ROADSIDE VEGETATION MANAGEMENT

Final Environmental Impact Statement

Washington State
Department of Transportation

December 1993

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Washington State Department of Transportation

Date

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Fact Sheet

Roadside Vegetation Management

Description of Proposed Action

The Washington State Department of Transportation (WSDOT) will prepare a programmatic Environmental Impact Statement (EIS) of its statewide roadside vegetation management program. WSDOT's roadside vegetation management program is an integral part of the overall maintenance of state highways. Key components of the vegetation management program include meeting the engineering, environmental, functional, and legal requirements of the highway system and maintaining roadside vegetation using a combination of biological, cultural, chemical, and mechanical methods to control or enhance vegetation.

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Statement of Availability

Additional Copies of this document may be obtained from:

Washington State Department of Transportation

Summary

Final EIS
Roadside Vegetation Management

Summary

This environmental impact statement (EIS) analyzes the impacts of a series of programs that the Washington State Department of Transportation (WSDOT) considered for implementation to manage state highway roadside vegetation. Although WSDOT is not required under State Environmental Policy Act (SEPA) to conduct an EIS review of its vegetation management activities ((WAC 197-11-800 (24)(f)), the Department and the legislature felt such a review was in the best interest of the public and the environment.

The EIS assesses the impacts of seven alternatives for roadside vegetation management. The Draft EIS, issued February 10, 1993, analyzed six alternatives. In response to public and agency comments on the Draft EIS, WSDOT added a seventh alternative for the Final EIS and selected this new alternative as the "preferred alternative." The new alternative is: Alternative G - Locally Based, Long-Term Planning Integrated Vegetation Management. This alternative represents a combination of Alternatives E and F, which are defined later in the summary.

Where an alternative is added late in the process, a supplemental environmental impact statement (SEIS) may be called for to assess any new adverse impacts that may result from implementation of the new alternative. It was determined that in this instance an SEIS is unnecessary because there are no new adverse environmental impacts to assess. This is because the vegetation controls available under Alternative G are derived from Alternative E, which is analyzed extensively in the EIS.

Vegetation management is a critical part of any highway system for the following reasons: (1) It helps maintain a safe driving environment for the public by establishing and maintaining a clear sight distance, maintaining a tree (>3 inch diameter) free recovery zone, ensuring that all road signs are clear of vegetation, reducing shade in areas where ice is a problem, and preserving the structural integrity of the roadway surface; (2) It protects the state's investment in the highways by preventing costly damage due to unchecked vegetation growth; (3) It manages unwanted vegetation, such as noxious weeds, and reduces fire hazards. WSDOT's management areas are subdivided by zones 1 through 3, with zone 1 being immediately adjacent to the road surface. A diagram describing this is included at the end of chapter 1; (4) It provides a more visually appealing roadway for motorists.

The vegetation management treatment methods described in this EIS include mechanical, chemical, cultural, and biological methods conducted <u>after</u> the initial revegetation associated with highway construction activities. Mechanical methods include the use of heavy machinery to mow, disc, cut brush, or perform any other similar activity involving machinery. It also includes all manual vegetation control, such as hand weeding and the use of hand tools (powered and non-powered). Chemical methods involve the use of pesticides and adjuvants to manage roadside vegetation. Cultural methods include the preparation and planting of areas to desirable species, fertilizing, and other activities which would enhance soil productivity and desirable plant communities. Often, such activities as mowing and application of herbicides are used to promote the growth of desirable species and, technically, are cultural methods. However, delineation between

chemical and mechanical weed control methods and chemical and mechanical methods that are used to enhance plant growth would be extremely difficult. For that reason a more narrow view of cultural methods is being used throughout this DEIS. Biological methods are limited to the use of species-specific insect pests or diseases. These treatments would be used when determined to be appropriate under the constraints and restrictions of the selected vegetation management alternative. The vegetation management alternatives being considered by WSDOT are: Alternative A - No Action, Alternative B - Remedial Action Approach, Alternative C - No Chemical Approach, Alternative D - Short-Term Single Action Approach, Alternative E - Long-Term Comprehensive Integrated Approach, Alternative F - Current Practices, Decentralized Management, and the new preferred alternative, Alternative G - Locally Based, Long-Term Planning Integrated Vegetation Management. See Section 0.4, Alternatives, for a discussion of these vegetation management alternatives. Also, the definitions are included in Chapter One, Section 1.1.3, and the Glossary Section of the main body of the DEIS.

Along with the selection of a preferred alternative, the EIS identifies specific vegetation management issues which require evaluation and analysis in further depth. The changes suggested in this document and those resulting from other developments around WSDOT's vegetation management program will require additional funds and legislative support before they are realized. It is important to note that these proposed changes are a direct result of increasing public concern for environmental quality.

In accordance with SEPA, this programmatic (non-project) EIS identifies how each of the vegetation treatment methods impact the environment, and then analyzes the alternatives.

0.1.0 Public Participation

0.1.1 Scoping Process

A major consideration when developing the scope of this EIS was to determine which issues are of most concern to the public. Six public scoping meetings were held throughout the state to present the alternatives and to get feedback concerning issues that need to be addressed. Comments were also sent by mail to WSDOT headquarters in Olympia. Responses and concerns expressed were considered in development of the information provided here.

0.1.2 Public Comment on the Draft EIS

The Draft EIS was issued on February 10, 1993. Notification of the availability of the document was listed in the SEPA register. Additionally, many individuals and state agencies were notified by mail. Copies of the document were mailed to all those who requested them. At that time, a public comment period, which began as a 30-day period and eventually became an 100-day period, was initiated. All comments received were read and considered during the preparation of the Final EIS, and the creation and selection of a preferred alternative was heavily influenced by the comments.

0.2.0 Affected Environment

The methods and the alternatives were analyzed for potential impacts on 13 elements of the environment that are associated with highway right-of-ways. These elements include geology and soils, air quality, water quality, flood plains, wetlands, vegetation, wildlife and wildlife habitat, hazardous materials and waste, visual quality, cultural resources, transportation, services, and human health. The impacts of the treatment methods and the alternatives were analyzed for each of these elements (Table 0-1). In addition, the impacts on these elements were discussed for eight separate regions in the state, called physiographic provinces. These provinces are: Olympic Peninsula Province, Coast Ranges, Puget Trough, Northern Cascades, Southern Cascades, Okanogan Highlands, Columbia Basin, and the Blue Mountains. These provinces are broad regions of relatively homogeneous conditions in terms of geology and climate (see Figure 3-1 of Chapter 3 of the Main Body of the EIS).

0.3.0 EIS Organization

Chapter 1 of this EIS discusses the purpose and need for the action, defines the treatment methods, reviews the history of the WSDOT vegetation management program and policies, and summarizes the results of the public scoping comments. Chapter 2 introduces the alternatives. Chapter 3 presents the analyses that were conducted in Appendices A, B, and C as a comparative analysis of the alternatives. Section 3 of Chapter 3, is a comparative analysis by physiographic provinces. Chapter 4 presents the results of the public comment period. A representative sample of the comments is included in Chapter 4.

0.4.0 Alternatives

Alternatives A through F, as presented in the Draft EIS, are defined in this section along with a new alternative (G): Locally Based, Long-Term Planning Integrated Vegetation Management. Alternative G has been created for the Final EIS in response to the public comments on the DEIS, and in response to other developments in and around the WSDOT vegetation management program.

Preferred Alternative

As part of the SEPA-compliant Environmental Impact Statement process, one of the alternatives is selected as the "preferred alternative." WSDOT has selected Alternative G - Locally Based, Long-Term Planning Integrated Vegetation Management as the preferred alternative. As stated above, Alternative G represents a combination of Alternatives E and F, incorporating all aspects of Alternative E (Integrated Vegetation Management) with parts of Alternative F (Decentralized Management). Many of the comments received regarding the DEIS pointed out that while Alternative E was the most desirable of the alternatives, the ability to make site-specific decisions is necessary for Alternative E to work. Alternative G incorporates principals of Integrated Pest Management (IPM) within the development of Roadside Management Plans (RMPs) for

site-specific roadside vegetation management. The cornerstone of IPM, as defined in WAC 173-720, is careful evaluation, planning, and monitoring in conjunction with the use of all available vegetation management options. It also provides a system for prioritizing activities with the most long-term benefit and the rationale to support management decisions. In the long-term this results in a higher percentage of stable vegetation, and an overall reduction in the amount of required maintenance. Initial costs may be high, due to the cost of developing plans, however, this will provide for lower long-term costs. The terms Integrated Vegetation Management and Integrated Pest Management are used interchangeably throughout the document.

0.4.1 Alternative A - "No Action Approach"

Objective - To have no management of right-of-way vegetation along WSDOT maintained highways.

Under Alternative A, no action would be taken to manage vegetation along WSDOT maintained highways. It is anticipated that right-of-way vegetation would grow uncontrolled, ultimately adversely affecting the road user's safety, the operation and life of the highway facility, and the agricultural economy, due to noxious weed infestations.

0.4.2 Alternative B - "Remedial Action Approach"

Objective - To control right-of-way vegetation only after it has been determined that public safety, legal action, or damage to the highway facility exists.

Under Alternative B, only mechanical and chemical methods for control of vegetation would be used, because these methods generally provide immediate control of vegetation.

0.4.3 Alternative C - "No Chemical Approach"

Objective - To manage roadside vegetation without the use of chemicals, including herbicides and fertilizers.

Under Alternative C, no chemical pesticides or fertilizers would be used for vegetation management, but the other treatment methods (mechanical, biological, and cultural) would be available.

0.4.4 Alternative D - "Short-Term Single Action Approach"

Objective - To manage and control vegetation at the lowest available cost (labor, materials, and equipment), with an emphasis on worker productivity and immediate treatment results.

All vegetation methods will be available for use under Alternative D. Priority of use, however, will be given to methods that provide immediate results at a minimum cost.

0.4.5 Alternative E - "Long-Term Comprehensive Integrated Approach"

Objective - To use a long-term integrated vegetation management program that utilizes all available treatment methods to control vegetation along highway right-of-ways.

The basic foundation of Alternative E is to develop a long-term vegetation management strategy based upon the prevention of problems with the establishment of a stable, desirable vegetation requiring minimal maintenance.

Initial Treatment Period 0 - 5 Years:

It is estimated that 72.3 percent or less of the treatable roadside acreage would be managed annually under this alternative.

Stabilized Treatment Period 5+ Years:

After 5 years, it is anticipated that portions of the treatable roadside acreage would have established stable plant communities, requiring little or no control methods of any type. At this point, roadside acreage of lower priority could be managed in the vegetation management program. While the goal for this alternative is to achieve stable plant communities, the acreage on which this is possible is probably 38.5 percent or less of the total treatable roadside acreage.

It is estimated that 61.5 percent or less of the treatable roadside acreage would be treated annually under this alternative.

0.4.6 Alternative F - "Current Practices, Decentralized Management"

Objective — To continue vegetation management activities as they are currently employed by WSDOT.

Currently, WSDOT vegetation management control practices are based on decentralized management decisions and vary among maintenance areas depending upon departmental policy and priorities established at the district level. Vegetation management treatment methods are selected by the Area Superintendent in response to a defined biennial budget, public concerns, limited available labor, environmental constraints, and operational needs. WSDOT headquarters provides standard generalized guidelines for decision strategy, budget review, and specialized expertise upon request. Interpretations of standard guidelines provided may vary from district to district.

All control methods are available for use under Alternative F. However, preference is given to methods that provide the most control within the constraints of local district priorities. As each district may have different constraints and priorities, the method and amount of vegetation control varies among districts.

It is estimated that 72.3 percent or less of the treatable roadside acreage would be managed annually under this alternative.

0.4.7 Alternative G - "Locally Based, Long-Term Planning Integrated Vegetation Management"

Objective - To use long-term integrated vegetation management principles incorporated within written roadside management plans developed for each of the WSDOT maintenance areas.

Alternative G incorporates all aspects of Alternative E and goes a step further by incorporating some of the decentralized aspects of Alternative F. This would allow for localized, site-specific decision making, within the framework of department-wide management strategies. Under Alternative G, a statewide procedure would be established to develop roadside management plans in a standardized format for each of WSDOT's maintenance areas. The Integrated Pest Management (WAC 173-720) decision-making process would be utilized for this. The Roadside Management Plans (RMPs) would provide a means of documenting the rationale supporting management decisions, tracking the efficacy and costs of control methods, and identification of environmentally sensitive areas, as well as providing a means for continuing opportunities for public input. The process for preparing RMPs has already begun for the Puget Sound Area due to legislative support of this concept in the 1993 legislative session.

Initial Treatment Period, Stabilized Treatment Period, and Percent Treatable Acreage are the same as Alternative E.

0.5.0 Environmental Consequences

0.5.1 Geology and Soils

In terms of specific management techniques, mechanical treatments would have the greatest potential to impact soils, if grading is used to reconfigure the roadside vegetation patterns. The repeated use of high ground pressure equipment for mechanical treatments, particularly under wet conditions, can cause soil compaction and inhibit the natural ameliorating process. Chemical treatments have the potential to impact soils directly when soil is exposed and, additionally, indirectly affect soil microorganisms and productivity. Biological and cultural management techniques will usually maintain or enhance the stability of right-of-way slopes.

Alternatives A, B, and C would likely have the greatest adverse impact on geology and soils. Alternatives D, E, F, and G could also adversely impact the geology and soils. impacts of Alternatives E and G would decrease significantly over time.

0.5.2 Air Quality

In terms of specific management techniques, mechanical treatments will impact air quality the greatest, through the introduction of particulates (dust) into the air. Mechanical

treatments also burn more fossil fuels than the other treatments, but this impact is expected to be minor when compared with the use of fossil fuels statewide. Chemical applications could introduce spray drift and objectionable odors into the environment. These are short-term impacts and are relatively easy to mitigate. Biological control of unwanted vegetation is not expected to impact air quality significantly. Cultural treatment impacts on air quality would be the same as for mechanical treatments.

The greatest adverse impacts on air quality from the burning of fossil fuels would come from Alternatives C, E, and G, where there is an emphasis on mechanical and cultural treatments, although Alternatives E and G would decrease their emphasis on mechanical treatments over time. Alternatives D and F would have the greatest impact on air quality from the use of herbicides.

0.5.3 Water Quality

Mechanical treatments have the potential to disturb the soils to the extent that runoff is increased. This can cause increased erosion, which can transport sediment and road surface chemicals into the local surface waters. Chemical treatment impacts can be summarized as either direct or indirect. Direct impacts would result from the introduction of herbicides directly into the water, either from drift, runoff, or leaching. Indirect impacts would result if the vegetative cover were reduced to such an extent that soil erosion was increased. Cultural treatments would have similar impacts on water quality, as would mechanical treatments, in the sense that the soil is being disturbed in the preparation of seedbeds. This can increase erosion from exposed soils and from compaction from equipment. In the long-term, cultural treatment impacts would be far less than those of mechanical or chemical methods.

The greatest adverse impacts on water quality due to erosion and nutrient loading would come from Alternatives B, C, D, and the first five years of E and G, where there is an emphasis on mechanical techniques. Alternatives E and G would decrease their emphasis on mechanical treatments over time. Direct chemical impacts on water quality would be more probable under Alternatives D and F. Indirect chemical impacts would be more likely under Alternatives B and D.

0.5.4 Flood Plains

Roadside vegetation management is not expected to have significant impacts on flood plains. Construction of highways and associated developments on flood plains results in displacement of floodwaters and an increase in the severity of flooding. However, the management of roadside vegetation does not have a measurable effect on high water conditions.

0.5.5 Wetlands

Mechanical treatments have a low potential to impact wetlands. Chemical treatments can have both a direct and indirect impact on wetlands. The direct introduction of chemicals through drift or runoff may adversely impact wetlands. Indirectly, the use of non-selective herbicides can expose soils and increase erosion. Cultural treatments generally have a low potential to adversely impact wetlands; however, the introduction of excess

nitrates and urea compounds from fertilizers can upset nutrient balances in aquatic environments. Biological treatments are not expected to adversely impact wetlands.

The greatest adverse impacts on wetlands from increased erosion, sedimentation, and nutrification would come from Alternatives C, E, and G, where there is an emphasis on mechanical and cultural treatments, although Alternatives E and G would decrease their emphasis on mechanical treatments over time.

0.5.6 Vegetation

Mechanical treatments can be a very effective treatment for small trees, shrubs, and herbaceous vegetation. However, the operation of equipment on some soils can reduce vegetative cover and allow invasion of undesirable species. Constant mowing of grasses and forbs to maintain a lawn-like appearance reduces plant vigor and makes the plants more susceptible to invasion by noxious weeds or disease. The greatest potential impact on plant communities as a result of the use of herbicides is the possibility of affecting non-target vegetation and causing increased soil erosion. No adverse effects to vegetation are expected from cultural activities. Biological treatments will have no adverse impacts on non-target vegetation.

The impacts on vegetation would vary considerably from one alternative to the other. In each of the alternatives, some types of vegetation would benefit and other types would not. Overall, the best alternative for vegetation health would be Alternatives E and G.

0.5.7 Wildlife and Wildlife Habitat

Mechanical control can be very effective as a tool for improving habitat for small mammals, birds, and arthropods. However, along with increased wildlife come increased predators and the likelihood of road kills. Mowing reduces nesting and cover and reduces food availability. It can be especially damaging to ground nesting birds during the breeding season. It also encourages the growth of palatable grasses and forbs that could attract large mammals to the roadside. Depending on the off-road site distance, this could be either a benefit or a hazard. The use of machinery could also compact the soil, destroying burrowing animal habitat. Manual techniques are not expected to adversely impact wildlife significantly. The toxicological impacts of the herbicides, adjuvants, and fertilizers used by WSDOT are presented in Appendix B, Chapter 3. Although it is possible that occasional individual animals will experience short-term symptoms of exposure, especially for 2,4-D, 2,4-DP, and diuron, it is highly unlikely that animal fatalities will occur from use of these herbicides. In addition, none of the herbicides proposed for use by WSDOT are expected to adversely impact any wildlife populations. Habitat manipulations as a result of herbicide applications will benefit some animals and will harm others. Cultural treatments will benefit most wildlife species by establishing low-maintenance native plant communities. Fertilizers and mulches are not expected to significantly impact wildlife populations. Biological treatments are not expected to adversely impact wildlife populations.

The potential impacts of roadside vegetation management methods on aquatic habitats and aquatic species are directly related to the water quality impacts described previously. Potential effects include reduced survival or reproduction of aquatic organisms, resulting

from habitat degradation or exposure to toxic concentrations of pollutants. In general, however, roadside vegetation management treatments are not known to have caused substantial impacts to aquatic organisms in adjacent waters.

Alternatives A and B would provide the most forage and cover for large wildlife, but would result in the highest rates of road kills. If cultural techniques are employed to enhance wildlife habitat, Alternatives E, F, and G could best enhance wildlife habitat amounts of activity along roadsides.

0.5.8 Hazardous Materials and Hazardous Waste

Cultural methods will most likely produce more hazardous waste per acre than mechanical methods during the first year of treatment (engine oil). Biological methods produce a negligible amount of hazardous waste through the use of motorized equipment when compared to the other vegetation management methods. Properly stored and handled pesticides are classified as hazardous material. However, pesticides do not become a hazardous waste unless they become unusable through contamination or when they exceed their expiration date, when an unrecoverable spill occurs, or when pesticide containers are not adequately rinsed.

Alternatives A and B would produce the least amount of hazardous materials. Alternative C would produce the most waste oil; Alternative D has the greatest potential to produce waste associated with herbicide use.

0.5.9 Visual Quality

Chemical techniques typically cause discoloration and death of some or all of the treated foliage or plant. Cultural techniques improve plant health and improve overall visual quality. Biological methods using insects and diseases to control unwanted vegetation may cause defoliation, discoloration, or death of targeted plant species. However, more common biological methods will not produce significant visual impacts since biological agents more commonly reduce reproduction of, rather than kill, the target species. The impacts to visual quality from mechanical methods depend upon the season, vegetation type, and amount of cutting. Cutting in the spring can expose brown and shattered stems, which contrast sharply with new foliage and can result in deformed leaf plants which are more susceptible to damage from disease and pests.

Frequent mowing of unirrigated grasses reduces the health and vigor of the stands, allowing increased susceptibility to invasion by weedy plant species. Other visual problems with mowing include grass clippings and bare spots due to mower scalping.

Alternatives E, F, and thus G would provide better visual quality than the other alternatives. Alternative F would provide more mowed landscapes and Alternatives E and G would provide more land in native, stable vegetation in the long-term.

0.5.10 Cultural Resources

Mechanical methods all have the potential to physically damage culturally significant sites, especially archaeological sites. Chemical methods will not physically impact

culturally significant areas unless these areas include vegetation. WSDOT should be aware of these areas throughout the state and modify the vegetation management practices in order to prevent damage to these sites. Cultural methods of vegetation management have the greatest potential to damage archeological sites, since disturbance of the soil surface is required for establishing vegetation. However, any method where mechanized equipment traverses Vegetation Management Zone 3 has a potential to damage cultural resources. Biological methods of vegetation management will not likely have an effect on cultural resources.

Alternatives C, E, and G would have the greatest impact on cultural resources because of their heavy emphasis on cultural methods of vegetation management. The risk to cultural sites would not decrease over time, because of the long-term emphasis on cultural treatments.

0.5.11 Transportation

Mechanical and chemical methods can help maintain the structural integrity of the highway and ensure highway safety. Proper follow-up management techniques should be implemented to discourage establishment of undesirable vegetation, to prevent soil erosion, and to reduce potential fire hazards. Cultural and biological management techniques help improve growing conditions of desirable plants and discourage establishment of undesirable plants which can affect the structural integrity and public safety of the highway. Most cultural and biological techniques will have no adverse impacts on the integrity and safety of the highway. Mechanical management techniques can have the same effects as chemical techniques if follow-up management techniques are not implemented.

Alternatives A and B will undoubtedly have the greatest adverse impact on transportation. Alternative C would probably be inadequate to satisfy transportation needs. Alternatives D, E, F, and G would all be adequate to satisfy transportation needs.

0.5.12 Services

The highway system provides service facilities for public use. These facilities include bus stops, emergency areas, and scenic and historic facilities. Users of service facilities, such as rest areas, may come into contact with chemicals applied on vegetation; the human health risk of such exposure is discussed in Appendix B. Mechanical equipment can produce projectiles during operation, which could endanger the public. Other potential impacts may include dust, smoke, and objectionable odors, and also affect those with allergy problems.

Alternatives A and B would cause the greatest adverse impacts on services, since no vegetation management would occur under these alternatives in service areas.

0.5.13 Human Health

The greatest threat to human health from the use of mechanical vegetation control is the risk to workers from the possibility of accidents involving heavy machinery and hand tools, and contact with poisonous vegetation. Also included in the risk to workers is the

possibility of accidents with passing motorists. In general, the risk of experiencing either short- or long-term effects from using herbicides is much greater for the WSDOT workers than it is for the general public.

WSDOT mixers, mixer/loaders, and mixer/loader/applicators involved in chemical control of unwanted vegetation are at some risk of experiencing adverse health effects. Risk analyses are grouped by negligible (less than the risk of taking one transcontinental flight per year), low (less than the risk of drinking one pint of milk per day), medium (roughly equivalent to drinking one diet drink per day), or high (roughly equivalent to risk from smoking or consuming alcohol). Under an average exposure scenario (average WSDOT application rates), the risks of short-term effects are low for diuron and oxadiazon and negligible for the remaining 23 herbicides. All of the 25 herbicides present either a negligible or low risk of short-term effects to the public. If pedestrians were dermally exposed to directly sprayed vegetation at average rates, all herbicides would pose negligible risk. The risks to human health from the movement of herbicides into surface and ground waters are determined to be negligible for all 25 herbicides. The carcinogenic risks to WSDOT workers and the public from long-term exposures to these herbicides at average application rates are negligible for all 25 herbicides.

Neither WSDOT workers nor the public would be at risk from biological control methods, unless methods introduced obstructions to visibility or delayed clearance of obstructions from the roadway. The most significant impact that cultural methods would have on human health is directly related to the impact that fertilizers would have on water quality.

The greatest risk to the WSDOT employees comes from labor intensive activities. Alternatives C, E, and G treat the largest number of acres with the most labor intensive methods of vegetation management, and therefore present the greatest risk to WSDOT employees. Risk from chemical exposures to workers and the public would be greater for Alternatives D and F.

0.6.0 Mitigation Measures

Comparing Alternatives A - G, Alternative G offers the highest level of programmatic mitigation through the development and implementation of Roadside Management Plans (RMP). The WSDOT maintenance areas will develop specific localized RMPs using a standardized format defined by the WSDOT vegetation management section according to Best Management Practices (BMP) for roadside vegetation management, which outlines an evaluation process that selects the most practical control method and allows the use of herbicides if other alternatives are not practical. An additional source for programmatic mitigation in the area of water quality, the Highway Run-Off manual, is currently being written by WSDOT.

It is recommended that the EIS be used as a base for further detailed study of specific vegetation management issues within WSDOT. Areas recommended for further detailed study include: (1) Overall Mitigation - evaluation and expansion of the list provided in this EIS, (2) Pesticide Approval and Accountability - evaluation of the refinement of WSDOT's approved product list, determination of appropriate buffers and setbacks for spraying, use of computerized spray records database, (3) Mowing - evaluation of the

establishment of regional standards, (4) Habitat Enhancement and Management - evaluation of the issues of wildlife compatibility.

The following list represents mitigation measures for each of the vegetation control methods. Many of the listed measures are already currently employed by WSDOT, and some will be incorporated into RMPs under WSDOT's revised policies. These lists will serve as a basis for ongoing evaluation of programmatic mitigation and will be added to when possible. Further detailed site-specific mitigation measures will be added in the roadside management plans.

0.6.1 Mechanical Treatment Methods

- Do not operate heavy equipment on steep or unstable slopes, slopes greater than 33 percent. Heavy equipment can cause erosion that contributes to water quality and aquatic wildlife impacts.
- If possible, avoid the use of heavy machinery in Zone 3, to reduce soil compaction and the impacts on native vegetation and wildlife.
- Limit techniques such as scouring of ditch bottoms as much as possible.
- Recycle used motor oil to reduce hazardous waste material disposal.
- Wear protective equipment when operating heavy equipment or hand tools (powered and unpowered), especially when hand weeding to control vegetation.
- Wear bright clothing when working along roadsides to increase worker visibility.
- Use signs well in advance of roadside work to inform motorists of upcoming activities. (WSDOT's policy is to follow the Uniform Traffic Control Devices Manual on signing and flagging.)
- Do not use heavy machinery in areas that may support nesting ground birds during the spring and early summer months.
- Limit operation of heavy equipment to calm days to reduce dust, especially in the drier regions. (WSDOT currently attempts to follow this mitigation measure.)
- Utilize low ground pressure equipment when operating in roadside areas to minimize compaction.
- Maintain roadways during times of reduced traffic.
- Schedule work seasonally when it will do the least damage.
- Always use the correct type of machinery for the job.

0.6.2 Chemical Treatment Methods

- When using pesticides, follow all label precautions concerning timing of applications, application rates, protective clothing and equipment, re-entry periods, and proper rinsing, disposal, and recycling of empty containers.

- Follow all label restrictions regarding buffer restrictions. Additional increased buffers can be established on a site-specific basis through local Roadside Management Plans.

- Provide adequate storage of herbicides to prevent and contain spills.

- Implement spill control plans. (WSDOT has a spill control plan for major storage areas only.)

- Recycle used motor oil to reduce disposal of hazardous waste material.

- Select herbicides based on target vegetation, efficacy, and potential impacts on non-target vegetation for each specific project.

- Use adjuvants where appropriate to reduce drift to passing traffic and non-target vegetation, and to reduce off-site exposure to wildlife and aquatic habitats.

- Use adjuvants to reduce or eliminate objectionable odors caused by the application of herbicides.

- Avoid the use of herbicides that can potentially move through the soil column.

- Avoid herbicide applications when precipitation is imminent, except for herbicides that will not wash off or that need water to activate.

- Use target-specific spot applications rather than broadcast applications to reduce the environmental exposure.

- Maintain the narrowest width practical for Vegetation Management Zone 1. (WSDOT is currently considering implementing a plan to reduce the width of the vegetation free zone.)

- Emphasize the use of selective herbicides to control vegetation, and timing of applications to avoid "brown-outs."

- Use the lowest application rates possible that still provide adequate control, and schedule applications when they will be most effective.

- Maintain roadsides during times of reduced traffic.

- Use signs well in advance of roadside work to inform motorists of upcoming activities. (WSDOT's policy is to follow the Uniform Traffic Control Devices Manual on signing and flagging.)

- Do not apply herbicides to edible plants or to plants while they are bearing edible fruit.
- Provide yearly training of WSDOT employees in the proper use and handling of pesticides.
- All applicators and maintenance supervisors must maintain current and applicable pesticide handling licenses.
- Add new low impact herbicides to the program as they are registered and evaluated.
- Take advantage of new equipment and application technologies which minimize required application rates and maximize target area delivery.
- Apply only when there is no other practical alternative.
- Set a maximum allowable wind speed for herbicide spraying to minimize chemical drift.

0.6.3 Cultural Treatment Methods

- Maintain dense, healthy vegetation to reduce erosion impacts to soils and water quality, and prevent invasion of undesirables.
- Use mulch to stabilize disced and seeded beds until the vegetation is established, in order to reduce erosion impacts.
- Recycle used motor oil to reduce disposal of hazardous waste material.
- Provide waterway buffer for application of fertilizers. (WSDOT is considering implementing a buffer zone policy for fertilizers). Calculate proper fertilizer application rates.
- Plant species which are appropriate for specific site needs.
- When replanting, WSDOT should evaluate the use of low stature plants that are not preferred by large herbivores. This will reduce the possibility of vehicle collisions with large mammals.
- Improve nutrient holding capacity in soils with the use of mulch, to minimize fertilizer applications.

0.6.4 Biological Treatment Methods

- Very few adverse impacts for biological methods have been identified; therefore, mitigation is not needed.

Table 0-1 Summary of Impacts by Alternatives

	Geology and Soils	Air Quality	Flood Plains	Aquatic Wildlife and Wildlife Habitat	Water Quality	Wetlands	Vegetation
Alternative A	Increase chances of erosion. Possibility of greater fire hazard could lead to further erosion.	In drier areas, possible increase of windblown dust. In more humid areas natural vegetation growth would prevent windblown dust problems.	Vegetation management has negligible affects on flood plains.	Possible contamination from erosion. No potential for chemical contamination related to vegetation management.	Dense vegetation could increase retention time and filtration capacities, but channels could also be blocked. In drier areas, increased erosion from runoff.	Potential to increase sedimentation. No potential for chemical contamination.	Would lead to weed domination on disturbed sites, possibly attracting insect pests and diseases.
Alternative B	Effects similar to Alternative A. Similar to C and D on land treated by mechanical or chemical.	Similar to Alternative A. Additional impacts would include wind erosion, airborne particulates, exhaust emissions.	Vegetation management has negligible affects on flood plains.	Some mitigable potential for contamination, although less than Alternative F.	Similar impacts as with Alternative A. Vehicle emissions, erosion, and potential contamination by chemical herbicides.	Potential for contamination, although substantially less than that of Alternative F.	Similar to Alternative A for untreated lands. Impacts on treated lands will be similar to Alternatives C and D.
Alternative C	Heavy equipment use would increase possible erosion scenarios. Destruction of deep-rooted vegetation could reduce stability on steep slopes.	Impacts include exhaust emissions, airborne particulates, and soil to wind erosion. Possible odors from organic fertilizers.	Vegetation management has negligible affects on flood plains.	No potential for chemical contamination.	Mechanical removal could reduce filtration capacity. Decreased infiltration, increased erosion, and pollutant transport possible.	No potential for chemical contamination from vegetation management activities.	Heavy equipment use could compact soils and remove vegetative cover. Repeated mowing could weaken less competitive desirable species.
Alternative D	Chemical herbicides would have little direct impact on geology or soils.	Potential impacts from spraydrift and odors. Potential for unintentional exposure of humans, non-target plants, and wildlife.	Vegetation management has negligible affects on flood plains.	Potential chemical contamination of aquatic habitats similar to that of Alternative F.	Herbicides could impact water quality.	Mitigable potential for contamination of surface water similar to that of Alternative F.	Herbicides could impact non-target species. Removal of all vegetation could lead to erosion and invasion by undesirable species.
Alternative E	Similar to C and D. Cultural and biological techniques would have no adverse impact on soils or geology. Impacts would decrease with time.	Similar to C and D. Cultural impacts include dust generation during seedbed preparation. Overall impacts would decrease with time.	Vegetation management has negligible affects on flood plains.	Potential for contamination, although less than for Alternative F. Over time, less potential for chemical contamination.	Similar to Alternatives C and D. Impacts would decrease as emphasis shifts away from mechanical and chemical treatments to cultural treatment methods.	Potential for contamination, less than for Alternative F. Over time, less potential for chemical contamination.	Similar to Alternatives C and D. As management emphasis shift from mechanical and chemical methods to cultural, negative impacts would decrease with time.
Alternative F	Impacts would vary, depending on treatment methods. Impacts similar to the first few years of Alternative E.	Impacts would vary, depending on treatment methods. No change from current impacts would be expected over time.	Vegetation management has negligible affects on flood plains.	Mitigable potential for impact to aquatic organisms and contamination of aquatic habitats.	Impacts would vary, depending on treatment method. No change from current impacts would be expected over time.	Mitigable potential for contamination of surface water.	Impacts would vary, depending on treatment method. No change from current impacts would be expected over time.

Table 0-1 Continued

	Wildlife and Wildlife Habitat	Hazardous Materials and Waste	Visual Quality	Cultural Resources	Transportation	Services	Human Health
Alternative A	Would favor animal species associated with the plant communities that would establish. Could attract large mammals.	No hazardous material produced under this alternative.	Unmanaged vegetation would produce the poorest visual quality of any of the alternatives studied.	Unmanaged vegetation would allow damage to occur unchecked to cultural, historical, and archeological resources.	No vegetation management would cause the deterioration of the state's transportation facilities.	Service areas would not be maintained.	No adverse effect from herbicide applications. Greatest human health risk due to poor visibility/sight distances.
Alternative B	Similar to Alternative A in areas not receiving treatment. Impacts on treated lands would be similar to Alternatives C and D.	Except for Alternative A, smallest amount of hazardous material from equipment and chemicals	Would provide poor visual quality.	Allow damage to cultural resources to go unchecked.	Damage to the transportation system may occur before action is taken.	Service areas would not be maintained.	Health risk from accidents and air quality associated with mechanical equipment. Herbicides would provide negligible health risks.
Alternative C	Mowing could reduce nesting, hiding cover, food availability. Possible increase in erosion and damage to the habitat of burrowing animals.	Alternative C would produce more than Alternative B. No potential for creating hazardous material from herbicides.	Would provide moderate visual quality.	May impact cultural resources from no herbicide use	Damage to the road surface could occur without herbicides to maintain Zone 1.	Control of some noxious weeds may be difficult without the use of herbicides.	Health risks greater than Alternative B. No health risks associated with herbicides.
Alternative D	Chemical herbicides could have direct toxicological impacts on wildlife, and indirect impacts through habitat alteration.	Alternative D would create more than Alternative B (oils and herbicides).	Would provide moderate visual quality.	Would protect cultural resources.	Better protection than Alternatives A, B, or C, but worse than Alternatives E and F.	Maintenance of service areas would occur.	All chemicals are of negligible risk to employees when used at WSDOT's historical average application rates.
Alternative E	Similar to Alternatives C and D. Cultural treatments could improve habitat by proper plant selection, but could increase collision hazard.	More mechanical waste, less chemical waste than Alternative B. Waste would decrease over time.	Would provide good visual quality. After five years it would provide the highest visual quality of any of the alternatives.	Would be adequate for the protection of cultural resources.	This alternative would provide an adequate level of protection of transportation facilities.	After five years, this alternative would probably provide the most visibly pleasing service areas.	Similar to Alternative C during first 5 years for mechanical methods and Alternative D for chemical methods of vegetation management. Risks would decrease.
Alternative F	Impacts would vary, depending on treatment methods. No change from current impacts would be expected over time.	Alternative F would create more waste associated with mechanized equipment, as would Alternative B.	Alternative F uses all available vegetation management methods and would provide good visual quality.	Vegetation management methods available under this alternative would be adequate for the protection of cultural resources.	This alternative would provide an adequate level of protection of transportation facilities.	Maintenance of service areas would occur.	The health risks associated with this alternative are similar to Alternative E during its first five year period.

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Chapter One

Final EIS
Roadside Vegetation Management

1.1.0 Introduction

It is the Washington State Department of Transportation's goal to establish and maintain roadsides to ensure that they are safe, cost effective, pleasing to the eye, and environmentally constructive, while at the same time implementing policies which will ensure the structural integrity and longevity of the roadway itself. Vegetation management plays an important role in achieving these goals. Vegetation management is the planning, establishing, and maintaining of desirable vegetation, and the control of unwanted vegetation. It is important to manage vegetation along the roadways to ensure that the above stated goals are met. The two major categories of a vegetation management program are the establishment and management of desirable vegetation and the control of undesirable vegetation. It is important to remember that this FEIS covers the vegetation management activities after the initial establishment of vegetation associated with construction activities.

Desirable vegetation can achieve roadside vegetation management objectives by:

- Maintaining stable slopes and controlling erosion
- Eliminating sunlight and headlight glare, reducing noise pollution, and providing snow drift control
- Integrating the roadside vegetation with adjacent landscaping, screening roadside distractions and views of the road, creating aesthetically pleasing roadsides, and controlling noxious weeds
- Providing or eliminating compatible wildlife habitat, and preserving rare and endangered species.

The prevention or control of undesirable vegetation is also important in achieving the department's objectives. Proper management and maintenance will:

- Maintain proper sight distance and keep recovery zones clear of obstructions
- Increase maintenance crew safety, minimize pedestrian security problems, increase solar exposure and reduce ice hazards, and reduce fire risks
- Provide free-drainage of road surfaces, preventing costly road damage and maintaining roadside drainage
- Protect economic (agricultural) resources and native plant communities
- Decrease dense vegetation conducive to hiding wildlife in certain areas, promote habitat growth in others

- Enhance visual quality and visibility of roadside features and control noxious weeds

This environmental impact statement (EIS) was developed in accordance with the State Environmental Policy Act (SEPA), and reviews the Washington State Department of Transportation's entire vegetation management program. Since the EIS examines WSDOT's entire management program, it is programmatic in scope. This EIS is designed to directly compare treatment effectiveness among the vegetation management alternatives. Existing data were used to produce the EIS. No original research, other than quantitative risk assessments, was conducted. Sources of information for the EIS include existing literature, information received from WSDOT, state and federal regulations, and other EISs. In accordance with the State Environmental Policy Act, the material supporting the programmatic EIS identifies impacts on human health and the environment by assessing potential impacts of each vegetation treatment method (chemical, cultural, mechanical, and biological methods) and potential impacts of vegetation management program alternatives.

This environmental impact statement will be used to evaluate existing vegetation management practices, formulate new vegetation management practices, and evaluate human and environmental risks. Seven vegetation management alternative programs are examined in this EIS. Each vegetation management alternative is discussed in detail in Chapter 2, Section 1.1.3. These seven vegetation management alternatives are: no action approach, remedial action approach, no chemical approach, short-term single action approach, long-term comprehensive integrated approach, decentralized management approach, and locally-based/long-term integrated approach. Each method will be examined to determine consequences on the following aspects of the environment:

- Geology and Soils
- Air Quality
- Water Quality
- Wetlands
- Vegetation
- Wildlife and Wildlife Habitat
- Hazardous Materials and Waste
- Visual Quality
- Cultural, Historic, and Archaeological Resources
- Transportation
- Services
- Human Health

1.1.1 Purpose of the EIS

Vegetation management along WSDOT roadsides is considered to be categorically exempt from environmental review under the State Environmental Policy Act (SEPA). Due to WSDOT and the state legislature's concern for the public, for WSDOT employee safety, and for maintaining a healthy environment, a decision was made to study the effects roadside vegetation management has on the state's environment.

The objectives of the EIS are:

- Identify significant impacts that program alternatives may have on Washington's environment.

- Identify mitigation measures that may be implemented to prevent or minimize significant adverse impacts of the alternatives.

- Identify alternative programs that WSDOT may use in place of the current program.

- Provide a resource that WSDOT can use when making vegetation management decisions, in order to avoid adverse impacts on the environment.

- Document WSDOT's current vegetation management practices.

1.1.2 Description and Need of Treatment Methods

1.1.2.1 Description of Treatment Methods

Mechanical, chemical, biological, and cultural are the four treatment methods available to WSDOT to manage vegetation in highway right-of-ways. This EIS will also consider the results of combining the treatment methods and the use of no treatment methods in the discussion of the vegetation management alternatives. The following is a description of the four treatment methods.

Mechanical

Mechanical control techniques used by WSDOT include cutting or trimming herbaceous and woody plants, and cultivation of soils to reduce or eliminate undesirable vegetation growth. Mechanical methods used by WSDOT include: operation of tractor-mounted flail-type mowers, rotary mowers, sickle bars, and other powered machines that chop, cut, mow, grub, blade, or cultivate; manual techniques of grubbing, pulling, cutting, sawing, and mulching. Manual techniques employ both powered and non-powered hand tools.

Chemical

This treatment method involves application of herbicides to eliminate undesirable vegetation. Most herbicides are applied with truck-mounted spray rigs in Zones 1, 2, and 3, and by backpack hand-sprayers in Zones 2 and 3. For a description of zones, see Section 1.1.3. Selective herbicides are used to control specific plants. Nonselective herbicides are used to control all plant species and are usually used in the vegetation-free zone (Zone 1) of the roadway. Selection of herbicide treatment methods places emphasis on protection and enhancement of the roadside environment.

Biological

This treatment method uses a biological agent (such as an insect or plant disease) to suppress a specific plant species population. The biological agent is matched with a plant species which it depends upon for survival. Biological control usually does not totally

eradicate the target species, but will diminish the population to a level where the target species is no longer a serious problem or to where it can be more easily managed in combination with other treatment methods. This method affects host plant species on a local basis, which includes areas off of the highway right-of-way. Grazing livestock are not used as a biological control technique along WSDOT roadsides.

Cultural

This treatment method involves planting and enhancing the growth of desirable plants. Growing conditions for desirable plants can be improved by adding organic materials to the soil, liming, using fertilizers, and irrigating. Proper selection of planting stock is important to ensure vegetative competitiveness. Promoting healthy desirable plant communities produces plants that can resist invasion by undesirable plants as well as disease and insect damage. Often such activities as mowing and application of herbicides are used to promote the growth of desirable species and therefore technically are cultural methods. However, the delineation between chemical and mechanical methods that are used to enhance growth and those which are not would be extremely difficult. For that reason, a more narrow view of cultural method which does not include mowing and chemical applications is used in this EIS.

1.1.3 Definitions

Several terms used throughout this document are specific to WSDOT's roadside vegetation management program. Key terms are defined below to help the reader understand the basic concepts of roadside vegetation management. A glossary of technical terms, which have been used throughout the assessment portions of this FEIS, is located in the Glossary of the main body of the EIS.

WSDOT Terminology

Best Management Practices (BMP): As defined in the Highway Runoff Manual: "BMP's are the physical, structural, and/or managerial practices that when used singly or in combination, reduce the downstream quality and quantity impacts of stormwater". It should be noted that term BMP was originally created in regard to water quality issues and has recently come to cover a more broad range of disciplines.

Broadcast: Spraying or fertilizing an entire site without specificity for plants or areas within the site. Usually accomplished by truck-or tractor-mounted sprayers.

Delineation: Vegetation or grading designed to help guide traffic through the highway corridor; e.g., planting in median sections.

District: One of 6 regional management zones in the State

EOP: Edge of pavement.

Fertilizer: Compound containing nitrogen, phosphorus, potassium, and/or other nutrients that is specifically designed to promote plant growth. Sources may be mineral deposits, biological by-products, or by synthetics.

Fog line: Continuous, white, painted line located between the right lane edge and the shoulder to help guide the driver in poor visibility conditions.

Herbicide: Chemical compound designed to terminate or regulate plant growth.

- *Selective Herbicides:* Selective herbicides destroy specific plants or groups of plants. For example, a selective herbicide may destroy woody plants without damage to herbaceous plants, or grasses without damage to broad leaf plants.

- *Non-Selective Herbicides:* Non selective herbicides are used to control a broad range of vegetation types.

- *Pre-emergent:* A herbicide applied to prevent weed seedling emergence.

- *Post-emergent:* A herbicide applied to control existing undesirable vegetation.

IVM: Integrated Vegetation Management, a decision-making process which may employ any or all available vegetation management methods to address site-specific vegetation management needs. IVM incorporates Integrated Pest Management (IPM), as defined in the WAC 173-720, as the basis for the decision-making process.

Maintenance area: WSDOT has divided the state into 25 geographical areas for the purpose of right-of-way maintenance. Each maintenance area has a maintenance superintendent and resident maintenance crew, who are responsible for highway maintenance for that area.

Method: A means of vegetation management; i.e., biological, chemical, cultural, mechanical.

Minimum sight distance: The shortest distance required for a vehicle traveling at the assumed design speed to stop safely before reaching a stationary object in its path.

Noxious weed: A plant regulated or identified by law as being undesirable, troublesome, and difficult to control.

Right-of-way: Land that may be lawfully used for highway accommodations.

Roadside: The area between the edge of the shoulder and the right-of-way line, and unpaved medians in multi-lane highways.

Roadway: Surface used for vehicular traffic.

Spray: An application of chemicals, such as herbicides, fungicides, insecticides, rodenticides, and fertilizers.

Spot: Spraying small areas with herbicides. Spraying individual undesirable plants while leaving adjacent desirable species untouched. Also, spraying small areas where vegetation is to be eliminated, such as plants at the base of signs or invasive plants in

shoulder areas. Usually accomplished by handheld sprayers, and occasionally by truck- or tractor-mounted sprayers.

Zones: The roadside management zones are contained in the unpaved area of the road right-of-way.

- Zone 1 - The vegetation-free zone. This zone is currently in the process of being evaluated by WSDOT in terms of where it is justified and how wide it should be when it is justified. It is anticipated there will be a significant reduction in the width of this zone statewide and it will be eliminated wherever practical. This zone is necessary where stormwater requires rapid drainage to prevent build up on the road surface, and around guardrails and roadside hardware for ease of maintenance on those items.

- Zone 2 - The operational zone. Vegetation is maintained so as not to interfere with the function of this zone. Included in this zone are the underground utilities, medians, ditches, cut banks, and any other structures necessary for ancillary roadway activities and maintenance. The function of the operational zone is to maintain the vehicle recovery area, sight distance and sign visibility for motorists, maintain the hydraulic performance of drainage facilities, and delineate the roadway.

- Zone 3 - The transition zone. This zone extends from Zone 2 to the right-of-way line, and represents a transition from roadway environments to the adjacent land uses. The transition zone is also used to accommodate utilities.

1.1.4 Description of Current Practices

Maintenance of desirable or acceptable vegetation along roadsides requires more resources than any other roadside management activity. This is not unexpected, considering the important role vegetation management plays in maintaining the structural integrity, environmental quality, public safety, and visual quality of the right-of-way. Management of roadside vegetation matches the specific needs with the resources available. Usually two or more of the four basic treatment methods (biological, chemical, cultural, and mechanical) are used. However, often there higher priority items relating to the road condition, safety or emergency situations which take precedence over vegetation management items. Also, much of the energy spent on vegetation issues in urban areas goes to responding to complaints and requests from the public. This can result in missed opportunities for early or properly timed vegetation control and more costly treatments later on. When this reactionary response to vegetation management begins it becomes increasingly more difficult to establish a proactive and planned approach.

1.1.4.1 Program Objectives

Roadside vegetation management is used to protect the public's investment in the Washington State highway system and to provide safety to the users in concert with the road's intended use. In addition, roadside vegetation management is necessary to develop or restore a desired plant community, create biological diversity, decrease or increase

desirable forage or cover for wildlife, and control noxious weeds. The primary goal of the vegetation management program is to establish stable roadside vegetation that will resist encroachment by undesirable plants. Other objectives of the program are to provide soil and slope stability, provide stormwater drainage, and maintain fire control.

User Safety: WSDOT's responsibility to promote roadside safety is directed toward a variety of issues, which are outlined in section 1.1.0.

Sight Distance: Maintaining proper sight distances will allow the driver to have time to react to changes in conditions of the road ahead. Proper sight distance is imperative for highway users' safety. Sight distance can be reduced by tall or overhanging vegetation, or by vegetation otherwise encroaching upon the line of sight.

Visibility of Roadside Signs and Hardware: The clear visibility of fixed objects, such as signs, guardrails, and delineator posts, is critical. An unsafe situation develops when vegetation is not adequately controlled and visibility of fixtures is impaired.

Fog Lines: The primary focus of fog lines is to delineate the edge of the travel lane at night and during inclement weather. Roadside vegetation, if uncontrolled, can obscure this line.

Standing Water: Standing water on the roadway creates a safety problem by affecting vehicle stability. This may be caused indirectly by roadside vegetation. For example, relatively flat shoulders with dense vegetation may impede the flow of water off the paved surface.

Icy Road Conditions: Overhanging or tall vegetation can prevent sunlight from reaching the roadway during the winter, thereby enhancing the formation or persistence of ice on the pavement.

Safe Accidental Exit Off Roadway: Vehicles that accidentally veer off the roadway need an area free of roadside hazards. The area needed is related to the speed limit set for that highway.

Screening Oncoming Headlights: Vegetation strips in medians can reduce eyeglare and help to prevent accidents caused by poor visibility or fatigue.

Vegetation Debris Removal: Fallen trees, limbs, or other plant materials (leaves, fruit, etc.), and overhanging limbs, can create safety problems, especially in poor visibility conditions.

Fire Hazard Reduction: Removal of dead and decaying debris along roadsides reduces the likelihood of roadside fires.

Protection and Enhancement of the Environment: Washington's highways pass through diverse environments, including wet coastal mountains, dry interior mountains, ocean and sound coastlines, dry interior basins, and interior desert plateaus. WSDOT's vegetation management practice goals are to balance the needs of highway users with environmental concerns. Important environmental concerns of vegetation management include:

controlling soil erosion, maintaining water quality, protecting wildlife habitats, enhancing native vegetation, controlling noise, providing pleasant visual environment such as screening views of the road and opening or screening views from the road, and protecting the health of WSDOT workers and the public.

Establishing desirable vegetation helps control soil loss due to erosion. Planting permanent erosion control vegetation has a direct bearing on long-term vegetation management requirements. It is consistent with roadside maintenance to establish low maintenance vegetation, either by manipulation of the existing plant community or by actively planting desirable species. In areas with limited wildlife habitat, the roadside can be managed to support wildlife in a manner that will not conflict with the safe use of the highway. To the extent possible, native vegetation is used along highway right-of-ways. Where the use of native vegetation is impractical, careful consideration is given to the selection of the introduced species to be used in order to ensure they meet WSDOT's needs and do not conflict with ecological concerns.

Some areas are intended for active use by the traveling public (Zones 1 and 2), while others are intended to integrate the transportation facility into the environment through which it passes (Zone 3). Visual impacts are important considerations to both users' and adjacent landowners' "quality of life." Well maintained vegetation in Zones 2 and 3 of the right-of-way contribute to the water quality of an area by: 1) preventing soil erosion, 2) acting as a filter, trapping sediment, and 3) slowing the flow of runoff.

Recent and ongoing developments in stormwater treatment methods involving biofiltration and retention/detention facilities have significant maintenance requirements. The BMP's for maintaining these facilities are currently being developed by WSDOT as part of the Highway Run Off Manual and will result in an increase in vegetation management responsibilities.

Stewardship of the Public's Investment: WSDOT is responsible for protecting the public's investment, and vegetation management is a key tool in the maintenance of the structural integrity of the roadway. Proper stormwater drainage is one of the key features for maintaining highway integrity, particularly in western Washington. Ditches are the principal means by which water is conveyed from the highway. Therefore, potential loss of ditch function through vegetation encroachment is a major problem faced by highway maintenance.

The mechanical action of plants may damage highway pavement. Some plant species, such as Horsetail, break up pavement by penetration. Observations indicate that the establishment of seedling plants, especially grasses, in tiny pavement cracks creates serious problems for highway pavements.

Whereas the presence of vegetation as mentioned above is a concern, soil erosion as a result of inadequate vegetation is probably a more severe problem for long-term roadside maintenance. Such problems include undermining the shoulder, roadway, and other structures, slope instability, and premature loss of ditch function. Roadside vegetation plays an important role in the mitigation of erosion.

Be a Good Neighbor: Where the practice will not conflict with departmental goals, WSDOT tries to establish vegetation and control existing vegetation in a manner that is compatible with the needs of adjacent landowners. These activities include controlling noxious weeds, maintaining visual barriers, and providing an aesthetically pleasing roadside environment.

1.1.4.2 WSDOT's Current Management Approach

WSDOT uses decentralized management to make vegetation management decisions. Decentralized management principles delegate decision-making responsibilities to the local level rather than a central office for the entire state. As a result, the vegetation management approach can vary from one location to another, depending on local needs. The Department of Transportation is divided into 25 maintenance areas, each of which has a superintendent responsible for roadway maintenance in that area. WSDOT headquarters provides general guidance, in the maintenance manual and design manual, for vegetation management requirements. However, each maintenance area is responsible for planning and management decisions made for its own roadside vegetation management.

Each maintenance area superintendent is also responsible for planning and submitting a biennial budget for planned expenditures of a limited allocation of dollars and labor hours for highway maintenance in that area. This budget will dedicate money and resources to specific maintenance tasks for two years. One of the many maintenance tasks which is planned in this budget is vegetation management. However, priority of maintenance starts from the centerline of the highway. The maintenance crew which performs vegetation management tasks also has other aspects of highway maintenance to perform.

WSDOT's roadside management philosophy is: roadsides are to be maintained as nearly as possible in the condition to which they were constructed or subsequently developed, and in a manner that makes a satisfactory contribution to the safety, convenience, and pleasure of the public, and the preservation and protection of the roadway itself.

1.1.4.3 Public Involvement

The public has had input on WSDOT's vegetation management issues through contact with maintenance area superintendents and the district supervisors who are the program's decision makers. If problems occur as a result of the program, the maintenance area superintendent should be the first contact made by the complainant. On most occasions the problem can be resolved by the maintenance superintendent. There is another avenue through which the public has direct input into the vegetation maintenance along state highways; adjacent land owners can maintain the roadside which abuts their property by making arrangements with the department.

The Washington State Department of Transportation decided voluntarily to go through the EIS process as a means of gathering public input. Public involment in the EIS process is discussed in 1.3.2 of this chapter and Appendix D.

1.1.4.4 Roadside Maintenance Management Zones

Roadsides along WSDOT highways are divided into three zones that help classify the priority and types of maintenance activities which may be performed in highway right-of-ways. Not all zones occur on every section of highway. Figure 1-1 shows where typical roadside management zones are located. The most intensive vegetation management area is Zone 1. Zone 2 is managed for visibility, shading, and drainage control, while Zone 3 is often left natural, or landscaped and managed only for purposes consistent with visibility or noxious weed control.

1.2.0 History of Project

Vegetation management along roadsides has been an important part of roadside safety and maintenance program for decades. Although the reasons for controlling vegetation on right-of-ways has not changed significantly over the years, the methods used to control roadside vegetation have. The most notable change has been the development of herbicides that are less detrimental to the environment, while providing better control of noxious weeds and unwanted vegetation.

In order to fully assess the impacts that the seven alternatives might have on the way WSDOT functions and on our environment, it is necessary to define what the vegetation management practices are today, and what they were prior to the development of the current practices. In addition, it is important to look at what vegetation management should be like in the future, in order to provide some understanding of the direction to pursue. The alternatives can then be assessed with these goals in mind.

1.2.1 Past Practices

Early vegetation management relied on manual and mechanical methods to control vegetation and keep roadways clear, since most of the resources available for transportation purposes were needed for construction and paving of new roads. Vegetation management programs employed a reactive management strategy in order to meet the early vegetation management goals. Early vegetation management programs were not as refined or goal oriented as today's programs; however, the goals were maintaining of the structural integrity of the roadway, public safety, and control of noxious weeds. Herbicides came into use after WW II, although, they were used infrequently. As chemical pesticides, products, and procedures become more refined and developed, the use of chemicals for vegetation mangement become widespread and quite economical. (Willard, 1992)

1.2.2 Development of Current Practices

1.2.2.1 WSDOT Policies - Decentralized Management

Washington State encompasses numerous climatic conditions, geologic differences, and vegetative communities. The current decentralized management practices were developed as a result of the individual vegetation management needs of the districts and maintenance areas, dictated by the differing environmental conditions. The decision-making responsibility remained at the district level, where priorities could be set to meet local

needs. As a result, policies concerning treatment methods, priority areas, environmental concerns, and other issues specific to the district are set by the district. Because of this, the same policies vary considerably from one district to another. Therefore, the specifics of these policies are not discussed here. Other policies, such as training, education, and safety, are established at WSDOT headquarters and apply to all districts. These policies are discussed in the following section. WSDOT's current decentralized management practices (Alternative F) are discussed throughout this document.

1.2.2.2 Employee Training

The purpose of WSDOT's training program is to keep employees updated on changing regulations, products, and new developments in vegetation management. All aspects of vegetation management which can be used to make employees aware of project development and design concepts are part of the training program, including the sharing of employee experience and knowledge. Effective training is possibly the most important aspect of a successful program.

Training and other technology transfer is accomplished by several means:

a) Field Reviews - WSDOT conducts field reviews with local personnel and district representatives in order to address specific problems and recommend methods and materials to solve these problems.

b) Training Seminars - WSDOT holds seminars and programs on methods and materials for vegetation management. These seminars involve agency and non-agency personnel at both field and management levels. These training seminars include an annual herbicide training program.

c) Maintenance Technical Bulletins - These bulletins present policies and methods regarding roadside management from a "why" and "how" point of view.

d) Maintenance Newsletter - Articles in the newsletter present information on roadside management to WSDOT employees in a "news" format.

e) Articles in Periodicals - WSDOT presentations in periodicals are generally limited to insights into Washington's methods of accomplishing and planning roadside management programs.

f) WSDOT has issued the following directives regarding roadside activities:

D 51-10(MN)	Seasonal Maintenance of Rest Areas 07-09-71
D 51-50	Adopt-A-Highway Litter Control Program
D 55-76(MT)	Use of Safety Rest Areas for Dispensing Refreshments 08-23-79
M 51-01	Maintenance Manual

(Willard, WSDOT 1992)

1.2.2.3 Certification and Recertification

All WSDOT employees engaging in the practice of pesticide application are required to obtain a pesticide applicators license from the Washington State Department of

Agriculture (DOA) prior to handling pesticides or giving recommendations on the use of pesticides. This licensing process requires employees to attend 16 hours of training in a Department of Agriculture approved training program. After successfully passing an examination and obtaining a license, a person must attend at least 40 hours of accredited training courses to be recertified at the end of a five-year period.

WSDOT's annual herbicide training program includes such topics as principles, methods, techniques, safety, record keeping, and public relations. It emphasizes Integrated Vegetation Management and stresses the use of pesticides as a portion of an overall program. A portion of this 16-hour course is approved by DOA and counts towards pesticide applicators recertification. Other topics included in the annual course help prepare the workers to accomplish their tasks in a more efficient and effective manner. (Kegg, WSDOT 1992)

1.2.2.4 Maintenance Safety and Accident Records

Each WSDOT district operates separately and hires its own safety officer. The WSDOT headquarters office establishes WSDOT policy, maintains state-wide safety records, and helps the districts where there are gaps in experience or expertise. Main office staff includes an industrial hygienist and safety expert.

Each district's safety personnel perform the education and training of employees which is required by law. It is also the responsibility of district safety personnel to conduct site inspections of traffic control setups, and examine employees' protective clothing and equipment in order to identify potential problems and investigate accidents. Additional training is required for WSDOT personnel who handle pesticides. WSDOT's main safety office provides pesticide safety training. Particular care is taken to train employees regarding safety techniques during the mixing of pesticides.

Most maintenance employee job related deaths are the result of vehicular impacts. Equipment used in vegetation management is occasionally involved in motor vehicle accidents, usually as a result of being rear-ended by other motor vehicles. WSDOT's safety office has had no instances related to pesticides which have required hospitalization. (Nowitzki, WSDOT 1992)

1.2.2.5 Neighbor Maintained

WSDOT has a policy which allows the adjacent property owner to maintain the highway right of way. The adjacent property owner must agree to maintain the right of way in a manner which is conducive to the safety needs of the general public and the highway maintenance needs of WSDOT.

1.2.2.6 Future Practices

The preferred alternative, Alternative G, represents several new directions in roadside vegetation management. The integrated approach adopted under Alternative G would call for: (1) *the defining of long term goals and objectives in the local RMP's.* Long-term planning using the principals of IPM is probably the most important aspect of Alternative G. (2) *the documentation of rational behind management decisions.* This will, in time,

enhance future management decisions by providing a history of the decision making process. (3) *the tracking of the efficacy and cost of chosen control methods.* This coupled with (2) will provide a means for management to evaluate past and current control methods. (4) *the identification of environmentally sensitive areas.* This promotes employment of the most efficient and least impacting vegetation management practices for these sensitive areas.

The overall direction of WSDOT's vegetation management program is being set forth by such documents as the Zone 1 Task Force Study, which recommended a reduction of the maximum size of Zone 1, from 12 feet to 2 feet, where possible. Another document that is playing a large part in WSDOT's shift in direction is the Highway Run-Off Manual. The manual will set guidelines for regulating the run-off of pollutants and other environmentally dangerous substances from the roadway.

One major trend in roadside vegetation management is a reduction in the use of chemicals because of potential or perceived adverse environmental impacts. In Alternative G, WSDOT has committed to a reduction in pesticide use in the long term. Long term goals would include the establishment of stable, native vegetation in roadside zones 2 and 3, thus reducing the amount of active management needed to control the area. This approach would yield both cost and environmental benefits.

1.3.0 Community and Interagency Coordination

The following summarizes the means that the Washington State Department of Transportation used to notify the public and other government agencies of scoping for the Draft Roadside Vegetation Management EIS. The comment period lasted 65 days, from January 10, 1991, to March 15, 1991. The Summary Of Public Notice Of Scoping And Comment Period is located in Apendix D.

Advertisements announcing each public open house location and date were published ten days prior to the open house. A press release discussing the public open houses was sent to 42 television and radio stations, and newspaper editors throughout the state, 30 days prior to the first open house meeting on February 20, 1991. Announcements were sent to 313 groups across the state, including 51 local, state, and federal governmental agencies and state legislators, 26 tribal representatives, the Bureau of Indian Affairs, and the Governor's Office of Indian Affairs. Other groups included on this mailing list are environmental awareness groups, non-profit associations and societies, industry representatives, selected state citizens, county noxious weed boards, public works agencies, and water quality agencies.

Roadside reader boards outside the Kelso, Ellensburg, and Spokane open house locations were posted the day of the open house meetings. Signs were also placed inside the hotels where the open houses were held, to provide direction for the public.

1.3.1 Summary of Scoping Results

All comments collected during the scoping meetings and letters of comment addressed to the Washington State Department of Transportation were considered while developing

the following summary. This summary does not attempt to address all the issues raised during the scoping period. It is a summary of the most common concerns and issues.

Concerns about the physical appearance of our roadways were the most common comments encountered. People are generally displeased about the "clear cutting" of brush and trees and the chemical "brownouts" that are apparent on the roadsides. There are numerous comments advocating the use of low maintenance, natural vegetation, in place of total eradication, as a vegetation control technique.

There are a number of comments expressing concern about the welfare of our environment. These comments cover a range of environmental concerns from wildlife and vegetation (terrestrial and aquatic) to wetlands and groundwater. Wildlife issues deal mainly with the effect of herbicides on aquatic species and habitat manipulation of terrestrial and aquatic environments. The provision for nesting and cover for upland birds along the roadways is a common theme. Shading and silting of aquatic habitats was also mentioned. The perception is that today's practices are not conducive to wildlife habitat and that these issues should be addressed in the EIS. Conversely, it is stated that forage plant species should not be considered in vegetation management zones because of the hazard of attracting wildlife to the roadway. It is also stated that a definite buffer zone for aquatic habitats should be defined in the EIS. Concerns for groundwater and wetland contamination from herbicide use are recurring comments.

There are comments advocating the use of trees as visual fences between the roadway and developed areas. These comments are countered by others who do not want their views obstructed by trees. These concerns show the need to consider a visual impact evaluation by any vegetation management program.

There are a small number of comments addressing the need to protect the cultural traditions of Native Americans. Traditions that might be affected by a vegetation management program include the gathering of medicinal and food plants and tree shading over roadways.

A number of letters suggest that any WSDOT vegetation management program would be more effective if the department worked with other agencies, such as Washington Department of Fisheries (when brushing around streams), local weed control agents (for fast, effective noxious weed control), local community organizations (for view maintenance), and native tribes (to reconcile vegetation management goals with cultural practices and traditions).

1.3.2 Summary of Open Houses

The details of the scoping meetings and the comments from those meetings are presented in Appendix D. A total of 77 people attended the six open houses. This included eight people at the interagency open house, six representatives at the Native American open house and 63 for the public open houses.

1.3.2.1 Summary of Public Open Houses

Six open houses were held throughout the state. The open house meetings were three hours long and were held at the following locations:

Public Open House,	Kelso	February 20, 1991
Public Open House,	Issaquah	February 21, 1991
Public Open House,	Ellensburg	February 26, 1991
Public Open House,	Spokane	February 27, 1991

1.3.2.2 Summary of Agency/Native American Open Houses

There was one Native American open house and one interagency open house held for comments and review of the EIS proposals. Each of these open houses was three hours long, and they occurred at the following locations:

Agency Open House	Olympia	January 28, 1991
Native American	Issaquah	February 21, 1991

After the Native American open house held in Issaquah, it was determined that a tri-state Native American Conference was held the same day in Spokane. Phone calls were made to Eastern Washington tribal headquarters, as a further reminder of the open houses that were being held in Ellensburg and Spokane, to ensure Native Americans in eastern Washington had an opportunity to attend an open house.

1.3.3 Summary of Issues Raised

In addition to the concerns mentioned in Section 1.4.1 and comments received during scoping, there were a number of issues raised.

Herbicides: Comments ranged from continuing the use of herbicides to no herbicide use except in extreme cases. There were a few comments that urged the use of herbicides with greater weed selectivity.

Native Vegetation: This was a very popular subject throughout the comments. The general consensus was to increase the use of native vegetation along roadsides. Suggestions were made to increase mixed conifers (not only Douglas fir) and salal along roadsides. Elimination of noxious weeds while leaving all other native vegetation was stated as a goal.

Noxious Weeds: Control of noxious weeds on roadsides by WSDOT was another common subject. It was suggested that this be accomplished by working with local weed control agencies.

1.3.4 Draft EIS Comment Period

The Draft EIS was issued on February 9, 1993 and a 30 comment period was initiated. Notification of the availability of the document was listed in the SEPA register, and many individuals and state agencies were notified by mail. The comment period was eventually extended to an 100 day period to maximize public input. Chapter 4 is devoted to the Draft EIS public comment period.

1.4.0 Purpose of and Need for Action

1.4.1 How Transportation Needs Are Met

WSDOT has designed roadsides to perform operational, visual, and environmental functions in a cost effective manner. The road and roadside are engineered environments and as such require maintenance to protect users and the investment made in road development. Roadside development concepts apply to: signs, safety rest areas, roadside parks, viewpoints, retaining walls, fencing, and vegetation. Roadside vegetation management is vital to keeping roadways, signs, and safety hardware operational and safe for the highway user. The objective of a roadside vegetation project is to accomplish the following:

- Maintain a safe driving environment.
- Prevent soil erosion and other influences from damaging the roadway and restore the roadside to a natural appearance.
- Mitigate the transportation facility's impact on the surrounding area.
- Reduce long-term maintenance required for a roadside section; for example, maintaining drainage away from the paved area to prevent pavement breakup.

1.4.2 How Regulatory Requirements Are Met

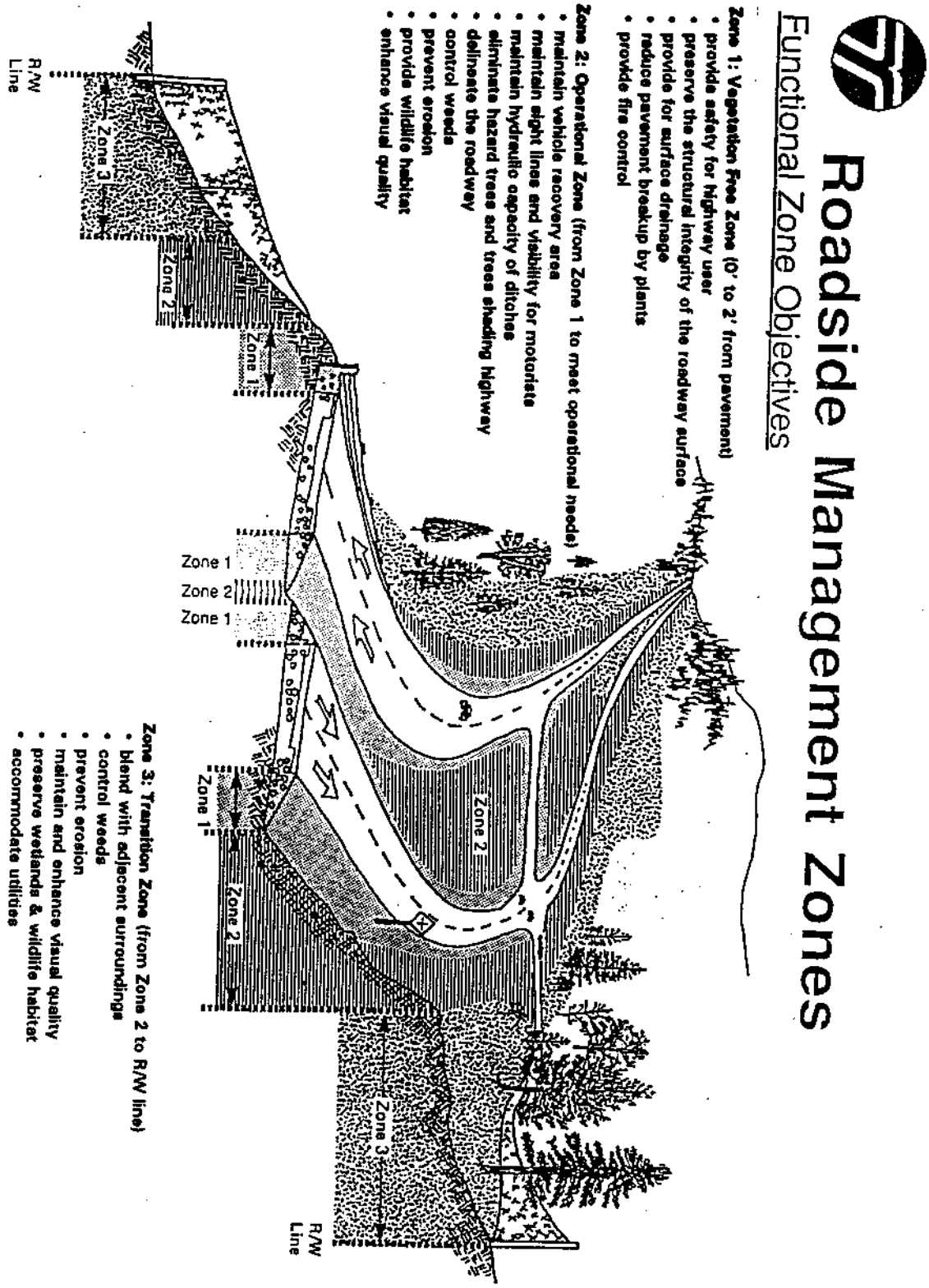
WSDOT has no legal requirements to develop an environmental impact statement for vegetation management programs. The purpose of the EIS is to analyze WSDOT's existing vegetative management program. The EIS will give WSDOT a better understanding of current effects of vegetation management techniques on the environment and on the health of the general public and WSDOT employees. Using knowledge gained from the EIS process, WSDOT can select a management program that will improve long-term efficiency of its vegetation management practices and increase environmental and human safety.

This analysis will provide an understanding of current practices and their effects on human health and the environment, even though all chemicals used by WSDOT in its roadside management activities have been tested and registered by US EPA. The EIS will provide for:

- Analyzing statewide effects of vegetation management.
- Improving consistency of methods between the various management areas.
- Improving long-term efficiency of management practices.
- Evaluating environmental safety.
- Evaluating human safety, both for citizens and WSDOT employees.

WSDOT will use the information and recommendations given in the EIS to better serve the citizens of the state of Washington and best protect the environment.

Figure 1-1 Roadside Management Zones



Chapter Two

Final EIS
Roadside Vegetation Management

2.1.0 Introduction

Based on concerns identified during the scoping process, six alternatives were formulated to evaluate the impacts on the environment of the various roadside vegetation treatment methods available to WSDOT. One more alternative was added and one of the seven was selected as the "preferred alternative" based on input received during the public comment period. Alternatives to be assessed in this FEIS are based on specific vegetation management approaches. The different management approaches place limitations on or give priority to certain treatment methods. Impacts to the environment will vary between alternatives, based on the limitations and priorities selected by each vegetation management approach. The treatment methods that this FEIS assesses are mechanical, chemical, biological, and cultural.

Alternative A, the "No Action" alternative, will act as a baseline to which the impacts of other alternatives will be compared. Alternative B, the "Remedial Action" alternative, is a reactionary approach where vegetation will be managed only when the highway facility is unsafe for operation. Alternative C, the "No Chemical" alternative, is presented as an alternative to the use of chemicals for vegetation management. This alternative eliminates the use of pesticides (herbicides) and fertilizers as a treatment method. Alternative D, the "Short-Term Single Action" alternative, is designed to provide the quickest, short-term control of vegetation at the lowest cost. Alternative E, the "Long-Term Comprehensive Integrated" alternative, is a long-term management approach designed to establish stable plant communities in the first five years, thus reducing the cost of maintenance in the following years. Alternative F is the current management program used by WSDOT. Alternative G, the "Locally Based, Long-Term Planning Integrated Vegetation Management" alternative, represents the union of alternatves E and F. It sets out with the same vegetation management goals as alternative E while incorporating the locally-based decision making process present in Alternative F.

According to WSDOT's, Real Estate Division, the Department of Transportation has approximately 110,000 acres of right-of-way. However, only a portion of this right-of-way is treatable roadside acreage. Treatable roadside acreage is defined as the area from the edge of the pavement to the boundary of the right-of-way, and the median area (from the edge of the pavement to the edge of the pavement). It is estimated that WSDOT has 97,535 treatable roadside acres. The number of roadside acres treated annually is estimated to be 70,600 acres. This number is based on WSDOT records of past vegetation management accomplishment reports and pesticide spray records. This number does not take into account the retreatment of acreage by the same or other treatment methods; therefore, the number of roadside acres actually treated may be larger. Table 2-1 lists the estimated number of treatable roadside acreage by WSDOT districts. These WSDOT districts are delineated in Figure 3-1, "Physiographic Provinces and State Transportation Districts of Washington," located in Chapter Three of the main body of the DEIS.

