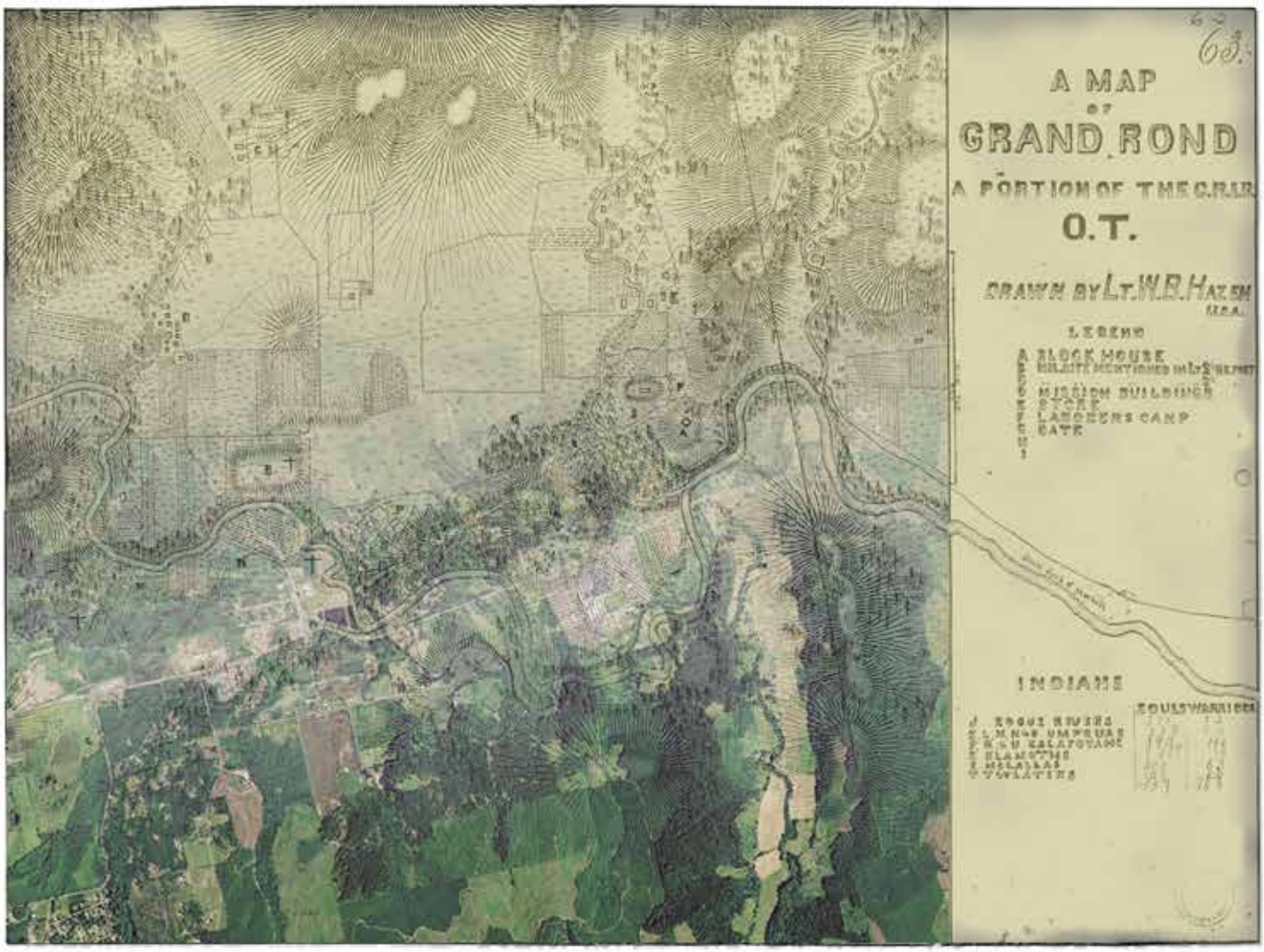
The Confederated Tribes of Grand Ronde Wildlife Management Plan



The Confederated Tribes of Grand Ronde Wildlife Management Plan

Executive Summary September 5th, 2014

Introduction

On April 18, 2008 The Confederated Tribes of Grand Ronde struck an agreement with the State of Oregon to adopt state wildlife management plans as The Confederated Tribes of Grand Ronde Interim Fish and Wildlife Management Plan until such time as they develop a Tribal Fish and Wildlife Management Plan of their own. The following document represents the Tribes' own Wildlife Management Plan.

Plan Organization

The Tribal plan covers 12 fish and wildlife species including four upland game bird species. The overall management goal along with objectives and strategies to achieve that goal is established for each species. The economic and cultural values along with a brief life history and management issues are also addressed for each species.

Action Area and Implementation

The Oregon Fish and Wildlife Commission (Commission), in reviewing and approving this plan, has delegated its statutory authority to manage fish and wildlife to the Confederated Tribes of the Grand Ronde only as specified herein. This delegation is voluntary, discretionary, and revocable by subsequent Commission action. However, the Commission and Tribes agree that any modification to this plan, or revocation of the plan or delegated authorities, requires written notice to the other party at least 90 days prior to the action. The intent of the delegation is to establish a cooperative relationship of responsibility and stewardship between the Commission and the Tribes.

The action area as a whole covers an enormous geographic region, involving both Tribal lands and Ceded lands as well as authorized hunting and fishing areas. Therefore, the Plan is structured to address these areas in three ways.

1. For the Reservation and Tribal trust lands, the Tribes assume full authority as delegated by the State of Oregon Fish and Wildlife Commission through OAR 635-043-0130 to manage fish, wildlife, and their habitats, as specified herein the Tribal Wildlife Plan.
2. For authorized hunting and fishing areas, the State of Oregon Fish and Wildlife Commission recognizes the Joint Memorandum in Support of Consent Decree of 1986 of special Tribal interest and rights of the designated area(s). The Commission endorses the Tribes' objectives and strategies outlined in the Plan are of particular importance. Nothing in this plan modifies or changes the Consent Decree. However, the Commission, in reviewing and approving this plan, recognizes the Tribes' special rights in the Trask Unit as represented in the Consent Decree, and agrees to cooperate and coordinate with the Tribes in implementing both Tribal and Commission plans, strategies, rules and laws in this area.
3. The Tribes have a vested interest in all Ceded lands, as shown in Figure 2. The Commission will retain full authority of fish, wildlife, and their habitats in these areas, as the State of Oregon considers the Consent Decree of 1987 to have defined "specifically and permanently, the nature and extent of the Tribes' rights." Nothing in this plan modifies or changes the Consent Decree. However, the Commission, in reviewing and approving this plan, recognizes the Tribes' historic cultural interests in these lands and agrees to cooperate and coordinate with the Tribes when implementing Commission plans, strategies, rules, and laws in this area.

Conclusion

The Confederated Tribes of Grand Ronde have a long history of land stewardship. The Tribes' connection to the land and their stewardship of natural and cultural resources has been and continues to be pursued. The natural resources of this area have provided the Tribes with a way of life for centuries. It is important to the Tribes that the present and future fish and wildlife management goals provide for cultural, subsistence and recreational needs of current and future Tribal members.

Recommendations

The Tribes recommend meeting semi-annually with the State of Oregon Department of Fish and Wildlife to ensure coordination with Plan actions and implementation to the benefit of wildlife

and;

The Tribes recommend a five year Plan review process with the state, for updates and revisions.

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Cover: Map of Grand Ronde drawn by Lt. William Hazen in 1857. This image is faded into an aerial photo of the same area from 2009.

A. Introduction

The Confederated Tribes of Grand Ronde's ceremonial hunting rights were restored to the Tribes by the State of Oregon's Fish and Wildlife Commission on April 18, 2008. This allowed Grand Ronde Tribal members the legal right to hunt deer, elk and bear for important Tribal ceremonies and celebrations which occur outside of state sanctioned hunting seasons.

A component to the ceremonial hunting rights agreement between the State of Oregon and the Tribes involved the establishment of a Tribal Fish and Wildlife Management Plan. There were two steps in this process. First, as an exercise of the Tribes' authority as a sovereign nation, the Tribes adopted state wildlife management plans as The Confederated Tribes of Grand Ronde Interim Fish and Wildlife Management Plan. Second, the Tribes would establish a management plan of their own for fish and wildlife resources on Tribal lands. This document represents the second step in the process, The Confederated Tribes of Grand Ronde Fish and Wildlife Management Plan (Plan). The goal of this Plan is to restore management authority to the Tribes for the management of wildlife resources on Reservation and Trust lands.

The following Fish and Wildlife Management Plan was developed by The Confederated Tribes of Grand Ronde (Tribes) Natural Resources Department (NRD). The plan contains goals, objectives and strategies that the Tribes believe will enhance and protect fish and wildlife resources.

A1. Plan Organization

A1.1 Species Covered and Structure of the Plan

The Confederated Tribes of Grand Ronde Fish and Wildlife Management Plan covers the following species:

1. Winter steelhead
2. Coastal cutthroat trout
3. Coho salmon
4. Spring Chinook salmon
5. Pacific lamprey
6. Crayfish
7. Columbian black-tailed deer
8. Roosevelt elk
9. Upland game birds
    a. Blue (Sooty) grouse
    b. Ruffed grouse
    c. Mountain quail
    d. California quail
    e. Wild turkey
10. Cougar
11. Black bear
12. Coyote
13. Bobcat

A1.2 Document Format

Each species is covered in a basic outline format:

1. Management Goal - states the broadest management goal for the particular species.
2. Biology - covers the basic life history and habitat requirements of the particular species.
3. Economic/Cultural Aspects - touches upon the past, present and future economic and cultural value of the species.
4. Management Issues - covers the obstacles to achieving the management goals.
5. Management Objectives and Strategies - objectives identify purposes and strategies identify actions that may be employed to reach management goals.

A1.3 Sidebars

Interspersed throughout the plan are technical and cultural sidebars. These sidebars provide an insight into some of the technical projects the Fish and Wildlife Department is working on and some of the cultural connections with the species covered under this Plan.

A2. Action Area

This plan defines an action area consisting of three categories, with different boundaries and authorities for each. The action area encompasses lands of historic and cultural interest to the Tribes, and recognizes the fact that wildlife resources are not confined to specific boundaries. These three categories include: Reservation and Trust lands, Authorized hunting and fishing areas of the Consent Decree of 1987, and Tribal Ceded lands. Sections A2.1 through A2.3 further define the boundaries of the different land categories. Section A3 defines the authorities and considerations granted to the Tribes for each land category. The Oregon Fish and Wildlife Commission (Commission), in reviewing and approving this plan and adopting OAR 635-043-0130, has delegated its statutory authority to manage fish and wildlife to the Confederated Tribes of the Grand Ronde only as specified herein. This delegation is voluntary, discretionary, and revocable by subsequent Commission action. However, the Commission and Tribes agree that any modification to this plan, or revocation of the plan or delegated authorities, requires written notice to the other party at least 90 days prior to the action. The intent of the delegation is to establish a cooperative relationship of responsibility and stewardship between the Commission and the Tribes.

Figure 1. Action Area.

A2.1 Reservation and Trust Lands:

The original Grand Ronde Reservation, established in 1857, covered more than 60,000 acres. Federal recognition of the Tribes was terminated in 1954. Federal recognition of the Tribes was restored and a portion of the original Reservation was returned in 1988. The present day Reservation consists of approximately 10,212 acres of Douglas-fir forest. The Reservation is an important community asset and the Tribes manage it for multiple uses such as timber production, fish and wildlife, and recreation. The Tribes also hold an additional 2,955 acres of land in trust or fee status with a wide range of purposes including government and community infrastructure, forestry production, natural resources management, farming, and commercial and industrial use. Current Tribal lands are shown in Figure 2. As specified in the 2007 Proclamation signed by the Governor, Chair of the Commission, and Chair of the Tribal Council (attached), this document, when approved by the Commission, will delegate the Commission's authority to manage fish and wildlife on Reservation and Trust lands to the Tribes as specified herein.

