



Climate Change

Yakama Nation

*Adaptation Planning and **Action***

Jonalee Squeochs
Yakama Nation Fisheries



Map 1. The territories of the Yakama Nation, including the ceded lands and the Yakama Nation reservation.

Review of Approach

Phase 1: (1) general information about YN programs, interests and important resources and (2) outline potential vulnerabilities, risks and critical uncertainties. *Climate Adaptation Plan for the Territories of the Yakama Nation, v1. April 2016.*

Phase 2: Vulnerability and Risk Assessments – Action Plan. (1) detailed vulnerability and risk assessment of infrastructure, community health and programs within the Yakama Nation reservation and (2) natural resource interests throughout the territories of the Yakama Nation. December 2017.

Phase 3: Implementation, Monitoring and additional Planning for future actions. December 2018.

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Climate Adaptation Plan for the Territories of the Yakama Nation

APRIL 2016



Posted on the YN General Website

Water and Wetlands

RESEARCH AND MONITORING

1. **Continue to inventory, identify, and prioritize stream reaches, floodplains, riparian areas, and wetlands for protection and for restoration** in collaboration with fisheries and wildlife experts. Take into account areas that are expected to be particularly resilient or particularly vulnerable in the context of a changing climate.
2. **Continue to inventory, identify, and prioritize areas where aquifer recharge is feasible and effective.**
3. **Evaluate the need to modify existing integrated water resource management plans or develop new plans** for each sub-basin, and incorporate climate change considerations into those plans.



CLIMATE ADAPTATION PLAN FOR THE TERRITORIES OF THE YAKIMA RATION

4. **Develop or work to improve existing models** to help managers better anticipate, and where appropriate, control instream flows to protect and enhance beneficial uses.
5. **Improve understanding of water use and conservation potential by encouraging and incentivizing the use of meters.**

MANAGEMENT AND IMPLEMENTATION

1. **Work with the State of Washington, the U.S. Forest Service, and other appropriate entities to evaluate the need and establish priorities for removing roads** which disrupt riparian and floodplain function or intercept precipitation and ground water and accelerate its movement into stream systems.
2. **Identify and prioritize transportation infrastructure** where improvements are needed in light of climate change projections, such as enlarging road crossings.
3. **Work with the State of Washington and the U.S. Forest Service to identify and implement forestry practices that would improve water-holding capacity** within the watersheds, help maintain water quality, and reduce stream temperatures.
4. **Prioritize and develop livestock water sources away from riparian, wetland, and other vulnerable and important areas.**
5. **Identify and encourage water conservation measures in residences and towns** in collaboration with the public and local municipalities. Water conservation measures may include, but are not limited to, promoting water reuse, converting existing landscaping, and establishing policies to encourage or require native and/or drought-tolerant landscaping, including replanting lawns.
6. **Increase coordination within the communities to understand the extent of exempt and emergency wells and their impact on flows.** Promote tying such wells to mandatory conservation.
7. **Make use of the strategies and collaboration mechanisms in the Yakima River Basin Integrated Water Resource Management Plan; potentially expand the Plan to make sure climate change impacts are being considered.**
8. **Continue to explore opportunities for increasing irrigation efficiency** and returning diverted water back into stream channels during critical flow periods. Look at the Wapato Irrigation Project and the Rosa Project, for example, as places that may have the largest difference in temperature between withdrawal and returns.
9. **Work with the public and local municipalities** to identify additional actions to promote conservation of water resources in our cities and homes.

Fisheries

RESEARCH AND MONITORING

1. **Use existing or new models to get more information on forecasted stream temperatures and changing hydrologic regimes** in order to better understand potential climate change impacts to fishery resources. Critical impacts may include, but are not limited to, changes in life history patterns and overall productivity.
2. **Develop a long-term integrated monitoring, evaluation, and reporting program**—that clearly identifies the intended function and staffing requirements—in order to track the status and trends of fish, fish habitat, and hydrologic resources.
3. **Identify seasonal refugia and fish use of those thermal refugia**, in order to prioritize conservation efforts.