2.1.1 Programmatic Boundaries

Environmental impact statements can be loosely divided into two very general categories, Project EIS and Programmatic EIS. A project EIS is designed to address very specific environmental concerns that are related to a specific project, such as the construction of a bridge or an interstate corridor. These EISs can be applied to a very limited physical area that is generally defined by the borders of a specific project. It is inappropriate to use a project EIS from one project to identify environmental concerns and mitigations for a different project,because these EISs are very site specific.

Programmatic (non-project) EISs are designed to bridge the gap between different projects and provide an environmental assessment of all activities that are available at all possible sites. This FEIS is a programmatic EIS. It is designed to address the environmental consequences and mitigations that are likely from a collection of program management alternatives designed to manage roadside vegetation along Washington State Highways.

Since this is a programmatic EIS, there are no project boundaries as would be defined in a project EIS. It is, however, designed exclusively to assess the impacts on vegetation management of Washington State highways. Therefore, the effective boundaries of this EIS are the Washington State lines between Canada, Idaho, Oregon, and the Washington State coast.

This FEIS includes only the right-of-way for state-owned and maintained highways. This FEIS is not an assessment of vegetation management practices for any portion of the state other than state highway right-of-ways. It also does not include the right-of-ways for county, private, or other roadways that are not owned and maintained by the state of Washington. In addition, in areas where state-maintained roads run through United States Forest Service (USFS) boundaries, the USFS EIS applies for vegetation management in these areas. Therefore this FEIS assesses the programmatic (non-site specific) environmental consequences on the 97,500 acres in the highway right-of-way Zones 1, 2, and 3.

2.1.2 Description of the Alternatives

Alternative A - No Action

Objective: To have no management of right-of-way vegetation along WSDOT-maintained highways.

Under Alternative A, no action will be taken to manage vegetation along WSDOT maintained highways. This will include no vegetation control around signs and corners to improve visibility. There will also be no vegetation management along Zone 1 of the right-of-way, which is generally kept clear of vegetation to protect the road surface from damage due to vegetative growth. There will also be no control of noxious weeds that are established on the highway right-of-ways. It is anticipated that right-of-way vegetation will grow uncontrolled, ultimately adversely affecting the safety, operation, and life of the highway facility, and creating an agricultural hazard in some portions of the state because of noxious weed infestations.

It is estimated that 0 percent of the treatable roadside acreage would be managed annually under this alternative. (See Table 2-2.)

Alternative B - Remedial Action Approach

Objective: To control right-of-way vegetation only after it has been determined that public safety, legal action, or damage to the highway facility is threatened.

Under Alternative B, only mechanical and chemical methods for control of vegetation will be used, because these methods generally provide immediate control of vegetation. No acreage will be treated by biological or cultural treatment methods, because of the length of time it takes for them to control vegetation. Most activity under this alternative can be anticipated in WSDOT Districts 1, 3, and 4, where the native vegetation is very thick and grows rapidly.

It is estimated that 28.9 percent or less of the treatable roadside acreage will be treated annually under this alternative. (See Table 2-3.)

Alternative C - No Chemical Approach

Objective: To manage roadside vegetation without the use of chemicals, including herbicides and fertilizers.

Under Alternative C, no chemical pesticides or fertilizers will be used for vegetation management, but the other treatment methods (mechanical, biological, and cultural) will be available. It is estimated that the mechanical method will require 65 percent mowing, 15 percent grading, and 20 percent manual treatment.

It is estimated that 48.8 percent or less of the treatable roadside acreage will be treated annually under this alternative. (See Table 2-4.)

Alternative D - Short-Term Single Action Approach

Objective: To manage and control vegetation with the lowest available cost (labor, materials, and equipment), with an emphasis on productivity and immediate treatment results.

All vegetation methods will be available for use under Alternative D. Priority of use, however, will be given to methods that provide immediate results at a minimum cost. Therefore, biological and cultural control methods are not expected to be used, since they generally do not provide immediate control results.

Chemical treatments will be preferred over mechanical treatments because of the cost of treatments.

It is estimated that 72.3 percent or less of the treatable roadside acreage will be treated annually under this alternative. (See Table 2-5.)

Alternative E - Long-Term Comprehensive Integrated Approach

Objective: To employ a long-term integrated vegetation management program that uses all available treatment methods to control vegetation along highway right-of-ways.

Under Alternative E, the selection of an appropriate vegetation control method for a given right-of-way area will consider factors including, but not limited to: 1) Environmental concerns, such as soil erosion, wildlife habitat, impacts on water quality; 2) Operational objectives, such as maintaining clear sight distances, maintaining no vegetation in Zone 1 and maintaining visibility of signs; 3) Legal responsibilities, such as WSDOT's responsibility to control noxious weeds growing in the right-of-way. The basic foundation of Alternative E is to develop a long-term vegetation management strategy based upon the prevention of problems, with the establishment of a stable, desirable vegetation requiring minimal maintenance. This alternative will lead to a reduction in area requiring annual treatments after five years, once stable, desirable vegetation is established.

Initial Treatment Period 0 - 5 Years:

It is estimated that 72.3 percent or less of the treatable roadside acreage will be treated annually under this alternative. (See Table 2-6.)

Stabilized Treatment Period 5+ Years:

After five years, it is anticipated that portions of the treatable roadside acreage will have established stable plant communities, requiring little or no control methods of any type. At this point, roadside acreage of lower priority can be included in the vegetation management program. While the goal for this alternative is to achieve stable plant communities, the acreage on which this is possible is probably 38.5 percent or less of the total treatable roadside acreage.

It is estimated that 61.5 percent or less of the treatable roadside acreage will be treated annually under this alternative. (See Table 2-7)

Alternative F - Current Practices, Decentralized Management

Objective: To continue vegetation management activities as they are currently employed by WSDOT.

Currently, WSDOT vegetation management control practices are based on decentralized management decisions, and vary among maintenance districts depending upon priorities established at the district level. Vegetation management treatment methods are selected by the area superintendent in response to a defined biennial budget, public concerns, and limited available labor. WSDOT headquarters provides standard generalized guidelines for decision strategy and budget review, and specialized expertise upon request. Interpretations of the standard guidelines provided may vary from district to district.

All control methods are available for use under Alternative F. Preference is given to methods that provide the most control within the constraints of local district priorities.

As each district may have different constraints and priorities, the method and amount of vegetation control varies among the districts.

It is estimated that 72.3 percent or less of the treatable roadside acreage will be treated annually under this alternative. (See Table 2-8)

Alternative G - Locally Based, Long-Term Planning Integrated Vegetation Management

Objective: To use long-term integrated vegetation management principles incorporated within written roadside management plans developed for each of the WSDOT maintenance areas.

Under Alternative G, all of Alternative E will be applied to the existing locally-based management framework. Statewide policies and procedures would be established that would allow roadside management plands (RMP's) to be written in a atandardized format for each of WSDOT's maintenance areas. While incorporating the same control methods selection process outlined in Alternative E, Alternative G would additionally allow the local superintendent to determine priorities with the framework of the RMP. The roadside mangement plans would define local program long-term goals and objectives, define any necessary uniform practices, procide a means of documenting control methods, and identidication of environmentally sensitice areas. The RMP's would outline a vegetation mangement decision making process based on Integrated Pest Management principals as defined in WAC 173-720.

Acreages treated during the Initial and Stabilized Treatment Periods will be the same as those listed under Alternative E.

2.2.0 Selection of Alternatives

2.2.1 Reasonable Alternatives

Of the alternatives that have been described above, six of them are considered to be reasonable (B, C, D, E, F, and G) and one of them is not (A). A reasonable alternative is one which WSDOT can employ and still be able to maintain the structural integrity of the road and public safety, and remain within legal constraints. Therefore, Alternative A is included in the analysis presented in Chapter 3 as a baseline alternative with which the viable alternatives can be compared. The cost of implementation of the alternative is not considered. These six reasonable alternatives have been developed from: (1) WSDOT's requirements for vegetation management, to ensure safety and maintain the structural integrity of the road surface, (2) the public comments which were communicated to WSDOT during the public scoping process, and (3) public and angency comments received during the DEIS public comment period.

2.2.2 Alternatives Considered but Rejected

Other alternatives which were considered but rejected included all alternatives that use fire as a vegetation management tool. These were rejected because of the small amount

of vegetation that is controlled using this method. WSDOT has no intention of incorporating the use of fire into its regular schedule of vegetation management activities.

2.2.3 Alternatives Selected for Further Study

All six of the alternatives that were discussed as being reasonable alternatives in section 2.2.1 of this chapter were selected for further study. The results of this analysis are presented in Chapter 3 of this FEIS and in the technical appendices (A, B, and C). Alternative A was also included for further study, even though it does not represent a reasonable choice. It is not considered to be a reasonable alternative because applying no vegetation management would compromise the safety of motorists and pedestrians, and would eventually allow the destruction of Washington's roadways. It also ignores WSDOT's legal responsibility to control noxious weeds that grow in the right-of-way. Alternative A has been included in this FEIS as a standard by which the other alternatives can be compared and to emphasize the need for a comprehensive roadside vegetation management program.

Table 2-1 The Estimated Number of Treatable Roadside Acreage by WSDOT Districts

District	Treatable Acres	Percent
1	17,500	18.0
2	17,200	17.6
3	13,100	13.4
4	13,000	13.3
5	18,200	18.7
6	18,500	19.0
TOTAL	97,500	100.0

Table 2-2 Treatment Distributions Under Alternative A - No Action

VEGETATION CONTROL METHOD	ACRES TREATED	PERCENT
Mechanical	0	0
Chemical	0	0
Biological	0	0
Cultural	0	0
TOTAL	0	0

Table 2-3 Treatment Distributions Under Alternative B - Remedial Action Approach

VEGETATION CONTROL METHOD	ACRES TREATED	PERCENT
Mechanical	24,000	24.6
Chemical	4,240	4.4
Biological	0	0
Cultural	0	0
TOTAL	28,240	28.9

Table 2-4 **Treatment Distributions Under Alternative C - No Chemical Approach**

VEGETATION CONTROL METHOD	ACRES TREATED	PERCENT
Mechanical	33,530	34.4
Cultural	10,590	10.9
Biological	3,500	3.6
Chemical	0	0
TOTAL	47,620	48.8

Table 2-5 **Treatment Distributions Under Alternative D - Short-Term Single Action Approach**

VEGETATION CONTROL METHOD	ACRES TREATED	PERCENT
Chemical	49,420	50.7
Mechanical	21,180	21.7
Biological	0	0
Cultural	0	0
TOTAL	70,600	72.3

Table 2-6 **Treatment Distributions Under Alternative E - Long-Term Comprehensive Integrated Approach -Initial Treatment Period 0 - 5 Years**

VEGETATION CONTROL METHOD	ACRES TREATED	PERCENT
Chemical	28,240	29.0
Mechanical	24,710	25.4
Cultural	14,120	14.4
Biological	3,530	3.6
TOTAL	70,600	72.3

Table 2-7 **Treatment Distributions Under Alternative E - Long-Term Comprehensive Integrated Approach - Stabilized Treatment Period 5+ Years**

VEGETATION CONTROL METHOD	ACRES TREATED	PERCENT
Cultural	24,170	25.3
Mechanical	14,120	14.4
Biological	10,590	10.9
Chemical	10,590	10.9
TOTAL	60,010	61.5

Table 2-8 **Treatment Distributions Under Alternative F - Current Practices, Decentralized Management**

VEGETATION CONTROL METHOD	ACRES TREATED	PERCENT
Chemical	45,190	46.3
Mechanical	13,410	13.8
Cultural	8,470	8.7
Biological	3,530	3.6
TOTAL	70,600	72.3

Table 2-9 **Treatment Distributions Under Alternative G - Locally Based, Long-Term Planning Integrated Vegetation Management Approach-Initial Treatment Period 0 - 5 Years**

VEGETATION CONTROL METHOD	ACRES TREATED	PERCENT
Chemical	28,240	29.0
Mechanical	24,710	25.4
Cultural	14,120	14.4
Biological	3,530	3.6
TOTAL	70,600	72.3

Chapter Three

Final EIS
Roadside Vegetation Management

Chapter Three — Affected Environment, Environmental Consequences, and Mitigation Measures

3.1.0 Introduction

This FEIS examines and compares the environmental impacts of the six viable roadside vegetation management alternatives (B, C, D, E, F, and G) considered for use by WSDOT, and the one non-viable alternative (A), which is used for comparison. Alternative G is omitted from the analysis in instances where the results would be the same as those associated with Alternative E. Impact analysis is divided into two categories. The first is the evaluation of the different vegetation management alternatives, and the second is a discussion of differing impacts between the physiographic provinces. Management alternatives were developed from various combinations of vegetation treatments now used by the state. These alternatives were designed to reflect concerns identified during the scoping process and the public comment period. Treatments used in one or more of the alternatives include mechanical, chemical, biological, and cultural techniques. Thermal treatments (fire and steam) were also considered, but they were rejected due to the projected low frequency of use. An in-depth discussion of these alternatives is contained in Chapter Two.

3.1.1 Environmental Matrix

The following sections of this FEIS examine the affected environment, potential impacts on the environment from each of the alternatives, and possible mitigation efforts for geology and soils, air quality, water quality, flood plains, wetlands, vegetation, wildlife, hazardous waste, visual quality, cultural resources, transportation services, and human health. Although these different aspects of the environment are discussed separately, they are interrelated and actions that directly impact one area often indirectly affect other areas. For example, removing vegetation may accelerate soil erosion, leading to air quality or water quality problems. Likewise, soil and moisture conditions determine the vegetation that can grow in any particular site, while the vegetation may determine the species of wildlife that can be present. These interactions among environmental elements are discussed where appropriate.

3.2.0 Affected Environment, Impacts, and Mitigation

3.2.1 Geology and Soils

The state of Washington is located in one of the most diverse regions of North America in terms of environment and vegetation. It encompasses wet coastal and dry interior mountain ranges, ocean and sound coastline, interior basins, and interior high desert plateau. Precipitation, temperature, soils, and geology vary greatly throughout the state. Vegetation types range from dense coastal coniferous forests through woodland and savanna to shrub-steppe. Appendix A Chapters 1 and 2 discuss in more detail the physical provinces and geology and soils respectively.

In a treatise on the natural vegetation of Oregon and Washington, Franklin and Dyrness (1973) divided Washington into the following eight major physiographic provinces:

(1) Olympic Peninsula
(2) Coast Ranges
(3) Puget Trough
(4) Northern Cascades
(5) Southern Washington Cascades
(6) Okanogan Highlands
(7) Columbia Basin
(8) Blue Mountains

Physiographic provinces are broad regions of relatively homogeneous conditions in terms of geology and climate. Stratification by provinces attempts to reduce the complexity of Washington's environmental diversity into manageable proportions. The broad vegetational patterns and general geologic, hydrologic, edaphic (soil), and climatic features in each of the eight physiographic provinces are discussed in Appendix A, Chapters 1 and 2. To further reduce the complexity within each physiographic unit, Franklin and Dyrness (1973) divided Washington into zonal vegetation associations (see Figure 3-1 of this chapter).

Stratification by province allows the environmental consequences of alternative roadside vegetation management practices to be more evaluated and discussed more effectively than if presented for the entire state highway system. Although the management of roadside vegetation in Washington can vary considerably among provinces, the prescribed treatments remain reasonably similar within a vegetation association of a province. Each Washington State Highway District includes two or more physiographic provinces with accompanying variation in environmental conditions. Thus, there will often be multiple issues, approaches, and methods associated with a specific vegetation management operation.

Geology and soils are important physical factors in determining slope stability, shoulder drainage, surface erosion, and water quality along Washington highways. Geology often directly influences right-of-way slope stability. Slope failures, in turn, can affect water quality and, in more severe cases, impact the physical condition of the highway. The relationship between geology, soils, and vegetation on highway right-of-ways is also extremely important. Good vegetative cover protects the function, stability, and condition of soils, while good soil conditions are necessary to maintain healthy vegetative cover. Thus, both the physical and biological roadside environment must be evaluated when developing and applying vegetation management techniques.

The geology and soils of Washington are highly variable. Although volcanic rock types cover much of the state, sedimentary and metamorphic rocks also provide the raw material which, through weathering, breaks down into soils. Many soils in the state are quite young geologically, resulting from such recent events as glacial scouring, which removes existing soils (roughly 12,000 years ago), and volcanic eruptions, which add new, unweathered surface materials (some as recently as 12 years ago). More mature soils (well in excess of one millions years old) that are found in more southerly locations of the state, support vegetation and exhibit features quite different from those of younger

soils. This broad range in parent materials and historical disturbance, along with the extremely diverse climatic conditions and biological communities, result in a multitude of different soils across the state.

3.2.1.1 Environmental Consequences of Alternatives

Potential adverse environmental impacts of roadside vegetation management techniques on geologic and soil resources include accelerated surface erosion, slope failures in unstable soil zones, soil compaction, and reduced soil productivity. Surface soil losses may be accelerated by the reduction or removal of vegetative cover, allowing increased erosion by wind or water. Vegetation removal and soil disturbance can also cause slope failures where unstable or moist soil conditions exist. Surface soil erosion removes the topsoil horizon, which tends to be richest in organic material, thus leading to reduced soil productivity.

Soil compaction may also reduce vegetative productivity by physically restricting root growth, limiting water and air movement to the rooting zone, and forming an inhospitable seedbed. In addition, accelerated surface soil erosion is more probable on compacted soils. Although right-of-way soils are often disturbed and compacted during road construction, natural soil-forming processes can lessen compacted conditions with time.

Vegetation management is important in regions with a high prevalence of mass soil movement activity, particularly in the Coast Ranges and Olympic Provinces, and to a lesser degree in the Cascade Provinces. Vegetation with deep roots, such as coniferous and deciduous tree species, is effective in maintaining soil mass cohesiveness. In addition, vegetation is effective in dewatering soil masses and in creating internal drainage channels to enhance slope stability.

In terms of specific management techniques, mechanical treatments would have the greatest potential to impact soils, particularly where grading is used to reconfigure the roadside terrain. The repeated use of high ground pressure equipment for mechanical treatments, particularly under wet conditions, can cause soil compaction and inhibit the natural ameliorating process. Soil compaction resulting from roadside maintenance equipment is of most concern in the western provinces. This is particularly true in the Coast Ranges Province, where right-of-ways are on finer textured soils and soil moisture is high. Mechanical mowing or flailing of live, deep-rooted vegetation has the potential for adverse impacts on slope stability. Intensive manual control could also result in reduced slope stability, due to the loss of soil stabilizing functions of vegetative cover.

Chemical treatments would not impact soils directly. Spray trucks stay on the highway surface or on the paved shoulder when spraying. Chemical destruction of live, deep-rooted vegetation has a potential for adverse impacts on slope stability similar to that of mechanical techniques. Soil compaction would not be a problem with chemical treatments, since spray rigs stay on paved surfaces.

Biological and cultural management techniques will usually maintain or enhance the stability of right-of-way slopes. Biological treatment aimed at specific undesirable plant species should reduce competition and enhance the growth of more desirable species that

may be more effective in controlling erosion and improving slope stability. Cultural methods will also accelerate the development of desirable vegetative communities, again minimizing potential soil erosion problems. Adverse impacts of cultural and biological treatment methods on geologic and soil resources should be negligible. Short-term negative impacts related to cultural activities include soil erosion from ground preparation and planting.

3.2.1.1.1 Alternative A - No Action

Under Alternative A, no action would be taken to manage roadside vegetation. During highway construction, right-of-way soils are often severely disturbed and compacted. As part of construction activities, disturbed areas are seeded or planted with desirable plant species. However, without a vegetation management program to ensure establishment and maintenance of a healthy vegetative cover, roadside soil surfaces are more vulnerable to storm events that could lead to significant erosion. Loss of soil through accelerated erosion would cause further deterioration of plant community structure and productivity, as well as affecting water quality in stormwater run-off.

Without vegetation management, erosion would go uncontrolled. Unchecked, small rills and gullies could develop into major erosion problem areas. Under this alternative, no action would be taken to control noxious weeds. Weeds invade disturbed areas faster than desirable species and are usually less capable of preventing erosion than well managed desirable plant species. Noxious weeds also damage the productivity of adjacent agricultural lands. Roadside vegetation communities susceptible to fire could become established in some areas. With a greater potential for fires within the right-of-way, there would be a corresponding increase in fire potential on adjacent lands, as well as increased potential for soil erosion and water quality impacts.

3.2.1.1.2 Alternative B - Remedial Action Approach

Under Alternative B, remedial action would be taken to control roadside vegetation only after a determination that public safety, legal action, or damage to the highway facility is threatened. It is estimated that annual mechanical treatments would be used on 24,000 acres and chemical methods on 4,240 acres. It is possible that the entire roadside acreage would be treated over a period of four to five years. The environmental impacts and consequences on geology and soils would be similar to Alternatives C and D. Alternative B would have less of a negative impact on geologic and soil resources than would Alternative A.

3.2.1.1.3 Alternative C - No Chemical Approach

Mechanical treatment methods, including mowing, grading, and manual techniques, would be the primary vegetation management approach under Alternative C. It is estimated that mechanical methods would be used on 33,530 acres, biological methods on 3,500 acres, and cultural methods on 10,590 acres annually. Mechanical techniques would impact geology and soil resources by repeated compaction and inhibition of natural soil-forming processes. Compaction would inhibit plant productivity and accelerate soil erosion. Soil compaction by heavy equipment would be of greatest consequence in the

western regions of the state, particularly in the Coast Ranges Province where roadways are constructed on finer textured soils and in areas with higher soil moisture.

Scouring of the ditch to improve roadside drainage would disturb surface soils and reduce vegetative productivity. Natural nutrient cycles, which involve both soil and vegetation, would be disrupted, and nutrients would be lost through water transport. Thus, the fertility base to establish and maintain healthy vegetation may be altered, leaving exposed mineral soil which would be subject to accelerated water and wind erosion.

The heavy emphasis on mechanical techniques in Alternative C could lead to problems of mass soil movement, particularly in areas with high potential for natural mass soil movement activity, such as the Coast Ranges and Olympic Peninsula Provinces and, to a lesser degree, in the Cascades Provinces. Mechanical mowing or flailing of live, deep-rooted vegetation has the potential to adversely impact slope stability. If manual control is used intensively, it could also impact slope stability in localized areas.

The proposed use of cultural and biological techniques in Alternative C would have no long-term adverse impacts on geology and soils. A short-term impact from cultural methods may include increased erosion. Biological treatment aimed at specific undesirable plant species would have a beneficial effect by reducing competition and enhancing the growth of more desirable species. Desirable species would include those that are effective in controlling erosion and improving slope stability.

3.2.1.1.4 Alternative D - Short-term Single Action Approach

Chemical control of vegetation would be the dominant management technique in Alternative D. This approach would attempt to maximize short-term results and minimize costs. It is estimated that mechanical methods will be used on 21,180 acres and chemical methods on 49,420 acres annually. No cultural or biological methods of vegetation management would be used under this alternative. Chemical applications would be used on approximately 50 percent of the treatable roadside acreage. Mechanical techniques would be used on another 20 percent, and roughly 30 percent would remain untreated.

With the exception of soil residuals, chemical herbicides and pesticides would have no known direct impact on geology or soils. While chemical herbicide applications could affect soil microorganisms, the limited roadside area to be treated and the natural repopulation characteristics of organisms would limit the severity of this impact. Herbicides, which are subject to degradation by soil microorganisms, may actually stimulate microorganism populations during their degradation process. Soil sterilants, discussed in *Appendix B - Toxicological Assessment*, may be used for the long-term control or prevention of vegetative growth on the road surface and shoulder.

The effects of mechanical vegetation treatment on geology and soils in Alternative D would be similar to those of Alternative C, but less area would be affected.

3.2.1.1.5 Alternative E - Long-term Comprehensive Integrated Approach

Alternative E would use all available vegetation management techniques on a site-specific basis. Over time, the proportion of acreage treated by mechanical and chemical methods would decrease, while the acreage subject to cultural or biological treatment would increase. During the first five years, it is estimated that mechanical methods will be used on 24,710 acres, chemical methods on 28,240 acres, biological methods on 3,530 acres, and cultural methods on 4,120 acres annually. After five years, it is estimated that mechanical methods will be used on 14,120 acres, chemical methods on 10,590 acres, biological methods on 10,590 acres, and cultural methods on 24,710 acres annually. Short-term impacts from cultural methods may include increased erosion. Biological methods would have no adverse effects on geology and soils. The immediate impacts of mechanical and chemical techniques would be similar to those discussed in Alternatives C and D, respectively. The long-term impacts on geology and soils would be expected to decrease as the treatment emphasis is shifted from chemical and mechanical techniques to cultural and biological methods.

3.2.1.1.6 Alternative F - Current Practices, Decentralized Management

Under the current roadside vegetation management procedures, there are no standardized, state-wide programs. Each maintenance district operates independently, following priorities and utilizing methods determined by local conditions. As in Alternative E, all available vegetation management techniques could be applied under this alternative, although a much heavier emphasis would be placed on chemical methods and less emphasis on mechanical, biological, or cultural methods. It is estimated that mechanical methods would be used on 13,410 acres, chemical methods on 45,190 acres, biological methods on 3,530 acres, and cultural methods on 8,470 acres annually. The immediate environmental consequences of Alternative F would be similar to those of Alternative E. However, the impacts on geology and soils over the long-term would not diminish. There would be no expectation to shift the present emphasis on chemical and mechanical techniques to cultural and biologic techniques, which have lesser impacts.

3.2.1.1.7 Alternative G - Locally Based, Long-Term Planning IVM

Alternative G derives its vegetation management techniques from Alternative E, therefore the consequences are the same.

3.2.1.2 Unavoidable Adverse Impacts

Several components of vegetation management control techniques have the potential to cause unavoidable adverse impacts on the geology and soils of highway roadsides. Mechanical techniques may cause soil compaction and expose mineral soil, which would accelerate erosion and reduce vegetative productivity. In areas of high soil instability, removal of deeply rooted vegetation and inadequate surface water control could lead to mass soil movement and water quality degradation. Inappropriate use of chemical fertilizers to enhance soil fertility as part of the cultural technique could lead to off-site movement of the material which, in turn, may affect surface and ground water quality. However, compared with the initial disturbance caused by road construction, the effects of roadside vegetation management on geology and soils are generally minimal.

3.2.1.3 Mitigation Measures

Most impacts of mechanical vegetation treatments can be minimized or avoided by limiting the number of treatments of any kind applied along a specific right-of-way and scheduling the activity during seasons with dry soil conditions. Roadside areas dominated by desirable grass communities should not be mowed until the grass has matured. Grading to reconfigure roadside terrain should be well planned and kept to a minimum. Where soil surfaces are exposed, hydromulching or other methods should be used to protect the soil surface and to establish new vegetation as quickly as possible. Establishment of deep-rooted tree species can be very effective in maintaining soil mass cohesiveness. In addition, vegetation dewaters soil masses and creates internal drainage channels that enhance slope stability.

Where chemical fertilizers are used with a cultural technique, the potential for off-site movement of these compounds can be reduced to insignificant levels by making site-specific prescriptions rather than using a regional prescription. Factors to consider are soil type, fertilizer (type, kind, and amount), season, and method of application. Different soil and climatic conditions in the various physiographic provinces will require consideration of different nitrogen-fixing plant species or fertilization techniques.

Unintended impacts related to herbicide applications and potential off-site transport can be minimized by strict adherence to manufacturers' guidelines. As with the fertilizers, herbicide usage should be determined on a site-specific basis. Factors to be considered to help promote maximum effectiveness include the target plant species, the type of herbicide, the concentration and application rate of that herbicide, and seasonal weather conditions. The vegetation free zone (Zone 1) is maintained through the use of soil residuals. Vegetation management Zone 1 is the vegetation management zone most subject to erosion. This zone should be kept to the minimum width required to maintain the structural integrity of the roadway.

3.2.2 Air Quality

The air quality in Washington can vary considerably from region to region. The principal sources of contaminants are motor vehicle emissions, industrial process emissions, industrial fuel use, home heating with wood, and burning of refuse and forest debris (DNR, 1983). As a result, poorer air quality is generally correlated with the higher population densities of the state. Although more rural areas of the state may have better air quality overall than the urban centers, they can still experience air quality impacts. Dust and smoke from agricultural and forestry practices reduce air quality on a localized, short-term basis. Contaminants generated by these processes primarily include sulfur oxides (SO_x), particulates, carbon monoxide, nitrogen oxides (NO_x), fluorides, and hydrocarbons. With the exception of exhaust from motorized equipment (which contains carbon monoxide, sulfur oxides, nitrogen oxides, hydrocarbons, and particulates), relatively minor amounts of these contaminants are generated by vegetation management activities in transportation corridors. Appendix A Chapter 3 contains a discussion of air quailty.

3.2.2.1 Environmental Consequences of Alternatives

The potential adverse impacts that roadside vegetation management might have on air quality would include both localized and regional impacts. Localized impacts would consist of short-term reduction in air quality as a result of dust generated from the use of heavy machinery. The use of chemicals can also have a localized adverse impact on air quality because of the potential for drift and for introducing objectionable odors into the air. These localized impacts are generally very short lived and most of them can be mitigated quite effectively.

Regional impacts would include the introduction of pollutants into the air as a result of the burning of fossil fuels. All of the heavy machinery, trucks, and spray rigs, and many of the smaller powered hand tools burn fossil fuels. This introduces carbon dioxide, carbon monoxide, and other pollutants into the air that contribute to regional air pollution problems. However, the consumption of fossil fuel as a result of vegetation management techniques is a small fraction of the total consumed in Washington, and it is not expected to decrease the overall air quality in the state.

In terms of specific management techniques, mechanical treatments will have the greatest impact on air quality, through the introduction of particulates (dust) into the air. Mechanical treatments also burn more fossil fuels than the other treatments, but this impact is expected to be minor when compared with the use of fossil fuels statewide.

Chemical applications could introduce spray drift and objectionable odors into the environment. These are short-term impacts and are relatively easy to mitigate.

Biological control of unwanted vegetation is not expected to impact air quality significantly.

Cultural treatment impacts on air quality would be the same as for mechanical treatments for initial treatments, but overall impacts would greatly decrease as areas become established.

3.2.2.1.1 Alternative A - No Action

Without vegetation management, there may be an increase in exposed mineral soil surfaces along roadsides, particularly in drier parts of the state. During windy conditions, airborne soil particles or dust generated along these roadsides can be a localized traffic safety hazard. While soil loss by wind erosion from roadside right-of-ways may be insignificant compared with that occurring on nearby agricultural lands, it is a factor in air quality deterioration.

In more humid parts of the state, where vegetation can regenerate, a lack of vegetation management would have minimal adverse impacts on air quality.

Any risk of negative impacts to air quality from herbicide application would be eliminated. However, negative impacts to air quality from herbicide application are negligible.

3.2.2.1.2 Alternative B - Remedial Action Approach

Remedial action techniques under Alternative B would be primarily mechanical, with chemical treatment in some areas. The objective would be for immediate relief for specific safety problems. The reactive nature of this approach would preclude the use of biological and cultural management methods, although localized blowing dust can be a serious safety hazard. The primary impacts on air quality would be through wind erosion, generation of airborne particulates, and vehicle emissions. There would be localized negative effects to air quality from applications of chemical herbicides. The expected impacts of Alternative B would be similar to those of Alternative A. However, because of the consequences of mechanical and chemical treatments in some areas, the overall impacts of Alternative B on air quality would be greater than those of Alternative A.

3.2.2.1.3 Alternative C - No Chemical Approach

Alternative C depends heavily upon mechanical techniques to control roadside vegetation. The primary adverse impact of mechanical activities on air quality is the odor generated by exhaust emissions from gasoline- or diesel-powered machinery. Air quality may also be adversely affected by other exhaust emissions, including volatile organic compounds, carbon monoxide, particulates, NO_x, and SO_x. It is also possible to generate airborne particulates during activities such as grading, mowing, and cultivation. Where graders are used to clean ditches and areas between lanes, the surface soil would be exposed and wind erosion would be possible. Windblown particulates may be carried long distances in the atmosphere, depending on the soil type and climatic conditions.

Cultural techniques used under Alternative C would be expected to have short-term impacts on air quality through airborne particulates following soil preparation. There would also be some impacts from vehicle emissions and possible odors from organic fertilizers. Chemical fertilizers would not be used under this alternative.

Biological techniques of managing vegetation under Alternative C would have no known adverse impacts on air quality.

3.2.2.1.4 Alternative D - Short-term Single Action Approach

Chemical treatments to control vegetation would be the dominant management technique in Alternative D. Impacts from pesticides would be more significant with this alternative, but would apply to any alternative including pesticides as an option. Pesticides inadvertently carried by the wind (spray drift) have three potential impacts: occupational exposure, exposure of near by human populations, and exposure of non-target plants and wildlife. Occupational exposure of workers applying chemicals, from inhalation of spray or direct contact with chemical herbicides or fertilizers, is a potential hazard which is evaluated in detail in Appendix B. There is also the potential for exposing other human populations to spray drift, including downwind residents or passing motorists. These effects on human populations are also considered in Appendix B. The effect of drift on non-target plant species depends on application techniques and the sensitivity to the type of herbicide being used. Selective herbicides affect only related plant species, while non-selective herbicides will affect all plants contacted. Drift from herbicide applications will

have negligible effects on wildlife. There is also a potential for odor impacts associated with the use of specific chemical formulations.

Air quality impacts of using mechanical management techniques would be similar to those described for Alternative C. No biological or cultural management techniques would be used under this alternative.

3.2.2.1.5 Alternative E - Long-term Comprehensive Integrated Approach

All vegetation management techniques would be available for use in Alternative E. The immediate impacts from mechanical and chemical techniques would be similar to those discussed in Alternatives C and D, respectively.

Cultural vegetation management methods may have several possible impacts on air quality, both positive and negative. Preparation of seedbeds or planting areas may generate dust emissions, which would be expected to be short-term and localized. However, after plantings are established, the potential for wind erosion of soil would decrease with the development of root systems and ground cover. Possible odor impacts may be associated with the use of organic or chemical fertilizers. These impacts would also be expected to be short-term and localized.

Positive impacts of enhanced vegetation include the consumption of carbon dioxide (CO_2) and trapping of airborne pollutants. Another positive impact of cultural vegetation management techniques is a reduction in vehicle and equipment emissions, due to a reduction in acreage requiring annual maintenance. No biological control agents used in Washington are considered to have adverse impacts on air quality when properly applied.

The long-term impacts on air quality under Alternative E would be expected to decrease as treatment method emphasis is shifted from chemical and mechanical techniques to cultural and biological techniques.

3.2.2.1.6 Alternative F - Current Practices, Decentralized Management

Alternative F would be a continuation of the current decentralized management procedures, with each district selecting management techniques independently. The immediate environmental consequences of this alternative would be similar to those of Alternative E. The adverse impacts on air quality over the long-term, however, would not diminish with time, as there would be no expectation to shift the present emphasis on chemical and mechanical techniques to cultural and biological techniques.

3.2.2.1 Unavoidable Adverse Impacts

Roadside vegetation management may have several potentially unavoidable impacts on air quality. Dust emissions are likely during activities that disturb soil layers, including cultural and mechanical techniques that must be applied during dry weather. Exhaust emissions are an unavoidable result of all activities that require the use of motor vehicles or gasoline or diesel-powered equipment. Unpleasant odors are often associated with the application of herbicides or chemical and organic fertilizers. In addition, there is a slight potential risk of exposing people, wildlife, and other non-target organisms to airborne

chemicals, particularly in areas where it would be impractical to remove non-target organisms or to prevent their entry during or immediately after chemical applications.

3.2.2.3 Mitigation Measures

A variety of potential mitigation methods are available to reduce or eliminate possible adverse impacts on air quality from the various management techniques. Electric-powered equipment could be used as an alternative to gasoline or diesel-powered equipment, thus reducing objectionable odors and potential adverse health effects from exhaust emissions. Electric-powered equipment may be impractical and can indirectly create exhaust emissions from either portable generators or powerplants. Dust emissions could be reduced by restricting activities that cause soil disturbance, such as mowing or cultivation, to periods when winds are at a minimum (mainly east of the Cascade mountains).

To minimize possible adverse impacts on air quality due to chemical treatments, it would be necessary to implement appropriate occupational safety and health training and controls for all employees responsible for chemical applications. Herbicides should be selected and applied in a manner consistent with federally approved warning labels to minimize the potential for exposures to non-target species of plants, wildlife, and aquatic organisms. The selection of herbicides should consider materials having the lowest degree of adverse odor impacts, while maintaining an acceptable degree of effectiveness. Herbicide applications should be restricted to environmental conditions that minimize the probability of drift outside the treatment area. Application methods, nozzle configuration of sprayers, and physical delivery systems should be configured to maximize droplet size and product efficacy. Adjuvants which prevent drift and mask odors should be added to the pesticide spray solution.

Air quality impacts of cultural vegetation management techniques could be mitigated by restricting activities that cause soil disturbance to periods when weather and soil conditions are likely to generate minimal particulate emissions. Dust suppression techniques could be used where appropriate, including water sprays to reduce dust generated by machinery, and straw mulch or tarps to cover small areas of exposed soil to minimize erosion.

Because biological control agents used in Washington are considered to have no adverse impacts on air quality when properly applied, mitigation measures would not be necessary.

3.2.3 Water Quality

Protecting water quality is one of the primary reasons for maintaining a healthy vegetation cover in the roadside environment. Fresh water is defined as all non-salt water lakes and drainage waters including lakes, ponds, rivers, creeks, and irrigation canals. The marine waters of the state include the coastal waters of the Pacific Ocean on the state's west coast, the Strait of Juan de Fuca, portions of the Strait of Georgia, and Puget Sound. The term ground water is used in this document to broadly mean all water below the ground surface. Appendix A, Chapter 4 contains a more in depth discussion of water quality.

The water quality of streams draining undisturbed lands is typically high in Washington. The principal influence on surface water movement is the hydrologic regime, which includes the combined effects of climate, soils, geology, topography, and vegetation (DNR, 1983). Because of the great topographic variation found in Washington, there are many hydrologic regimes. Generally, these regimes coincide with the eight physiographic provinces, with the exception of the Northern Cascades and Southern Washington Cascades provinces, which are divided into eastside and westside regimes. The primary difference between these regimes is the annual precipitation. Annual precipitation ranges from 7 to 30 inches per year in eastern Washington to well over 100 inches per year on the western slopes of the Cascade Mountains, the Olympic Peninsula, and the southwestern Washington coast.

The greater the precipitation, the greater the likelihood of experiencing run-off for a given area. Run-off is defined as the movement of water across the soil surface until it reaches a defined natural stream channel. Run-off probably has the greatest impact on surface water quality throughout the state. Generally, run-off rarely occurs on undisturbed natural land surfaces west of the Cascade Crest, because infiltration rates usually far exceed maximum rainfall intensities. But, if the soil surface on highway right-of-ways is disturbed during construction and maintenance, the infiltration capacity may be significantly reduced and run-off may occur. In eastern Washington, the soil and vegetation types do not provide the infiltration rates that those on the west side do (again this is a broad generalization). As a result, during heavy rain events (thunderstorms), even undisturbed sites will run off. Moreover, the impervious road surface creates additional run off for both regions of Washington. In order to reduce problems associated with roadside run-off, WSDOT, in conjunction with the Department of Ecology, is writing a Highway Run-Off Manual which will establish policy for the use of best management practices to reduce or eliminate problems associated with highway run-off.

Protecting ground water quality is of concern because of its importance as a resource for public drinking water supplies, irrigation, and industrial uses. Ground water occurs in two different zones. One zone, the unsaturated zone, occurs immediately below the soil surface in most areas and contains both water and air. The unsaturated zone is almost invariably underlain by a saturated zone in which all interconnected soil pore spaces are full of water.

The occurrence of aquifers is determined by the underlying geologic units. There are three principal regional aquifer types in Washington. Figure 3-2 shows Washington State's major ground water reservoirs. Two of these are related to unconsolidated sedimentary rock units both glacial (glacial drift aquifers) and non-glacial (terrace and valley fill aquifers). Glacial drift aquifers are generally found in the northern Puget Trough Province as well as along rivers in the Okanogan Highland Province and the Spokane area. The principal occurrence of terrace and valley fill aquifers is along the western Olympic Peninsula Province, the Vancouver area in the southern Puget Trough Province, and the Kittitas and Yakima Valleys within the Southern Cascade Province. The third major aquifer type is principally volcanic and generally occurs through the Columbia Basin Province.

3.2.3.1 Environmental Consequences of Alternatives

Potential impacts on water quality from roadside vegetation management are primarily related to mechanical, cultural, and chemical methods, which may cause accelerated soil erosion, transport, and deposition of sediment (including sediments from road surfaces), and to the use of chemical herbicides and fertilizers, which could introduce chemicals into non-target waters. Accelerated erosion may result from vegetation management where soil disturbance and compaction influence the natural infiltration and run-off processes. Adverse effects on streams and lakes, resulting from the transport and deposition of eroded sediments, include nutrient enrichment, increased turbidity, decreased dissolved oxygen levels (if nutrient concentrations sufficiently stimulate algal blooms), and the accumulation of toxic pollutants. These effects, in turn, may adversely impact fish and other aquatic resources. It should be noted that many state highways have storm water detention/treatment facilities which treat run-off before it discharges downstream.

In terms of treatment methods, mechanical treatments have the potential to disturb and compact the soils to the extent that run-off is increased. This can cause increased erosion, which can transport sediment and chemicals into the local surface waters. Scouring of the ditch bottom also increases erosion and can destabilize ditch slopes.

Chemical treatment impacts can be summarized as either direct or indirect. Direct impacts would result from the introduction of herbicides directly into the water, from drift, run-off, or leaching. Indirect impacts would result if the vegetative cover were reduced to the degree that the erosion was increased.

Cultural treatments would have similar impacts on water quality, as would mechanical, in the sense that the soil is being disturbed in the preparation of seedbeds or plantings. This can increase erosion from exposed soils and from compaction by equipment. However, since the goal of cultural treatment is the establishment of a stable and dense vegetative cover, the impact of these methods would lessen after the initial phase. Cultural treatments can also impact water quality from the introduction of nutrients (fertilizers) into surface water

Biological treatments are not expected to impact water quality significantly.

3.2.3.1.1 Alternative A - No Action

After revegetation associated with construction activities, there would be no further vegetation management under Alternative A. If any barren areas develop in the vegetation, or if erosion became a problem, no action would be taken to correct these situations. In addition to natural minerals, soils adjacent to roadways often contain elevated concentrations of pollutants that may be carried by surface run-off into water bodies. In vegetation management Zones 1 and 2, the native soils have been removed or altered, making these areas less suitable for invasion by native species than undisturbed areas. The natural invasion of plant species would be less likely to control erosion problems than on undisturbed soils.

In areas with more temperate climates, a lack of vegetation management may lead to prolific growth of roadside vegetation. Usually, grasses are planted in vegetation management Zone 2. These grasses act as a filter for roadway pollutants. Where low growing grasses and herbaceous plants become well established, increased filtration will reduce downstream transport of pollutants. However, where woody vegetation (a natural vegetative climax in many parts of Washington) invades vegetation management Zone 2 and chokes out the grasses planted in the ditches and drainage ways, a decrease in filtration of contaminants would occur. In general, the absence of vegetation management would increase the risk of erosion of roadside soils and decrease soil stability, thereby reducing the ability of the right-of-way to filter pollutants from storm water before it reaches receiving waters. Excessive vegetation growth could block natural or artificial drainage channels, increasing stormwater detention times that would allow for greater particulate settling. On the other hand, blocked drainage channels could divert run-off and cause erosion of new channels. Retarding run-off from highways could also create a safety hazard.

3.2.3.1.2 Alternative B - Remedial Action Approach

Treatment techniques under Alternative B would be primarily mechanical, with chemical treatment in some areas. (Biological and cultural methods are not effective short-term reactive measures.) The primary impacts on water quality would be additional vehicle emissions related to use of mechanical equipment, increased compaction of surface soils contributing to increased erosion, and possible contamination with chemical herbicides. Impacts of mechanical and chemical methods are discussed in greater detail under Alternatives C and D, respectively.

Because run-off water quality concerns are not directly related to safety issues, roadside vegetation management under this alternative would not address potential water quality problems. In this aspect, the impacts of Alternative B would be similar to those of Alternative A. However, because of the impacts related to mechanical and chemical treatments in some areas, the overall adverse impacts on water quality are likely to be greater for Alternative B than the impacts associated with Alternative A.

3.2.3.1.3 Alternative C - No Chemical Approach

The management emphasis in Alternative C is on mechanical techniques. Impacts of these techniques on water quality relate primarily to increased run-off, soil erosion, and sedimentation. Mechanical vegetation management activities that remove extensive areas of vegetation from drainage swales may reduce the filtration capacity and the removal of pollutants. In addition, mowing, cutting, and trimming may temporarily reduce the ability of vegetation to protect the soil surface from erosion and to filter pollutants from storm water.

Use of heavy machinery for mechanical or cultural management of vegetation would most likely result in significant soil disturbance or compaction that would have water quality impacts. Grading, cultivation, or seedbed preparation that expose the soil surface may, in the short term, increase sheet erosion. It is important to remember that cultural practices are used to repair areas which already are presenting an erosion problem.

Cultural management techniques that involve fertilizer application also have the potential to contaminate surface water and ground water.

Chemical herbicides and fertilizers would not be applied under this alternative.

Biological techniques available for vegetation management would not have any direct impacts on water quality. However, in areas where biological control results in extensive target plant mortality, there may be a temporary reduction in the ability of roadside vegetation to filter pollutants from run-off. Biological techniques, if used alone, may not react quickly enough to allow clearance of intended drainage areas or to prevent undesirable vegetative cover.

3.2.3.1.4 Alternative D - Short-term Single Action Approach

Chemical and mechanical methods would be the dominant management techniques used in Alternative D. The water quality impacts of mechanical vegetation management would be similar to those described for Alternative C.

Most herbicides will have little to no negative impact on water quality if applied in accordance with registered label directions. Application of chemical herbicides is more likely to affect water quality, through the removal of vegetative cover rather than through the herbicide itself.

Several mechanisms prevent or retard the migration of organic chemicals through the soil column. These mechanisms include chemical precipitation, chemical degradation, volatilization, physical and biological degradation, biological uptake, and adsorption. Furthermore, many organic substances have extremely low water solubility. Also, clays and organic matter in the soil absorb trace metals and certain complex organic pollutants. As a result of these mechanisms, it is unlikely that herbicides will leach through the soil column at WSDOT application rates. Impacts to aquatic resources from the use of specific chemicals for vegetation management are described in Appendix B - Toxicological Assessment.

Cultural methods are not proposed for use under this alternative. Therefore, areas which are presenting erosion problems due to poor vegetative cover would not be revegetated. The natural invasion of plants could, over time, reduce erosion and sediment entering surface waters from these poorly vegetated areas.

3.2.3.1.5 Alternative E - Long-term Comprehensive Integrated Approach

All vegetation management techniques would be available for use in Alternative E. The immediate impacts from mechanical and chemical techniques would be similar to those discussed in Alternatives C and D, respectively. The potential water quality impacts of cultural and biological techniques would be similar to those described for Alternative C. The long-term impacts on water quality would be expected to be markedly less as the treatment emphasis is shifted from chemical and mechanical techniques to cultural and biological methods.

3.2.3.1.6 Alternative F - Current Practices, Decentralized Management

Alternative F would be a continuation of the current decentralized management procedures, with each district selecting management techniques independently. The immediate environmental consequences of Alternative F would be very similar to those of Alternative E. The impacts on water quality over the long term, however, would not diminish with time, as there is no expectation to shift the present emphasis on chemical and mechanical techniques to the less detrimental cultural and biological techniques.

3.2.3.2 Unavoidable Adverse Impacts

Highway pollutants in storm water will continue to have an unavoidable adverse impact on water quality regardless of the alternative selected, although this will be improved with the implementation of the Highway Run-Off Manual.. Contamination of water from these sources overwhelms impacts from most treatment alternatives. Accelerated erosion as a result of soil compaction and reduced vegetative cover by specific vegetation management activities, especially mechanical treatments, would have an unavoidable adverse impact on water quality.

3.2.3.3 Mitigation Measures

Potential water quality impacts from mechanical vegetation management can be minimized by avoiding the use of heavy equipment on steep slopes and by maintaining dense, healthy vegetation in the roadside environment, particularly in drainage swales.

Where chemical herbicides are used as a control technique, the following practices will minimize their potential adverse impacts on water quality:

- Apply herbicides according to label instructions and appropriate regulations, prepare and implement spill control plans, and dispose of cleaning waste and containers properly.
- Apply pesticides at the lowest possible rate to achieve the desired results.
- Use selective chemical herbicides that do not persist in the environment and that are not readily transported through soil by leaching.
- Avoid herbicide applications when precipitation is imminent.
- Control spray drift by increasing droplet size, using adjuvants to maintain spray droplet size, and spraying only during calm conditions.
- Use targeted spot applications rather than broadcast applications wherever possible.
- The width of the vegetation free zone (Zone 1) should be as narrow as possible, thereby reducing the amount of chemicals applied and the area of barren soil exposed for erosion.

- Avoid scouring ditch bottoms.

For cultural methods of vegetation management, the use of mulch will greatly reduce the amount of sediment entering waterways. Where chemical fertilizers are used with a cultural technique, the potential for off-site movement of chemicals can be reduced to insignificant levels by making site-specific prescriptions rather than by using a regional prescription. This may not be econimally practical given the amount of roadside in question. Factors to consider are soil type, fertilizer (type, kind, and amount), season, and method of application. As an alternative to chemical fertilizers in some locations, nitrogen-fixing vegetation could be planted to provide a natural form of nutrient enhancement. Different soil and climatic conditions in the various physiographic provinces will require consideration of different nitrogen-fixing plant species.

3.2.4 Flood Plains

Transportation routes through Washington have historically followed streams and rivers. Many miles of highways were located in flood plains, due to topographic constraints, and land development has grown up around these transportation corridors. Highway encroachments onto flood plains and associated developments have been an integral part of economic growth in Washington. Flood plains are recognized as providing many natural and beneficial values, including fish and wildlife habitat, scenic beauty, opportunities for scientific study, outdoor recreation, agriculture, forest resources, natural moderation of floods, water quality maintenance, and groundwater recharge. Appendix A Chapter 5 discusses possible impacts to floodplains from vegetation management activities.

3.2.4.1 Environmental Consequences of Alternatives

Roadside vegetation management is not expected to have significant impacts on flood plains. Construction of highways and associated developments on flood plains results in displacement of floodwaters and an increase in the severity of flooding. However, the management of roadside vegetation does not have a measurable effect on high water conditions. Some increased run-off can be expected from roadside areas where soil is compacted or vegetation is eliminated, but roadside zones are usually only a small portion of a watershed and do not have a significant effect on flooding.

The Alternatives that utilize mechanical or chemical treatments could cause minor increases to localized run-off as a result of soil compaction or vegetation removal. However, impacts to flood plains would generally be minor because roadside areas represent very small proportions of watersheds contributing run-off to the flood plains.

3.2.4.2 Unavoidable Adverse Impacts

No unavoidable adverse impacts to flood plains are foreseen under any of the vegetation management alternatives. In the event of special local conditions in which specific vegetation treatments could increase storm run-off to the extent that flood plains would be impacted, different management techniques could be used. Alternatively, mitigation could be required to compensate for increased flooding.

3.2.4.3 Mitigation Measures

In general, roadside vegetation management alternatives are not expected to have significant impacts on flood plains, and mitigation would not be necessary.

Many of the mitigation measures described in Section 3.2.1.3 are designed to limit soil compaction and erosion and increase soil infiltration rates. These measures would also be effective in limiting increases in storm run-off. If there are areas where increased run-off from roadsides has the potential to increase flooding, additional detention facilities could be installed to store the run-off and release it gradually.

Mulch or other materials used on the roadside should not be stockpiled within flood plain limits where they could displace, or be removed by, flood waters.

3.2.5 Wetlands

Wetlands, often referred to as "marshes," "swamps," or "bogs," provide a transition between land and water environments (DOE, 1988). They are lands where ground water is usually at or near the surface, or where the land is covered by shallow water for all or part of the year. Wetlands are further defined as lands where saturation with water is the dominant factor determining the nature of soil development and the types of plants and animal communities living in the soil or on its surface (DOE, 1985). However, a consistent methodology for delineation of a "wetland area" is currently under debate. Appendix A Chapter 6 contains an expanded discussion of the effects of roadside vegetation management to wetlands.

There are a wide variety of wetlands in Washington State. With over 2,400 miles of shoreline, Washington has extensive coastal marshes and tidelands. Along the coast, there are estuarine salt marshes, coastal dune systems with both salt and freshwater marshes, algal beds, and tide pools. Puget Sound contains tidal-flat wetlands and river mouth estuaries such as the Nisqually Delta and Skagit Bay (DOE, 1985).

Freshwater wetlands are widespread west of the Cascade crest from the alpine zone down to sea level. They include both deep and shallow marshes, wet meadows, sphagnum bogs, and scrub-shrub and forested wetlands. While many are associated with ponds, lakes, streams, and rivers, many more are isolated from open water and owe their existence to saturated soil conditions (DOE, 1985).

Although more localized in their distribution, wetlands in eastern Washington are even more varied than their western counterparts in terms of seasonality, species composition, salinity, and pH. The climatic regimes of eastern Washington give rise to an array of permanent and intermittent streams, vernal pools, saline, alkaline, and neutral pH wetlands called "marl fens."

The Washington State Department of Transportation's Protection of Wetlands Action Plan, developed in August 1990, provides policy and guidance for the protection and preservation of wetlands, ensuring no net loss of wetlands caused by department actions, and increasing the quantity and quality of wetlands in the long term.

3.2.5.1 Environmental Consequences of Alternatives

The potential impacts to wetlands resulting from roadside vegetation management are directly related to the water quality impacts described above, and include methods causing accelerated soil erosion, transport and deposition of sediment, and use of chemical herbicides and fertilizers. Adverse effects on wetlands resulting from the transport and deposition of eroded sediments include nutrient enrichment, increased turbidity, decreased dissolved oxygen, and accumulation of toxicants. These effects, in turn, may adversely impact fish and other aquatic organisms using wetland habitats.

In terms of the treatment methods, mechanical treatments have a low potential to impact wetlands, except in areas where the slopes are steep and the operation of equipment on these slopes can cause slope instability and increased erosion and sedimentation in wetlands. Clippings and other organic debris from mechanical control can reduce oxygen levels in wetlands due to decomposition.

Chemical treatments can have both a direct and indirect impact on wetlands. The direct introduction of chemicals through drift or run-off may adversely impact wetlands. Indirectly, the use of non-selective herbicides can expose soils and increase erosion.

Cultural treatments generally have a low potential to impact wetlands adversely. However, the introduction of excess nitrates and urea compounds from fertilizers can upset nutrient balances in aquatic environments.

Biological treatments are not expect to adversely impact wetlands.

3.2.5.1.1 Alternative A - No Action

The No Action alternative would have minimal adverse impacts upon wetlands. A lack of vegetation management may lead to prolific growth of roadside vegetation, which could reduce erosion and the transport of pollutants by increasing the filtration and evapotranspiration capacity of roadside areas. There would also be no potential for chemical contamination, except from road surface runoff.

However, without roadside vegetation management, there would be the potential for soil erosion, particularly in the drier provinces of the state. During periods of precipitation, these soils and any associated pollutants could be carried by surface run-off into wetland areas, thus degrading water quality. Without vegetation management, no action would be taken to control rills, gullies, or other types of erosion once they had begun. In general, the absence of vegetation management activities would result in poor stands of desirable vegetation, which would reduce the ability of roadside areas to retard water movement, stabilize soils, and filter pollutants from storm water before it reaches receiving waters. Additionally the no action approach would leave the areas susceptible to noxious weed invasion.

3.2.5.1.2 Alternative B - Remedial Action Approach

The primary impacts on wetlands of Alternative B would be those resulting in degraded water quality from additional vehicle emissions related to use of mechanical equipment,

increased compaction of surface soils contributing to increased erosion, and possible contamination with chemical herbicides. Impacts of mechanical and chemical methods are discussed in greater detail under Alternatives C and D, respectively.

3.2.5.1.3 Alternative C - No Chemical Approach

The management emphasis in Alternative C is on mechanical techniques. Mechanical methods, such as mowing, generally have a low potential to impact wetland habitats through soil erosion because they result in substantial retention of soil cover. However, grass clippings and organic debris entering wetland areas may lead to a decline in dissolved O_2 due to vegetation decomposition. Scouring and discing create a high potential for soil erosion by exposing soil, which can then be carried to aquatic habitats during storm events. The resulting sedimentation can thus degrade aquatic habitats.

Cultural techniques, specifically the use of organic or inorganic mulches, generally have a low potential for adversely affecting wetland habitats. However, excess nitrates and urea compounds can be introduced through the use of fertilizers. These compounds can alter the pH and nutrient balance of aquatic environments.

Biological techniques, such as the introduction of pest organisms or the introduction of insects and plant pathogens, are not likely to adversely impact water quality. Both of these techniques are species specific and are therefore very selective. Erosion is not a likely consequence of biological management techniques, and non-target effects are minimal. However, in areas where biological control results in extensive target plant mortality, there may be a temporary reduction in the ability of roadside vegetation to filter pollutants from run-off.

3.2.5.1.4 Alternative D - Short-term Single Action Approach

Chemical and mechanical methods would be the dominant management techniques used in Alternative D. The impacts of mechanical vegetation management on wetlands are discussed in Alternative C above.

Chemical methods of vegetation management along WSDOT right-of-ways can potentially have both direct and indirect effects upon wetland habitats and resources. The use of chemical methods can have effects on water quality because of accidental direct application, spray drift, and the transport of herbicides to surface waters due to run-off.

Herbicide residues can be mobilized by surface transport or overland flow, entering surface waters in solution or adsorbed on particulate matter. An aquatic ecological risk assessment is presented in Appendix B, Chapter Two: Wildlife Risk Assessment, that describes the potential risks of herbicide-contaminated water to aquatic organisms.

A number of indirect effects to wetland habitats are possible as a result of herbicide application to WSDOT right-of-ways. Non-selective chemical methods can contribute to soil erosion by removing all vegetation cover. Soil erosion can result in increased sedimentation in adjacent wetlands, injuring or destroying fish spawning and nursery areas. Erosion can also reduce shoreline stability along streams, resulting in loss of protective cover for organisms using such habitats. It is important to note that only

vegetation management Zone 1 requires the use of non-selective herbicides in order to maintain a vegetation free zone. This zone would rarely be directly adjacent to wetlands. The only other case where WSDOT would use non-selective herbicides over broad areas would be in preparation for reseeding or planting an area.

Direct application of herbicides to wetland areas could potentially impact wetland vegetation, thereby degrading many of the functions of a wetland, including water quality protection, flood control, shoreline stabilization, contributions to groundwater and stream flows, and wildlife and fisheries habitat.

Because approximately 20 percent of the species listed by the federal government as threatened or endangered depend heavily on wetlands (DOE, 1988), any impacts on wetlands could potentially affect special-status species. However, few aquatic plant species are currently considered to be pests which would be controlled through the use of herbicides. Purple loosestrife (*Lythrum salicaria L.*), which invades and eliminates wetlands, and eastern marshgrass, which destroys native oyster habitat, are undesirable species which are controlled, to date, only by chemical means.

3.2.5.1.5 Alternative E - Long-term Comprehensive Integrated Approach

All vegetation management techniques would be available for use in Alternative E. The immediate impacts from mechanical and chemical techniques would be similar to those discussed under Alternatives C and D, respectively. The potential impacts to wetlands and water quality from cultural and biological techniques are discussed under Alternative C. The long-term impacts on wetlands due to possible chemical contamination and soil erosion would be expected to be less as the treatment emphasis is shifted from chemical and mechanical techniques to cultural and biological methods.

3.2.5.1.6 Alternative F - Current Practices, Decentralized Management

Alternative F would be a continuation of the current decentralized management procedures, with each district selecting management techniques independently. The immediate environmental consequences of Alternative F would be similar to those of Alternative E. The impacts to wetlands would be directly related to those on water quality, and thus would not diminish with time, as there is no expectation to shift the present emphasis on chemical and mechanical techniques to the less detrimental cultural and biological techniques.

3.2.5.2 Unavoidable Adverse Impacts

Any of the techniques employed for the management of roadside vegetation are likely to adversely impact the environment to some degree. As discussed above, the most likely impact is from soil erosion due to elimination of groundcover. In the case of herbicide application, some of the herbicide may be deposited directly in wetland habitats as a result of spray drift or surface run-off. The degree of impact depends on the type of herbicide used and application method, the concentration to which non-target organisms are exposed, and the duration of that exposure.

3.2.5.3 Mitigation Measures

Because the impacts to wetlands are directly related to the impacts on water quality, the mitigation measures for wetlands are much the same as those for water quality. Impacts due to mechanical techniques can be minimized by avoiding the use of heavy equipment on steep slopes and by maintaining adequate groundcover along the roadside environment, especially in areas near wetland habitats or areas that have the potential to drain to wetlands.

Where chemical herbicides are used, the following practices will minimize their potential adverse impacts on wetlands:

- Apply herbicides according to label instructions and appropriate regulations, prepare and implement spill control plans, dispose of cleaning waste and containers properly.
- Use selective chemical herbicides that do not persist in the environment and that are not readily transported through soil by leaching.
- Avoid herbicide applications when precipitation is imminent.
- Control spray drift by using methods to increase droplet size and adjuvants to maintain spray droplet size, and by spraying only during calm conditions.
- Use spot target specific applications rather than broadcast applications wherever possible.
- Limit the width of the vegetation free zone (vegetation management Zone 1) to the narrowest practical width.

3.2.6 Vegetation

Vegetation in the state of Washington varies from bunchgrass dominated steppe communities to some of the tallest, most productive forest communities on earth. The climate is described as a Pacific maritime regime having dry, warm summers and wet, cool fall to spring seasons. A vegetation zone (not to be confused with WSDOT vegetation management zones) is an environmental subsection of a province supporting relatively homogeneous plant communities dominated by a specific group of potential climax plant species. These zones cover thousands of acres, and consequently encompass widely varying topographic conditions. The plant community descriptions for each of the vegetation zones refer to relatively undisturbed, long-term stable, mature, old-growth, or climax conditions. The different vegetation zones (see Figure 3-3) are largely a response to the wide variation in annual precipitation, which ranges from a low of seven inches in the Columbia Basin to over 240 inches on the Olympic Peninsula. The vegetation zones which occur in Washington State include the Sitka Spruce, Western Hemlock, Puget Sound Area, Subalpine Forest, Steppe, Shrub-Steppe, Ponderosa Pine, Grand Fir and Douglas Fir, and Timberline and Alpine Regions Zones. Appendix A Chapter 7 provides a more detailed discussion of Washington State's vegetation and impacts from roadside vegetation management.

In the following discussions, the concepts of vegetation zone and roadside management zone must be maintained as separate entities. A vegetation zone is an environmental subsection of a province supporting relatively homogeneous plant communities dominated by a specific group of potential climax plant species. These zones cover thousands of acres, and consequently encompass widely varying topographic and physiographic conditions. The conceptual breakdown of highway roadsides into "vegetation free," "operational," and "transition" functional management zones is discussed in Chapter I.

Highway cut-and-fill slope construction (Roadside Management Zone 1 and Zone 2) generally results in soil conditions unlike any under the adjacent natural vegetation. Therefore, it cannot be assumed that roadside vegetation will have the same species composition or productivity as occurs outside the heavily impacted construction zones. Roadside Management Zone 3 is much less disturbed during construction and subsequent management activities. Therefore, naturally occurring plant communities will probably establish easily in this zone. Species compositions within all three management zones are functions of soil conditions, planting practices, seed sources available in adjacent habitats, and seeds transported by vehicular traffic from other areas.

3.2.6.1 Environmental Consequences of Alternatives

The ultimate goal of roadside vegetation management is to maintain plant communities that have the desired growth characteristics for roadside safety and aesthetics, require low maintenance, discourage large animal use, and provide storm run-off biofiltration capacity while not greatly impeding flows. Vegetation management techniques to create the desired conditions can include mechanical, chemical, cultural, or biological treatments. These treatments have widely varying costs (both financial and environmental) that often differ among vegetation zones and Washington State Department of Transportation districts.

The vegetative responses to roadside management programs can be assessed in this document only in a very generalized manner. Every combination of trees, shrubs, forbs, and grasses can respond differently to treatment. This response variability is often increased when native and exotic species are intentionally planted along right-of-ways. The plant community response, as opposed to individual species responses, often depends upon climate, species composition, dominance and phenology, treatment type, extent of treatment, and site properties.

Even though vegetation management programs are very site specific, environmentally similar sites can be expected to respond to treatments in a similar manner. The plant communities within vegetative zones (described in Appendix A, Chapter 7, for each of the physiographic provinces of Washington) are by definition homogeneous units, irrespective of their occurrence in different provinces. For example, the Western Hemlock Zone has a large amount of plant community variation within the classification unit. But, whether the Hemlock Zone occurs in the Olympic Peninsula, Puget Sound Trough, or Cascade Mountains, the vegetational responses to environmental or man-caused disturbances are more similar within hemlock communities than in comparison to plant communities of other vegetation zones.

Evaluation of vegetation responses to management programs must be addressed as a specific evaluation of site/species/disturbance relationships on each individual area. Currently, WSDOT accomplishes this by having resident program managers in each district. Particular attention must be paid to prevent inadvertent application to threatened, endangered, or sensitive species or high-quality native plant communities. In areas of intensive agricultural activity, sometimes the only remnant examples of individual species or entire climax plant communities are located in Roadside Zone 3, between the actively managed road system and the annually disturbed agricultural fields. In the future, the Natural Heritage Program in the Washington Department of Natural Resources will be consulted where the potential to disturb native plant communities exists.

Mechanical treatments can be very effective for small trees, shrubs, and herbaceous vegetation. However, the operation of equipment on some soils can reduce vegetative cover, allowing invasion of undesirable species. Constant mowing of grasses and forbs to maintain a lawn-like appearance reduces plant vigor and makes the plants more susceptible to invasion by noxious weeds or disease.

Chemical treatments for roadside vegetation management are used to eliminate undesirable plant species. The greatest potential impact on plant communities as a result of the use of herbicides is the possibility of killing non-target vegetation and causing increased soil erosion. In addition, if not applied correctly, herbicides can create an environment that is conducive to invasion by undesirable vegetation, such as noxious weeds. Misapplication could also reduce the vigor of existing non-target vegetation.

Cultural treatments would generally be very beneficial to the plant communities along roadsides, by helping to establish native plant communities that are vigorous and resistant to disease and invasion by non-target vegetation. No adverse effects to vegetation are expected from cultural activities.

Biological treatments will have no adverse impacts on non-target vegetation.

3.2.6.1.1 Alternative A - No Action

If no vegetation management activities were used to control roadside vegetation, nature would take its course. The natural biological requirements of plants provide them with highly competitive niches. Any native or exotic plant species that can establish itself in direct competition with other plants will grow within its environmental constraints, unimpeded by management activities.

Over time, vegetation would develop along normal successional pathways. On sites where some topsoil remains or has been replaced following construction, desirable native species could be established rapidly. However, due to the highly disturbed nature of right-of-ways (cut and fill slopes of bare soils), most sites will revert to early successional plant communities composed of weedy annual and perennial grass and forb species. On sites where all upper soil horizons have been removed, pioneer species communities will dominate the disturbed sites for long periods of time.

In western Washington, red alder, big-leaf maple, cottonwood, and willows are the primary pioneer tree invaders, while salmonberry and himalayan blackberry are pioneer

shrubs. Numerous broad-leaved forb species, both native and exotic, desirable and undesirable, could colonize a site, probably with undesirable weeds dominating. If a heavy canopy cover of coniferous species is present, most pioneer weed species would not be competitive and would occupy the site for only a very short time, if at all.

In eastern Washington, the higher precipitation areas of the eastern Cascade Range and the Okanogan Highlands province would be invaded by alder (tree and shrub species), cottonwood, willow, oceanspray, ninebark, and ceanothus. The much drier shrub-steppe vegetation zones of the Columbia Basin and adjacent provinces would be invaded by sagebrush, rabbitbrush, and, in some areas, bitterbrush. For more specific potential species composition trends, refer to descriptions of existing communities in Appendix A, Chapter 7.

A no-action approach to roadside vegetation management would be undesirable because of the need to meet requirements of local weed control districts and of highway safety design. Under this alternative, native and exotic weedy vegetation could establish and dominate recently disturbed areas of right-of-way. Weed dominance on right-of-ways could attract undesirable insect pest populations and diseases and could contribute to weed invasion into adjacent land. These invasions would cause problems where they occur adjacent to large scale agricultural operations in the Columbia Basin and Palouse regions of eastern Washington. Although most agricultural pests are controlled directly on the crop, effective and economical control of noxious weeds, insects, and diseases requires that additional repositories, such as ditches and right-of-ways, also be free of host species.

3.2.6.1.2 Alternative B - Remedial Action Approach

On the roadside areas where no action is expected, the consequences of Alternative B would be similar to Alternative A. Thus, implementation of this alternative would generally have the same adverse effects as discussed above. In areas treated with mechanical and chemical techniques, impacts would generally be similar to those described under Alternatives C and D, respectively.

3.2.6.1.3 Alternative C - No Chemical Approach

The major management emphasis in Alternative C is the use of mechanical techniques. Tractor-mounted sickle bars and flail or rotary mowers would be used to control small trees, shrubs, and herbaceous vegetation. To maintain the perceived aesthetic value of lawn-like vegetation along roadways, fast-growing herbaceous species would require periodic mowing throughout the growing season. However, repeated mowing of grass and forb species often weakens the plants and mechanically degrades soil surfaces. Operation of even light-weight tractor-mounted mowers on wet, fine-textured soils, particularly in western Washington, could remove vegetative cover and allow for invasion of undesirable species. Operation of this equipment could also compact subsurface soil layers and lead to surface erosion and slumping of soils.

When shrubs and trees are controlled by mechanical methods they often resprout from roots and root-crowns, creating higher plant stem densities than before control. Many shrubs and resprouting tree species respond most vigorously after above-ground material

has been removed during the dormant season. Serviceberry (*Amelanchier*, spp.), maple (*Acer*, spp.), and red alder (*Alnus rubra* Bong.) often produce more and bigger stems, limbs, and suckers than if they were not pruned. Mechanical vegetation control measures should be applied in a manner that has the greatest adverse effect on the target species. Proper timing and treatment application is critical; otherwise, removal of regrowth may be required two or more times per year.

In eastern Washington, flailing is effective in controlling sagebrush species, but associated shrubs, such as rabbitbrush or bitterbrush (*Chrysothamnus*, spp.), and grasses, often respond to the release of competition with vigorous resprouting. The practice of establishing stands of crested wheatgrass and other forage species palatable to both livestock and wildlife could create more hazardous conditions (potential for fire, collision with large foraging mammals) than if low shrubs were allowed to dominate the Zone 3 roadside vegetation.

Manual methods for managing vegetation would include use of hand tools and hand-operated power tools to cut, clear, or prune vegetation, generally above or at ground level, to enhance site conditions for desired plants. Due to the large scale of most Department of Transportation projects, this control method would be relegated to sites where chemicals are not feasible and mechanized equipment could not operate because of site limitations. Disturbance would be minimal with manual treatment techniques, but the ability to affect plant community composition would also be very limited. Pulling or digging out plant root systems to prevent sprouting and regrowth would be extremely difficult or impossible in the often highly compacted, high gravel content soils at road edges (Zone 1) and on adjacent slopes (Zone 2).

Manual treatment techniques sometimes require multiple visits to a site to control regrowth of a single species or to treat different selected species. Forbs and grasses are generally too numerous to be controlled efficiently by manual techniques, except in small roadside areas infested with noxious weeds. Manual control can be very effective in some situations, however, since it is highly selective for species or life-forms being targeted. Non-target species would be beneficially affected through minimal exposure to disturbance and reduced competition from target species for nutrients, water, and space.

3.2.6.1.4 Alternative D - Short-term Single Action Approach

Under Alternative D, chemicals would be used to control vegetation on about half of the roadside acreage, with mechanical techniques used on the remaining treated acreage. Effects of mechanical vegetation treatments would be similar to those in Alternative C.

Chemical herbicides would be used to remove or retard vegetation growth on road shoulders, ditches, and right-of-ways. The impacts of chemical treatments would vary, depending on how closely the target and non-target species are related, the selectivity of the herbicide, and the application procedures, including timing and rate. Poorly planned or executed herbicide applications could remove or damage desirable vegetation, as well as undesirable species. Drift from herbicide applications could harm non-targeted off-site vegetation.

Removal of all vegetation with non-selective herbicides would create sites for accelerated soil erosion and invasion by undesirable plant species. Since cultural methods are not proposed under Alternative D, this practice would only be used for maintenance of vegetation management Zone 1.

Annual plants, generally more sensitive to herbicides, would be affected to a greater degree than perennial plants, especially if treated before producing seed. Annual and perennial weed species growing at a site for more than a few years often have large seed reserves in the upper soil horizons. Weed-infested sites could require repeated control measures until the majority of weed seeds have germinated and been killed. Pre-emergence herbicide treatment can be used to achieve control with fewer applications. Applications of broad-leaf selective herbicides could lead to grass-dominated monocultures along roads. Monocultures of any life form are highly susceptible to invasion by insects or diseases.

3.2.6.1.5 Alternative E - Long-term Comprehensive Integrated Approach

All vegetation management techniques would be available for use in Alternative E. The immediate impacts from mechanical and chemical techniques would be similar to those discussed in Alternative C and D, respectively. Biological techniques would not be expected to have adverse impacts on desirable vegetation, but would suppress undesirable target plant species. Cultural vegetation management techniques that encourage the establishment of highly competitive, stable, native plant communities would have no adverse impacts on desirable vegetation. The long-term impacts on roadside vegetation would be expected to decrease as treatment emphasis is shifted from chemical and mechanical techniques to cultural and biological methods.

3.2.6.1.6 Alternative F - Current Practices, Decentralized Management

Alternative F would be a continuation of the current decentralized management procedures, with each district selecting management methods independently. The initial environmental consequences of Alternative F would be similar to those of Alternative E. Adverse impacts on vegetation over the long term, however, would not diminish, as there would be no expectation to shift the present emphasis on chemical and mechanical techniques to cultural and biological techniques.