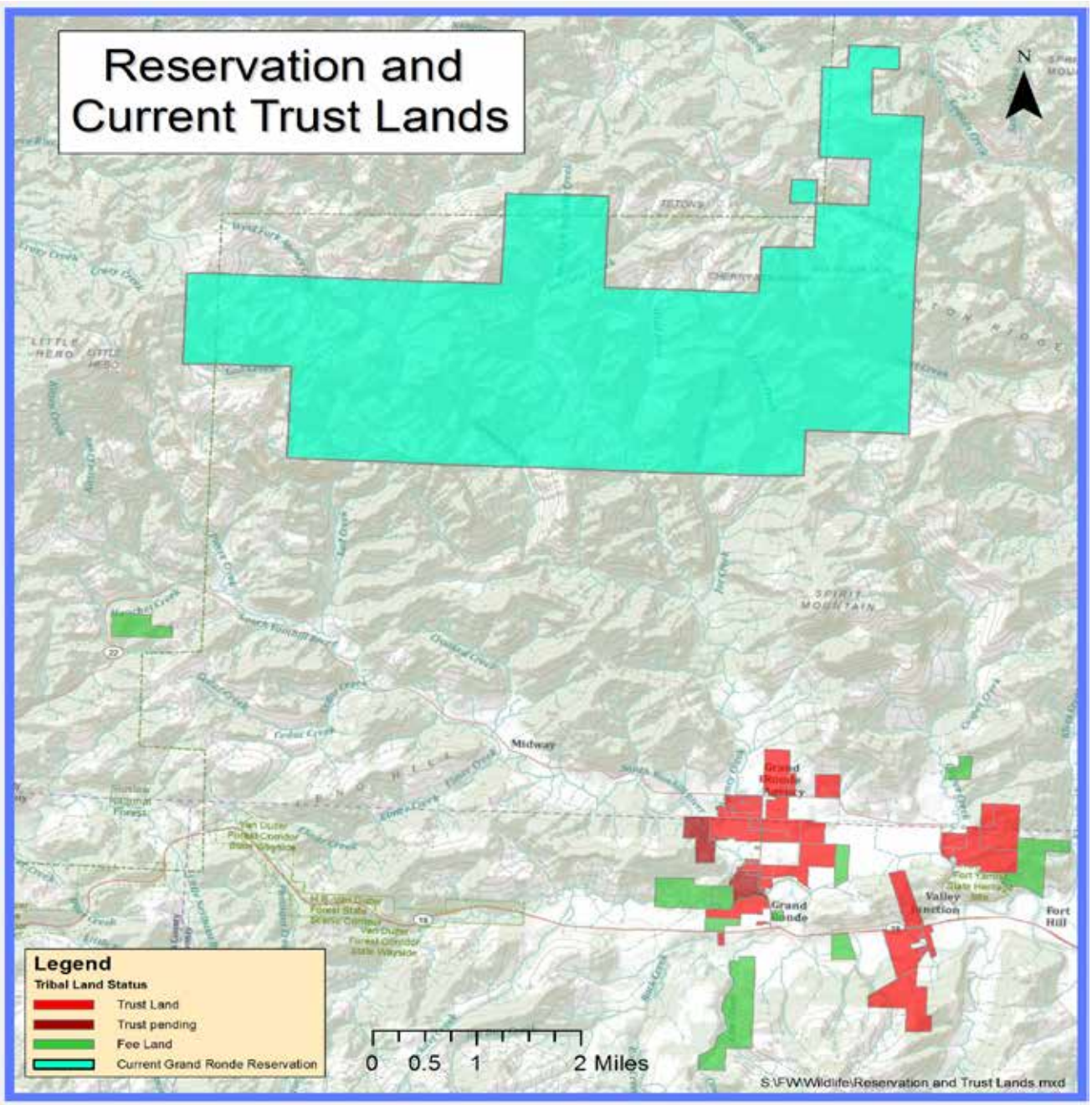


Figure 2. Reservation and Trust Lands.

A2.2 Authorized Hunting and Fishing Areas of the Consent Decree of 1987:

The Tribes' authorized hunting and fishing areas defined in the Consent Decree consist of the Trask Wildlife Unit, which covers 1,314 square miles in northwestern Oregon (Figure 3). The State of Oregon Fish and Wildlife Commission recognizes special Tribal interest and rights of the designated area(s). Nothing in this plan modifies or changes the Consent Decree. However, the Commission, in reviewing and approving this plan, recognizes the Tribes' special rights in the Trask Unit as represented in the Consent Decree, and agrees to cooperate and coordinate with the Tribes in implementing both Tribal and Commission plans, strategies, rules and laws in this area.

Figure 3. Authorized Hunting and Fishing Areas.

A2.3 Ceded Lands:

The Confederated Tribes of Grand Ronde are comprised of over 30 smaller tribes and bands that were removed from their lands in the 1850s, subsequently ceding these lands to the federal government. The land ceded to the United States by the Tribes included most of western Oregon as well as parts of southwest Washington and northern California. The treaties that ceded Tribal lands to the United States did not cede the Tribes' interest or connection to these ancestral homelands. The Tribes who signed this treaty were removed to the Grand Ronde Reservation, but retained a connection to their ceded lands. Tribal people have continued to fish and gather in their ceded lands throughout the Reservation era (1857-1954), the Termination era (1954-1983), and post-Restoration (1983-present). Ceded lands are shown in Figure 4. The State of Oregon considers the Consent Decree of 1987 to have defined "specifically and permanently, the nature and extent of the Tribe's rights." Nothing in this plan modifies or changes the Consent Decree. However, the Commission, in reviewing and approving this plan, recognizes the Tribe's historic cultural interests in these lands and agrees to cooperate and coordinate with the Tribes when implementing Commission plans, strategies, rules, and laws in this area.

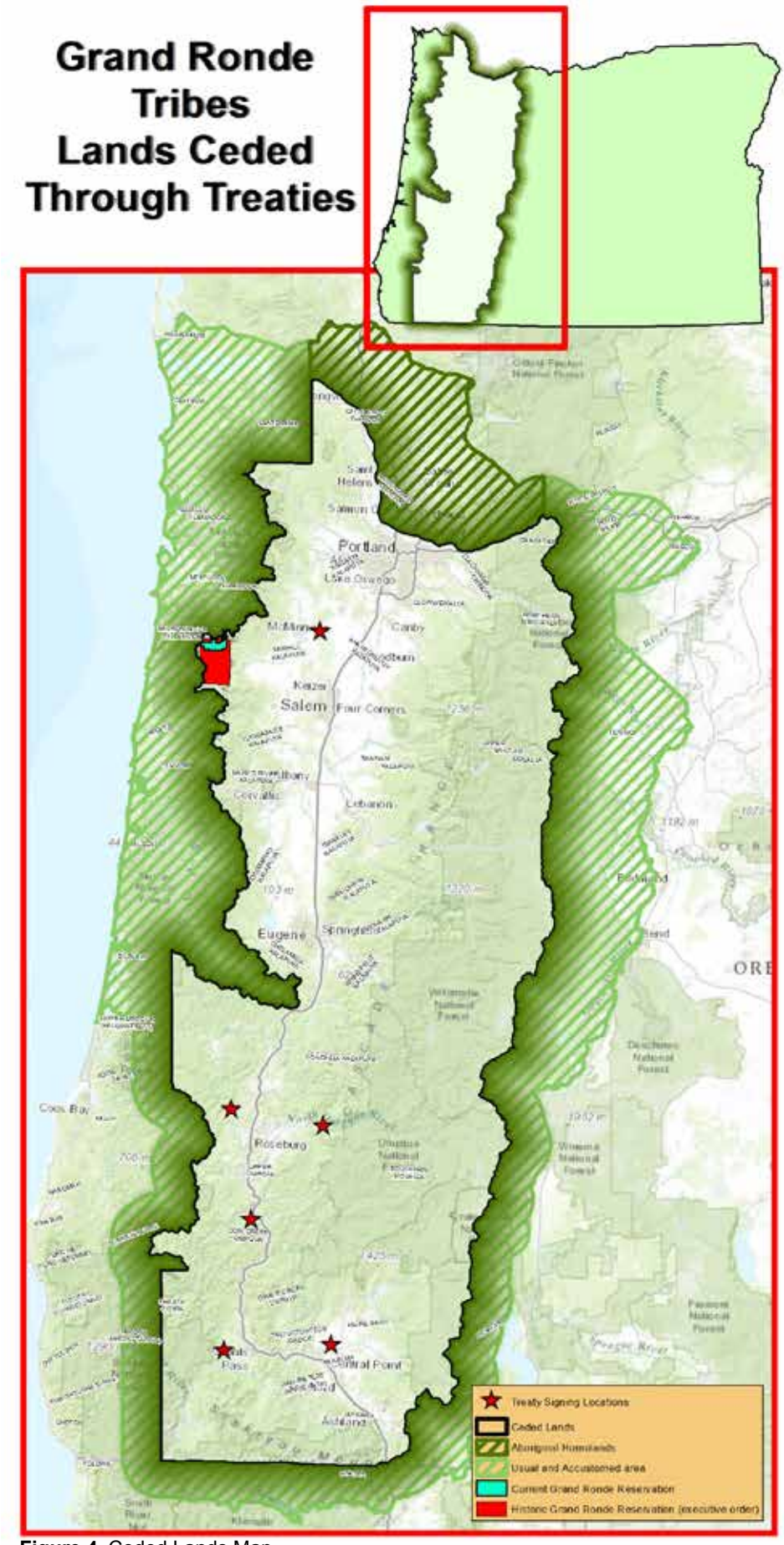


Figure 4. Ceded Lands Map.

A3. Implementation

A3.1 Reservation and Trust Lands

The Oregon Fish and Wildlife Commission, in reviewing and approving this plan, has delegated its statutory authority to manage fish and wildlife to the Confederated Tribes of the Grand Ronde as specified herein.

A3.2 Authorized Hunting and Fishing Areas

The State recognizes the Consent Decree in establishing special hunting, fishing and gathering rights to the Tribes and further, it recognizes the Tribes' special interests in this area. While nothing in this plan changes current legal authorities, the Commission recognizes the Tribes objectives and strategies as specified in the Plan. Both parties will seek cooperative opportunities to implement the objectives and strategies of the Plan for the benefit of fish and wildlife species and their habitats.

A3.3 Ceded Lands

The Commission retains full authority of fish and wildlife in these areas, and agrees to cooperate and coordinate with the Tribes when implementing Commission plans, strategies, rules and laws in this area. Special consideration will be given to the Tribal Wildlife Plan when implementing fish and wildlife management activities on Tribally owned lands not in trust status. Both parties agree to work cooperatively and meet on a government to government basis on policies and actions that could have an effect on fish and wildlife resources on such lands.

A4. Disclosures

The Plan is intended as a broad overarching foundation for the development of specific action or implementation plans which would be developed in coordination with cooperating and/or regulating agencies. The Tribes agree to share information on fish and wildlife management.

The Tribes intend to report progress or action developed under the plan to the Oregon Department of Fish and Wildlife Commission. This Plan is recognized as an evolving document. Both parties intend to work cooperatively to implement components of the plan and components may be amended as needed.

B. Winter Steelhead (*Oncorhynchus mykiss*)

B1. Winter Steelhead Management Goal

B2. Winter Steelhead Biology

B3. Winter Steelhead Cultural/Economic Aspects

B4. Winter Steelhead Management Issues

B5. Winter Steelhead Management Objectives and Strategies

B6. Winter Steelhead References

B1. Winter Steelhead Management Goal

Restore and enhance a population of adult steelhead in the Willamette Basin watershed, to the extent possible, to support Tribal fishing opportunities and experiences.

B2. Winter Steelhead Biology

Steelhead trout (*Oncorhynchus mykiss*) belong to the family Salmonidae which includes all salmon, trout, and chars. Steelhead are the anadromous form of rainbow trout, a salmonid species native to western North America and the Pacific Coast of Asia. The term anadromous refers to fish species born in streams that migrate to the ocean for their adult phase (Quinn 2005).