MANAGEMENT AND IMPLEMENTATION

1. **Continue to evaluate—and adjust, as necessary—practices at hatcheries** to manage fish stocks for increased resilience in the context of anticipated climate change impacts. For example, change adult collection sites and release locations to colder water sources as needed; take juveniles to facilities in cooler locations; vary release dates relative to streamflows; and develop guidance for hatchery facility managers that takes into account anticipated climate variability and change.
2. **Evaluate the need to increase restoration efforts in critical stream, side channel, riparian, and floodplain areas.** Identify critical areas where restoration should be prioritized and summarize the types of actions most needed to maintain or reduce stream temperatures, return flow patterns to more normative conditions, improve the quality and quantity of both spawning and rearing habitats, and regain riverine function and resilience.
3. **Continue to evaluate opportunities and means for improving irrigation efficiency** and returning diverted water back into stream channels during critical flow periods.
4. **Continue to develop management actions to control the abundance of excessive predators, non-native fish, or other aquatic organisms or aquatic plant species that thrive in warmer waters.** Evaluate the feasibility and use of flow management at critical life stages as a potential new management tool.
5. **Identify opportunities for reallocation and redistribution of water in critical basins** through water transfer, water transactions, water markets, and water banks, with the goal of increasing streamflow to benefit fisheries and riparian habitats.
6. **Evaluate the potential to purchase water rights** to be used exclusively for fishery benefits.
7. **Continue to evaluate the use of the Whoosh System** to facilitate fish passage, including around warm stream stretches.
8. **Aggressively seek funding** for restoration actions that focus on holistic measures to protect and restore fish habitats and ecosystem function.



Scanning the Conservation Horizon

A Guide to Climate Change Vulnerability Assessment



Figure 2.1. Key components of vulnerability, illustrating the relationship among exposure, sensitivity, and adaptive capacity.

**Vulnerability + Risk to Tribal Culture from Loss
=
Priority for Actions**

*Many of these we already know –
we are building a case, documenting then calling for actions.*

Ecosystem Habitats

Riverine

Riparian Areas

Wetlands

Shrub-steppe - Rangelands

Forests



Ecosystem Processes

Aquatic Connectivity

Hydro-function

Vegetative Connectivity

Natural Fire Regime

Insects / Forests



Focal Species

Salmon – Steelhead

Lamprey, Tail frog

Mink, Otter

Grizzly – Black Bear

Mule deer – Elk - Antelope

Coyote – Wolf

Quail, Pheasant, Eagles, Hawks

Sage Sparrow, Sage Grouse, Sage Thrasher

White Headed Woodpecker

Cottonwood

Huckleberry, Current, Service berries,
Chokecherry, roots (Coos, celery, camas,
bitterroot)



Funded BIA Objectives

1. Evaluate **vegetative responses** to climate change in the **forested areas** of the Yakama Nation Forest.
2. Evaluate **vegetative responses** to climate change in the **shrub-steppe and range lands** within the Yakima Subbasin.
3. Evaluate **responses of wetlands and meadows** to climate change within the reservation lands of the Yakama Nation.
4. Evaluate the potential of biological (beaver dams) and constructed (low-head check dams) **low-cost water retention structures** for increasing water storage on the landscape.
5. Evaluate **salmonid fisheries responses** (life history, abundance and distribution) to anticipated changes in water temperature and flow from environmental projections of climate change.

SPECIES	Habitats					Ecosystem Process			
	*Riverine	*Riparian	*Wetland	SS-Range	Forest	Aquatic Con	Veg Connect	Nat Fire Reg	Insects - Paths
<i>Fishes</i>									
*Salmon	P	s				P		s	
*Steelhead	P	s				P		s	
*Bull Trout	P	s				P		s	
*Cutthroat Trout	P	s				P		s	
Pac Lamprey	P	s				P		s	
<i>Amphibians</i>									
Tailed Frog	s	P				P		s	
<i>Avian</i>									
Trumpeter Swan			P			P		s	
Greater Sage-Grouse				P			P	s	
WH Woodpecker					P		P	s	P
Lewis Woodpecker		s		P	P		P	s	P
Pygmy Owl				P			P		
Burrowing Owl				P					
Eagle, Bald		P							
Eagle, Golden				P					
Hawk (?)				P	P				
Sage Sparrow				P					
Sage Thrasher				P					
Quail				P					
Pheasant				P					

<i>Mammals</i>									
Mule Deer		s		P			P	P	P
RM Elk		s		P					
Grizzly Bear		s			P				
Black Bear		s			P		P	P	P
Wolverine					P			P	P
Canada Lynx					P			P	P
Pronghorn Antelope					P			P	P
Otter		P					P		
Mink		P					P		
Pygmy Rabbit					P				
<i>Vegetation</i>									
Whitebark Pine						P			
Cottonwood, Black	s	P					P		
Huckleberry						P			
Currents		P							
Service Berries					P				
Chokecherry		P							
Roots		P	P	P	P		P		