3.2.6.2 Unavoidable Adverse Impacts

The various alternatives that have been proposed for roadside vegetation management could have several adverse impacts on vegetation. Repeated mowing or other mechanical treatments could reduce plant vigor by preventing the plants from completing their natural cycle of flowering and die-back. Operation of heavy equipment could destroy vegetative cover and cause increased soil compaction and erosion.

Non-selective herbicides have severe adverse impacts on desirable vegetation in addition to the intended impact on undesirable plants. Non-selective herbicides should only be used to maintain vegetation management in Zone 1 and as the initial site preparation for revegetation. Elimination of all vegetation in Zone 1 can lead to accelerated erosion and possible invasion of undesirable weedy or exotic species.

The diverse physiographic and climatic conditions in Washington, and the widely varied potential effects of vegetation management techniques on plant communities, indicate the need for detailed evaluation on a site-specific basis. The potential impacts at any given site will depend on the existing conditions of that site and on the technique, or combination of techniques, that is applied.

3.2.6.3 Mitigation Measures

Mitigation efforts can minimize the adverse impacts of roadside vegetation management on desirable vegetation, while continuing to provide for public safety concerns. Because impacts will vary with the specific conditions at different sites, mitigation efforts must be considered on a site-specific basis. Different approaches would be appropriate in the different zones of the roadside environment.

In order to maintain the structural integrity of the roadway surface, Zone 1 is currently maintained free of any vegetation. Zone 2 could be planted with low stature native herbs and shrubs that have a high probability of successfully competing with exotic weedy species. In Zone 3, the most effective mitigation measure would be to promote and maintain vegetation in as close to a natural condition as possible. Mechanical and chemical disturbances within this zone should be minimized. If chemical treatments are used in Zone 3, spot applications or highly selective chemical agents would minimize the impacts on non-target species. In all cases, chemical treatment must be applied in strict adherence with manufacturers' guidelines and US EPA requirements.

Grass-forb communities, a major component of the roadside vegetation in many areas, remain healthiest when allowed to complete their natural life-cycle of flowering and summer/fall die-back. Frequent mowing reduces grass species vigor and removes flowers before seeds mature fully. Mid- to late-summer mowing or merely knocking down the dried stems and leaves would aid the spread of seeds and incorporation of organic matter into the generally poor roadside soils. Dry season operation and low ground-pressure maintenance equipment could moderate possible soil disturbance.

Herbicides should be used to improve the potential success of desirable vegetation, not as a rapid, inexpensive means to remove vegetation from a site, except for vegetation management Zone 1. Proper herbicide usage requires a large investment in planning of chemical selection, application rate, phenology of target and non-target species, and site-specific environmental constraints. Planning for the safety of workers applying the herbicide and all potential off-site recipients of residues is also a must. Available herbicides range from non-selective pre- and post-emergence soil treatments to highly selective foliar-applied chemicals that target broad-leaved forbs, shrubs, and trees. Where desirable vegetation is established on slopes and medians, spot treatments with selective herbicides on small populations of noxious plants could be very effective for maintaining and enhancing the growth of preferred species. If desirable vegetation has not been previously established, herbicide treatments would generally result in rapid reinvasion by weedy species, necessitating additional treatments.

Use of cultural or biological techniques in preference to mechanical or chemical methods would minimize adverse impacts on non-target plant species and would promote the growth of desirable native vegetation. Maintenance of diverse plant communities would

be preferable, in most cases, to creation of grass monocultures. The practice in eastern Washington of establishing stands of palatable forage, including crested wheatgrass and other palatable grass species, may attract large animals, creating more hazardous conditions than if low shrubs were allowed to dominate the roadside vegetation. As very few livestock or wildlife species browse on sagebrush or rabbitbrush, establishment of these shrubs along roadways should be encouraged.

3.2.7 Terrestrial Wildlife and Wildlife Habitat

The physiographic provinces and vegetation zones of Washington encompass a broad range of environmental features and conditions, providing habitats for nearly 500 species of mammals, birds, reptiles, and amphibians. This diverse fauna can be grouped into communities, which are recognizable associations of plants and animals having common geographic and environmental distributions. Because of the diversity of physiographic features and climatic conditions in Washington, five of seven North American life zones are present in the state (see Figure 3-4). The life zones present in Washington include Arctic, Hudsonian, Canadian, Humid Transition, Humid Transition (Prairies), Arid Transition (Timberless), Arid Transition (Timbered), and Upper Sonoran. Appendix A Chapter 8 contains a more detailed discussion of terrestrial wildlife and wildlife habitat including general habitat and wildlife characteristics of the life zones found along Washington highways.

3.2.7.1 Environmental Consequences of Alternatives

Highways may affect wildlife populations through their impact on habitats and animal movements. Depending on the type of road and the characteristics of the surrounding habitat and wildlife community, roads can act as either corridors or barriers to animal movements, enhancing or isolating populations. For example, in forested landscapes species that favor open habitats, such as coyotes, use roadways as travel and hunting routes. Other animals, such as elk, typically avoid well-traveled roads, but they will use abandoned forest roads as travel routes. Some smaller vertebrates may choose never to cross roads.

Highway mortality of animals is a serious problem in some areas, particularly for animals with large home ranges that encompass well-traveled roads. Additionally, deer and elk mortality can be a serious seasonal problem on roads that bisect traditional migration corridors and feeding sites on deer and elk winter range. Although accurate roadkill statistics are not available in Washington, there is evidence that roads can significantly affect animal populations in some circumstances. Several years ago, for example, a large truck collided with and killed a group of elk crossing Interstate 90 near Cle Elum. Roadkills have been a particular problem for the Selkirk herd of woodland caribou in British Columbia.

Roadside vegetation management can influence wildlife populations through its effects on habitat and through direct impacts on the wildlife. These effects may be either beneficial or harmful depending on the location, site characteristics, species affected, and the timing, intensity, and frequency of treatment. In most cases, the effect depends on the habitat changes caused by the treatment, rather than the particular method utilized. To the extent that vegetation management supports habitat use and normal movements of

desirable native species of wildlife, it can be a beneficial management tool. Where vegetation management contributes to an increase in roadkills, reduces the diversity of native vegetation, or promotes the dispersal of opportunistic, invasive organisms, it is harmful. Wildlife and habitat responses to vegetation management must be evaluated on a site-specific, individual treatment basis.

In terms of the treatment methods, mechanical control can be very effective as a tool for improving habitat for small mammals, birds, and arthropods. However, along with increased wildlife come increased predators. This could increase the likelihood of roadkills. Mowing reduces nesting and cover and reduces food availability. It can be especially damaging to ground nesting birds during the breeding season. It also encourages the growth of palatable grasses and forbs that could attract large mammals to the roadside. Depending on the off-road sight distance, this could be either a benefit or a hazard. The use of machinery could also compact the soil, destroying burrowing animal habitat. Manual techniques are not expected to impact wildlife significantly.

Chemical treatments can impact wildlife either directly through toxicities to animals, or indirectly through manipulation of habitat. The toxicological impacts of the herbicides, adjuvants, and fertilizers used by WSDOT are presented in Appendix B, Chapter 3. None of the herbicides proposed for use by WSDOT are expected to adversely impact any wildlife populations. Only one herbicide used by WSDOT (Sulfometuron methyl) is considered to be moderately toxic to bees. WSDOT's maximum application rate of Sulfometuron methyl is less than half of the maximum label rate. In addition, WSDOT takes care to avoid application of this potentially harmful chemical near apiaries or near areas were pollination of crops is occurring.

Habitat manipulations as a result of herbicide applications will benefit some animals and will harm others. For example, the elimination of shrubs will lead to a decline in wildlife that depend on shrubs for nesting cover and browse foods but will increase numbers of grass-adapted species. The elimination of grasses does the opposite. The elimination of noxious weeds is beneficial to most species, but not all.

In general, wildlife impacts depend on the chemical used, its specific characteristics, and how and when it is applied.

Cultural treatments will benefit most wildlife species by establishing low-maintenance, native species, if native species selected for planting are a source of food or cover. Fertilizers and mulches are not expected to significantly impact wildlife populations.

Biological treatments are not expected to adversely impact wildlife populations.

3.2.7.1.1 Alternative A - No Action

Under Alternative A, roadside vegetation management treatments would be eliminated. A lack of periodic disturbance to soils and vegetation could allow native plant communities to remain or become established on some sites, favoring animals associated with these habitats. On the other hand, unmanaged roadside habitats could attract large herbivores, predators, and scavengers, and decrease the sight distance, which would

increase the potential for roadkills. Not controlling invasive, non-native plant species would have a negative impact on native wildlife species.

3.2.7.1.2 Alternative B - Remedial Action Approach

The effects of Alternative B would be similar to Alternative A on more than 70 percent of the roadside area where no action is expected. However, fewer roadkills would occur, since sight distances would be maintained. In those areas treated with mechanical and chemical techniques, the impacts would generally be similar to those described under Alternatives C and D, respectively.

3.2.7.1.3 Alternative C - No Chemical Approach

Intensive management of vegetation in the roadside environment by maximizing the use of mechanical methods would have some adverse impacts on wildlife and wildlife habitat. More frequent disturbance to soils and vegetation caused by vegetation management activities could prevent native plant communities from remaining or becoming established.

Where mechanical control is used to reduce tree cover along highways, the subsequent growth of shrubs and herbs could improve habitat for small mammals, birds, and arthropods. An increase in prey abundance could attract predators and scavengers to roadsides, resulting in increased potential for collisions with vehicles. Although the extent of highway mortality of predators and scavengers is unknown in Washington, it could be relatively important, because these species have few natural enemies and would otherwise have relatively low mortality.

Mowing of roadside vegetation would reduce nesting, hiding cover, and food availability for many small birds and mammals. Mowing during the breeding season could damage habitat, destroy nestlings, and reduce productivity of ground-nesting birds. Conversely, mowing may stimulate the production of palatable grasses and forbs, thus attracting deer and elk to roadsides. The use of mechanical equipment could result in soil compaction and accelerated erosion, which in turn inhibits the growth of new vegetation and damages the habitat of burrowing animals. The widely varied effects of mechanical treatment on wildlife dictate the need for site-specific evaluation.

Cultural and biological control techniques are used to a lesser degree in this alternative. Impacts on wildlife from these techniques are similar to those described under Alternative E.

3.2.7.1.4 Alternative D - Short-term Single Action Approach

Under Alternative D, chemicals would be used to control vegetation on half of the roadside acreage. Impacts of chemical vegetation control include direct toxicological effects and indirect effects from habitat alterations. This section addresses the effects of herbicide use on wildlife habitats. Toxicological impacts are discussed in Appendix B, Chapter 2.

Habitat changes resulting from herbicide applications are beneficial to some animals and harmful to others. Spraying of shrubs has been found to reduce breeding bird populations in sagebrush communities, as well as mule deer use of forested plantations (USDI, 1991; DNR, 1983). These effects were attributed to reduced nesting cover for shrub-nesting birds and a decrease in preferred browse species and fawning cover for deer. In another study, herbicide treatment of grasses and forbs led to a decline of small mammals adapted to grassy habitats and an increase in species preferring shrub communities (DNR, 1983). Chemical treatment of noxious weeds could be beneficial to most, but not all, wildlife species, since some of these plants are highly utilized as food. Seeds of certain thistles and annual weeds, for example, are eaten by many species of finches. Although they may be beneficial, the mandate to control these weeds overrides their value as a wildlife food item.

As with other treatments, the response of wildlife to chemical control depends on the chemicals used, how and when they are applied, their effects on habitat, and the relative availability of cover and forage in treated and adjacent untreated areas. Broadcast use of non-selective herbicides could have the greatest adverse impact on wildlife habitat, because it could remove both desirable and undesirable vegetation. However, the broadcast use of non-selective herbicides is limited to vegetation management Zone 1 and during preparation of a site before planting is to occur. Direct applications of selective herbicides are more common, and are less harmful because they treat only specific target plant species.

The use of chemical fertilizers (cultural methods) in roadside vegetation management activities would not have a direct adverse effect on wildlife, since these fertilizers would be used most often for plant establishment. As noted above, the establishment of plants in the roadside environment would protect soils and provide wildlife habitat. Additional use of fertilizers to increase vegetative growth could, however, attract large herbivores to the roadsides and increase their risk of highway mortality.

Mechanical methods of vegetation control would be used on nearly 20 percent of the roadside area under Alternative D. Mechanical vegetation management impacts on wildlife and wildlife habitat would be similar to those in Alternative C, but less acreage would be affected.

3.2.7.1.5 Alternative E - Long-term Comprehensive Integrated Approach

All vegetation management techniques would be available for use in Alternative E. Cultural and biological techniques would be used more heavily in this alternative than in other alternatives.

Cultural control of roadside vegetation, through planting of desirable competitive native species, could improve wildlife habitat and have variable effects on wildlife populations. Animals would benefit, for example, by planting of species utilized as food. Where plantings result in the establishment of native plant communities and the reduction of noxious weeds, wildlife species would also benefit. Improper use of roadside plantings could, in some circumstances, harm wildlife by reducing driver visibility and increasing the risk of collisions with animals. In roadside areas where deer and elk populations are high, it may be advantageous to plant low-growing species that are relatively unpalatable to these animals.

Biological control would be a long-term process with significant potential for roadside habitat improvement. Present control efforts in Washington are limited to a few species of noxious weeds, some of which cause serious economic losses by poisoning livestock or by displacing desirable forage for both wildlife and livestock. To the extent that biological control would allow more palatable native vegetation to become established along roadsides, wildlife habitats would improve. Whether this change would result in greater wildlife use of roadside habitats would depend on plant community characteristics, adjacent habitat types, and affected wildlife species.

The immediate impacts from mechanical and chemical techniques used in Alternative E would be similar to those discussed in Alternatives C and D, respectively. The negative long-term impacts on wildlife and wildlife habitat under Alternative E could be markedly less than under Alternatives C and D, as treatment acreage would be shifted, in part, from chemical and mechanical methods to cultural and biological techniques.

3.2.7.1.6 Alternative F - Current Practices, Decentralized Management

The immediate environmental consequences of Alternative F would be very similar to those of Alternative E. The impacts on wildlife and wildlife habitat over the long term, however, would not diminish with time, as there would be no expectation to shift the present emphasis on chemical and mechanical methods to cultural and biological approaches, which have lesser impacts.

3.2.7.2 Unavoidable Adverse Impacts

As long as vegetation is present along roadsides, it will be occupied by wildlife, either permanently or temporarily. In this setting, many animals are at increased risk of highway mortality. Predator/prey relationships may differ in the roadside environment, and species composition may be different from the surrounding habitats. Thus, where vegetation management techniques promote a significant increase in roadkills, reduce the structural and compositional diversity of native vegetation, or promote the dispersal of opportunistic, invasive organisms, they may cause unavoidable adverse impacts. In addition, mechanical vegetation control may have direct impacts on wildlife through heavy machinery crushing small vertebrates or destroying nests or burrows. Likewise, chemical treatments may have direct toxicological effects on wildlife. The widely varied potential effects of vegetation management techniques on wildlife and habitats indicate the need for evaluation on a site-specific basis.

3.2.7.3 Mitigation Measures

Mitigation efforts can minimize the impacts of roadside vegetation management on wildlife and wildlife habitat while continuing to provide for public safety concerns. Different approaches would be appropriate in the different zones of the roadside environment. Zone 1 is kept free of any vegetation in order to maintain the structural integrity of the road surface. In Zone 1 and parts of Zone 2, vegetation is managed for increased visibility and public safety. Zone 2 could be planted with low stature herbs and shrubs that are not particularly palatable to large herbivores, thus reducing the possibility of collision with vehicles. Low vegetation could still provide habitat for numerous small vertebrates. In Zone 3, the most effective mitigation measure for protecting wildlife and wildlife habitat would be to promote and maintain vegetation in as close to a natural condition as possible. Mechanical and chemical disturbances within this zone should be minimized. Wherever possible, the maintenance of natural diversity of native plant species, in contrast to grass monocultures, would ensure productive habitat for the greatest number of wildlife species.

3.2.8 Wildlife and Wildlife Habitat (Aquatic)

Aquatic habitats in Washington are quite diverse, ranging from the marine environments of the Pacific Coast and Puget Sound to the freshwater environments of the interior basins and interior high desert plateaus. Habitat diversity is reflected in the varied fauna and flora found in the lakes, rivers, and estuaries of the state. Freshwater and marine fish and invertebrates, as well as marine mammals, are found within waters of the state of Washington. Appendix A Chapter 8 contains a more detailed discussion of aquatic habitats and species within the state of Washington.

3.2.8.1 Environmental Consequences of Alternatives

The potential impacts of roadside vegetation management methods on aquatic habitats and aquatic species are directly related to the water quality impacts described previously. Potential effects include reduced survival or reproduction of aquatic organisms resulting from habitat degradation or exposure to toxic concentrations of pollutants. In general, however, roadside vegetation management treatments are not known to have caused substantial impacts to aquatic organisms in adjacent waters (Jones and Stokes, 1991). Nonetheless, the potential for adverse effects on special-status aquatic species should be recognized.

Aquatic habitat quality depends on hydrology, water temperature, total dissolved oxygen, food supply, protective cover, sediment and nutrient loads, availability of spawning and breeding areas, and the presence of toxic substances. Aquatic habitat degradation resulting from increased sediment and nutrient loading is the most likely adverse effect of roadside vegetation management. Effects could include turbidity-induced gill abrasion, covering of spawning habitat, and reduced dissolved oxygen concentrations due to the eutrophying effects of nutrient loads.

For treatment related impacts see Section 3.2.3, "Water Quality," of this chapter.

3.2.8.2 Alternative A - No Action

The No Action alternative would have minimal, if any, adverse impacts upon water quality, and thus upon aquatic organisms. A lack of vegetation management may lead to prolific growth of roadside vegetation, which could reduce erosion and the transport of pollutants by increasing the filtration and evapotranspiration capacity of roadside areas. There would also be no potential for chemical contamination from vegetation management activities.

However, without roadside vegetation management, there would be the potential for soil erosion, particularly in the drier provinces of the state. During periods of precipitation, soils and any associated pollutants could be carried by surface run-off into aquatic habitats, thus degrading the quality of those habitats and adversely affecting aquatic organisms. The absence of vegetation would reduce the ability of roadside areas to retard water movement, stabilize soils, and filter pollutants from storm water before it reaches receiving waters.

3.2.8.3 Alternative B - Remedial Action Approach

The primary impacts of Alternative B on aquatic habitats and aquatic organisms would be those resulting in degraded water quality from additional vehicle emissions related to use of mechanical equipment, increased compaction of surface soils contributing to increased erosion, and possible contamination with chemical herbicides. Impacts of mechanical and chemical methods are discussed in greater detail under Alternatives C and D, respectively.

The impacts of Alternative B would be similar to those of Alternative A on more than 70 percent of the roadside area where no action is expected.

3.2.8.4 Alternative C - No Chemical Approach

The management emphasis in Alternative C is on mechanical techniques. Mechanical methods, such as mowing, generally have a low potential to impact aquatic habitats through soil compaction and erosion, because they result in substantial retention of soil cover. However, grass clippings and organic debris entering wetland areas may lead to a decline in dissolved O_2 due to vegetation decomposition. Grading and discing create a high potential for soil erosion by exposing soil which can then be carried to aquatic habitats during storm events. The resulting sedimentation can thus degrade aquatic habitats.

Cultural techniques, specifically the use of organic or inorganic mulches, generally have a low potential for adversely affecting aquatic habitats. However, excess nitrates and urea compounds can be introduced through the use of fertilizers. These compounds can alter the pH and nutrient balance of aquatic environments.

Biological techniques, such as the introduction of pest organisms or the introduction of insects and plant pathogens, are not likely to impact water quality adversely. Both of these techniques are species specific, and are therefore very selective. Erosion is not a likely consequence of biological techniques and non-target effects are minimal. However,

in areas where biological control results in extensive target plant mortality, there may be a temporary reduction in the ability of roadside vegetation to filter pollutants from run-off.

3.2.8.5 Alternative D - Short-term Single Action Approach

Chemical and mechanical methods would be the dominant management techniques used in Alternative D. The impacts of mechanical vegetation management on aquatic habitats are discussed in Alternative C above.

Chemical methods of vegetation management along WSDOT right-of-ways have the potential to directly affect aquatic habitats and resources, because of spray drift and the transport of herbicides to surface waters in run-off.

A number of indirect effects to aquatic habitats are possible as a result of herbicide application to WSDOT right-of-ways. Non-selective chemical methods can contribute to soil erosion by removing all vegetation cover. Soil erosion can result in increased sedimentation in adjacent aquatic habitats, injuring or destroying spawning and nursery areas. Erosion can also reduce shoreline stability along streams, resulting in loss of protective cover for organisms using such habitats.

Herbicide residues can be mobilized by surface transport or overland flow, entering surface waters in solution or adsorbed on particulate matter. An aquatic ecological risk assessment is presented in Appendix B, Chapter Two: Wildlife Risk Assessment, that describes the potential risks to aquatic organisms of the herbicides used by WSDOT.

The ecological risk assessment consists of three sections: toxicity (hazard) assessment, exposure assessment, and risk characterization.

Of the 25 herbicides (active ingredients only, not formulations) considered for use by WSDOT, one was classified as very highly toxic (Benefin) to aquatic organisms and nine were classified as highly toxic (2,4-D; 2,4-DP; Chlorthal dimethyl; Diuron; Fluazifop butyl; Oryzalin; Oxadiazon; and Triclopyr).

Insufficient data were available to assess the toxicity to aquatic organisms due to chronic exposures to the herbicides under consideration by WSDOT. Spray procedures and acreage treated per year suggest that repeated, long-term exposure to any one population is unlikely. Therefore, the aquatic ecological risk assessment evaluates the risk to aquatic organisms based on acute toxicity information alone.

Relative exposure ratings for each of the herbicides in each physiographic province were calculated. For the majority of the herbicides, the potential for exposure is low. However, in the Puget Trough province, because of the high road density, there is a greater potential for exposure to a number of the herbicides, especially bromacil, diuron, oxadiazon, and picloram.

Risk to ecological receptors from exposure to a potentially hazardous substance is determined by two equally important factors: duration of exposure and the concentration or dose of the chemical (which is a function of the potency or toxicity of the chemical).

The relative risk presented to fish and aquatic invertebrates by the chemicals being considered by WSDOT was calculated using the exposure and toxicity ratings developed for each of the chemicals.

The majority of the chemicals were characterized as posing low relative risk to aquatic organisms. However, benefin and diuron were found to pose a potentially high relative risk to fish in the Puget Trough province, while aquatic invertebrates in the same province may be at high relative risk from exposure to diuron and oxadiazon. The high risk factors for these three chemicals can be attributed primarily to their potency, maximum label application rates, and the high road density in the Puget Trough province, which is assumed to be directly related to the volume of chemical used. Because of this threat, a hypothetical scenario was used to compare the quantities of these chemicals needed to have a significant impact on aquatic wildlife versus WSDOT's past application rates for benefin and diuron and estimated application rates for oxadiazon. Based on this study it seems unlikely that these chemicals would pose a threat to aquatic organisms within the Puget Trough province. See Appendix B, Chapter 3 Aquatic Risk Assessment for a more detailed discussion.

3.2.8.6 Alternative E - Long-term Comprehensive Integrated Approach

All vegetation management techniques would be available for use in Alternative E. The immediate impacts from mechanical and chemical techniques would be similar to those discussed under Alternatives C and D, respectively. The potential impacts to aquatic organisms and water quality from cultural and biological techniques are discussed under Alternative C. The long-term impacts to aquatic habitats due to chemical contamination and soil erosion would be expected to be less as the treatment emphasis is shifted from chemical and mechanical techniques to cultural and biological methods.

3.2.8.7 Alternative F - Current Practices, Decentralized Management

Alternative F would be a continuation of the current decentralized management procedures, with each district selecting management techniques independently. The immediate environmental consequences of Alternative F would be similar to those of Alternative E. The impacts to aquatic habitats and aquatic species would be directly related to those on water quality and would not diminish with time, as there is no expectation to shift the present emphasis on chemical and mechanical techniques to the less detrimental cultural and biological techniques.

3.2.8.8 Unavoidable Adverse Impacts

Any of the techniques employed for the management of roadside vegetation are likely to adversely impact the environment to some degree. As discussed above, the most likely impact is from soil erosion due to elimination of groundcover. In the case of herbicide application, some of the herbicide might be deposited directly in aquatic habitats as a result of spray drift or surface run-off. The degree of impact depends on the concentration to which non-target organisms are exposed and the duration of that exposure.

3.2.8.9 Mitigation Measures

Because the impacts to aquatic habitats are directly related to the impacts on water quality, the mitigation measures for aquatic habitats are much the same as those for water quality. Impacts due to mechanical techniques can be minimized by avoiding the use of heavy equipment on steep slopes and by maintaining adequate groundcover along the roadside environment, especially in areas near aquatic habitats or in areas that have the potential to drain into aquatic habitats.

Where chemical herbicides are used, the following practices will minimize their potential adverse impacts on aquatic resources:

- Apply herbicides according to label instructions and appropriate regulations, prepare and implement spill control plans, and dispose of cleaning waste and containers properly.
- Use selective chemical herbicides that do not persist in the environment and that are not readily transported through soil by leaching.
- Avoid using herbicides within five feet of surface water bodies and wetland areas, unless the herbicide is registered for use in such areas.
- Avoid herbicide applications when precipitation is imminent.
- Control spray drift by using adjuvants to increase spray droplet size and by spraying only during calm conditions.
- Use spot applications rather than broadcast applications wherever possible.

Specifically for benefin, diuron, and oxadiazon use in the Puget Trough province, application rates should be the lowest possible that will still allow effective vegetation control. Because these chemicals are somewhat persistent in the environment, the frequency of application within a given area should be kept to a minimum to prevent the accumulation of high residues.

3.2.9 Hazardous Material and Waste

WSDOT's routine operations require the storage of hazardous material and/or creation of hazardous waste materials. Hazardous materials include such things as gasoline, motor oils, lubricants, and pesticides. Pesticides become hazardous waste material when the container is damaged, the expiration date has expired, or when unrecoverable spills occur. Also, unrinsed or improperly rinsed containers become hazardous waste. Motorized equipment is used in all methods of vegetation management. This requires WSDOT to store gasoline, diesel, motor oils, and lubricants. The fuels, motor oils, and lubricants used in equipment are considered hazardous materials and the waste oils produced by internal combustion engines are considered hazardous waste materials. Appendix B Chapter 6 contains a more detailed discussion of hazardous material and waste.

3.2.9.1 Environmental Consequences of Alternatives

Mechanical methods of vegetation management use tractor mounted mowers and small hand operated power equipment to control vegetation growth. Areas where vegetation is to be controlled by mechanical methods frequently require annual treatments; mowing at least yearly—brushing less frequently. However, an area may be treated with mechanical methods more than once a year.

Cultural methods require the use of equipment for seed bed preparation, transporting and planting stock, and mulching. Cultural methods will most likely produce more hazardous waste per acre than mechanical methods the first year of treatment. Some maintenance activity may be required for several years following the initial planting of an area. Mechanical and chemical methods are frequently required to help establish the desired vegetation. However, after the first year the generation of hazardous waste will be dramatically reduced. The goal of cultural methods is to establish vegetative cover, which requires very little maintenance. Consequently, when the vegetation is established, little, if any, maintenance is required, thus little hazardous waste is produced.

Biological methods require the use of equipment for transportation and distribution of men, equipment, and biological agents. Biological methods produce a negligible amount of hazardous waste through the use of motorized equipment when compared to the other vegetation management methods. After distribution of the biological agent, no additional treatment of any kind is required for the area. Biological agents are applied by hand or spray equipment.

Chemical methods produce the same hazardous waste problems associated with motorized equipment as do other treatment methods. Properly stored and handled pesticides are classified as hazardous material. However, pesticides do not become a hazardous waste unless they are allowed to become contaminated, they exceed their expiration date, they produce an unrecoverable spill, or pesticide containers are not adequately rinsed. WSDOT routinely rinses its pesticide containers and reuses the rinse water in its new spray mixtures.

It is difficult to weigh the relative production of hazardous waste associated with motorized equipment. It is assumed that cultural methods will produce more waste than mechanical or chemical methods the first year of treatment. However, this depends on things which cannot be calculated in this DEIS, such as the number of times an area is mowed, frequency of pesticide applications, and, for cultural methods, the amount of site preparation required before planting.

For purposes of this discussion, the different alternatives are being compared in the following manner. When considering the storage of hazardous materials and the creation of hazardous waste related to the use of fuels and lubricants, the estimated acres of treatments requiring the use of motorized equipment (mechanical, cultural, and chemical methods) will be added together. The total acreage will be compared without trying to weigh the differing effects of the various methods. That is, straight line comparisons will be made. Biological methods will not be considered in this comparison, since the use of mechanical equipment will be much less for this method than any of the others.

It is assumed that the threat of creation of hazardous waste and the amount of hazardous material being stored and transported for chemical methods will be in direct relationship to the number of acres treated.

3.2.9.1.1 Alternative A - No Action

Under this alternative, no vegetation management activity would occur; therefore, no hazardous materials would be stored and no hazardous waste would be generated or disposed of due to vegetation management activities. However, as discussed under the Water Quality section of this chapter, vehicles using the highways generate pollutants including lead, zinc, copper, chromium, iron, nitrogen, phosphorous, and hydrocarbons. Other hazardous materials can be introduced into the roadside environment by spills and equipment/vehicle leakage of oils and gasoline not related to vegetation management.

3.2.9.1.2 Alternative B - Remedial Action Approach

Under this reactive management strategy only mechanical and chemical methods of vegetation control would be used, since these methods generally provide immediate vegetation control. Of all the alternatives, the remedial action approach will treat the fewest acres annually by mechanical, chemical, or cultural methods. This approach would produce the least amount of the hazardous waste related to motorized equipment. Its risk of creating hazardous waste associated with pesticide use is the smallest of any alternative using chemical methods of vegetation control.

3.2.9.1.3 Alternative C - No Chemical Approach

As the name of this alternative implies, no pesticides will be used. However, all other methods of vegetation management will be used, with an emphasis on mechanical control. The No Chemical Approach would produce over one and one half times the amount of hazardous waste related to motorized equipment as would Alternative B. This approach has no potential to create hazardous waste from pesticide use.

3.2.9.1.4 Alternate D - Short-term Single Action Approach

The Short-term Single Action Approach uses only mechanical and chemical methods for vegetation management. This approach would treat 70,600 acres annually and would produce two and one half times the hazardous waste associated with motorized equipment as does Alternative B. The storage of hazardous material and the potential risk of creating hazardous waste associated with pesticide use is nearly twelve times that of Alternative B.

3.2.9.1.5 Alternative E - Long-term Comprehensive Integrated Approach

With this alternative, the number of acres treated annually by mechanical and chemical methods will decease after the first five years. However, the number of acres treated annually by cultural vegetation methods will increase.

In the first five years, this approach would produce a little less than two and one half times the hazardous waste associated with motorized equipment as would Alternative B.

After five years, Alternative E would produce approximately one and three fourths as much hazardous waste associated with motorized equipment as would Alternative B.

The storage of hazardous material and potential risk of creating hazardous waste material associated with pesticide use is six and one half times Alternative B in the first five years and would drop to two and one half times Alternative B after five years.

3.2.9.1.6 Alternative F - Current Practices, Decentralized Management

Alternative F uses all vegetation control methods available. This alternative will produce a little less than two and one half time as much hazardous waste material associated with motorized equipment as Alternative B. It will produce the same as Alternative E for the first five years, but more hazardous waste than Alternative E in subsequent years.

The storage of hazardous material and potential risk of creating hazardous waste material associated with pesticide use is ten times greater than Approach B, and considerably more than Alternative E in the first five years and in subsequent years.

3.2.9.2 Unavoidable Adverse Impacts

The storage and use of hazardous and potentially hazardous materials and the generation of hazardous wastes, including motor fuels and lubricants and pesticides, cannot be avoided except under Alternative A.

3.2.9.3 Mitigation Measures

Many specific actions can be taken which will reduce the amount of hazardous material generated by vegetation management activities. There are also actions which will greatly reduce any threat to the environment that may exist from hazardous materials generated by vegetation management activities. Many options available to WSDOT will mitigate unavoidable impacts of vegetation management activities. WSDOT has already incorporated all these practices, described below, into the current vegetation management program.

Pesticides -

- Use all pesticides before the expiration date. This requires careful consideration of future pesticide needs when ordering. Use pesticides for their intended use and properly dispose of, only as a last resort.

- When spraying pesticides, sequence applications to minimize change-overs from one spray solution to another. If possible, dedicate equipment to compatible spray activities. Mix only the amount of pesticide that is needed.

- Properly rinse all pesticide containers. If possible, reuse water for rinsing of additional containers and/or as make-up for the next spray. If properly rinsed, pesticide containers are not considered to be a hazardous waste.

- Provide adequate storage conditions in order to avoid damage to the product or escape of the product if a spill should occur.

- Establish a spill response plan. Procedures to control and clean up spills of hazardous or potentially hazardous materials should be in effect, including adequate training of employees.

Waste Oil - Recycle all waste motor oil. Care should be taken when handling oil to ensure that spillage does not occur. Oil should be drained and transferred directly to the service truck and then transported to a designated high volume storage tank for recycling. All used oil filters should be drained and recycled.

3.2.10 Visual Quality

3.2.10.1 Environmental Consequences of Alternatives

The visual consequences of vegetation management vary with type, frequency, and time of year for each method. The four basic categories of maintenance practices are chemical, cultural, biological, and mechanical techniques. Chemical techniques typically cause discoloration and death of some or all of the treated foliage or plant. Cultural techniques improve plant health and usually improve visual quality. Biological methods, using insects and diseases to control unwanted vegetation, can cause defoliation, discoloration, or death of the targeted plant species. The impacts from biological techniques are not usually visible to the travelling public. Mechanical techniques involve cutting, mowing, and thinning to maintain roadside vegetation. The impacts to visual quality depend upon season, vegetation type, and amount of cutting. Cutting in the spring can expose brown stems, which contrast sharply with new foliage. Lawns, on the other hand, require frequent cutting to maintain visual quality.

3.2.10.2 Unavoidable Adverse Impacts

Work crews and equipment used to maintain roadside vegetation may temporarily impact visual quality of the roadway.

3.2.10.3 Mitigation Measures

Seasonal timing of vegetation management practices is the key to reducing the visual impact of vegetation management practices. Maintenance practices should also be timed to avoid peak commuter hours, tourist seasons, and other high visibility periods. Proper selection of maintenance practices is necessary to minimize visual impacts.

3.2.11 Cultural Resources

Cultural resources are buildings, sites, areas, architecture, memorials, and objects having scientific, prehistoric, historic, or social values. (USDA, FS 87) Cultural resources will not exist in vegetation management Zones 1 and 2 unless the actual road, bridge, etc. is considered to be of historical significance. Cultural resources will have been avoided, removed, or destroyed during the initial highway planning and construction activities in

vegetation management Zones 1 & 2. It is possible that these resources may exist in ,vegetation management Zone 3.

3.2.11.1 Environmental Consequences of Alternatives

Buildings, memorials, and other architectural features may be affected by surrounding vegetation management activities. Views of cultural resources can be obscured or preserved through vegetation management practices. Lack of adequate vegetation control can indirectly damage the structures. Overgrown structures are affected through increased decay (moisture retention), damage from tree roots, increased chance of damage from fire, etc.

The roadside vegetation itself may be considered a cultural resource. For example, a tree may be the site of an important historical event, have religious significance, or be a source of food for aboriginal peoples or the general public. The effects of the various alternatives would be site specific. However, Alternatives A and B would not provide for the protection of cultural resources. Alternative C, the no chemical approach, may not be able to adequately protect some cultural resources, such as historic structures, and may cause additional mowing of some sites. The most important element in preserving these resources is knowledge of their importance and flexibility in vegetation management strategies.

All mechanical methods have the potential to damage culturally significant sites, especially archaeological sites.

Chemical methods will not impact culturally significant areas unless these areas include vegetation. WSDOT should be aware of these areas throughout the state and modify vegetation management practices in order to prevent damage to these sites.

Vegetation management Zone 3 has the potential of containing archeological sites. Cultural methods of vegetation management have the greatest potential to damage archeological sites in Zone 3, since disturbance of the soil surface is required for establishing vegetation. However, any method where mechanized equipment traverses vegetation management Zone 3 has a potential to damage cultural resources.

Biological methods of vegetation management will probably not have an effect on cultural resources.

3.2.11.2 Unavoidable Adverse Impacts

WSDOT must control or remove plants which may impact highway user safety or the structural integrity of the road. Mowing impacts can damage archaeological sites, as can surface preparation of soil for establishing grass and herbaceous plant cover.

3.2.11.3 Mitigation Measures

WSDOT should develop a site specific vegetation management plan which addresses preservation of a cultural site's unique value to the public. Methods of vegetation management which will have as little impact as possible should be employed on and/or

around all cultural sites. Equipment traffic should be avoided on all culturally sensitive areas. However, if equipment traffic is required, all vehicular activity should take place during dry soil conditions. Vehicles with the lowest possible ground pressure should be used. Seeding should be used instead of planting established plants. Woody trees and shrubs should not be planted on archaeological sites.

3.2.12 Transportation

The highway system provides visual and physical aides for the safety of motorists. Vegetation management techniques must help maintain structural integrity of the highway. They must also ensure that visual and physical aides to road users are visible and functional and thus protect public health, safety, and welfare. Appendix C Chapter 1 contains a more in-depth discussion of roadside vegetation managements effects on transportation.

3.2.12.1 Environmental Consequences of Alternatives

Effects of chemical management techniques on vegetation occur in one day, a few weeks, or as long as a year depending on the type of chemicals used. Chemicals which take affect within a short time after application can have significant impacts to the highway. Proper follow-up management techniques should be implemented to discourage establishment of undesirable vegetation, prevent soil erosion, and reduce potential fire hazards. Cultural and biological management techniques help improve growing conditions of desirable plants and eliminate establishment of undesirable plants which can affect the structural integrity and public safety of the highway. Effects of cultural and biological management techniques occur over several months and as long as a year or more. Most cultural and biological techniques will have little or no adverse impacts to the integrity and safety of the highway. Competitive planting, however, may introduce plants which could have adverse impacts on the highway. Mechanical techniques are used where chemical techniques are not feasible to control vegetation encroachment onto highways and thus provide adequate visibility of highway safety appurtenances such as signs, lights, railings, and ditches. Mechanical management techniques can have the same effects as chemical techniques if follow-up management techniques are not implemented. See Chapter One, Transportation, of Appendix C, Social Assessment, which describes impacts of individual maintenance management techniques that may affect structural integrity and public safety of the highway.

3.2.12.1.1 Alternative A - No Action

Alternative A would not provide protection for the roadways structural integrity or safety of the highway user.

3.2.12.1.2 Alternative B - Remedial Action Approach

Under Alternative B, action would be taken only after it has been determined that the highway facility or public safety is threatened. As discussed previously, this is possibly an inadequate alternative to protect highway facilities and public safety.

3.2.12.1.3 Alternative C - No Chemical Approach

Under Alternative C, the No Chemical Approach, maintenance of the vegetation free Zone 1 while minimizing erosion would not be possible. The vegetation free zone is essential to protection of the highway structure and the public safety. This alternative would inadequately protect the highway facilities and the public safety.

3.2.12.1.4 Alternative D - Short-term Single Action Approach

Alternative D would adequately protect the highway structure and public safety.

3.2.12.1.5 Alternative E - Long-term Comprehensive Approach

Alternative E would adequately protect the highway structure and public safety.

3.2.12.1.6 Alternative F - Current Practices, Decentralized Management

Alternative F would adequately protect the highway structure and public safety.

3.2.12.2 Unavoidable Adverse Impacts

Dust, noise, smell, interruption of traffic, and distraction of motorists are consequences of vegetation management techniques which may temporarily impact motorists.

3.2.12.3 Mitigation Measures

Large scale use of chemical and mechanical management techniques, which expose soils to erosion or invasion of undesirable vegetation, should be minimized and should be followed by cultural techniques, such as mulching, revegetation, or a combination thereof. To minimize potential injury to the public, as well as unavoidable adverse impacts, the use of chemical and mechanical techniques should be performed during periods of low vehicular traffic.

3.2.13 Services

The highway system provides service facilities for public use. These facilities include bus stops, emergency areas, rest areas, and scenic and historic facilities. Vegetation management techniques should preserve the usability of these facilities, as well as maintain public safety. Appendix C Chapter 2 describes the different service areas associated with transportation corridors and how maintenance management techniques can improve or impact the use and safety of these facilities.

3.2.13.1 Environmental Consequences of Alternatives

The public is exposed to maintenance management techniques at service areas because these areas are maintained intensively in order to facilitate public use. Users may come into contact with chemicals applied on vegetation. Mechanical management techniques may produce sharp edges and points which can potentially injure users of service areas.

Mechanical equipment can produce projectiles during operation, which could endanger the public. Other potential impacts may include dust, smoke, and objectionable odors.

3.2.13.1.1 Alternative A - No Action

Under this alternative, no vegetation management activity would occur. This alternative would not preserve the usability of roadside facilities or maintain public safety.

3.2.13.1.2 Alternative B - Remedial Action Approach

Under this reactive management strategy, only mechanical and chemical methods of vegetation control would be used, since these methods generally provide immediate vegetation control. Of all the alternatives, the remedial action approach will treat the fewest acres annually by mechanical, chemical, or cultural methods. This approach probably would not preserve the usability of roadside facilities.

3.2.13.1.3 Alternative C - No Chemical Approach

As the name of this alternative implies, no pesticides will be used. However, all other methods of vegetation management will be used, with an emphasis on mechanical control. The No Chemical Approach would be less likely to preserve the usability of roadside facilities than Alternatives D, E, and F.

3.2.13.1.4 Alternate D - Short-term Single Action Approach

The Short-term Single Action Approach uses only mechanical and chemical methods for vegetation management. This approach would treat 70,600 acres annually and would probably preserve the usability of roadside facilities and provide for the public safety.

3.2.13.1.5 Alternative E - Long-term Comprehensive Integrated Approach

With this alternative, the number of acres treated annually by mechanical and chemical methods will decease after the first five years. However, the number of acres treated annually by cultural vegetation methods will increase. This alternative would adequately preserve the usability of the roadside facilities and provide for the public safety.

3.2.13.1.6 Alternative F - Current Practices, Decentralized Management

Alternative F uses all vegetation control methods available. This alternative would adequately preserve the usability of the roadside facilities and provide for the public safety.

3.2.13.2 Unavoidable Adverse Impacts

Dust, noise, glare, smell, and equipment associated with chemical and mechanical maintenance activities can temporarily impact the use of service areas.

3.2.13.3 Mitigation Measures

If possible, chemicals used adjacent to walks, picnic tables, restrooms, bus stops, and interpretive facilities should be of a granular type, to minimize the potential for direct contact to the public. Mechanical techniques using shearing equipment, which produces sharp edges and points, should not be used along walks, bicycle paths, bus stops, picnic tables, restrooms, and interpretive facilities, in order to minimize potential injury to the public. Mechanical techniques should be performed during hours of low usage of services areas, to minimize unavoidable adverse impacts.

3.2.14 Human Health

The analysis of the risk to human health from the vegetation management treatment methods is presented in Chapter 4 of Appendix B. The vegetation management treatment methods that were analyzed are mechanical, chemical, biological, and cultural. The alternatives that are presented in this EIS represent different combinations of these four treatment methods. This section of the EIS is designed to look at how these different methods are combined in the alternatives and to identify how human health concerns may differ from one alternative to another, based on the specific combination of vegetation management treatment methods.

3.2.14.1 Environmental Consequences of Alternatives

Each of the treatment methods presents its own set of risks to human health. Therefore, before the differences in human risk between alternatives are discussed, the human health risk for each of the treatment methods is summarized below.

Mechanical Methods - Mechanical treatments include manual techniques, such as hand weeding and the use of hand power tools, in addition to mowing, grading, and other activities using heavy machinery. The greatest threat to human health from the use of mechanical vegetation control is the risk to workers from the possibility of accidents involving heavy machinery, hand tools, and contact with poisonous vegetation. Also included in the risk to workers is the possibility of accidents with passing motorists. Soil erosion that may adversely affect water quality, the possible reduction in air quality from the burning of fossil fuels, and the increase in dust from the use of heavy machinery are also risks related to the use of mechanical vegetation control.

Many of the mechanical control byproducts to which WSDOT workers are exposed are reported to adversely affect human health. It is suspected that diesel exhaust may cause lung cancers or other cancers; CO may cause carboxyhemoglobin hypoxia; asbestos may cause asbestosis or lung cancer; lead may cause neurobehavioral effects; and inhaling dust may cause respiratory irritation or expose workers to silica. How significant a risk is presented is not clear. For example, the potential risk from diesel exhaust was considered less than significant in one exposure analysis. (Jones and Stokes, 1991)

Chemical Methods - A detailed analysis of the risks to human health from using herbicides is discussed in Appendix B, Chapter 4. In general, the risk of experiencing either short- or long-term effects from using herbicides is much greater for WSDOT workers than it is for the general public.

Risks evaluated in Chapter 4 of Appendix B are ultimately expressed as numerical equations based on probabilities. Many underlying assumptions are discussed in detail. All assumptions made are intended to err on the side of conservatism, in order to ensure risk is minimized. The results of the assessment process (expressed as "Hazard Quotients" or "Cancer Risk") are assigned by their numerical values to one of four categories: negligible risk (a hazard quotient of ≤ 1 or a cancer risk $\leq 1x10^{-5}$, roughly less than the risks associated with taking one transcontinental flight per year); low risk (a hazard quotient > 1 but ≤ 10 or a cancer risk $> 1x10^{-5}$ but $\leq 1x10^{-4}$, roughly in the range of the risk from drinking a pint of milk a day); moderate risk (a hazard quotient of > 10 but ≤ 100 and a cancer risk of $> 1x10^{-4}$ but $\leq 4x10^{-3}$, roughly in the range of the risk from drinking one diet drink per day); and high risk (a hazard quotient of > 100 or a cancer risk $> 4x10^{-3}$, roughly in the range of risk from alcohol consumption or smoking).

WSDOT mixers, mixer/loaders, and mixer/loader/applicators involved in chemical control of unwanted vegetation were evaluated as to their potential risk of experiencing adverse health effects. Under an average exposure scenario (average WSDOT application rates), the risks of short-term effects are low for diuron and oxadiazon and negligible for the remaining 23 herbicides. Under the maximum exposure scenario (maximum allowable label rate, not used by WSDOT), diuron creates a high risk to workers of experiencing short-term effects; 2,4-D and oxadiazon are moderate risks, and bromacil, 2,4-DP, dichlobenil, dicamba, fosamine, oryzalin mecoprop, and triclopyr are low risk herbicides. Again, WSDOT does not use these herbicides at maximum labeled rates. All other herbicides are negligible risks at maximum rates. Table 3-1 compares WSDOT's average and maximum application rate and maximum label rate. Tables 3-2 through 3-5 show human health risk of compounds used by WSDOT.

The risks to the public from the use of chemicals in vegetation management were analyzed using the average application rate scenario, the maximum application rate scenario, and by reviewing the exposure from drift, the consumption of berries and vegetables exposed to drift, and being exposed from walking through freshly sprayed vegetation. In all cases (average and maximum exposure scenarios), except the dermal exposure pathway, all of the 25 herbicides presented either a negligible or low risk of short-term effects to the public. If pedestrians were dermally exposed to directly sprayed vegetation at average rates, all herbicides are of negligible risk to the public. At maximum rates, not used by WSDOT, 2,4-DP, dicamba, dichlobenil, fosamine, and oxadiazon are of low risk, 2,4-D is a moderate risk, and diuron is a high risk to the public.

The risks to human health from the movement of herbicides into surface and ground waters were determined to be negligible for all 25 herbicides.

The carcinogenic risks to WSDOT workers and the public from long-term exposures to these herbicides at average application rates is negligible for all 25 herbicides. At maximum label rates, WSDOT employees would be at a low to moderate risk from repeat exposures to oryzalin, oxadiazon and 2,4-D. The potential cancer risks to the public from dermal exposure to directly sprayed vegetation at maximum label rates ranges from low for pronamide, to moderate for 2,4-D, oryzalin, and oxadiazon.

However, historical data from WSDOT spray records indicate that maximum rates are not used.

Biological Methods - Neither WSDOT workers nor the public would be at risk from biological control methods, unless they inhibit road use and visibility.

Cultural Methods - The only impact that cultural methods would have on human health is directly related to the impact that fertilizers would have on water quality. In addition, since cultural control activities require the use of heavy machinery, the risk of injury to workers and the public would be similar to the risks from the use of heavy machinery for mechanical control methods. However, there may be an increased risk to road users if inadequate control of vegetation blocks site distance or allows damage to the roadway to occur.

3.2.14.1.1 Alternative A - No Action

Under Alternative A, no action would be taken to control vegetation. Neither the public nor WSDOT workers would be at risk from the use of herbicides, adjuvants, inert ingredients, or fertilizers. WSDOT employees would not be at risk from inhalation of airborne contaminants or accidents caused by passing motorists or from accidents incurred from mechanical or manual control of vegetation. Air quality would not be adversely affected as a result of no action, but water quality could be significantly affected by the accumulation and wash-off of road surface contaminants.

There are, however, considerable evironmental and human health consequences to a "No Action Approach" to vegetation management. The major problem would be the safety of the roadway. Numerous safety hazards would become evident, such as low visibility, deteriorating roadways, and an increase in the numbers of large mammals closer to the roadside. These problems, undoubtedly, make this alternative a greater threat to human health and a greater threat to some wildlife species than any of the other alternatives.

3.2.14.1.2 Alternative B - Remedial Action Approach

Under Alternative B, measures to control vegetation would not be employed until it is determined that public safety, legal action, or damage to the highway facility is threatened. Since biological and cultural control methods are slow, this alternative would primarily involve only mechanical and chemical methods of vegetation control.

In this alternative, only 29 percent of the right-or-way would be treated with either mechanical (25 percent) or chemical (4 percent) methods. The effects on those areas that do not receive any vegetation management (75 percent) would be similar to those described under Alternative A.

The primary impact to human health would be from the risks associated with mechanical vegetation management, such as accidents, reduction in air quality from combustion of fossil fuels, and water quality impacts from increased erosion. Although chemical treatments are included in this alternative, only 4 percent of the roadsides would be treated with chemicals, so they would not pose as significant a health risk as mechanical methods.

3.2.14.1.3 Alternative C - No Chemical Approach

The primary method of vegetation control under this alternative would be mechanical treatments. Although cultural and biological treatments would also be used under this alternative, they have a very low potential for adversely affecting the health of human populations.

The human health risks associated with the implementation of this alternative would be the same as those described for Alternative B. However, since a larger portion of the right-of-way is treated under this alternative, it is expected that the risks would be greater under this alternative. The greatest increase in risk would be to WSDOT employees managing vegetation. The risk to the public would not necessarily increase as drastically as for WSDOT employees, since this alternative is less reactionary than Alternative B and may be able to prevent roadside hazards earlier.

3.2.14.1.4 Alternative D - Short-term Single Action Approach

The "Short-term Single Action Approach" dependes heavily on the use of chemicals to control vegetation. Mechanical control is also expected to be used—not as extensively as in Alternative C, but more so than the current practices, Alternative F.

The impacts on humans from mechanical control methods will be very similar to those in Alternatives C and F. The heavy use of chemicals may be of some concern. These concerns vary by region, the vegetation and the best methods to control it vary so drastically from one region to another. A summary of the impacts that regional differences will have on human health is presented in Section 3 of this chapter.

The greatest risks from the use of chemicals for vegetation management are to the WSDOT employees; more specifically, to the mixers, loaders, and applicators. All chemicals planned for use by WSDOT are considered to be of negligible risk to employees when used at WSDOT's historical average application rates. However, if these chemicals were used at maximum label rates, diuron would present a high risk of short-term effects to workers and 2,4-D and oxadiazon would be considered moderate risks. Historically, WSDOT's average application rates of these herbicides is approximately 13 percent of the maximum label rate for 2,4-D, and 8.3 percent for diuron. There are no historical application rates for oxadiazon by WSDOT. All herbicides are of low or negligible risk to the public if consumption of berries receiving direct sprays were to occur. The same is true for consumption of vegetables receiving drift or for direct exposure to drift from chemical application. The greatest risk of short-term exposures to the public would be dermal exposures from walking through recently sprayed vegetation. Under this scenario, 2,4-D and diuron would be moderate and high risks, respectively, if applied at maximum label rates. Under WSDOT average rates, risks are negligible.

All of the chemicals used present a negligible risk of causing cancer to both WSDOT employees and the public when used at WSDOT historic average application rates. Should maximum label rates ever be used, the cancer risks to both WSDOT employees and the public would be moderate from the use of oryzalin, oxadiazon, and 2,4-D.

3.2.14.1.5 Alternative E - Long-term Comprehensive Integrated Approach

Alternative E is designed in two phases. In the first phase, years 1 through 5, management would be composed primarily of chemical and mechanical means, but with a concerted effort to use cultural vegetation management to establish and maintain stable, low maintenance vegetation along the right-of-ways. This phase of the alternative would have much of the same chemical risks as described in Alternative D and the same kinds of risks associated with mechanical control as described in Alternative C.

The second period of this alternative, years 5 and beyond, would move into less dependence on chemical and mechanical treatments and more dependence on biological and cultural control methods. This would significantly reduce the risks to workers and to the public. The risks of degradation of water quality from the use of fertilizers in cultural control would increase, but the amount of fertilizers used for roadside vegetation management is inconsequential compared to the amount of fertilizers used in agriculture throughout the state and is not expected to have a significant impact on human health. Biological controls are considered to be of negligible risk to human health.

3.2.14.1.6 Alternative F - Current Practices, Decentralized Management

Alternative F describes current vegetation management practices. This alternative is also very dependent on mechanical and chemical treatments, as are Alternatives C and D, respectively, and the impacts on human health are expected to be similar to these other alternatives. The level of chemical and mechanical treatments is expected to be similar to the first period of Alternative F, but the risks from chemical and mechanical treatments are not expected to decrease over time, as is the case for Alternative E.

3.2.14.2 Unavoidable Adverse Impacts.

Probably the biggest unavoidable impact on human health is the threat to WSDOT employees of encountering an accident with a passing motorist, or involving heavy equipment operation or the use of powered hand tools. Although many of these accidents can be avoided, not all accidents can be prevented.

The inhalation of exhaust fumes, CO_2, lead, and dust cannot be avoided by WSDOT employees working along highways.

Some impacts on water and air quality from the use of mechanical, chemical, and cultural methods are also unavoidable, but the impacts these will have on human health are likely to be insignificant.

3.2.14.3 Mitigation Measures

Chemical Methods - The main mitigating practice is to follow the label directions for applications, mixing, and safety equipment recommendations. Water quality can be protected by not applying within 5 feet of surface water or when rain is imminent. The use of adjuvants to reduce drift and mask offensive odors can significantly reduce the impacts on local air quality and reduce the possibility of drift landing on non-target vegetation which could be consumed by the public. Reducing the number of broadcast

applications in favor of spot application, maintaining as narrow as practical a vegetation free zone along the highway shoulder, and limiting application to calm days, can also reduce the possibilities of drift. Using reduced application rates can reduce exposure of the public.

Mechanical Methods - Providing adequate notification that roadside work is being performed ahead, in addition to conducting maintenance activities during lower traffic times, can help to reduce roadside accidents. WSDOT employees should wear bright, reflective clothing. Avoiding the use of heavy equipment on steep slopes, moist soils, and fine textured soils can aid in preventing equipment accidents and water quality impacts. Activities to control dust, such as watering exposed, dry soils and limiting the use of heavy machinery in dry regions to calm days, can help improve local air quality and reduce the possibility of motorist accidents caused by poor visibility.

Cultural and Biological Methods - Since the use of cultural and biological control methods (except fertilizer) are not expected to affect human health adversely, no mitigation measures are necessary. Mitigation measures that reduce the impact fertilizers will have on water quality are similar to those recommended for herbicide use.

3.3.0 Summary of Impacts and Mitigation Measures By Physiographic Provinces

3.3.1 Geology and Soils

Several components of vegetation management control techniques have the potential to cause adverse impacts on the geology and soils of Washington highway roadsides. Mechanical and chemical techniques may cause soil compaction and expose mineral soil, which could lead to accelerated erosion and lower vegetative productivity. In areas of high soil instability, removal of deep rooted vegetation and inadequate surface water control could lead to mass soil movement. Individual physiographic provinces (see Figure 3-1) do not correlate well with specific impacts to geology and soils, but minor differences do exist on the east versus the west side of the Cascade Mountains.

The greatest opportunity to mitigate the adverse impacts of mechanical vegetation management techniques on soils is to limit the number of, or eliminate, mechanical treatments on a specific right-of-way. Mowing should be deferred until July, after the vegetation has matured and soils are generally drier. In addition, grading to reconfigure roadside terrain should be kept at a minimum, and hydromulching or other surface-protecting methods should be used to establish new vegetation quickly where soils are exposed.

All Physiographic Provinces West of the Cascade Range

Impact - Soil compaction, mass movement, or surface erosion may result from the removal of vegetation or the vegetation treatment methods used.

Mitigation - Mowing should be avoided, or done only once in late summer after grass has fully developed seed heads and finer textured soils are relatively dry; complete plant

cover of soil surface should be maintained as protection against surface erosion and as an enhancement to soil structure.

All Physiographic Provinces East of the Cascade Range

Impact - Wind erosion and soil mass movement may result from loss of a vegetative cover on soil surface.

Mitigation - Complete vegetative coverage of soil surface should be maintained; on unstable slopes, deep-rooting trees and shrubs should be maintained, to reduce mass wasting.

3.3.2 Air Quality

Roadside vegetation management may have adverse impacts on air quality. Dust emissions are likely to result from activities that disturb the soil surface during dry weather. Exhaust emissions are an unavoidable result of all activities that require the use of gasoline- or diesel-powered equipment. Unpleasant odors are often associated with the application of herbicides and fertilizers. In addition, there is a potential risk of exposing people, wildlife, and other non-target organisms to airborne chemicals, particularly in areas where it would be impractical to remove non-target organisms or to prevent their entry during or immediately after application.

Wind erosion from roadside areas void of vegetation can have a large impact on air quality, particularly east of the Cascade Range. Management techniques that promote and maintain a continuous, healthy cover of vegetation over the soil surface are the most effective means of dust control. See Chapter 3, Section 3.2.2.3, for a discussion of a variety of potential mitigation methods available to reduce or eliminate the adverse impacts on air quality from vegetation management techniques.

All Physiographic Provinces West of the Cascade Range

Impact - Removal of vegetation from both Zones 1 and 2 by mechanical and chemical treatments often results in blowing dust or spray drift, affecting air quality adversely. Noxious weeds are generally controlled with a single herbicide application in western Washington.

Mitigation - Mowing should generally be performed once a year, after vegetation has matured in mid-summer. Mowing method should not create bare soil conditions that produce wind-blown dust. All chemical treatments should be performed during no wind or low-wind conditions, to reduce or eliminate chemical drift.

All Physiographic Provinces East of the Cascade Range

Impact - Low, open vegetation is removed from Zone 1 and sometimes portions of Zone 2, mostly by mechanical methods. Noxious weeds are generally controlled through multiple herbicide applications in eastern Washington.

Mitigation - Mowing and other mechanical techniques could be eliminated or performed only during low wind conditions. Many roadside zones can be planted with competitive perennial grasses and not mowed. Spraying of noxious weeds should occur only during low-wind conditions, and should be avoided during sensitive periods for adjacent agricultural crops.

3.3.3 Water Quality

Potential accelerated erosion, resulting from loss of ground surface cover caused by vegetation management activities (most often, mechanical), may have an adverse impact on water quality. Herbicide and fertilizer applications can have a substantial, but mitigable, impact on water quality. Inappropriate use of fertilizers to enhance soil fertility, as part of the cultural technique, could lead to off-site movement of the material, which in turn may affect surface and ground water quality.

Potential water quality impacts from the mechanical vegetation management technique can be mitigated by avoiding the use of heavy equipment on steep slopes and maintaining dense healthy vegetation in the roadside environment, and in particular, drainage swales. The practice of using hydromulching when seeding new vegetation has been particularly effective as a mitigation process in recently disturbed areas along many Washington highways. The potential for off-site movement of chemical fertilizers can be reduced by making site specific prescriptions rather than using a regional prescription. See Chapter 3, Section 3.2.3.3, for a list of practices designed to limit adverse impacts to water quality.

All Physiographic Provinces West of the Cascade Range

Impact - Highly productive vegetation is removed by mechanical and chemical treatments. Run-off carrying soil particulate matter and chemical contaminants could impact water quality.

Mitigation - Mowing is generally performed once a year, after vegetation has matured in mid-summer. Aquifers should be protected by avoiding the use of chemical treatments, which have a potential to migrate through the soil column. The use of persistent and/or non-selective herbicides should be limited.

All Physiographic Provinces East of the Cascade Range

Impact - Low, open vegetation is removed from Zone 1 and portions of Zone 2, mostly by mechanical methods that tend to scarify the soil surface. Noxious weeds are generally controlled through chemical techniques in eastern Washington, creating a potential for contaminated run-off.

Mitigation - Mowing and other mechanical techniques could be used only after July 1 in unirrigated areas. Many roadside zones can be planted with competitive perennial grasses and not mowed. Spraying of roadside vegetation generally should not be conducted during sensitive periods for adjacent agricultural crops. Chemical treatments which have a potential to migrate through the soil column should be avoided near aquifer recharge areas.

3.3.4 Flood Plains

No significant adverse impacts to flood plains are foreseen under any of the vegetation management alternatives for all physiographic provinces. Under some localized conditions, in which specific vegetation treatments could increase storm run-off to the extent that flood plains would be impacted, the management techniques being used would be modified.

Because roadside vegetation management is not expected to have significant impacts on flood plains, mitigation would not be necessary. Many of the mitigation measures described in Chapter 3, Section 3.2.1.3, are designed to limit soil compaction and erosion and increase soil infiltration rates. These measures are also effective in limiting increases in storm run-off. In those local areas where increased run-off from roadsides has the potential to increase flooding significantly, additional detention facilities could be installed to store the run-off and release it gradually.

3.3.5 Wetlands

The following information summarizes the potential impacts to water quality, aquatic habitats, and aquatic biota of the six alternatives being considered for use by WSDOT, and possible mitigation efforts within each of the physiographic provinces of the state of Washington.

3.3.5.1 Olympic Peninsula Physiographic Province

The Olympic Peninsula physiographic province is characterized by high annual precipitation (>240 inches) and low road densities. Both of these factors will influence the impacts of each of the alternatives on water quality and the mitigation efforts employed to reduce or eliminate impacts.

Impacts - Compaction from motorized equipment reduces water infiltration and increases soil erosion. Soil erosion and increase deposition of sediment occur where poor vegetative cover occurs. Wetlands are likely to be affected indirectly by the use of fertilizers and herbicides.

Mitigation Measures - Potential water quality impacts from mechanical vegetation management can be minimized by avoiding the use of heavy equipment on steep slopes, particularly during times of high soil moisture. Maintaining dense, healthy vegetation in the roadside environment will have the greatest positive impact on wetlands, as will use of a border/boundary area for herbicides not labeled for aquatic uses.

3.3.5.2 Coast Range Physiographic Province

As with the Olympic Peninsula physiographic province, the Coast Range physiographic province is characterized by high annual precipitation (60-120 inches) and low road density. The potential impacts of the selected alternatives on water quality, aquatic habitats, and aquatic biota in the Coast Range physiographic province, and mitigation measures to reduce or eliminate these impacts, would be similar or identical to those in the Olympic Peninsula physiographic province (see Section 3.3.5.1).

3.3.5.3 Puget Trough Physiographic Province

The Puget Trough Physiographic Province is characterized by moderate annual rainfall (15-60 inches) and high road density. Because of the high density of WSDOT right-of-ways, there is a higher potential for vegetation management alternatives to impact water quality, aquatic habitats, and aquatic biota. However, the potential impacts of the various vegetation management alternatives, as well as the mitigation measures to help reduce these impacts, are similar to those in the Olympic Peninsula physiographic province.

In the ecological risk assessment, the herbicides benefin, diuron, and oxadiazon were characterized as presenting a potentially high relative risk to aquatic organisms at maximum label rates in this province. To reduce the potential risks presented to aquatic organisms by these herbicides, the following mitigation measures should be implemented:

- When possible, alternative herbicides should be substituted for the high risk herbicides when applications near surface waters are necessary.
- Minimum necessary application rate should be used.
- Frequency of application should be reduced.

3.3.5.4 Northern Cascades Physiographic Province

As with the Olympic Peninsula physiographic province, the Northern Cascades physiographic province is characterized by high annual precipitation (50-180 inches) and low road density. The potential impacts of the selected alternatives on water quality, aquatic habitats, and aquatic biota in the Northern Cascades physiographic province, and mitigation measures to reduce or eliminate these impacts, would be similar or identical to those in the Olympic Peninsula physiographic province (see Section 3.3.5.1).

3.3.5.5 Southern Cascades Physiographic Province

As with the Olympic Peninsula physiographic province, the Southern Cascades physiographic province is characterized by high annual precipitation (50-140 inches) and low road density. The potential impacts of the selected alternatives on water quality, aquatic habitats, and aquatic biota in the Southern Cascades physiographic province, and mitigation measures to reduce or eliminate these impacts, would be similar or identical to those in the Olympic Peninsula physiographic province (see Section 3.3.5.1).

3.3.5.6 Okanogan Highlands Physiographic Province

The Okanogan Highlands physiographic province is characterized by low annual precipitation (12-45 inches) and moderate road density. The potential impacts of the selected alternatives on water quality, aquatic habitats, and aquatic biota in the Okanogan Highlands physiographic province, and mitigation measures to reduce or eliminate these impacts, would be similar to those in the Olympic Peninsula physiographic province (see Section 3.3.5.1). However, because of the low annual precipitation and the relatively moderate road density, there would be reduced potential for impacts to water quality,

aquatic habitats, and aquatic biota due to soil erosion and transport of herbicides to aquatic habitats.

3.3.5.7 Columbia Basin Physiographic Province

The potential impacts of the selected alternatives on water quality, aquatic habitats, and aquatic biota in the Columbia Basin physiographic province. Mitigation measures to reduce or eliminate these impacts would be similar or identical to those discussed for the Okanogan Highlands physiographic province (see Section 3.3.5.6).

3.3.5.8 Blue Mountains Physiographic Province

The potential impacts of the selected alternatives on water quality, aquatic habitats, and aquatic biota in the Blue Mountains physiographic province, and mitigation measures to reduce or eliminate these impacts, would be similar or identical to those discussed for the Okanogan Highlands physiographic province (see Section 3.3.5.6).

3.3.6 Vegetation

The widely diverse physiographic and climatic conditions in Washington, and the effects vegetation management techniques can have on plant communities, indicate the need for detailed evaluation on a site-specific basis. The alternatives proposed for roadside vegetation management could have various adverse impacts on vegetation, irrespective of physiographic province. The potential impacts at any given site will depend on the existing conditions of that site and on the technique, or combination of techniques, that might be applied. See Chapter 3, Section 3.2.6.2, for a discussion of potential impacts related to vegetation control techniques.

Mitigation efforts can minimize the impacts of vegetation management on desirable vegetation, while continuing to provide for public safety concerns. Because impacts will vary with the specific conditions at different sites and with different physiographic provinces, mitigation efforts must be considered on a site-specific basis. Different mitigation approaches could also be appropriate in the different zones of the roadside environment. See Chapter 3, Section 3.2.6.3, for a discussion of some mitigation techniques that may be considered.

Olympic Peninsula and North and South Cascade Provinces West of the Cascade Range

Impact - Tall, dense, native vegetation is removed from Zones 1 and 2.

Mitigation - Visibility and safety are the primary objectives for roadside corridors. The loss of native vegetation along roadsides would be minor, and its impact partially offset by an increase in plant community diversity. The loss would have no effect on species viability or community composition in adjacent habitats.

Coast Range and Puget Trough Provinces

Impact - Tall, dense, often non-native, shrubby vegetation is removed from both roadside Zones 1 and 2.

Mitigation - Visibility and safety are the primary objectives for roadside corridors. The minor loss of non-native vegetation along roadsides could be partially offset by an increase in plant community diversity and the replacement of non-native species with native plantings. The loss would have no effect on species viability or community composition in adjacent habitats.

Okanogan Highlands and North and South Cascade Provinces East of the Cascade Range

Impact - Generally low to medium height, shrubby vegetation is removed from Zone 1 and often portions of Zone 2.

Mitigation - Visibility and safety are the primary objectives for roadside corridors. Low-growing native shrubs and perennial grasses could be established to provide ground cover and some diversity in habitat. The loss of native vegetation along roadsides would have no effect on species viability or community composition in adjacent habitats.

Columbia Basin and Blue Mountain Provinces

Impact - Low, open, shrubby vegetation is removed from Zone 1 and sometimes portions of Zone 2.

Mitigation - Visibility and safety are the primary objectives for roadside corridors. Low-growing perennial grasses could be established to provide ground cover and some diversity in habitat. The loss of native vegetation along roadsides would have no effect on species viability or community composition in adjacent habitats.

3.3.7 Wildlife and Wildlife Habitat

The physiographic provinces and vegetation zones of Washington encompass a broad range of environmental features and conditions, providing habitats for nearly 500 species of birds, mammals, reptiles, and amphibians. Vegetation along roadsides will always attract some form of wildlife, putting many animals at increased risk of highway mortality. The presence of well-traveled highways results in much reduced usage of habitats immediately adjacent to the roadway by large mammals. Species composition and predator/prey relationships along the roadsides will therefore differ from surrounding habitats. The wide variation in effects that vegetation management techniques can have on wildlife and it's habitats indicates a need for impact analysis and mitigation design on a site-specific basis.

Mitigation efforts can minimize the impacts of roadside vegetation management on wildlife and wildlife habitat, while continuing to provide for public safety concerns. Because of the widely varying species compositions and populations, different approaches would be appropriate in the different physiographic provinces. The prevalence of large

mammals in the more vegetatively productive provinces requires that Zone 2 be maintained free of any moderate to tall vegetation, for visibility and public safety. Within these zones, however, low vegetation could provide habitat for numerous small mammals and birds, while maintaining increased visibility. Wherever possible, the maintenance of a natural diversity of native plant species, in contrast to grass monocultures, would ensure productive habitat for the greatest number of wildlife species.

Olympic Peninsula, Coast Range, Puget Trough, Northern and Southern Cascades, and Okanogan Highlands Provinces

Impact - Minor loss of habitat actually being used by larger animals. Change in habitat structure could provide a niche for animal species not normally present. The increased width of poorly or unvegetated highway corridors could create a barrier to dispersal by some smaller animals.

Mitigation - Increased safety for vehicular traffic is the primary objective of roadside vegetation management. Creating an inhospitable habitat for large animals would discourage their use of highway corridors. Habitat diversity, in the normally closed canopy forests, is created by maintenance of low vegetation along roadside zones, increasing habitat available to small mammals and birds.

Columbia Basin and Blue Mountains Provinces

Impact - Potentially large loss of habitat and habitat diversity for small mammals and birds in areas of intensive agricultural activities.

Mitigation - Low shrub and perennial grass/forb vegetation should be established for use by small animals. Desirable roadside plant communities should be established so that "clean farming" techniques do not annually remove all habitat available. Vegetation management treatments should be curtailed during nesting and rearing seasons of ground-dwelling birds.

3.3.8 Hazardous Materials & Waste

The use and storage of hazardous material and generation of hazardous waste material may vary between the various physiographic provinces. At this time, not enough data is available to allow a comparative discussion of these provincial differences.

3.3.9 Visual Impacts

Visual impacts for all provinces for each maintenance technique were assessed and given a numeric rating using methods described in "Esthetics and Visual Resource Management for Highways," by Jones and Jones and the Washington State Department of Transportation. See Appendix A, Chapter 9, for detailed numeric values by physiographic province. The ratings, both positive and negative, fall between (+27) and (-27). The numeric ratings have been grouped into five basic categories as follows:

+15.1	to +27.0	=	Very Positive
+3.1	to +15.0	=	Positive
-3.0	to +3.0	=	Neutral
-15.0	to -3.1	=	Negative
-27.0	to -15.1	=	Very Negative

Impacts were also assessed and rated by Landscape Types, i.e., Urban, Suburban, Rural, and Natural areas (see Figures 3-5 through 3-8 for summary of results).

3.3.9.1 Mitigation

There are four principle forms of mitigation for all maintenance management techniques. They include: usage (amount of application); season (time of year for application); exposure (visibility of the area); and magnitude (size of the affected environment). From the visual impact assessments, mitigations have been applied by physiographic province and landscape type for each individual maintenance technique. See Figures 3-9 through 3-12 for detailed assignments of mitigation measures.

Chemical Techniques

Chemical techniques tend to have a large visual impact, especially the use of non-selective herbicides. Impacts are greater in natural areas than in urban environments, and chemical use should be applied accordingly. Use of herbicides is recommended during periods when plants are dormant or nearing leaf drop. Visual impact can be reduced by applying herbicides to individual plants or by avoiding them in highly visible areas, or by using products which are selective.

Cultural Techniques

Cultural techniques are frequently seen as positive visual impacts and do not require mitigation. Inorganic mulch, although rarely used, can be a significant visual impact, especially in natural areas. Usage should be limited or not recommended. Placement in late summer and fall will allow inorganic mulch to be covered by falling leaves. Covering inorganic mulches with organic mulch will also reduce the visual impacts. Inorganic mulches should be used only in small areas as a temporary measure, and should not be used in places that are highly visible.

Irrigation can be a positive or a negative visual impact. In urban and suburban areas, irrigation is visually appropriate, but in a rural or natural environment irrigated areas will seem out of place and are not recommended.

Biological Techniques

Use of biological methods, such as insects and plant diseases, have less visual impact in a natural environment than near urban areas. Use should be limited near populated areas. Application should take place when plants are dormant, to reduce visual impact.

Mechanical Techniques

Visual impacts from mechanical techniques are far greater in natural areas than in urban environments. Brush cutting, shearing, and mowing can improve visual quality in urban areas, but are not recommended in natural areas. Most mechanical methods should be utilized during periods when plants are dormant. Grasses and other plants turn brown or lose their leaves during these times and are less likely to show signs of scalping from mowers. Visibility of some mechanical techniques, when performed in early spring, may be covered by new foliage during the growing season.

3.3.10 Transportation

3.3.10.1 Olympic Peninsula/Coast Range

A large portion of the highways within this province pass through rural, agricultural, and natural areas, with small cities and towns scattered throughout. Major highways within this province include Highways 4, 6, 12 and 101. Traffic on these highways is high during the tourist season (approximately June through September) and on holidays. The majority of the highways are two lanes and have no curbs or sidewalks, except within urban areas. Shoulders are graveled with open ditches. Freeways are two and four lanes and usually divided by a median. Highway speeds are normally from 45 mph to 55 mph, except in urban areas where speeds are normally from 25 mph to 40 mph. Speeds up to 65 mph are permitted outside of populated areas on interstate highways only.