Steelhead trout share similarities in their life cycle with other native salmon species in the Northwest. The native salmon species and steelhead trout are cool water species and have similar ecological requirements. Though general similarities are prevalent, steelhead life history is also very unique in many ways. Steelhead life history is highly variable and complex. They are born in fresh water streams, where they spend their first one to three years of life. They then journey to the ocean where most of their growth occurs. After spending between one to three years at sea, steelhead return to their native fresh water stream to spawn. Spawning of native winter steelhead in the Willamette Subbasin typically occurs from late February through April. Unlike other species in the *Oncorhynchus* genus, steelhead are spring spawners and their eggs incubate at the same time stream temperatures are increasing. It takes steelhead 360 Accumulated Thermal Units (ATUs) (a collective total of 360°C over time) to hatch and 600 ATUs (a collective total of 600°C over time) to emerge

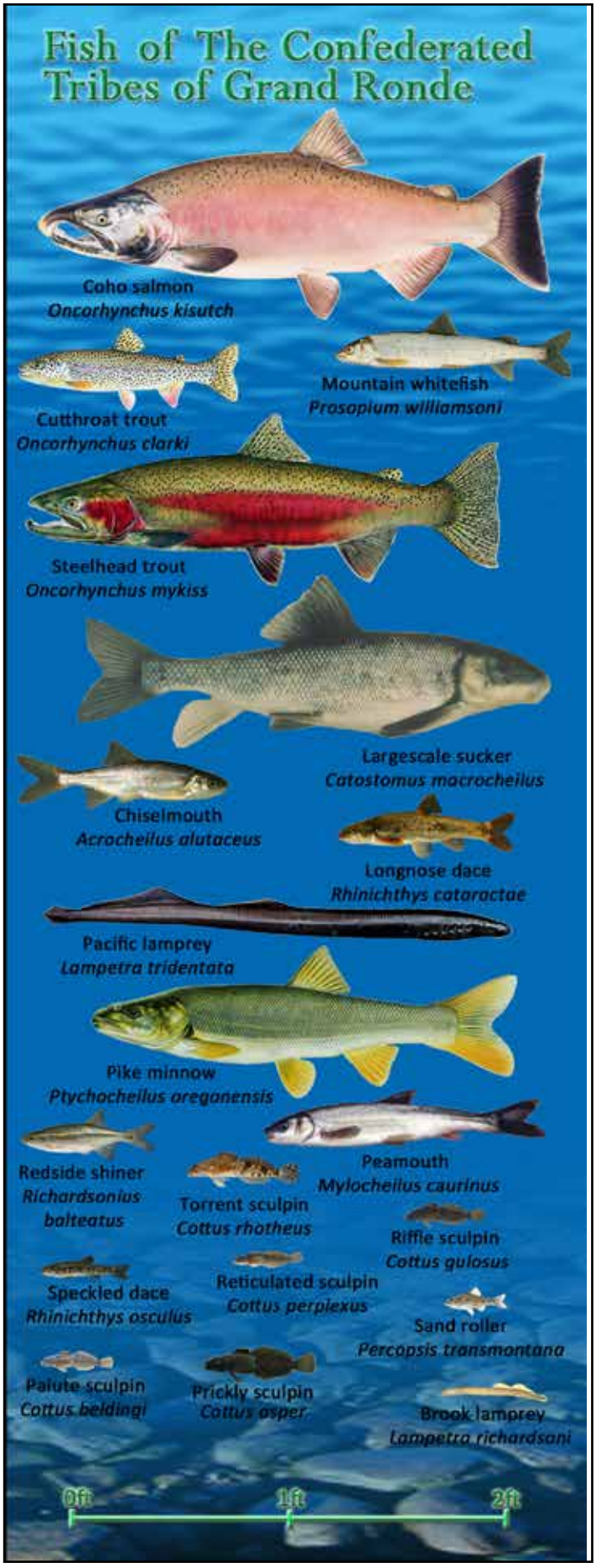


Figure 5. Fish Found on the Reservation.

from the redd. Unlike other native Northwest salmon species, steelhead do not necessarily die after spawning and are able to spawn more than once (Quinn 2005). A small proportion of spawners (referred to as kelts) may return to the ocean for a short period and repeat the spawning migration.

When steelhead die after spawning, their bodies become a direct food source for a wide variety of vertebrate species and through decomposition they also introduce important nutrients for aquatic plants and insects that are in turn a crucial food source for resident and rearing fish.

Steelhead can be divided into "ocean maturing" or winter steelhead and "stream maturing" or summer steelhead (Quinn 2005). The run we are concerned with in Tribal waters is the winter steelhead. The native winter steelhead run above Willamette Falls (Falls) is commonly referred to as the "late run" of winter steelhead. The historic return-time of adult winter steelhead that migrated upstream of the Falls can be viewed as an adaptive response to flow condition prior to laddering of the Falls. On typical runoff years, historic winter steelhead would ascend the Falls in late March and April (ODFW 1992). Due to more favorable passage conditions, winter steelhead mature in the ocean and enter fresh water in winter or spring anytime from later January until late April (Quinn 2005). The native winter steelhead are genetically distinct from introduced hatchery winter and summer steelhead that also ascend the Falls. The majority of winter steelhead returns are destined for eastern natal tributaries flowing off the Cascades. The Yamhill watershed, which drains a portion of the Coastal mountains, supports a greater number of winter steelhead than its western counterparts (ODFW 1992). Steelhead production for tributaries west of the Willamette River tend to be naturally limited due to many low stream gradients. However, the upper reaches of the South Yamhill River watershed are characterized by gravel or bedrock bottoms, boulders, and fast water with riffles; conditions ideal for salmonid production (Wever et al. 1992).

Historically, the Yamhill Subbasin probably never supported large numbers of winter steelhead (Wever et al. 1992). Although steelhead exist on Tribal lands, their genetic origin is in doubt. Oregon Department of Fish and Wildlife (ODFW) began stocking programs for steelhead and coho salmon in the Yamhill Subbasin watersheds in the 1960s and continued until the late 1980s. Anecdotal information from Tribal elders and state reports (Dimmick and Merryfield 1944, Willis et al. 1960) indicate the presence of steelhead before stocking programs began. Most of the steelhead in the Yamhill Subbasin are thought to be derived from Big Creek hatchery stock (see Table 1). Recent studies seem to indicate that the current stock has a

Table 1. Steelhead Stocking History.

Winter Steelhead Stocking South Yamhill

Year	Hatchery	Number	Lifestage
1964	NA	109,065	Fry
1965	Big Creek	17,658	Yearling
1966	Big Creek	10,440	Yearling
1967	Big Creek	202	Adults
1982	Big Creek	44,787	Fry

Winter Steelhead Stocking Agency Creek

Year	Hatchery	Number	Lifestage
1965	NA	7,392	Yearling
1966	Big Creek	8,175	Yearling
1967	Big Creek	10,141	Yearling
1968	Big Creek	5,578	Yearling
1967	Big Creek	446	Adults
1968	Big Creek	160	Adults
1969	Big Creek	208	Adults
1971	Big Creek	200	Adults
1972	Big Creek	330	Adults
1984	Big Creek	15,000	Fry
1985	Big Creek	24,265	Fry
1986	Big Creek	12,400	Fry
1989	Big Creek	27,500	N/A

Winter Steelhead Stocking Cosper Creek

Year	Hatchery	Number	Lifestage
1967	Big Creek	212	Adults
1983	Big Creek	3,805	Fry
1985	Big Creek	5,000	Fry
1986	Big Creek	1,935	Fry

Winter Steelhead Stocking Rowell Creek

Year	Hatchery	Number	Lifestage
1972	Big Creek	200	Adult

Winter Steelhead Stocking Rock Creek

Year	Hatchery	Number	Lifestage
1972	Big Creek	200	Adults
1973	Big Creek	200	Adults
1986	Big Creek	74,576	Fry
1988	Big Creek	29,600	N/A
1990	Big Creek	100	N/A

Winter Steelhead Joe Day Creek

Year	Hatchery	Number	Lifestage
1986	Big Creek	32,287	Fry

Winter Steelhead Wind River

Year	Hatchery	Number	Lifestage
1986	Big Creek	12,600	Fry

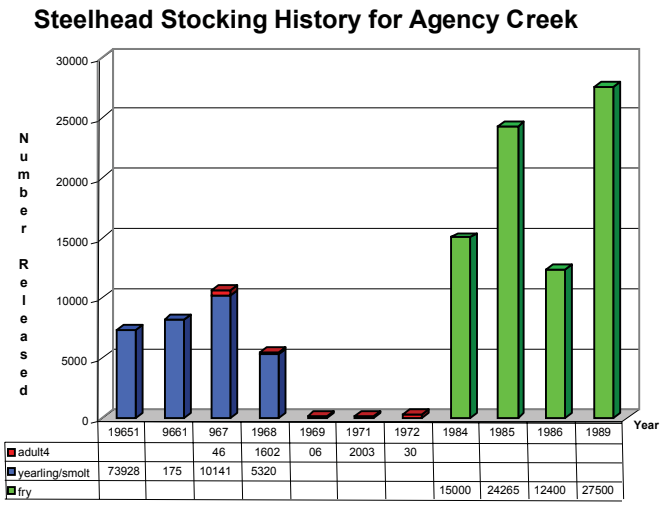


Figure 6. Steelhead Stocking Graph.

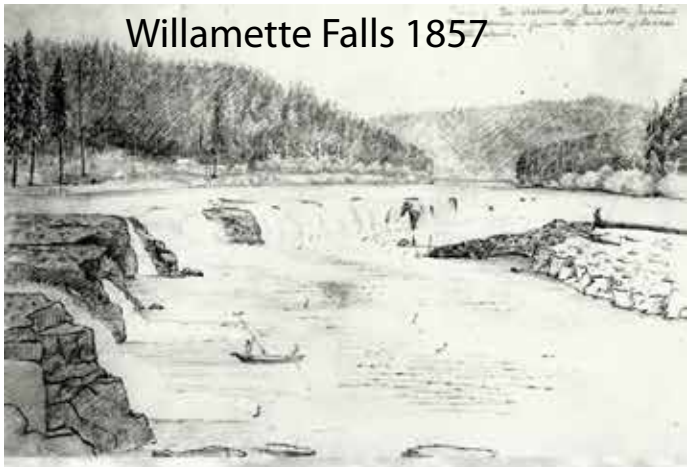
genetic affinity for Columbia River stocks, probably related to Big Creek stocks (Busby et al. 1999).

Steelhead continue to reproduce in local streams. However, there appears to be a drop in the population of steelhead in Agency Creek (one of the largest Tribal streams) since stocking was discontinued in 1990. The number of adult winter steelhead counted in the live box at the Agency Creek fish weir and the number of juvenile steelhead smolts counted at the Agency Creek smolt trap in 2007 and 2008 were very low.

Both the South Fork and North Fork Yamhill watersheds have documented reports of spawning winter steelhead. The estimated total amount of habitat utilized by winter steelhead for spawning in the Yamhill Subbasin is 88.8 river miles with the majority of available spawning habitat (61.6 miles) located in the Upper South Yamhill watershed (ODFW 2007). South Yamhill streams located on Tribal lands provide important spawning and rearing habitat for adult and juvenile winter steelhead.

B3. Winter Steelhead Cultural/Economic Aspects

The Tribes have regarded the historical run of salmon as a significant subsistence resource in the Willamette Valley. These fish are both historically and currently a highly prized commodity. Trout were also a highly valued resource, with steelhead (ocean migrating trout) carrying a value similar to salmon because of their larger size and marine quality flesh.



At the Falls, at the village of a band of Clackamas called the Clowwewallas, large scaffolds of cedar planks and poles rested on piers sunk deep into the riverbed. Platforms projected far into the waterfall and were large enough for dozens of men at once to harvest the fish with dip-nets and spears. Once the fish were brought to shore, teams of women prepared the huge quantities of salmon for drying on racks in the sun or over smokey fires. Mixed with nuts or berries and made into cakes or preserved in tightly woven baskets, the salmon would provide for the Tribe during the leaner winter months. Salmon at the Falls were plentiful enough to enrich the Clackamas beyond simple survival; other tribes came for trade fairs to purchase salmon or to pay tribute for the privilege of fishing in Clackamas territory. (Kohnen 2007)

Molalla expertise also extended to fishing salmon and steelhead. The Tribe developed a tradition both of spear and basket fishing. The latter used 10-by-12 foot vine baskets suspended on poles to catch fish under waterfalls as they were herded into the baskets with brush fences or by throwing stones. (Johnson 1999)

Figure 7. Willamette Falls. (Photo credit: John Rogers).