Sector:	Fisheries					Species	Spring Chinook
Potential Environmental Impacts	Biological Consideration	Geographic Scope (HUC?)	Vulnerability	Confidence of Vulnerability	Estimated Risks	Priority	Key Strategies
Increase/Decrease Stream Flows							
Increased flood frequency and higher peak flows	Reduce egg-fry survival for fall spawners and yearling parr winter survival.	Upper Yakima	H	H	H	H	<ul style="list-style-type: none"> • Increase spawning habitat resilience by restoring stream and floodplain structure and processes. • Increase habitat resilience by reducing threats from roads and infrastructure in the floodplain.
		Mid Yakima	M	M	M	M	
		Lower Yakima	L	M	M	L	
		Satus – Toppenish	NA	H	L	L	
		Naches - Tieton	H	H	H	H	
Lower low flows – reduction of fish habitat quality	Reduction of egg-smolt productivity, spatial diversity. Increase Pre-spawn mortality.	Upper Yakima	H	H	H	H	<ul style="list-style-type: none"> • Increase aquatic habitat resilience to low summer flows • Manage upland vegetation to retain water and snow in order to slow spring snowmelt and runoff • Increase in-stream flows with dry-season water conservation to reduce withdrawals
		Mid Yakima	H	M	M	M	
		Lower Yakima	M	M	M	M	
		Satus – Toppenish	NA	H	H	L	
		Naches - Tieton	H	H	H	H	
Increased Water Temperature							
Warmer stream temperatures will reduce thermal heterogeneity in streams	Will increase thermal stress on many life stages of fish	Upper Yakima					
		Mid Yakima					
		Lower Yakima					
		Satus – Toppenish					
		Naches - Tieton					
	Warmer stream temperatures may favor non-native fish species	Upper Yakima					
		Mid Yakima					
		Lower Yakima					
		Satus – Toppenish					
		Naches - Tieton					

Stillaguamish Tribe Natural Resources Climate Change Vulnerability Assessment

Final Draft | September 30, 2015

Prepared by the
Climate Impacts Group
University of Washington



Meade Krosby, UW Climate Impacts Group
Harriet Morgan, UW Climate Impacts Group
Michael Case, UW School of Environmental and Forest Sciences
Lara Whitley Binder, UW Climate Impacts Group

Mountain Lion

Stillaguamish Vulnerability Assessment: CCVI Results

Common Name: Mountain Lion
Scientific Name: *Puma concolor*

CCVI¹ Ranking 2050s: **Presumed Stable**
CCVI Ranking 2080s: **Presumed Stable**



The mountain lion received a CCVI ranking of *presumed stable* for both time horizons evaluated (2050s and 2080s). This stable vulnerability ranking is a result of the species' flexible diet and movement capabilities, which enable it to move to new locations as conditions change over time.

Key Exposures and Sensitivities

- **Anthropogenic Barriers – Increase Vulnerability**
Roads, industrial or urban development, suburban or rural residential development can act as barriers to dispersal.²
- **Historical Thermal Niche – Increase Vulnerability**
Considering the mean seasonal temperature variation for the species' range within the Stillaguamish watershed, the mountain lion has experienced small (37 - 47° F/20.8 - 26.3° C) temperature variation in the past 50 years.³
- **Dispersal / Movement – Decrease Vulnerability**
The mountain lion's maximum annual dispersal is estimated to be greater than 100 km.^{2 4} Dispersal may be affected by loss of travel corridors if forests become fragmented by fire or disease.³
- **Diet – Neutral**
The mountain lion is a highly opportunistic feeder, consuming a wide variety of vertebrate prey. Their primary food is deer in many areas.²

Additional Factors Not Reflected in the CCVI

Declining summer precipitation and a longer dry season could reduce food resources and lead to population declines. An increase in the length of the freeze-free period may facilitate the spread of diseases that were previously limited by cold temperatures. An increase in the area burned may also reduce availability of prey and habitat.

Future Research Needs

It is unknown if the mountain lion is dependent on a disturbance regime that is likely to be impacted by climate change. It is unknown if the mountain lion is exhibiting phenological responses to changing seasonal temperature or precipitation dynamics.

¹ Results incorporate projected temperature change (compared to baseline average 1961-1990) for the 2050s and 2080s for two separate emission scenarios from the IPCC 4th Assessment (high emissions scenario A2 and medium emissions scenario A1B). For the 2050s and 2080s, the temperature binning classification used by NatureServe puts the temperature projections for the two emission scenarios into the same temperature bin, thus leading to identical CCVI rankings. Since NatureServe does not distinguish between the two scenarios, we do not present separate results for each scenario, instead including just one scenario each for the 2050s and 2080s.

² Climate Change Sensitivity Database <http://climatechangesensitivity.org/species/puma-concolor>

³ Young et al. (2011)

⁴ Territoriality of the mountain lion is not taken into consideration when discussing dispersal/movement.

⁵ Stillaguamish Tribe's Natural Resources Staff – Personal Communication

*And let's not forget
why we are doing
this....*

*Questions and
Discussion*