3.3.10.1.1 Impacts

Chemicals used on a large scale may result in massive dead vegetation, which may lead to soil erosion, fire hazards, and, in some cases, encourage the establishment of undesirable vegetation. The use of mechanical equipment to remove vegetation on a large scale may result in exposure of soils to erosion and establishment of undesirable vegetation. Little or no significant negative impacts will result from cultural and biological management techniques.

Selective use of chemical and mechanical techniques can improve visibility around curves and intersections, control undesirable vegetation, minimize impacts to the structural integrity of the highway, and improve the safety of the highway. Cultural and biological techniques can improve the growing conditions for roadside vegetation and reduce potential soil erosion and establishment of undesirable vegetation.

3.3.10.1.2 Mitigations

Large scale use of chemicals and mechanical equipment should occur only when other management techniques are not feasible, and should be followed immediately by mulching and revegetation to avoid soil erosion and establishment of undesirable vegetation. Periods of heavy highway use should be avoided when using chemicals and mechanical equipment, to minimize traffic interruptions and avoid potential injury to the public.

3.3.10.2 Puget Trough

Most of Washington's major cities are within this province, as are a large portion of the state's freeways. Interstate highways include I-5, I-405, and I-90. Major state highways include 2, 3, 7, 9, 12, 16, 18, 20, 99, 101, 104, 167, 169, 202, 509, 512, 513, 516, 522, and 527. Traffic on highways within urban and suburban areas have peak traffic during the hours of 7 a.m. to 9 a.m. and from 4 p.m. to 6 p.m. Traffic is heavier when schools are in session and during the tourist season. Highways within urban and suburban areas usually have curbs and sidewalks on both sides. Rural and natural areas have graveled shoulders with open ditches. Highway appurtenances, such as signs, street and traffic lights, guardrails, median barriers, reflector buttons, cross walks, etc., are heavily used in urban and suburban areas. Highway speeds are normally from 25 mph to 35 mph within urban areas, and from 30 mph to 50 mph in suburban and rural areas. Speeds up to 65 mph are permitted outside of populated areas on interstate highways only.

3.3.10.2.1 Impacts

Because of the higher numbers of urban and suburban areas located within this province, potential impacts of maintenance management techniques to traffic flow and public safety are higher. Frequency of maintenance activities is also higher because of the greater number of highway appurtenances (signs, street and traffic lights, median barriers, and utilities). The number of intersections located within urban and suburban areas is significantly higher than in rural and natural areas, requiring regular maintenance to provide adequate visibility of crossing traffic.

3.3.10.2.2 Mitigation

Mitigation measures are similar to those identified for Olympic Peninsula/Coast range. Selective use of chemical and mechanical techniques is recommended within this province to minimize impacts to traffic flow and public safety within urban and suburban areas.

3.3.10.3 Northern Cascades/Southern Cascades

Most of the areas within this province are heavily forested, with steep terrain. A few cities and towns are located along major highways. The foothills of the Cascades are used for agricultural lands and for raising livestock. I-90 is the only interstate highway within this province. Major state highways include 2, 12, 14, 20, 97(AH), and 410. State highways are primarily two-lane highways with numerous horizontal and vertical curves, with three lanes on steep grades to allow passing of slow vehicles. Urban areas have four- and six-lane highways and relatively gentle horizontal and vertical curves. Speeds vary depending on the topography of the area. Steep and curving highways will have speeds from 20 mph to 40 mph, while the remaining highways will have speeds from 40 mph to 55 mph. Speeds up to 65 mph are permitted outside of populated areas on interstate highways only. Peak traffic occurs during the tourist season, on holidays, and during winter sports season (approximately December through February).

3.3.10.3.1 Impacts

Impacts are similar to those identified for the Puget Trough. The use of chemicals and mechanical equipment can significantly impact native vegetation, which in turn can significantly affect erosion. Erosion is of major concern because of the steep terrain within the province. Chemicals may significantly impact agricultural lands and livestock.

3.3.10.3.2 Mitigation

Mitigation measures are similar to those identified for the Olympic Peninsula/Coast Range. Selective use of chemical and mechanical techniques is recommended within native areas to minimize erosion.

3.3.10.4 Okanogan Highlands

The topography within this province is comprised of small mountains and large hills covered with pines and deciduous trees. Major state highways include 2, 20, 25, 31, 97, 155, 211, and 395. Highways in the Okanogan Highlands are typically two lanes on steep terrain with sharp curves. Typical highway speeds are from 40 mph to 55 mph. Peak traffic typically occurs during the tourist season, on holidays, and during winter sports season.

3.3.10.4.1 Impacts

Impacts are similar to those identified for the Northern and Southern Cascades. Fire and erosion are of primary concern because of the climate and hilly terrain within the province.

3.3.10.4.2 Mitigation

Mitigation is similar to that identified for the Northern and Southern Cascades.

3.3.10.5 Columbia Basin/Blue Mountains

Portions of the province are primarily rolling hills with grasses, brush, and little or no trees. Agricultural lands occupy a significant portion of the province. The Blue Mountains are similar to the Okanogan Highlands, except the hills are more densely covered by pines and understory. Significant vegetation within this province is primarily concentrated around lakes, rivers, streams, and major drainage channels. Three interstate highways are located within this province I-90, I-82, and I-182. Major highways include 2, 12, 17, 25/28, 26/127, 97(2), 155, 174, 195, 281, and 395. Highways are typically two lanes with gravel shoulders. Highway speeds vary between 40 mph to 55 mph, except within cities and towns where speeds range from 20 mph to 40 mph. Speeds up to 65 mph are permitted outside of populated areas on interstate highways only.

3.3.10.5.1 Impacts

Impacts are identical to those identified for the Okanogan Highlands.

3.3.10.5.2 Mitigation

Mitigation is identical to that identified for the Okanogan Highlands.

3.3.11 Service

Service areas along state highways include rest areas, viewpoints, points of interest, historic sites, bus stops, bicycle and pedestrian trails, bike lanes, shoulder turnouts, and snow drift and storage areas.

3.3.11.1 Olympic Peninsula/Coast Range

Viewpoints and historical sites are the major service areas along state highways within this province. These service areas have the highest usage during the tourist season (June through September). Other service areas include rest areas, bicycle trails, and shoulder turnouts.

3.3.11.1.1 Impacts

Chemicals and mechanical equipment may affect public use and safety of these facilities. Cultural and biological techniques will have little or no significant impacts to service areas.

3.3.11.1.2 Mitigation

Chemical and mechanical techniques should be performed during periods of low usage of these facilities. Methods which will eliminate or minimize potential direct contact of chemicals by the public should be chosen for high use areas. Placing mulch over chemically treated areas will provide protection from direct contact with the chemicals.

3.3.11.2 Puget Trough

Important service areas along state highways within this province include bus stops, rest areas, bicycle, pedestrian, and equestrian trails, bike lanes, and points of interests.

3.3.11.2.1 Impacts

Impacts are identical to those described for the Olympic Peninsula/Coast Range.

3.3.11.2.2 Mitigation

Mitigation is identical to that described for the Olympic Peninsula/Coast Range.

3.3.11.3 Northern Cascades/Southern Cascades

Important service areas along state highways within this province include viewpoints, historic sites, points of interest, and rest areas. Other service areas include shoulder turnouts and snow drift and storage areas.

3.3.11.3.1 Impacts

Impacts are identical to those described for the Olympic Peninsula/Coast Range.

3.3.11.3.2 Mitigation

Mitigation is identical to that described for the Olympic Peninsula/Coast Range.

3.3.11.4 Okanogan Highlands

Viewpoints, points of interest, and historic sites are the primary service areas along state highways within this province. Other service areas include rest areas and shoulder turnouts.

3.3.11.4.1 Impacts

Impacts are identical to those described for Olympic Peninsula/Coast Range.

3.3.11.4.2 Mitigation

Mitigation is identical to that described for the Olympic Peninsula/Coast Range.

3.3.11.5 Columbia Basin/Blue Mountains

Significant service areas along state highways within this province include viewpoints and points of interest. Other service areas include historic sites, rest areas, and shoulder turnouts.

3.3.11.5.1 Impacts

Impacts are identical to those described for the Olympic Peninsula/Coast Range.

3.3.11.5.2 Mitigation

Mitigation is identical to that described for the Olympic Peninsula/Coast Range.

3.3.12 Human Health

3.3.12.1 Olympic Peninsula Province

The Olympic Peninsula province is very sparsely populated, with extremely abundant precipitation. The major vegetation along Highway 101 (the major thoroughfare) is spruce, hemlock, and fir, and the understory is usually very lush. In disturbed sites, red alder, salmonberry and fern predominate.

The impact of a vegetation management program in this province (as in all eight provinces) would be mostly to WSDOT workers. Red alder and salmonberry along the highways are difficult forms of vegetation to control. Repeat applications and high

application rates are not unusual and bring exposures closer to maximum. Label precautions for personal protection should be strictly followed.

Since this province receives an abundant amount of rainfall in the lower areas near the highway, precautions should be taken not to spray when precipitation is imminent. Unexpected surface run-off can have a temporary adverse effect on water quality. However, the greatest potential effect from storm water run-off is to aquatic organisms, not human health.

Although it is WSDOT's policy not to directly spray edible vegetation, additional measures to control spray drift onto berries or gardens could include training WSDOT workers to be alert for gardens adjacent to highways and to reinforce the need for careful application practices in high use service areas.

Chemicals susceptible to hydrolysis and volatilization would degrade more rapidly in this climate than in a dry one. Results of anaerobic soil metabolism or anaerobic aquatic metabolism studies are expected to be more indicative of a chemical's behavior in this environment.

Air quality would be affected only by the exhaust odors and pollution from maintenance equipment.

If WSDOT fails to clear drainage channels of the heavy vegetation common in this province it would cause flooding of the highway, thus creating a worse hazard to human health than that posed by the proper use of mechanical or chemical control methods. The use of large equipment on steep slopes should be minimized in order not to compromise slope stability.

3.3.12.2 Coast Range Province

The Coast Range province can be classified as a "wet" region. It is sparsely populated and Washington State highways only skirt the perimeter. The major vegetation is spruce, hemlock, cedar, and fir, with a dense lush understory of shrubs and ferns. The succession of plant communities in disturbed sites is basically the same as for the Olympic Peninsula Province.

Impacts and mitigation measures for the Coast Range province would be basically the same as for the Olympic Peninsula province discussed above.

3.3.12.3 Puget Trough Province

The Puget Trough province is a "wet" region and is the most densely populated. It is covered by an extensive network of highways. The major vegetation in wetter areas is hemlock and cedar, with more fir occupying the drier areas. The understory is usually dense and lush (shrubs and ferns). Hardwoods and tall shrubs are most predominant in recently disturbed lands. Berry bushes are abundant along the highways.

Basically, the impacts and mitigation measures for the Puget Trough Province are the same as for the two previously discussed provinces. However, the potential hazard to

the public from any roadside maintenance activities is greater here than for any other provinces, due to the number of people living here and the extensive network of highways. More herbicides are used, due simply to the increased number of roadways. Care should be taken to avoid the use of maximum label rates or repeat applications. The area sprayed should be restricted. For example, the vegetation free zone, directly adjacent to the highway, should be kept as narrow as possible, not sprayed to the bottom of the drainage ditch, thus limiting the use of soil sterilants.

Berry bushes are very numerous in this region and many people enjoy their fruit. Every measure should be taken to avoid spray drift (from either broadcast or the use of spot applications) to bushes with edible fruit. The vegetation sprayed along the highway is usually dense and tall. Dermal exposure to the public walking through sprayed vegetation would be at a maximum. WSDOT should emphasize the use of practices which minimize the presence of wet foliage in high public use areas, and should continue the practice of not spraying edible or potentially edible fruits.

Puget Sound has a number of large lakes and waterways used for recreation and industry. In order to avoid overloading any body of water with herbicide contaminated run-off from the numerous highways, the spraying program should be well planned. Receiving waters should be known for each drainage channel and spraying scheduled so as not to potentially overload any one body of water. The use of herbicides which are known to leach or are potentially mobile should be restricted in order to avoid contamination of ground water used for drinking.

Traffic plays a major role in the lives of people residing in the Puget Trough. Extreme measures should be taken by WSDOT to ensure the safety of the public and WSDOT employees when performing road maintenance activities in congested areas. Maintenance activities of any kind should not be done during rush hour traffic.

3.3.12.4 Northern and Southern Cascade Provinces

The western side of the Cascades is humid and receives an abundance of snow and rain. Vegetation at the lower elevations is similar to that found in the Puget Trough. Coniferous trees and hardwood shrubs become more common at the upper elevations, with an understory of shrubs and herbs. The eastern side of the Cascades is drier and the vegetation turns to tall dense shrubs and grasses. Site disturbance usually leads to an invasion of noxious weeds. By regulation, noxious weeds must be controlled or eliminated in order to prevent their adverse impact on resources, agriculture, or human health.

Impacts and mitigation measures for the western side of the Cascades would be similar to those for the previously discussed provinces. These two provinces are much more sparsely populated than the Puget Trough and are crossed by only six state-maintained highways. Berry bushes are prevalent only at the lower elevations.

The eastern side of the Cascades is much drier; however, precautions should still be taken not to spray when precipitation is imminent. Erosion begins to have a greater impact on air and water quality, and photolysis could become a more important factor in the degradation of chemicals. Noxious weed control becomes a major portion of the

vegetation management program, requiring repeated applications. Thus, there is increased risk for WSDOT workers and the public due to the frequency of all maintenance activities.

Berry bushes are not found here, but the roadside vegetation can still be tall and dense. Drainage channels not cleared of the heavy vegetation common in this province still would cause flooding of the highway, creating a worse hazard to human health than the proper use of mechanical or chemical treatments. Dislodgeable residues are not washed off as frequently by rain. Foliage will dry more quickly. Measures to control spray drift onto gardens should be implemented, here as elsewhere.

3.3.12.5 Okanogan Highlands Province

The Okanogan Highlands province has extreme temperatures, receives only 12-45 inches of rain, and is sparsely populated. The dominant vegetation at higher altitudes is fir and pines, with an understory of grasses. Fir becomes dominant at the lower elevations, with an understory of tall dense shrubs and grasses. Areas disturbed by fire are usually repopulated by lodgepole pine. Repopulation of mechanically disturbed areas can lead to a heavy invasion of noxious weeds.

Impacts and mitigation measures for the Okanogan Highlands province would be basically the same as for the eastern side of the Cascades discussed above.

3.3.12.6 Columbia Basin Province

The Columbia Basin is an exceptionally dry area with extreme temperatures. The area is heavily irrigated for agricultural use and is dominated by shrubs and grasses. Noxious weed control is a prime concern in this province.

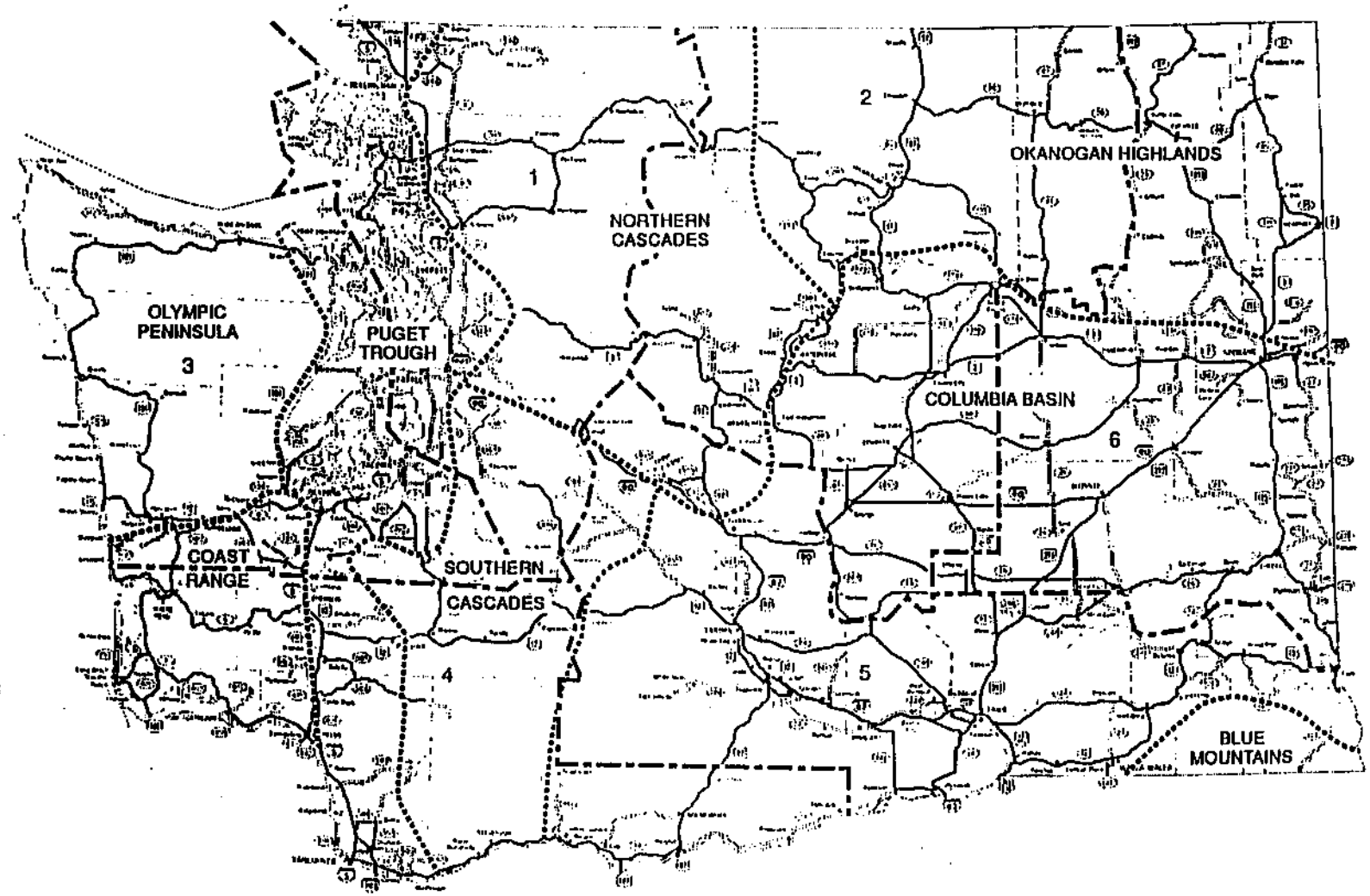
Impacts and mitigation measures for the Columbia Basin province would be basically the same as for the eastern Cascades region. Roadside vegetation is shorter and less dense, thus reducing the potential exposure to a pedestrian walking through directly sprayed weeds. There are no berry bushes in this region and most of the area surrounding the state-maintained highways is agricultural. Few home gardens could potentially be contaminated by herbicide drift. However, drift could potentially contaminate or damage adjacent crops. Measures to minimize drift should be taken and applications should never be made on a windy day.

The impact that the use of herbicides in the WSDOT vegetation management program would have on this province is insignificant compared to the impact of agricultural pest control. The repeated use of large equipment along the roadside would compact the soil, reduce plant productivity, and contribute to soil erosion and reduced air quality. However, on a windy day the contribution of WSDOT-caused erosion to reduced air quality is insignificant compared to the contribution of agricultural activities. Noxious weed control is an important legal issue. A major portion of the management program in this province is dedicated to the prevention of noxious weeds from invading agricultural lands, and preventing infestations which would require repeated herbicide applications.

3.3.12.7 Blue Mountain Province

The Blue Mountain province is a sparsely populated region containing only one small section of state-maintained highway. Most of the province is privately owned dryland agricultural or National Forest lands.

Impact and mitigation measures for the Blue Mountain province would be basically the same as for the Okanogan Highway province. Berry bushes will infest disturbed soils and could become prevalent.



SCALE IN MILES
0 20 40

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Physiographic Provinces

Highway Districts

Figure 3–1
Physiographic Provinces and State Transportation Districts of Washington

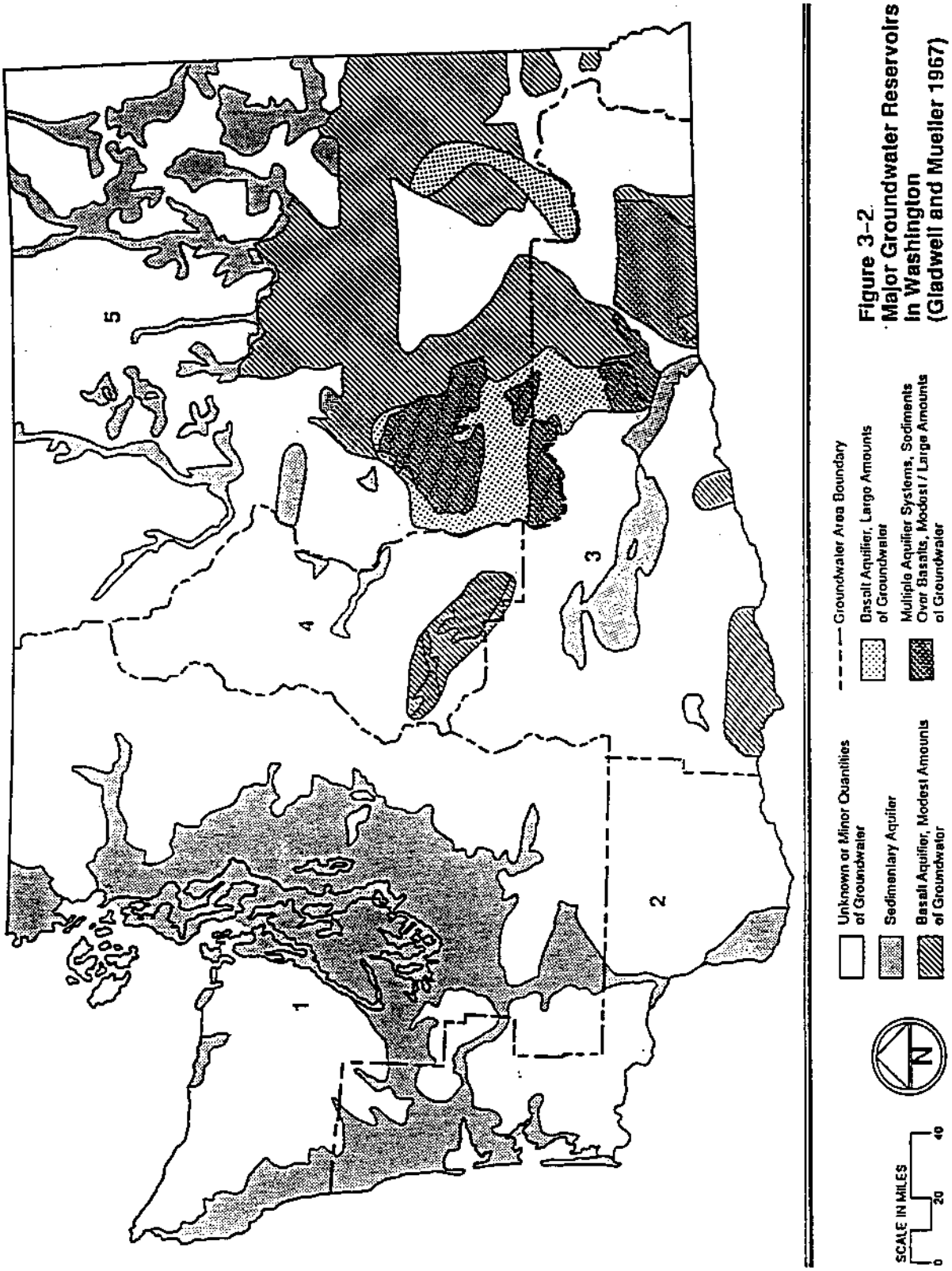

Figure 3-2
Major Groundwater Reservoirs in Washington (Gladwell and Mueller 1967)

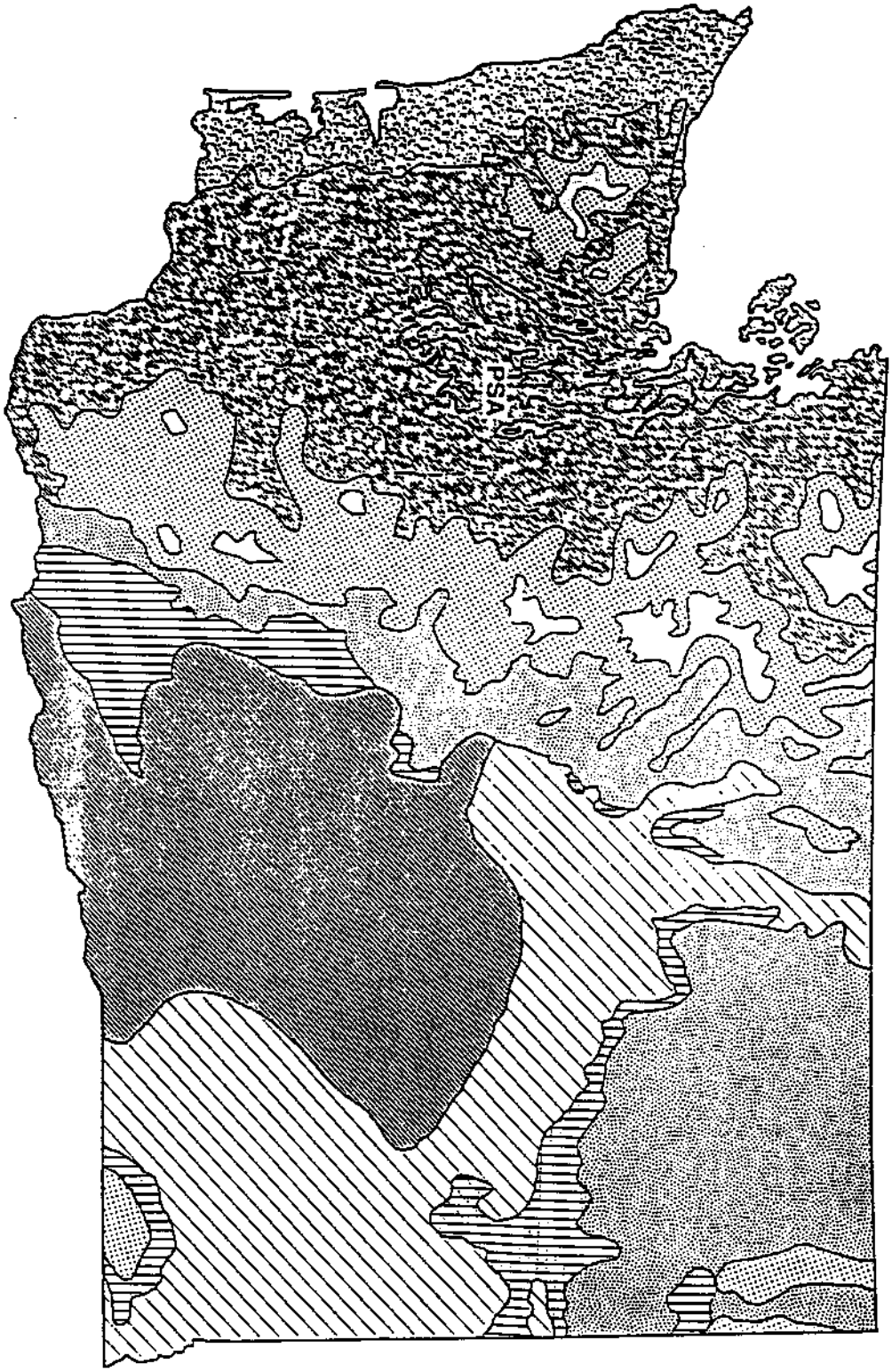

Figure 3-3
Vegetation Zones of Washington
(Franklin and Dyrness 1973)

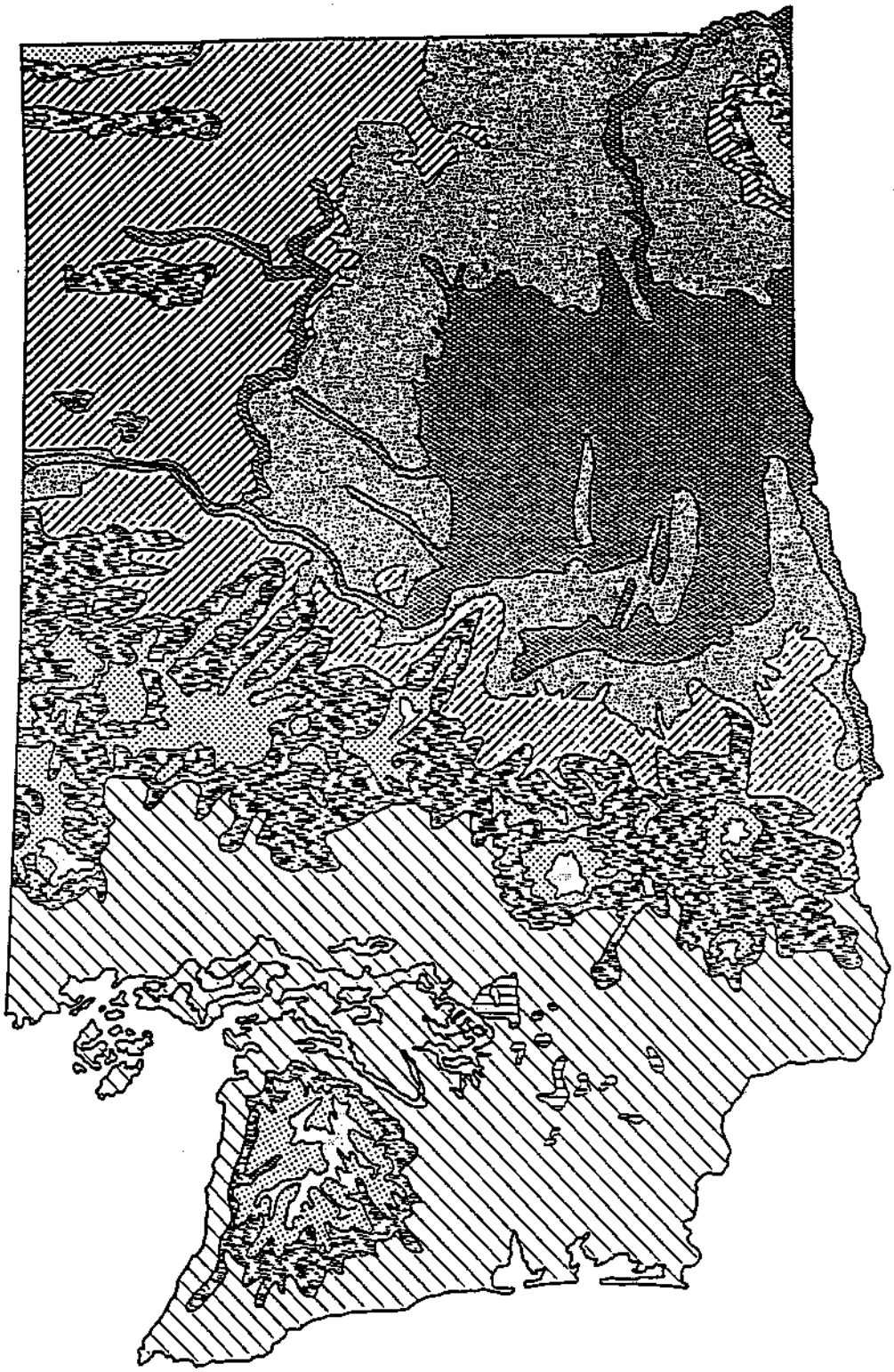

Figure 3-4
Life Zones of Washington (Jewett et al. 1953)

VISUAL IMPACTS

LANDSCAPE TYPE:			PHYSIOGRAPHIC PROVINCE				
☒ URBAN ☐ SUBURBAN ☐ RURAL ☐ NATURAL			OLYMPIC PENINSULA AND COAST RANGE	PUGET TROUGH	NORTH AND SOUTH CASCADES	OKANOGAN HIGHLANDS	COLUMBIA BASIN AND BLUE MTNS.
MAINTENANCE MANAGEMENT TECHNIQUES (MMT)	CHEMICAL	SELECTIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		NON-SELECTIVE	VERY NEGATIVE	NEGATIVE	VERY NEGATIVE	VERY NEGATIVE	NEGATIVE
		RESIDUAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
		GROWTH REGULANT	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
	CULTURAL	ORGANIC MULCH	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		INORGANIC MULCH	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
		SELECTIVE PRUNING	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		IRRIGATION	VERY POSITIVE	POSITIVE	VERY POSITIVE	VERY POSITIVE	POSITIVE
		COMPETITIVE PLANTING	VERY POSITIVE	POSITIVE	VERY POSITIVE	POSITIVE	POSITIVE
	BIOLOGICAL	INSECTS	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
		PLANT DISEASE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
	MECHANICAL	MOWED 4" HIGH	VERY POSITIVE	POSITIVE	VERY POSITIVE	VERY POSITIVE	POSITIVE
		MOWED 10" HIGH	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		UNMOWED	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		BRUSH CUTTING	POSITIVE	NEUTRAL	POSITIVE	POSITIVE	NEUTRAL
		BRUSH SHEARING	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		TREE THINNING	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL

FIGURE 3-5

VISUAL IMPACTS

LANDSCAPE TYPE:			PHYSIOGRAPHIC PROVINCE				
☐ URBAN ▩ SUBURBAN ☐ RURAL ☐ NATURAL			OLYMPIC PENNINSULA AND COAST RANGE	PUGET TROUGH	NORTH AND SOUTH CASCADES	OKANOGAN HIGHLANDS	COLUMBIA BASIN AND BLUE MTNS.
MAINTENANCE MANAGEMENT TECHNIQUES (MMT)	CHEMICAL	SELECTIVE	POSITIVE	NEUTRAL	POSITIVE	POSITIVE	NEUTRAL
		NON-SELECTIVE	VERY NEGATIVE	NEGATIVE	VERY NEGATIVE	VERY NEGATIVE	NEGATIVE
		RESIDUAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
		GROWTH REGULANT	POSITIVE	NEUTRAL	POSITIVE	POSITIVE	NEUTRAL
	CULTURAL	ORGANIC MULCH	VERY POSITIVE	POSITIVE	VERY POSITIVE	POSITIVE	POSITIVE
		INORGANIC MULCH	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
		SELECTIVE PRUNING	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		IRRIGATION	VERY POSITIVE	POSITIVE	VERY POSITIVE	VERY POSITIVE	POSITIVE
		COMPETITIVE PLANTING	VERY POSITIVE	POSITIVE	VERY POSITIVE	VERY POSITIVE	POSITIVE
	BIOLOGICAL	INSECTS	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
		PLANT DISEASE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
	MECHANICAL	MOWED 4" HIGH	VERY POSITIVE	POSITIVE	VERY POSITIVE	VERY POSITIVE	POSITIVE
		MOWED 10" HIGH	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		UNMOWED	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		BRUSH CUTTING	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
		BRUSH SHEARING	POSITIVE	NEUTRAL	POSITIVE	NEUTRAL	NEUTRAL
		TREE THINNING	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL

FIGURE 3-6

VISUAL IMPACTS

LANDSCAPE TYPE:			PHYSIOGRAPHIC PROVINCE				
☐ URBAN ☐ SUBURBAN ▣ RURAL ☐ NATURAL			OLYMPIC PENNINSULA AND COAST RANGE	PUGET TROUGH	NORTH AND SOUTH CASCADES	OKANOGAN HIGHLANDS	COLUMBIA BASIN AND BLUE MTNS.
MAINTENANCE MANAGEMENT TECHNIQUES (MMT)	CHEMICAL	SELECTIVE	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
		NON-SELECTIVE	VERY NEGATIVE	NEGATIVE	VERY NEGATIVE	VERY NEGATIVE	NEGATIVE
		RESIDUAL	NEGATIVE	NEUTRAL	NEGATIVE	NEUTRAL	NEUTRAL
		GROWTH REGULANT	POSITIVE	NEUTRAL	POSITIVE	NEUTRAL	NEUTRAL
	CULTURAL	ORGANIC MULCH	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		INORGANIC MULCH	VERY NEGATIVE	NEGATIVE	VERY NEGATIVE	NEGATIVE	NEGATIVE
		SELECTIVE PRUNING	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		IRRIGATION	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
		COMPETITIVE PLANTING	VERY POSITIVE	POSITIVE	VERY POSITIVE	POSITIVE	POSITIVE
	BIOLOGICAL	INSECTS	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
		PLANT DISEASE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
	MECHANICAL	MOWED 4" HIGH	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
		MOWED 10" HIGH	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		UNMOWED	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		BRUSH CUTTING	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
		BRUSH SHEARING	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
		TREE THINNING	NEGATIVE	NEUTRAL	NEGATIVE	NEGATIVE	NEUTRAL

FIGURE 3-7

VISUAL IMPACTS

LANDSCAPE TYPE:			PHYSIOGRAPHIC PROVINCE				
☐ URBAN ☐ SUBURBAN ☐ RURAL ☒ NATURAL			OLYMPIC PENNINSULA AND COAST RANGE	PUGET TROUGH	NORTH AND SOUTH CASCADES	OKANOGAN HIGHLANDS	COLUMBIA BASIN AND BLUE MTNS.
MAINTENANCE MANAGEMENT TECHNIQUES (MMT)	CHEMICAL	SELECTIVE	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
		NON-SELECTIVE	VERY NEGATIVE	VERY NEGATIVE	VERY NEGATIVE	VERY NEGATIVE	VERY NEGATIVE
		RESIDUAL	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
		GROWTH REGULANT	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
	CULTURAL	ORGANIC MULCH	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		INORGANIC MULCH	VERY NEGATIVE	NEGATIVE	VERY NEGATIVE	VERY NEGATIVE	NEGATIVE
		SELECTIVE PRUNING	POSITIVE	POSITIVE	POSITIVE	POSITIVE	POSITIVE
		IRRIGATION	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
		COMPETITIVE PLANTING	VERY POSITIVE	POSITIVE	VERY POSITIVE	VERY POSITIVE	POSITIVE
	BIOLOGICAL	INSECTS	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
		PLANT DISEASE	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
	MECHANICAL	MOWED 4" HIGH	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
		MOWED 10" HIGH	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL	NEUTRAL
		UNMOWED	VERY POSITIVE	POSITIVE	VERY POSITIVE	POSITIVE	POSITIVE
		BRUSH CUTTING	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE
		BRUSH SHEARING	VERY NEGATIVE	NEGATIVE	VERY NEGATIVE	NEGATIVE	NEGATIVE
		TREE THINNING	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE	NEGATIVE

FIGURE 3-8

VISUAL IMPACT MITIGATION

LANDSCAPE TYPE:
- ■ URBAN
- □ SUBURBAN
- □ RURAL
- □ NATURAL

MAINTENANCE MANAGEMENT TECHNIQUES (MMT)		PHYSIOGRAPHIC PROVINCES: OLYMPIC PENINSULA AND COAST RANGE				PUGET TROUGH				NORTH AND SOUTH CASCADES				OKANOGAN HIGHLANDS				COLUMBIA BASIN AND BLUE MOUNTAINS			
		USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE
CHEMICAL	SELECTIVE																				
CHEMICAL	NON-SELECTIVE	NR	LS F	H	IP	L	LS F	PV	SA	NR	LS F	H	IP	NR	LS F	H	IP	L	LS F	PV	SA
CHEMICAL	RESIDUAL	A	W	PV	SA	A	W	PV	SA	A	F	PV	SA	A	F	PV	SA	A	F	PV	SA
CHEMICAL	GROWTH REGULANT																				
CULTURAL	ORGANIC MULCH																				
CULTURAL	INORGANIC MULCH	L	LS F		SA	L	LS F		SA	L	S LS		SA	L	LS F	H	SA	L	LS F	H	SA
CULTURAL	SELECTIVE PRUNING																				
CULTURAL	IRRIGATION																				
CULTURAL	COMPETITIVE PLANTING																				
BIOLOGICAL	INSECTS	L	S LS	PV	SA	L	S LS	PV	SA	L	S LS	PV	SA	L	S LS	PV	SA	L	S LS	PV	SA
BIOLOGICAL	PLANT DISEASE	L	F W	PV	SA	L	F W	PV	SA	L	F W	PV	SA	L	F W	PV	SA	L	F W	PV	SA
MECHANICAL	MOWED 4" HIGH																				
MECHANICAL	MOWED 10" HIGH																				
MECHANICAL	UNMOWED																				
MECHANICAL	BRUSH CUTTING					A	F W	PV	SA									A	F W	PV	SA
MECHANICAL	BRUSH SHEARING																				
MECHANICAL	TREE THINNING	A	SP W	PV	IP	A	SP W	PV	IP	A	SP	PV	IP	A	SP W	PV	IP	A	SP W	PV	IP

MITIGATION LEGEND

USAGE
- NR - NOT RECOMMENDED
- L - LIMITED USE
- A - ALLOWED

SEASON
- SP - SPRING
- S - SUMMER
- LS - LATE SUMMER
- F - FALL
- W - WINTER

EXPOSURE
- H - HIDDEN AREAS
- PV - PARTIAL VISIBILITY
- V - VISIBLE AREAS

MAGNITUDE
- LA - LARGE AREAS
- SA - SMALL AREAS
- IP - INDIVIDUAL PLANTS

FIGURE 3-9

VISUAL IMPACT MITIGATION

LANDSCAPE TYPE:
- ☐ URBAN
- ▩ SUBURBAN
- ☐ RURAL
- ☐ NATURAL

MAINTENANCE MANAGEMENT TECHNIQUES (MMT)		PHYSIOGRAPHIC PROVINCES: OLYMPIC PENINSULA AND COAST RANGE				PUGET TROUGH				NORTH AND SOUTH CASCADES				OKANOGAN HIGHLANDS				COLUMBIA BASIN AND BLUE MOUNTAINS			
		USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE
CHEMICAL	SELECTIVE					A	LS F	PV	SA									A	LS F	PV	SA
CHEMICAL	NON-SELECTIVE	NR	LS F	H	IP	L	LS F	PV	SA	NR	LS F	H	IP	NR	LS F	H	IP	L	LS F	PV	SA
CHEMICAL	RESIDUAL	A	W	PV	SA	A	W	PV	SA	A	F	PV	SA	A	F	PV	SA	A	F	PV	SA
CHEMICAL	GROWTH REGULANT					A	SP	V	LA									A	SP	V	LA
CULTURAL	ORGANIC MULCH																				
CULTURAL	INORGANIC MULCH	L	LS F	H	SA	L	LS F	H	SA	L	S LS	H	SA	L	LS F	H	SA	L	LS F	H	SA
CULTURAL	SELECTIVE PRUNING																				
CULTURAL	IRRIGATION																				
CULTURAL	COMPETITIVE PLANTING																				
BIOLOGICAL	INSECTS	L	S LS	PV	SA	L	S LS	PV	SA	L	S LS	PV	SA	L	S LS	PV	SA	L	S LS	PV	SA
BIOLOGICAL	PLANT DISEASE	L	F W	PV	SA	L	F W	PV	SA	L	F W	PV	SA	L	F W	PV	SA	L	F W	PV	SA
MECHANICAL	MOWED 4" HIGH																				
MECHANICAL	MOWED 10" HIGH																				
MECHANICAL	UNMOWED																				
MECHANICAL	BRUSH CUTTING	A	W	V	LA	A	W	V	LA	A	F	V	SA	A	F	V	SA	A	F	V	LA
MECHANICAL	BRUSH SHEARING					A	W	PV	SA					A	F	PV	SA	A	F	PV	SA
MECHANICAL	TREE THINNING	A	SP W	PV	IP	A	SP W	PV	IP	A	SP	PV	IP	A	SP W	PV	IP	A	SP W	PV	IP

MITIGATION LEGEND

USAGE
- NR - NOT RECOMMENDED
- L - LIMITED USE
- A - ALLOWED

SEASON
- SP - SPRING
- S - SUMMER
- LS - LATE SUMMER
- F - FALL
- W - WINTER

EXPOSURE
- H - HIDDEN AREAS
- PV - PARTIAL VISIBILITY
- V - VISIBLE AREAS

MAGNITUDE
- LA - LARGE AREAS
- SA - SMALL AREAS
- IP - INDIVIDUAL PLANTS

FIGURE 3-10

VISUAL IMPACT MITIGATION

LANDSCAPE TYPE:
- ☐ URBAN
- ☐ SUBURBAN
- ▩ RURAL
- ☐ NATURAL

MAINTENANCE MANAGEMENT TECHNIQUES (MMT)		PHYSIOGRAPHIC PROVINCES: OLYMPIC PENINSULA AND COAST RANGE				PUGET TROUGH				NORTH AND SOUTH CASCADES				OKANOGAN HIGHLANDS				COLUMBIA BASIN AND BLUE MOUNTAINS			
		USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE
CHEMICAL	SELECTIVE	A	LS F	PV	SA	A	LS F	PV	SA	A	LS F	PV	SA	A	LS F	PV	SA	A	LS F	PV	SA
CHEMICAL	NON-SELECTIVE	NR	LS F	H	IP	L	LS F	PV	IP	NR	LS F	H	IP	NR	LS F	H	IP	L	LS F	PV	IP
CHEMICAL	RESIDUAL	A	W	PV	SA	A	W	PV	SA	A	F	PV	SA	A	F	PV	SA	A	F	PV	SA
CHEMICAL	GROWTH REGULANT					A	SP	V	LA					A	SP	V	LA	A	SP	V	LA
CULTURAL	ORGANIC MULCH																				
CULTURAL	INORGANIC MULCH	NR	LS F	H	SA	L	LS F	H	SA	NR	S LS	H	SA	L	LS F	H	SA	L	LS F	H	SA
CULTURAL	SELECTIVE PRUNING																				
CULTURAL	IRRIGATION	A	S	V	SA IP	A	S	V	SA IP	A	S	V	SA IP	A	S	V	SA IP	A	S	V	SA IP
CULTURAL	COMPETITIVE PLANTING																				
BIOLOGICAL	INSECTS	A	S LS	PV	SA	A	S LS	PV	SA	A	S LS	PV	SA	A	S LS	PV	SA	A	S LS	PV	SA
BIOLOGICAL	PLANT DISEASE	A	F W	PV	SA	A	F W	PV	SA	A	F W	PV	SA	A	F W	PV	SA	A	F W	PV	SA
MECHANICAL	MOWED 4" HIGH	L	LS F	V	LA	L	LS F	V	LA	L	S LS	V	LA	L	LS F		LA	L	LS F	V	LA
MECHANICAL	MOWED 10" HIGH																				
MECHANICAL	UNMOWED																				
MECHANICAL	BRUSH CUTTING	L	W	PV	SA	L	W	PV	SA	L	F	PV	SA	L	F	PV	SA	L	F	PV	SA
MECHANICAL	BRUSH SHEARING	L	W	PV	SA	L	W	PV	SA	L	F	PV	SA	L	F	PV	SA	L	F	PV	SA
MECHANICAL	TREE THINNING	L	SP W	PV	IP	A	SP W	PV	IP	L	SP	PV	IP	L	SP W	PV	IP	A	SP W	PV	IP

MITIGATION LEGEND

USAGE
- NR - NOT RECOMMENDED
- L - LIMITED USE
- A - ALLOWED

SEASON
- SP - SPRING
- S - SUMMER
- LS - LATE SUMMER
- F - FALL
- W - WINTER

EXPOSURE
- H - HIDDEN AREAS
- PV - PARTIAL VISIBILITY
- V - VISIBLE AREAS

MAGNITUDE
- LA - LARGE AREAS
- SA - SMALL AREAS
- IP - INDIVIDUAL PLANTS

FIGURE 3-11

VISUAL IMPACT MITIGATION

LANDSCAPE TYPE:
- ☐ URBAN
- ☐ SUBURBAN
- ☐ RURAL
- ▩ NATURAL

MAINTENANCE MANAGEMENT TECHNIQUES (MMT)		PHYSIOGRAPHIC PROVINCES: OLYMPIC PENINSULA AND COAST RANGE				PUGET TROUGH				NORTH AND SOUTH CASCADES				OKANOGAN HIGHLANDS				COLUMBIA BASIN AND BLUE MOUNTAINS			
		USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE	USAGE	SEASON	EXPOSURE	MAGNITUDE
CHEMICAL	SELECTIVE	A	LS F	PV	SA	A	LS F	PV	SA	A	LS	PV	SA	A	LS F	PV	SA	A	LS F	PV	SA
CHEMICAL	NON-SELECTIVE	NR	F	H	IP	NR	F	PV	IP	NR	LS	H	IP	NR	F	H	IP	NR	F	PV	IP
CHEMICAL	RESIDUAL	L	W	PV	SA	L	W	PV	SA	L	F	PV	SA	L	F	PV	SA	L	F	PV	SA
CHEMICAL	GROWTH REGULANT	A	SP	V	LA	A	SP	V	LA	A	SP	V	LA	A	SP	V	LA	A	SP	V	LA
CULTURAL	ORGANIC MULCH																				
CULTURAL	INORGANIC MULCH	NR	F	H	SA	L	LS F	H	SA	NR	LS	H	SA	L	F	H	SA	L	LS F	H	SA
CULTURAL	SELECTIVE PRUNING																				
CULTURAL	IRRIGATION	A	S	V	SA IP	A	S	V	SA IP	A	S	V	SA IP	A	S	V	SA IP	A	S	V	SA IP
CULTURAL	COMPETITIVE PLANTING																				
BIOLOGICAL	INSECTS	A	S LS	PV		A	S LS	PV		A	S LS	PV		A	S LS	PV		A	S LS	PV	
BIOLOGICAL	PLANT DISEASE	A	F W	PV		A	F W	PV		A	F	PV		A	F	PV		A	F	PV	
MECHANICAL	MOWED 4" HIGH	L	LS F	V	LA	L	LS F	V	LA	L	LS	V	LA	L	LS	V	LA	L	LS	V	LA
MECHANICAL	MOWED 10" HIGH	A	LS F	V	LA	A	LS F	V	LA	A	LS	V	LA	A	LS	V	LA	A	LS	V	LA
MECHANICAL	UNMOWED																				
MECHANICAL	BRUSH CUTTING	L	W	PV	SA	L	W	PV	SA	L	F	PV	SA	L	F	PV	SA	L	F	PV	SA
MECHANICAL	BRUSH SHEARING	NR	W	H	SA	L	W	PV	SA	NR	F	H	SA	L	F	PV	SA	L	F	PV	SA
MECHANICAL	TREE THINNING	L	SP W	PV	IP	L	SP W	PV	IP	L	SP	PV	IP	L	SP	PV	IP	L	SP	PV	IP

MITIGATION LEGEND

USAGE
- NR - NOT RECOMMENDED
- L - LIMITED USE
- A - ALLOWED

SEASON
- SP - SPRING
- S - SUMMER
- LS - LATE SUMMER
- F - FALL
- W - WINTER

EXPOSURE
- H - HIDDEN AREAS
- PV - PARTIAL VISIBILITY
- V - VISIBLE AREAS

MAGNITUDE
- LA - LARGE AREAS
- SA - SMALL AREAS
- IP - INDIVIDUAL PLANTS

FIGURE 3-12

Table 3-1 WSDOT's average and maximum application rates for the 25 herbicides from July 1989 through June 1990. These rates (average and maximum) are compared with the maximum label rate for each of the herbicides.

CHEMICAL	max. label rate lbs/acre	WSDOT's avg. appl. rate lbs/acre	% of max. label rate	WSDOT's max. appl. rate lbs/acre	% of max. label rate
2,4-D	16.65	2.16	13%	5.82	35%
2,4-DP	16.65	1.21	7%	1.28	8%
Benefin	3.00	2.05	68%	2.50	83%
Chlorsulfuron Methyl	0.14	0.10	71%	0.13	93%
Bromacil	12.00	2.04	17%	2.52	21%
Chlorthal Dimethyl	15.00	12.75	85%	12.75	85%
Dicamba	8.00	1.12	14%	3.98	50%
Dichlobenil	20.00	4.93	25%	6.50	33%
Diuron	40.00	3.33	8%	10.30	26%
Fosamine Ammonium	24.00	7.28	30%	9.30	39%
Glysphosate	10.60	1.55	15%	5.45	51%
Imazapyr	1.50	0.47	31%	0.60	40%
Isoxaben	1.00	0.69	69%	0.75	75%
Mecoprop	0.54	0.52	96%	0.60	111%
Mefluidide	1.00	0.63	63%	0.63	63%
Metsulfuron Methyl	0.15	0.04	27%	0.07	47%
Napropamide	4.00	4.00	100%	4.00	100%
Oryzalin	6.00	3.12	52%	3.90	65%
Picloram	4.00	0.88	22%	1.63	41%
Pronamide	4.00	2.00	50%	2.00	50%
Sulfometuron	0.56	0.19	34%	0.27	48%
Triclopyr	9.00	1.65	18%	5.00	56%

Table 3-2 Compounds of Negligible Risk

	SYSTEMIC EFFECTS		CANCER EFFECTS	
	Average	Maximum*	Average	Maximum*
Applicator	4D,DP,BE,BR,CS,CD, DC,DB,FB,FO,GL,IM, IS,MC,MF,MM,NA,OR, OX,PI,PR,SE,SM,TR	BE,BR,CS,CD,FB,GL, IM,IS,MC,MF,MM, NA,OR,PI,PR,SE,SM, TR	4D,BR,OR,OX,PI,PR	BR,PI,PR
Mixer/Loader	4D,DP,BE,BR,CS,CD, DC,DB,FB,FO,GL,IM, IS,MC,MF,MM,NA,OR, PI,PR,SE,SM,TR	BE,CS,CD,FB,GL,IM, IS,MF,MM,NA,PI,PR, SE,SM	4D,BR,OR,OX,PI,PR	BR,PI,PR
Applicator/Mixer/Loader	4D,DP,BE,BR,CS,CD, DC,DB,FB,FO,GL,IM, IS,MC,MF,MM,NA,OR, PI,PR,SE,SM,TR	BE,BR,CS,CD,FB,GL, IM,IS,MC,MF,MM, NA,PI,PR,SE,SM	4D,BR,OR,OX,PI,PR	BR,PI,PR
Hand-held Spray Applicator	4D,DP,BE,BR,CS,CD, DC,DB,FB,FO,GL,IM, IS,MC,MF,MM,NA,OR, OX,PI,PR,SE,SM,TR	DP,BE,BR,CS,CD,DC, FB,FO,GL,IM,IS,MC, MF,MM,NA,OR,PI, PR,SE,SM,TR	4D,BR,OR,OX,PI,PR	BR,PI,PR
Ingestion of Drift Contaminated Berries (adult)	4D,CS,DC,FO,GL,MC, MM,PI TR (all)	CS,DC,FO,GL,MC, MM,PI,TR	4D,PI	PI
Ingestion of Drift Contaminated Berries (child)	4D,CS,DC,FO,GL,MC, MM,PI, TR (all)	CS,DC,GL,MC,MM,PI TR	Not applicable	Not applicable
Ingestion of Drift Contaminated Lettuce	4D,CS,DC,FO,GL,MC, MM,PI, TR (all)	CS,GL,MC,MM,PI	4D,PI	4D,PI
Ingestion of Drift Contaminated Beans	4D,CS,DC,FO,GL,MC, MM,PI, TR (all)	CS,DC,FO,GL,MC, MM,PI,TR	4D,PI	4D,PI
Dermal Contact with Drift Contaminated Berries	4D,CS,DC,FO,GL,MC, MM,PI TR (all)	CS,DC,FO,GL,MC, MM,PI,TR	4D,PI	4D,PI
Dermal Contact with Directly Sprayed Vegetation	4D,DP,BE,BR,CS,CD, DC,DB,DU,FB,FO,GL, IM,IS,MC,MF,MM,NA, OR,OX,PI,PR,SE,SM, TR (all)	BE,BR,CS,CD,FB,GL, IM,IS,MC,MF,MM, NA,OR,PI,PR,SE,SM, TR	4D,BR,OR,OX,PI,PR	BR,PI

Legend:

4D=2,4-D
DP=2,4-DP
BE=Benefin
BR=Bromacil
CS=Chlorsulfuron
CD=Chlorthal dimethyl
DC=Dicamba
DB=Dichlobenil
DU=Diuron
FB=Fluazifop-butyl
FO=Fosamine
GL=Glyphosate
IM=Imazapyr
IS=Isoxaben
MC=Mecoprop
MF=Mefluidide
MM=Metsulfuron methyl
NA=Napropamide
OR=Oryzalin
OX=Oxadiazon
PI=Picloram
PR=Pronamide
SE=Sethoxydim
SM=Sulfometuron methyl
TR=Triclopyr

*WSDOT rarely uses maximum label rate see Table 3-1 for maximum WSDOT rates.

Table 3-3 Compounds of Low Risk

	SYSTEMIC EFFECTS		CANCER EFFECTS	
	Average	Maximum*	Average	Maximum*
Applicator	DU	DP,DC,DB,FO,OX	--	OR,OX
Mixer/Loader	DU,OX	DP,BR,DC,DB,FO MC,OR,TR	--	--
Applicator/Mixer/Loader	DU,OX	DP,DC,DB,FO,OR,TR	--	OR
Hand-held Spray Applicator	DU	DB,OX	--	OR,OX
Ingestion of Drift Contaminated Berries (adult)	--	4D	--	4D,OR,OX
Ingestion of Drift Contaminated Berries (child)	--	4D,FO	not applicable	not applicable
Ingestion of Drift Contaminated Lettuce	--	4D,DC,FO,TR	--	--
Ingestion of Drift Contaminated Beans	--	4D	--	--
Dermal Contact with Drift Contaminated Berries	--	4D	--	--
Dermal Contact with Directly Sprayed Vegetation	--	DP,DC,DB,FO,OX	--	PR

Legend:

4D - 2,4-D
DP - 2,4-DP
BE - Benefin
BR - Bromacil
CS - Chlorsulfuron
CD - Chlorthal dimethyl
DC - Dicamba
DB - Dichlobenil
DU - Diuron
FB - Fluazifop-butyl
FO - Fosamine
GL - Glyphosate
IM - Imazapyr
IS - Isoxaben
MC - Mecoprop
MF - Mefluidide
MM - Metsulfuron methyl
NA - Napropamide
OR - Oryzalin
OX - Oxadiazon
PI - Picloram
PR - Pronamide
SE - Sethoxydim
SM - Sulfometuron methyl
TR - Triclopyr

*WSDOT rarely uses maximum label rate see Table 3-1 for maximum WSDOT rates.

Table 3-4 Compounds of Moderate Risk

	SYSTEMIC EFFECTS		CANCER EFFECTS	
	Average	Maximum*	Average	Maximum*
Applicator	--	4D	--	4D
Mixer/Loader	--	4D,OX	--	4D,OR,OX
Applicator/Mixer/Loader	--	4D,OX	--	4D,OX
Hand-held Spray Applicator	--	4D,DU	--	4D
Ingestion of Drift Contaminated Berries (adult)	--	--	--	--
Ingestion of Drift Contaminated Berries (child)	--	--	not applicable	not applicable
Ingestion of Drift Contaminated Lettuce	--	--	--	--
Ingestion of Drift Contaminated Beans	--	--	--	--
Dermal Contact with Drift Contaminated Berries	--	--	--	--
Dermal Contact with Directly Sprayed Vegetation	--	4D	--	4D,OR,OX

Legend:

4D = 2,4-D
DP = 2,4-DP
BE = Benefin
BR = Bromacil
CS = Chlorsulfuron
CD = Chlorthal dimethyl
DC = Dicamba
DB = Dichlobenil
DU = Diuron
FB = Fluazifop-butyl
FO = Fosamine
GL = Glyphosate
IM = Imazapyr
IS = Isoxaben
MC = Mecoprop
MF = Mefluidide
MM = Metsulfuron methyl
NA = Napropamide
OR = Oryzalin
OX = Oxadiazon
PI = Picloram
PR = Pronamide
SE = Sethoxydim
SM = Sulfometuron methyl
TR = Triclopyr

*WSDOT rarely uses maximum label rate see Table 3-1 for maximum WSDOT rates.

Table 3-5 Compounds of High Risk

SYSTEMIC EFFECTS			CANCER EFFECTS	
	Average	Maximum*	Average	Maximum*
Applicator	—	DU	—	—
Mixer/Loader	—	DU	—	—
Applicator/Mixer/Loader	—	DU	—	—
Hand-held Spray Applicator	—	—	—	—
Ingestion of Drift Contaminated Berries (adult)	—	—	—	—
Ingestion of Drift Contaminated Berries (child)	—	—	not applicable	not applicable
Ingestion of Drift Contaminated Lettuce	—	—	—	—
Ingestion of Drift Contaminated Beans	—	—	—	—
Dermal Contact with Drift Contaminated Berries	—	—	—	—
Dermal Contact with Directly Sprayed Vegetation	—	DU	—	—

Legend:
4D=2,4-D
DP=2,4-DP
BE=Benefin
BR=Bromacil
CS=Chlorsulfuron
CD=Chlorthal dimethyl
DC=Dicamba
DB=Dichlobenil
DU=Diuron
FB=Fluazifop-butyl
FO=Fosamine
GL=Glyphosate
IM=Imazapyr
IS=Isoxaben
MC=Mecoprop
MF=Mefluidide
MM=Metsulfuron methyl
NA=Napropamide
OR=Oryzalin
OX=Oxadiazon
PI=Picloram
PR=Pronamide
SE=Sethoxydim
SM=Sulfometuron methyl
TR=Triclopyr

*WSDOT rarely uses maximum label rate see Table 3-1 for maximum WSDOT rates.

Chapter Four

Final EIS
Roadside Vegetation Management

4.1.0 Introduction

The Draft Environmental Impact Statement was issued on February 10, 1993, with an announcement of a 30-day period for the receipt of public and agency comments. At the end of that period, WSDOT felt it had not received an adequate number of public comments, and extended the comment period one month to April 10, 1993. At that time additional requests for the DEIS were still being received, and WSDOT extended the comment period a final time to May 19, 1993. The comment period was terminated at the end of the day on May 19, 1993, although late comments were received and accepted until the writing of this section.

The letters received during the public comment period were read by WSDOT Project Management Team and a team of environmental consultants, and played a large role in the creation of Alternative G for the FEIS.

4.1.1 What This Chapter Contains

This chapter deals with the public comment period on the DEIS. We provide here a list of the people and organizations that responded to the DEIS, a summary of the issues raised by those comments, and summary responses. Most importantly, this chapter contains copies of a representative sample of the letters received. Though not all the letters received during the comment period are included, the ones we selected for inclusion are an accurate representation of the whole.

4.1.2 The Need for Increased Public Input

Roadside vegetation management issues have been important to many people throughout the state for a long time. The confrontational tone of many of the letters demonstrates a need for a more productive form of interaction between WSDOT and the public. WSDOT believes that in producing this EIS, new avenues of communication are being opened that will facilitate positive interactions in the future. The RMP format will be developed to encourage public notification and input on a local basis.

4.2.0 Summary of Issues Raised

All comments collected during the comment period and letters of comment addressed to the Washington State Department of Transportation were considered during the production of the Final EIS, and while developing the following summaries.

Herbicides: The majority of the comments received concerned the use of herbicides as a roadside vegetation management tool; some pro, most con. Many who were against the use of herbicides were concerned with chemical drift and run-off, water quality issues, and the exposure to humans and wildlife. Those that support the use of herbicides cited cost effectiveness, and lower rates of worker injuries and deaths. Comments ranged from continuing the use of herbicides to phasing them out altogether. Arguments were

made for both sides, and many of these letters are included later in this section. A group of comments were received from people claiming to be ultra-sensitive to chemicals in general. These people urged WSDOT to cease all pesticide use.

Native Vegetation: Many comments proposed the use of low-growing native vegetation as a roadside vegetation management tool. These comments expressed the belief that if this technique were used, little vegetation management would be required. This concern is addressed in the EIS under Alternative E (Long-Term Comprehensive Integrated Approach), and the preferred alternative, Alternative G, which inherited all of the attributes of Alternative E, combining them with the management style in Alternative F. Part of the definition of Alternative E states (page *iv*): "...The basic foundation of Alternative E is to develop a long-term vegetation management strategy based upon the prevention of problems with the establishment of a stable, desirable vegetation requiring minimal maintenance",

Water Quality: A number of comments were received, particularly from the tribes, concerning water quality issues. Most expressed concern over the herbicide use and the implementation of inadequate buffers. One comment questioned the use of a lake as a model for the aquatic risk assessment.

Right-of-Ways: A few comments voiced concerns over abuses of WSDOT right-of-ways, particularly by land owners in eastern Washington.

The Alternatives: Many letters expressed their support of one of the alternatives, while some disapproved of all the alternatives. The majority of comments that mentioned the alternatives were in favor of Alternative E (Long-Term Comprehensive Integrated Approach). Many letters were very similar in wording and urged WSDOT to adopt an "...Integrated Pest Management program that will eliminate the use of pesticides within five years with a 50% reduction by the end on the first year..." Although it was not clearly stated in the DEIS, the Integrated Vegetation Management (IVM) approach of Alternatives E and G incorporate Integrated Pest Management (IPM); however, the elimination of pesticide use is not a part of IVM or IPM. Please see section 4.1.3.1.

4.2.1. Comment Grouping and Analysis

Once the comments were read, they were grouped into logical broad categories to facilitate analysis. The groupings themselves were reviewed by WSDOT as well as SEPA experts. Once successfully grouped, the main issues addressed by each group were considered. Many of the comments touched on both the alternatives and herbicide use. In these cases, we attempted to ascertain the main theme of the comment, and grouped it accordingly.

4.2.2 Summary Response

Responses to individual comments and statements are included on the comments themselves later in this chapter. This summary response is intended to briefly summarize responses to the comments.

The vast majority of the comments received concerned WSDOT's use of herbicides as a vegetation management tool. Most of these comments stated their oppostion to herbicide use. The main response to this comes in the creation of Alternative G, and its subsequent selection as the preferred alternative. Among the many positive attributes to come out of Alternative G will be an overall reduction in the amount of required maintenance, thus the reduced use of pesticides. This is accomplished through the eventual establishment of stable vegetation along much of the state highway system.

4.2.2.1 IVM and IPM

Many of the comments mentioned Integrated Pest Management (IPM), while the definitions of Alternatives E and G mention Integrated Vegetation Management (IVM). The term IVM is used instead of IPM because it is specific to roadside vegetation management. IVM incorporates IPM as part of the decision-making process. The term IPM grew out of the agricultural industry, and while it fits nicely as a part of IVM, it cannot be the whole roadside vegetation management plan. WSDOT recognizes IPM as it is defined in the WAC 173-270, which outlines an evaluation process that selects the most practical control method and allows the use of herbicides if other alternatives are not practical.

4.2.3 Names of Those Responding

The following list contains the names of people responding to the DEIS.

Habecker, Thomas B., Green Ridge Hills, Battle Ground, Washington
Parkin, Richard B., EPA - Region 10, Seattle, Washington
Adams, Gordon, Seattle, Washington
Forest, Shomer, Port Townsend, Washington
Monahan, Dr. Paul M., Toppenish, Washington
Farley, Dr. Mark C., Toppenish, Washington
Combs, James, Seattle Dept. of Construction & Land Use, Seattle, Washington
Laws, Marilou K., North Bend, Washington
Tupper, Kenneth H., Asotin County Noxious Weed Control Board, Asotin, WA
Dietzman, David F., SEPA Center, Seattle, WA
Liester, Pam, Pilchuck Audobon Society, Everett, WA
Ritchie, Barbara, Dept. of Ecology, Environmental Review Section, Olympia, WA
Brookerson, Dept. of Agriculture, Olympia, WA
Conrad, Jim, DUPONT, Vancouver, WA
Blewett, Dr. Craig T., DowElanco, Indianapolis, IN
Bradley, Link, DUPONT, Agricultural Products, Wilmington, DE
Cantlon, John, DUPONT, Vegetation Mgmt., Boise, ID
Conrad, Jim, DUPONT, Vegetation Mgmt., Boise, ID
Plescia, Frank, Monsanto, Roseville, CA
Wellings, Dr. Ian, DUPONT, Agricultural Products, Wilmington, DE
Carroll, Arthur J., USDA, Forest Service, Hood River, OR
Iten, Connie, Dept. of Wildlife, Olympia, WA
Rowley, Marjory F., Redmond, WA
Fries, Mary A., Washington Native Plant Society, Tacoma, WA
Malcom, Roderick, Muckleshoot Indian Tribe, Fisheries Dept., Auburn, WA

Parkin, Richard, US EPA, Region 10, Seattle, WA
Sell, Dave, USDA Forest Service, Hood River, OR
Myers, Phillis, The Suqamish Tribe, Dept of Fisheries, Suquamish, WA
Gorsline, Jerry, Washington Environmental Council, Port Townsend, WA
Washington Toxics Coalition, Seattle, WA
Doherty, Jonathan L., Columbia River Gorge Commission, White Salmon, WA
Dobyns, Doug, Nooksack Indian Tribe, Deming, WA
Northwest Coalition for Alternatives to Pesticides, Eugene, OR
Hovanic, Catherine E., WA State Dept. of Agriculture
Bernthal, Carol, Point No Point Treaty Council, Kingston, WA
Frederickson, William, Franklin County Noxious Weed Control Board, Pasco, WA
Benowitz, Sam, Raintree Nursery, Morton, WA
Grunenfelder, Gregg, Public Health & Social Services Dept., Olympia, WA
Kooiman, Marianne, The Guemes Is. Envioronmental Trust, Anacortes, wA
Olsen, David P., Olympic Environmental Council, Port Townsend, WA
Erickson, Eric, Issaquah Creek Basin Advisory Team, Renton, WA
Petrich, Dean, Petrich's Piano Shop, Freeland, WA
Humphrey, Dave, Oregon Dept of Trans., Salem, OR
Love, Lorin R., Civic Action on Redmond Environment, Redmond, WA
Buehler, Joanna A., Save Lake Sammamish, Issaquah, WA
Havig, Mg, Oregon Dept. of Trans. Highway Division, Roseburg, OR
Clark, Margaret A., Organic Advisory Board, WA Dept. of Ag., Bainbridge, IS, WA
Patten, Kim, WA State University, Long Beach, WA
Fletcher, Kathy, People for Puget Sound, Seattle, WA
Hellmuth, Elane, Bainbridge Is., WA
Brown, Adrian, Black Hills Audubon Society, Olympia, WA
Fox, Richard, Port Townsend, WA
Piccolo, Vallana M., Puget Sound Water Quality Authority, Olympia, WA
Kreitman, Gayle, WA State Dept of Fisheries, Olympia, WA
Jennings, David, WA State Dept of Health, Olympia, WA
Parker, Gregory, Sun Basin Chapter, Ephrata, WA
Clise, John M., Mayor, City of Townsend, WA

4.3.0 Representative Comments from the Comment Groupings

Because of the large number of comments received during the 100-day public/agency input period, it was necessary to categorize the comments whenever possible. An attempt is made here to convey all of the views that were expressed. It should be mentioned that in some cases comments included attachments which were often quite lengthy. In the interest of document length, most of these attachments were omitted because the author had made their point in the body of the comment.

Responses are included to some of the comments. Time constraints prevented responding to every point brought up in every letter. An attempt was made to cover all the issues raised at least once.

In the end the most important aspect of this chapter is the reproduction of a wide sample of the public comments.

4.3.1 Comments and Questions Concerning the Alternatives

The following comments deal mainly with the Alternatives. The five included here are representative of many comments concerning the alternatives.

4.3.1.1 Group Response

The creation of Alternative G, and subsequent selection as the preferred alternative is meant to be the response to many of the issues brought up by the public comments. In that Alternative G represents the combination of Alternatives E and F, WSDOT has created an alternative that will implement IVM in a site-specific manner.

Comment 1

1.1 **Keeping in mind that the risk assessment sections dealing with herbicide use are just one part of the analysis done here, it is true that much effort was put forth assessing risk associated with WSDOT'sherbicide use. The point here is that herbicides WSDOT utilizes were looked at, and thus risk assessment associated with their entire program was looked at. It could be callled a "programmatic risk assessment".**

1.2 **Comment noted.**

1.3 **Comments noted. These enclosures are not included here for the sake of document length.**

DUPONT

VEGETATION MANAGEMENT
JIM CONRAD
12818 S.E. Angus St.
Vancouver, WA 98684

Phone: (206) 892-
Fax: (206) 944-

RECEIVED MAY 4 1993

May 3, 1993

Eric Henriksen
Compliance Services International
1112 Alexander Avenue
Tacoma, WA 98421

Mr. Henriksen:

The following comments are in regard to the Washington State DOT draft environmental impact statement.

1.1 First, it is obvious that a great deal of time and tax payer/public money was spent assessing the environmental impact of the use of herbicides. Why? This assessment has already been completed as part of the EPA registration process.

Herbicide development, testing and EPA approval takes eight to ten years and costs manufactures $35 million to $50 million for each herbicide. To ENSURE that a herbicide, when used properly, will NOT present any health or environmental concerns, it is subjected to more than 120 separate tests. On average, only one in 20,000 chemicals tested makes it through the demanding discovery, development and screening process. I have enclosed a booklet which describes this process in more detail.

What is absolutely aggravating, as a Washington State tax payer, is tax dollars being spent on the assessment of herbicides which have already been completed. No doubt, over $500,000 of tax payer/public funds will have been spent to complete the EIS. Based on the content of the draft EIS, over 50% of this expenditure is for the assessment of herbicides. Over $250,000 of superfluous, unnecessary, redundant expense.

1.2 Second, with respect to Alternative C - "No Chemical Approach". I have enclosed an article which explains what happened in Lane County, Oregon when herbicides were banned from use. Experience is an excellent teacher provided the aquired knowledge is applied properly. I submit to you that what has occurred in Lane County is not desirable nor acceptable for Washington State. When you consider Alternative C, it is imperative that you also consider the information provided in this article.

Better Things for Better Living

Also, there is another excellent source of information which compares the benefits and risks of using only mechanical vegetation management versus a combination of mechanical plus chemical vegetation management. This source is a video tape produced by the Monsanto Company. The title of this tape is "Why use Herbicides". It is free of charge and can be obtained by phoning 1-800-768-6387. Also, this video thoroughly explains the need for highway right of way vegetation management. Please find a copy enclosed.

1.3 Third, in regard to the comments from the scoping process. It is apparent that some people have an unnecessary fear or paranoia with respect to herbicides or pesticides. There are several professionals in the Northwest who deal with the impact of chemicals on the health of humans, other species and the environment. I have enclosed a list of these professionals. Should anyone have any questions or concerns, help is only a phone call away.

Finally, I have enclosed an article from C. Everett Koop. It is my wish for the final Washington State DOT EIS that "Science and good sense will prevail...".

Sincerely,

Jim Conrad

Jim Conrad

Enclosures

Comment 2

2.1 The comment period was extended to 100 days to allow all those interested to comment.

2.2 Alternative E is the basis for the vegetation control aspects of Alternative G. Your support of Alternative E is noted. References to the Highway Runoff Manual were added for the FEIS.