Many of the Willamette Valley streams provided good fishing opportunities. The fishery at Willamette Falls provided some of the best opportunities, especially in the spring. Steelhead and spring Chinook (*Oncorhynchus tshawytscha*) historically ran concurrently with each other over the Falls due to favorable passage flows in the late winter and spring. Historical catch records suggest that fishing below Willamette Falls in the late 1800s yielded a harvest of roughly 50% Chinook salmon (*Oncorhynchus tshawytscha*), 40% steelhead, and 10% coho salmon (*Oncorhynchus kisutch*) (ODFW 2007). Willamette Valley Tribes have had and continue to have a connection to a fishery at Willamette Falls.

B4. Winter Steelhead Management Issues

In 1999, winter steelhead was listed as Threatened under the Endangered Species Act (ESA) in the Upper Willamette River. The Yamhill Subbasin and the Tribal lands are within the Evolutionarily Significant Unit (ESU) for this species. An ESU is a population or group of populations that is substantially reproductively isolated from other conspecific populations that represent an important component of the evolutionary legacy of the species. The Tribes continue to engage in consultations with National Marine Fisheries Service (NMFS) for projects such as timber sales, management plans, and construction and development projects that may affect these species.

The National Oceanic and Atmospheric Administration (NOAA) lists the following as important habitat components salmon and steelhead need for proper growth and development (NOAA's National Marine Fisheries 2006):

1) Cool, clean water
2) Appropriate water depth, quantity and flow velocities
3) Upland and riparian (stream bank) vegetation to stabilize soil and provide shade
4) Clean gravel for spawning and egg-rearing
5) Large woody debris to provide resting and hiding places
6) Adequate food
7) Varied channel forms

Figure 8. Agency Creek Winter Steelhead.

Anthropogenic impacts to the watershed affect the above habitat needs for salmonids resulting in the decreased survival rates for winter steelhead. In 2002, the Yamhill Basin Council developed a Watershed Assessment for the Upper South Yamhill River. This is an area of heightened interest to the Tribes because lands are located in this watershed. The Watershed Assessment identified the following human caused habitat alterations that have significant influence to the important habitat components for salmon and steelhead listed above. These are not issues specific to the Tribal lands, but are general issues of concern in the Upper South Yamhill River:

1) Loss of riparian vegetation and wetlands
2) Channel modifications
3) Increased sedimentation
4) Altered hydrology
5) Decreased water quality
6) Fish passage barriers

B5. Winter Steelhead Management Objectives and Strategies

In order to meet management goals for winter steelhead, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

B5.1 – Objective – Assess winter steelhead populations

Investigate, research, and monitor winter steelhead populations to gain a better understanding of their distribution, status, and trend which provide a basis for scientifically supported management actions.

B5.1.1 *Strategy – Assess population status*

Develop and implement methodology to assess population status and trend of steelhead. Develop protocol to monitor adult winter steelhead escapement, population distribution, and abundance: as measured by redds per mile through annual spawning surveys. Continue to monitor adult fish counts at existing and potential fish trap sites.

B5.1.2 *Strategy – Assess the genetic profile of winter steelhead*

Investigate and assess the genetic profile and population structure of winter steelhead. Assess and identify current and future genetic risks (genetic bottlenecks). Assess existing genetic variability estimating effective population size based on an assessment of population genetics. Identify suitable populations for translocations, reintroductions, and broodstock development.

B5.1.3 *Strategy – Develop population objectives*

Develop population objectives with the potential of the reintroduction of appropriate native steelhead stocks.

B5.1.4 *Strategy – Investigate effects of competition due to stock supplementation*

Investigate and assess the effects of supplemented winter steelhead inter-specific and intra-specific interactions and competition have on self-sustained populations of native fish species.

B5.2 – Objective – Develop a better understanding of winter steelhead current habitat conditions

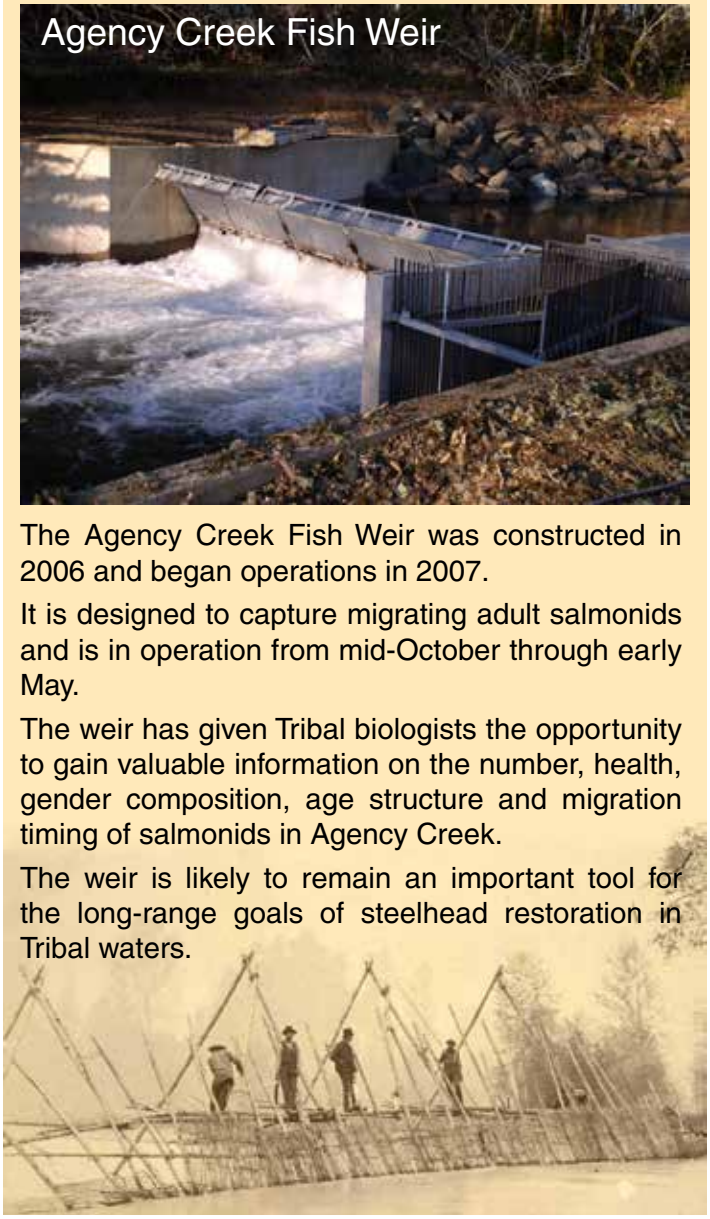
Investigate, research, and monitor winter steelhead habitat to gain a better understanding of their critical habitat and life history needs. Use this information as a basis for scientifically supported management actions.

B5.2.1 *Strategy – Assemble existing habitat data*

Compile existing habitat and water quality data into Tribal database and GIS; identify data gaps and information needs. Conduct necessary research, surveys, and data collection efforts to fill data gaps.

B5.2.2 *Strategy – Identify limiting factors and important habitat*

Investigate and define the life history characteristics of steelhead and identify limiting factors that affect each life stage. Identify critical spawning and rearing areas, seasonal distribution, smolt-to-adult ratios (SARs) and time of juvenile out-migration.



The Agency Creek Fish Weir was constructed in 2006 and began operations in 2007.

It is designed to capture migrating adult salmonids and is in operation from mid-October through early May.

The weir has given Tribal biologists the opportunity to gain valuable information on the number, health, gender composition, age structure and migration timing of salmonids in Agency Creek.

The weir is likely to remain an important tool for the long-range goals of steelhead restoration in Tribal waters.

Figure 9. Agency Creek Fish Weir.

B5.3 – Objective – Restore and improve habitat

B5.3.1 *Strategy – Identify and prioritize habitat restoration*

Conduct an assessment that will identify and prioritize habitat restoration and protection actions for steelhead. Create or adopt existing methodologies that quantify species specific habitat and water quality requirements. Use this information to objectively rank restoration and protection actions.

B5.3.2 *Strategy – Large woody debris restoration*

Where large woody debris (LWD) recruitment is deficient, design and implement LWD placement projects in streams to increase habitat quality.

B5.3.3 *Strategy – Removal of exotic vegetation in riparian areas*

Identify, prioritize, assess, and implement removal of exotic vegetation and noxious weeds in riparian areas.

B5.3.4 *Strategy – Coordinate restoration efforts with others*

The Natural Resources Department shall coordinate with federal, state and local entities to address factors limiting steelhead habitat.

B5.3.5 *Strategy – Secure and protect critical and viable habitats*

Where possible, maximize protection of critical and viable habitats through the acquisition of management rights properties. These properties can be restored and protected for the long term health of winter steelhead through title acquisition, conservation easements, and/or long-term leases in perpetuity.

B5.3.6 *Strategy – Evaluate effectiveness of restoration techniques*

Evaluate and monitor the effectiveness of restoration techniques implemented and report project findings.

B5.4 – Objective – Reduce pollutants

Reduce pollutants to the extent feasible from agricultural activities, urban areas and other sources to meet Oregon water quality standards.

B5.4.1 *Strategy – Develop and maintain proper storm water systems*

Provide guidance and assessment of storm water systems on Tribal developments.

B5.4.2 *Strategy – Address water quality*

Continue to monitor water quality. The Natural Resources Department shall coordinate with federal, state and local groups to assure water quality plans (i.e. Total Maximum Daily Loads (TMDL's), Senate Bill 1010 plans, etc.) are effective in addressing water quality and human health issues affecting migrating winter steelhead and Tribal fish consumption.

B5.5 – Objective – Improve Tribal member steelhead fishing opportunities and experiences

B5.5.1 *Strategy – Improve opportunities to restore traditional practices*

B5.5.2 *Strategy – Develop action plans to increase existing fishing opportunities and experiences*

Develop goals and objectives to improve the fishing opportunity and experience capacity currently available for Tribal members.

B6. Winter Steelhead References

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C. Coastal Cutthroat Trout (*Oncorhynchus clarki clarki*)

C1. Coastal Cutthroat Trout Management Goal

C2. Coastal Cutthroat Trout Biology

C3. Coastal Cutthroat Trout Cultural/Economic Aspects

C4. Coastal Cutthroat Trout Management Issues

C5. Coastal Cutthroat Trout Management Objectives and Strategies

C6. Coastal Cutthroat Trout References

C1. Coastal Cutthroat Trout Management Goal

Maintain a sustainable coastal cutthroat trout population, to the extent possible, to support Tribal fishing opportunities and experiences.

C2. Coastal Cutthroat Trout Biology

Cutthroat trout (*Oncorhynchus clarki*) are indigenous to western North America and their isolation throughout the range of the species has resulted in the evolution of many unique sub-species in the west. The sub-species of coastal cutthroat trout (*Oncorhynchus clarki clarki*) are the dominant native salmonid in the Yamhill River watershed (Moring 1978). Coastal cutthroat trout currently occupies, at least seasonally, 100% of the available habitat (ODFW 2005). According to state records, no stocking of cutthroat trout has occurred in the Yamhill River Subbasin (ODFW 1992).

Though present throughout the Yamhill Subbasin, densities vary across the range. Densities of coastal cutthroat trout increase in the headwater streams, with lower densities in the lowlands likely associated with higher stream temperatures and lower gradient. Densities of coastal cutthroat trout range from 204 fish per mile in the North Yamhill sub-watershed to 437 fish per mile in the South Yamhill sub-watershed (ODFW 1992). The Yamhill River coastal cutthroat trout population is stable and considered “not at risk”, the healthiest status classification utilized by the Oregon Department of Fish and Wildlife in their statewide status report on native fish (ODFW 2005).

Coastal cutthroat trout are rarely the target species in biological studies and most information on the species is incidental documentation and/or spot inventory assessments. Therefore, any baseline life history characteristics of coastal cutthroat trout in the Yamhill Subbasin are more qualitative and descriptive rather than quantitative. It is suspected that the Yamhill Subbasin contains both resident and fluvial life history forms of cutthroat trout (ODFW 1992). Fluvial life history forms of coastal cutthroat trout are common in the Willamette River system (Sumner 1972). It is suspected that fluvial fish in the Yamhill may seasonally migrate into the Willamette River and into other tributaries, but anadromy is highly unlikely. Fluvial coastal cutthroat trout migrate from large river or streams into smaller tributary habitat from November through June (Wyatt 1959, Nicholas 1978). Fluvial fish tend to grow larger and live longer than its residential counterpart due to the migratory trait to relocate to larger water sources that have more abundant food resources available. In small streams, age class structure is dominated by coastal cutthroat trout ages zero to two, while the age class structure of coastal cutthroat trout in larger streams and rivers is dominated by age two and three year fish (ODFW 1992).

Coastal cutthroat trout in the Willamette River system exhibit a long period of spawning that extends from January through July depending on location. Typically, spawning occurs earlier in the lowland habitats as compared to later spawning activity in the small headwater streams in forested mountains. The timing of spawning is related to stream temperatures and seasonal flow patterns (Nicholas 1978). After spawning, fluvial adults tend to migrate back downstream. Coastal cutthroat trout attain reproductive maturity as early as age two, but reproductive maturation is common at age three and four. Size of maturity for coastal cutthroat trout in the South Yamhill River watershed ranges from 165mm (6.5 inches) to 277mm (10.9 inches) fork length (age three), but can be as small as 112mm (4.4 inches) in fork length (ODFW 1992). Average fork length for age four cutthroat trout in the South Yamhill watershed is 264mm (10.4 inches).

According to state records, no stocking of cutthroat trout has occurred in the Yamhill Subbasin (ODFW 1992). However, records indicate that rainbow trout (*Oncorhynchus mykiss*) were stocked from the 1950s through approximately the mid-1990s. Interspecific

hybridization with non-native trout has not been identified as an issue for coastal cutthroat trout (ODFW 1992). Beginning in 2009, the Oregon Department of Fish and Wildlife initiated a small program of hatchery trout releases in the South Yamhill to create a consumptive trout fishery in a three-mile reach between Willamina and Fort Hill. All trout released for this program are triploid (sterile) rainbow trout. Past regulations for cutthroat trout in the South Yamhill and tributaries were catch and release, fly and artificial lure only. With the creation of the new triploid trout program in 2009, ODFW established new regulations that allow anglers to harvest up to five fin-clipped hatchery rainbow trout in the specified reach of the South Yamhill. Hatchery trout have their adipose fin removed for easy identification in the fishery. In addition, ODFW adopted a rule in 2010 allowing anglers to keep two wild trout, eight inches or greater in size in all tributary streams in both the Tualatin and Yamhill basins. Therefore, anglers fishing in the South Yamhill near Willamina had the unique opportunity to retain five trout, of which three may be hatchery rainbow trout, and two may be wild trout. Fishing was limited to artificial flies and lures to protect native fish.

C3. Coastal Cutthroat Trout Cultural/ Economic Aspects

Coastal cutthroat trout are considered a critical subsistence traditional food due to the fact that cutthroat trout were one of the few food sources available year-round. The historic abundance and wide distribution throughout the Valley, found readily in both the highland and lowland reaches, provided a stable food resource for the historic Tribes of the Willamette Valley.

Today, the cutthroat trout resource continues to be valued by Tribes and non-Tribal anglers. Due to declines in the Willamette Basin winter steelhead population and the subsequent federal listing of these winter steelhead, harvest opportunities for cutthroat trout were terminated in the late 1990's as a measure to protect ESA-listed winter steelhead juveniles potentially rearing in the Yamhill River Subbasin. Due to public demand for a consumptive trout fishery in the Yamhill Subbasin, ODFW implemented limited harvest opportunities on cutthroat trout in the Yamhill Subbasin in 2010.

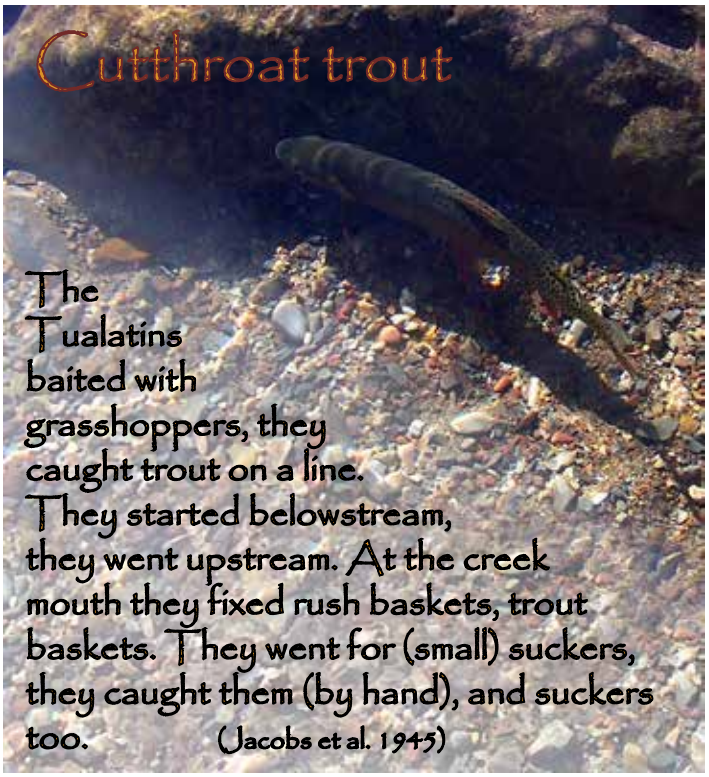

Figure 10. Tualatin Trout Fishing.

Presently, both Tribal and non-Tribal members support enhancing local cutthroat trout populations to provide sustainable harvest opportunities in the Subbasin.

C4. Coastal Cutthroat Trout Management Issues

Coastal cutthroat trout in the Yamhill Subbasin are subject to the same human caused impacts encountered by other native salmonids. Historically, highly complex, diverse habitat in the Willamette Valley lowlands provided the most productive habitat for rearing salmonids (IMST 2002). Currently, the forested upper reaches of the Willamette Basin provide the optimal habitat for rearing salmonids. The lowland streams have been disproportionately affected by agriculture and urban/residential development. Yamhill Subbasin coastal cutthroat trout have a relative advantage compared to anadromous species present in that all life stages of cutthroat trout are limited to freshwater habitats. Cutthroat trout are able to cycle through progressive life stages with relatively limited exposure to downstream risks in comparison to anadromous species that have to encounter many of the risks in the lower and out of Subbasin reaches. Alternatively, habitat modification is suspected to have decreased the capacity and range

for coastal cutthroat trout. Seasonal habitat use, fluvial migration patterns, population size, spawn time and spawn location are not well documented in the Yamhill Subbasin and such an investigation into the life history of the species should be regarded as a high priority research need.

The Yamhill Basin Council (YBC 2002) developed a Watershed Assessment of the Upper South Yamhill River. The following are human caused habitat alterations identified in the Watershed Assessment that have significant influence on the capacity of coastal cutthroat trout:

1) Loss of riparian vegetation and wetlands

2) Channel modifications

3) Increased sedimentation

4) Altered hydrology

5) Decreased water quality

6) Fish passage barriers

The Northwest Power Conservation Council (NPCC 2004) identifies limiting factors affecting various life stages of cutthroat trout and closely mirror those concerns identified by the Yamhill Basin Council. Currently, these are not issues specific to the Tribal lands. Limiting factors for Yamhill Subbasin coastal cutthroat trout populations are:

1) Adult Migration and Holding – water quality and quantity, habitat connectivity, and modifications of aquatic and riparian habitat characteristics and processes.

2) Adult Spawning and Egg Incubation – habitat connectivity and modification of aquatic and riparian habitat characteristics and processes.

3) Fry and Juvenile Rearing and Migration – water quality and quantity, habitat connectivity, modification of aquatic and riparian habitat characteristics and processes, and interspecific interactions with non-native fish species.

Currently, there is no reach-level quantifiable assessment that has been developed for cutthroat trout in the Yamhill Subbasin or South Fork Yamhill River sub-watersheds. Species specific, quantifiable and qualitative assessments are an effective tool in objectively prioritizing restoration and protection actions or strategies. This plan prioritizes a need to compile a detailed database and quantitative and qualitative assessment for cutthroat trout.

Until an assessment is in place, this plan has outlined restoration and protection objectives and strategies that address those human caused habitat alterations identified in the Yamhill Basin Council's Watershed Assessment (2002) and age class specific limiting factors for cutthroat trout identified by the Northwest Power and Conservation Council (2004).

C5. Coastal Cutthroat Trout Management Objectives and Strategies

In order to meet management goals for coastal cutthroat trout, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

C5.1 – Objective – Assess coastal cutthroat trout populations

Investigate, research, and monitor cutthroat trout populations to gain a better understanding of their distribution, status, and trend which provide a basis for scientifically supported management actions.

C5.1.1 *Strategy – Assess population status*

Develop and implement methodology to assess population size, status, age structure, densities and population trend of cutthroat trout.

C5.1.2 *Strategy – Assess the genetic profile of cutthroat trout*

Investigate and assess the genetic profile of coastal cutthroat trout. Assess and identify current and future genetic risks (genetic bottlenecks). Assess existing genetic variability by estimating effective population size based on an assessment of local population genetics. Develop a better understanding of genetic population structure. Identify suitable populations for potential future broodstock development.

C5.1.3 *Strategy – Investigate the potential impacts of supplemental stocking*

Investigate and assess the effects supplemented coastal cutthroat trout inter-specific and intra-specific interactions and competition have on self-sustained populations of native fish species.

C5.2 – Objective – Develop a better understanding of cutthroat trout current habitat conditions

Investigate, research, and monitor cutthroat trout habitat to gain a better understanding of their critical habitat and life history needs. Use this

information as a basis for scientifically supported management actions.

C5.2.1 *Strategy – Assemble existing habitat data*

Compile existing habitat and water quality data into Tribal database and GIS; identify information needs. Conduct necessary research, surveys, and data collection efforts to fill data gaps.

C5.2.2 *Strategy – Identify limiting factors and important habitat*

Investigate and identify the life history characteristics of cutthroat trout such as critical spawning and rearing habitats, seasonal migratory movements and seasonal distribution of all life stages, and factors that limit capacity for each life stage.

C5.3 – Objective – Restore and improve habitat

C5.3.1 *Strategy – Identify and prioritize habitat restoration*

Conduct an assessment that will identify and prioritize habitat restoration and protection actions for cutthroat trout. Create or adopt existing methodologies that quantify species specific habitat and water quality requirements. Use this information to objectively rank restoration and protection actions.

C5.3.2 *Strategy – Large woody debris restoration*

Where large woody debris (LWD) recruitment is deficient, design and implement LWD placement projects in streams to increase habitat quality.

C5.3.3 *Strategy – Removal of exotic vegetation in riparian areas*

Identify, prioritize, assess, and implement removal of exotic vegetation and noxious weeds in riparian areas.

C5.3.4 *Strategy – Coordinate restoration efforts with others*

The Natural Resources Department shall coordinate with federal, state and local entities to address factors limiting cutthroat trout habitat.

C5.3.5 *Strategy – Secure and protect habitats*

Where possible, maximize protection of habitats through the acquisition of management rights properties. These properties can be restored and protected for the long term health of cutthroat trout through title acquisition, conservation easements, and/or long-term leases in perpetuity.

C5.3.6 *Strategy – Evaluate effectiveness of restoration techniques*

Evaluate and monitor the effectiveness of restoration techniques implemented and report project findings.

C5.4 – Objective – Reduce pollutants

Reduce pollutants, to the extent feasible, from agricultural activities, urban areas and other sources to meet Oregon water quality standards.

C5.4.1 *Strategy – Develop and maintain proper storm water systems*

Provide guidance and assessment of storm water systems on Tribal developments.

C5.4.2 *Strategy – Remain engaged in water quality issues*

Continue to monitor water quality. The Natural Resources Department shall coordinate with federal, state and local groups to assure water quality plans (i.e. Total Maximum Daily Loads (TMDL's), Senate Bill 1010 plans, etc.) are effective in addressing water quality and human health issues where cutthroat trout are found.

C5.5 – Objective – Improve Tribal member cutthroat trout fishing opportunities and experiences

C5.5.1 *Strategy – Improve opportunities to restore traditional practices*

C5.5.2 *Strategy – Develop action plans to increase existing fishing opportunities and experiences*

Develop goals and objectives to improve the fishing opportunity and experience capacity currently available for Tribal members.

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Table 2. Coho Stocking History S. Yamhill.