2.3 Comment noted.

NANCY McKAY
Executive Director

STATE OF WASHINGTON
PUGET SOUND WATER QUALITY AUTHORITY
PO Box 40900 • Olympia, Washington 98504-0900 • (206) 493-9300

March 10, 1993

Mr. Marrell Livesay
Compliance Services International
950 Pacific Ave, Suite 700
Tacoma, WA 98402

Mr. Livesay:

Thank you for the opportunity to comment on the draft Roadside Vegetation Management Environmental Impact Statement prepared for the Washington State Department of Transportation. The Authority commends the department for reviewing it's current vegetation management practices and beginning an exchange with interested and affected parties.

Our comments are specific only to the Puget Sound basin and are guided by the Puget Sound Water Quality Management Plan (Plan) requirements for the highway runoff control (Element SW-5).

2.1 There are several other groups which have key interests in pesticide issues that should perhaps be given the opportunity to comment on this important document also. The Puget Sound Water Quality Authority is a partner in the Urban Pesticides Task Force that is developing recommendations to reduce pesticide use in urban environments. This group is represented by individuals from the state departments of Agriculture, Health and Ecology, WSU and the Environmental Protection Agency. It also appears that neither local governments nor tribes are included on the distribution list for this draft. We suggest that WSDOT extend the comment period on the draft to allow input from several of these other groups as well. We may offer additional comments after discussions with the Urban Pesticide Task Force.

2.2 Of the six alternatives proposed in this document, the Puget Sound Water Quality Authority supports Alternative E - Long-term Comprehensive Integrated Approach as most consistent with both the Plan and the Puget Sound Highway Runoff Program rule (WAC 173-270). The Plan and rule require WSDOT to develop and implement a vegetation management program for state highways in the Puget Sound basin. The intent of the program is to reduce the use of roadside chemicals. Tribes and affected local

governments must be formally consulted during program development.

2.3 Under the Purpose of and Need for Action section, we believe that fulfillment of the Puget Sound Plan and the Puget Sound Highway Runoff Program rule requirements should be listed as a purpose. We feel that Alternative E provides a good basis from which to develop and implement the highway runoff rule requirements. The final EIS should address requirements listed in Chapter 173-270-040. The draft EIS appendices appear to contain sufficient information on desirable minimum maintenance vegetation, appropriate chemical use, storage and waste disposal options and risk management alternatives to address these requirements.

The Authority's least preferred alternative discussed in the draft EIS is Alternative F - Current Practices, Decentralized Management. Within the Puget Sound Basin, we prefer to see consistent application of policy and procedure for managing roadside vegetation.

Thank you again for the opportunity to comment on this draft. Please call me at 493-9173 if you have questions.

Sincerely

Vallana M. Piccolo

Vallana M. Piccolo
Water Quality Supervisor

cc: Mr. Robert L. Berger, Chief Landscape Architect, WSDOT

Comment 3

3.1 Roadside Management Plans (RMP's) will allow for the identification of sensitive areas (habitats), and thus provide for long-term protection.

3.2 Your support for Alternative E is noted. As mentioned previously, Alternative G is, in part, a combination of Alternatives E and F.

MAY-19-'93 WED 17:46 19: DEPT OF WILDLIFE TEL NO:206 586 8240 NOV P02

CLIFF SMITCH
Director

STATE OF WASHINGTON
DEPARTMENT OF WILDLIFE
600 Capitol Way North • Olympia, Washington 98501-1091 • (360) 753-5700

May 19, 1993

John Conrad
Chief Maintenance Engineer
Washington Department of Transportation
P.O. Box 47358
Olympia, WA 98504-7358

SUBJECT: Roadside Vegetation Management Draft Environmental Impact Statement (DEIS)

Dear Mr. Conrad:

The Washington Department of Wildlife (WDW) has reviewed the DEIS and appreciates the opportunity to provide comments. As previously mentioned in scoping process, we are delighted the Department of Transportation (DOT) is reviewing current maintenance activities on state highways to better meet public desires, one of which is the perpetuation of wildlife and the habitats on which they depend.

We offer the following comments for consideration in the development of the final document:

GENERAL COMMENTS:

3.1 1. Loss of habitat is the number on problem wildlife populations are facing in the state of Washington. The estimated 97,500 acres of treatable roadside available within DOT's six districts poses a unique opportunity. Not only is helping to reduce maintenance costs, but assisting in the perpetuation of many species of wildlife. Marked declines in some wildlife populations have been noted with the conversion of native habitat for agriculture or residential or commercial development. In many areas, particularly in eastern Washington, recovery and perpetuation of native habitat along roadsides will enhance wildlife one and survival by providing corridors linking large isolated blocks of native habitat. Modification of the roadside vegetation management program could well provide wildlife benefits beyond that of simply access to roadside refugia.

3.2 2. In reviewing the proposed alternatives, Alternative E would best achieve the identified goal " to establish and maintain roadsides to insure that they are safe, convenient, pleasing the eye and environmentally constructive while at the same time implementing policies which will insure the structural integrity of

Comment 3 continued

3.3 The vehicle for implementing these site-specific concerns will be the Roadside Management Plans. The RMP's will be developed for each local area as defined by WSDOT.

3.4 This is beyond the scope of this EIS. These concerns would be dealt with in a project EIS.

3.5 This subject is covered in WSDOT's incident response plan.

3.6 This problem will be addressed through the RMP process in conjunction w/ corridor planning.

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John Conrad
May 19, 1993
Page 2

3.2 the roadway itself." Alternative E provides the best opportunity to benefit fish and wildlife concerns identified in the scoping process. WDW fully supports the adoption of Alternative E as the Preferred Alternative.

3.3 3. Although Programmatic EIS' set the stage for agency direction, they often fall short of implementation by not specifying future actions for implementation of the selected Alternative. We request that the FEIS include an implementation plan for the selected Alternative. Specifically, the roadside maintenance implementation plan for each District should include, but not be limited to:

- Fish and Wildlife inventories;
- Vegetation inventories;
- Soils inventories;
- Maps which specify DOT ownership boundaries;
- Current site conditions and constraints, including any adjacent landowner agreements;
- Site development potential and objectives;
- Site development requirements;
- Incorporation of action plan items listed in Appendix A, chapter 6, pages A6-6 - A6-8;
- Development plans, which include development time schedule, monitoring, periodic site evaluations to determine if objectives are being met, and future maintenance programs.

3.4 4. A key item that was not presented in the DEIS that warrants inclusion is habitat protection needs during highway construction and expansion activities. Requiring minimal disturbance of native habitat during these activities could significantly reduce roadside vegetation reclamation costs, reduce what often results in long-term wildlife impacts and minimize future maintenance expenditures.

3.5 5. The final EIS should consider how roadsides which are inadvertently altered from flooding, fire, toxic spills, accidents, etc., will be reclaimed.

3.6 6. The final EIS should include DOT's proposed monitoring and enforcement of roadside abuses by adjacent landowners, which of particular concern in agricultural areas.

Comment 3 continued

3.7 For the purposes of this EIS, "No Action" means "no vegetation control" as opposed to "no change".

3.8 This suggestion has been incorporated into the FEIS. See section 0.6.0. WSDOT will use these mitigation measures as a starting place for developing a detailed set in the future.

3.9 This has been added to the mitigation measure list in 0.6.1 for the FEIS.

3.10 This has been added to the mitigation measure list in 0.6.2 for the FEIS.

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John Conrad
May 19, 1993
Page 3

7. In reviewing the State Environmental Policy Act, "No Action" Alternatives do not represent substantive changes in proponent actions or site conditions. The presentation of the No Action Alternative represents a substantive change in current agency actions and future site conditions. Alternative F - Perpetuation of current practices - would more accurately represent a "No Action" Alternative. 3.7

8. In the Final EIS the identified mitigation measures should not be listed as "suggested mitigation" measures as is done under 0.6.0. DOT should make a commitment to mitigation measures identified for the Alternative selected. The mitigation measures listed should be presented as general measures to allow refinement of measures where needed. 3.8

SPECIFIC COMMENTS:

1. 0.5.0. Environmental Consequences, 0.5.2. Air Quality

In eastern Washington an extensive amount of DOT's roadsides are annually disturbed by adjacent landowners. These practices of plowing, burning and removal of ground cover contribute significantly to local air quality problems. This issue needs to be addressed in this section and in section 3.2.2. - 3.2.3 describing Air Quality - Affected Environment, Environmental Consequences, and Mitigation Measures, pages 3-7 - 3-11.

2. 0.6.0. Mitigation Measures, 0.6.1. Mechanical Treatment Methods: Do not operate heavy equipment on steep or unstable slopes, slopes greater than 33%.

In shrub-steppe habitat in eastern Washington we do not recommend that heavy equipment be used on slopes greater than 20%.

3. 0.6.0. Mitigation Measures, 0.6.1. Mechanical Treatment Methods: do not use heavy machinery in areas that may support nesting ground birds during the spring or early summer months.

All motorized equipment should be kept out of these areas during the nesting season. Specific dates should be established for the respective Districts when implementation plans are developed. 3.9

4. 0.6.0. Mitigation Measures, 0.6.2. Chemical Treatment Methods

Commitment not to spray herbicides when winds exceed 10km per hour should be included as a mitigation measure for this section. 3.10

Comment 3 continued

3.11 The suggested five-foot buffer has been removed for the FEIS. The EIS now recommends that all label requirements for buffer distances be met. WSDOT is free to add additional buffers if it wishes.

3.12 Native plants are not always the most appropriate and should be used only when appropriate and practical.

3.13 Comment noted.

3.14 Comment noted.

3.15 The statement from the EIS assumes proper application of the herbicide.

MAY-19-'93 WED 17:48 13: DEPT OF WILDLIFE TEL NO:206 586 0248 [illegible]

John Conrad
May 19, 1993
Page 4

5. 0.6.0. Mitigation Measures, 0.6.2. Chemical Treatment Methods: Do not apply herbicides within 5 feet of water (or beyond label restrictions), unless labelled for aquatic use, to prevent water quality and aquatic wildlife impacts.

3.11 Restricting herbicide applications within 5 feet of wetlands is not adequate in most cases. Type of herbicide being used, wind conditions, precipitation, type of water and sensitivity of fish, wildlife and vegetation present need further consideration in the established buffer distance(s). Further review of this mitigation measure is necessary to adequately meet its intent.

6. 0.6.0. Mitigation Measures, 0.6.3. Cultural Treatment Methods: Plant species which are appropriate for specific site needs.

3.12 This should be expanded to include native species as a first priority in the vegetation selection process.

7. 0.6.0. Mitigation Measures, 0.6.3. Cultural Treatment Methods: When planting of an area occurs, DOT should plant only low stature herbs and shrubs that are not preferred by large herbivores. This will reduce the possibility of collision with large herbivores.

3.13 This statement is too general in nature. The possibility of collision with large, wild herbivores is not a statewide problem and should not be presented as such. Some large shrubs may not pose a problem, rather the density of the shrubs that ultimately conceal these large roadside animals that pose a collisions threat.

8. 3.2.2. Air Quality pages 3-7.

3.14 Air quality in eastern Washington is significantly impacted from Mount Saint Helen's ash, as well as burning and plowing occurring on DOT's roadsides, these impacts should be examined in the final EIS.

9. 3.2.2.1.4. Environmental Consequences of Alternatives: Alternative D - Short-term Single Action Approach. ". . .Drift from herbicide application will have negligible effects on wildlife."

3.15 This statement is used too loosely, particularly if herbicide drift occurs in wetlands, or areas where salmonids or other sensitive species are present.

Comment 3 continued

3.16 This has been added to section 3.2.7.1 for the FEIS.

3.17 These measures are already in use where problems are identified.

3.18 Comment noted.

3.19 Comment noted.

3.20 Comment noted.

John Conrad
May 19, 1993
Page 5

10. 3.2.7 Terrestrial Wildlife and Wildlife Habitat. 3.2.7.1. Environmental Consequences of Alternatives. ". . . Highway mortality of animals is a serious problem in some areas, particularly for animals with large home ranges that encompass well-travelled roads."

3.16 Highway mortality of deer and elk is also a serious problem seasonally on roads that bisect traditional migration corridors and feeding sites on winter range for deer and elk.

11. 3.2.7. Terrestrial Wildlife and Wildlife Habitat. 3.2.7.3. Mitigation Measures.

3.17 In addition to the discussion presented in the DEIS, there are other measures for minimizing highway wildlife mortality that should be incorporated in the roadside maintenance program, i.e., sware flex, advisory, crossing signs, etc.

12. 3.2.13. Services. 3.2.13.1.5. Alternative 2 - Long-term Comprehensive Integrated Approach. ". . .However, the number of treated acres annually by cultural vegetation methods will increase.

3.18 This statement is incorrect. The objective of cultural vegetation methods is to establish permanent vegetation that would minimize repeat treatment needs.

13. 3.3.0. Summary of Impacts and Mitigation Measures by Physiographic Provinces. 3.3.6. Vegetation. Within all provinces the DEIS states " . . .The loss of native vegetation along roadsides would have no effect on species viability or community composition in adjacent habitats.

3.19 This statement would be incorrect for many areas in eastern Washington, particularly for burrowing owl, pheasants and Washington ground squirrels.

14. 3.3.0. Summary of Impacts and Mitigation Measures by Physiographic Provinces. 3.3.7. Wildlife.

3.20 In the Columbia Basin Province, Zone 3 of the roadside management areas, establishment of large shrubs would not appear to pose any problem. In addition, within this province establishing single trees, i.e., one locust, one hawthorn, etc., per mile could significantly enhance Swainson's hawk (a sensitive species) nesting habitat in eastern Washington. Maintenance and establishment of low shrubs and perennial grass/forb vegetation in this province would also benefit ring-necked pheasants, a key species trying to recover to former population levels.

Comment 3 continued

3.21 Your comments are noted. Unfortunately the Appendices will not be changed or reprinted for the FEIS. Your comments will serve as the correction/addition.

MAY-19-'93 WED 17:49 IB: DEPT OF WILDLIFE TEL NO:206 586 8248 #2/7 P02

John Conrad
May 19, 1993
Page 8

15. Appendix A, Chapter 7, page A7-20, 4.1 Shrub-Steppe Zone. It states, within deep soil sites shrub species to encourage or plant include big sage and green or grey rabbit brush. Bitter brush could be planted, but it's presence may attract large herbivores.

Bitterbrush should still be considered as a desirable plant in shrub-steppe zones not occupied by large numbers of deer and elk. Three-tip sagebrush, spiny hopsage, and winterfat should be added to this list of desirable shrubs. The list of desirable shrubs for lithosolic soils should be expanded, refer to Daubenmire, R. 1970. Steppe Vegetation of Washington. This would also be an important reference for other edaphic and topographic vegetative community needs, and selecting grass species which could be most successful for respective sites in eastern Washington.

16. Appendix 7, chapter 7, page A7-54, Table 7-8 Native Plant List.

The list is incomplete. Native plant species associated with the shrub-steppe zone are noticeably missing.

3.21

17. Appendix A, chapter 8, Wildlife and Wildlife Habitat, page A8-1, discussion designation for endangered, threatened, sensitive species, etc.

This section needs to include and separate designations for state and federal listings. This is particularly important in relation to state highway projects which have received federal funding assistance.

18. Appendix A, Chapter 8, Wildlife and Wildlife Habitat, pages A8-5 and A8-6, 2.3 Okanogan Highlands - Blue Mountains, 2.4 Columbia Basin Provinces.

Upland sandpipers are currently limited to the Rathdrum area near Spokane. Sharp-tailed grouse, a State Endangered Species, should be added to listed species found in the Okanogan Highlands and Columbia Basin Provinces.

19. Appendix A, Chapter 8, Table 8-3. Washington State Candidate Species and Monitor Species and Federal Listings.

Pygmy rabbits have not been included in the mammals list. Attached please find WDW's Nongame Data Systems Special Animal Species list for reference.

Comment 3 continued

3.22 Thank you for your comments, your support of Alternative E is noted.

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John Conrad
May 19, 1993
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3.22 In summary, selection of Alternative E would best meet the public desires for roadside vegetation management in Washington as identified in the scoping process. We hope that the comments and concerns presented will assist in the preparation of the FSTR. If you have any questions or need further assistance please call me at (206) 753-3318.

Sincerely,

Constance Iten
Habitat Biologist
Regulatory Services

enclosure

cc: Tracy Lloyd

Comment 4

RECEIVED APR 26 1993

John D. Cantlon
3483 South Ashbury
Boise, Idaho
83706

208-342-5939 (Office)
208-344-5449 (Home)
208-343-5736 (FAX)

April 20, 1993

Eric Henriksen
Compliance Services International
1112 Alexander Avenue
Tacoma, WA.
98421

Dear Mr. Henriksen:

I applaud WSDOT's effort to communicate their Roadside Vegetation Management Program to the public via an informational EIS. Given the array of public perception and comment on the values and the risk of roadside maintenance, this informational EIS will be a valuable document.

In the that vain, I am concerned about the value and weight being placed on biased interpretation versus the scientific information available surrounding herbicide management options. There appears to be several very extreme social groups who have a personal vendetta against a modern technological tool. This is evidenced by the communications and correspondence associated with the Scoping Process.

In viewing this EIS and other EIS documents, I find assumptions or accusations of herbicides being toxic to the environment, when used according to the label instructions, a gross distortion of fact. This is documented many ways in your Appendices, particularly B. Unfortunately, these individuals have not taken the time to learn about the properties of herbicides.

The biological properties of these herbicides are well understood, there is no magic or secret properties as several of the extreme groups would like to describe. Most perplexing to me is the high cost to the public which is associated with frivolous accusations and legal injunctions brought on by extreme groups.

Comment 4 continued

4.1 We feel this goal, while possibly not accomplished in other western states, is a valid one. The EIS lists a five year goal of establishment of stable vegetation on 38.5% of Washington's highways. While this is an aggressive goal, we feel it is one that WSDOT can accomplish through careful planning. It is true that in certain areas, particularly agricultural areas, that encroachment of undesirable vegetation will always be a problem.

It will be disastrous to the WSDOT road system for safety and functional use, the adjoining property owners and the State of Washington's transportation of goods and commerce to curtail the use of integrated management tools.

Specific concerns surrounding your EIS Summary.

Alternative A - "No Action Approach".

This approach would be a gross violation of the public's investment of protecting the road. This subjects the public to poor driving conditions and low safety margins.

Alternative B - "Remedial Action Approach".

This alternative represents a total misunderstanding of how vegetation interacts with roadside structures and safety parameters. Deterioration of the road investment and driving safety would be significant.

Alternative C - "No Chemical Approach".

This alternative is politically biased. This is the typical misinformed and extreme social group's desire. This alternative represents a poor understanding of vegetation control and the benefits of integrated vegetation management.

Alternative D - "Short-term Single Action Approach".

This alternative represents a poor understanding of vegetation control and the benefits of integrated vegetation management.

Alternative E - "Long term Comprehensive Integrated Approach".

Although this alternative addresses integrated control, the 5 year goal of establishing stable vegetation is vague. To assume that maintenance levels can be reduced given the wet and arid climate extremes of the state is unfounded. Comparisons of other state vegetation programs through out the entire western US have not accomplished this goal. Undesirable vegatation will continue to encroach and invade into desirable vegetation as it has done for thousands of years. 4.1

I question the validity and practicality of these goals. This alternative does not represent the vegetation diversity and natural change occurring in a given plant community.

page 2

Comment 4 continued

4.2 The statement to which these comments refer are made as general observations to the subject of Environmental Consequences. Chapter 3 contains a more detailed discussion of these issues.

Alternative F - "Current Practices, Decentralized Management".

This alternative, in practice, addresses integrated vegetation management. However, this summary does not outline the ongoing program with just accuracy.

The current program administered by WSDOT has achieved national recognition and respect. The benefit to the residents of Washington are excellent. However, often the results are "driven by" or a misunderstanding of the goals and methodology lead to unfounded and inaccurate claims against the Department of Transportation.

I question the accuracy and generalization of your statements in the following sections based on actual chemical properties of the herbicides listed.

0.5.1 Geology and Soils

What specific herbicides indirectly affect soil microorganism and productivity?

How and which herbicides in Alternative D, E and F would adversely impact the geology and soils?

0.5.2 Air quality

Which specific herbicides would have impact on air quality? Not all herbicides you discuss have the chemical properties to impact air quality.

4.2 0.5.3 Water quality

When used according to the label, how will these herbicides directly impact the water quality? This is an over statement.

Please be more descriptive in identifying soil erosion potential. Does 1 inch shoulder aggregate in Zone 1 erode?

0.5.5 Wetlands

When used according to the label, which specific herbicides will directly impact wetlands?

0.5.6 Vegetation

What is the value of the impact of herbicides affecting non-target species when applied according to the label?

I am unclear on the value placed on soil erosion equated with herbicide use. This generalization is misleading.

page 3

Comment 4 continued

4.3 We are not referencing any documentation with this statement. It is generally regarded as fact that habitat changes affect wildlife, some positively, some negatively.

4.4 The point of sentences 2 and 3 in section 0.5.10 are summed up in sentence 3.

4.5 The values for diuron utilized for risk assessment were obtained from the USEPA, USDI, and Dupont. See section 2.3 on page B2-3 for further explanation.

4.6 While risks to workers and public alike are "negligible", when compared workers are at greater risk because they are have a greater exposure to the chemicals.

0.5.7 Wildlife and Wildlife Habitat.

4.3 What documentation are you referencing when you state, "habitat manipulations as a result of herbicide applications will benefit some animals and harm others?"

0.5.10 Cultural Resources

4.4 I do not understand the reasoning behind the generalization that herbicides will cause damage to desirable vegetation. Many of the herbicide options available enhance cultural programs and subsequently promote desirable vegetation in various sites.

0.5.13 Human Health

4.5 The values (rates) utilized for diuron are inaccurate. Subsequently the risk assessment will be inaccurate.

4.6 The scientific data and findings in your own appendices reflect "negligible risk" or "pose no risk" to the public or workers. How can you state in paragraph one, "In general, the risk of experiencing either short or long term effects from using herbicides is much greater for the WSDOT workers than it is for the general public".

This is an unfounded summarization causing unnecessary misrepresentation of the facts when you assess risk.

Sincerely,

John D. Cantlon

Comment 5

5.1 Thank you, your comments and your support of Alternative E are noted.

22 March 1993

Compliance Services International
950 Pacific Avenue, Suite 700
Tacoma, Washington 98402

Attn: Eric Henriksen

5.1 I support Alternative " E " Long-term Comprehensive Integrated Approach after review of the draft Environmental Impact Statement for the Washington State Department of Transportation's Roadside Vegetation Management Program. The Department of Transportation already has a nationally recognized program in place with emphasis on addressing surface runoff, leaching and other environmental concerns. The Department of Transportation is a leader in innovative approaches in reducing chemical dependency by means of plant community manipulation, biological, and cultural practices. The Department of Transportation further demonstrates their commitment to prudent use of chemicals by insistence of advanced training in application techniques covering timing, product efficacy, and environmental fate.

The "mission" is to facilitate the safe movement of vehicles on the roadway. The roadway system is not a park system. Copious amounts of thought, time, and money have gone into the decision making process regarding the Department of Transportation's vegetation management choices. The procedures and practices are constantly changing to meet the growing concern for environmental consequence, dollar expenditure, and effective use of resources (personnel, equipment, and materials).

Sincerely,

Leonard O. Cade
200 Chestnut Street
Kelso, Washington 98626

4.3.2 Comments Concerning Herbicide Use

The following comments deal mainly with the use of herbicides as a roadside vegetation management tool. Most of the comments express opposition to the use of pesticides as a management tool, with some suggesting stronger mitigation measures if they are to be used. Many of the comments urged WSDOT to use native vegetation as a stabilizing factor, thereby reducing the need for treatments of the roadsides.

Many of the comments received seemed to be from a network of people mobilized by organizations to write WSDOT in opposition to herbicide use. These letters called for the use of Integrated Pest Management (IPM), a 50% reduction of pesticide use in the first year, and a total phase-out of pesticide use within five years. This large group of letters showed a growing, well organized grass-roots effort to curtail, if not eliminate, herbicide use by WSDOT.

4.3.2.1 Group Response

By its selection of the preferred alternative, WSDOT has provided a very positive response to this group of comments, and perhaps the best way to respond here is simply to reiterate some of the ways Alternative G addresses the concerns expressed in this group. Under Alternative G pesticide use will be reduced through the establishment of stable vegetation and the use of site-specific Integrated Pest Management (IPM) in the decision-making process.

Comment 6

6.1 WSDOT's spray history records are quite lengthy, therefore only records from 1990 to present were used in the analysis. This time span is more than adequate, and effectively shows WSDOT's current practices.

6.2 It is inconceivable that WSDOT could apply 84,000 pounds of pesticides, per acre, in a given year. The value of 84,000 pounds would be closer to a yearly total for the entire state, as opposed to per acre.

6.3 We could not find data to support or disprove this, however, it must be pointed out that this claim is based entirely on assumption.

RECEIVED MAY 18 1993

WASHINGTON TOXICS COALITION
4516 University Way NE
Seattle, Washington 98105
206/632-1545

May 14, 1993

Eric Henrikson
Compliance Services International
#700 Seafirst Center, 950 Pacific Ave.
Tacoma, Washington 98402

Dear Mr. Henrikson:

The enclosed comments are regarding Washington State Department of Transportation's (WSDOT) Draft Environmental Impact Statement on Roadside Vegetation Management.

WSDOT's Attitude Regarding the EIS Project

WSDOT states, "Vegetation management along WSDOT roadsides is considered to be categorically exempt from environmental review under the State Environmental Policy Act (SEPA)." This is clearly the opinion held by WSDOT and represents an underlying problem that is prevalent throughout the document. There is a unwillingness to acknowledge the scope of the potential impacts that WSDOT's vegetation management practices have on the natural resources of this state.

WSDOT claims that this EIS was voluntarily undertaken. The true history of this process in fact, bares out continued citizen pressure and an act of the legislature forcing this EIS. There was resistance and denial of environmental impacts by WSDOT from the very beginning of this process.

This "attitude problem" is also borne out in an apparent refusal on WSDOT's part to provide the public with an intelligent and defensible assessment of the potential impacts of WSDOT's roadside management practices. The DEIS is inadequate, misleading and incomplete. It does not adequately address the potential or known problems with the current management regime or the trend of increased pesticide use.

6.1 The history of WSDOT's spray program was not adequately addressed. By ignoring WSDOT's records of use of pesticides between 1980 and 1989, WSDOT missed an opportunity to understand a continuing trend of increased reliance on spraying hazardous compounds which could hopefully lead to better understanding of how it will reverse this trend. WSDOT should address this trend and volume increase in the final document.

Based on information from Caltrans, California Department of Transportation is the single largest user of herbicides in that state. More pesticides are used on their highways than by any other segment of pesticide users—including agriculture and urban use. Keep in mind that California has the largest agribusiness in the United States with the most land under production.

6.2 According to a 1987 survey by the Federal Transportation Research Board, WSDOT was number one in the nation for the amounts per acre of pesticide used, with approximately 84,000 pounds. WSDOT concurrently decreased acreage mowed. WSDOT refused to participate in the survey the following year.

6.3 Since WSDOT used more pesticides per acre than any other state in the nation, it follows that WSDOT is likely to be the leading user of pesticides in the State of Washington. The pesticide use data provided by WSDOT in the DEIS is based on information from 1989, "records and best estimates" from WSDOT districts and indicates an increase of 59%, from 84,000 pounds 1987 to 134,000 pounds of active ingredient in 1989.

Comment 6 continued

6.4 See response 6.14 (this letter) and section 4.1.3.1 at the beginning of this chapter.

6.5 The comment period was 100 days, opposed to the 30 days required by SEPA. The Draft Environmental Impact Statement was issued on February 10, 1993 with an announcement of a 30-day period for the receipt of public and agency comments. Notification was listed in the SEPA register. At the end of that period WSDOT felt it had not received an adequate number of public comments, and the comment period was extended one month to April 10, 1993. At that time additional requests for the DEIS were still being received, and WSDOT again extended the comment period, this time to May 19, 1993. The comment period was terminated at the end of the day May 19,1993 although late comments were received and accepted up until the writing of this section.

The scoping comments were both considered and incorporated: see Section 1.3.0 of Chapter One for a summary of the scoping process.

Page 2

The reduction of pesticide use is not in any way a considered a goal by WSDOT. This is alarming and disturbing and borders on the incredible.

Consider how it must be perceived by the public that, in the face of repeated pesticide use of this magnitude in areas designed to move water into drainages and creeks, with a 5 foot buffer on water, WSDOT continues to maintain that there are not unlikely to be significant impacts to the environment or to human health from pesticide use. 6.4

WSDOT needs to address the attitude behind progressively increasing its reliance on pesticides. It must justify the steady increase of pesticide use in the decade between 1980 and 1990. It must also identify and evaluate the possible alternatives for this.

Public Involvement and Notification

WSDOT demonstrated in many ways that it is not interested in public's input into this process. WSDOT did not bring interested individuals and/or affected parties together to develop an approach to assessing its impacts and relations with adjacent land managers, nor did not WSDOT respond to or incorporate the scoping comments. 6.5

On page 1-9, WSDOT is quoted, "WSDOT decided to voluntarily go through the EIS process in order to increase opportunity for public involvement." This statement was not borne out in WSDOT's actions. WSDOT has made a mockery of public involvement. WSDOT has refused input, failed in its obligation to involve the public, and violated the intent and the mandate of SEPA to provide adequate notification and opportunity to review the Draft EIS. WSDOT failed in its legal mandate to distribute the draft document to the parties identified in SEPA, namely, affected Tribes, interested citizens and the cooperating state and federal agencies. 6.6

This exclusion reinforces a feeling held by many who have had dealings with the WSDOT and that is pervasive throughout Washington. Namely: WSDOT is not interested in how it impacts other jurisdictions, nor it is concerned with what the affected organizations or the public thinks about its roadside management program. There is a tremendous mistrust of WSDOT's roadside program by the public, water quality managers, fish and wildlife managers and the Native American Tribal community.

This issue is relevant to raise because these problems are reflected throughout the DEIS. It impacts the public's sense of access to affect change in this public agency. The Tribes, the public and relevant state agencies have been "shut out" from the beginning of the DEIS process. Opportunity to provide scoping comments was an initial issue raised by this organization in a letter to John Conrad dated March 14, 1991. The Toxics Coalition protested our exclusion from the scoping notification process and voiced serious concerns about the issue of public involvement.

"WSDOT decided to voluntarily go through the EIS process in order to increase opportunity for public involvement." This statement from the DEIS is an insult to the public's sensibilities and to anyone who has an interest and attempted to provide input into the EIS process. 6.7

The violations of SEPA regarding notification and distribution were pointed out by the Washington Toxics Coalition. We contacted tribal representatives, county, state, and federal agencies, and interested citizens about the availability of this document. The amount of public response that WSDOT is likely to receive is based primarily on the outreach performed by the Toxics Coalition.

The Toxics Coalition formally requested an extension of comment deadline and that WSDOT begin the notification process over again. We supplied WSDOT with lists of organizations and individuals that needed to be notified. It is unclear how much outreach WSDOT undertook at that late date. The

6.6 The DEIS was issued to anyone who requested it. Notification of the availability of the document was made through the SEPA register and press releases.

6.7 See section 4.1.2

Comment 6 continued

6.8 WSDOT read the all comments in their entirety.

6.9 The cost of the document, $40.55, did not exceed the cost of printing and mailing the document.

6.10 This "claim" would be ludicrous and unfounded, if it had been made. This claim does not appear in the EIS or its appendices.

6.11 Generalized statements regarding cost were made in the document. The EIS is not intended to present a detailed cost comparison.

Page 3

comment deadline was extended, but offered an inadequate amount of time (according to SEPA, a minimum of 30 days), for individuals to receive and provide comment. In the opinion of this organization, public notification was inadequate and violated the spirit and stated procedures of SEPA.

WSDOT indicated to this organization that no public hearings will be held due to fact that, "WSDOT already did outreach to the public during the scoping process." Based on the information provided in the DEIS, less than ten members of the public (in total) attended these meetings statewide. Does this constitute adequate public outreach in WSDOT opinion?? If WSDOT is interested in public input, referring to statement made on Page 1-9, "WSDOT decided to voluntarily go through the EIS process in order to increase opportunity for public involvement." If this is true, explain why would WSDOT not hold public hearings to determine the best possible vegetation management program for the people who fund this agency?

6.8 The fact that WSDOT has contracted out even the reading of public comments is another example of the agency's discounting of public input. Will WSDOT ever read the comments or will it only see a sanitized and generalized version of the comments?

The Washington Toxics Coalition formally requests that all comments received by the consultants and by WSDOT be included in their entirety in the body of the Final EIS.

6.9 The price quoted for the DEIS is $40.55. This is exorbitant and may exceed cost of production. The cost of Caltrans DEIS document of similar size was $15.00. How does WSDOT account for the high price of the DEIS?

Underlying Assumptions and Unfounded Claims

The DEIS presents numerous assumptions and claims which are undocumented and unfounded. These assumptions undermine the intent of an EIS process and render this document inadequate. Some of these assumptions are identified.

6.10 "Herbicides, if used as directed, do not cause impacts to the environment or to human health." This is perhaps the most ludicrous and unfounded claim of all. Where is your data? This presumption undermines the intent SEPA and undermines the ability of an objective assessment by WSDOT. WSDOT has no monitoring information that would support this unfounded claim. WSDOT uses 28 different pesticides, nearly all of which are "conditionally registered" with incomplete testing data—i.e. for which health and environmental fate data are lacking. This attitude must be reversed if an adequate EIS is to be developed.

6.11 Pesticides are the most economical control method. There is no discussion of cost comparison, yet WSDOT states numerous times throughout the document that pesticides are more economical than any other method of control.

Page 1-10, "As chemical pesticides, products and procedures become more refined and developed, the use of chemicals for vegetation management(sic) has become widespread and quite economical." The reference to "refined and developed" should be fully explained and discussed. The assumption that pesticide use is "quite economical" is unfounded and must be supported with a full assessment of the direct, indirect and societal costs of use. WSDOT implies throughout the document that pesticides are the most economically feasible alternative to "conventional vegetation management methods (mechanical)." Page 1-13.

On Page 1-5, WSDOT describes its current program as, "matching the specific needs with the resources available." Without revealing what those resources are, it is impossible to provide review or comment on this justification of current practices. WSDOT must identify the true long-term costs

Comment 6 continued

6.12 This statement in the document is made in the context of comparing effects on individuals versus effects on populations. It is an assessment based on the analysis presented on Appendix B.

6.13 Higher vegetation cover provides more hiding and foraging space for animals, thus attracting them closer to the road.

6.14 The 5-foot buffer statements caused a large response. To avoid confusion the wording has been changed from "Do not apply herbicides within 5 feet of water (or beyond label restricitions)..." to "Observe label restrictions when applying herbicides". The 5-foot buffer was meant as an extra buffer to be used in cases where a herbicides label provided no buffer restrictions.

Page 4

accepted with pesticide use. Without fully assessing the economic impacts of both methods, this underlying assumption is unacceptable and indefensible.

What is the total cost of developing and producing this EIS. Identify all costs.

Please refer to Washington Toxic Coalition's Scoping Comments, appendix A, for a full discussion of the considerations that should be included in a comprehensive assessment of cost. Some key considerations follows.

Economic assessments of management programs that include the use of pesticides should include the following cost considerations:

- Rising costs of chemicals.
- Training, licensing and insurance rates for a pesticide applicators.
- Fines levied against WSDOT for label violations, etc.
- Monitoring/laboratory testing should be randomly performed on wetlands, creeks (including sediment), soils and vegetation and workers before and after pesticide applications. (Tests must be conducted for both the parent material and the metabolite or initial breakdown product of each pesticide used.)
- Lower prices for organic growers who cannot sell produce grown near roadways at organic prices
- Crop loss from drift. (Dust has been responsible for crop loss and soil sterility lasting many years.
- Processing "Owner Will Maintain" agreements.
- Existing or potential personal liability claims against WSDOT (include costs to public of lawyers, legal fees, court costs and settlements).
- Rehabilitation of a damaged or destroyed natural resource such as native salmon, shellfish or an endangered plant species.
- Monitoring impacts of pesticide use, including: sediment, shallow wells, surface and ground water, soils around storage sheds and mixing and loading areas.
- Clean-up of contaminated groundwater, wetlands, soils, disposal, etc.
- Spill or accident response involving materials used by WSDOT.

6.12 Wildlife and Wildlife Habitat: "None of the herbicides proposed for use by WSDOT are expected to adversely impact any wildlife populations." Page vii. This is an unfounded statement. It undermines the purpose of the DEIS. One drop of petroleum distillate — found in 85 % of all pesticides—can kill a bird egg. Valent X-77, a surfactant added to glyphosate to comprise the aquatic formulation, is extremely toxic to fish. 2,4-D causes reproductive effects in animals. (Bene, Gwen. "2,4-D." Journal of Pesticide Reform, Vol. 11, No. 3)

6.13 The presence of vegetation in Zone 2 causes an increase in roadkill. "When replanting of an area occurs, WSDOT should only plant low stature herbs and shrubs that are not preferred by large herbivores. This will reduce the possibility of collisions with large mammals." Page xiii. This cannot be documented and is not a logical argument. It is common knowledge that large mammals have predetermined migration routes that are perhaps millenia old. The presence of vegetation has little to do with the death of deer, except perhaps through toxic effects of pesticides.

6.14 "Roadside vegetation management treatments are not known to have caused substantial impacts on aquatic organisms in adjacent waters." Where are the data to support this ? Ditches are designed to carry water. WSDOT sprays herbicides in the ditches and provides 5 foot buffers on water. To make this statement indicates a poor understanding on WSDOT's part of the potential impacts of repeated herbicide use.

Comment 6 continued

6.15 State highway "visual quality" should not be compared to cosmetic standards for foods. The message conveyed in the visual quality section is not that visual quality is a reason for vegetation management, it is a by-product of good vegetation management. Example: (Section 3.2.10.3) "Seasonal timing of vegetation management practices is key in reducing the visual impact of vegetation management practices." While visual quality is important to most citizens, WSDOT did not use this as a criteria in the selection of Alternative G.

6.16 Bare earth zones in Zone 1 are necessary for a number of reasons. Probably the most important is to ensure proper surface, and more importantly, subsurface drainage. Vegetation in Zone 1 can lead to surface puddles which increase danger to the motorist and subsurface water deposits which damage the structure of the road. It is important to note that Zone 1 was recently reduced from 0-12 feet to 0-2 feet by the Zone One Task Force.

Page 5

6.15

System design standards are not all based on need. The concept of an "aesthetic or visual standard" is the department's own invention and carries with it a subjective value that is not defensible as a justification to select one alternative over another. This standard may be compared to cosmetic standards on foods. If the standard is changed, pesticide use would reduce significantly. This is an underlying assumption that is of extreme importance. When visual appearance standards are coupled with the list of what WSDOT considers to be "target vegetation", excessive pesticide use may be explained. WSDOT needs to address these concepts and demonstrate through documented referenced data that "visual standards" are mandated and achievable only through pesticide use. How many pounds of pesticides are used to maintain "appearance"?

In addition, the Tacoma Coalition maintains that superior aesthetic standards can be met or exceeded by other alternatives. WSDOT dismisses Alternative C (no chemical approach) as a means to meet an aesthetic visual standard. However, under Alternative C, native vegetation, including native wildflowers and the federally funded wildflower program within WSDOT would be able to survive.

Elimination of pesticides used to maintain "visual appearance" would be an obvious mitigation measure. The omission of this obvious step indicates that WSDOT is not considering that reduction of pesticides is an obvious goal.

WSDOT fails to address the management conflict of its wildflower program and the "vegetation management" or spray program.

6.16

Bare earth zones are necessary. WSDOT claims that a "bare earth" zone is necessary from the edge of the highway to the bottom of the ditch (zone one) in order to protect the integrity of the road bed. This has never been substantiated or documented in the scientific literature of the Federal Highway Research Board. This is an "assumed" management need. WSDOT offers no documentation or data to support this claim. In fact there are studies and existing practices by other states and counties that directly contradict this unfounded claim. In addition, if this was an established management goal, maintaining a "bare earth zone" is not dependent on the use of chemical pesticides.

For example, a study of 61 roadway sites was undertaken by the Public Works Department in Lane County, Oregon to determine what factors influenced pavement conditions. The study failed to establish a correlation between the presence of vegetation adjacent to the pavement edge and pavement condition, indicating that maintaining bare earth is not necessary.

In addition, there are many states that do not manage for a "bare earth" zone. How does WSDOT explain this? How does WSDOT justify maintaining a bare earth zone in areas with less than 40" of rainfall per year? This is not site specific management.

WSDOT must support the claim that a "bare earth" zone is necessary by providing valid studies, with referenced documentation, available for review by the public.

Alternatives to Pesticides are Ignored

Because WSDOT assumes that pesticide use is necessary, excellent models employing viable alternative management strategies are ignored.

Jefferson, Mason and San Juan have been successfully managing roadside vegetation for over a twelve years, providing an excellent case study of pavement conditions and vegetation control that meets performance, safety and visual standards. There has not been any accelerated deterioration of the pavement nor has drainage been impeded—as claimed by WSDOT. Acknowledge, describe, and discuss management strategies in effect in other jurisdictions. Include an assessment of Thurston County and Vancouver Island, B.C.

Comment 6 continued

6.17 It is not the purpose of this document to explore new techniques.

6.18 Alternative E, and more importantly, Alternative G employ Integrated Pest Management (IPM) as the cornerstone of the decision-making process. IPM is defined in WAC 173-270 and includes monitoring and evaluation of pest populations, damage and results of treatment, the reliance to the maximum extent possible on nonhazardous biological, mechanical, and cultural treatment of pests, and the use of pesticides only after all other methods have been evaluated.

Page 6

WSDOT has systematically ignored excellent examples of alternative management strategies. U.S. Forest Service, Region 6, the National Park Service, Mason, Clallam, Snohomish, Jefferson, San Juan, Whatcomm, as well as large portions of King and Kitsap Counties do not use any pesticides to manage roadside vegetation. Address why this relevant and pivotal information was ignored by the DEIS.

6.17 Steam is an exciting and potentially very viable alternative to pesticides. Steam is effectively being used by the Canadian Pacific Railroad with apparently excellent results. WSDOT has dismissed out of hand an opportunity to explore the potential effectiveness of this alternative technique. Demonstrate and discuss the reasons for this decision.

There are scores of excellent documents that explore viable and tested alternative management strategies. Not one mention of alternatives to pesticides is made. This is another example of how underlying assumptions on WSDOT's part has undermined and rendered useless this document.

WSDOT's Current Practices

WSDOT does not adequately or accurately describe its current management practices in terms of what is really happening on the roadsides. This includes steady increases in pesticide use, calendar applications of herbicides and sterilants, targeting unnecessary species of a wide variety plants for herbicide treatment, brown cuts, and the systematic displacement of native vegetation and trees with graded hillsides of turf.

WSDOT is confused about are what current practices versus proposed practices versus future practices. There is a very muddled presentation about "current practices" that does not accurately reflect current practices. "Future practices" are described as "current practices. WSDOT's description of current practices are not distinguishable from what is described as Alternative E—Long Term Comprehensive Integrated Approach. This confusion occurs throughout the document. It is apparent that WSDOT does not have a handle on what current practices or their impacts are.

WSDOT claims that the current practice is an "integrated program" Page 1-6.

There is a strong likelihood that the public will view Alternative E as an IPM approach.

WSDOT ignores the term Integrated Pest Management (IPM), but claims that it follows an "integrated program". There is a reference on page 1-6 to an "integrated program" matching specific needs with the resources available. This is an omission of tremendous proportion. A true IPM strategy is an obvious and viable alternative. IPM has been in the forefront of pest and vegetation management and if implemented by WSDOT, would result in significant reduction of pesticide use.

6.18 WSDOT confuses and misrepresents the meaning of the term "integrated program." An "integrated approach" does not mean mixing together all the possible treatment options. It refers to an applied scientific management strategy. This strategy is referred by experts in the field of pest and vegetation management control as, "Integrated Pest Management." The true essence of this management approach is lost, compromised and misrepresented by WSDOT.

WSDOT has adopted the chemical industry's own unique version of what IPM means. Kent L. Pittard of Du Pont, stated, "Ideally, IPM requires that all methods of controlling a pest are equally available. Setting predetermined constraints on the use of an particular control (sic) will reduce the overall effectiveness of IPM and would undermine the goal of enhancing water quality." This is how WSDOT has characterized Integrated Vegetation Management. And this is why Alternative E is not acceptable as presented by WSDOT.

Comment 6 continued

Page 7

The chemical industry wants the public to believe that IPM provides all management tools with an equal status. In other words, there is no ranking of management tools according to the potential environmental impact and the term "integrated" implies a "mix" of management tools. It is obvious that the WSDOT has adopted the chemical industry's interpretative definition of Integrated Pest Management.

It is essential that the goals and principles of this discipline are formally established. "Integrated Pest Management" or "IPM" should be defined by WSDOT to include specific goals and principles in order to distinguish this management process from other less accurate interpretations of IPM.

If there is not a clear understanding of the intent of IPM, then the goal of this entire process is lost. It is critical that we all adopt the same goals and operate with the same definitions. IPM is not whatever anyone wants it to be.

6.18 The Bio-Integral Resource Center in Berkeley, California is a leader in developing IPM strategies and defines IPM as follows. "IPM is a long-term ecologically-based systems approach to controlling pest populations that utilizes needs assessment based on decision-making criteria. IPM maximizes reliance on natural pest controls. The major components of IPM are: monitoring and inventory of pest populations, determination of injury and action levels, identification of priority pest problems, selection and timing of least toxic management tools, site-specific treatment, evaluation and adjustment. Pesticides are used only as a last resort. Prevention is a major component of IPM and can best be addressed at the design stage."

WSDOT's current discussion of an "integrated program" is confusing to the public. WSDOT leads the public to believe that "Integrated Vegetation Management" as defined in the DEIS, is really IPM or Integrated Pest Management. WSDOT must distinguish between IPM as a classically applied decision/making approach versus WSDOT's version relying on all tools as equally available.

There is a strong likelihood that Alternative E will be confused with what the public perceives as an IPM approach. WSDOT must distinguish between its version of an "integrated approach" and true Integrated Pest Management. IPM is not all tools are equally available, as is indicated by WSDOT to be Integrated Vegetation Management. This should be made clear in the final.

Primary Goal of Vegetation Management

In describing current practices, WSDOT indicates that the primary goals of its vegetation management program is the establishment of stable roadside vegetation that will resist encroachment by "undesirable plants".

WSDOT must identify where specifically the establishment of native vegetation has actually occurred. It has been the observation of this organization and others that, in fact, WSDOT has been systematically replacing native plant communities along roadsides with graded slopes planted in turf grass. (State Routes 104, 101, 20, 16, 16.) The removal of stable, low-growing plant communities directly contradicts the claim the current practices and the primary goal of promoting the native vegetation. "It is consistent with roadside maintenance to establish low maintenance vegetation, either by manipulation of existing plant community or by actively planting desirable species." (Page 1-7) Please explain this departure from the stated "primary goal" and the associated exorbitant budget expenditure of this activity.

"Good Neighbor" Agreements

Describe how WSDOT sees itself as being a "good neighbor". What are the components of being a good neighbor.

Comment 6 continued

6.19 No alternative had been selected at the time of the issuance of the DEIS. After reading the public comments, WSDOT created Alternative G and selected it as the preferred alternative.

6.20 Please see the definition of Alternative G in the EIS summary.

6.21 Alternative E was combined with Alternative F to form the basis for Alternative G. Alternative E incorporates a true IPM approach. Alternative C was rejected in favor of an integrated approach that reduces pesticide use through the establishment of stable vegetation. Alternative D differs from the current program in that Alternative D has contains no provisions for long-term planning of any kind.

Page 6

WSDOT needs to identify all the agencies and organizations with which it has Memoranda of Understandings, identify their nature, previous problems, successes, and discuss the implications of implementation of the MOUs with each proposed alternative.

EIS Alternatives

6.19 Another clear example of WSDOT not having a good understanding of its program or the direction that it needs to be moving in is the failure to state a preferred alternative. This does not provide guidance to the public nor reflect a sense of a direction for the program. What is WSDOT's rationale for this lack of leadership?

WSDOT claims that without "centralization" more pesticides will be used and additional negative impacts will result from this use. (Page 1-10) WSDOT presents the alternatives with a clear bias toward the need for centralization.

This needs to be described and explained in detail. What is the justification for promoting centralization. Centralization is not defined or described. Do so. What would happen differently? How would centralization be implemented? How would Olympia enforce the districts? How would local managers respond to this approach?

Identify the specific problems with the current decentralized management style. WSDOT currently maintains a standardized maintenance manual developed by headquarters and used by each district. Environmental requirements would be standardized. Currently there are regular meetings of district supervisors as well as inner district newsletters and bulletins. Communication currently exists between the districts.

6.20 If a professionally defined version of an Integrated Pest Management (IPM) approach were to be adopted and implemented, site specific management and localized decision-making would be pivotal to its success. This is a basic tenet of IPM.

The alternatives are not adequately defined in terms of the concept of centralization or continued decentralization. It is unclear what WSDOT is proposing when it describes the Current program, Alternative E versus Alternative F. What is WSDOT really proposing with Alternative E? Is centralization presumed to be included in this alternative? What is WSDOT proposing for Alternative E regarding this issue? This is unclear and not well explained.

After hearing what centralization would mean to several district maintenance supervisors, it was clear, based on those conversations, that centralization is not favored in the districts. Each felt, as does this organization, that intelligent management decisions can only be made on a site-specific basis. Centralization of prescription controls would be in direct contradiction to the implementation of Alternative E. Explain the motivation for removing management decisions from the local managers.

WSDOT does not provide any data or rational justifications for the projections about the amount of roadsides that would be treated under each of the stated alternatives. There is a distinct bias against the likely success of Alternative C. There is a bias in the presentation of the alternatives toward a supposition that pesticide reliance will continue.

Alternative E: Alternative E is at first glance, a likely preferred alternative. However, there is a continued reliance on significant uses of pesticides, without a discussion or evaluation of how or in what instances they would be used. The description of this alternative is incomplete and vague.

6.21 There is also a strong likelihood that Alternative E, "Long-term Comprehensive Integrated Approach" will be confused by most people to be a true IPM approach. WSDOT must distinguish

Comment 6 continued

6.22 The text of this section has been changed for the FEIS to reject WSDOT's change in direction.

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between its version of an integrated approach and true Integrated Pest Management. Make this clear in the text.

Alternative C: The No Chemical Approach is dismissed as not being able to meet WSDOT standards. This is irrational and unfounded. The final EIS must consider the successful management strategies used by others mentioned above. Explain how many local and federal jurisdictions manage successfully without pesticides.

6.21

In Alternative C WSDOT's obvious bias toward pesticide reliance emerges in the discussion of various methods of control. In stating that less than half of the roadsides would be managed under Alternative C, WSDOT is assuming that nothing will be done in the place of applying tens of thousands of pounds of pesticides. This statement is not defensible. Where is your data to support this claim? The description of this alternative is skewed to indicate fewer acres would be managed without chemicals and that maintenance standards would not be met. This is unfounded.

Alternative D: Explain with examples, ways that this not the most accurate description of WSDOT's current policy?

Maintenance and Safety and Accident Records

What records are maintained by WSDOT that would produce information about the known or unknown reasons that a worker is out sick? Hospitalization is not the only factor that is relevant to worker injury.

What protective equipment is worn by backpack applicators? Other applicators?

What baseline information is gathered on workers? Is biomonitoring done? If not, why not?

Neighbor Will Maintain

How many "neighbor will maintain" contracts are currently held? Is any public notification carried out that informs the public that this option is available? If so, please identify. If not, explain.

What mechanical control does WSDOT provide for neighbors who do not want pesticides used adjacent to their property? What is WSDOT's position about providing the mechanical controls? What is the rationale for this position?

Future Practices

On Page 1-12, WSDOT indicates that it recognizes a national trend in roadside management toward continuing the reduction of pesticides. WSDOT, however characterizes this trend as a response to "potential or perceived" environmental impacts. WSDOT goes on, "This is balanced by the fact that herbicides can manage vegetation along a greater number of roadside acres at less cost and possibly less disturbance that other conventional methods....However, even with the increase in cost of these chemicals, they are still an economically feasible alternative to conventional vegetation management methods (mechanical)."

6.22

These statements are another indication that WSDOT does not fully understand the impacts of its spray program. Steady increases in pesticide use by an agency that characterizes the impacts from pesticides as "potential or perceived", and requires only five feet buffers on water indicates that the program is out of control.

WSDOT should be able to recognize the critical importance of mapping sensitive areas. Yet this is characterized on Page 1-9 as an "interesting trend" that is being considered.

Comment 6 continued

6.23 Sensitive area mapping is included as part of the IPM approach utilized by Alternative G.

6.24 WSDOT keeps very detailed application records. See the tables on pages B5-62 through B5-86 showing WSDOT application rates for various active ingredients. This information was compiled from WSDOT application records.

6.25 This section of the comment ("Environmental Consequences of Various EIS Alternatives") contains a number of points listed in support of the argument against pesticide use as a roadside vegetation management tool. The best and most meaningful response is the selection of Alternative G as the preferred alternative.

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Mapping and protecting sensitive area is more than a trend. It is a requirement of responsible management and necessary for the protection of water quality, sensitive wetlands, threatened and endangered plant species and our natural resources.

6.23 WSDOT contradicts itself when it states that a "trend being closely watched by WSDOT" includes the establishment of low maintenance plant communities. It was stated in the discussion of Current Practices that the "establishment of stable plant communities" is a current practice and the "primary goal" of the vegetation management program. Which is it? An interesting trend that WSDOT is tracking or current practice?

6.24 According to a conversation with one of the consultants who contributed to the DEIS, no application records are kept by WSDOT. This person stated that it was impossible for him to gain access to rates of application or numbers of applications per year of any given pesticide. If this is true, this constitutes a serious violation of state law. Please explain.

Hazardous Materials and Hazardous Waste

The discussion of this topic is totally lacking in depth and is inadequate. It presents another strange perception put forward by WSDOT. Stating that, "Cultural methods will most likely produce more hazardous waste per acre than mechanical methods during the first year of treatment (engine oil). "Alternative C wold produce the most waste oil." Why does WSDOT think this? Please describe your thought process in detail. First, pesticide applications require equal amounts of engine oil as mechanical or "cultural". In addition, there are literally tons of pesticide containers that require disposal.

WSDOT is responsible for the of thousands of pounds of pesticides being shipped into Washington State each year. What are the potential impacts of this in the event of an accident? WSDOT should fully assess the impacts on water quality and fish of the Southern Pacific Railroad spill of Metam Sodium near Dutzenair, California.

The issue of the disposal of contaminated soil is completely ignored.

Cultural Resources

WSDOT clearly does not understand what cultural resources are, let alone how their spray program would affect them. This concept is so poorly described that it is a disgrace and a travesty. "Alternative C and E would have the greatest impact on cultural resources because of their heavy emphasis on cultural methods of vegetation management." Does WSDOT really believe this? This is so illogical that it verges on the bizarre. Cultural and mechanical techniques would be applied in a site specific methodology. How much of the traditional gathering grounds has WSDOT sprayed because it believes no harm is being done? This is a travesty.

The Toxics Coalition strongly suggests that WSDOT now do what it should have done in the beginning: confer with the Tribes to gain an understanding of the meaning of cultural resources and completely rewrite this section. A public apology to all Tribes would also be appropriate.

Environmental Consequences of Various EIS Alternatives

6.25 Less than 1% of a pesticide hits the target pest/vegetation. The remaining 99% enters the environment through a myriad of pathways. (Pimentel, D. and Levitan, L., "Pesticides: Where do they go?" Journal of Pesticide Reform, Vol. 7, No. 4)

Comment 6 continued

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WSDOT has failed to make a connection between spraying 134,000 pounds of active ingredient annually and the potential impacts from runoff, migration, drift, leaching and volitization.

The WSDOT DEIS does not address the issue of pesticide residues found in soil, fog, rain and sediment. Impacts to the environment and human health through these media need to be addressed. In addition, the EIS should address the potential for cumulative impacts resulting from pesticide use by other entities, including agriculture, forestry, golf courses, and county rights-of-way.

WSDOT needs to address the fact that there may be cumulative impacts resulting from the application of pesticides every year for the last twenty years.

The EIS must include the indirect impacts to the environment from fossil fuel consumption for each alternative. WSDOT ignores the impacts to the environment and to human health from reliance on fossil fuels in both in the manufacture and the application of pesticides. WSDOT mentions that there may be impacts from mechanical methods, but fails to point out that gas powered trucks are used to spray roadsides as well.

Discuss the considerable contribution that WSDOT makes in sheer volume of pesticide use and the impacts on the manufacturing, application and transportation all requiring fossil fuels. According to the EPA, an average of 85% of all pesticides contain petroleum distillates. WSDOT should address this use of fossil fuel as well.

The impacts of pesticides on storage facilities, mixing and loading areas are not addressed. What types of spills have happened? What clean-up procedures are in place? What would be the procedure for a concentrated pesticide, such as a sulfone urea? What are the added impacts from the disposal of pesticide containers? None of these issues is adequately addressed in this DEIS and should be.

6.25

Soils

The impacts of pesticides on soils is not adequately addressed. There are four primary adverse effects of pesticides in soil: persistence, runoff and leaching, disruption of soil biological processes and erosion. The half life of herbicide can vary greatly depending on such variables as soil organic content, temperature and pH. These factors were completely ignored by the DEIS.

WSDOT ignores persistence completely. For example, Picloram has a half life of as long as four years in dry soil. (National Research Council of Canada, 1974. "Picloram: The effects of its use as a herbicide on environmental quality." Associate Committee on Scientific Criteria for Environmental Quality. Ottawa, Ontario.)

How does WSDOT know when it is managing an area of "groundwater vulnerability"? How does WSDOT cooperate, or not, with other jurisdictions with well-known groundwater protection efforts, such as in areas of Thurston, Island, Kitsap and Snohomish Counties? What effort is made by WSDOT to comply with local protection efforts? What effort has been made by WSDOT to identify areas of groundwater concern or sole source aquifers? Please identify.

WSDOT should focus efforts on taking inventory of vulnerable soils (which are not identified in the DEIS), and should eliminate pesticide use in those areas.

Since many pesticides are extremely acid, how does the repeated use of pesticides impact soil acidity? Please address the likelihood that the repeated use of acidic compounds could create a perfect environment for unwanted weeds.

Comment 6 continued

Page 12

It is well established that repeated pesticide use weakens soil health through the diminishing of organic content, including earthworm and microorganism populations. The result being increased erosion and vulnerability to insect damage and disease.

The following statement found on Page 3-5 is an example of this documents' attempt to justify pesticide reliance. "With the exception of soil sterilants, chemical herbicide and pesticides (sic) would have no known direct impact on geology or soils. While chemical herbicide application could affect soil microorganisms, the limited roadside area to be treated and the natural repopulation characteristics of organisms would limit the severity of this impact. Herbicides which are subject to degradation by soil microorganisms may actually stimulate microorganism populations during their degradation process." Please site referenced sources to support this claim. WSDOT's fixation on the benefits of pesticides is well demonstrated by the previous statement.

WSDOT uses some persistent chemicals, some of which are highly toxic to fish and many which are known to be leachers. These chemicals are sprayed in the areas of the roadside (pavement edge to bottom of ditch) that, by WSDOT admission, is the most vulnerable to runoff. It is well established that repeated pesticide use kills microorganisms, weakens soil health and contributes to erosion. WSDOT needs to address these realities.

WSDOT should also discuss the fact that there are significantly lower levels of organic matter in gravely soils adjacent to roadsides. This would slow if not prevent total degradation of the pesticides that rely on organic material for degradation. Please address this issue in the final EIS. Address the presence of other chemicals and how that may impact degradation. Include residuals of other pesticides, such as diuron or dust, and the effect of PCBs and petroleum distillates on the degradation process.

6-25 Identify all the pesticides used by WSDOT that have incomplete data on environmental fate. What are the studies that are either missing or inadequate, including "supplementary" or invalid studies for each pesticide used.

The impacts of increased erosion on sensitive fish population are ignored and must be addressed.

WSDOT uses nine pesticides which are on EPA's list of agricultural pesticides with leaching characteristics, have been discovered in groundwater or have otherwise been determined to have leaching potential. Dust, for example is persistent and mobile.

WSDOT is selective in the information that it relays to the public. Even though, WSDOT quotes often the Caltrans document, it ignores information that may damage the premise that pesticides do not pose a threat to human health or the environment. For example, Jones and Stokes, refer to a study ignored by WSDOT entitled, "Runoff and leaching of diuron on highway rights-of-way." Environmental Monitoring and Pesticide Regulation, California Department of Pesticide Regulation, 1991.

Also, the use of diuron by the U.S. Forest Service, Region 6, was abandoned due to insufficient information. Even though WSDOT repeatedly refers to this document, it clearly selected only information it perceived would support its current program. Diuron is not used in Thurston County due to its high potential to leach.

Describe in detail how WSDOT disposes of soils removed from the ditches or roadsides that may be contaminated with pesticides. What provision is there for monitoring the toxicity of these soils? How are these soils handled, disposed of or otherwise managed?

WSDOT does not address the characteristics of a leaching pesticide. It does not demonstrate that it has an understanding of the variables that contribute to leaching or that it could recognize a leacher.

Comment 6 continued

6.26 The sections concerning mitigation have been significantly changed for the FEIS. Please see section 0.6.0 for a summary of mitigation measures.

6.27 See response 6.12

Page 12

WSDOT must address what the leaching potential is for each chemical to migrate from the site of application. Factor in the soil types and conditions under which the pesticide is applied. For example, soil sterilants are applied to gravely soil with little or no organic material present. What is the factor the persistence of previously applied chemicals?

Identify the mobility quotient for the active ingredient and for the full formulation (including secret ingredients, carriers, metabolites and contaminants of each compound used).

Air

WSDOT identifies the contaminates found in soils along the roadside as those originating from vehicle emissions. WSDOT fails to address the impacts from PCBs, asbestos and pesticide residues in dust. Pesticide residues have been found in house dust from the use of lawn pesticides. It would follow that residues would be present at significant levels in soils adjacent to roadsides and consequently present in airborn dust. If WSDOT disagrees with this, please document why this would not be the case. The presence of these compounds in roadside soils and the subsequent impacts on air quality should be addressed in the final EIS.

6.25 The increased wind and air current velocities created by the road corridor are not addressed. The resulting tunneling effect of a road corridor is compounded by passing vehicles that would distribute materials in a wide pattern. This needs to be addressed. Drift patterns would be affected as well as contaminated dust patterns. What is the impact of this level of dust and spray drift movement on human health, water quality, fish and wildlife?

How many personal injury cases involving drift have been brought, settled, or are pending against WSDOT?

WSDOT fails to address the issue of volitization of pesticides. For example, 2,4-D is highly volatile, as is its metabolite 2, 4-Dichlorophenol (2,4-DCP). These chemicals reenter the atmosphere in warm temperatures and move in air currents for weeks after application. Given the tens of thousands of pounds of 2,4-D used by WSDOT each year, it would be appropriate to address the volitization of this chemical as a likely pathway into water, on non-target vegetation and by inhalation by wildlife and humans.

Mitigation Measures are Unacceptable

WSDOT offers as mitigation existing federal and state legal requirements— including following the label directions and training applicators. This inadequacy is repeated throughout the document. To mitigate the effects of pesticide drift, WSDOT offers to "limit applications to calm days." (Page 3-53). Minimizing drift and making applications in low wind conditions is a state law and a label requirement. Mechanical methods are offered to be eliminated to reduce dust. Why is reduced pesticide use never offered as a possible mitigation?

6.26

Water

"Water quality can be protected by not applying within 5 feet of surface water or when rain is imminent." (Page 5-52). This claim is not supported by any data whatsoever. It is insulting for WSDOT to make this claim in the face no information and in light of the attempts by Tribes, other state and federal agencies and organizations to protect our state's water quality.

No other state agency or anyone concerned about protecting water quality would even suggest that 5 feet of buffer could adequately protect our waters. WSDOT makes this ridiculous claim without any monitoring information to defend itself.

6.27

Comment 6 continued

6.31 The medical community is at this time undecided about chemical sensitivity. WSDOT will need to monitor developments in this area closely.

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another with WSDOT's application rate per treatment. WSDOT also lists a percentage of the "maximum label rate," as if this demonstrates a conservative use of pesticides.

The Toxics Coalition has not been able to find any information to support the stated maximum level of 2,4-D of 16.5 pounds per acre. This is 4 times the average application rate stated on the label. WSDOT needs to identify the source for 2,4-D and the other "maximum rates" that are quoted in the DEIS.

This is clearly a deliberate attempt to mislead the public and attempts to justify WSDOT's reliance on chemicals. The public can only assume that all the data presented by WSDOT is skewed and misleading. This table is insulting and illegal must be corrected or abandoned in the FEIS. This seriously undermines all possible credibility.

6.30

WSDOT cannot seriously offer acute LD 50's as an indication of toxic effects. WSDOT must address other sublethal effects. Cancer is not the only indication of a problem. WSDOT ignores the potential neurotoxic effects of pesticides on the public and on workers.

According to U.S. Environmental Protection Agency (EPA), WSDOT uses six possible human carcinogens, five pesticides which are not classified for carcinogenicity due to lack of or inadequate information and thirteen pesticides which are low priority for carcinogenicity studies and have not yet been tested at. Only one of the pesticides addressed in the DEIS is classified by the EPA as a non-carcinogen.

Sensitive Populations

Impacts from the use of pesticides on children, the elderly, the chemically sensitive, and pets are not adequately addressed in the DEIS. The increased risks from residents living along a state or federal highway is ignored.

There are numerous common scenarios that are completely ignored. What increased impacts are likely on residents living below the highway? What are impacts on joggers, bicyclists, children playing in roadway ditches?

WSDOT does not reveal the documented incident of when a child waiting for a school bus was soaked by pesticides sprayed from a passing WSDOT truck. There are two other incident that were reported to the office of eyewitness events of WSDOT trucks spraying school bus stops when children were present. In one event, a parent intervened and moved the children to safety. Clearly the risk to children waiting for school buses is real and significant. This issue should be addressed in detail. Similarly, the potential impacts to children waiting in areas that have been recently treated with pesticides must be addressed. Keep in mind that children are many magnitudes more susceptible to the negative impacts of pesticides.

6.31

In regard to spraying roadside reststops, an exposure scenario should address a small child rolling on the grass and an person with chemical sensitivities walking to and from his/her car. Include the studies that link lawn care pesticides to childhood lusteamia and address the greater sensitivity of children to each of the pesticides identified by WSDOT for use as well as simazine and atrazine.

WSDOT ignores existing viable alternative control strategies for managing weeds in turf.

There is no mention of placing warning signs on spray trucks or posting recently sprayed areas as a mitigation measure.

In the Final EIS, WSDOT needs to address the following (not meant as an exhaustive list): Synergistic effects of mixing pesticides and their inert ingredients; the cumulative impacts from repeated pesticide use, such as weed tolerance, and an increase in soil erosion, the metabolites of each compound, including the toxicity and impacts on the environment; assess health and environmental

Comment 6 continued

6.32 WSDOT does not use Atrazine and Simazine because of their high soil mobility.

6.33 While these issues are important, they are out of the scope of this EIS.

Page 17

impacts of all undisclosed "inert" ingredients; assess the impacts of pesticides on children, the chemically sensitive and other sensitive populations; and identify all missing and incomplete health and environmental fate data.

6.32

WSDOT should address the numerous sensitive populations and populations adjacent to our highways who are more likely to come into contact with recently sprayed turf and vegetation or be indirectly impacted by spraying. This includes areas where the homeless are likely to inhabit, nursing homes or hospitals located near state or federal highways, areas where children walk or wait for the school bus, other bus stops, campgrounds, rest stops, parks and playgrounds, and water-contact recreation areas.

The DEIS does not adequately address the toxic effects of metabolites of the various pesticides. WSDOT must investigate the impacts of these compounds. The DEIS indicates that 2,4-DCP is a metabolite of 2,4-DP. 2,4-Dichlorophenol is the initial metabolite of 2,4-D. ("Health Effects of 2,4-Dichlorophenol: A Literature Review", Dr. David Monroe, 1990.) The environmental fate and human toxicity of 2,4-DCP should be assessed.

Atrazine, Simazine and What Else?

6.31

Explain the absence of simazine and atrazine in the DEIS. If WSDOT has abandoned the use of these leaching carcinogens, then what are the reasons for this and why is this not explained?

Why are both of these chemicals excluded from the 1989 use records reported in the DEIS Appendix B? Did WSDOT use these pesticides in 1989, 1990, 1991, 1992? Is WSDOT still using them.

Reveal the amount of each of these pesticides used by WSDOT and address the subsequent potential impacts on the environment and human health in the FEIS. Reveal all other pesticides that have been used in the past by WSDOT and are either not currently being used or are not addressed in the DEIS.

Identify WSDOT's use of insecticides, fungicides, rodenticide and any other 'cides that WSDOT uses but failed to mention. What insecticides and fungicides are used by WSDOT? What are the target pests? What is the reason for excluding these compounds?

WSDOT's assessment of fertilizers is inadequate. On Page B2-13, "No information WSDOT found concerning the toxicity of these fertilizers to terrestrial or aquatic organisms." One can only assume that no information was looked for. This is inadequate.

WSDOT does not identify the amounts of fertilizers that it uses. What is used when, how much is used and what are the likely effects of these compounds on human health and the environment. Be specific. Page B1-28, WSDOT lists compounds that are used for which it does not know the ingredients. This is another totally unacceptable practice. Either find out what is in those products or abandon their use.

The impacts of fertilizers on water quality, fish and aquatic organisms or on wetlands and groundwater are ignored. The toxicity of chemical fertilizers to human health or the environment is completely dismissed. This must be addressed.

There is no discussion of alternative methods to achieve increased soil fertility.

Complaints, Fines and Reprimands

6.33

Please reveal all fines, reprimands, and warnings received by Washington State Department of Agriculture regarding a repeated label violation.

Comment 6 continued

6.34 This list is present in the FEIS in the beginning of the summary.

Was WSDOT ever cited or warned regarding the use of atrazine or simazine in areas that had been designated as "sole source aquifers"? Please explain WSDOT's use of these known leachers on islands and in other areas of sensitive groundwater, gravely outwash soils found in southern King, Pierce, and Thurston County.

6.33 Has WSDOT ever received a fine, reprimand or warning from the Department of Ecology or from the Environmental Protection Agency for activities associated with pesticide use?

Does WSDOT keep a record of complaints that are received from citizens, agencies, tribes, other? What is the nature of those complaints and how are they dealt with?

Inadequate Assessment of the End Use of a Pesticide

The DEIS completely ignores the environmental and human health effects of the production, formulation, transportation and disposal of pesticides and their by-products. There are profound environmental consequences at each of these stages of the pesticide chain: workers and communities near pesticide plants are exposed to hazardous chemicals during production, when the pesticides are formulated; motorists and residents near highways and the surrounding environment are at risk from transportation accidents. Those impacted from disposal and toxic waste dumps also need to be considered. To only address the impacts of "use" ignores the other direct consequences of the activity. What is the impact of the product before it is purchased by WSDOT?

The final document must, if it is to meet SEPA requirements, address unknown information and complete a Worst Case Analysis based on the fact that WSDOT does not have enough information to determine what the impacts to human health or the environment are.

WSDOT often (vaguely) refers to third party references (such as Jones and Stokes) to support a point. This is sloppy, lazy and unacceptable. This forces the reader to obtain and read the entire Caltrans document to find out what WSDOT may be referring to.

There are numerous instances of references being poorly and incompletely cited, such as, "Lavy, et al., 1980". These instances are not acceptable practices. In addition, there should be references in the back of each document. There are no references identified to support the "risk assessment" in Appendix B. The only referenced data relates to the tables 5-3 through 5-8. Please explain this. Referenced data are intrinsic to a documents' credibility.

The reliance on unpublished and unreviewed "proprietary" industry studies cited as references in the DEIS are clearly not available to the public for review. Reliance on unreviewed studies is unacceptable and a violation of SEPA (WAC 197-11-440-7).

6.34 According to SEPA, an EIS must include a list of, "Authors and principal contributors to the EIS and the nature or subject area of their contributions". (WAC 197-11-440) This was not done in the DEIS. Were contract requirements met by WSDOT?

The EIS fails to identify the significant areas of controversy. (WAC 197-11-440) Despite all denial by WSDOT, the area of central controversy is the exorbitant reliance on excessive amounts of pesticides at increasing rates. This fundamental issue must be addressed in the FEIS.

WSDOT missed an excellent opportunity to develop an ecologically sound management program with public involvement and support.

To summarize, the DEIS was vague, generalized and not specific about the known hazards and the potential environmental effects of pesticides. There was no evaluation of the existing program or an

Comment 6 continued

6.35 Thank you, your comments are noted.

assessment of what needs to change within the department. WSDOT demonstrated in a multitude of ways that it does not believe that pesticides pose a problem to workers, the public or to the environment. WSDOT failed to ask the questions about what potential problems are and consequently developed a document that does not begin to address those problems.

Critical data were ignored and information was selectively presented.

The Department of Transportation has failed to grasp or worse, refused to address the real and established threats involved with pesticide use on our state's highways. The lack of in depth identification and assessment of key problems indicates that the agency is at drift, responding to weed problems with archaic and irresponsible management techniques. WSDOT has clearly demonstrated in this DEIS that it is truly out of touch with the goals of water quality protection and with the public sentiment about repeated and unnecessary pesticide use.

Under the circumstances, none of the Alternatives presented are appropriate except Alternative C, the No Chemical Approach. The Toxics Coalition recommends that WSDOT adopt a comprehensive, classically-defined Integrated Pest Management approach that requires an immediate reduction by 50% of all pesticide use within the first year and a phase out of all pesticides within five years. No pesticides or fertilizers should be sprayed into the ditches and we would recommend that no pesticides be used within 300 feet of a school bus stop, creek, lake, river or any water body, wetland or other environmentally sensitive area.

Because this agency has demonstrated that it is not at all interested in the implementation of alternatives, a planned phase out of pesticides will provide a specific mechanism for pesticide reduction and the implementation of alternatives.

To this end, an Advisory Committee should be convened to insure that the reduction timeline was being adhered to and that alternatives are being built into the management programs. The advisory committee should be represented by Tribes, adjacent land owners, managers of jurisdictions that do no employ pesticides, an IPM specialist, a botanist, environmental representatives and water quality managers.

6.35 It is our hope that WSDOT is able to accept these comments and make the corrections necessary to produce a useful Final EIS and a program that recognizes the need to significantly reduce and phase out reliance on pesticides.