Coho Stocking South Yamhill

Year	Hatchery	Number	Lifestage
1954	Bonne.	10,000	Yearling
1954	Sandy	100,000	Fry
1955	Sandy	50,000	Fry
1955	Sandy	45,486	Yearling
1957	Sandy	79,877	Yearling
1957	Sandy	239,556	Fry
1957	Sandy	128,000	Fry
1959	Sandy	88,476	Fry
1961	Bonne.	97,784	Yearling
1965	Sandy	220	Adults
1966	Bonne.	799,153	Fry

Coho Stocking South Yamhill Tributaries

Year	Hatchery	Number	Lifestage
1962	Sandy	63,158	Yearling
1962	Bonne.	402,052	Fry
1963	Sandy	44,979	Yearling
1963	Bonne.	462,907	Fry
1964	Sandy	61,814	Yearling
1965	Sandy	69,793	Yearling
1964	Cascade	600	Adults
1965	Klaskan.	1,827,209	Fry
1965	Oxbow	64,152	Fry
1966	Sandy	14,329	Yearling
1966	Bonne.	150	Adults
1967	Trask	104,250	Fry
1967	Klaskan.	806	Adults
1967	Siletz	100	Adults
1968	Klaskan.	306,000	Fry
1968	Bonne.	140	Adults
1969	Big Creek	300	Adults
1969	Alsea	200	Adults
1970	Big Creek	1,226,997	Fry
1972	Big Creek	397,240	Fry

Coho Stocking South Yamhill Tributaries

1973	Bonne.	435,226	Yearling
1972	Bonne.	208	Adults
1973	Elk River	196,100	Fry
1974	Bonne.	484,769	Yearling
1976	Cascade	124,869	Yearling

Coho Stocking Rock Creek

Year	Hatchery	Number	Lifestage
1982	Sandy	31,388	Fry
1983	Cascade	98,900	Fry
1987	Bonne.	41,088	Fry

Coho Stocking Hanchet

Year	Hatchery	Number	Lifestage
1983	STEP	8,000	Fry
1984	STEP	25,000	Fry
1985	STEP	9,000	Fry
1986	STEP	16,093	Fry

Coho Stocking Cosper Creek

Year	Hatchery	Number	Lifestage
1983	STEP	20,000	Fry
1987	STEP	19,055	Fry

Coho Stocking Ead Creek

Year	Hatchery	Number	Lifestage
1983	STEP	25,000	Fry
1984	STEP	25,000	Fry
1985	STEP	25,208	Fry
1986	STEP	16,093	Fry
1987	STEP	40317	Fry

Coho Stocking Jackass Creek

Year	Hatchery	Number	Lifestage
1983	STEP	25,000	Fry
1984	STEP	25,000	Fry
1985	STEP	19,247	Fry
1986	STEP	32,186	Fry
1987	STEP	40,222	Fry

Coho Stocking Kitten Creek

Year	Hatchery	Number	Lifestage
1983	STEP	8,000	Fry
1984	STEP	25,000	Fry
1985	STEP	31,208	Fry
1986	STEP	16,093	Fry
1987	STEP	40,388	Fry

tocking Pierce Creek

Year	Hatchery	Number	Lifestage
1983	STEP	25,000	Fry
1984	STEP	25,000	Fry
1985	STEP	24,450	Fry
1986	STEP	16,093	Fry
1987	STEP	12,500	Fry

tocking Rowell Creek

Year	Hatchery	Number	Lifestage
1983	STEP	45,000	Fry
1984	STEP	25,000	Fry
1985	STEP	49,688	Fry
1986	STEP	64,373	Fry
1987	STEP	45,902	Fry

Stocking Gold Creek

Year	Hatchery	Number	Lifestage
1983	STEP	50,000	Fry
1984	STEP	25,000	Fry
1985	STEP	24,692	Fry
1986	STEP	43,197	Fry
1987	STEP	62,122	Fry

tocking Rogue River

Year	Hatchery	Number	Lifestage
1983	Sandy	56,388	Fry
1984	STEP	25,000	Fry
1985	STEP	19,247	Fry
1986	STEP	32,186	Fry
1987	STEP	13,619	Fry

D. Coho Salmon (*Oncorhynchus kisutch*)

D1. Coho Salmon Management Goal

D2. Coho Salmon Biology

D3. Coho Salmon Cultural/Economic Aspects

D4. Coho Salmon Management Issues

D5. Coho Salmon Management Objectives and Strategies

D6. Coho Salmon References

D1. Coho Salmon Management Goal

Determine the role coho salmon play in the action area. Promote utilization of coho where feasible and appropriate.

D2. Coho Salmon Biology

Coho salmon (*Oncorhynchus kisutch*) is a native species to western North America. Coho, however, were not thought to be native above Willamette Falls at the time of European settlement and were not recorded on the Tribal lands until introduced by stocking programs. The timing of adult upstream migration for coho occurs in the fall, which historically, was likely impassable due to seasonal low flows and the height of the Falls. In 1895, the Sullivan Plant (Station B), now owned by Portland General Electric, was opened on the West Linn side of the Willamette River. The subsequent construction and successful operation of various fish ladders over the years made year-round adult upstream passage possible.

Efforts to establish coho above Willamette Falls began in 1952. Oregon Department of Fish and Wildlife (ODFW) started releasing coho into the Yamhill River Subbasin in 1954 and continued until 1987 (see Tables 2-3). Initial stocking of coho was part of an effort to establish a self-sustaining run in the upper Willamette Basin (ODFW 1992),

primarily to support recreational and commercial fisheries outside the Subbasin. The run never reached expectations, so the effort to establish coho runs in the Yamhill River Subbasin was de-emphasized and the stocking program was terminated in 1976 (Williams 1983). In 1983, a second effort to stock coho was implemented in an effort to alleviate depressed ocean and Columbia River fisheries (ODFW 1992). Releases of hatchery coho in the South Yamhill River were discontinued in 1987 due to concerns regarding competition between coho and native game fish. Since 1988, no supplementation efforts of coho have been implemented in the South Yamhill River (ODFW 1992). Because of these past stocking efforts, coho in the Yamhill Subbasin are now reproducing naturally and the Tribes have documented coho populations in several streams in and around Tribal lands.

Due to the lack of historic records, very little information is known about coho salmon in the Yamhill Subbasin, other than hatchery release locations, numbers, and dates of release. The most readily used stock to seed the Yamhill Subbasin was coho from the Toutle River and the secondary stock was from the Cowlitz River. Both stocks originate from the Lower Columbia in southwest Washington. Seed stock from the Trask River, located on the north-central Oregon coast, was released into the Yamhill River Subbasin in 1967 (ODFW 1992).

Primary releases into the Yamhill Subbasin consisted of Type-S Toutle River stock (early return) with occasional releases of Type-N Cowlitz River stock (late return) (ODFW 1992). As smolts enter the ocean, two stocks of coho have been identified in the Lower Columbia River. Type-S refers to an ocean distribution generally south of the Columbia River with early adult run timing back into the Columbia River. Type-N refers to an ocean distribution generally north of the Columbia River with a late run timing back into the Columbia River (NPCC 2004b). River entry timing for Type-S stocks occurs from mid-August to September while Type-N river entry timing occurs in late September to December. Spawn time for Type-S stocks occurs from mid-October to early November while Type-N stocks spawn November to January.

General life history traits of coho suggest adults return in late summer to late fall and spawn in fall or early winter. It takes coho salmon 400 – 500 Accumulated Thermal Units (ATUs) (a collective total of 400°C – 500°C over time) to hatch and 700 – 800 ATUs (a collective total of 700°C – 800°C over time) to emerge from the redd. Typically, eggs incubate over late fall and winter and emergence occurs between January and April. Once emergence occurs, coho juveniles will rear in freshwater for at least one year and up to fifteen months prior to migrating out to sea. In this freshwater phase, juvenile coho will rear in quiet areas with low flow velocities such as river edges, backwater pools, beaver ponds, sloughs, side channels and off-channel ponds (NPCC 2004a). The approximate year-old fish will transition into smolts, migrate downstream and enter saltwater estuaries sometime in April through June and eventually push out into the open ocean. Typically, coho will rear and mature in the ocean for two summers prior to returning to freshwater to spawn and start the cycle over. Some coho mature after spending only one summer at sea and migrate back as smaller fish commonly referred to as “jack salmon,” or “jacks.”

According to the Willamette Falls fish count data for 2006 and 2007, coho have been observed ascending Willamette Falls from August through January. Peak migration over the Falls for both years occurred in late September and early October. The Tribes have operated a fish weir located on Agency Creek (RK 0.9) to monitor fish counts since 2006. Data from the weir suggest coho salmon migrate into Agency Creek from October through December with peak counts in November. Carcass counts peak at the weir in December. Additionally, the Tribes’ radio telemetry studies in 2004 documented spawning in December. This suggests that spawning occurs soon after migration into Agency Creek.

When coho die after spawning, their bodies become a direct food source for a wide variety of vertebrate species and through decomposition they also introduce important nutrients for aquatic plants and insects that are in turn a crucial food source for resident and rearing fish.

D3. Coho Salmon Cultural/Economic Aspects

The Tribes have regarded the historical run of salmon as a significant subsistence resource in the Willamette Valley, as evidenced by the traditional

ceremonies and dances that were dedicated to the species.

Oral histories indicate that fish did ascend the Falls, although this may not have been consistent. Willamette Valley Tribes had plentiful access to coho that utilized tributaries downstream of the Falls that include, but are not limited to the Clackamas River, the Sandy River and other Lower Columbia River tributaries. While many of the Willamette Valley streams provided good fishing opportunities, fishing for coho salmon historically occurred at the Falls. Catch records suggest that fishing below Willamette Falls in the late 1800s yielded a harvest of roughly 50% Chinook salmon (*Oncorhynchus tshawytscha*), 40% steelhead (*Oncorhynchus mykiss*), and 10% coho salmon (ODFW 2007). Willamette Valley Tribes have had and continue to have a connection to a fishery at Willamette Falls.

Economic value for Yamhill River Subbasin coho is currently unrealized. Angling for coho salmon is currently open upstream of Willamette Falls but angling effort and success is suspected low. The food quality of adult coho migrating into Tribal waters has been reported as "poor" by Natural Resources staff.

Yamhill Subbasin coho salmon provide little economic benefit at best to the ocean fishery. Coho from the Yamhill Subbasin are managed as "unmarked coho" and fall under protection measures of the Endangered Species Act once they migrate downstream of Willamette Falls. This limits commercial and recreational harvest opportunities and reduces their economic value. The Pacific Fishery Management Council (PFMC) annually set salmon fishing regulations for commercial, recreation and tribal fisheries in ocean waters from three to 200 miles off-shore (federal jurisdiction). As a general rule, commercial and recreational ocean fisheries cannot harvest "unmarked coho" with the exception of an occasional "in season" action permitting harvest of "unmarked coho". By treaty, some Washington coastal tribes are permitted to harvest "unmarked coho" in ocean waters under federal jurisdiction.

D4. Coho Salmon Management Issues

Coho salmon distribution throughout the Yamhill Subbasin is defined through limited data. Oregon

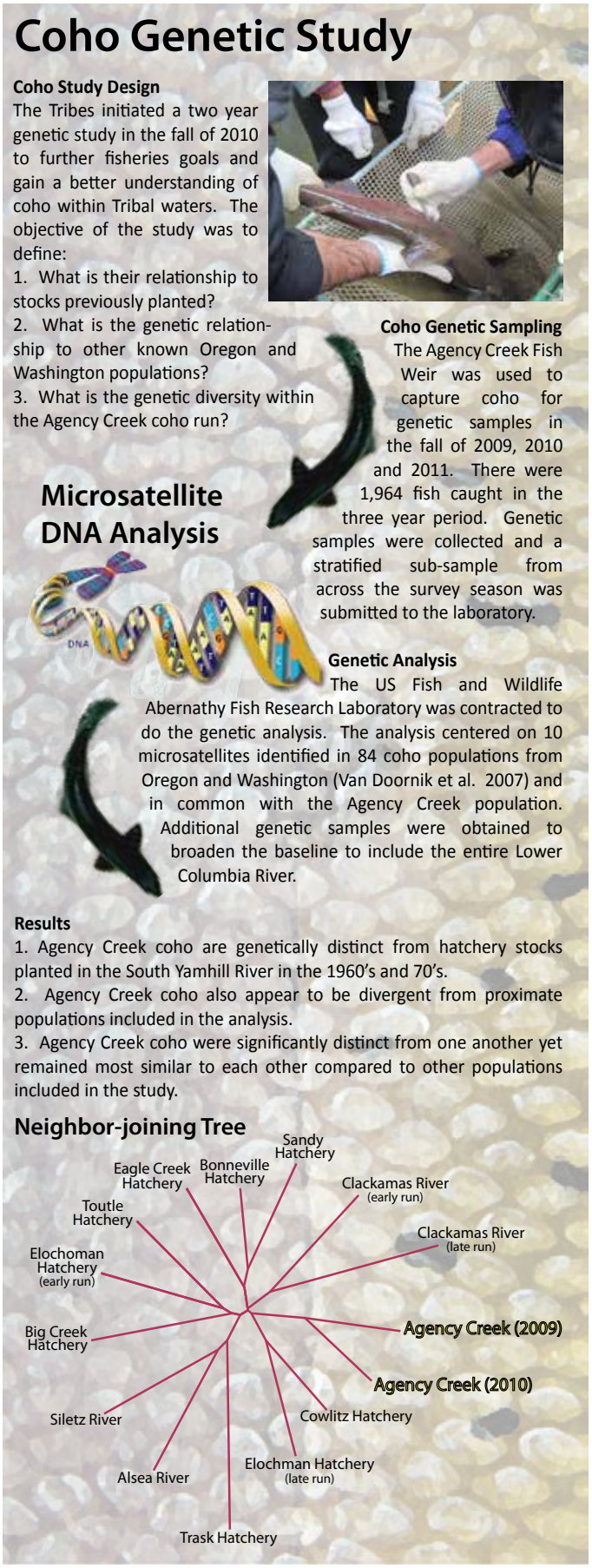

Figure 11. Coho Genetic Study.

Department of Fish and Wildlife Subbasin Plans (ODFW 1992) presume that natural production extends only to those areas that have been stocked since 1983 (ODFW 1992). Based primarily on the assessment in these plans, an estimated 92.5 miles of spawning habitat are available to coho in the Yamhill Subbasin; 61 miles are available in the South Yamhill watershed. However, recent surveys conducted by ODFW since 2006 in the North and South Yamhill indicate that coho are now well distributed throughout the Subbasin in most major tributary streams. Agency Creek, once not identified as potential coho spawning habitat, received about 3.5% of the total Willamette coho escapement above the Falls in 2009 and 2010. Fish counts conducted at Willamette Falls in the last ten years identify that coho returns are increasing substantially and returns in 2009 and 2010 are the two highest adult coho returns on record.

Native populations of coho in the Lower Columbia River (LCR) have declined significantly over the past fifty years and are now federally listed as Threatened under the Endangered Species Act. At the time of listing, several of the LCR coho populations were believed to be extirpated but a number of populations have rebounded and their status has improved in response to reduced sport and commercial harvest, favorable ocean conditions, habitat improvements and improved management practices. The Yamhill coho population, a component of the Willamette population, is not part of the LCR Evolutionary Significant Unit (ESU) but is presently strong and appears to be building. Investigations of distribution, population, life history traits and inter-specific interaction with native fish species would provide the needed information to guide future management decisions.

Past management decisions and current health of coho salmon in the Northwest have put sustainable populations of coho salmon above Willamette Falls in a unique situation. Though viewed as a non-native species above the Falls, depressed returns throughout their native range in the Columbia Basin may have managers taking a second look at the self-sustaining non-native populations in the Willamette Basin.

D5. Coho Salmon Management Objectives and Strategies

In order to meet management goals for coho salmon, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

D5.1 – Objective – Assess coho salmon populations

Investigate, research, and monitor coho populations to gain a better understanding of their distribution, status, and trend which provide a basis for scientifically supported management actions.

D5.1.1 *Strategy – Assess population status*

Develop and implement a study methodology to assess population status and trend of coho. Develop protocol to monitor adult coho escapement, population distribution, and abundance: as measured by redds per mile through annual spawning surveys. Continue to monitor adult fish counts at existing and potential fish trap sites.

D5.1.2 *Strategy – Assess the genetic profile of coho*

Investigate and assess the genetic profile of coho. Assess and identify current and future genetic risks (genetic bottlenecks). Assess existing genetic variability estimating effective population size based on an assessment of local population genetics. Develop a better understanding of genetic population structure. Identify suitable populations for translocations and reintroductions.

D5.1.3 *Strategy – Develop biological objectives*

Coordinate with state and federal resource management agencies to develop biological objectives for coho populations.

D5.1.4 *Strategy – Investigate effects of competition*

Investigate and assess the effects of competition from coho on other native fish species.

D5.2 – Objective – Develop a better understanding of coho salmon current habitat conditions

Investigate, research, and monitor coho habitat to gain a better understanding of limiting factors affecting natural production and critical habitat and life history needs. Use this information as a basis for scientifically supported management actions.

D5.2.1 *Strategy – Assemble existing habitat data*

Compile existing habitat and water quality data into Tribal database and GIS; identify data gaps and information needs. Conduct necessary research, surveys and data collection efforts to fulfill data gaps.

D5.2.2 *Strategy – Identify limiting factors and important habitat*

Investigate and define the life history characteristics of coho and identify limiting factors that affect each life stage. Identify critical spawning and rearing areas, seasonal distribution, smolt-to-adult ratios (SARs) and time of juvenile out-migration.

D5.3 – Objective – Where feasible and appropriate, restore and improve habitat

D5.3.1 *Strategy – Identify and prioritize habitat restoration*

If appropriate, conduct an assessment that will identify and prioritize habitat restoration and protection actions for coho. Create or adopt existing methodologies that quantify species specific habitat and water quality requirements. Use this information to objectively rank restoration and protection actions.

D5.3.2 *Strategy – Large woody debris restoration*

Where large woody debris (LWD) recruitment is deficient, design and implement LWD placement projects in streams to increase habitat quality.

D5.3.3 *Strategy – Removal of exotic vegetation in riparian areas*

Identify, prioritize, assess, and implement removal of exotic vegetation and noxious weeds in riparian areas.

D5.3.4 *Strategy – Coordinate restoration efforts with others*

The Natural Resources Department shall coordinate with federal, state and local entities to address factors limiting coho habitat.

D5.3.5 *Strategy – Secure and protect habitats*

If feasible and appropriate, maximize protection of habitats through the acquisition of management rights properties. These properties can be restored and protected for the long term health of coho through title acquisition, conservation easements, and/or long-term leases in perpetuity.

D5.3.6 *Strategy – Evaluate the effectiveness of restoration techniques*

Evaluate and monitor the effectiveness of restoration techniques implemented and report project findings.

D5.4 – Objective – Reduce pollutants

Reduce pollutants to the extent feasible from agricultural activities, urban areas and other sources to meet Oregon water quality standards.

D5.4.1 *Strategy – Develop and maintain proper storm water systems*

Provide guidance and assessment of storm water systems on Tribal developments.

D5.4.2 *Strategy – Remain engaged in water quality improvement activities*

The Natural Resources Department shall coordinate with federal, state and local groups to assure water quality plans (i.e. Total Maximum Daily Loads (TMDL's), Senate Bill 1010 plans, etc.) are effective in addressing water quality and human health issues affecting migrating coho salmon and Tribal fish consumption.

D5.5 Objective – Where feasible and appropriate, improve Tribal member coho salmon fishing opportunities and experiences

D5.5.1 *Strategy – Improve opportunities to restore traditional practices*

D5.5.2 *Strategy – Develop action plans to increase existing fishing opportunities and experiences*

Develop goals and objectives to improve the fishing opportunity and experience capacity currently available for Tribal members.

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E. Spring Chinook Salmon (*Oncorhynchus tshawytscha*)

E1. Spring Chinook Management Goal

E2. Spring Chinook Biology and Management Issues

E3. Spring Chinook Cultural/Economic Aspects

E4. Spring Chinook Management Objectives and Strategies

E5. Spring Chinook References

E1. Spring Chinook Management Goal

Restore and enhance a population of spring Chinook salmon, to the extent possible, to support sustainable Tribal fishing opportunities and experiences.

E2. Spring Chinook Cultural/Economic Aspects

The rivers were at the heart of the Upper Chinook people's way of life. Fishing equipment – the harpoons, gigs, gaffs, nets, and scaffolding – required the labor of the entire village and much technical expertise. Even after the arrival of early-Americans at Oregon City, the local Indians continued to supply fish. In 1856, after General Palmer ordered all Indians to be exiled from Oregon City, the Oregon Argus newspaper reported, "Since the Indians have been removed, not a salmon is to be had, though our river is literally swarming with them." (Silverstein 1990)

At the Falls, at the village of a band of Clackamas called the Clowwewallas, large scaffolds of cedar planks and poles rested on piers sunk deep into the riverbed. Platforms projected far into the waterfall and were large enough for dozens of men at once to harvest the fish with dip-nets and spears. Once the fish were brought to shore, teams of women prepared the huge quantities of salmon for drying on racks in the sun or over smoky fires. Mixed with nuts or berries and made into cakes or preserved in tightly woven baskets, the salmon would provide for the Clackamas during the leaner winter months. Salmon at the Falls were plentiful enough to enrich the Clackamas beyond simple survival; other tribes came for trade fairs to purchase salmon or to pay tribute for the privilege of fishing in Clackamas territory. (Silverstein 1990)

The great salmon runs both required and allowed a large settled population. The limited time for harvest required a great many hands for labor and the prized fishing sites needed warriors for protection from invaders. Except for the most prime fishing villages, however, the Clackamas would temporarily abandon their cedar lodges to gather seasonal food supplies such as roots, berries, and waterfowl. (Silverstein 1990)

Salmon were very culturally significant to all tribes in the Columbia Basin. Salmon provided a much valued food source and are intrinsically tied to the historic traditions of the tribes. Historically, numerous ceremonies were dedicated to the salmon runs. Many of the Willamette Valley streams provided good fishing opportunities, but the fishery at Willamette Falls provided some of the best opportunities. Historical catch records suggest that fishing below Willamette Falls in the late 1800s yielded a harvest of roughly 50% Chinook salmon, 40% steelhead (*Oncorhynchus mykiss*), and 10% coho salmon (*Oncorhynchus kisutch*) (ODFW 2007). Willamette Valley Tribes have had and continue to have a connection to a fishery at Willamette Falls.

The Confederated Tribes of Grand Ronde, today, annually receive approximately 4,000 pounds of Chinook salmon from the State of Oregon fish hatcheries, mainly from within the Willamette River Basin (Confederated Tribes of Grand Ronde 2003). The annual allocations of salmon provided to the Tribes allow the members access to a dwindling traditional resource that once was in great abundance. Current populations of Chinook in the Willamette Basin have dwindled to the point which federal protection of the species is required. It is in the best interest and a high priority of the Tribes to restore, protect and reduce the risk of extirpation of the greatly valued Columbia Basin traditional salmon resources.

E3. Spring Chinook Biology and Management Issues

The Willamette Basin historically provided significant and productive spawning and rearing grounds for large numbers of spring Chinook salmon of the Columbia River Basin. The Oregon Department of Fish and Wildlife (ODFW) and Columbia Basin Fish and Wildlife Authority (2010) have estimated annual counts of spring Chinook that migrate into

the Columbia River, annual counts above Willamette Falls, and annual counts above Bonneville Dam since 1970. The annual spring Chinook escapement that migrate above Willamette Falls and above Bonneville Dam average approximately 20% and 46% respectively. Spring Chinook count estimates have averaged 37,682 annually since ODFW began these counts in 1953. They range from a high of 95,968 in 2004 to a low of 13,000 in 1960. Spring Chinook runs in the 1920s have been estimated to be greater than 250,000 annually (Mattson 1948). In summary, the Willamette Basin is an essential component to both the historical and current population of spring Chinook salmon in the Columbia River Basin.

In 1999, spring Chinook salmon were listed as Threatened under the Endangered Species Act (ESA) in the Willamette River by National Marine Fisheries Service (NMFS) (Federal Register 1999). The Yamhill Subbasin and Tribal lands are within Evolutionarily Significant Unit (ESU) of the species. Since listing of spring Chinook, the Tribes have engaged and continue to engage in consultations with NMFS for projects such as timber sales, management plans, and construction and development projects that may affect the species.