Sincerely,

Cha Smith

Cha Smith, Director
Pesticide Reform/Groundwater Protection

Enclosures

Comment 7

BLACK HILLS AUDUBON SOCIETY

A Washington State Chapter of the National Audubon Society
Mailing Address: P.O. Box 2524, Olympia, WA 98507

March 10, 1993

Marrell Livesay
Compliance Services International
950 Pacific Avenue, Suite 700
Tacoma, WA 98402

RECEIVED MAR 15 1993

Dear Mr. Livesay:

Black Hills Audubon Society is grateful for the opportunity to review and comment on the Draft Environmental Impact Statement for Roadside Vegetation Management by the Washington Department of Transportation.

The chapter's concerns have been the adverse environmental effects of the maintainence operations on wetlands, streams, wildlife habitats, native vegetation and stormwater runoff. Two of our members served on the sub-committee on Environment and Energy for the State Transportation Policy Plan. The committee unanimously voted to reduce dependence on pesticides by WSDOT.

Our comments on the Roadside Vegetation Management DEIS follow:

7.1 1. Registration by the Environmental Protection Agency (EPA) does not assure its safety, but only that a pesticide can be legally used.

7.2 2. All risk assessments of the 25 pesticides intended for use by WSDOT are provided by manufactureres. The preparers failed to obtain and include independent assessments of adverse environmental impacts from other sources. This is a major inadequacy.

7.3 3. Some of the herbicides, such as 2,4-D, have been on the market for 40 years with adequate health studies still incomplete. The DEIS should reflect that no conclusions about environmental or human health effects are appropriate until such studies have been made and results published.

7.4 4. The DEIS includes no studies on inert ingredients, adjuncts and fertilizers, although toxic wastes and undisclosed chemicals may be added as inerts to pesticides. (See enclosed EPA letter of December 11, 1990.)

7.5 5. There are no soil, sediments and water tests performed in the study by WSDOT. Thus, the DEIS is inadequate in supplying information about the probable adverse environmental impacts of contamination.

7.6 6. No research study record is included that validates the claim by WSDOT that Zone #1 bare earth policy justifies the heavy use of pesticides to prevent pavement break-up by vegetation. Studies made by David W. Dunlap on Pilot Study by Land County, Oregon Department of Public Works could reach no conclusions. (This study is available from WSDOT.)

7.7 7. A 5 foot buffer for "protection" of wetlands and streams is not even merit discussion. It violates virtually all standard recommendations.

7.1 **The USEPA will register a pesticide only after it has met certain safety requirements.**

7.2 **None of the risk assessments for the 25 pesticides were provided by the manufacturer. In all cases the risk assessments were performed by the authors of the document.**

7.3 **WSDOT uses only pesticides that are legally registered with the EPA.**

7.4 **It is true that there is less information available for inert ingredients than active ingredients, Table 5-7 lists physical data, toxicity information, and wildlife toxicity information for the inerts that qualify as "inerts of concern" (Table 5-2). Table 5-8 does the same for adjuvants.**

7.5 **Soil, sediments and water tests were used to generate the environmental fate data present in Appendix B. None of these tests were performed by WSDOT. The tests were performed by the manufacturers as required by the USEPA for registration.**

7.6 **Zone 1 policy is currently under review by WSDOT following the Zone 1 Task Force.**

7.7 **See response 6.14 for a discussion of this topic.**

Comment 7 continued

7.8 See response 7.6 on the previous page.

7.9 Comments were received from people claiming chemical sensitivities. Those comments were read and considered in the production of the Final EIS.

7.10 Thank you for your comments and your support of Alternative C, the "No Chemical Approach," is noted.

Marrall Livesay
March10, 1993
Page 2.

8. WSDOT's Zone #1 study of June 1992, Page 21, clearly indicates that the department is aware of serious toxic problems in Zone #1.

7.8

9. The draft contains no advice about the removal and disposal of treated soils from Zone #1. Such maintenance procedures imply serious problems that are not addressed by the document.

10. WSDOT has been careless in the past about spraying during periods of precipitation, not screening pesticides on the EPA's Leach list, and mixing several pesticides in single applications. These practices, while not authorized, should nevertheless be considered in the assessment and covered in the final EIS.

7.9

11. In the past the WSDOT has received complaints from people who have multiple chemical sensitivities. Hogan's Corner near Ocean Shores and Tonasket are examples. These are not considered in the draft.

12. The enclosed letter February 7, 1990 letter from Secretary Berentson to Senator Jack Metcalf explains that public concerns brought about the department's decision to proceed with the non-project EIS.

13. WSDOT's Roadside Vegetation Management plan is not in accordance with the Washington State Transportation Policy Plan of 1991. Scoping should have taken into account the policy plan instead of current program.

7.10

Considering the foregoing reservations, Black Hills Audubon Society finds that the only acceptable course is to support 0.4.3 Alternative C. "No chemical approach". In view of the fact that many states have either completely abandoned use of chemicals for vegetation management, or reduced their use to insignificance, this is reasonable.

Sincerely yours,

Adrian Brown, Toxics Chairman

Jack Davis, Committee member

Enclosures: (4)

Comment 8

8.1 A lake was used for the aquatic risk assessment because it is generally regarded as a "worst-case" scenario. A concentration of chemicals introduced into a stream or river is constantly being diluted by the flow of new water into the system, whereas in a lake the process of dilution is much less.

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LUMMI INDIAN BUSINESS COUNCIL
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DEPARTMENT _____ EXT. _____

May 11, 1993

Eric Henricksen
Environmental Scientist
Compliance Service International
1112 Alexander Avenue
Tacoma, WA 98421-4102

Dear Mr. Henriksen;

We are submitting the following comments regarding the Washington State Department of Transportation's Roadside Vegetation Management DEIS. We think it is very serious that the DOT did not involve the tribes in this according to the SEPA regulations, and hope that this experience will result in better performance on their part in the future. We have found that a process of education is necessary for many of these agencies who do not realize the role the tribes have as co-managers of fisheries with the state.

In general, we believe that the state DOT has a long way to go to understand the serious damage caused by their application of toxic chemicals to the roadways to humans and wildlife. The widespread use of chemicals in agriculture, residential use, golf courses, and roadside vegetation management has contributed in part to the decline in fisheries resources.

We have reviewed the comments of the Washington Toxics Coalition and support their concerns about the inadequacies of the EIS. We too are concerned about the broad, sweeping conclusions based on little or no scientific evidence.

In Appendix B, the Wildlife Risk Assessment is not rigorous enough to offer an adequate level of protection.

8.1 First, an estimate of toxic concentrations using a 100 acre lake does not replicate the habitat of much of the fisheries resource in Western Washington, which is in rivers and streams. Many of these rivers and streams suffer extremely low flows in the summer and in the winter, when headwaters are frequently frozen.

The discussion (2.2) of Synergistic Effects is grossly inadequate. The issue is dismissed because of the limited

Comment 8 continued

8.2 Comment noted.

8.3 You are correct that the analysis was somewhat simplified. In these types of risk assessments it is often difficult to quantify the multitude of environmental variables present. Some degree of "simplification" is neccessary to carry out the analysis. However, we do not feel the accuracy of the risk assessment was significantly compromised.

8.4 Comments noted.

8.2 resources available to test these effects, so that little is known. It is inappropriate to use these substances until these effects, as well as cumulative effects, are known. Far too many times in the past substances such as DDT were used because there was no proof they were damaging, and these are now in the food chain and continue to cause damage decades after they were applied. Allowing application of chemicals for purposes for which alternative methods of management exist will result in future environmental problems that the public will pay for in health costs, in loss of resources, and in clean-up costs.

The persistence of these substances in the environment is of high concern. Table 3-2 (Appendix B) shows that a number of chemicals toxic to aquatic life persist for 4 months or greater. For several substances the half-life is not even determined, yet these will be used. These will persist through at least several major precipitation events, perhaps more depending on when they are applied.

8.3 The formula for exposure is totally inadequate for estimating the true risk. First, using average rainfall means that for all the years when the rainfall is higher than average, the risk is greater. Second, road density is clearly greater in the Puget Trough, and yet nothing has been factored in to account for basin sizes. Travel times from the watershed crest to the rivers are far shorter in Western Washington, where basins are small. Nothing has been included to account for the distance from roads to streams and rivers, which is far shorter in the Puget Trough. Because of the steeper valleys relative to those in Eastern Washington, the risk of exposure is far higher. What is the "stream density" and what are the slopes or gradients toward the streams? And, most significantly, what is the density of fisheries resources? What is the density of other activities, such as urban development and industry, that contribute to degradation of habitat? The approach used is short-sighted and over-simplified and does not protect the resources.

In Whatcom County a very real example of our concern is a major DOT-managed highway (542) following the Nooksack River from the lowland into the upper watershed. State Highway 9 follows along the South Fork Nooksack River, as well. Spraying along these roads will run-off into the river almost immediately in many areas. The Nooksack species of anadromous salmon are seriously depleted. To make a statement that "use adjacent to aquatic environments should be avoided" is not enough. Use of these substances should be banned based on specific criteria for proximity to streams. Those that are toxic to aquatic life and persist for longer than 3 months should not be used at all.

There are alternative management methods available. These must be explored and developed. There is a finite time limit before the salmon are gone forever and the substances used are proven to be detrimental to human health individually, synergistically, and cumulatively.

The DOT needs to re-evaluate its entire program and think of the future cost to all Washington residents, not just their immediate budget. The long-term savings in developing an alternate program will be far greater. The sooner this is done, the better for all concerned. To delay further means that the DOT will continue to contribute to the destruction of the regional salmon and other fisheries resources, and to poison the populations, in particular the Native American populations, who consume far more of these foods than most people. The EPA bases their water quality criteria on consumption of approximately 2 small meals of fish per month, which is far below that consumed by most Native Americans in Western Washington.

8.4 The conclusions of Appendix B state that the evaluation of the Puget Trough found a high relative risk. The chemicals mentioned (p. B3-15) should be banned in this physiographic province, and also on all highways within a certian distance from streams. Only by application of strict regulations can protection be guaranteed. There is no doubt that salmon and shellfish resources are diminishing rapidly. It is hardly worth it to future generations to add to the stresses causing their extinction by using chemicals when other methods for vegetation control are available. We strongly support a program where the DOT undertakes an aggressive revision of their management program to reflect the fact that toxic chemicals are not harmless, but are extremely dangerous and leave lasting legacies for future generations.

Sincerely,

Leroy Dearborff

Leroy Dearborff
Director
Water Task Force

Comment 9

9.1 While it is a fact that some pesticide information remains proprietary to the public, it must be remembered that the USEPA has seen and reviewed all of the data it deems relevant for these pesticides.

9.2 The USEPA will not register a chemical if methodologies for residue analysis are not available.

NCAP

Northwest Coalition for Alternatives to Pesticides

May 12, 1993

Compliance Services International
attn: Mr. Eric Henriksen
1112 Alexander Ave.
Tacoma, WA 98421

Dear Washington DOT EIS Contractors,

The following comments are submitted on the Draft Environmental Impact Statement (DEIS) for the Washington Department of Transportation Roadside Vegetation Management Program. On April 12, the Northwest Coalition for Alternatives to Pesticides (NCAP) was notified that the comment period is extended until May 19, 1993.

The DEIS is deficient in many areas. Consequently, it fails to comply with the Washington State Environmental Policy Act of 1971 (RCW 43.21C).

9.1 1. The DEIS contains information that is proprietary and inaccessible to the public, making it impossible for the public to determine whether the document is guided by credible science.

Significant portions of the toxicological information and data summaries are pesticide industry proprietary documents and personal communications with pesticide industry representatives. It is inappropriate for a public agency EIS to rely on information that is outside the public purview, especially when that reliance constitutes such significant portions of the hazard analysis. None of the citations should be proprietary or "personal communications" with industry personnel. If WSDOT cannot assess the impacts of its herbicide program proposals using publicly available information, it must reject the proposal to spray.

9.2 2. The DEIS proposes using herbicides for which there is no publicly available information on methodology to ascertain the presence of residues.

The lack of information on how to test for residues in environmental samples points to yet another problem with public access to information. The disclosure needs under SEPA cannot be met as a result.

Specifically, no methodology is available in the public literature or through a federal of state public agency to test for residues of sulfometuron methyl (Oust) in plants and imazapyr (Arsenal) in water.

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Comment 9 continued

9.3 The EPA has registered all of the pesticides analyzed in the EIS. It is out of the scope of this EIS to second guess or critique the EPA's registration process.

The Seattle-based Region X EPA office sent a letter to the Washington D.C.-based EPA complaining about the registration of pesticides for which methodology for residue testing is not available. Region X states this situation poses an enforcement quandry for the regional office. (See Attachment A.) Apparently, the regional office is yet to receive a reply to this letter. No testing method is available.

In 1992, citizens from Deadwood, Oregon visited the library at Oregon State University and, despite a literature search, they found no published method for detecting imazapyr residues in water. Incredulous, the citizens then visited the EPA water laboratory that is located in Corvallis, and EPA personnel could find no methodology on the EPA database to which the Corvallis laboratory had access.

WSDOT needs to disclose when information is lacking about the ability to ascertain the presence of residues for each of the herbicides proposed for use. WSDOT needs to consult the literature and find out if the methodology is publicly available, and it needs to disclose this information on a chart in the EIS. WSDOT needs to reject consideration of all herbicides for which there are not published methodologies for detecting residues in various environmental media including soil, water, plants, and air.

9.3 3. <u>The DEIS fails to disclose that none of the herbicides proposed for use in the DEIS has completed the federal registration process.</u>

EPA registers a pesticide active ingredient by considering whether the use of that product, according to the label, will cause unreasonable risk to humans or the environment, taking into account the economic, social and environmental costs and benefits of the herbicide's use.

Since 1972, federal law has required EPA to register pesticides by considering, among other things, the acute and chronic toxicological damage that may result from exposure to that pesticide. Many pesticides are on the market without the full complement of tests required by law. These pesticides were "conditionally" registered pending industry's submission of the toxicological and environmental tests required by law. Basically, EPA could not assess the potential hazards without the hazard testing, hence the "conditional" registration status.

In 1988, Congress reauthorized the national pesticide law, requiring EPA in the next nine years to reregister all the pesticides placed on the market prior to November 1984. The intent of the law was to get the testing completed for the pesticides that were on the market without adequate hazard tests. It is now EPA's job to "reregister" over 600 pesticide active

Comment 9 continued

9.4 Comment noted.

ingredients found in roughly 20,000 pesticide products, ensuring that the data used in registration are sound science of modern quality standards. As of January 1993, EPA had issued a registration eligibility document (RED) for a total of 29 pesticide active ingredients. Issuance of a RED indicates that testing information is adequate for EPA to perform the hazard assessment required by law. None of the 29 pesticides is an herbicide proposed for use in the DEIS.

WSDOT needs to disclose two things. First, the agency must indicate whether the herbicide was initially registered with EPA prior to November 1984, making it subject to reregistration. For those herbicides subject to reregistration, WSDOT needs to disclose whether a "registration eligibility document" has been prepared. Second, WSDOT needs to indicate if the herbicide was or will be registered with EPA after November 1984. These pesticides are not subject to reregistration, however, some of them are still being "conditionally" registered by EPA without the full complement of tests required for EPA to do the hazard assessment that national law requires. EPA provides a clear statement when registering these active ingredients that the registration is "conditional." For the herbicides registered after November 1984, WSDOT needs to disclose whether the active ingredient has been "conditionally" or "unconditionally" registered.

This is crucial public information that must be disclosed in the EIS. The EIS must disclose the paucity of information available to EPA for evaluating whether these products are capable of causing harm to humans, other animals, and the environment. The public needs to know that the federal agency responsible for registering these substances has not received from the pesticide industry the basic data required by law for proper hazard assessment.

As is, the DEIS gives the appearance that there has been some meaningful government regulatory assessment of the damage these substances are capable of doing to animals and the environment. Such an assessment is not possible because the industry has not submitted studies in a timely manner that would allow EPA to determine whether the active ingredients are capable of causing unreasonable harm. The DEIS needs to make this clear.

9.4 4. The DEIS fails to assess the quality of information that is found in the risk assessments that are used.

When the Pacific Northwest Region 6 U.S. Forest Service wrote its EIS for vegetation management, a process completed in 1988, the agency made a specific determination about the quality of information used in its quantitative risk assessment. NCAP has long argued that quantitative assessments are meaningless if the information used is invalid, inadequate, or simply missing

Comment 9 continued

altogether.

For example, the only toxicological tests for a particular herbicide may have been conducted at Industrial Bio-Test (IBT) Laboratories and found by EPA to be invalid. IBT was once the largest toxicological testing firm in the U.S., and the top three toxicologists at this company have served time in jail because they falsified data. As a result, a quantitative risk assessment based on those tests has no confidence of being of meaningful quality. Testing fraud continues as evidences in a 1991 incident involving a Texas firm, Craven Laboratories.1

The Forest Service in its EIS conducted both quantitative and qualitative risk assessments. The implications of this two dimensional assessment are noted in Attachment 2. This table portrays (a) the degree of hazard concern that is posed by each of the herbicides that were assessed and (b) the degree of uncertainty about quantitative conclusions that result from the quality of that information. The larger the circle, the greater the hazard concern; the darker the color, the greater certainty about the test's conclusions. The Forest Service rejected use of two herbicides, diuron and fosamine, because they lacked credible data to conduct a proper hazard assessment. WSDOT needs to reassess its consideration of these two herbicides, knowing that the Forest Service rejected their uses for lack of quality data.

Although the qualitative information appears for <u>some</u> of the tests described in the narrative, the DEIS fails to adequately address these issues. WSDOT must systematically disclose the quality of each test that is used in its risk assessments (human and wildlife) by indicating which public agency (e.g., EPA, CDFA) evaluated the study and what that agency concluded. If more than one public agency evaluated the study, all agencies and their conclusions need to be noted. The evaluating agency's conclusions are sometimes contradictory. The information must be presented in the DEIS in a manner that the quantitative information (e.g., NOEL of 3 mg/kg of a certain herbicide) is presented simultaneously with the qualitative information (e.g., marginal/supplemental study). The DEIS fails to present qualitative information for each test, much less each category of tests. The level of certainty associated with each test and each type of test (e.g., cancer, reproduction) must be presented.

The public and WSDOT decisionmakers need to understand the implications of deciding to use herbicides to kill vegetation along Washington's roadways. The DEIS needs to disclose not only <u>what</u> damage may result from using herbicides, but also the degree

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1 U.S. EPA. March 1, 1991. Fact sheet: Alleged data manipulation by Craven Laboratories of Austin Texas. Office of Pesticide Programs.

Comment 9 continued

9.5 The EIS lists toxicological data for all inerts on List's 1 and 2 that occur in the analyzed pesticides. Again it is out of the scope of this EIS to critique the EPA's inert policy.

Thank you, your comments are noted.

of confidence that can be derived in the evaluation from the quality of information used in that assessment. WAC 197-11-080.

9.5 5. The so-called "inert" ingredients in pesticide products are not disclosed and have not be adequately assessed for their potential to cause adverse effects.

Pesticide products are made up of two types of ingredients. The active ingredients are listed on the label by name. All other ingredients are called "inerts," but this is a serious misnomer. These ingredients are neither biologically nor chemically inert. Some "inerts" are more toxic than the named, active ingredients in a pesticide formulation. The "inerts" in the glyphosate product, Roundup, is one such example. These "inert" ingredients are not identified by name on the label. Pesticide manufacturers claim that the identity of these ingredients are trade secret.

Basically, without knowledge of the identity of these ingredients, WSDOT cannot know what it proposes to spray into the environment, exposing people and wildlife. WSDOT cannot assess what harm may result from the use of these herbicides to people, wildlife, water, air, and more.

The DEIS performs some assessment of two "inert" ingredients: petroleum distillates and xylene. However, a multitude of other ingredients may be found in the herbicide formulations proposed for use along state highways. WSDOT needs to contact each formulator for the herbicides it proposes to use, asking the formulator to disclose all the ingredients in its formulations. WSDOT must explain to the manufacturers and formulators of pesticides that it cannot comply with the disclosure intent of SEPA without this information.

If the herbicide registrant is forthcoming with this information, WSDOT needs to disclose that the information and consider the impacts that may result from the use of these substances. After all, it is not the active ingredient, but mixtures of active and "inert" ingredients and adjuvants that are sprayed into the environment.

If the herbicide registrant insists on keeping this information secret from users of its products and from the public, then WSDOT must clearly state that it does not know what it proposes to broadcast along roadsides and it has no method of analyzing the effects of that activity.

The EPA categorized the "inert" ingredients it thought was being added to pesticide products into four lists. List 1 is the ingredients that are known to pose toxicological concern. List 2 is ingredients that are a high priority for testing because of suspected toxicological concerns. List 3 ingredients are

Comment 9 continued

9.6 We attempted to provide accurate data in an objective manner. No effort was made to deceive the public or downplay herbicide toxicity concerns.

substances of unknown toxicity. List 4 (which is divided into a 4a and a 4b list) is of low toxicological concern. Lists 1 and 2 were originally published in the Federal Register in 1987; the lists were updated in 1989.

According to a September 1991 Inspector General audit of the EPA's inerts policy and implementation strategy,2 the EPA has not adequately identified the inert ingredients in about 600 products, and it has not made progress in evaluating the toxicity of the inerts of unknown toxicity. This report states, "[T]he EPA cannot be certain that the use of these inert ingredients will not harm humans or the environment."

WSDOT's DEIS states that the products proposed for use do not have List 1 and 2 "inerts" other than the petroleum distillates and the xylene. According to EPA, this is no assurance to the public that toxic concerns have been addressed. Simply stating that the ingredients are not listed on List 1 or List 2 is no indication that toxicity has been evaluated. WSDOT's DEIS needs to candidly state that the harm that may result from spraying herbicides that have ingredients that are secrets is impossible to assess. The agency does not know what it is spraying along public roads, and it cannot evaluate the damage that may result. The agency must work to obtain the missing information, indicate the cost of obtaining the information (e.g., letters to the manufacturers, reverse engineering formulations in a chemistry lab), and indicate the worst case that may result from the herbicide's use.

9.6 | 6. The DEIS downplays or ignores toxicity concerns about various herbicides and adjuvants proposed for use.

A. Triclopyr is toxic to fish. These concerns are ignored in Appendix B and the DEIS needs to be rectified. Canadian researchers looked at sublethal and acute toxicity of the ester formulation of triclopyr (Garlon 4).3 They note that the toxicity to salmonids of Garlon 4 is two orders of magnitude greater than Garlon 3A (the amine formulation). The toxicity of the ester form of triclopyr is from 10 to 100 times greater than triclopyr acid. In their study, triclopyr affected the nervous system of fish. Triclopyr accumulated in fish tissue when fish were exposed to water that had triclopyr residues.

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2 U.S. EPA, Office of the Inspector General. 1991, Inert ingredients in pesticides. Report of audit. (September 27).

3 Johansen, A and G H Geen. 1990. Sublethal and acute toxicity of the ethylene flycol butyl ether ester formulation of triclopyr in juvenile Coho salmon (Oncorhynchus kisutch). Arch. Environ. Contam. Toxicol. 19, 610-616.

Comment 9 continued

This finding is contrary to the DEIS that states that triclopyr has a low potential for bioaccumulation. Perhaps triclopyr does not biomagnify, but it certainly accumulates.

The same researchers suggested that triclopyr (the acid) was the compound associated with fish death. They believed that triclopyr applications at recommended rates that directly oversprayed a stream side channel could result in high enough concentrations to cause the observed behavioral changes and mortality in fish. They cautioned, "The importance of identifying sublethal effects is demonstrated by these behavioral changes which could lead to survival threatening situation such as reduced predator avoidance or downstream drift."

Although WSDOT may not intend to make direct applications to surface waters, the run-off slopes, ditches, and water channels adjacent to roads are designed to move water into surface water bodies. The agency is deluding itself if it thinks it is not clear to the public that sprayed roadsides necessarily result in contaminated runoff. This movement of water is the basic idea.

The resulting water contamination and the effects on fish and other organisms that use those waterways can be significant. The DEIS fails to adequately portray this concern, especially for triclopyr.

B. The adjuvants added to pesticide products, particularly surfactants, pose toxic concerns to fish. While many marine and aquatic organisms are adversely affected by surfactants, gilled animals are particularly susceptible.4 Almost a quarter of the 600 inert ingredients approved for use on food crops and listed in government regulations were surfactants.5 Non-food crop pesticides are just as likely to have surfactants added as "inert" ingredients in formulations, and many right-of-way herbicide formulations are mixed with surfactants prior to application. The concern about surfactants, especially as it relates to fish and gilled animals, is not adequately addressed in the DEIS.

Particular concerns arise over the use of 2,4-D. The DEIS states that WSDOT relied on the toxicological assessments of other agencies (i.e., U.S. Forest Service, BLM, Caltrans) rather than conducting its own literature search. This is not acceptable, as many studies were available in the literature

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4 Rankin, JC, RM Stagg, and L Bolis. 1982. Effects of pollutants on gills. In Houlihan, DF, JC Rankin, and TJ Shuttleworth (eds.). Gills Cambridge, U.K.: Cambridge University Press.

5 40 Code of Federal Regulations 180.1001.

Comment 9 continued

after these agencies developed their EISs.

Attachment 3 is a factsheet on 2,4-D that NCAP produced in 1991. Despite the fact that 2,4-D has been sold since the 1940s, tremendous amounts of toxicological research is still being published on this herbicide. Many of these studies are raising concerns about the harmful effects of 2,4-D. It is unacceptable that WSDOT walks away from performing the basic analysis responsiblities required by SEPA by simply using existing and outdated EISs developed by other agencies.

Specifically, the NCAP factsheet has twenty references (out of the 66 cited) that were published in the literature in 1990 or later. These studies are all highlighted in the attachment. Several of these studies show concern for neurotoxicity, a subject that is brushed off in the DEIS. One study describes how 2,4-D damages and kills sperm in men who are occupationally exposed to 2,4-D. Another 1990 study showed significant maternal weight reductions and death and adverse developmental effects in the offspring of female laboratory animals fed 2,4-D. The researchers chose to look at 2,4-D because few of such effects had been exhibited in previous studies. Health effects studies are not the only recent studies of interest to NCAP and the public. Recent studies about effects on non-target organisms are also of concern.

The lack of resolution about the carcinogenicity of 2,4-D is extremely frustrating to the public. This is a situation where industry is simply getting away with murder. In 1980, EPA issued a data call-in to the manufacturers of 2,4-D, ordering them to conduct cancer tests on animals and make a progress report on the tests in 1982 and submit the final results in 1983.6 Ten years later, industry has yet to put rats in a cage, feed them 2,4-D and determine whether the substance causes cancer in rodents. It is an insult to the public that the pesticide industry, which is ever so capable of selling these substances at huge profits, cannot comply with EPA's order to conduct a cancer test. It's been over ten years!

And what has been accomplished in this time? One can only wonder how many studies have been dumped into the trash can by industry as multiple attempts are made to produce a test that shows no oncogenic effect. In October 1992, industry succeeded in convincing EPA to extend their test completion deadline yet

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6 U.S. EPA, Edwin L. Johnson, Deputy Assistant Administrator for Pesticide Programs. August 29, 1980. Order and notice to registrants of 2,4-D formulations pertaining to the April 29, 1980 findings of the EPA on significant data gaps in the 2,4-D database. ~ Washington, D.C.

Comment 9 continued

again.7 Meanwhile, endless wrangling continues over the significance of epidemiological studies. Pesticide users insist that sound epidemiological studies (e.g., the Hayes study showing cancer in pet dogs) be replicated. The public is left to question how many dead bodies are needed before regulatory action is taken to protect public health.

WSDOT needs to conduct a literature search for more recent studies for all of the herbicides it proposes for use. It is not adequate to rely on other agency's EIS analyses for this information. As shown for 2,4-D, even the herbicides that have been in use for decades have recent studies that show significant concern for causing adverse health and environmental effects. It is unacceptable for WSDOT to shirk its responsibility to add to the existing information with a search in the most recent literature. The studies found in that search need to be added to the information that is used in the analysis.

Further, the EIS needs to portray the utter disregard of industry to comply with the law in a timely manner. Industry's defiance of EPA's 1980 order to conduct the oncogenicity tests on 2,4-D and its recent manipulation of EPA to allow another extension on the tests is one such example that needs to be included in the EIS.

The public and WSDOT decisionmakers need to understand the pathetically weak regulatory framework of the EPA. Public health and the environment are not protected by EPA and the federal pesticide law. The health and environmental concerns for the herbicides and adjuvants must not be downplayed or ignored in the EIS. The EIS must specifically state these concerns.

This concludes NCAP comments on the DEIS. If we can supply any of the studies or reports mentioned in our comments, please do not hesitate to get in contact with us.

Sincerely,

Norma Grier

Norma Grier

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7 U.S. EPA. Communication, Education and Public Affairs. October 9, 1992. Task force representating 2,4-D pesticide registrants agrees to exposure-reduction label changes and user education- program as alternative to EPA suspension for overdue data. Press Advisory. Washington, D.C.

List of Attachements

1. Letters from Region X EPA to the Washington Office concerning sulfometuron methyl and other sulfonlyureas.

2. Table 3 showing U.S. Forest Service Region 6 quantitative and qualitative assessments of herbicide effects.

3. NCAP's 2,4-D factsheet.

Comment 10

10.1 Comment noted.

10.2 Alternative G will provide for the establishment of stable vegetation along as much of the state highway system as possible, thus reducing levels of vegetation control needed.

10.3 Comment noted.

Olympic Environmental Council
P.O. Box 1906, Port Townsend, WA 98368 (206)379-8462
(206)681-2642

RECE... 20 1993

Compliance Services International
attn: Robert L. Berger, L.A.
950 Pacific Avenue, Suite 700
Tacoma, WA 98402

Dear Mr. Berger,

The Olympic Environmental Council (OEC) is an organization representing over 2000 individuals and organizations on the North Olympic Peninsula. We have written to you in the past about our concerns and are pleased that you are now addressing these problems.

10.1 OEC has strong concerns about herbicide usage, flailing, and scraping. Herbicide use and scraping have deleterious effects on groundwater quality. Flailing damages vegetation and encourages infection by disease or insects resulting in increased roadside hazards and maintenance costs. Flailing also increases the siltation level of storm water runoff resulting in further water quality degradation. Scraping results in deep roadside trenches creating hazards to both vehicular traffic and pedestrians.

10.2 We would like to see these techniques eliminated. Herbicide use and scraping should be replaced by the use of indigenous ground cover species such as salal and ferns which will require minimal maintenance, enhance water quality, and increase aesthetic quality. The apparent policy of creating deep roadside trenches should be abandoned.

Flailing can be replaced with more labor intensive and less damaging techniques of trimming. Spot thinning techniques have worked in Port Townsend and should be considered.

10.3 OEC proposes a modified Alternative E which would incorporate the elimination of herbicide usage on all State highways as described in Alternative C. We feel that such a modified alternative will result in a healthier road side environment for all species using the habitat. The utilization of plants and landscaping concepts will result in lower maintenance costs, improved water quality, increase roadside aesthetic benefits, and improve public relations. The replacement of flailing will provide for healthy, functioning roadside vegetation and provide much needed jobs.

Thank you,

David P. Olsen,
Olympic Environmental Council

Abundant Life Seed Foundation * Admiralty Audubon * Black Hills Audubon * C.A.U.S.E. * Friends of Kah Tai Lagoon * Friends of the Burke * Jefferson County Watershed Council * No Oil Port * Olympic Park Associates * Olympic Rivers Council * Protect the Peninsula's Future * Quileute Ancient Forest Creators * Save Our State Park * Trinity United Methodist Church * Wash. Native Plant Society - Oly. Chap. * Wild Olympic Salmon*

Comment 11

11.1 Comment noted.

RECEIVED MAY 21 1993

SQUAXIN ISLAND TRIBE

May 17, 1993

John F. Conrad, Chief Maintenance Engineer
Washington State Department of Transportation
IC4 Transportation Building, KF-01
Olympia, WA 98504

RE: Roadside Vegetation Management Environmental Impact Statement

Dear Mr. Conrad:

The enclosed comments are based upon the Squaxin Island Tribe's review of the document referenced above. We appreciate the opportunity to review your policies, and particularly appreciate the extra time you have incorporated into the review process.

The Tribe regularly and systematically reviews Environmental Impact Statements from a variety of jurisdictions and projects, including programmatic EISs such as you have presented. In the seven years this reviewer has been evaluating such documents, I have never seen a document so filled with unsubstantiated assumptions as this one. I do not believe that this review meets the letter or the intent of the State Environmental Policy Act.

The statement of assumptions as fact is so pervasive in this document, it renders the reviewer incapable of specifically responding to every error of fact. A serious transformation of thinking is essential on your part to develop this EIS into a coherent environmental review that fairly evaluates the risks and impacts of your proposed actions. It is not clear to me whether this is possible using your draft as a starting point.

11.1 For example, you make the statement that "mechanical control can be very effective as a tool for improving habitat for small mammals, birds, and arthropods." However, you have provided no basis for this statement. In the absence of specific reference to such a statement, you should provide data and a critical analysis to support your conclusion. You have presented no such information, yet this style is repeated throughout the document.

NATURAL RESOURCES DEPARTMENT / West 81 Highway 108 / Shelton, WA 98584
FAX 426-3971 / Phone (206) 426-[illegible]

Comment 11 continued

11.2 See response 3.11

WSDOT Roadside Vegetation Management EIS
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Page 2

Unfortunately, it raises even greater concerns when you make presumptive assertions regarding the use of pesticides. For example, the following quote on dichlobenil: "From the limited data available, it does not appear that dichlobenil bioaccumulates to a great extent in fish." You acknowledge limited data though you do not describe what is available or how limited it is. "It does not appear" is hardly a scientific appraisal of the risk or likelihood. "To a great extent" is clearly not a scientific evaluation of bioaccumulation, it is a value judgement that does not belong in a technical appendix.

"It is highly unlikely that animal fatalities will occur from use of these pesticides." (2,4-D, 2,4-DP, and diuron) Again, where is your evidence? You have consistently presented the assumption that chemicals that are conditionally registered with the EPA are free of any harmful effects. It should be noted that every chemical now banned for pesticide use by the EPA was at one time conditionally registered with them. They became banned by evidence required to be developed by manufacturers after their product is on the market. We do not feel that this system of checks and no balance is conducive to protecting human health and natural resources.

You have dismissed out of hand sublethal and cumulative effects of chemicals on organisms and on the environment. Yet, the vast majority of impacts for which we restrict and ban chemicals are sublethal and cumulative. The days of acceptable pesticide toxicity testing being based on LC 50 are long gone. As a public agency in this state you have an obligation to meet a standard which protects human health and the environment. Acute toxicity testing is but one tool currently employed to evaluate environmental impacts. Why have you dismissed chronic and sublethal effects of your roadside treatments from this environmental analysis?

11.2 Several times in the document you state as a mitigation measure that you will not apply herbicides within 5 feet of surface water bodies. If that is your mitigation, I would hate to see your impacts. No known authority, state agency other than WSDOT, county agency, extension service, or anyone else believes that 5 feet is an appropriate buffer for waterbodies. Herbicide drift (which you acknowledge to happen by virtue of your mitigation measures) can easily traverse a 5 foot buffer, even if the application was accurate. In addition, runoff and leaching to surface water are not only possible, they are probable within this zone.

Unfortunately, even these concerns are missing the larger point: why should you be treating vegetation this close to water bodies in the first place? The scientific community has widely come to regard the importance of riparian zones and buffers around water bodies and wetlands. These important biological zones should be

Comment 11 continued

WSDOT Roadside Vegetation Management EIS
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Page 3

protected and avoided at all costs. On particularly important and fragile wetlands and ecosystems, buffer zones may run as high as 300 feet on a regulatory basis. WSDOT should never be treating within these areas of concern, yet you have no systematic inventory of these areas, and you present a clear disregard by the suggestion that 5 feet is an adequate buffer for mitigation of chemical impacts. WSDOT MUST STAY AWAY FROM WATERWAYS AND WETLANDS ALL TOGETHER!

As a mitigation measure under wetlands, you suggest that the use of "selective chemical herbicides that do not persist in the environment and that are not readily transported through soil by leaching" is a criteria for avoiding impacts. Is this a criteria that WSDOT actually uses? If so, then why do chemicals with these attributes show up on your chemical summaries? We count 9 chemicals on your list with some degree of soil mobility. It is also noted that a number of the chemicals you use have not been evaluated for this attribute.

As far as environmental persistence goes, what is your standard? Among the chemicals you have reviewed, soil residual has been measured from 1 day to 4 years, with 12 chemicals showing soil residual measurements longer than 3 months. Although less than half of the chemicals you have examined have water residual data, all of them have persistence in water longer than 1 month. Again I ask you, what is your standard for persistence in the environment? Once you have identified your standard, please evaluate those chemicals that you will still use as to their impacts on the environment rather than making sweeping statements that gloss over the facts.

"None of the herbicides proposed for use by WSDOT are expected to adversely impact any wildlife populations." Where do you get your data? Chemicals in the environment have been causing significant impacts on wildlife populations for decades. WSDOT is not an expert on these impacted wildlife populations. State and Tribal resource agencies are. Are any of these agencies supporting your findings? There is substantial evidence available for evaluating chemical impacts on wildlife populations. Why have you steadfastly avoided any consideration of existing data in the absence of your own data to justify your statements regarding wildlife impacts?

The Washington Department of Natural Resources is another state agency that uses pesticides in its operations. Six years ago they concluded the need to reduce their use of herbicides and specifically to minimize the use of 2,4-D, and triclopyr citing epidemiological studies showing increased incidence of cancer from exposure. In the face of mounting evidence available on these chemicals, how can WSDOT continue to justify their use which puts both humans and natural resources at risk?

Comment 11 continued

11.3 See section 4.2.3, as well as the definitions of Alternative G presented throughout the document.

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DNR also adopted a policy, as have some counties like Thurston, against the use of mixtures of chemical herbicides. The rationale behind this decision was the lack of any data on the toxicity data for the combined herbicides. When using combinations of pesticides it is not known if the toxicity of the mixture is greater than the combined toxicity of the individual herbicides. Under these circumstances, and when WSDOT contends that they only use pesticides which are registered and for which toxicity information is available, why do you persist in using mixtures of herbicides for roadside application, thus exposing the public and the environment to unknown effects and impacts?

Numerous local authorities like Mason County have eliminated the use of pesticides in their roadside maintenance programs. They have done this out of regard for the environment and as a mechanism to control costs, both current and future. By utilizing mechanical means of vegetation control they have a much greater degree of predictability over their impacts on surrounding resources than if they use pesticides which have the potential for direct impact from application and long term and unknown impacts from the chemicals themselves. One would think that if a county public works department could make such an analysis that a much larger agency like WSDOT with greater financial resources at its disposal could discover the underlying truths that support these local county programs. Why have you not conducted a complete analysis of the efficacy of these local programs, both in terms of impacts to non-target resources and to managed roadways? They offer a viable alternative right here in Washington operating under the same environmental conditions as does WSDOT. In most cases they manage more roadway than does WSDOT within a given area. It would seem like their information would be most valuable.

WSDOT conducts numerous roadside maintenance activities involving ditches and stormwater retention and conveyance areas. These activities such as ditch scouring and excavation, often lead to the discharge of sediment to waters of the state. It is unclear whether WSDOT needs or has NPDES permits for these activities, but at a minimum it would seem that a state Waste Discharge Permit or a 401 Water Quality certification are needed. Your EIS does not address these issues, nor do you adequately address the physical impacts of erosion and deposition of sediments in the aquatic environment. Do you intend to address the impacts that soil erosion has on aquatic ecosystems, and the resulting impacts on fish and wildlife resources?

11.3 We are surprised that WSDOT did not include an alternative for evaluation that represented an Integrated Pest Management (IPM) approach. There is some pretension to fool the reader in the belief that Alternative E represents this strategy, but it clearly does not. An IPM approach that reflects a carefully thought

Comment 11 continued

11.4 In some EIS's, the "no Action" alternative is used to represent "no Change". However, in this case Alternative F represents "no management change", and Alternative A represents "no vegetation control".

11.5 Comments noted.

WSDOT Roadside Vegetation Management EIS
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through plan of action and feedback responses to identified pests and impact levels has been endorsed by wide varieties of groups from those supporting environmental protection to agricultural and trade groups. It is a widely studied and clearly defined strategy for pest management that could be easily deployed on state roadways.

However, you have not even considered IPM as an alternative even though, more than any other strategy presented, it represents a clearly defined program which eliminates the type of assumptions that WSDOT is so clearly dependent upon. It is surprising that WSDOT would create the array of alternatives you have presented and not have included an IPM alternative which reflects the extensive work conducted all over the country in numerous applications. WSDOT has clearly left the "state of the science" alternative out of consideration. We cannot accept this EIS as complete without the inclusion of such an obvious alternative. It would stand in stark contrast to the Alternative E proposal which WSDOT attempts to characterize as an "integrated" approach. 11.3

You have confused the form of an EIS in your discussion of alternatives. A No Action alternative should represent the conditions present if no changes are made to the existing program. This more closely resembles Alternative F. 11.4

Your treatment of cultural resources in this EIS is so uninformed as to be useless. You apparently don't even know what cultural resources are for Native American Tribes. You certainly did not consult with Tribes as to this concern. Our only suggestion on this matter is to start over from the beginning.

In summary, you have presented a document which you have characterized as an Environmental Impact Statement. We cannot accept it as such. You have completely failed to address the real impacts of your program on water, fish, and wildlife resources. The flaws in your analysis are gaping. You have created a document which attempts to support your current philosophy rather than to analyze its impacts on the environment. This is clearly not the intent of the SEPA process.

We have only addressed a few of the gross assumptions included in your report. These assumptions have been used as explanation and justification for a series of value judgements. We have pointed out certain assumptions as <u>examples</u> of a misguided approach to environmental documentation. By no stretch of the imagination could we possibly attempt to analyze all the inaccuracies presented in this document. The inconsistent and undocumented assumptions are so ingrained and so repetitive as to make this EIS inherently flawed. At the immediate risk of continuing with WSDOT's status quo for vegetation management, which we believe to be specifically 11.5

WSDOT Roadside Vegetation Management EIS
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harmful to the environment, we are compelled to demand that you start this EIS over with a completely new and independent management team to examine the impacts of your decisions. We cannot seriously consider this document as the basis to move ahead with any legitimate management decisions on roadside vegetation management in the state of Washington.

Sincerely,

Jeff Dickison, Biologist

Comment 12

12.1 Notification of the Draft EIS was listed in the SEPA register. See response 6.5

RECEIVED MAY 19 1993

May 17, 1993

Eric Hendricksen
Compliance Services, International
#700 Seafirst Center—950 Pacific Ave.
Tacoma, WA 98402

Response to WSDOT Vegetation Mgmt EIS

Eric Hendricksen, et al.:

12.1 WSDOT's obvious reluctance to come to terms with its contribution to the poisoning of the planet and its inhabitants is pervasive throughout the draft EIS. Of course, those of us outside the Olympia loop had no inkling a grueging SEPA process was even underway until notified by our most competent, concerned friends with the Washington Toxics Coalition. Thanks to their efforts we can now see more clearly another chemically addicted, bureaucratic obstacle to the common sense idea of avoiding harm's way rather than trying to undo damage.

When the dangers of herbicides have become so obvious and our government and regulatory framework so corrupt that even so-called women's magazines (e.g. Family Circle) are doing exposés, it would seem that WSDOT policy makers are just a smidgeon behind the general public in recognizing sham science when they trip over it.

And while practically everything else during the Reagan/Bush era of greed became more expensive, evidently human life became more cheap. Through the psuedo science of "risk assessment" it is now apparently acceptable to anonymously kill 1 in 100,000 people rather than the old standard of 1 in 1,000,000. And,according to your EIS,numerous possible pathways of exposure weren't even factored-in to the equation.

Those who even scratch the surface of pesticide issues soon learn the following:

* EPA's regulatory system is a fraud;
* Formula full content disclosure is proprietary;
* No one can assess risk because no one really knows what they're using;
* Major labs have falsified critical test data and yet products remain on the market;
* Pres. Reagan abolished the national Pesticide Incident Monitoring System in 1980;
* Synergistic effects of some 70,000 compounds are impossible to calculate;
* Genuine scientific methodology (e.g. Peer review, publishing, etc.) is ignored in the marketing of chemicals;
* Children, the chronically ill and elderly populations are most at risk;
* EPA has included disclaimers in its own regulations that registration is not to be equated with safety; and
* The collusion between industry and government to linguistically detox dioxin was finally exposed in the 2/20/92 Wall St. Journal.

According to Peter Montague (Editor "Rachel's Hazardous Waste News"), " To expose the swindle inherent in all risk assessments, one merely needs to point out that little or nothing is known about the effects of chemicals on the immune system, the reproductive system, and the nervous system. When little or nothing is known, it is obviously impossible to show that any particular chemical exposure is safe. Under such circumstances, the only dose known to be safe is zero. Since there will never be enough research to discover the ill effects of all individual chemicals now in use, risk assessment is, and always will be, a sham and a deception."

Comment 12 continued

12.2 The Employee training referred to in that section is for all methods of vegetation management currently employed.

12.3 Physicians are used to identify any poisonings.

12.4 Yes, over the 40+ years that pesticides have been used in vegetation management.

12.5 It is out of the scope of this EIS to critique or defend the EPA's registration process.

12.6 See response 6.17

12.7 These conclusions are made based on analysis of manufacturers data, which was reviewed by the EPA, and is presented in Appendix B.

12.8 See response 6.14

12.9 See Appendix B: Wildlife Toxicology Data.

Honiman response to WSDOT draft EIS -Pg. 2-

The following are specific comments and questions for your response...

12.2 Sec. 1.2.2.2 - Are any non-chem vegetation specialists involved in your seminars ? (If so, names and addresses)

12.3 Sec. 1.2.2.4 - Has the WSDOT Industrial Hygeinist extensive training in identifying pesticide poisonings?

12.4 Has WSDOT been involved in any pesticide related disability claims, litigation, fines, spills, highway accidents?

Sec. 1.2.2.6 - Factor the following into your "least cost" chemical option...
* Cumulative adverse impact of health and environment from manufacture to transport to final cleanup and disposal.
* Loss of irreplaceable resources in manufacture and transport of chemicals.
* Loss of species diversity and creation of resistant vegetation.
* Indiscriminate kill of native plants and wildlife.
* Cumulative damage in heavy agricultural areas.
* Training, liability and insurance costs.
* Increased use (i.e. increased exposure) by hikers, joggers and walkers of highway shoulders.

12.5 Sec. 1.4.2 - Statement that chems have been tested and registered by EPA is a sick joke perpetrated upon the unsuspecting public. For any at WSDOT genuinely concerned in knowing the truth, we're attaching (Exhibit A) a 1986 article from the award winning publication , "The Journal of Pesticide Reform." Even though there have been some minor changes in the process since '86 the fundamental truths of Ann Tattersall's article still stand.

12.6 Sec. 3.1.0 - Explain in more detail why steam treatment was rejected and what is meant by "Projected low frequency of use?"

Sec. 3.2.2.1 - In addition to chemical odor and spray drift problems why is there no mention of chemical bonding with soil particles (especially the most dangerous PM-10 surfaces) carried adrift by every wind and continually stirred up by traffic?

12.7 Sec. 3.2.2.1.4 - What extensive, peer reviewed, published data does WSDOT have to support the emphatic statement "Drift from herbicide applications will have negligible effects on wildlife"?

Sec. 3.2.3.1.4 - Which WSDOT chemicals are on EPA's Leach List?
Has WSDOT commissioned any independent or in-house ground water testing for known leachers such as Tordon (picloram) which contaminated a number of Spokane wells?

12.8 Sec. 3.2.3.3 - Your 5 ft. buffer between sprays and surface waters is unconscionable. How did you determine this margin for error and leaching? And why is no setback from wells even mentioned?

Sec. 3.2.4 - How are floodplains identified? HUD maps? Others?

12.9 Sec. 3.2.7.1 (Para 5) - Are we supposed to be placated by WSDOT's assertion that it doesn't expect any of its herbicides to adversely impact any wildlife? And further, if 2,4-D, 2,4-DP and Diuron should cause occasional, short term symptoms, it is highly unlikely the animals will die. Please cite your

Comment 12 continued

documentation for such a statement?

Appendix B-2.2 - The author's reference to EPA's guidelines for toxicity studies and the interest of good science all in the same sentence is the ultimate oxymoron. True science can stand the light-of-day, publishing, peer review and full public disclosure, all elements alien to EPA's process. In the interest of genuine science we're attaching Exhibits B and C to our comments in order to clearly demonstrate the foundation for our total distrust of anything EPA. Exhibit B "Early History of the Chemical Wars" explains the insidious chemical invasion from Nazi Germany in the '50's. Exhibit C "Dioxin Detoxification Campaign Exposed" clearly explains what we're up against in trying to stop the poisoning. If the experts responsible for the EIS or WSDOT chemical policies have substantive data to refute any section of either document we would expect same to be printed in the final EIS.
How many of WSDOT's chosen chemicals were registered using data from either IBT or Craven laboratories?
How many of WSDOT's chemicals are only "conditionally" registered (meaning marketing has preceded testing)?
What is WSDOT's target date for completion of all reregistration requirements?

In summary, your determination of acceptable risk for ourselves and all other inhabitants is totally unacceptable and has no scientific basis in fact. Multiple exposures to synthetic poisons are pervasive in all our lives and must be stopped.

Since we can't send our addicted highway program to the Betty Ford Clinic we recommend the Washington Toxics Coalition's alternative of a 5 year chemical withdrawal with a 50% reduction the first year, And the 300 ft. buffer between herbicides and water is at least a minimum protection until we're off the treadmill.

Groups such as WTC and NCAP in Eugene Oregon have much expertise to offer as do communities which have already kicked the habit. An excellent teaching tool is the $15, 17 minute, video documentary "Inert Alert: Secret Poisons In Pesticides" produced by the Northwest Coalition for Alternatives to Pesticides (NCAP). Their address is--P.O.Box 1393, Eugene, OR 97440. Or phone: (503) 344-5044.

Finally, knowing the horrendous legacy of earlier expert pronouncements of safety on everything from cigarettes to Dalkon Shields to DDT, can we arrogantly assume many human decisions regarding industry profits and the poisoning of the planet will be correct? As a toxicology professor recently commented, after noting the increasing withdrawal of "...cides" from the market, "If this keeps up I'll soon be teaching the History of Pesticides." We should all live so long (and in good health)...

Nellie Honican

John Honican

NW 333 True St.
Pullman WA 99163

Comment 13

Thank you, your comments and your support of Alternative C are noted.

FAX (206) 272-6241

720 Governor Stevens Ave. SE
Olympia, WA 98501

May 19, 1993

Compliance Svcs. International
Attn: Eric Henriksen
1112 Alexander Ave.
Tacoma WA 98421

Dear Mr Henriksen:

I am writing to comment on the draft EIS for the WSDOT Roadside Vegetation Management Program, dated February 1993.

I believe we are very fortunate to have such attractive roadsides in this state. In fact, I have heard a national authority say that only one other state compares.

However, I am troubled when I see the amount of chemicals that are used to kill the weeds. Everything I know about chemicals says that a portion of them winds up in the groundwater - our drinking water supply. I am not willing to risk this for the aesthetics of the roadsides.

Thus, I prefer Alternative C - the "no chemical approach."

No only would this approach reduce pollution; it would also increase employment opportunities as weeds were removed by hand rather than sprayed.

I would also like to say that I believe the information in Table 0-1, Summary of Impacts by Alternatives, on page xiv, Summary, overstates the negative consequences of implementing Alternative C under Geology and Soils, Air Quality, Water Quality, and Vegetation.

Thank you for the opportunity to comment on this draft EIS.

Sincerely,

Robert E. Jacobs

Comment 14

14.1 See response 6.5 for a detailed discussion of the DEIS notification and comment process. The issue of public involvement is very important, and should improve in the future through the development and use of Roadside Management Plans (RMPs), which will provide for public input. See section 4.1.2

14.2 Due to rapidly improving techniques for conducting ecological risk assessments, this needs to be an ongoing process for WSDOT. An effort was made here to conduct the best possible risk assessments with the available data. The IVM/IPM approach set forth in Alternative G provides for the continuous monitoring and assessment of environmental effects. See the definition of Alternative G in the EIS Summary.

14.3 Comment noted.

14.4 See section 4.2.3

March 29, 1993

RECEIVED APR 5 1993

Washington State Department of Transportation
c/o Eric Henriksen
Compliance Services, International
700 Seafirst Center
950 Pacific Avenue
Tacoma, WA 98402

Re: WSDOT Roadside Vegetation Management--Draft Environmental Impact Statement

PEOPLE for PUGET SOUND
1326 Fifth Ave.
Suite 450
Seattle, WA
98101
(206) 382-7007
Fax 382-7006

Ladies and Gentlemen:

Thank you for the opportunity to comment on the draft Environmental Impact Statement regarding the roadside vegetation management program of the Department of Transportation. People for Puget Sound, a citizens' organization working for the protection and restoration of Puget Sound, applauds WSDOT's efforts to evaluate the environmental impact of its activities and to consider alternatives that might reduce adverse environmental effects. State policies and actions must reflect the high priority Washington's citizens give to environmental protection.

14.1 As an initial matter, we are deeply concerned that there has been inadequate public involvement in the process of reviewing this DEIS. The distribution list in the DEIS reflects an unacceptably limited distribution of the draft. In particular, a large number of interested state agencies, tribes, and environmental organizations are not on the distribution list. Even many individuals and organizations who submitted scoping comments are not on the list. Public involvement is essential to the EIS process. We urge WSDOT to be more active and responsible in encouraging public involvement.

With respect to the substantive aspects of the DEIS, People for Puget Sound's principal concern is to minimize the damage done to the natural environment, particularly to our state's watersheds and waterways. Specifically, we urge WSDOT to adopt a program that will phase out the use of pesticides for the control of roadside vegetation.

14.2 No one knows whether current uses of pesticides are harming our waters. As a result, it is not surprising that the "Aquatic Risk Assessment" in Appendix B, Chapter 3 of the DEIS fails to address this issue in any meaningful way. There is some discussion of laboratory-based data on the acute toxicity to certain organisms of various herbicides; however, as the DEIS acknowledges, there is considerable uncertainty about the extrapolation of this data to different species, life stages, and populations. Similarly, the aquatic risk assessment provides little information about the

March 29, 1993
Page Two

14.2 chronic effects of herbicides on aquatic organisms, and no information about potential hazards to populations and communities. In brief, the DEIS does not provide any meaningful assessment of the risks of herbicides to aquatic life. Based on currently available information, no such assessment can be made.

14.3 In the absence of adequate information about the effects of herbicides and other pesticides on aquatic life, the only prudent course is to reduce and ultimately eliminate the use of pesticides wherever possible. Several counties in Washington state have already eliminated herbicides from their roadside vegetation management programs, as have the National Park Service and Region 6 of the U.S. Forest Service. In many areas, native plants are being used to create self-perpetuating roadside plant communities that require a minimum of maintenance and pesticides. In the long run, adoption of such techniques will reduce maintenance costs, enhance wildlife habitat, and protect water quality. The DEIS acknowledges this fact repeatedly in its discussions of Alternative E, which is the alternative that comes closest to being environmentally acceptable.

14.4 The alternatives identified in the DEIS do not include an integrated pest management approach that would phase out the uses of pesticides completely. The DEIS should be modified to consider a statewide program that would use such an approach to completely eliminate the use of pesticides within five years, with a 50% reduction by the end of the first year. Other jurisdictions have eliminated the use of pesticides for roadside vegetation management. There is no reason WSDOT cannot accomplish the same goal.

Thank you for considering our comments.

Very truly yours,

Kathy Fletcher

Kathy Fletcher
Executive Director

Comment 15

15.1 The goal of 38.5% reflects the estimated amount of roadside in the state that lend themselves to stable plant communities. In many areas constant disturbance prevents the establishment of stable plant communities.

9610 7th Ave NE
Seattle, WA 98115
April 11, 1993

Erik Henriksen
Compliance Services International
950 Pacific Avenue, Suite 700
Tacoma, WA 98402

Thank you for the opportunity to review the Washington State Department of Transportation's draft environmental impact statement "Roadside Vegetation Management," and thank you also for extending the comment period so that laggards such as I could get our comments in.

15.1 Alternative E, "Long-Term Comprehensive Integrated" management, is certainly the only alternative that can truly be called management. We need to decide where we are going and what steps will take us there. All other alternatives keep us stuck forever in cycles of futility. However, the so-called integrated management scheme described in this study seems not to merit the title. After five years, stable plant communities would be established in only 38 percent or less of roadside acreage. The remaining acreage would still require annual treatment. Surely we can do better than this. Our goal should be stable plant communities on 100 percent of roadside acreage. This goal may be unmeetable, but we can certainly come closer than 38 percent.

A long-term comprehensive integrated management scheme should include the following measures:

-- Herbicides should be used as a last resort, applied with extreme care, and their use should be temporary. Any plan that requires continued application of herbicide is not comprehensive, not integrated, and not long-term. Any calculation of trade-offs involved in applying poisons should be made in full consciousness of our great ignorance. We do not know the long-term, cumulative effects of the massive application of these substances, either on humans or on other species, and to pretend that we do is arrogant and foolhardy.

-- In all vegetation management proposals, strong preference should be given to native plants in their natural habitat. If we allow natural ecosystems to develop, we do not need to manage them at all. They will manage themselves quite nicely with no intervention from humans (and with no expenditure of tax dollars.)

-- Particularly in roadsize operational zone 3 (see Figure 1-1: Roadside Management zones, p. 1-10), every attempt should be made to restore a natural ecosystem. It is sad but true that for many tourists driving through Washington, or for many commuters riding up the freeway, the primary view they receive of the Pacific Northwest is the buffer zones along the freeway. These freeway buffer zones can with very little effort be restored to the state they were in before a highway was built. In a Western Hemlock zone, for example, there is no reason not to see a cover layer of Western Redcedar, Western Hemlock and Douglas Fir above a ground layer of salal, Oregon grape and ferns. A strong initial replanting effort can be followed by centuries of zero maintenance. The benefits to wildlife should need no enumeration, but the benefits to passing motorists would also be significant.

Once again, thank you for the environmental impact statement and for the chance to respond.

Sincerely,

L.A. Heberlein

Comment 16

Thank you for your input, your comments are noted.

NOOKSACK INDIAN TRIBE
P.O. Box 157 Deming, WA 98244
Phone: (206) 592-5176 FAX: (206) 592-5721

Doug Dobyns
Nooksack Indian Tribe
Water Program
P.O. Box 157
Deming, WA. 98244

May 13, 1993

Eric Hendricksen
Compliance Services International
1112 Alexander Avenue
Tacoma, WA. 98421

RE: Roadside Vegetation Management Draft EIS

The Nooksack Indian Tribe welcomes the opportunity to offer our comments and suggestions regarding the Washington State Department of Transportation's Draft Environmental Impact Statement on Roadside Vegetation Management. As a federally recognized tribe, we have many concerns involving the possible impacts of pesticide applications upon tribal trust lands and cultural resources.

Our reservation abuts a major transportation corridor, the Mount Baker Highway, and the Nooksack River. Additionally, tribal members reside on tribal trust lands which may be impacted by roadside vegetation management practices. Our primary concern relates to the associated impacts of pesticides on fish habitat that is both on and off the reservation but is within the jurisdiction of the tribe through US -vs- Washington (Boldt II). We are concerned with possible impacts to culturally significant sites where forage roots and medicinal herbs are gathered. Additionally, we are concerned with human health and the ecological health of the environment as a whole.

Although the EIS attempts to reassure the public that pesticides pose minimal health threats and environmental impacts, we strongly disagree and object to these assertions. Human error is a factor which is never given adequate consideration in risk assessments. There have been several instances where careless application of these chemicals have resulted in severe illness in children and other individuals who are highly sensitive. For example, a child was exposed from playing in a creek that had been directly sprayed. Children have gotten ill from ingestion of herbicide contaminated berries, or simply waiting for the school bus in Glacier, Washington. There have also been several documented instances of fish kills associated with herbicide contaminated runoff from roadways (Driver, et al., 1992).

The EIS is in serious error where it states on page viii of the Summary that " Chemical methods will not physically impact culturally significant areas unless those areas include

RECEIVED MAY 17 1993

Comment 16 continued

vegetation." First of all, nearly all culturally significant sites include vegetation. Secondly, chemical herbicides do impact our culturally significant fisheries resource. The EIS overlooks negative impacts to fisheries where runoff, leaching, drift or volatilization eliminate or severely reduce aquatic vegetation, macroinvertebrates which feed on this vegetation, and, indirectly, the fish which feed on aquatic vegetation or macroinvertebrates. Indirect effects also occur to salmon through biological magnification.

There are currently four stocks of threatened salmonid species in the Nooksack River system for which we cannot condone any further threats of adverse impacts. The suggested five foot buffer between herbicide application and waterbodies is totally inadequate to protect our fisheries. We would refer you to the WDNR Forest Practices guidebook on buffer zones concerning waterbodies and herbicide sprays (50 ft. buffers). However, we do support your proposal of reducing the width of management zone one. We are adamantly against any use of the herbicide, 2,4-D as it highly toxic to rainbow trout as well as the source of lymphomas in deer and elk populations. It is one of the most acutely toxic of the herbicides used by the Washington Department of Transportation.

Recognizing the Department's responsibility to maintain safe and unobstructed highway conditions, our recommendation would be to adapt a management strategy which integrates aspects of both alternatives C and E. If alternative E were to be adapted without chemical use, it would appear to be the most viable long term management alternative, having the least adverse impacts upon our fisheries and cultural resources. We strongly support the aspects of alternative E which incorporate the establishment of native vegetation to reduce noxious weed infestations and reduce the need for maintenance. Other tribes have recommended use of salol, mixed conifers and native low water use landscapes to achieve these objectives, and we support their recommendations. Dr. Jan Weijer of the University of Alberta has developed strains of grass that are low-growing, drought resistant and can establish easily on disturbed soils.

Governor Lovry reaffirmed the Centennial Accord which defines the government-to-government process and co-management authority between the Treaty Tribes and the State agencies of Washington as co-managers of the Washington State's fisheries, water and environmental resources. As such, our recommendations should be regarded in the serious light with which they are extended. The Treaty Tribes are not just another "interested party" and should be consulted at the scoping level in the EIS process.

Sincerely,

Doug Dobyns, Director

Comment 17

17.1 See response 14.2

RECEIVED MAY 19 1993

MUCKLESHOOT INDIAN TRIBE
FISHERIES DEPARTMENT
39015 172nd Avenue SE • Auburn, WA 98002 • (206) 931-0652 • FAX (206) 931-0752

14 May 1993

Mr. Eric Henriksen, Environmental Scientist
Compliance Services International
1112 Alexander Avenue
Tacoma, Washington
98421

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT - WASHINGTON STATE DEPARTMENT OF TRANSPORTATION ROADSIDE VEGETATION MANAGEMENT

The Fisheries Department of the Muckleshoot Indian Tribe has reviewed the Draft Environmental Impact Statement prepared for the WSDOT. The preparation of an EIS for an activity that could be considered exempt from SEPA review is commendable. However, despite the voluminous presentation of alternatives and toxicity information, the DEIS understates the potential threat to aquatic resources due to the use of chemical agents. Additionally, the DEIS overlooks potential thermal impacts to streams that would arise from implementation of some alternatives. The following comments are forwarded to protect the fish and wildlife within the Usual and Accustomed Area of the Muckleshoot Indian Tribe

HERBICIDES

17.1 The discussion of toxicity to aquatic organisms has been devoted mainly to acute events. Though, it is probable that aquatic organisms will not be chronically exposed to chemical agents, such an outcome should not be ignored. Chronic exposure could result from numerous causes: spilt material slowly leaching into water; release of material from soil and plant material, *etc*. The DEIS admits that insufficient data was available to assess chronic toxicity to aquatic organisms (3-37). In addition, the information presented about the chemicals proposed to be used, is based exclusively on laboratory studies involving a limited number of aquatic species (B3-14). The EIS has stated that mobile organisms may avoid and leave a treated area (B3-14). Such a sublethal effect, especially among invertebrates and salmonids is of great concern to the Tribe. Field studies conducted in Canada have demonstrated the potential for invertebrate drift to occur in streams exposed to pesticides. The resulting drop in biomass available for fish consumption caused a drop in fish growth rates. The DEIS has assumed that sublethal effects, if they occur, adds to the uncertainty in estimating risk. If risk is uncertain, a greater safety factor must be incorporated.

Given the potential for sublethal effects, the unknown additive and synergistic interactions of herbicides, and the unknown interactions of herbicides with the normal road

Comment 17 continued

17.2 See response 6.14

17.3 Comments noted.

17.4 Alternative G was created and selected as the preferred alternative in response to these concerns, among others.

17.2 runoff containing hydrocarbons and heavy metals, great care must be taken reduce the potential of herbicides entering waterbodies. A DEIS proposed mitigation measure to reduce potential impact to aquatic organisms is to refrain from applying herbicides within five feet of water, or beyond label restrictions (xii, 3-16). A five foot buffer between water bodies and the site of herbicide application is insufficient, it fails to allow for human error, shifting winds, and a host of other factors, and above all does not provide sufficient protection given the potential for adverse impacts such as invertebrate drift. If an alternative involving chemicals is adopted, the minimum distance between application and a waterbody should be 200 feet.

VEGETATION REMOVAL AND STREAM TEMPERATURES

17.3 Many roads follow waterbodies. Often due to the clearing associated with road construction and the follow-up roadside management program, little riparian vegetation remains by these streams. Thus, these streams are exposed to solar heating and water temperature rises. Elevated stream temperatures cause direct mortality to salmonids and increased disease prevalence. Depending upon road and stream orientation, the roadside vegetation management program by preventing vegetative succession may be responsible for adverse temperature impacts to fish. The WSDOT roadside vegetation plan must consider the impact of management activities upon the ability of the riparian corridor to provide shading, and hence improve the water quality of streams. If an alternative is adopted that requires vegetation planting and manipulation, it should be modified to ensure that streams are shaded, even though this would require that high stature trees be planted and permitted to grow within areas of normal exclusion.

SUMMARY

17.4 If an alternative using chemical agents is adopted, then stringent control and mitigation measures must be proposed to ensure the introduction of chemical herbicides into waterbodies is minimal. In addition, vegetation management should not be permitted to occur at the expense of present or future successional shade producing vegetation, otherwise fish populations will suffer.

I thank you for your attention to our concerns. If you have any questions regarding this letter call me at 931-0652.

Sincerely,

Roderick Malcom

Roderick Malcom
Habitat Specialist

cc: USFWS /
WDF /
WDW /

2

Comment 18

18.1 See response 6.5

18.2 See the definition of Alternative G in the EIS Summary (Chapter One).

Point No Point Treaty Council
Port Gamble S'Klallam • Lower Elwha Klallam • Jamestown Klallam • Skokomish

April 28, 1993

RECEIVED MAY 4 1993

Eric Henriksen
Compliance Services International
1112 Alexander Avenue
Tacoma, WA 98421

Dear Mr. Henriksen:

The Point No Point Treaty Council would like to comment on the Draft Environmental Impact Statement Roadside Vegetation Management prepared for the Washington State Department of Transportation.

The Point No Point Treaty Council provides fisheries management services for the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha S'Klallam Tribes. As such we have co-management responsibilities for fisheries within an area extending from the southern Hood Canal to the Hoko River on the Strait of Juan de Fuca. Any activity that impacts habitat within this area requires consultation with Point No Point Treaty Council tribes.

18.1 We were surprised to learn about this programatic EIS from the Washington Toxic's Coalition rather than your agency. A program of this scope demands full review by state, federal, local, and tribal organizations which manage the resources that may potentially be effected by this decision. We would ask that comments in their entirety be included in the final EIS.

ALTERNATIVES

The Point No Point Treaty Council can only support Alternative C-No Chemical Approach as outlined in the DEIS although we would urge that the FEIS include an alternative based on an Integrated Pest Management (IPM) Program. While at first glance Alternative E-Long Term Comprehensive Integrated Approach represents such an alternative, it stops far short of an integrated program especially when reviewing the projected treatment percentages after five years.

18.2 An integrated approach involves a systematic assessment of pest problems and alternatives for controlling the target population while maintaining water quality, beneficial uses, and other locally important issues such as cultural resources. Site specific management and decision-making are an essential component of IPM. A true IPM process involves monitoring and inventorying of pest populations, determination of injury and action levels, identification of priority pest problems, selection and timing of the least toxic management tools, site-specific treatment, evaluation, and adjustment.

7999 N.E. Salish Lane • Kingston, Washington 98346 • Kingston (206) 297-3422 • FAX (206) 297-3413

Comment 18 continued

18.3 Comment noted.

18.4 The development of site-specific Roadside Management Plans will be used for these purposes, among others.

18.5 Comment noted.

18.2 Alternative E as outlined in the EIS, will utilize all treatment methods to control vegetation. There is no indication how the various treatment levels were derived or if an evaluation of pest problems, resource considerations, or operational objectives will be utilized on a site-specific basis. All tools are equally considered and cost appears to be a primary objective in selecting the treatment method.

18.3 A disturbing underlying assumption in all the alternatives is the concept of "undesirable plants", and the lack of any meaningful evaluation into the extent and actual threat they pose to road management objectives. For example, the target vegetation specified for the Olympic Peninsula in Appendix A, page A7-4 includes many native species such as alder, willow, salmonberry, cattail, elderberry, and wide ranging groups such as "fir/evergreen, grasses". Many of the species are mentioned earlier as components of vegetation communities native to this physiographic region. What differentiates a target (pest) species from a desirable native community, especially since there appears to be an emphasis on promoting low maintenance native species? At what point does a desirable native plant become a pest? What level of control is needed? These are the types of questions that need to be evaluated and would be in a meaningful IPM program.

TERRESTRIAL WILDLIFE:

18.4 The EIS evaluates potential impacts to terrestrial wildlife based on the different alternatives and concludes that the "widely varied potential effects of vegetation management techniques on wildlife and habitats indicate the need for evaluation on a site-specific basis" (EIS, page 3-34) While one can appreciate the complexity of trying to develop mitigation measures for such a diversity of habitats, more guidance should be provided for determining the necessity of vegetation control, mitigations, and alternative methods for sites in sensitive wildlife areas.

18.5 Many of the species listed in Appendix A, Chapter 7 as target species are also preferred browse for deer and elk. Targeting this vegetation for removal is removing habitat for these species. Several species such as alder, maple, and elderberry provide hiding cover for wildlife. Retention of native vegetation in Zone 2 and 3 should be a standard practice. Not only will this discourage roadside deer browsing and roadkill problems commonly found in areas planted with short grass but it would also maintain habitats for small animals and birds.

AQUATIC WILDLIFE:

1. Habitat

Impacts to aquatic habitats and species includes direct contact with pesticides, sedimentation and nutrient loading from mechanical

2

Comment 18 continued

18.6 See response 14.2

18.7 Comment noted.

methods, and indirect impacts related to vegetation removal. The last factor was not evaluated in any detail. Removing riparian vegetation through mechanical or chemical control can have a wide range of secondary effects, including destabilization of the stream channel, reducing the input of fine organic material and large woody debris, and increasing stream temperatures. Where roads run parallel with streams, the impact increases as more of the riparian zone is involved. Alternative treatments such as biological and cultural are more appropriate means of controlling vegetation, if absolutely necessary, in this areas.

2. Risk Assessment to Aquatic Wildlife

There are some serious limitations in the risk assessment methodology. The toxicity values are derived from laboratory experiments involving a limited number of aquatic organisms. Aquatic wildlife are adapted to the specific environmental conditions of their natal watershed. The specific adaptive characteristics increase the genetic fitness of a population. The main point is that it is hard to translate laboratory conditions and responses to the wide ranging variability found in nature.

18.6 It is unknown during what life phase toxicity was tested. For fish, certain life phases are more vulnerable, such as the period between spawning and rearing. Vulnerability varies substantially between species. For example, coho spend up to one year in freshwater streams and could potentially be exposed at several life phases. Chinook, in contrast, spend a limited amount of time in freshwater streams.

Watershed and stock specific information was not considered. For example, what is the exposure potential and risk for individual streams or fish stocks with diminished populations? While the generalized rating may be low, populations which are substantially reduced have a higher risk associated with exposure and reduced reproduction. Information on sub-lethal effects on fish and aquatic organisms was lacking in this evaluation as was a cumulative effects evaluation.

Given these factors and the facts that over 50% of the fish stocks in Washington are rated at risk, it is difficult to support the conclusion that "the majority of chemicals evaluated present low relative risk to aquatic species." I would also like an approach 18.7 that maintains and improves aquatic habitats rather than limiting decisions to preventing lethal or sub-lethal effects.

3. Aquatic Insects

Changes in water quality affect the assemblage of aquatic invertebrates. Macroinvertebrates are extremely useful indicators

3

Comment 18 continued

18.8 The 5-foot buffer mitigation measure has been changed for the FEIS. See the chemical mitigation measures section in the EIS summary.

18.9 This is an important point. There should be cooperation between DOT and the Tribes to protect Native American cultural resources.

of water quality and from their role as an intermediate trophic level between microorganisms and fish. Information assessing the impacts of various alternatives on macroinvertebrates may provide a more meaningful evaluation for aquatic wildlife in evaluating water quality after treatment. Species abundance and richness should be used to evaluate aquatic invertebrate health.

4. Fisheries

The most direct impact to fisheries relates to chemical and mechanical methods. At a minimum, the EIS should include stocks identified at risk within the detailed physiographic region descriptions and include special mitigation measures for those stocks. Sources for this information can include the American Fisheries Society Report and the Washington State Salmon and Steelhead Stock Report.

18.8 To reduce impacts to aquatic habitats and species, a minimal 300 foot buffer should be established for chemical and mechanical treatments adjacent to streams, shorelines, and wetlands and only as a last alternative if biological or cultural treatments are not appropriate. This buffer may need to be increased with sensitive species. The five foot standards proposed as a mitigation for chemical treatment is scientifically unsupportable and will not provide adequate protection. If chemical treatments or mechanical treatments are used in sensitive area, follow up monitoring should be required to test the effectiveness of mitigation standards.

Mechanical treatment has the potential to introduce sediment even on flat areas, especially following heavy precipitation events. Heavy rainfall and introduction of sediment following mechanical removal of vegetation is a common problem in the Point No Point Treaty Council area. There was also no consideration of the cumulative impacts from other land use activities in combination with WSDOT chemical and mechanical treatments on aquatic and terrestrial wildlife.

Although shellfish resources are listed in Appendix A, Chapter 8, there is little discussion about potential impacts and appropriate mitigations to protect these resources. Many roads follow shorelines and pose sedimentation and water quality threats to shellfish beds. In areas of identified shellfish beds, cultural or biological methods which minimize disturbance are the most appropriate treatment.

CULTURAL RESOURCES:

18.9 Cultural resources for Native American people include both physical (shell middens, village sites, burial grounds, native plants) and non-physical features (berry gathering sites, ceremonial areas, mythological sites). Most of these sites have not yet been identified and involve sensitive issues for tribal governments.

4

Comment 18 continued

18.10 Thank you, you comments are noted. Alternative G, the preferred alternative, represents and integrated Pest Management approach to Roadside Vegetation Management.

While the DEIS mentions cultural resources, there is an extremely limited understanding of their type, significance, and required protection standards discussed in this document.

18.9 To avoid disturbing cultural or archeological areas, DOT should notify local tribal organization of proposed activities as early as possible in the planning process and avoid disturbing these areas. Respectful treatment of cultural sites should be a top priority for DOT.

18.10 In conclusion, the Point No Point Treaty Council is seriously concerned about the potential impacts to fisheries, shellfish, wildlife, and cultural resources. We urge you to include and adopt as a preferred alternative in the FEIS a meaningful Integrated Pest Management Alternative. Thank you for the opportunity to comment.

Sincerely,

Carol Bernthal

Carol Bernthal
Habitat Coordinator

5

Comment 19

To: Compliance Services International
FAX: (206) 272-6241
Attn: Eric Henriksen

NW 125 Webb Street
Pullman, WA 99163
May 25, 1993

Washington State Department of Transportation
IC4 Transportaton Building, Mail Stop KF-01
Olympia, Washington 98504

Re: EIS - Roadside Vegetation Management

I am a fifth generation northwest native. My love runs deep for the beauty of this land where I grew up. I want to be able to walk on a roadside to breathe and touch my surroundings and eat a piece of miners lettuce off the bank.

It makes me ill to come upon a spray rig spewing carcinogenic toxins. Sometimes a corridor of herbicidal death runs alongside the road for miles like a high waterline. Nothing upsets me more than to see native plants and trees herbicided. Once disturbed with herbicide, it is open to weed species.

Travelling east to Inchelium through Colville Indian Reservation - My mother and I were disgusted by the broadcast application of chemical along the highway over benign plants. It appeared to serve no purpose whatsoever, except perhaps increase erosion by stripping vegetation. When we reached Nespelem, we asked some of the Indians about it. The Indians we spoke with didn't seem to want the chemical. They said, "the State does what it wants to." They said the tank had come right into town. [DOT should avoid entering towns with spray rigs.] We travelled on, Nespelem to Inchelium, to find the most god-awful scene of roadside destruction. Perhaps this is the work of the flail mentioned in your EIS. It was like some hacking, slashing monster had chewed both sides of the road. The beautiful forest with all its treasures of native plants and shrubs was assaulted in the most vile, insensitive and criminal fashion. Young trees were hacked, not cut, sometimes leaving very tall stumps of shattered wood. Boarded Gifford Ferry to the East bank of the Columbia - We saw crupina vulgaris. Forget erradication, it's too far gone. Control through education of the public to eliminate new sites of infestation, clear rosettes before seed stage is best. We cleared a fairly large site in about an hour and had a nice swim in the river.

Last year I was on a state highway north of Vancouver. I pulled over to look because I could not believe what I saw. A group of roadsigns had been treated with herbicide. There was no tall vegetation within a quarter mile of them, thus no visibility problem. The treated vegetation was in a dry area where the height of plants was about eight inches max. I could not discern the threat posed by the plants. It looked like another waste of tax money on chemical.

I have the clear impression, reinforced by the EIS, that chemical salesmen have sold DOT some bill of goods.

P.2 MAY 19 '93 11:23 J&H (509) 334-1552 PAGE 1

Comment 19 continued

19.1 There are often many data available on chemical toxicity. An effort was made here to obtain the most recent data.

The EIS pesticide risk assessment is based on selective and often inaccurate information. Inhalation and dermal exposure, the most prevalent risks, are given little attention. Children are not even considered. Most attention is given to ingestion, so I guess the average citizen is suppose to figure it's okay if you don't eat it.

The public should not be asked to live with exposure to chemicals that must be kept secret. If a conclusion is based on proprietary information, the pesticide does not belong on our public highways.

The following examples are from the EPA, Office of Pesticide Programs reviews on Triclopyr gained under the Freedom of Information Act compared to your EIS versions of the studies:

Page B4-65 Triclopyr - Chronic Toxicity / Oncogenicity, Rats 0, 3, 12, 36 mg/kg/day showed numerical increases in oncogenic effects and statistically significant mammary gland tumors. Rat 38 mg/kg/day, "has been compromised as a carcinogenic and toxicity evaluation because of incomplete pathology". Tissues of only ten rats/sex in control and high dose were examined histologically, "even this was not accomplished for every tissue". (The EIS is misleading to report no oncogenic effects for these two studies. No mention is made that the data was not collected in the 38 mg study.)

19.1

Page B4-66 - Mice 0, 50, 250, 1250 ppm for 22 months, numerical increase in mammary gland adenocarcinomas in females, 0/60, 1/60, 2/58, 4/59 for the control, LTD, MTD, HTD respectively. Thymus enlargement in males 0/60, 2/60, 6/60, 9/59 for control, LTD, MTD, HTD respectively, "the authors do not consider this effect treatment related mainly because mice having enlarged thymuses also had malignant lymphomas of the thymus". No information was provided to show the distribution of the lymphomas. The only number given was 11/60 control animals had malignant lymphoma. "... it is not clear why none of the control animals with malignant lymphomas (11/60) had enlarged thymuses while practically all treated animals with malignant lymphomas also had enlarged thymuses." (Your EIS reports (systemic toxic effects observed) enlarged thymus in males at 250 and 1250 ppm and negative for oncogenic effects.) But the authors say the enlarged thymuses are not treatment related? Did you ask to see the distribution of the lymphomas? Confusing isn't it.

If the health effects studies performed by the manufacturers and contracted private laboratories can not be fully reported in the open literature, that is an indication that something is wrong. The examples above show major discrepancies between EPA - OPP reviews and EIS versions of studies. The EIS is riddled with misleading, inaccurate and selective information on pesticides. It is a serious public health issue.

It is dangerous to use pesticides that have no odor. A member of the public has no warning that they are in a treated area. Did I understand the EIS to say that DOT is actually making an effort to find and use odorless pesticides?

Appendix A indicates that somewhere there is an understanding of

P.3 2551-PEE (605) MON 12:11 EG. 01 ... PAGE 2

Comment 19 continued

19.2 Comments noted.

19.2 native vegetation and sensible roadside management. The DOT effort should be directed to establish stable plant communities, plants native to the area and good vegetation cover to prevent erosion. In highly disturbed or urban areas, wildflower mixes are nice, even if not native. Care should be taken not to introduce something that becomes an invasive pest. The monoculture, lawn-like, mowed aesthetic belongs in the states back east.

We need DOT managers with respect for the natural beauty of our state of Washington.

Sincerely,

Crystal Dollhausen

Crystal Dollhausen

DATE 13

Comment 20

OLYMPIC
RIVERS
COUNCIL

PO Box 221 Hoodsport WA 98548-9998

May 5, 1993

John Conrad
Washington Department of Transportation
Transportation Building
Olympia, WA 98504

RE: DEIS on Roadside Vegetation Management

Mr. Conrad:

We hope our comments are not too late. To avoid paying what we felt was a restrictive price (forty bucks!) for the DEIS, we waited for a 'hand-me-down' copy of the DEIS summary. The time factor alone restricts most citizens from responding to these important documents, but in the case of the DOT's DEIS, unfortunately there was also an affordability factor.

In reading the DEIS Summary, I was almost surprised that the document was dated 'February, 1993.' The mentality of the document was NOT of our present decade. It had a real 'sixties' feel to it. It seemed comfortable with high us of chemicals on our highways, as though pesticides were the easy, obvious answer to all our vegetative management needs.

The DOT has failed to grasp the 180-degree turnaround in the well-educated public sentiment about the use of pesticides. I happen to be a veterinarian. A large segment of my work involves the battle against that awful pest, the flea. If I recommended today what I recommended ten years ago to my clients regarding flea control, they'd hi-tail it down the road to another veterinarian who has some sense of the known and yet-unknown dangers of widespread pesticide use. People know. They just won't tolerate the unnecessary use of pesticides anymore. The scary thing is that my clients can easily turn elsewhere for better advice . . . the residents of the State of Washington don't have that easy choice regarding their DOT.

I guess that's our message in a nutshell. However, I hope the Final EIS does a thorough job of assessing some additional angles:

**If the DEIS really costs $40 to publish—we can recommend a good printing company in Bremerton for your future documents, so they will be affordable to the public. Hopefully at least the 'Summary' of the DEIS was available at no charge to interested citizens, as should the FEIS 'Summary' be.

**start with the basics—what do the people of Washington really want from the DOT as far as vegetation management goes? We were almost amused to read your 'Visual Quality' section. We really doubt if most citizens expect the roadways to look like golfcourses—especially when that 'golfcourse' appearance correlates with the use of precious irrigation water, pesticides, fertilizers, and expensive maintenance costs for the State.

**how can the DOT reduce the use of pesticides? Kitsap County, for instance, maintains our property's road right-of-way with NO chemicals, as it does for most of the County. We have vegetation RIGHT to the road's edge, with no apparent affect on the roadway—it looks nice, it more effectively filters out non-point pollutants, and everyone

Comment 20 continued

20.1 See response 6.14

20.2 Comments noted.

breathe and drinks their well water a little easier.

**a lot of the statements you make in the DEIS Summary are so naive and innocent—the pesticides you use heavily are far from innocent. In an era where we are (finally!) looking at ways to bring back previous wild salmon populations from the brink of extinction, how can the DOT fail to analyze the known toxic effects of pesticides, toxic non-point stormwater drainage, and high-sediment erosive runoff on the food chain, especially the fragile fish populations?

The biggest concern of the Olympic Rivers Council is the effect of DOT management practices on the water quality of our Peninsula streams, wetlands and rivers. And the more we find out about the dynamics of "hydraulic continuity," the more critical it becomes to protect ALL water resources.

If you're applying pesticides and fertilizers in the roadway drainage ditches, you're pouring those chemicals right into the rivulets, tributaries and streams where our few remaining wild salmon are fighting for survival as it is. We think you really missed the boat on this issue, and it must be addressed in the Final EIS.[1]

Also, your depth of understanding of very basic ecological interactions is surely lacking in your statement that "Water quality can be protected by not applying within 5 (yes, FIVE!!!) feet of surface water. . . ." We had to laugh when we read this, but of course it's not funny at all.

20.1

**As we read through the Alternatives you have proposed, we got the feeling that if this was a multiple-choice test, you were fishing for a correct answer of "Alternative E." On the surface it looks like a smart direction. The words "long-term" and "all available treatment methods to control vegetation" (not just chemicals) tempted us to endorse this Alternative. However, we can't trust you. How can we trust your proposed Alternative, when you haven't even addressed water quality or fish & wildlife impacts seriously?

**Your comments in the 0.5.5 of the DEIS Summary included some definitions of "hazardous materials" versus "hazardous waste." We got the feeling you tried to cloud the issue with definitions, then momentarily "forgot" that PESTICIDES ARE HAZARDOUS MATERIALS!! Your definitional logic that deducted "Alternative C" would generate the most waste oil conveniently overlooked that "Alternative C" would produce NONE of the BIGGIE—chemical hazards.

**Your comments in 0.5.10 made no sense at all. We'd suggest you either delete this section entirely, or do it right and consult with the Tribes on this.

**In your section 0.5.13, we were glad to find that drinking a pint of milk on a daily basis put us at "low" risk of adverse health effects! We don't know where this analogy came from, but it is ridiculous, and another indication that DOT refuses to address the very real threats of continued, high levels of pesticide use in our State.

Also, "labor-intensive activities" was insinuated to be a negative thing—is it?

We hope these comments are heard. We hope the DOT responds to the changing needs and expectations of the citizens of the State. We hope your Final EIS has a "nineties feel"—not the unenlightened attitude that permeated the DEIS. Good luck in your work. Don't hesitate to contact us if we can be of any assistance.

20.2

Carol Volk

Carol Volk, D.V.M.
Chair, Steering Committee

---

[1] A good resource person for you on this subject would be Holly Coccoli, a fisheries biologist with the Point No-Point Treaty Council.

4.3.3 Comments concerning herbicide use that do not reference the EIS

The following comments are in the same vain as the preceding section, however, they are not in response to or commenting to the EIS. There were many of these letters received, urging WSDOT to discontinue the use of pesticides as a vegetation management tool. Of the many received, the four included here are very representative of the others received. As these letters did not comment to the EIS, response was difficult, however a sample of this grouping is reproduced here.

4.3.3.1 Group Response

Under Alternative G, pesticide use would be reduced over time through the establishment of stable vegetation, thus reducing the amount of roadside acreage that would need to be treated. Herbicide use is, and will continue to be an important issue for WSDOT and the public. It will be important that there be a high level of communication between WSDOT and the public, and this will be accomplished through the process of Roadside Management Plan development.

Comment 21

5624 Boston Harbor Road
Olympia, WA 98506
April 2, 1993

Eric Henriksen
Compliance Services, International
#700 Seafirst Center
950 Pacific Avenue
Tacoma, WA 98402

RECEIVED APR 7 1993

Dear Mr. Henriksen:

We are concerned about the adverse environmental impact of the Department of Transportation's [DOT] roadside spray program. We want the DOT to develop an Integrated Pest Management program that will eliminate the use of pesticides within five years with a 50% reduction by the end of the first year. We know that it is possible and cost-effective to manage roadsides without herbicides. We have supported Thurston County's policy to restrict herbicide use by its agencies and are opposed to DOT's use of these restricted herbicides in our county and in our state. We will urge our legislators to oversee this Department's adherence to SEPA procedures.

Sincerely,

Kathleen Connor
Bruce Mountjoy

Kathleen Connor
Bruce Mountjoy

Comment 22

ISSAQUAH CREEK BASIN ADVISORY TEAM

April 13, 1993.

Eric Henriksen
Compliance Services, International
#700 Seafirst Center - 950 Pacific Avenue
Tacoma, WA 98402.

RECEIVED APR 20 1993

Dear Mr. Henriksen,

Re: WSDOT DRAFT EIS ON
ROADSIDE VEGETATION MANAGEMENT

On behalf of the Issaquah Creek Basin Advisory Team (BAT), which has been working for the last two years with King County Surface Water Management Division and the City of Issaquah to develop the Issaquah Creek Basin and Non-point Action Plan, I would like to comment on your Roadside Vegetation Management Plan.

There are three overarching goals of the Basin Plan:

1) To reduce flooding and protect health and safety of people and property
2) To enhance riparian habitat, particularly for continued salmonid use
3) To protect water quality within the Issaquah Creek Basin.

Sections of I-90, SR 18 and SR 500 traverse the Issaquah Creek Basin and runoff from them drains directly into some of the Basin's creeks (East Fork and Mainstem Issaquah, Carey, Holder and Tibbetts), which still support anadromous salmonid populations. Therefore, WSDOT's maintenance practices have the potential to affect our water quality and fish habitat. Inasmuch as the dramatic decline of the Pacific Northwest fisheries has become a concern both regionally and nationally, and the citizens of King County and Issaquah will be asked to make a major investment through this Basin Plan in order to restore and protect water quality and beneficial uses within the Basin, the BAT urges WSDOT to use maintenance practices that are congruent with the goals of the Basin Plan. In short, we respectfully request that WSDOT cease the application of chemical controls (i.e. herbicides), that are, or may be, toxic to fish and aquatic organisms

Thank you for your consideration of our concerns and this opportunity to comment on WSDOT practices.

Very truly yours,

Eric Erickson, Chair, Issaquah Creek BAT
13040 189th Avenue SE
Renton, WA 98059.

Comment 23

Barbara Tomlinson
5034 - 7th N.E.
Seattle WA 98105

RECEIVED MAR 29 1993

USA 19

Eric Henriksen
Compliance Services,
International
#700 Seafirst Center
950 Pacific Avenue
Tacoma, WA 98402

24 march 1993

Sir: I am outraged almost beyond words that you would be so crude as to use unnecessary, environmentally destructive toxic chemicals on our roadsides — when there are good, economic alternatives. This policy is obscene!! — it must stop NOW!! Your children as well as mine — and grandchildren — will suffer from the present policy, if it continues.

Sincerely, Barbara Tomlinson
5034 - 7th N.E.
Seattle WA 98105

Comment 24

RECEIVED APR 20 1993

THE GUEMES ISLAND
ENVIRONMENTAL
TRUST

POST OFFICE BOX 643
ANACORTES WA 98221
FAX 206/293-9697
206/293-9047

April 16, 1993

Eric Henriksen
Compliance Services, International
#700 Seafirst Center - 950 Pacific Avenue
Tacoma, WA 98402

RE: DRAFT EIS Roadside Vegetation Management

Dear Mr. Henriksen,

We wish to express our disappointment with the Environmental Impact Statement on Roadside Vegetation Management, released by the Washington Department of Transportation (WSDOT) in February of this year.

The EIS is little more than a gesture and does not present an objective comparison of costs and effects of the various currently available methods of roadside management.

At a time of increasing public concern with the quality of our groundwater and surface water, it is distressing to learn that WSDOT continues to apply tens of thousands of pounds of toxic chemicals along the state highway rights-of-way (ROWs). In fact, the amount of pesticides has steadily increased, while mechanical maintenance has decreased. Instead, the WSDOT should be a leader and an example in the application of environmentally safe techniques and in the phasing-out of herbicides and pesticides.

Alternative management practices are available and cost-effective. Many Washington counties, including Snohomish, Jefferson, Thurston, Mason, and parts of King and Kitsap Counties have all or mostly phased out all use of herbicides.

The argument that herbicides are the least expensive tool for vegetation management tool is not acceptable. Indirect and societal costs (those costs which are borne by third parties) are not taken into account by the WSDOT. Long-term effects on the environment and on human health from the production, transport, and application of toxic chemicals have to be accounted for. The costs of cleanup of contamination of the soil under and around storage

1

Comment 24 continued

facilities, the restoration of contaminated aquifers, the loss of crops and livestock all are costs connected to the use of herbicides.

We strongly recommend the adoption of a comprehensive Integrated Vegetation Management, which includes phasing-out of herbicides within a period of five years. All available control actions, such as mechanical and cultural methods, natural enemies and pathogens, and competing plant species, should be considered, first. The use of herbicides and pesticides should be strictly limited to local applications, as a last resort.

Sincerely,

Marianne Kooiman

Marianne Kooiman

cc: Governor Lowry

2

4.3.4 Specific Comments Concerning Specific Portions of the EIS

The following comments can not be easily categorized but were very substantive and influenced the editing and production of the Final EIS.

Comment 25

25.1 Maintenance worker injuries due to traffic exposure is an important issue, and must be considered when WSDOT chooses an alternative, as all the stated alternatives require maintenance workers - but some, such as Alternative C (No Chemical Approach) require a significantly higher number of workers. Section 0.5.13 discusses this issue in the first paragraph.

25.2 The spreading of noxious weeds and unwanted vegetation is one of the greatest reasons for the need for effective vegetation management.

Eric

DUPONT

AGRICULTURAL PRODUCTS
Walker's Mill, Barley Mill Plaza
P.O. Box 80038
Wilmington, Delaware 19880-0038

May 12, 1993
19201 Portos Dr.
Saratoga, CA
95070

ROADSIDE VEGETATION MANAGEMENT

Environmental Impact Statement

Washington State Department of Transportation Feb. 1993

I appreciate the opportunity to comment on the draft EIS.

I recommend the selection of Alternative E. It appears it incorporates much which has been the standard program with some improvements.

The review of the appendices B, C, and D and the draft EIS indicates there is a great deal missing about the Rights-of-Way management program in terms of value or benefits of what is currently practiced.

25.1 o Maintenance worker injuries and deaths due to exposure to the traffic. Changing practices which causes more exposure to traffic is an increased risk to workers. More research should have been done in this area and it should have been covered in detail.

o Rights-of-Way habitat for wildlife should have been covered in detail because some of the alternatives will result in more wildlife. How many motorists will be killed or injured because of wildlife flying or running onto the road?

25.2 o Noxious weeds are spread by the public when travelling on the highways. Without an effective noxious weed control program including the use of pesticides more farm land and forest lands will be infested by these serious weed pests. What is the cost of noxious weeds to agriculture and forestry which are spread by the public? This needs to be pointed out because it is not just an issue of controlling noxious weeds. Benefits of control desires a great deal of coverage to help in the decision of which program is best.

o Roadside fires caused by cigarettes being thrown from cars and trucks is a major concern and one reason for having a bare strip along the pavement edge. How important is this in terms of fires started on the Rights-of-Way and spreading to neighboring property? What do the records have on this? Away from the shoulder some of the alternatives will have more vegetation which can burn increasing the danger of smoke which will cause accidents.

RECEIVED MAY 17 1993

"...A Growing Partnership With Nature."

Comment 25 continued

25.3 A detailed cost analysis was not performed as part of this Environmental Impact Statement.

H-15248 7/90

DUPONT

AGRICULTURAL PRODUCTS
Walker's Mill, Barley Mill Plaza
P.O. Box 80038
Wilmington, Delaware 19880-0038

Again, all of these issues are extremely important along with some I probably have missed. Because there was insufficient coverage of these issues the value of the current program is greatly under estimated and the true impact of the alternatives are very difficult to measure. I believe those reading these documents will notice there is a whole volume (appendix B) on pesticides and very little on alternatives in terms of costs.

25.3

Sincerely,

Link Bradley

Link Bradley
Regulatory and Environmental Issues
Agricultural Products, DuPont Co.

"...A Growing Partnership With Nature."

Comment 26

26.1 Thank you for your comments. The corrections to Appendix A avian tables are noted.

4 1993

Scott A. Richardson
215 East Tenth Av #5
Olympia, WA 98501-1351

April 29, 1993

Compliance Services International
1112 Alexander Avenue
Tacoma, Washington 98421

Subject: Washington DOT Roadside Management Plan

To whom it may concern:

Thank you for sending the draft document for the Department of Transportation Roadside Management Plan. I am pleased the deadline for comments was extended and that I have this opportunity to contribute in a minor way.

This letter is an expression of support for Alternative E. Philosophically I am comfortable with Alternative A, but I will compromise my anti-automobile sentiments to contribute pragmatically to this process.

When instituting Alternative E, I encourage the DOT to use cultural techniques as much as possible, emphasizing manual and mechanical treatments over chemical. I echo the call for a strong focus on preservation of native species with an aggressive campaign to eradicate the exotic weed Scot's broom wherever possible.

26.1 Three minor updates/corrections to Appendix A tables are due:
Snowy Plover is now federally listed as a threatened species (Table 8-1).
Marbled Murrelet is now federally listed as a threatened species (Table 8-3).
Gyrfalcon is misspelled (Table 8-3).

The draft plan appeared to my untrained eyes to be quite thorough. I wish the team luck on completion of the final draft.

Sincerely,

Scott A Richardson

Comment 27

27.1 Comment noted.

Jean Stam
8400 Rocky Lane SE
Olympia WA 98513 (206)459-0946

RECEIVED MAY 4 1993

5/2/93

Compliance Services International
1112 Alexander Ave
Tacoma WA 98421

Dear Friends at Compliance Services International:

The Washington Department of Transportation's EIS did a beautiful job of defining the eight major physiographic provinces of natural vegetation of Washington, describing the zonal vegetation associations and identifying the approaches and methods and impacts of the different vegetation management operations it has at its disposal. It was very thorough and I learned a lot. It is a real contribution to the natural understanding of this beautiful region. In fact the EIS, especially Appendix A has enough information to make the state highway roadsides, the showplace of native vegetation and soil restoration and landscaping'

From the document I understood that DOT voluntarily went through this process which gives them new credibility in my eyes. I thank the agency for doing such a thing, though not bound by law to do so, except for matters of water quality. So I know legally DOT does not need to heed my comments, but I encourage DOT to incorporate them, for all is connected and in the end my comments will lead DOT to creating water quality.

There is a table series, the Visual Quality Matrix, that has a list of 4 different types of roadsides, from urban ones through to natural, and the management treatments to be used in each of those different settings. It is stated that the agency seeks to blend its roadside appearance in with the 4 various settings. I beg DOT to consider "scraping" this thinking. It makes no sense. If the highway wended through a garbage dump would the department therefore landscape the roadside with garbage? Of course not. So, why when passing through an urban area must citizens be charged with the expense of the agency trying for plantings of exotic high maintenance ornamentals and all the trimmings? I suggest we put back the landscape found in the underlying physiographic province of natural vegetation and the zonal vegetation associations. And I ask DOT to take this thought even further. After successful establishment of such a landscape, management would be as with a natural area where instead of intruding into the natural landscape, the softer natural environment with a less defined edge is encouraged to develop. 27.1

This shift in management perspective would achieve the vegetation management goal of protecting and enhancing the natural environment. Latitude would still exist to make intersections

1

Comment 27 continued

27.2 Alternative G has been created for the FEIS, and it has been selected as the preferred alternative. See section 0.4.0 in the EIS Summary.

with good visibility and even opening up vegetation where a good view is to be seen.

I believe native plants must cease to be target vegetation for eradication efforts. Killing or removing salal, huckleberry, elderberry, maple, fir/evergreens, salmonberry, red cedar, rose, alder, cottonwood, and so on, is "throwing the baby out with the bath water". The target species the agency controls seem the better candidates for roadside management. Page A7-5, 3rd paragraph states that "successional communities .... are often dominated by red alder and salmonberry for up to 60 years". So let it! If the department reads the state of the art literature on how to do native restoration, and I have provided the department*, **, ***, **** with a paper and letters on how to do this, it will be found that Nature is going to have to be allowed to go through its successional stages on our state roadsides. Each stage will be no less beautiful than the next and the soils and cultural conditions will be prepared naturally for each upcoming stage.

Suggestion was made in the EIS that successional stages nature goes through can't be permitted, whereas this presumption removes your best tool for managing the roadsides. The roadside management zones are not appropriate entities to decide on vegetation management as alluded to in Alternative F because the zonal vegetation association boundaries differ from these man made jurisdictional boundaries.

27.2 I don't believe alternatives A - F offered for the public to choose, fairly address all concerns and beg the department to consider the following practical one. An alternative needs to be created that permits succession to happen, where a degree of management comes into play in retaining native vegetation that exists, not only on current roadsides, but as much as possible in new highway development, encouraging native vegetation to invade from non-DOT properties onto Roadside Management Zone 3 and 2 (if safe), and planting native vegetation if noncexists for colonization, (with local, correctly collected gene pool seed if at all possible (research asterisked *** reference below)) and aggressively remove non-native species from the roadsides using the least environmentally impactful treatment possible. The Natural landscape type should be the only landscape type in DOT's visual quality matrix. Lastly, trees should be classed as Unavoidable Adverse Impacts.

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*letter FEBRUARY 12, 1991 ART SMELSER D.O.T. DIST. ADMINIST'or
**letter FEBRUARY 27, 1991 JOHN F. CONRAD CHIEF MAINT. ENGINEER
***11/1/91 Paper for DOT conference, Choices for Washington's Environment, "The Goal of Utilizing the Transportation Right-of-Ways and Corridors of the Department Of Transportation, for Restoration of Native Ecosystems to satisfy landscaping's function and "to Stabilize the Environment" by Jean Stam
****letter August 3, 1991 John Conrad, WDOT

2

Comment 27 continued

27.3 Thank you, your comments are noted.

Page A7-27, 6.1 "No Vegetation Management Activities" somewhat describes it with the naturalizing exotic plant species eliminated from the picture. And I would suggest that native soil from the outlaying area far from the cut and fill areas be dug and used as an inoculate in altered Roadside zones so succession can proceed more quickly and not be in the first "weedy" stage so long. The EIS says in a few paragraphs earlier, "in intensely farmed areas of the state some of the only remaining native plant communities are located in Roadside Zone 3. Here is the contribution DOT, in its power, can provide to the state's natural ecosystem investment - upholding the integrity of the physiographic provinces of natural vegetation underlaying its thousands of miles of roadside. Bird life will carry the seeds of it back over the land and keep the lines of regeneration alive on the greater landscape. What a unique opportunity roads can provide. It's another one of those oxymorons, where something so destructive to the environment as a highway finds a rare ability to contribute to the good of the environment!

I will close with a paraphrased statement in the EIS page A7-29 which wasn't written like a recommendation, but which I give an affirmative YES to..... Discontinuing the use of chemicals ..... (applies to Roadside Zone 3) generally results in an invasion of deciduous trees, shrubs and forbes. ....But, if a heavy canopy cover of coniferous species ..... dominates the roadside vegetation, most of the invading weed species will not be competitive and will occupy the site for only a very short time.

27.3 If my new Cultural Management Alternative is seriously adopted, water quality won't be a big issue to solve, only law suits about trees, which is just "peanuts" in comparison.

Thank you.

Sincerely,

Jean Stam

Jean Stam

cc: Bob Berger

3

Comment 28

28.1 Comment noted.

RECE ... MAR 1 1 1993

March 9, 1993

Compliance Service International
Attn: Mr. Marrell Livesay
950 Pacific Avenue
Suite 700
Tacoma, WA 98402

Dear Mr. Berger:

RE: COMMENTS ON DRAFT ROADSIDE VEGETATION MANAGEMENT EIS WASHINGTON STATE DEPARTMENT OF TRANSPORTATION, FEBRUARY 1993

We support Alternative E, "Long Term Comprehensive Integrated Approach." We think emphasis should be placed on mechanical/cultural control methods and that under all circumstances, except where public safety is concerned, permanent, perennial, and where possible, native vegetation should be maintained on all rights-of-way.

28.1 We recognize the need to have different application of control practices in different areas of the state but decentralized management to us appears to be an excuse to ignore statewide policy. We are particularly concerned about the abuse and trespass occurring on state rights-of-way in Eastern Washington. Many state rights-of-way are being farmed illegally, cultivated, used as access roads or otherwise destroyed. These activities contribute to air pollution, wind erosion, poor visibility during windstorms, and destruction of possible wildlife habitat. **CONTROLLING NOXIOUS WEEDS SHOULD NOT BE USED BY LANDOWNERS OR DOT AS AN EXCUSE TO MAINTAINING ROADSIDE RIGHTS-OF-WAYS AS BARE SOIL.**

We feel that stronger statewide policy direction needs to be given to all DOT entities responsible for roadside management. The "Be a Good Neighbor" policy if that's what it is at the bottom of page 1-8 ignores the public good and safety. In eastern Washington, there are adjacent landowners who think that bare soil or the ability to farm the right-of-way for their own benefit, is the best use of the right-of-way. And, they are doing it! This should not be allowed. The policy should be to first protect the public good and safety, and then protect the environment. The individual interests of adjacent landowners should not, under most circumstances, be a significant issue. These are public lands.

The issue of illegal use of roadside rights-of-way is not addressed in the draft EIS and it should be.

Comment 28 continued

28.2 In Section 3.2 clover is listed as undesirable species if not "controlled adequately". In Section 4.2 the point is made that clover can be desirable in situation where the soil is nitrogen-poor.

28.2 The list referenced is not meant to be a complete listing.

28.4 Thank you, your comments are noted.

On page A2-15 the you say that, "Wind erosion is one of the most serious soil management problems in the Columbia Basin..." and, "A good ground cover of vegetation is one of the most effective methods of reducing the impacts of these erosion events." We couldn't agree more and wonder why then, does DOT continue to allow adjacent landowners to trespass farm, cultivate or otherwise destroy roadside vegetation in the Columbia Basin. We can think of numerous examples where this is occurring and have seen dust storms--the severity of which could be reduced by roadside vegetation--that have cased traffic accidents and even death because of reduced visibility along the highways.

The discussion of air quality on page A3-1 begs the same question. If you know that the lack of roadside vegetation is contributing to air pollution, why does DOT continue to allow adjacent landowners to illegally destroy roadside vegetation? In some cases landowners are actually raising crops on this public property. Can we assume that these landowners are compensating the state/public for this use? Isn't this illegal?

On page A7-19, section 3.2, you list 'seeds' as undesirable vegetation. We've never heard of this particular plant. Suggest you proof your document.

On page A7-20, section 4.1, we recommend that Sherman Big Bluegrass be included as an alternative to Crested Wheatgrass, and that Crested Wheatgrass only be included in grass seed mixtures at no more than 10% of the mix or not at all. It provides almost no wildlife benefits. If the only alternative to bare soil were crested wheatgrass, it would be OK, otherwise we would rather not see it used in the Columbia Basin. There are alternatives. Under all cases, a mix should be planted as opposed to a single species planting.

28.2 On page A7-19, section 3.2 you list clover as undesirable vegetation. On page A7-20 you list clover as a desirable species to be planted in the steppe zone. This is confusing.

28.3 Page A8-6, section 2.4: Given their economic and cultural significance we feel you are delinquent in not mentioning waterfowl, and upland game birds including pheasant as major species. They are considered principal species by the Washington Department of Wildlife and that agency spends a lot of their time managing those species.

28.4 We like most people who travel the highways of Washington are very proud of most of the highways and the crews that maintain them. But there are some areas where DOT needs to do a better job. In the agricultural region of eastern Washington, DOT has ignored many instances of highway right-of-way abuse, much of it from adjacent landowners. This abuse results in more wind erosion, more air pollution, less wildlife, and more safety problems along our state highways.

Thank you for the opportunity to comment.

Sincerely,

Gregory Parker

Gregory Parker
President
Sun Basin Chapter
Pheasants Forever, Inc.
Box 82
Ephrata, WA 98823

cc: Mr. Robert Berger, WDOT
Operations and Maintenance
Transportation Building, Room Ic8, KF-01
Olympia, WA 98504

Comment 29

REC... ... 10 1993

Ephrata Sportsmen's Association

P.O. BOX 342
EPHRATA, WASHINGTON 98823

March 8, 1993

The Ephrata Sportsmen's Association wishes to thank the Department of Transportation for offering ~~the~~ us the opportunity to comment on the Draft Environmental Impact Statement on "Roadside Vegetation Management". We are also hopeful that the Final Draft of the E.I.S. will be an implemental plan.

Having spent considerable time reviewing the Draft E.I.S. we are quite prepared to comment on the Right-of-ways in Central Washington in the Upper Sonoran and the Arid Transition Zones where the precipitation ranges from 7 to 10 inches a year.

Of the six Alternatives offered, Alternative "E" provides the best solution to the ROW problem, in our estimation. In these more arid areas of the state there are only a limited number of plant species that could be utilized. Grasses provide the widest range of possibilities especially where herbicides must be used to reduce the initial competition with weeds. The grass species would be limited to zones 2 and 3. With seed bed preparation and fertilization followed by the use of herbicides to control noxious weeds, the grasses should show very substantial stability by the third year.

By planting the right-of-ways to desirable grass species and nurturing them for a period of time these grasses should:

1. Control weed growth.
2. Provide wildlife habitat.
3. Reduce wind and water erosion.
4. Beautify the roadsides.
5. Reduce roadside maintenance.

The planting of grasses along the highway rights-of-way in Central Washington has often been confined to the seeding of Crested Wheatgrass (Agropyron sp.). Crested wheatgrass readily grows in these dryer habitats but is sparse growing and provides very little for wildlife and even allows the growth of weeds between the clumps of grass.

There are a number of grass species adapted to this semi-arid

Comment 29 continued

29.1 Thank you, your comments are noted. Groups such as yours need to provide input to WSDOT as Roadside Management Plans are developed in your WSDOT maintenance area.

climate that would provide, weed control, wildlife habitat, erosion control, beautify the roadsides, and greatly reduce roadside maintenance. Several new species of grasses have shown great promise within the last few years. Agencies that could help in the selection of grass species would include the U.S. Conservation Service, State Department of Wildlife, County Weed Boards and area Sportsmen's organizations.

The reduced wildlife habitat in the Columbia Basin has resulted from intensive farmering practices amoung other things. A number of other states have shown that roadside habitats have provided important additions to wildlife of a wide variety of species. By the use of a cooperative effort by D.O.T., Soil Conservation Service, Weed Districts, State Wildlife Department and Sportsmen's organizations vast improvements can be realized. Very little expence would fall to D.O.T. but they must be the lead agency in contacting and obtaining assistance from the farmers adjacent to the roadsides to be improved. Many of the farmers would aid the cause by refraining from destroying planted rights-of-way. Farmers tend to burn the rights-of-way, operate farm machinery over them and otherwise destroy the plantings. Education is the key to this. Some farmers tend to burn the right-of-ways saying that they are controlling weeds. Actually, they are fostering weed growth..For the farmers benefit, as well as the publics, a good grass environment would be far more beneficial. Again, farmers who make a travel lane along the roadways with their farm machinery going from one field to another compact the soil, reduce plant productivity, foster soil erosion and reduce air quality.

29.1 The Ephrata Sportsmen's Association would be very willing to be a paricipant in any attempt to improve the right-of-ways in the Columbia Basin of Central Washington and look foreward to being a partner in this operation. Thank you.

EPHRATA SPORTSMEN'S ASSOCIATION
Donald E. Galbreath
Donald E. Galbreath, President
P.O. Box 334,
Ephrata, Wa. 98823

Comment 30

30.1 Comment noted.

30.2 Scotch broom is not considered a noxious weed.

Area Code (206)
[illegible]
Fax [illegible]

THE SUQUAMISH TRIBE
P.O. Box 498 Suquamish, Washington 98392

May 13, 1993

John R. Conrad
Chief Maintenance Engineer
Washington State Department of Transportation
Operations Division
1C4 Transportation Building, KF-01
Olympia, WA 98504

Re: Roadside Vegetation Management Draft Environmental Impact Statement

Dear Mr. Conrad,

We appreciate the extension of the comment period for this proposal and the provision of a draft, which was received by the Suquamish Tribe on April 9th, 1992. The Suquamish Tribe agrees with the Washington State Department of Transportation (WSDOT) and the legislature, that a review of this proposal is in the best interest of the public and the environment. Coordinating management activities is critical for protecting the natural resources. Many parties have a common interest in natural resources.

We have the following comments and questions about this proposal.

30.1 1) The objectives of vegetation management by the WSDOT described in the third paragraph on the first page of the summary (page i), and on the first page of the first chapter (page 1-1), include functional as well as subjective criteria. On the first page of the summary, four reasons are listed near the bottom of the page. The first reason, to provide a safe environment and preserve the structural integrity of the road, is a clearly supportable objective. The second reason appears to be redundant to the latter part of the first reason. The third reason however, many people would argue with.

Visual appeal to motorists, or others using state transportation routes is subjective. This is illustrated by the text provided in the scoping summary, in the fourth paragraph of section 1.3.1 on page 1-14, where conflicting comments are described. While we do not disagree with your conclusions that the concerns show a need to consider visual impact, we do not think such considerations should weight nearly as heavily as clearly supportable objectives in decisions made about vegetation management. Clearly supportable objectives include public safety and minimizing cost. Cost for us includes natural resource damage (such as adverse impacts to fisheries resources) as well as expenditure of funds.

30.2 2) Is scotch or scot's broom considered a noxious weed by the WSDOT?

Comment 30 continued

30.3 The "fire hazard factor" is very important in roadside management, especially in eastern Washington.

30.4 A weighted decision making process is out of the scope of this EIS. The EIS process address the determination of impacts of the stated alternatives. The objectives of the actions and their relative priority would be addressed in any policy changes implemented in light of these impact findings. Traditionally, visual impact doesn't outweigh protection of natural resources in WSDOT's decision making process.

30.5 The treatable roadside percentages were derived from a number of factors including: known amounts of roadside habitat types, estimated amount of potential stable vegetation in each of those habitat types, and the alternative being analyzed.

30.6 It is recommended that WSDOT conduct a cost estimate of the alternatives before choosing an one.

30.7 These conclusions are based on the amount of equipment needed for the various alternatives.

30.8 Thank you, your comments are noted.

30.3 3) Does fire hazard factor into decisions regarding roadside management more than some of the other roadside safety issues listed on page 1-67

4) How do safety considerations "measure up" to avoidance of adverse environmental impact?

30.4 5) We think that some objectives, such as avoidance of damage to natural resources, should be a higher priority than others, such as consideration of the visual impact. We request a decision making process, to weight priorities, be provided or described in the final environmental impact statement (EIS) for this proposal. This decision making process would then be used prior to selection or implementing of specific projects for the proposed alternatives.

30.5 6) How were the areas of treatable roadside acreage derived?

7) Why is the estimated treatable roadside acreage for alternative E, for the stabilized treatment period, so high?

30.6 8) How would the WSDOT estimate the relative costs of the alternatives?

30.7 9) Are data available to support the conclusion that impacts to air quality from the burning of fossil fuels would be greatest for alternatives C and E as specified on page v of the summary?

10) The obvious approach of protecting public safety, reducing cost and protecting the environment, by limiting the area affected, is not discussed. We think this should be evaluated, particularly in the cost analysis portion of new projects, in the decision making process.

11) Is enough know about biological treatments for assumptions about impacts to be made? See for example the last sentence of the first paragraph under section 0.5.5 on page vi.

12) Wildlife and Wildlife Habitat sections only address birds, mammals, and the Oregon Silverspot butterfly for the Puget Trough province. We would prefer a systems approach which focuses more on wildlife habitat structural components, rather than individual species, in the environmental analysis. Therefore we request analysis of structural components of wildlife habitat, particularly for the riparian zone, in the alternatives analysis.

13) We support the use of native species in roadside vegetation management.

30.8 We look forward to reviewing the responses to comments submitted on the draft EIS, and the final EIS.

Sincerely,

Phyllis Meyers

Phyllis Meyers
Fisheries Environmental Program Manager

Comment 31

31.1 WSDOT's position on herbicide use is clearly stated in the FEIS. See the definition of Alternative G in the EIS summary.

RECEIVED MAY 2 4 ...

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

Postmarked the 20th

May 19, 1993

Reply To
Attn Of: AT-083

Mr. Eric Hendricksen
Compliance Services International
950 Pacific Avenue
Suite 700
Tacoma, Washington 98402

Re: Comments on "Roadside Vegetation Management, Draft Environmental Impact Statement" (DEIS), Washington State Department of Transportation (WSDOT).

Dear Mr. Hendricksen:

I am writing to communicate comments from the Pesticide Section, U. S. Environmental Protection Agency (EPA), Region 10 on the subject DEIS.

I have four general comments.

The DEIS should clearly state WSDOT's position on the use of herbicides for road side vegetation management.

The DEIS should rank the alternatives or select a preferred alternative.

The DEIS should include a truly integrated vegetation management approach that integrates the ecology of the site, and the biology of pests and desirable plants to create roadside environments that require a minimum of routine maintenance.

The DEIS should consider the long-term cost, benefits and impacts of the alternatives.

State WSDOT's position on herbicide use:

31.1 The role of Region 10's Pesticide Section is to enforce federal pesticide laws, support and provide oversight to state pesticide regulatory programs, and interact with the public, and public agencies on issues related to pesticide use. In that role, we have been involved in pesticide use complaints and controversies across the State of Washington involving many of the herbicides used by the Washington Department of Transportation. Many of these herbicides are applied at such

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Comment 31 continued

31.2 Alternative G has been selected as the "preferred alternative" for the Final EIS.

small rates that the tiny spray droplets are prone to drift. It has been shown that many of these chemicals are phytotoxic at residue concentrations less than analytical detection limits. As human populations expand throughout the state, pesticide-related complaints are increasing.

While pesticides are valuable tools when used under the proper conditions, when they move off site, or when they are used unnecessarily, they are pollutants. Pollutants with the capability to cause significant environmental damage. The DEIS devotes almost no attention to the capacity of the herbicides that it uses to damage non-target vegetation. The problem of off site movement of herbicides and subsequent damage to nontarget plants is exacerbated in roadside vegetation management by the nature of the target site. Virtually all of the target sites border non-target sites, and the target sites cut right across virtually every plant community type in the state.

The best way to reduce the release of pesticides as pollutants to the environment is to make every effort to reduce our reliance on pesticides.

The DEIS gives the following objectives for a roadside vegetation project:

"To prevent soil erosion and other influences from damaging the roadway and to restore the roadway to a natural appearance.

"To maintain a safe driving environment.

"To mitigate the transportation facility's impact on the surrounding environment.

"To reduce the long-term maintenance required for a roadside section; for example, maintaining drainage away from the paved area to prevent pavement breakup."

I suggest one more objective; "To reduce the Department's reliance on herbicides for roadside vegetation management."

Rank the alternatives or select a preferred alternative:

31.2 The structure of the DEIS makes it difficult to understand WSDOT's position on the issues. It is difficult to direct comments because there is no way to know how WSDOT interprets the environmental impact information that is provided. The DEIS states that under alternative C, "No chemical approach," 49 percent or less of the treatable roadside acreage would be managed annually, while under current treatment methods, 72 percent is treated. This could be interpreted to mean that WSDOT thinks there is no means other than herbicides to treat 23 percent of the roadside acreage they manage. It appears that the draft EIS overall is resigned to the fact that herbicides must be

Comment 31 continued

31.3 Alternative G, Long-Term Planning Integrated Vegetation Management, incorporates IPM as its decision-making process.

31.4 A detailed cost analysis was not performed as part of this EIS. It is recommended that WSDOT do this in the near future.

3

a primary tool for roadside vegetation management. But that may be a totally erroneous conclusion. The reader cannot direct comments without knowing how the Department interprets the information presented.

Include an integrated vegetation management alternative:

31.3 While Alternative E refers to the subject of integrated management, it falls short of integrating the sciences and arts of plant culture and health care to create roadside habitats that favor desirable species and exclude pests. Integrated pest management (IPM) techniques can be applied to roadside habitats with good result. States, counties, and cities across the nation are using IPM techniques or are committed to moving toward their use (eg: State of California; Thurston County, Washington; City of Eugene, Oregon). The Thurston County Roads Department has stated that it has not used any herbicides in two years.

The DEIS, by describing a more centralized decision-making program under alternative E, recognizes that management philosophy is important in achieving the goals of a plan. I urge the Department to clearly state its philosophy in the EIS for both the public and its employees. A strong statement of philosophy to implement IPM and use herbicides only as a last resort, accompanied by on-going training should allow the Department to implement a strong IPM program through its district managers.

We would be happy to work with the Department to obtain technical expertise to develop an IPM plan, and train personnel.

31.4 Discuss long term costs, benefits and impacts:

There was no discussion of the costs of the various alternatives, and little discussion of their long-term benefits and impacts. Many of the treatment alternatives will be very costly over the long term because their benefits are so short lived they must be repeated often. An IPM approach may prove to be costly at first but over the long term would probably be less costly.

My thanks to WDOT for soliciting public comment on their vegetation management program. If you would like to discuss these comments please call me at (206) 553-8574.

Sincerely,

Richard B. Parkin

Richard B. Parkin, Chief
Pesticides Section

Comment 32

32.1 See section 4.2.3

Robert Turner
Acting Director

RECEIVED MAR 11 1993

STATE OF WASHINGTON
DEPARTMENT OF FISHERIES
115 General Administration Building, M.S. AX-11 • Olympia, Washington 98504 • (206) 753-6600 • ISCAN 234-6600

March 9, 1993

Compliance Services International
ATTENTION: Marrell Livesay
950 Pacific Avenue, Suite 700
Tacoma, Washington 98402

SUBJECT: Washington Department of Transportation (WDOT)
Draft Environmental Impact Statement (DEIS) for
Roadside Vegetation Management Dated February 1993,
WDF SEPA Log No. 21241

Dear Mr. Livesay:

Washington Department of Fisheries (WDF) reviewed the WDOT DEIS on Roadside Vegetation Management. We recommend the final plan include the following.

32.1 WDF supports the goals of integrated plant management (IPM). To implement IPM, a long-term management plan that addresses environmental concerns (such as erosion, fish and wildlife and their habitat, including both riparian and wetland habitats, and water quality) is needed. Least damaging alternatives and management practices should be used, and environmentally sensitive technologies and methodologies should be explored and adopted as they become available.

Utilize local, self-sustaining, and drought-resistant native plant species. Native plants are more disease-resistant than non-natives and have greater habitat value for fish and wildlife. Nitrogen-fixing native plants provide the proper soil nutrient balance by acting as natural fertilizers. Native plants can best out-compete non-native plants under most conditions. Use of native plant species will result in both reduced maintenance needs and costs.

Maintain a mixture of trees, shrubs, and grasses within the roadside vegetation management zones, which provide erosion control and habitat values. This is especially necessary where roads and highways border or cross wetlands and streams and roadside vegetation management decisions have a greater potential to adversely impact fish habitat and fish life.

Comment 32 continued

32.2 Comment noted.

32.3 The Highway Runoff Manual should be used for these issues.

32.4 Comments and corrections to the Appendices are noted.

Marrell Livesay
Page 2
March 9, 1993

Pre-planting site preparation is important. Use of proper soil preparation and mulches to ensure water retention in the soil is important. Use efficient irrigation systems and practices, particularly those which incorporate the use of reclaimed water, where irrigation is absolutely necessary.

32.2 Eliminate the need for and use of chemical treatments and minimize the frequency of herbicide applications. Herbicide use should be restricted to low-impact varieties that target noxious, non-native plant species. Use in riparian corridors should be eliminated, but at the minimum, greatly restricted. A five-foot buffer from a stream or wetland for herbicide application, as recommended in the DEIS, is not adequate to control drift or entry into riparian corridors. Planting native species to out-compete undesired noxious plants, and hand removal of noxious plants within the riparian buffer of a stream or wetland is preferred for the protection of fish life. Avoid the use of broadcast spraying of any chemical or herbicide.

32.3 Adequate detention and treatment of stormwater run-off from road surfaces is necessary to reduce pollutant entry to streams and wetlands. Grasses and other roadside vegetation act as sediment and pollutant filters and must be an integral part of any road stormwater treatment plan. Grass-mowing practices which leave longer blade height are recommended for improved filtration of surface run-off and greater water retention in the soil. Dense, healthy vegetation should be left in drainage swales to facilitate filtration of pollutants.

Communication to WDOT maintenance crews is important. It is not uncommon to find the vegetation WDOT planted as mitigation for stream channel impacts from a road project "weed-whacked" by WDOT's maintenance crews.

WDOT should develop a Protection of Riparian/Stream Corridors Action Plan similar to the one developed in August 1990 for wetlands. Similar action items for riparian/stream protection as proposed for wetlands on Pages A6-6 and A6-7, Appendix A, Chapter 6, should be included in the action plan.

32.4 The discussion of threatened and endangered species under Section 3.0 Aquatic Wildlife and Wildlife Habitat, Subsection 3.5, Page A8-8, Appendix A, Chapter 8 should be expanded to include species listed under the Federal Endangered Species Act. Snake River sockeye salmon have been listed as endangered and Snake River fall chinook and spring/summer chinook salmon have been listed as threatened. These salmon stocks utilize Washington waters in some part of their life cycle. WDOT roadside vegetation management can have both a direct and an indirect impact on the survival of these fish. Table 8-4

Comment 32 continued

referenced in the last paragraph under this subsection as listing sensitive species in Washington actually lists the distribution of life zones and vegetation zones by physiographic province in Washington.

32.4 Several omissions in Table 8-8, "Fish Species by Phytogeographic Province," Page AB-35, Appendix A, Chapter 8, are noted as follows:

1. Chinook salmon, specifically spring and fall chinook, are also present in Phytogeographic Province 8 (Grand Ronde River).

2. Green sturgeon are also present in Phytogeographic Province 2.

3. White sturgeon are also present in Phytogeographic Provinces 2, 4, 6, 7, and 8.

Finally, before any "brushing," tree falling, or other work in or around streams and fish-bearing wetlands, WDF Habitat Management Division should be contacted to inquire about possible need for Hydraulic Project Approval prior to activities.

Thank you for the opportunity to comment on this Draft Environmental Impact Statement. If you have any questions regarding these comments, please call me at (206) 902-2564.

Sincerely,

Gayle Kreitman

Gayle Kreitman
Regional Supervisor, Freshwater Permits
Habitat Management Division

GK:lt

cc: Don Haring, WDF, Olympia
Millard Deusen, WDF, Olympia
Carl Samuelson, WDF, Olympia

Comment 33

33.1 The buffer recommendations in the DEIS have been changed for the FEIS. We have simplified the issue by only recommending that label requirements for buffers be met. This policy is already in effect at WSDOT.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. BOX 47600 • Olympia, Washington 98504-7600 • (206) 459-6000

March 10, 1993

Mr. John F. Conrad
Department of Transportation
1C4 Transportation Building, KF-01
Olympia, WA 98504

Dear Mr. Conrad:

Thank you for the opportunity to comment on the draft environmental impact statement (DEIS) for the Roadside Vegetation Management Program. We reviewed the DEIS and have the following comments.

We support the Department of Transportation's efforts to develop a roadside vegetation management plan that balances public concern over environmental and human health with the need to control vegetation along our state highways. The Water Quality Program has the following comments that we would like to see addressed in the final document:

- The revised Water Quality Standards for Surface Waters of the State of Washington (Chapter 173-201A WAC) became effective on December 25, 1992. Changes should be made in appropriate references throughout the document.

- In keeping with the requirements of the State Environmental Policy Act, please list the licenses that are known or likely to be required by the proposed activity. This includes the requirement for obtaining a short-term modification of the Surface Water Quality Standards (WAC 173-201A-110) for any treatment projects that may or will result in the direct application of pesticides to surface waters.

- We would recommend that you consider employing larger buffer distances. Particularly when motor assisted sprayers are used, the proposed five foot no spray zone next to surface waters will likely prove insufficient in preventing pesticide spray from entering these waters. Varying nozzle types and settings or using adjuvants can help, but cannot be solely relied upon to effectively control drift and overspray. We recommend the development of a buffer distance matrix that would base buffer distance on variables such as the type of equipment used; geographic, hydrologic and meteorological considerations; label use restrictions; and the toxicity, persistence, and leachability of the full formulation used.

33.1

Comment 33 continued

33.2 Comment noted.

33.3 While this is beyond the scope of this EIS, it should be considered by WSDOT at some point.

- Ecology Water Quality Program (WQP) staff have spent considerable effort in preparing a supplemental environmental impact statement (EIS) for the state Aquatic Plant Management Program, which was adopted January, 1992. Based on the risk assessments conducted as part of this effort, Ecology presently issues short-term water quality standards modifications for the following herbicides: glyphosate, fluridone, endothal and copper sulfate. WQP staff are currently working as co-lead with the state departments of Agriculture, Fisheries, Natural Resources, Wildlife and the state Noxious Weed Board on a Noxious Emergent Plant EIS. 2,4-D is being assessed in this EIS relative to potential use in noxious emergent plant control. The Aquatic Plant Management Supplemental EIS and the reports prepared by the consultant, Ebasco Services Inc., in support of the Noxious Emergent Plant EIS contain human health and environmental risk assessment information for several herbicides that does not appear to have been considered or incorporated in Transportation's draft EIS. We recommend these documents be reviewed and incorporated where appropriate in the final EIS to maximize consistency in the state's aquatic plant management programs.

33.2

- Some discrepancies appear to exist between the risk assessments presented in Transportation's draft EIS and those prepared for the Aquatic Plant Management Supplemental EIS and Ebasco's reports for the Noxious Emergent Plant EIS. Of particular concern are discrepancies in assessments relating to herbicides that currently are not permitted for aquatic use by Ecology. These discrepancies may cause confusion on the part of herbicide applicators and the general public if not clearly identified and explained in Transportation's final EIS. We would be happy to work with you to more clearly identify and address these discrepancies.

33.3

- There appears to be little or no discussion regarding the registration status of the various chemical control methods considered. For example, the U.S. Environmental Protection Agency (EPA) is requiring substantial additional research for several chemicals as part of the re-registration process, particularly regarding the potential carcinogenic risk associated with 2,4-D. Also, Triclopyr is presently not registered for aquatic use, although the product manufacturer has submitted an application for an aquatic label which is being incorporated into the re-registration review of this product. We encourage you to discuss more fully the registration status of the chemicals under consideration, particularly EPA's re-registration requirements and concerns.

- Ecology's Water Quality Program remains committed to working with Transportation in developing conditions for a general water quality modification that could be issued annually to the appropriate Transportation district offices. However, we would also encourage you to identify in the final EIS potential mitigation measures that would minimize or prevent the introduction of pesticides to surface waters and thereby remove the need for a short-term water quality standards modification.

Comment 33 continued

33.4 This has been added for the FEIS.

33.5 See section 0.6.0 for mention of the Highway Run-Off Manual.

Mr. John F. Conrad
Page 3
March 10, 1993

- Nutrient management requirements need to be discussed as nutrients are a common contaminant of water both from overuse and misuse.
- Sole source aquifers and well head protection areas are mentioned at the end of Section 1.2 in Appendix A, but Ground Water Management Areas and Critical Aquifer Recharge Areas were not.
- Pesticides listed as Restricted Use for the protection of ground water by the Department of Agriculture (WAC 16-228-164) or EPA deserve additional ground water protection measures because they are leachers. Restricted Use Pesticides on the Transportation potential use list include: Bromacil, Diuron, Picloram and 2,4-D (in counties located east of the Cascade crest). The final EIS should discuss the additional precautions that will be used to track their movement.
- Geologic and soil controls of pesticide and nutrient loss to surface and ground water need to be determined on a site specific basis. The geologic and soils data included is not detailed enough to do this. Sources of detailed maps and methods to determine appropriate pesticide and nutrient applications need to be referenced.

33.4
- Summary 0.6.2 - Please add: Consider vegetation needs and timing to calculate agronomic rates for fertilizer application to avoid contamination of water from over application of nutrients.
- Chapter 3 - Section 2.3.3 - Mitigation measures should include determination of agronomic rates and timing for fertilizer applications.
- The expected changes in Chapter 173-201 WAC mentioned in Appendix A, Chapter 4, Section 1.1, were not made. This section should be deleted.
- The fate and transport data for Triclopyr (page B1-22) does not describe the range of half-lives and soil leaching rates reported in the literature. This would indicate that other fate and transport data in this section is also too limited to accurately design ground water protection measures.

33.5
- Within the Puget Sound basin, the Department of Ecology has to approve any vegetation management plan as specified Chapter 173-270 WAC, Puget Sound Highway Runoff Program. The EIS should specifically address compliance with this rule.
- Staff recently observed a mechanical mulching operation along I-405 where wind-downed vegetation was chipped and blown onto the slopes along the road. This mulching tends to retard weed growth and stabilize soils. Additional consideration should be given to mulching, rather than chemical treatment. The amount of leachate from mulching may be related to density of application, slope, precipitation, etc.

Comment 33 continued

Mr. John F. Conrad
Page 4
March 10, 1993

- Some roadside vegetative species absorb fossil fuel pollution and tend to bind it in place in the short term. We would encourage you to leave as much vegetation as possible along easements where this would not present a hazard.
- Use of native vegetation may tend to minimize the need for fertilizer, since it is preadapted to the environment.

If you have any questions, please call Mr. Dave Peeler with the Water Quality Program at (206) 438-7060.

Sincerely,

Barbara J. Ritchie
Environmental Review Section 7707

BJR:
9301019

cc: Dave Peeler

Comment 34

34.1 Comments noted.

34.2 Thank you for pointing out these corrections. Unfortunately the appendices will not be reissued with the FEIS, so your comments will serve as the corrections.

STATE OF WASHINGTON
DEPARTMENT OF AGRICULTURE
P.O. Box 42560 • Olympia, Washington 98504-2560 • (206) 902-1800

MEMORANDUM

Date: May 10, 1993

To: Robert L. Berger, Washington State Department of Transporation

From: William E. Brookreson, Acting Assistant Director
Pesticide Management Division

Re: Comments on the Draft Roadside Vegetation Management--Environmental Impact Statement

Thank you for the opportunity to review the Draft Roadside Vegetation Management Environmental Impact Statement (EIS). Over the past four years, as the Assistant Director for the Plant Services Division and the Pesticide Management Division of the Department of Agriculture, I have had a number of opportunities to observe first hand the roadside vegetation management practices of the Department of Transportation. I have been very favorably impressed by the WSDOT commitment to environmentally sound practices, especially in the management of noxious weeds.

34.1 I have a few direct comments on the EIS which I found to be comprehensive and well prepared. I appreciate the fact that the EIS was prepared even though the agency is not required to do so under SEPA. In reviewing the alternatives, clearly Alternative A - "No Action Approach," is unacceptable because of the environmental consequences, especially in the unchecked movement of noxious weeds. Alternatives B, C and D are also significantly deficient in our view. Our preference is Alternative E - "Long-Term Comprehensive Integrated Approach." The approach to developing a long-term vegetation management strategy based upon the prevention of problems with the establishment of stable, desirable vegetation requiring minimal maintenance appears to be the most environmentally and economically sound long-term approach, even realizing that this can be achieved on only 38.5 percent or less of the total roadside area. We see this also as providing a more consistent long-term approach than the current decentralized approach.

There are some specific comments. There appears to be some directly conflicting supportive information referenced in Appendix B. Specifically, in reference to

34.2 sulfometuron methyl movement in soil, page B4-63 section 2.3.24 states in part: "It is a relatively mobile compound and would tend to leach and migrate through the soil." Page B1-21 section 2.24.2 states in part: "Sulfometuron methyl is considered among those chemicals that are unlikely to move through the soil column." These two, apparently directly contradictory, statements need to be revisited and corrected.

The other technical observation is in Appendix A, page A7-61 on table 7-8, a state listed class B noxious weed, Chrysanthemum laucanthemum (oxeye daisy), is listed a wildflower seed for roadside planting. Such planting would also violate the noxious plant and seed quarantine.

Comment 35

35.1 Comment noted.

35.2 Comment noted.

35.3 The FEIS recommends only that label buffer restrictions be followed. WSDOT can add additional buufer distances if it deems it necessary.

35.4 Comment noted.

WASHINGTON STATE DEPARTMENT OF
Natural Resources

April 19, 1993

John F. Conrad
Chief Maintenance Engineer
Washington State Department of Transportation
Operations Division
1C4 Transportation Building
Olympia, WA 98504

Dear John:

RE: Department of Transportation DEIS - Roadside Vegetation Management Plan Comments

Thank you for the opportunity to review the Roadside Vegetation Management Draft Environmental Impact Statement.

The Natural Heritage Program has the following comments:

35.1 Summary, Page vi 0.5.5 Wetlands - Equipment is a prime vector for the spread of exotic plant species. Mechanical treatments increase sediment and erosion into wetlands. This results in sedimentation and introduction of exotics into wetlands. This is regardless of slope. Where machines are used in wetlands, they compact the soil, disturb soil and vegetation, and cause sedimentation. • Seeding with exotic species along roadways widely distributes exotics and increases the potential for spread of exotics into wetlands. • Herbicides and fertilizers have direct and indirect impacts to wetlands.

35.2 Summary, Page vii 0.5.6 Vegetation - Mowing effects are expected to differ from wet to moist to dry sites. Mowing may be effective in many areas. • While it may be true that no adverse impacts are expected from cultural or biological control, it may be overstated to say that there will be none.

35.3 Summary, Page xii 0.6.2 Chemical Treatment Methods - Ground based herbicides and fertilizers should not be applied closer than 75 feet from water, water courses, or wetlands.

35.4 Summary, Page xiii 0.6.3 Cultural Treatment Methods - Seed and plant only native species except in urban settings. • Fertilizers should be used only when needed. Fertilizer application should be kept back 75-100 feet from water, water channels, or wetlands.

Equal Opportunity/Affirmative Action Employer

Comment 35 continued

35.5 Comment noted.

35.6 Comment noted.

35.7 Comment noted.

35.8 Comment noted.

35.9 This is for WSDOT to decide.

2

35.5 Chap. 3, Page 3-6 3.2.1.3 Mitigation Measures - Hydromulching should use native plant species. Otherwise, the roadway can become a tremendous source of exotics to spread into native ecosystems. • Straw or hay bales used for erosion control often harbor seeds which can introduce exotic plant species into areas in which the bales are placed. • Native plants and seeds should be used along roadways - this decreases the potential spread of exotics and should increase survivability while decreasing the need for fertilizers.

35.6 Chap. 3, Page 3-20 3.2.5.1 Environmental Consequences of Alternatives - Impacts of roadside vegetation management on wetlands, also includes the introduction of exotic plant species and damage to native wetland communities (vegetation and animal species.) • Direct mechanical treatment on wetlands has significant impact to soil hydrology and vegetation.

3.2.5.1.1 Alternative A - No Action - No action could increase the spread of exotic species into wetlands, by allowing exotics to produce seed.

35.7 Chap. 3, Page 3-21 3.2.5.1.3 Alternative C - No Chemical Approach - Vegetation management in wetlands has direct effects on the wetlands. We recommend that DOT does not cut trees, mow vegetation, or use vehicles in or next to wetlands. • Care should be taken to assure that mulches don't include exotic species propagules that could spread into wetlands.

35.8 Chap. 3, Page 3-23 3.2.5.3 Mitigation Measures - Vehicles should be kept out of wetlands, and water courses and as far back as possible - regardless of slope. • Herbicides and fertilizers should not be used within 75-100 feet of wetlands, water courses or water. • Control of noxious weeds in wetlands and aquatic systems is exempt from these comments.

35.9 Chap. 3, Page 3-25 3.2.6.1 Environmental Consequences of Alternatives - The following comments regard the first complete paragraph on this page: the last sentence should include endangered, threatened, and sensitive plant species as well as native plant communities; this paragraph isn't clear whether the Natural Heritage Program is always consulted or whether the WSDOT resident program manager evaluates specific sites regarding plant species/communities of concern.

Comment 35 continued

35.10 Comment noted.

35.11 Your comments to the appendices are noted. The appendices will not be altered or reissued for the FEIS.

3

35.10

Chap. 3, Page 3-59 3.3.6 Vegetation - Columbia Basin and Blue Mountain Provinces - The statement under "mitigation" that the loss of native vegetation along roadsides would have no effect on species viability or community composition in adjacent habitats may not be correct. Due to the degree of fragmentation in the Columbia Basin, loss of native vegetation could have a significant effect in some instances.

35.11

Appendix A, Chap.6

Page A6-2 1.1.1 Water Quality Protection - Wetlands can be degraded by too high nutrient or pollutant levels. Species composition can be changed and the health and function of systems degraded.

Page A6-3 1.1.5 Wildlife and Fisheries Habitat - Wetlands provide habitat for many plant and native wetland community species. They provide habitat for state listed endangered, threatened, and sensitive species as well.

Page A6-8 3.0 Regulation of Wetlands - Five years is not sufficient time to assess the success or failure of wetland mitigation or restoration projects.

Page A6-9 4.1 Chemical Techniques - Herbicide application - direct or indirect - can affect native wetland vegetation as well as other wetland functions.

Page A6-10 4.2 Cultural Techniques - If cultural techniques only use native plant species and avoid straw bales and fertilizers, it may have minimal effects on native wetlands. • Care must be taken to maintain surrounding vegetation along water courses and wetlands. This vegetation can significantly affect light and temperature in wetlands.

Appendix A, Chap.7

Page A7-6 2.3 Puget Trough Province - Vegetation Zones and Major Species - Puget Sound Area - There are no sagebrush/bunchgrass communities in Western Washington.

Page A7-7 - Puget Trough Province - Southern Puget Sound Area - Ponderosa pine has not been important in Western Washington for 4000 years.

Comment 35 continued

35.12 IPM is incorporated into the decision making process in Alternative G, the Long-Term Planning Integrated Approach. See the definition of Alternative G in the EIS Summary.

35.13 Comment noted.

4

35.11

Page A7-27 — 6.0 Environmental Consequences of Treatment Methods - The last sentence of the first full paragraph should read: " The Washington Department of Natural Resources, Natural Heritge Program should be consulted on all projects involving potential disturbance of endangered, threatened, or sensitive plants or high quality native plant communities."

Page A7-39 — Table 7-2 State listing of Endangered Vascular Plants of Washington - Using "Not Listed" under the Federal Status column might be taken to mean that the "candidates" are "listed." Some other term or symbol would be preferable. • The common name for Delphinium leucophaem is pale larkspur. • The Natural Heritage Program periodically updates the endangered, threatened, and sensitive plant list so WSDOT should cite whichever edition of our list they used to generate this table. • A Washington State plant, Sidalcea nelsoniana, has been added to the state list as endangered and has been federally listed. Sidalcea nelsoniana (Nelson's checker-mallow) has recently been discovered in Cowlitz County.

Page A7-55 — Table 7-8 Ornamental Plant List - Remarks need to include species potential to escape and naturalize beyond the roadside.

35.12

A) The Forest Practices Program has the following comments:

Summary — Some statements about impacts could be more accurately stated, including the statement that impacts are few therefore no mitigation is needed on page xiii, 0.6.4 Biological Treatment Methods.

Summary — The basis for treatment percentages should be shown.

Summary — In an Integrated Pest Managment approach some or all of the alternatives could be used. IPM is an obvious methodology that was not included in the alternatives and should be.

35.13

B) Additional Forest Practices Program comments:

General Comments — Spraying activities adjacent to forest lands should meet Forest Practices standards to protect surface water, wetlands areas, sensitive ground water concerns, etc. No application is required. See Forest Practices WAC 222-16 and WAC 222-38.

Comment 35 continued

5

Please contact the following individuals if you have questions regarding these statements:

Comments

Natural Heritage	Sandy Norwood, Natural Heritage	902-1667
Summary, Page vi	"	"
Summary, Page vii	"	"
Summary, Page xii	"	"
Summary, Page xiii	"	"
Chapter 3, Page 3-6	"	"
Chapter 3, Page 3-20	"	"
Chapter 3, Page 3-21	"	"
Chapter 3, Page 3-23	"	"
Chapter 3, Page 3-25	"	"
Chapter 3, Page 3-59	"	"
Appendix A, Chapter 6 Page A6-2	"	"
Page A6-3	"	"
Page A6-8	"	"
Page A6-9	"	"
Page A6-10	"	"
Appendix A, Chapter 7, Page A7-6	"	"
Page A7-7	"	"
Page A7-27	"	"
Page A7-39	"	"
Page A7-55	"	"
Forest Practices (A)	Dan Bigger, Forest Practices Division	902-1408
Forest Practices (B)	Ronn Schuttie, Central Region	753-3411

For general questions you may call me at 902-1600.

Sincerely,

David F. Dietzman

David F. Dietzman, Manager
SEPA Center

RFD:ja

Comment 36

36.1 Comment noted.

36.2 This is similiar to the IPM approach adopted under Alternative G.

EIS

THURSTON COUNTY

RECEIVED APR 22 1993

COUNTY COMMISSIONERS
Judy Wilson
District One
Diane Oberquell
District Two
Dick Nichols
District Three

PUBLIC HEALTH AND SOCIAL SERVICES DEPARTMENT

Patrick M. Libbey, Director
Diane T. Yu, MD, MSPH
Health Officer

April 12, 1993

Robert L. Beryer, L.A.
Department of Transportation
c/o Compliance Services International
950 Pacific Avenue, Suite 700
Tacoma, WA 98402

Dear Mr. Beryer:

Thank you for the opportunity to comment on the roadside vegetation management draft EIS. The task of writing an EIS for such a wide variety of substances and environments must be a difficult challenge at best. As the local health department, we review pesticide products proposed for use by Thurston County agencies. We have certainly been frustrated by the complexities and uncertainties present in any pesticide review. Based on the past eight years' experiences in our own limited reviews, we offer the following comments on the chemical review and risk assessment portion of the EIS.

36.1 While much of the EIS seems well-written, objective, and provides relevant information, other portions appear to be more subjective and confusing. Our concerns include: (1) Conclusions were not always supported by data provided in the EIS. (2) The quantity, quality, and scope of data gathered seemed inadequate. (3) The evaluation of data was, at times, based on unclear assumptions and inappropriate comparisons. (4) There were a number of confusing or potentially misleading statements. And (5) Mitigation measures were inadequate to address the potential hazard. Attachment 1 explains the bases for these concerns.

36.2 An alternative approach not included in the EIS is to choose chemicals as the least preferred alternative, select only the least toxic products, and minimize their use. This approach is increasingly being adopted by governmental agencies. Further, it is identified in the Northern Thurston County Ground Water Management Plan recommendations for rights-of-way management agencies in Thurston County. We encourage DOT to include this approach as an alternative. Least toxic products would include those with no positive carcinogenic, reproductive, or developmental studies.

Environmental Health Division: 2000 Lakeridge Drive SW, Olympia, Washington 98502-6045 (206) 786-5455

Recycled Paper

Comment 36

36.3 Comment noted.

36.4 Comment noted.

36.3 Further, we ask that DOT abide by the same precautions the county uses in protecting adjacent surface waters, vulnerable ground waters, and wetlands. These precautions include no chemical use in these highly sensitive areas, unless unusual problems are encountered for which there are no other alternatives.

Another county department, Community and Environmental Programs, also reviewed the draft EIS from the perspective of Integrated Vegetation Management. Their detailed comments are on Attachment 2. In general, the comments include: encouraging DOT to work cooperatively with local governments; a more detailed definition of IVM is needed; there is a lack of data supporting the need for a vegetation free zone; the advantage of a grass community in Zone 1; support for the decentralized management alternative; and environmental consequences of mechanical methods.

36.4 On an entirely separate issue, the EIS states it is the policy of DOT to dispose of ditch cleanings, pavement sweepings, shoulder repair, or other materials from maintenance activities in upland sites. Thurston County solid waste regulations require a solid waste permit for disposal of non-inert wastes. Based on existing data, ditch cleanings and pavement sweepings contain heavy metals, polycyclic aromatic hydrocarbons, petroleum hydrocarbons, and phthalates in concentrations sufficient for these wastes not to be considered inert. If DOT believes the materials are inert, testing data should be submitted to the Health Department before any additional wastes are disposed of at any unpermitted site in Thurston County.

We applaud the intent of the EIS and hope the future revision will become what DOT surely intended it to be: a balanced presentation of the information available relevant to roadside vegetation management and comparison of management strategies.

Sincerely,

Gregg Grunenfelder

Gregg Grunenfelder, Director
Environmental Health Division

Attachment

cc: Board of Health
Linda Hoffman, Assistant Chief Administrative Officer

Comment 36

36.5 While some chemicals show the potential to leach at high application rates, it is unlikely that leaching will occur at WSDOT application rates. For example, WSDOT application rates for 2,4-D, Bromicil, Dicamba, Mecoprop, Metsulfuron, and Picloram are 13%, 17%, 14%, 97%, 22%, and 41% of the maximum application rates, respectively. While the listed WSDOT application rate for Mecoprop is 97% of maximum, only 158 lbs. of active ingredient were used in the entire state during that one year period. See the tables on pages B5-62 through B5-86.

ATTACHMENT 1: SPECIFIC COMMENTS RELATING TO THE CHEMICAL REVIEW AND RISK ASSESSMENT PORTION OF THE DRAFT EIS

(1) Conclusions made were not always supported by the data provided.

(a) The following statements in the EIS all imply mobility is a potential concern:

> p 3-68 "The use of herbicides which are known to leach or are potentially mobile should be restricted in order to avoid contamination of ground water used for drinking."
>
> p A4-3 "Every effort must be made to keep potential roadside contaminants from reaching underlying aquifers."
>
> In the specific chemical reviews, several products are identified as possible leachers: p. B1-2 The solubility of the amine salt formulation of 2,4-D "may present a potential for groundwater contamination for all regions." p. B1-4 "the possibility of groundwater contamination should be explored" (for bromacil). p. B1-7 "Dicamba is listed....as having a 'high' likelihood of migrating to groundwater." p B1-14 "... mecoprop is relatively mobile..." p. B1-15 "...metsulfuron does have the potential to move through the soil column." p. B1-19 "Picloram is considered to be fairly mobile....combined with its slow degradation rate makes it a concern for movement through the soil column."

36.5

Yet the main text of the EIS concludes: "it is unlikely that herbicides will leach through the soil column at WSDOT application rates." Why? The EIS explains that several mechanisms prevent or retard the migration of chemicals through soil: chemical precipitation, chemical degradation, volatilization, physical and biological degradation, biological uptake, absorption, low water solubility, and the ability of the soil to absorb trace metals and certain organic pollutants.

There are at least three difficulties with this conclusion: (1) It is not supported by any chemical-specific data: rather, the chemical-specific reviews in the EIS contradict it; (2) The mobility tests required by EPA already take into many of the above factors. (3) Some of the herbicides reviewed have been detected in groundwater after real-world applications (for example, one percent of the domestic wells in Kansas tested positive for picloram).

1

Comment 36

36.6 We do not believe it is a contradiction to list possible potential impacts in an appendix and then to provide a mitigation measure to minimize that potential impact in the EIS main body.

36.7 Risk assessments are typically conducted using the equation: Risk = Hazard * Exposure. The first statement regarding Diuron represents the hazard component, which is based on toxicity data. The next statement regarding the 100 acre lake scenario represents the exposure component of the equation. Both the hazard and the exposure components need to be quantified to establish risk.

36.8 Data from manufacturers were used, whether the data were accepted by the EPA for registration, because this is the most complete data source. The most conservative values were used in the risk assessments to maximize potential risk in the assessment.

36.9 Data and statements from manufacturers was referenced as such, thus providing the data source for the reader. In mutagenic studies the results are typically presented this way (i.e. mutagenic or non-mutagenic). See table 5-4.

(b) Regarding mitigation measures, page 3-7 states, "Unintended impacts related to herbicide applications and potential off-site transport can be minimized by strict adherence to manufacturers' guidelines." In contrast, page B3-3, states "In reviewing WSDOT application records for the 1989-1990 spray season, it was apparent that the herbicide application practices would more likely result in intermittent discharges in surface runoff and in possible spray drift into roadside surface water bodies." Further, page B3-15 concludes three of the herbicides reviewed pose a high relative risk to fish and/or aquatic invertebrates. On the surface, these statements suggest that one portion of the EIS discounts off-site transport as insignificant, while another portion concludes a high risk is present. 36.6

(c) Page B3-15 concludes "Diuron poses high relative risk to both fish and aquatic invertebrates while benefin and oxadiazon pose high relative risk to fish and aquatic invertebrates, respectively." The EIS then goes on to use a hypothetical scenario based on a 100 acre lake and the amounts used of three herbicides for the entire Puget Sound area "to illustrate the potential for achieving toxic concentrations" of these herbicides in aquatic environments (page B3-16). It was our understanding the risk characterization was intended to estimate just that -- the potential for risk. The hypothetical scenario approach appears to contradict the assessment already made in the risk characterization portion of the EIS. 36.7

(2) Gathering data:

(a) Data quality

Page B1-1 states "we felt it appropriate to go directly to the manufacturers first and then to the literature to fill in the data gaps. Data was also obtained from US EPA..." Data from a manufacturer may or may not have been evaluated by EPA as to its adequacy, yet the approach taken by DOT assumes the manufacturers' studies provide reliable data. In fact, many studies submitted to EPA for the registration process do not initially meet EPA guidelines, as reflected by the many toxicological studies referenced in Appendix B, Chapter 4 which are noted as being rated inadequate by EPA. The EIS appears to give inadequate studies equal weight as adequate studies. 36.8

Similarly, the draft EIS included unsupported statements from the manufacturer as useable information, for example, "DowElanco provided a statement concerning the mutagenic potential of benefin, concluding that the compound was not mutagenic." (p. B4-27) No actual data was provided, just an assertion by the manufacturer. 36.9

2

Comment 36

36.10 The data mentioned here are present in table 5-3, Appendix B. However, the results here are derived from past studies, not chemical characteristics.

36.11 Comment noted.

36.12 Even though there were data gaps, the risk assessment was conducted using available data, as opposed to not conducting a risk assessment.

Unsupported assertions and seriously flawed studies should be regarded as data gaps, rather than information sufficiently detailed upon which to base a decision.

(b) Data quantity

The draft EIS did not use commonly available, reliable information sources. Appendix B, page B1-2, states "No data were found concerning leaching potential for 2,4-D." Yet data on leaching potential of 2,4-D is readily available from reliable sources. For instance, EPA's "Environmental Fate One Liners" (available from EPA Region 10 -- for free) includes some data; and the Handbook of Environmental Fate and Exposure Data for Organic Chemicals by Philip H. Howard summarizes more extensive data.

Similarly, the draft EIS states "Very few data were available which described the leaching or mobility of sulfometuron methyl." Yet Kd, water solubility, Kow, pKa, Henry's law constant, and Rf values were all available to Thurston County when we reviewed sulfometuron methyl, as were the results of field testing.

36.10 The two examples above were from products the County has already reviewed. But these examples decrease our confidence in "data not available" statements elsewhere in the EIS.

(c) Scope

36.11 The EIS did not appear to include studies on the toxicity or environmental fate of degradation products, toxicity to microorganisms, contaminants, or relative potential for drift. While these issues are more difficult to research, often it is possible to obtain at least one study or an estimate of potential for concern. They are relevant issues in an overall assessment of the hazard a pesticide and should be included in the EIS.

(2) Evaluating data:

(a) Unstated assumptions

Page 3-49 states "Many underlying assumptions are discussed in detail. All assumptions are intended to err on the side of conservatism, in order to assure risk is minimized." However, several assumptions are not stated -- and do not appear to be conservative.

36.12 Data gaps. Several products reviewed had significant data gaps. Yet the EIS concluded the risk was acceptable. This assumes the missing information is of no consequence. It is not a

3

Comment 36

36.13 **Comment noted.**

36.14 **Comment noted.**

36.15 **See response 8.1**

conservative assumption. In contrast, Thurston County has a policy to not use products with two or more significant data gaps (e.g., carcino-genicity, mutagenicity, teratogenicity, reproductive toxicity, mobility, and persistence). We encourage DOT to adopt a similar conservative philosophy.

36.13 Reliance on other EISs. Page B4-5 states the "risk associated with drinking water contaminated by drift or runoff was not estimated. This route of exposure was evaluated in previously cited documents. Not one compound was found to be a cause for concern..." This does not appear to be a conservative approach for at least two reasons. One, the assumptions that USFS and BLM used in estimating exposure may or may not be appropriate for roadside spraying. For example, wider buffer zones were assumed by the USFS in estimating expected environmental concentrations. Two, the Department of Natural Resources' worse case analysis, while not cited, did find unacceptable risk to the public from ingestion of drinking water contaminated with certain herbicides. Apparently, the USFS and BLM documents chose less conservative assumptions than DNR. If reasons for selecting these two documents rather than others as references were included in the EIS, we did not find them.

36.14 Chronic toxicity to aquatic organisms. The EIS explains on page 3-37 that insufficient data were available to assess chronic toxicity to aquatic organisms, but suggested that repeated, long term exposure is unlikely due to spray procedures and acreage treated per year. This assumption does not seem conservative when one considers that: (1) some of the products reviewed would be expected to persist for many months and are potentially mobile; and (2) chronic effects are usually seen at much lower exposures than acute effects.

Instead, couldn't the EIS could use existing toxicity data where available, estimate expected environmental concentrations, and discuss uncertainties and safety margins? For example, continuous exposure of 10 mg/l Roundup caused complete feeding inhibition in grass carp, but no significant loss of feeding at 3.2 mg/l. In one field study, the highest concentration found in runoff was 5.2 mg/l. This suggests a narrow margin of safety under a worse-case situation. In contrast, Coho salmon exposed to Garlon 4 at less than 0.10 mg/l were hyper-sensitive to stimuli and had elevated activity oxygen uptake during photoperiod transitions. In a study of lateral movement, triclopyr residues of 0.01-0.96 ug/l were found in a ditch 12-13 meters downslope; less than 1 ug/l were present in runoff water 105 days after treatment. These suggest at least a 10 fold safety margin.

36.15 Aquatic toxicity. On page B3-16, the EIS uses a hypothetical scenario based on a 100 acre lake and the amounts used of three herbicides for the entire Puget Sound area to estimate the

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Comment 36

36.16 Comment noted.

36.17 Comment noted.

36.18 The word significant is not used statistically here, instead it used in a qualitative sense.

36.15 potential for aquatic toxicity. Since the concentrations in a small stream near a road shoulder may be much greater than that estimated by the 100 acre lake scenario, it does not appear to be a conservative scenario.

EPA registration requirements. Page B1-10 states "The data on aquatic half-life and metabolism in aquatic environments for fosamine are not required for its current uses and are therefore not presented." This appears to assume that because the data are not required by EPA, the question of whether the product will persist in surface water runoff or groundwater is irrelevant.

(b) Inappropriate comparisons

36.16 In discussing "acceptable risk," the EIS (page B4-103) compares risks associated with herbicide use to the risks from taking a transcontinental flight, smoking, and drinking a diet drink or alcohol. Numerous studies have found most people's evaluation of risk varies with factors such as whether the risk is voluntary, unusual, has significant consequences, etc. (For example: "Perception of Risk," Slovic, Paul, Science, April 17, 1987 Vol 236; Industry risk communication manual: Improving dialogue with communities, Hance, B.J., Chess, C. & Sandman, P.M., 1990, Lewis Publishers; "Improving Risk Characterization: Summary of a Workshop held in Washington, D.C., on September 26 & 27, 1991" Sponsored by EPA, et al. September 1992.) The risks used in your comparison are voluntary, controlled, and familiar. Trying to compare dissimilar risks seems inappropriate and a disservice to the public.

(d) Confusing or potentially misleading statements

36.17 Runoff. The EIS states that most roadsides in WA are designed to minimize contamination of surface waters due to runoff. However, in Thurston County, the runoff from I-5 discharges directly into Capitol Lake, untreated. And a variety of studies in the county have found pesticides in storm drain and surface water sediments. It is difficult to believe this type of situation (untreated stormwater, known sediment contamination) is so unusual it need not even be mentioned in the EIS.

36.18 Risk reduction. Page 3-52 states Alternative E would "significantly reduce the risks to workers and the public" because of decreased reliance on chemical and mechanical methods by shifting to stable plant communities. Yet page iv of the summary explains that 61.5% or less of the treatable roadside acreage would be treated annually under this alternative. It is difficult to understand how a decrease from 72.3 (for the alternative in which chemical treatment is preferred) to 61.5% is

5

Comment 36

36.19 Comment noted.

36.20 True. However, properly planned applications should reduce damage to desired vegetation.

36.21 We agree. It should be stated in terms of significantly reduced concentration after 90 days.

36.22 A more practical solution would be to emply spot applications (which is already done) to negate drift.

36.23 See response 3.11

36.24 Comment noted.

considered significant. If this is truly what DOT intended to say, perhaps the word "significant" should be clarified.

36.19 Soil microorganisms. Page A2-15 states "While improper application of selective herbicides may indirectly affect soil microorganism...." Nothing is mentioned about the effects of properly applied herbicides may have on microorganisms, implying the effects occur only during improper applications. It is certainly possible the herbicides reviewed are not toxic to microorganisms at proper application rates; however, without supporting data it is only an assumption.

36.20 Drift. Page 3-27 states "Poorly planned or executed herbicide applications could remove or damage desirable vegetation, as well as undesirable species." Yet properly applied applications can also remove or damage desirable vegetation.

36.21 Half-lives. Page B2-16 explains that the 10 to 50 day half-life of 2,4-D and 2,4-DP "significantly reduces the possibility of 90 consecutive days of exposure." This is confusing. With a half-life of 50 days, over 25% of the applied product would still be remaining 90 days after application. Is there an assumption here that the exposure must be of a certain concentration?

(5) Inadequate mitigation

36.22 Drift. Page A3-4 discusses mitigation of possible drift. Unfortunately, the potential drift hazards with some products may not be mitigatable. For example, the sulfonylureas can cause damage to nontarget susceptible plants below the analytical detection limit. If neighboring plants were damaged, it would be impossible to analytically determine if drift was the cause. For this reason alone, the sulfonylureas should not be used on rights-of-ways (which, by definition, all are adjacent to someone else's property) until and unless a method is developed to determine the extent of drift.

36.23 Wetlands and surface water. Page 3-23 discusses mitigation measures for minimizing potential adverse impacts on wetlands. A five foot buffer zone is mentioned. Data demonstrating the effectiveness of such a narrow buffer zone should be provided, especially since this runs contrary to so many other buffer zone width recommendations. Similarly, page 3-52 states "Water quality can be protected by not applying within 5 feet of surface water or when rain is imminent." Data supporting this statement should also be provided.

36.24 Air quality. Page A3-4 lists potential mitigation measures of air quality impacts. The last item, "Select and apply herbicides that have the lowest degree of adverse odor impacts..." should be modified to include selecting the least toxic alternative.

6

Comment 36

36.25 The issue of centralization on the surface seems to be beyond the scope of the of an EIS. However, with the advent of IPM approaches, this issue becomes central to decision making processes.

Fertilizing could be included under cultural practices, but for the purposes here it was advantageous to include it in the chemical analyses.

36.26 The preferred alternative, Alternative G, provides for this very type of government and community interaction on a local basis.

36.27 Roadside Management Plans will provide the decision making criteria on a site-specific basis, as well as provide for public input.

36.28 Zone 1 issues are currently under review by WSDOT, following the Zone 1 Task Force.

ATTACHMENT 2: COMMENTS RELATING TO VARIOUS ELEMENTS OF THE DRAFT EIS - THURSTON COUNTY COMMUNITY AND ENVIRONMENTAL PROGRAMS.

General Comments:

36.25 It is confusing why the alternatives in the EIS include whether the program is centralized versus decentralized. How is that going to make any difference on the environmental impacts? Why is fertilizing included under chemical treatments instead of cultural practices?

Specific Comments:

1) 0.6.2 Chemical treatment methods

36.26 • Work cooperatively with local governments by informing them of the areas of chemical treatments and a list of proposed chemicals that will be used. This will allow an opportunity for local governments to work with WDOT by identifying critical areas such as Critical Aquifer Recharge Areas and Wellhead Protection Areas. Local governments can also help WDOT understand the impact their proposed chemical treatments may have on these critical areas.

2) 1.1.3 Definitions

Definition of IVM - Integrated Vegetation Management

36.27 • This definition should be expanded to include the decision making criteria used for the choice of control methods specific to the site and vegetation.

• This definition should include a statement that non-chemical methods will be emphasized over the use of herbicides. IVM is typically supported by both sides of the "chemical" issue because it has been effective in reducing the quantity of pesticides used in many programs but doesn't require total elimination. Therefore, by including in the definition of IVM that the use of pesticides as the least preferred alternative admits to this compromise.

Definition of Zone 1

36.28 • Zone 1 - There is no supporting documentation that zone 1 needs to be "vegetation free". In most areas around the United States zone 1 is maintained as a stable grass community with minimal to no use of herbicides and is maintained mechanically.

1 Shoulders still will provide user safety if maintained as a stable grass community.

1

Comment 36

36.29 Comment noted.

36.30 Roadside Management Plans, as put forth under Alternative G, provide for increased public input on the local and state levels.

36.31 Under Alternative G, this will be addressed through Roadside Management Plans on a site-specific basis.

36.32 See section 1.3.0

36.33 Comment noted.

36.34 This has been added to the mitigation measures in section 0.6.0

36.28

- There is no documentation showing that vegetation (especially grasses) has a negative impact on structural integrity of the roadway surface.

- With adequate slope a grass community will not negatively impact drainage of water from the surface of the roadway.

- There is no documentation that supports the fact that a "no vegetation" zone 1 will suppress fire especially in the western region of the state.

- There is no supporting documentation to the statement that to remain functional this zone must be kept vegetation free.

3) 1.1.4.1 Program objectives -

36.29

- Protection and Enhancement of the Environment: (P 1-8) Maintenance of water quality - Appropriate vegetation in Zone 1 should also be considered as an aid to water quality. Appropriate vegetation in Zone 1 can act as a biofilter, prevent soil erosion, and slow the flow of runoff. Appropriate grass communities in zone 1 should be promoted especially when sufficient slope exists to prevent standing water problems.

- Stewardship of the Public's Investment:

  - Last sentence of first paragraph fails to mention how wide a "vegetation free" area is needed in Zone 1 to provide adequate drainage. Also there is no documentated information that other factors may contribute to the drainage such as angle of slope. In fact the slope may be more important to drainage than vegetation.

  - Second paragraph discussing mechanical action doesn't mention that these cracks can be maintained with spot application of herbicides with follow up crack sealing program. Grass in cracks doesn't justify a vegetation free Zone 1.

36.30

- Be a Good Neighbor: Another recommended way to reach this goal is to ask for input and cooperate with local governments. They may have particular concerns, needs, and requirements on environmental and health issues. Other important activities not included on the list in this paragraph can be expanded to include the use of herbicides in critical aquifer recharge, wellhead protection, and other environmentally sensitive areas.

4) 1.2.2.1 Decentralized Management - This would seem the preferred alternative due to the goal mentioned above of being a

2

36.30

good neighbor. Allowing the vegetation management activities to be determined by local managers allows for direct access to the public and vice-versa. Once it becomes centralized, access to the decision makers becomes more problematic.

36.31

5) 1.2.2.6 Future Practices - The last paragraph discusses tracking sensitive areas. Does this mean that Zone 1 will be maintained with appropriate vegetation in areas considered critical aquifer recharge areas and close to other environmentally sensitive areas?

36.32

6) 1.3.0 Community and interagency coordination - I called early in the process to include my name on the notification list for the scoping meeting schedules. I was never notified.

36.33

7) 3.2.1.1 Environmental Consequences of Alternatives -

- Fourth paragraph - should recognize there is mowing equipment with extended arms that can mow areas causing no adverse soil compaction problems. Equipment is available with large tires that spread the weight of the equipment over larger areas, thereby, reducing compaction problems. Negative impacts to soils by mowing is also dependent on other factors such as angle of the slope, moisture content of the soil, the time of year, and the vegetative cover. Mechanical mowing in all three zones during appropriate times of the year is an acceptable practice in most of the rest of the country.

36.34

8) 3.2.7.3 Mitigation Measures for Terrestrial Wildlife and Wildlife Habitat.

- The EIS recognizes the fact that mowing operations in zone 3 during nesting season has an adverse impact on birds. Therefore, include a recommendation to mitigate this negative impact by reducing or eliminating mowing operations in zone 3 during nesting season.

Comment 37

37.1 Alternative G, derived from Alternative E, will require a larger budget in its initial stages. Legislative support will be necessary for this.

37.2 See response 3.11

37.3 Comment noted.

37.4 Comment noted.

[illegible] WATERSHED COUNCIL
THURSTON COUNTY

Robert L. Berger
Chief Landscape Architect for Operations and Maintenance
Washington State Department of Transportation
Operations and Maintainance
Transportation Building, Room 1C8, KF-01
Olympia, Washington, 98504

Dear Mr. Berger,

We are pleased to have an opportunity to comment upon the draft "Roadside Vegetation Management" environmental impact statement.

In general, we applaud the detail and thoroughness of the statement, and only in a few instances do we disagree or at least register a difference in emphasis.

We agree with most of the comments in the scoping summary (1.3.1) especially the following areas of consideration:

- The effect of herbicides upon the aquatic habitat.
- Shading and silting of aquatic habitat
- Wider buffer zone near aquatic habitat
- Groundwater and wetland contamination
- Increased coordination with the Department of Fisheries where water could be affected.

37.1 Under future practices (1.2.2.6), the trend is to use less herbicideas stated, but with current budget constraints, it may become increasingly tempting to reverse that trend. We urge the WSDOT to construct a maintainance budget that permits establishment of Alternative E (0.4.5), Long Term Comprehensive Integrated Approach albeit a more expensive procedure.

37.2 Both in the opening summary (0.6.2), and in Appendix A (1.1), the statement is made that WSDOT will not use herbicides within 5 feet of surface waters. That seems a very short and arbitrary distance that does not permit consideration of topography, run-off probability, nor drift on even a relatively calm day.

37.3 Although water quality standards for all surface waters in the state are classified (WAC173-201), we urge the application of the same Best Management Practices for all surface waters regardless of classification so that the possibility remains of improving the quality of a given body of water and certainly to not contribute to the further degradation of a less than highest class body. We are only too aware of the fact that all fresh water systems in the Puget Sound Trough inevitably arrive in the marine waters of Puget Sound.

37.4 Finally, Trimming or removal of shade trees to increase solar melting of ice is perhaps more important in other climates than what has been observed in the South Sound. Black ice seems to form near open areas, not on tree lined pavements.

Thank You,

D. A. Davidson, council-member

4.3.5 Comments concerning noxious weeds

The following comments concern the management of noxious weeds in the context of overall roadside vegetation management. Many other comments mentioned noxious weed briefly, but these two centered on the issue. The issues brought out are very important to the choosing of alternatives, and future management technique decisions.

Comment 38

38.1 Comment noted.

FRANKLIN COUNTY
NOXIOUS WEED CONTROL BOARD
COURTHOUSE - 1016 North 4th
PASCO, WASHINGTON 99301
Phone (509) 545-3847 Fax (509) 545-2130

May 14, 1993
Eric Henrickson
c/o Compliance Services International
1112 Alexander Avenue
Tacoma, WA 98421

Dear Mr. Henrickson:

38.1 We reviewed with interest the 5 proposals in the Draft Environmental Impact Statement for Roadside Vegetation Management. After review, we favor the Alternative E "Long-Term Comprehensive Integrated Approach". We feel this plan is well done and comes very close to what we think would be an ideal approach to noxious weed control here in SE Washington.

Control of noxious weeds is not only our policy, but it is our program in Franklin County. Washington State DOT has been very cooperative in this Region the past 6 years. We have seen good advances made in the control of Canada thistle, Kochia and Diffuse knapweed.

Despite a good faith attempt to control noxious weeds on the part of DOT, we have found that in certain areas, particularly where excess moisture is available from circle end guns or seep areas. that certain weeds remain a problem. Canada thistle has been well controlled by the use of glyphosate but in its place Kochia has become established and with at least 2 or 3 flushes of seed germination a year, control by mowing or chemical means is expensive. Uncontrolled kochia is much dreaded by the wheat grower who knows it may tumble out of the roadway into his newly seeded wheat, where it will grow and remain green at harvest time. Harvest than necessitates swathing a portion of the field and allowing the kochia to dry before combining, an expensive additional operation.

If the Canada thistle had not been controlled by DOT it too could cause a problem where seed may drift with the wind into seed crops such as alfalfa where expensive additional cleaning is needed to remove all Canada thistle seed.

Continuous mowing has provided a good but expensive control of both Canada thistle and Kochia, but has so reduced competition from these weed that Puncture vine may become a problem. Puncturevine is not a noxious weed in Franklin County, but it is a very obnoxious weed which both farmers, stranded motorists

RECEIVED MAY 17 1993

Comment 38 continued

38.2 Thank you, your comments are noted. Alternative G represents a combination of Alternatives E and F.

page 2

bicyclists and the general public have come to greatly dislike.

All 3 of these weeds could be held in check and usually controlled easily if roadsides were growing a desirable vegetation such as dry land grasses, forbs and low growing woody species which utilized space, moisture and fertility and resist the encroachment of weedy broadleaves and grasses. We applaud the efforts of the Wash. DOT to establish these species in newly constructed highways. Usually it has been successful, but because weather does not cooperate, sometimes they are not successful. It should be the policy of Wash. DOT to continue trying to establish these plants, even after failure, the same as a farmer would. We think it also should become policy to establish permanent cover on all existing highways where needed, thereby reducing annual maintenance costs, providing native wildlife cover and preventing the spreading of noxious weeds from the roadsides to adjoining property owners.

38.2 In short we believe that Alternative E is a good concept and superior to Alternative F which even though it has provided us fair noxious weed control in this area, it has not reduced the need for frequent spraying or mowing, nor has it provided a more pleasing environmentally acceptable roadside.

Sincerely,

Wm. Frederickson

William Frederickson
Coordinator

Comment 39

39.1 See the definition of Alternative G in the EIS Summary.

WASHINGTON STATE NOXIOUS WEED CONTROL BOARD

1851 So. Central Pl. Suite 211, Kent, WA 98031-7507
Catherine Hovanic, Executive Secretary (206) 872-6480

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Scientific Adviser
206-902-1679

May 13, 1993

Compliance Services International
1112 Alexander Avenue
Tacoma, WA 98421
ATTN: Eric Henriksen

Dear Dr. Eric Henriksen,

Thank-you for the opportunity to submit comments on the Washington State Department of Transportation's Roadside Vegetation Management Draft Environmental Impact Statement. The Washington State Noxious Weed Control Board finds the document a thoughtful analysis of vegetation management and its potential positive and negative impacts on the environmental resources of the state. It also presents a solidly rational assessment of the various vegetation management methodologies available. The document is well-organized, easy to read and to understand.

39.1 Because it is a programatic E.I.S. and not a project E.I.S., the use of Franklin and Dyrness's eight physiographic provinces to assess potential impacts and recommend mitigation make good sense in terms of overall program development and direction for the State Department of Transportation. It will be important for the Department to ensure the programatic E.I.S. is fully grasped and implemented at the district level. This would require more intensive training at the district level and more intensive oversight of district planning for sight specific situations. The Department of Transportation's computer tracking of "sensitive areas" is an excellent example of site-specific planning which could be further developed at the district level in terms of site-specific long-term management within each district. A process for evaluating district implementation of an integrated approach and true long-term planning is needed.

The Washington State Department of Transportation has a good record of compliance with state noxious weed laws and working with local county noxious weed control boards and weed districts in Washington.

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Comment 39 continued

39.2 Comments noted.

Department of Transportation
Draft Roadside Vegetation
Management E.I.S. Comments

Compliance with chapters 17.10 R.C.W., 17.04 R.C.W. and 17.06 R.C.W.; and the state noxious weed list, chapter 16-750 W.A.C., ensures the department is prioritizing noxious weeds in terms of potential invaders, new invaders, and established infestations. Ongoing training of district personnel regarding the regulatory differance between noxious weeds and undesirable vegetation is essential.

Prevention of spreading noxious weeds, causing new introductions or exacerbating weed problems has not been emphasized enough in this document. The importance of establishing desirable vegetation is identified by the E.I.S., but other strategies should be included. For example:

* District personnel should be able to recognize noxious weeds on or adjacent to their districts and be familiar with state noxious weed laws.

* High priority noxious weeds should be mapped, just as sensitive areas, to ensure consistent control and monitoring.

* Where existing inventory information identifies a noxious weed infestation near a ground disturbing activity, the activity should be designed to prevent the spread of the noxious weed.

39.2 * Favor the use of native species for revegetation efforts when possible. When other species are utilized be selective. Avoid invasive and aggressive species.

* Utilize certified seed when reseeding areas to prevent introduction of noxious species.

* Disturbed sites should be rehabilitated and revegetated as soon after the disturbance as possible.

* Gravel pits and D.O.T. maintenance areas need to be managed for noxious weeds, as well as, rights-of-ways and service areas. Prevention of all seed production on all noxious weeds in gravel pits should be ensured. (This is essential to prevent continued introduction and replenishment of noxious weed seed in these pits and along state highways.)

We are pleased the Department of Transportation is careful about its selections for revegetation along state highways, and the document clearly indicates the Department takes care not to introduce noxious species in its ornamental plantings, tries to utilize native species when possible, and considers site

2

Comment 39 continued

39.3 Because the Appendices will not be reissued with the Final EIS, these comments will serve as corrections and additions to the document.

Department of Transportation
Draft Roadside Vegetation
Management E.I.S. Comments

appropriate plantings. All of this illustrates environmental sensitivity blended with an understanding of visual aesthetics.

The state noxious weed list on page A7-49 through A7-51 is several years old. I have enclosed a copy of the 1993 state noxious weed list, chapter 16-750 W.A.C.

Your discussion in Appendix A, 3.0 Noxious Weeds and Other Undesirable Vegetation needs clarification:

* The definition for noxious weed in chapter 17.10 R.C.W. is "any plant which when established is highly destructive, competitive, or difficult to control by cultural or chemical practices".

* The Washington State Noxious Weed Control Board is responsible for determining what the noxious weeds of Washington are, not county noxious weed control boards or weed districts. The State Weed Board adopts the state noxious weed list (chapter 16-750 W.A.C.) following a public hearing.

* No native plants are included on the state noxious weed list. This is by law for Class A and Class B noxious weeds and by Washington State Noxious Weed Control Board policy for Class C noxious weeds.

39.3 * Noxious weeds on the state noxious weed list diminish the agricultural and natural resources of the state including cropland, rangeland, pasture, native plant communities, wildlife, wetlands, and recreational lands.

* County noxious weed control boards are required, by law, (17.10 R.C.W.) to include all class A noxious weeds on their county noxious weed lists and to include all class B noxious weeds designated for control within their county (by the Washington State Noxious Weed Control Board). Prevention of all seed production is required by the landowner. Counties may also add to their county noxious weed lists Class B weeds not designated for mandatory control by the state noxious weed control board and Class C weeds. When these Class B and Class C noxious weeds are included on a county's noxious weed list, following a public hearing, counties may enforce control under state law.

* No county noxious weed control board may include a noxious weed on their county list and enforce its control which is not included on the state noxious weed list.

3

Comment 39 continued

39.4 Alternative G, the preferred alternative, represents an enhancement of Alternative E in which much of the decentralized approach is retained.

Department of Transportation
Draft Roadside Vegetation
Management E.I.S. Comments

Clearly Alternative E, A Long-Term Comprehensive Integrated Approach to vegetation management along state highways should be the alternative selected by the State Department of Transportation. Prevention needs to become an integral part of this alternative and suggestions for its better incorporation into the department's vegetation management program have been made in this letter. The Integrated Vegetation Management alternative provides a balanced approach to management methodology allowing flexibility for the site specific decisions necessary in any environmentally sound vegetation management program. Alternative E can be assimilated into the Department's current decentralized approach by ensuring more training, oversight, and evaluation of the districts. This would seem to meet management and organizational needs as well as environmental needs.

39.4 The Washington State Department of Transportation should be commended for voluntarily committing to this major undertaking, the preparation of its Roadside Vegetation Management E.I.S. This document illustrates the sophistication of the Department's roadside vegetation management program and illustrates Washington is in the forefront with respect to its environmental sensitivity and natural resource protection when it comes to the state highway system. Washington is blessed with an abundance of natural beauty and the Department of Transportation clearly strives to integrate its highway landscaping to blend with this natural beauty. The Washington State Department of Transportation has been a recipient of the National Roadside Vegetation Management Award in both the state and federal categories, has won the American Nurserymen's Association Award for excellence in landscaping, and has been recognized for similar excellence by numerous other organizations. With over seven thousand miles of roadway, 93,000 management acres and numerous employees statewide this is no small achievement. The Washington State Noxious Weed Control Board submits these comments in the spirit of cooperation and a mutual desire to improve the stewardship of public lands.

Sincerely,

Catherine E. Hovanic

Catherine E. Hovanic
Executive Secretary
Washington State Noxious Weed Control Board

enclosure

4

4.3.6 Toxicology Issues

The following comments bring to light new or different toxicology data. Due to the fact that the appendices are not being reproduced, the comments themselves will serve as updates to the EIS.

Comment 40

40.1 No corrections to the Appendices will be made for the Final EIS. These recent study data will serve as an update to the EIS.

Monsanto

FRANK FLESCIA
Manager, Government Affairs
Western U.S.

THE AGRICULTURAL GROUP
2240 Douglas Blvd., Suite 280
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RECEIVED MAR 12 1993

March 9, 1993

Dr. Bernalyn D. McGaughey
Compliance Services International
950 Pacific Avenue, Suite 700
Tacoma, WA 98402

Dear Dr. McGaughey:

On behalf of Monsanto, I would like to respond to your request for comments on the Roadside Vegetation Management Draft EIS your firm performed for the Washington State Department of Transportation. Monsanto is the manufacturer of the active ingredient glyphosate and the herbicides Roundup and Rodeo which are referenced in the February, 1993 Draft EIS document.

In general, I felt that the Draft EIS was a balanced document, fairly presenting the pros and cons of the various methods of roadside vegetation management. Instead of commenting on which vegetation management option the Washington State DOT should choose, Monsanto's comments will focus on specific references to our glyphosate-based products in the document.

40.1 The priciple thrust of our comments is that several pieces of new information have become available that need to be reflected in the Final EIS. Most importantly:

1) EPA has reviewed a new rat chronic/oncogenicity study on glyphosate and agreed that the NOEL is 8000 ppm. In light of this new study, the EPA Peer Review Committee reevaluated the weight-of-evidence for the carcinogenic potential of glyphosate. EPA concluded that glyphosate's classification should be changed from a category "D" to a category "E" (evidence of noncarcinogenicity in humans), based upon adequate studies in rats and mice.

2) EPA has also reviewed a new rat reproduction study and concluded that the NOEL is 8000 ppm. This new information led EPA to change its Reference Dose (RfD) determination for glyphosate, since EPA is no longer using the 10 mg/kg NOEL from the original rat reproduction study.

Comment 40 continued

I have attached detailed comments from our toxicologists on these and other areas covered in the EIS review of glyphosate in Appendix B, chapters 2, 3 and 4. We have also included references where appropriate.

In addition to our glyphosate-specific comments on Appendix B, I would like to offer the following more general comments:

1) Sections 3.2.5 and 3.2.8 discuss impacts of the various treatment alternatives to aquatic and wetland habitats. It should be pointed out that some herbicides are actually labelled by the EPA for aquatic weed control and therefore have gone through extra hurdles to demonstrate a lack of significant adverse effects on aquatic organisms.

2) In Sections 3.2.6 - 3.2.8, the use of selective herbicides is mentioned as a mitigation measure to prevent killing non-target vegetation. In this discussion, it should be pointed out that selectivity of herbicides is somewhat rate dependent - some herbicides that are nonselective at higher rates can be used as selective herbicides at lower rates. An example of this would be the use of low rates of glyphosate to kill annual weeds without killing established perennial grasses.

Thank you for giving us the opportunity to comment on this Draft EIS. Please call me at 916-784-1746 if you have any questions on our comments, or need any documentation to substantiate the above or attached information.

Sincerely,

Frank Plescia

Frank Plescia
Manager, Government Affairs
Western U.S.

Comment 40 continued

APPENDIX B, CHAPTERS 2 AND 3, WILDLIFE ASSESSMENT AND AQUATIC RISK ASSESSMENT

1. **Page B2-7, Section 3.12.1, Glyphosate Terrestrial Wildlife**
The mammalian acute oral LD50 is listed as 4300 to 5600 mg/kg for rats. The 4300 mg/kg value is from an old study. A more recent study has been conducted which shows the rat oral LD50 to be >5000 mg/kg. A copy of the summary page from this study is attached as Appendix A. We request that the EIS be changed to indicate that the rat oral LD50 is >5000 mg/kg.

2. **Page B2-7, Section 3.12.1, Glyphosate Terrestrial Wildlife**
The avian dietary LC50 values are listed as 4,640 mg/kg. No mortality was observed at this value in either bobwhite quail or mallard ducks so the LC50 values should be > 4640 mg/kg. This would mean that glyphosate is "no more than slightly toxic". See the Monsanto Glyphosate Toxicology Summary referenced in this section of the EIS.

3. **Page B2-15, Section 2.0, Terrestrial Risk Assessment**
Calculation #3 is somewhat difficult to follow as written. For the units to cancel properly the equation would be written as follows:

   Chemical ingested (mg) = Chemical (mg)/grain X Grain/g
   X daily food intake (g)

4. **Page B2-19, Section 2.5.1, Glyphosate, Chemical Impact (birds)**
The EIS states: "A 200 gram quail would have to eat approximately 14 times its normal daily intake of glyphosate-treated grain in a matter of minutes in order to ingest a lethal dose of glyphosate." By our calculations the difference between the LD50 and the maximum exposure on grain would be 53 X instead of 14 X. The numbers as we have calculated them are as follows:

   Glyphosate (mg)/grain = 10.6 lb/acre ÷ 4 X 10^5 grains/acre X 453592.4 mg/lb

   = 1.2 X 10^{-2} mg/grain

   Glyphosate ingested (mg) = 1.2 X 10^{-2} mg/grain X 25 grain/g
   X 25 g/day

   = 7.5 mg

Comment 40 continued

Glyphosate dose (mg/kg) = 7.5 mg ÷ 0.2 kg quail
= 37.5 mg/kg

The acute oral LD50 in quail is >2000 mg/kg so 37.5 mg/kg is approximately 53X less.

5. **Page B2-22, Table 2-1**
As indicated in comment #1 above, the rat oral LD50 should be >5000 mg/kg.

6. **Page B3-10, Glyphosate**
It is stated that glyphosate is practically non-toxic to moderately toxic to fish. The references given are USDA (1988 and 1989). However, the USDA 1989 on pages 6-27 and 6-28 indicates that the aquatic LC50 values for glyphosate technical are all greater than 10 mg/l. This means that glyphosate is at most slightly toxic and not moderately toxic.

7. **Page B3-22, Table 3-4**
The relative risk to fish for glyphosate in Province 3 is listed as a 2 (moderate risk). However, when one considers comment #6 above, the risk should be a 1 (low risk). The risk assessment used in the EIS would be as follows:

$$\frac{\text{Exposure rating X toxicity rating}}{4} = \text{relative risk}$$

For glyphosate:

Exposure = 2
Aquatic toxicity rating = 2 (slightly toxic)

Therefore:

$$\frac{2 \times 2}{4} = 1 \text{ (low risk)}$$

8. **Page B3-26, Table 3-6**
The relative toxicity of glyphosate to fish is listed as a 3 (moderately toxic). As indicated in comment #6 above, glyphosate is at most slightly toxic to fish.

APPENDIX B, CHAPTER 4, HUMAN HEALTH RISK ASSESSMENT

1. **Page B4-41, Section 2.3.12, Glyphosate, Acute Toxicity**
The acute rat oral LD50 for glyphosate technical is given as 4320 mg/kg. A more recent study has been conducted which shows the rat oral LD50 to be >5000 mg/kg. A copy of the summary page from this study is attached in Appendix A. We request that the EIS be changed to show the new value.

2. **Page B4-41, Section 2.3.12, Glyphosate, Acute Toxicity**
The EIS states: " An acute delayed neurotoxicity study in hens was performed but results were inconclusive." However, the results from this study clearly show that glyphosate did not produce delayed neurotoxicity. It is not certain how the authors reached the position that the results are inconclusive. Glyphosate is not an organophosphate and would not be expected to produce delayed neurotoxic effects. We request that this sentence be changed to state that glyphosate did not produce delayed neurotoxic effects in hens.

3. **Page B4-42, Section 2.3.12, Glyphosate.**
The Environmental Impact Statement (EIS) reviewed a three generation rat reproduction study with glyphosate. This study was conducted in 1980 - 1981. The only effect observed in this study was an equivocal increase in the incidence of renal tubular dilatation in F_{3b} male pups. The NOEL for this equivocal effect was 10 mg/kg. A second rat reproduction study with glyphosate was conducted in 1990 using higher dose levels than the first study. Dose levels used were 0, 2000, 10,000 and 30,000 ppm (approximately 0, 149, 740 and 2268 mg/kg). Treatment-related effects were observed only at the high dose and consisted of decreased parental weight gain and decreased pup weights. The NOEL was 10,000 ppm (740 mg/kg). No histopathological effects on pup kidneys were observed in this study.

The EPA has reviewed the second rat reproduction study and concluded that the NOEL is 8000 ppm. A copy of the EPA review is attached in Appendix B. We request that the EIS be updated to include the new glyphosate rat reproduction study. Please note that the EPA no longer uses the 10 mg/kg from the original rat reproduction study in its determination of a Reference Dose (RfD) (see comment #8 and Appendix E).

Comment 40 continued

4. **Page B4-42, Chronic Toxicity/Oncogenicity**
In the first paragraph the EIS states that the glyphosate chronic/oncogenicity study in rats was not accepted by the EPA due to the lack of an MTD and is being repeated. The repeat study has now been completed and reviewed by the EPA. In the second study, glyphosate was fed to Sprague-Dawley rats at dose levels of 0, 2000, 8000 and 20,000 ppm (approximately 0, 100, 410 and 1050 mg/kg) for 24 months. The only treatment-related effects were a decrease in body weight gain in high dose females, and cataractous lens changes in high dose males. The NOEL was determined to be 8000 ppm (410 mg/kg). There was no evidence of treatment-related tumors.

The EPA has reviewed the second rat chronic/oncogenicity study on glyphosate and agreed that the NOEL is 8000 ppm (approximately 410 mg/kg). A copy of a Federal Register Notice which indicates the EPA position is attached as Appendix C. We request that the EIS be amended to include a review of the new rat chronic/oncogenicity study with glyphosate.

5. **Page B4-32, Chronic Toxicity/Oncogenicity**
The second paragraph concerns the chronic dog study with glyphosate. The EIS states that the NOEL is 20 mg/kg based upon decreased pituitary weights at 100 and 500 mg/kg. However, the study indicated that these differences were considered spurious and not related to treatment because: (a) no microscopic abnormalities were noted in the pituitaries of treated animals, (b) there was no dose-related trend and (c) pituitary weights can be quite variable. The EPA agreed with the study authors and concluded that the NOEL is 500 mg/kg. A copy of a Federal Register notice which indicates the EPA position that 500 mg/kg is the NOEL is included in Appendix C.

We request that the EIS be amended to indicate that the NOEL from the chronic dog study is 500 mg/kg.

6. **Page B4-42, Chronic Toxicity/Oncogenicity**
The third paragraph reviews the mouse oncogenicity study with glyphosate. The EIS states: "The EPA has requested that a repeat study be performed." However, the EPA no longer requires that the mouse oncogenicity study be repeated (see Appendix C). The EPA Peer Review Committee evaluated the weight-of-the-evidence for the carcinogenic potential for glyphosate. They recommended that the glyphosate carcinogenicity classification be changed from a "D" to an "E" (evidence of noncarcinogenicity for humans). This was based upon adequate studies in rats and mice. It was concluded that the renal tubular neoplasms in high dose male mice were not related to treatment.

We request that the EIS be amended to reflect the current EPA position on the mouse oncogenicity. We also request that the EIS reference the fact that glyphosate is now considered a category E for carcinogenicity.

Comment 40 continued

7. **Page B4-66, Bioavailability**
The fourth paragraph states that the dermal absorption rate for glyphosate is 3.5% based upon data in Jones and Stokes (1991). The 3.5% value comes from a study by Shipp *et al.* (1986). However, this is an assumed value and not derived from real data. A study by Wester *et al.* (1991) showed that the maximum dermal penetration rate for glyphosate was 2.2%. A copy of this paper is attached in Appendix D. Because the value of 2.2% was derived experimentally, it should be used over an assumed value. We request that the EIS be changed to indicate that the dermal penetration rate for glyphosate is 2.2%. This value should also be changed on page B4-164, Table 4-11.

8. **Page B4-166, Table 4-12**
If the EIS authors are in agreement with our comments # 3-6 above, then the Reference Dose would be based upon the NOEL from the rat teratology study of 175 mg/kg. The EPA has used this value in their latest RfD determination (see Appendix E). The EPA used 175 mg/kg as the lowest NOEL and a 100X safety factor to get an RfD of 2 mg/kg (rounded value from 1.75).

9. **Risk Summaries for Glyphosate**
The RfD of 2 mg/kg mentioned in comment #8 should be used to recalculate risk values for the text table on page B4-121 and in tables 4-19 through 4-28.

10. **Page B4-168, Table 4-13**
Glyphosate is listed as a category D carcinogen. However, the EPA now lists glyphosate as a category E, evidence of non-carcinogenicity for humans (see comment #6 and Appendix D).

11. **Page B5-27, Table 5-4**
If the EIS authors are in agreement with our other comments, this table should be amended accordingly. The acute oral LD50 should be >5000 mg/kg; the chronic rat NOEL should be 8000 ppm (410 mg/kg); the dog chronic NOEL should be 500 mg/kg; and the reproductive NOEL should be 10,000 ppm (740 mg/kg). In addition, the statement under skin sensitization should be **non-sensitizing** instead of non-irritating.

12. **Page B5-51, Table 5-6**
The second reference for the glyphosate rainbow trout 96 hr LC50 gives values from 10 to 197 mg/l. We cannot determine where these values were obtained. The reference given, number 257, is a paper on Dicamba, not glyphosate. The value obtained by Monsanto is 86 mg/l as given in the first reference in Table 5-6. The second reference for bluegill 96 hr LC50 gives values of 24-140 mg/l. The reference given, number 98, is an EPA fact sheet for 2,4-D. The study conducted by Monsanto gave an LC50 of 120 mg/l as reported in the first reference in Table 5-6. If these values are in error we request that this table be amended accordingly.

If the EIS authors agree with the above comment, then there are no reported LC50 values for glyphosate less than 10 mg/l. Glyphosate would, therefore, be considered slightly toxic to all aquatic organisms tested.

Comment 41

41.1 Comment noted.

41.2 New herbicides not included in this EIS will not be prohibited from use by WSDOT. The process of herbicide evaluation and selection is an ongoing one.

DowElanco
9002 Purdue Road
Indianapolis, IN 46268-1189

RECEIVED MAR 15 1993

Quad III/2
March 10, 1993

DowElanco

Roger Humphries
Compliance Services International
700 Seafirst Center
Tacoma, WA 98402

Dear Roger:

ROADSIDE VEGETATION MANAGEMENT

Thank you for the copy of the draft "Roadside Vegetation Management" Environmental Impact Statement your organization has prepared for the Washington State Department of Transportation. It is far superior to other EIS's I have recently seen.

41.1 There are two comments I would like to make concerning the document. The reference to triclopyr on page B3-12 and the table on page B3-26 indicates the acute aquatic toxicity ranges from practically non toxic to highly toxic. This range is due to the respective formulation. Garlon 3A contains triclopyr as the triethylamine salt and has a very low toxicity to aquatic organisms. Garlon 4 which contains triclopyr as the butoxyethyl ester is of greater acute toxicity to aquatic organisms. The relevance for this distinction is that the preferred formulation for use by transportation departments for roadside weed control is the triethylamne salt which is less acutely toxic to aquatic organisms.

41.2 The second comment is that another active ingredient, clopyralid, was not included in the review. This active is increasingly being used because of its activity on especially difficult to control weeds. It is my understanding that a product will not be prohibited from use by the Washington Department of Transportation if it is not included in this EIS. Such a prohibition would unfortunately prevent timely entry of new active ingredients into this market.

Thank you for the opportunity to comment on your excellent work. If there is any additional information I can provide to your for DowElanco products please contact me at 317-870-7664.

Sincerely,

T. Craig Blewett

T. Craig Blewett, Ph.D.
State Regulatory Affairs Manager

Comment 42

Thank you, your comments and corrections are noted. However, the risk assessments will not be recalculated for the Final EIS, so this information will serve as the corrections.

DUPONT

AGRICULTURAL PRODUCTS
Walker's Mill, Barley Mill Plaza
P.O. Box 80038
Wilmington, DE 19880-0038
Registration & Regulatory Affairs
Fax: 302-992-6470

RECEIVED MAR 10 1993

March 3, 1993

OVERNIGHT COURIER

Mr. Marrell Livesay
Compliance Services International
950 Pacific Avenue
Suite 700
Tacoma, WA 98402

Dear Mr. Livesay:

We have examined the four-volume draft report entitled "Roadside Vegetation Management," which has been issued as an Environmental Impact Statement reviewing the health and environmental safety of several DuPont herbicide products. While we are in agreement with most of the information provided, we do not agree with a number of negative statements suggesting that diuron may be a high risk product to the user and to non-target species. These statements result from risk assessments using the incorrect maximum label rate of 40 lbs diuron per acre (See Chapter Three, page 3-83).

42.1

The maximum use rate on our currently registered Karmex® DF Herbicide label is 15 lbs per acre of this 80% formulation, which is equivalent to 12 lbs diuron per acres. Thus the maximum label rate in lbs/acre should be **corrected in Table 3-1 from 40 to 12, and the risk assessments should be recalculated to reflect the lower risk.**

There is one minor error in the naming in one of the chemicals listed in Table 3-1. The chemical listed as "Chlorsulfuron Methyl" should be corrected to "Chlorsulfuron." If there are any questions related to this response, please feel free to call me at (302) 992-6269.

Sincerely,

Ian Wellings

Ian Wellings, Ph.D.
Product Registration Manager

IW/msd

AG-6401

Distribution List

Final EIS
Roadside Vegetation Management

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Glossary

Draft Final EIS
Roadside Vegetation Management

General Terms

* The bulk of this glossary was taken from "Risk Analysis: A Guide to Principles and Methods for Analyzing Health and Environmental Risks", by John J. Cohrssen and Vincent T. Covello, NTIS No. PB-89-137772 (1989).

Absorbed dose

The amount of a substance (e.g., a chemical) that enters the body of an exposed organism.

Absorption

The movement of a substance (e.g., a chemical) through a membrane into the body after exposure has occurred.

Acceptable daily intake (ADI)

Estimate of the largest amount of a substance to which a person can be exposed on a daily basis that is not anticipated to result in adverse effect. Usually expressed in mg/kg/day. Same as Reference Dose.

Acute Effects

Effects that show up soon after exposure.

Acute Exposure

Exposure over a short period of time.

Additive effect

Refers to situations where the combined effect of two or more substances (e.g., two or more chemicals) is equal to the sum of their individual effects.

Adenoma

Glandlike benign growth (tumor). An adenoma in a rat that has received a test chemical is considered evidence that the chemical might cause cancer in a human.

Adjuvants

An agent added to a compound to increase or aid its effect. an immunological agent that increase the antigenic response.

Adsorb

To take up by attraction and holding to a surface. Chemicals are often adsorbed by soil particles, dust, activated charcoal, or other substrates.

Allergen

A foreign substance that induces a response from the immune system of some people so that subsequent exposures to the substance cause an allergic reaction (wheezing, sneezing, runny nose, red eyes, hives, other dermatitis, headaches, shock, etc.). Also called an antigen.

Allergic reaction

A reaction to an antigen or allergen (such as a pollen or chemical) that is acquired from previous contact with the material and that is far stronger than would be expected in most people.

Ames assay

A standardized screening test using a mutated strain of Salmonella bacteria to determine whether introduction of a given substance causes further mutations in the bacteria. Mutagenesis is believed to be an indication of carcinogenesis.

Antagonism

Interference or inhibition of the effect of one substance (e.g., a chemical) by the action of another substance (e.g., another chemical).

Antibody

A protein, produced by the immune system, that recognizes antigens and attempts to destroy or inactivate them.

Antigen

See allergen.

Assay

A test for a particular substance or effect.

Average daily dose (ADD)

Estimated single day exposure (or average daily dose). The exposure period is assumed to be one day and is not adjusted for a lifetime of exposure.

Biofiltration

The use of vegetation or microorganisms to filter out sediment or pollutants.

Biota

The animal and plant life of a region; flora and fauna collectively.

Benign tumor

A tumor confined to the territory which it arises, not invading surrounding tissue or metastasizing to distant organs. Benign tumors can usually be excised by local surgery.

Bile

The fluid secreted by the liver. Contains red blood cell pigments, fat, cholesterol, cellular debris, etc. Aids digestion and excretion of some xenobiotics.

Bioaccumulation

The retention and concentration of a substance by an organism.

Bioassay

An evaluation of the effects of a substance on a living organism.

Bioconcentration

The accumulation of a substance (e.g., a chemical) in tissues of an organism (such as fish) to levels that are greater than the level in the medium (such as water) in which the organism resides. See bioaccumulation.

Biodegradation

Decomposition of a substance into more elementary compounds by biological action.

Biomagnification

The serial accumulation of a substance (e.g., a chemical) by organisms in the food chain, with higher concentrations of the substance in each succeeding level.

Biotransformation

The enzymatic transformation of a foreign compound into a different one. The new compound may be more or less toxic than the old one.

Cancer

The uncontrolled, invasive growth of cells. Cancerous cells can metastasize; they can break away from the original tumor, relocate, and grow elsewhere in the body.

Candidate species

Any species for which the Washington State Department of Wildlife has substantial information to support the biological appropriateness of proposing to list as endangered or threatened but has not yet issued proposed rules because of preclusion by other listing activity.

Capillaries

Finest subdivisions of the blood vessels; they bring the blood into intimate contact with the tissue.

Carcinogen

A substance that causes or induces cancer.

Central nervous system (CNS)

Portion of the nervous system that consists of the brain and the spinal cord; protected from the rest of the body (and toxicants) by the blood brain barrier.

Chromosome

Rodlike structure in the nucleus of a cell composed of DNA and protein. Chromosomes contain the genes responsible for heredity.

Chronic

Of long duration. Chronic exposure usually refers to long-term, low-level exposure. Chronic toxicity refers to the effects produced by such exposure. Chronic exposure may cause latent damage that does not appear until later.

Compatibility

The degree to which development with specific visual characteristics is visually unified with its setting."

Concentration

The quantity of a substance per unit volume or weight.

Critical period

The time during development of an embryo or fetus when it is most sensitive to the effects of a chemical or virus. The critical period for many chemicals in humans is during the first trimester (the first three months of gestation).

Cumulative exposure

The summation of exposures of an organism to a substance (e.g., a chemical) over a period of time.

Cytoplasm

Cellular material within the cell membrane and surrounding the nucleus.

Degradation

Chemical or biological breakdown of a complex compound into simpler compounds.

Dermal exposure

Contact between a substance (e.g., a chemical) and the skin.

Dermatitis

A skin inflammation or rash.

Diffusion

The movement of suspended or dissolved particles from a more concentrated to a less concentrated region as a result of the random movement of individual particles. The process tends to distribute the particles uniformly throughout the available volume.

Distribution

In pharmacology, the dispersion of a chemical within the body of and organism that has been exposed. Distribution depends to a large extent on the physical properties, such as water or fat solubility, ionization, particle size, and ability to bind to blood protein.

Dose

The quantification of exposure. For oral and dermal exposure, it is typically expressed as the amount of chemical in grams or milligrams per kilogram of body weight, and for inhalation, as the concentration of the chemical in the air.

Dose-response

A quantitative relationship between the dose of a substance (e.g., a chemical) and an effect caused by the substance.

Dose-response assessment

Describes the quantitative relationship between the amount of exposure to a substance (dose) and the extent of injury or disease.

Dose-response curve

A graphical presentation of the relationship between degree of exposure to a substance (dose) and observed biological effect or response.

DNA

The molecule that encodes genetic information (genes) contained in chromosomes. It may be altered by mutagens.

Edema

Swelling, caused by excessive fluid buildup in tissue.

Endangered species

Any species that is seriously threatened with extirpation throughout all or a significant portion of its range in Washington.

Endpoint

A biological effect used as an index of the effect of a substance on an organism.

Environmental fate

The destiny of a substance (e.g., a chemical) after release to the environment. Involves considerations such as transport through air, soil, and water; bioconcentration; and degradation.

Enzyme

A large protein that speeds up the rate of a biochemical reaction.

Epidemiology

The study of the patterns of disease in groups of people.

Epigenetic

Pertaining to a nongenetic mechanism.

Estuarine

Of, pertaining to, or formed in an estuary.

Eutrophication

The process whereby a body of water becomes highly productive of aquatic plants, such as algae, due to the input of large quantities of nutrients.

Evapotranspiration

That portion of the precipitate returned to the air through evaporation and transpiration.

Excretion

Any physiological process through which waste or toxic materials are removed from the body; routes of exit may include urine, feces, sweat, milk, and expired air.

Exposure

Contact between a substance (e.g., a chemical and a potentially affected biological system that permits interaction.

Exposure assessment

The determination or estimation (qualitative or quantitative) of the magnitude, frequency, duration, route, and extent (number of people) of exposure to a substance.

Exposure scenario

A set of conditions or assumptions about sources, exposure pathways, concentrations of toxic chemicals, and populations (numbers, characteristics, and habits) that aid the investigator in evaluating and quantifying exposure in a given situation.

Extrapolation

Estimation of unknown values by extending or projecting from known values.

Fat-soluble

Dissolves in fat.

Fetus

The later stages of a developing organism. In the human, it is the unborn child during the period of uterine life from the end of the second month until birth.

Forbs

A herbaceous plant other than a grass, especially one growing in a field or meadow.

Gastrointestinal (GI) tract

Includes the mouth, esophagus, stomach, duodenum, small intestines, appendix or cecum, large intestines, and the rectum.

Gavage

Force-feeding (or dosing) by stomach tube.

Gene

The unit of inheritance; part of a DNA molecule.

Genetic

Having to do with genes. Genetic toxicants affect the germ cells (eggs, sperm, or their precursors) of the parents; the effects will be manifested only in the offspring, not the parents.

Germ cell

A reproductive cell.

Gram (g)

One-twenty-eighth of an ounce; the weight of one milliliter of water.

Gut

The alimentary (digestive) tract, especially the intestines. "Gut flora" are all the microorganisms that normally inhabit the gut.

Half-life

The length of time required for the mass, concentration, or activity of a chemical or physical agent to be reduced by one-half.

Hazard

Potential for a chemical to cause an adverse health effect. A source of risk that does not necessarily imply potential for occurrence. A hazard produces risk only if an exposure pathway exists and if exposures create the possibility of adverse consequences.

Hazard Identification

Involves gathering and evaluating data on the types of injury or disease that may be produced by a substance and on the conditions of exposure under which injury or disease occurred.

Hazard Index (HI)

The total risk associated with exposure to multiple chemicals or multiple pathways. The summation of hazard quotients.

Hazard quotient (HQ)

The actual amount of human exposure in a population (ADD) divided by the maximum amount of a substance to which a person can be exposed on a daily basis that is not anticipated to result in adverse effects (RfD).

Hepatic

Pertaining to the liver.

Hepatoma

A malignant tumor occurring in the liver.

Herbicide

A pesticide that kills weeds or undesirable plants.

Histamine

A substance released by injured tissue; causes redness, itching, shock, and other responses.

Histology

The study of the structure of the cells and tissues. Usually involves microscopic examination of tissue slices.

Hormone

A chemical substance secreted in one part of an organism and transported to another part of that organism where it has a specific effect.

Hydrolysis

A chemical reaction in which water reacts with another substance to form two or more new substances.

Hypersensitive

Greater sensitivity than usual to a substance (e.g. a chemical) but not showing an "allergic" reaction.

Hyposensitive

The quality of being less sensitive to a substance (e.g. a chemical) than most people.

Immune system

The body's system which protects against infectious agents, controls white blood cell (leukocyte) maturation and immuno/globulin production, and guards against the proliferation of cancerous cells.

Individual lifetime risk

The estimated incremental lifetime risk of an adverse effect incurred by an individual owing to exposure to a specified concentration of risk for a given time period.

Initiator

An external stimulus or agent that produces a cell that is "latently premalignant." An initiation event may be a mutational change in the cell's genetic material.

Intactness

The integrity of visual order in the natural and man-built landscape, and the extent to which the landscape is free from visual encroachment.

Intake

Amount of material inhaled, absorbed through the skin, or ingested during a specified period of time.

Integrated Pest Management (IPM) (WAC 173-270)

Integrated Pest Management or 'IPM' means the selection, integration, and implementation of pest control that consists of: Prevention of pest problems; monitoring and evaluation of pests, damage and results of treatment; acknowledgement of population levels of pests that can be tolerated based on legal, economic, health, or aesthetic thresholds; use of natural control agents in an ecosystem; reliance to the maximum extent possible on nonhazardous biological, mechanical, and cultural treatment of pests; application of pesticides in a manner that minimizes damage to the ecosystem's natural controls and integrity; and use of pesticides only after all other methods have been evaluated.

Interspecies extrapolation

The act of applying a set of data or an individual test result on one species, under certain conditions and subject to particular dose levels of a toxic substance and application methods, to another population of the same or different species tested under perhaps different conditions, dose levels, and application methods.

Intestine

See gut.

In vitro

Phrase-literally, in glass-used to refer to experiments that take place outside the living animal.

In vivo

Phrase-literally, in the living being-used to refer to experiments that take place in the living animals.

Irreversible effect

Effect characterized by the inability of the body to partially or fully repair injury caused by a toxic agent.

Irritation

Transient, reversible effects, including redness, pain, and itching.

Kilogram (kg)

A kilogram is about 2.2 pounds.

Latency

Time from the first exposure to a substance (e.g. a chemical) until the appearance of a toxic effect. For cancer, this period may be 10 to 20 years in humans.

LC_{50} (Median Lethal Concentration)

A measure of acute toxicity, the concentration that kills 50% of the test animals exposed. Used in aquatic toxicity and inhalation studies.

LD_{50} (Median Lethal Dose)

A measure of acute toxicity, the dose level that kills 50% of the test animals exposed.

Leukemia

A form of cancer characterized by the rapid multiplication of abnormal white blood cells (leukocytes) in the blood and blood-forming tissue.

Lifetime average daily dose (LADD)

Estimated single day exposure (or average daily dose) adjusted to reflect lifetime exposure.

Lifetime exposure

Total amount of exposure to a substance that a human would receive in a lifetime (usually assumed to be 70 years).

Likelihood

Statistical probability that an event such as harm or injury may occur as a result of exposure to a risk agent.

Linear relationship

Straight-line. When the statistical relationship between two variables increases on a direct unit-for-unit basis, this relationship, when plotted on a chart, will form a straight line.

Linearized multistage model

A type of dose-response model; a derivation of the multistage model, wherein the data are assumed to be linear at low doses.

Lipid

Fat and fat-like material; any substance that originates from living organisms and that dissolves in organic solvents, such as ethyl alcohol, ether. benzene, etc. Along with proteins and carbohydrates, lipids are the principal structural element of the living cells, especially the cell membrane.

Liter (l)

A liter is a little larger than a liquid quart.

Logistic curve

In risk assessment, an s-shaped curve that, if plotting dose-response relationships, is linear at low doses. of higher degree at higher doses, and finally saturates at very high doses where the effect in question always occurs.

LOAEL (Lowest Observed Adverse Effect Level)

In dose response experiments it's the lowest exposure level which causes a statistically significant increase in the frequency or severity of an adverse effect between the exposed population and it's appropriate controls.

LOEL (Lowest Observed Effect Level)

In dose response experiments, it's the lowest exposure level which causes a statistically significant increase in the frequency or severity of any effect between the exposed population and it's appropriate controls.

Lymphatic system

The system of vessels and nodes that returns the lymph (clear fluid that is collected from body tissues) to the blood.

Lymphoma

Any of several types of cancerous conditions of the lymphatic tissue, including lymphosarcoma and Hodgkin's disease.

Malignant

A tumor that has invaded neighboring tissue and has undergone metastasis to distant body sites, at which point the tumor is called a cancer.

Margin of safety (MOS)

The maximum amount of exposure producing no measurable effect in animals (or studied humans) divided by the actual amount of human exposure in a population.

Maximum tolerated dose (MTD)

Dose that allows the survival of animals exposed for a lifetime carcinogenicity test.

Mechanism of action

The way in which a substance (e.g. a chemical) exerts its toxic effect(s).

Metastasis

Movement of cancer cells from their original site to distant sites in the body.

Metabolism

(1) The sum of the chemical reactions occurring within a cell or a whole organism; includes the energy-releasing breakdown of molecules (catabolism) and the synthesis of new molecules (anabolism). (2) In toxicology, the altering of a chemical to a different chemical. See biotransformation.

Metabolite

Any product of metabolism, especially a transformed chemical.

Microgram (ug)

One-millionth of a gram.

Microliter (ul)

One-millionth of a liter.

Milligram (mg)

One-thousandth of a gram.

Milliliter (ml)

One-thousandth of a liter.

Modeling

Use of mathematical equations to simulate and predict real events and processes.

Morbidity

Illness.

Mortality

Death.

Multihit models

Dose-response models that assume more than one exposure to a toxic material is necessary before effects are manifested.

Multistage models

Dose-response models that assume there are a given number of biological stages through which the carcinogenic agent must pass (for example, metabolism, covalent binding, or DNA repair), without being deactivated, for cancer to occur.

Mutagen

A substance that can produce change in the genetic material (DNA) of cells that can be transmitted during cell division.

Mutagenicity

The capacity of a chemical or physical agent to cause permanent alteration of the genetic material within living cells.

Nanogram (ng)

One-billionth of a gram.

Necrosis

Death of cells or tissue from irreversible damage.

Neoplasm

See tumor.

Neurotoxicity

Exerting a destructive or poisonous effect on nerve tissue.

NOAEL (No Observed Adverse Effect Level)

In dose response experiments, it's the exposure level which causes no statistically significant increase in the frequency or severity of an adverse effect between the exposed population and it's appropriate controls.

NOEL (No Observed Effect Level)

In dose response experiments, it's the exposure level which causes no statistically significant increase in frequency or severity of any effect between the exposed population and it's appropriate controls.

Normal probability distribution

See Gaussian statistical distribution.

Ocular

Pertaining to the eye.

Oncogene

A gene that induces a cancer process.

One-hit model

A mathematical dose-response model based on the biological theory that a single "hit" of some minimum critical amount of a carcinogen at a cellular target can initiate an irreversible series of events, eventually leading to a tumor.

Parasympathetic

Pertaining to part of the nervous system, below the level of consciousness, that participates in the regulation of the involuntary functions of the body (for example, heart beat, breathing rate).

Pathogenic agent

A substance, living or inanimate, or a force, the excessive presence or relative lack of which is the cause of a particular disease.

Pathologic

Pertaining to a disease state.

Peritoneal cavity

The abdominal cavity, which contains such organs as the stomach, intestines, and liver.

Persistence

Resistance to degradation. A persistent substance is expected to remain in the environment for a long time.

Pesticide

Any substance used for controlling, preventing, destroying, repelling or mitigating any pests. Pests include insects, mites, birds, algae, bacteria, fungi, weeds, nematodes, fish, coyotes, and slimes.

Petrochemical

A chemical derived from petroleum.

pH

A term used to express the degree of acidity or alkalinity of a solution. A pH of 7 is neutral. Acid solutions have pH's below 7. and alkaline solutions have pH's greater than 7.

Pharmacokinetics

The study of the changes in a toxicant in parts of the body over time. Involves absorption, distribution through the body, biotransformation, and excretion of the toxicant.

Photolysis

Chemical decomposition induced by light.

Placenta

The organ that forms the bridge between the fetal and maternal blood streams.

Plasma

The clear, yellowish fluid portion of blood, lymph, or intramuscular fluid in which cells are suspended.

Poison

A substance that may be dangerous to life or health. Often considered to be a substance with relatively high acute toxicity; legally defined as having an acute oral toxicity of less than 50 milligrams per kilogram of body weight.

Population at risk

A population subgroup that is more likely to be exposed to a substance (e.g. a chemical), or is more sensitive to a substance (e.g. a chemical), than is the general population.

Potency

Amount of a substance or material necessary to produce a given level of deleterious effect.

Procarcinogen

A chemical that must be activated by an enzyme reaction before it is carcinogenic. See also initiator.

Promoter

An agent causing an initiated cell to produce a tumor.

Proposed candidate species

Any species for which the Washington State Department of Wildlife has information to propose listing is as endangered or threatened but cannot provide conclusive data to support the biological appropriateness of such a proposal. The taxa in this category are not being considered as proposed additions to the list unless further information becomes available.

Qualitative

The non-numerical presentation of information.

Quantitative

Numerical or measured information, such as the dose needed to produce an effect, or the number of people effected.

Receptor

(1) In biochemistry, a specialized molecule in a cell that binds a specific chemical with high specificity and high affinity. (2) In exposure assessment, an organism that receives, may receive, or has received environmental exposure to a substance (e.g. a chemical).

Reference dose (RfD)

See acceptable daily intake.

Renal

Pertaining to the kidney.

Reproductive toxicant

A substance that can alter the reproductive process at any point, including fertilization, implantation, maternal metabolic changes, embryonic and fetal growth, placenta functioning, birth, lactation, postnatal growth, and maturation.

Reservoir

A tissue in an organism or a place in an organism where a substance accumulates, from which it may be released at a later time. See sink.

Respirable

Capable of being inhaled.

Respiratory system

All structures through which air enters the body.

Reversible effect

An effect that is not permanent, especially an adverse effect that diminishes after exposure to a toxic substance ceases.

Risk

In risk assessment, the probability that something will cause injury, combined with the potential severity of that injury.

Risk agent

Chemical substance, biological organism, radioactive material, or other potentially hazardous substance or activity.

Risk characterization

Integration of the data and analysis involved in hazard identification, exposure assessment, and dose response assessment to estimate the nature and likelihood of adverse effects.

Risk estimate

A description of the probability that organisms exposed to a specified dose of a substance (e.g. a chemical) will develop an adverse response (for example, cancer).

Route of exposure

The avenue by which a substance (e.g. a chemical) comes into contact with an organism; such avenues include inhalation, ingestion, and dermal contact.

Safety

Practical certainty that a substance will not cause injury under carefully defined circumstances of use.

Sarcoma

A usually malignant tumor that occurs in connective tissue or other mesodermal cells (mesodermal cell are one of the basic tissue types).

Sensitive species

Those species classified as candidate or monitor species.

Sensitization

The process (chemical exposure and immune response) through which a person acquires an antibody-mediated sensitivity to a chemical or other allergen.

Sink

A place in the environment where a compound or material collects. See reservoir.

Skin cancer

Common cancers (over 500,000 cases per year in the United States) associated with excessive exposure to the sun and some occupational exposures. Most serious type is malignant melanoma.

Slope failure

Gradual or rapid downslope movement of soil or rock under gravitational stress, often as a result of man-caused factors, e.g. removal of material from the base of a slope.

Slope stability

The resistance of a natural or artificial slope to failure by landsliding.

Solvent

A liquid capable of dissolving another substance. Many solvents are organic, or carbon-based; many of these are volatile, flammable, and toxic. Examples: acetone, trichloroethylene (TCE), perchloroethylene, benzene. Water is a nonorganic solvent.

Somatic

Pertaining to the body cells, as opposed to reproductive cells.

Sorption

A surface phenomenon that may be either absorption or adsorption, or a combination of the two; often used when the specific mechanism is not known.

Statistically significant

Experimental results that are "not likely" to have occurred by chance. "Significant with .05 probability" means there is only a 5 percent probability that the results were attributable to chance and a 95 percent probability that the results were attributable to the experiment.

Subchronic

Of intermediate duration, usually used to describe studies or levels of exposure of between 5 and 90 days.

Sublethal

Pertaining to a dose level that is less than an amount necessary to cause death.

Substance

Refers to chemicals and other external, nonliving sources of potential hazard, such as ionizing radiation and microwaves.

Synergism

Effects from a combination of two or more events, efforts, or substances that are greater than would be expected from adding the individual effects.

Synthetic

Made by man.

Systemic effects

Effects observed at sites distant from the entry point of a chemical owing to its absorption and distribution into the body.

Teratogenic

Capable of producing birth defects.

Threatened species

Any species that is not presently endangered but could become so in the foreseeable future.

Threshold

The lowest dose of a substance (e.g. a chemical) at which a specified measurable effect is observed and below which it is not observed.

Tissue

A group of similar cells that form one of the structural materials of a plant or animal.

Toxicant

See poison.

Toxicity

The quality or degree of being poisonous or harmful to plant, animal, or human life.

Toxicology

The study of toxic chemicals and their effects on organisms.

Toxin

A poison of biological origin.

Transformation

Changes in the visible characteristics and/or growth patterns of cells, usually accompanied by the ability to cause tumors when inoculated into a host organism.

Tumor

Abnormal tissue that keeps growing after the original stimulus to growth has ceased. Also called a neoplasm. A benign tumor does not form metastases (secondary tumors) and does not invade and destroy nearby normal tissue. A malignant tumor invades, destroys, and metastasizes and is likely to kill the host unless treated.

Tumor incidence

Fraction of animals having a tumor of a certain type.

Uncertainty factors

Factors used to adjust for multiple sources of uncertainty encountered in using experimental data for predicting effects on humans, such as intraspecies variation, interspecies variation, synergism, and different routes of exposure (oral verses inhalation). EPA guidelines provide the following uncertainty factors:

Factor	Used to extrapolate from:
10	Valid human evidence
100	Valid long-term animal studies
1000	Animal studies of less than chronic exposure
1-10	Additional factor used to extrapolate from a LOAEL instead of a NOAEL

Unity

The degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. Unity refers to the compositional harmony or inter-compatibility between landscape elements.

Vividness

The memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern.

Water-soluble

Dissolves in water.

Xenobiotic

Foreign substance, or one not usually found in a particular organism.

Glossary of Soil Terms

Definitions for the great soil groups are:

Argixerolls

Mollisols found under an xeric moisture regime in a Mediterranean climate that have a relatively thin argillic horizon or one in which the percentage of clay decreases rapidly with depth. Most have a ca horizon or a calcic horizon below or in the lower part of the argillic horizon.

Camborthids

Aridsols formed mostly in sediments having a light-colored surface horizon over an altered (cambric) horizon that generally, is redder or browner than the surface horizon. Either there is no pronounced horizon of carbonate accumulations (a calcic horizon) or the soil does not have free carbonates in the upper horizons to a depth of more than seven inches. They are found in arid regions.

Cryorthods

More or less free draining Spodosols found under cold conditions at high elevations that do not have a fragipan or placic horizon. The horizons are mostly thin, but they may be strongly contrasting.

Dystrandepts

Andisols formed on volcanic ash featuring a low bulk density, large amounts of organic carbon and amorphous materials and a small amount of bases. Generally found under forested conditions.

Dystrochrepts

More or less freely drained brownish, acid Inceptisols found in humid regions. They have developed mostly in Holocene deposits or on steep slopes.

Haplohumults

More or less freely drained, humus rich Ultisols found in steep coniferous forested covered mountainous areas with high precipitation. They have some weatherable minerals in the argillic horizon.

Haplorthods

More or less freely drained Spodosols found where the soil temperature regime is warmer than Cryorthods. Generally support coniferous forest vegetation.

Haploxerolls

Freely drained mollisols found under xeric moisture regime that do not have argillic subhorizons. Generally support grass and shrub communities, with occasional dry conifer stands.

Haplumbrepts Acid

Dark reddish or brownish, freely drained, organic matter-rich Inceptisols found in coniferous forested mountainous region with high winter precipitation and generally short dry summers.

Torripsamments

Sands most often in dunes found in arid climates.

Vitrandepts

Freely drained soil developed from recently deposited volcanic ash or pumice. Generally found in coniferous forest region, very productive and high in moisture holding capacity.

Xerochrepts

Reddish or brownish freely drained Inceptisols of Mediterranean climates. They are mostly moist in winter or spring, but are thoroughly dry in summer. In an earlier classification they were known as Brown Forest soils.

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