Historical populations of spring Chinook within the Upper Willamette ESU include: 1) Molalla, 2) North Santiam, 3) South Santiam, 4) Calapooia, 5) McKenzie, 6) Middle Fork Willamette and 7) Clackamas (below the Falls). The Oregon Department of Fish and Wildlife has determined the overall extinction risk classification as "high" (ODFW 2005). Only four core populations remain: North Santiam, McKenzie, Middle Fork Willamette, and Clackamas; these populations may have the intrinsic capacity to recover and sustain a large population in the future (McElhany et al. 2003). The core genetic populations of the Molalla and Calapooia are thought to be either severely depressed or extirpated (U.S. Army Corps of Engineers [USACE] 2002 as cited in Willamette Restoration Initiative 2004). In the South Fork Santiam watershed, the combination of prime spawning habitat for spring Chinook that has been blocked by federal dams for over thirty years and the intense supplementation of hatchery fish has deteriorated the genetic integrity and viability of the native stock.

Historical Upper Willamette River spring Chinook are both behaviorally and genetically distinct from other populations in the Columbia River Basin. Early observation from the state noted that Willamette River salmon are an early-run fish that entered the Columbia River system early in the season to navigate above Willamette Falls and move into remote areas of the upper basin (Oregon Department of Fisheries [ODF] 1905). Since historical flow and stream temperatures needed to pass over the Falls typically occur early in the year, Upper Willamette River upstream migration timing of adult fish adapted to this condition. The timing of adult migration was notably different and conversely genetically different from other Columbia River Basin stocks (Myers et al. 2003). Adult spring Chinook would start ascending the Falls in February, with the peak occurring in April and May. Historically, only larger sized spring Chinook were able to ascend the Falls in June due to flow limitations. The construction of the first fish ladders in 1882, followed by improvements in 1971 has led to year-round upstream passage capabilities for anadromous salmonids. Since fish ladders have been developed at the Falls, spring Chinook are now able to ascend through July and August. Due to low stream flows, it is presumed that fall Chinook historically would not have been able to ascend the Falls and therefore, were not native to the tributaries above the Falls (Weavers et al. 1992).

There is some doubt about the historic distribution of spring Chinook in the tributaries of the Coast Range Subbasin (CRSB). The relatively low summer stream flows and elevated summer stream temperatures are not thought to provide adequate habitat for spring Chinook in the CRSB (Galovich 1999). Currently, spring Chinook are not known to be present in the Yamhill Subbasin.

As a general rule, spawning in the tributaries of the Willamette River occurs from August through October with peak spawning activity occurring in September. The construction of federal dams in the Willamette Basin has dramatically affected spring Chinook spawning distribution. An estimated 48% of the spawning habitat for spring Chinook salmon was eliminated with dam construction and subsequent inundation in the Santiam, McKenzie and Middle Fork Willamette watersheds (Mattson 1948). In addition, water releases from the dams have disrupted the historical hydrograph and

seasonal stream temperatures that once influenced historical migration and spawn timing. Homolka and Downy (1995) suggest that spawn time of spring Chinook in the McKenzie River has been considerably delayed. Additionally, thermal effects downstream of Lookout and Dexter dam projects resulted in a delayed spawn time in the Middle Fork Willamette River with spawning activity extending into November (Mattson 1962).

It takes approximately 900 – 1,000 ATUs (a collective total of 900°C – 1,000°C over time) for Chinook salmon to emerge from the redd. Since stream temperature variation in the spawning tributaries is apparent throughout the Willamette Basin, it is also expected that emergence will vary based on local stream temperatures. Mattson (1962) found that fry emerge from February through March, but emergence can occur as late as June.

Spring Chinook juvenile rearing and emigration strategies are highly variable in the Upper Willamette Basin. Most juvenile Chinook salmon will rear in mainstem habitats, including mainstem tributary habitats, for up to one year before out-migration into the open sea. Three distinct patterns of emigration out of the tributaries into the mainstem Willamette River have been identified: 1) late winter to early spring as fry, 2) fall to early winter as fingerlings, 3) late winter to early spring as yearlings (Myers et al. 2003). Based on scale analyses of returning adults, 10% had entered the ocean as sub-yearlings which suggests a high proportion of juveniles over-winter in the Willamette or Columbia Rivers (Mattson 1963). Oregon Department of Fish and Wildlife has found fingerlings in some valley floor tributaries upwards of twenty miles from the mainstem and juvenile Chinook have been found as far as Salt Creek in the Yamhill Subbasin. According to ODFW, these juveniles are thought to have hatched elsewhere in the Upper Willamette system and moved into the lower tributaries of the Willamette in search of refugia and rearing areas (Galovich 1999). Historical Chinook use of the Yamhill Subbasin is presumed to be limited to juvenile rearing only and did not sustain an adult spawning population.

Spring Chinook from the Willamette Basin will typically spend two to four years in the ocean before migration back into freshwater. Five-year ocean spring Chinook, or six year-old fish, historically migrated into Willamette Basin in good numbers. The origin of this older and larger run (25 – 30 pound individuals) ascended the Falls in June, which can be disputed as being a summer-run stock of Chinook. Regardless, this run of larger Chinook last ascended the Falls in 1934 and is believed to have been extirpated more likely due to habitat and water quality degradation in the early 1900s (Myers et al. 2003, Mattson 1963).

When Chinook die after spawning, their bodies become a direct food source for a wide variety of vertebrate species and through decomposition they also introduce important nutrients for aquatic plants and insects that are in turn a crucial food source for both resident and juvenile anadromous fish.

E4. Spring Chinook Management Objectives and Strategies

In order to meet management goals for spring Chinook salmon, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

E4.1 – Objective – Work collaboratively toward recovery

The Tribes shall work collaboratively with other managers and interested parties to de-list ESA spring Chinook salmon.

E4.1.1 *Strategy – Remain engaged in ESA recovery*

Participate and provide Tribal input in defined processes set forth in the ESA recovery plans and associated Biological Opinion(s) for spring Chinook salmon.

E4.2 – Objective – Restore and protect spring Chinook habitat

Restore and protect spring Chinook habitat, to the extent feasible, to support a viable, sustainable Chinook population.

E4.2.1 *Strategy – Work collaboratively to establish biological objectives and harvest opportunities*

Work collaboratively with other managers and interested parties to set biological objectives in excess of the minimum recovery and de-listing goals to the extent feasible to provide sufficient harvest opportunities.

E4.2.2 *Strategy – Maintain a holistic approach to spring Chinook recovery efforts*

In conjunction with other restoration efforts, highly prioritize efforts that would provide multi-species benefits to spring Chinook salmon, wildlife, resident and other anadromous fish resources.

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F. Pacific Lamprey (*Entosphenus tridentatus*)

F1. Pacific Lamprey Management Goal

F2. Pacific Lamprey Biology

F3. Pacific Lamprey Cultural/Economic Aspects

F4. Pacific Lamprey Management Issues

F5. Pacific Lamprey Management Objectives and Strategies

F6. Pacific Lamprey References

F1. Pacific Lamprey Management Goal

Maintain and improve the Pacific lamprey populations in order to provide, to the extent feasible, a sustainable cultural and subsistence harvest opportunities and experiences for current and future generations.

F2. Pacific Lamprey Biology

Lamprey belong to the Superclass Agnatha, a group of jawless fishes which represent some of the earliest known vertebrate species. The origins of the agnathans date back to the Ordovician period, about 500 million years ago. Fossil evidence indicates that the agnathans were once much more abundant and diverse. Only two orders have survived to the present: lamprey and hagfish. The Pacific lamprey has inhabited rivers, streams and coastal waters of the west for 350 million years.

Oregon has somewhere between eight and a dozen species of lamprey (Kostow 2002). The Pacific lamprey (*Entosphenus tridentatus*) is the largest of Oregon's lamprey and is the most widely distributed lamprey species on the west coast of the United States; distribution patterns are similar to anadromous salmonids. They have been found around the Pacific Rim, including Japan and Korea, as well as the southern reaches of California.

Pacific lamprey have a round sucker-like mouth, gill openings and no scales. It is difficult to distinguish lamprey species when they are in the larvae stage. Identification of Pacific lamprey depends largely on the number, structure and position of teeth found in an adult. The adult Pacific lamprey has three large anterior teeth and many posterior teeth on the oral disc.

Pacific lamprey is an anadromous species, migrating from ocean water to spawn in fresh water. While in the ocean the species is parasitic, feeding on a wide variety of fish and whales. By attaching itself to a host with a sucker-like oral disc, lamprey cut flesh with rasp-like teeth and feed on blood. Lamprey produce an anticoagulant that maintains blood flow and allows for continued feeding. The length of time Pacific lamprey spend in the ocean is not known; estimates range from one to three years.

Lamprey return to fresh water between April and June on the Oregon coast and as early as February in the Columbia River; peak numbers are observed at Willamette Falls in May and June and on coastal streams from February until August.

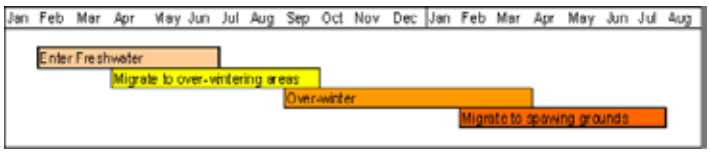

Figure 12. Lamprey Migration Timing.

Pacific lamprey are thought to over-winter (hold-over) for a year in fresh water before continuing spawning migrations the following spring. Figure 8 illustrates the general timing of upstream migrations. It is important to note, however, researchers found some adult lamprey have spawned within the same year of fresh water entrance (Bayer and Seelye 1999). Other researchers have found some lamprey holding over for up to two years before spawning (Whytle et al. 1993). The Tribes are currently involved in Pacific lamprey migration behavior research in the Willamette Basin.

Lamprey are thought to spawn between March and May on the Oregon coast and between February and May in the Willamette Basin. Spawning usually occurs within gravel beds of shallow streams. Both sexes participate in the construction of a redd by moving stones with their mouths. Females produce between 15,000 and 240,000 eggs. Both sexes typically die within three to thirty-six days after spawning.

Egg hatching is thought to be temperature dependent, occurring around 15°C and usually occurs ten to twenty days after egg deposition into the redds. Survival of larvae is ideal over a range of 10°C to 18°C (Meeuwig et al. 2005). The Accumulated Thermal Units (ATUs) required for emergence is not yet known. Lamprey larvae, or

ammocoetes, are hatched without eyes and emerge from the redd when they are about one centimeter (0.39 inches) in length. The ammocoetes seek slower waters with soft sediments where they live as burrowing filter feeders. Ammocoete diets include algae, detritus and diatoms (Hammond 1979).

The length of time lamprey remain as ammocoetes is not known, but is estimated to be between three and seven years. Eventually, ammocoetes develop into eyed lamprey. Metamorphosis is thought to occur from July through November. Both eyed lamprey and ammocoetes migrate, with ammocoetes moving progressively downstream and eyed lamprey moving on to the ocean. Outward migration occurs between April and November. Eyed lamprey must make one final transition to a macrothalmia where they undergo physiological changes necessary for life in the ocean. More research is needed to understand the habitat preferences for all life stages of Pacific lamprey.

Adult lamprey are often referred to as a buffer species, meaning they are a prey source that reduces predation on salmonids. Studies have shown that lamprey are the preferred choice of food for birds, native and non-native fish, marine mammals, and are preferred over salmon smolts (Close 1995). Like salmon, lamprey play an important role in the nutrient cycle of fresh water streams. Pacific lamprey leave fresh water weighing an average of approximately 2.6g (0.005 pounds) (Stone 2001) and return from the ocean weighing an average of about 290g (0.64 pounds) (Kan 1975). This growth is an example of nutrient sequestration in one ecosystem (the ocean) and return in another ecosystem (fresh water) during spawning. When lamprey die after spawning, their bodies become a direct food source for a wide variety of vertebrate species. Through decomposition, their bodies release important nutrients for aquatic plants and insects that are a food source for resident and rearing fish.

F3. Pacific Lamprey Cultural/Economic Aspects

Pacific lamprey has deeply rooted traditions with Northwest tribes and is culturally revered and intrinsically linked with the long history of the Confederated Tribes of Grand Ronde. "From time immemorial the people of the Confederated Tribes of Grand Ronde have relied on 'Skakwal' (Chinook wawa for lamprey or eel) for subsistence, medicine, commerce and a way of living" (Archuleta 2005).

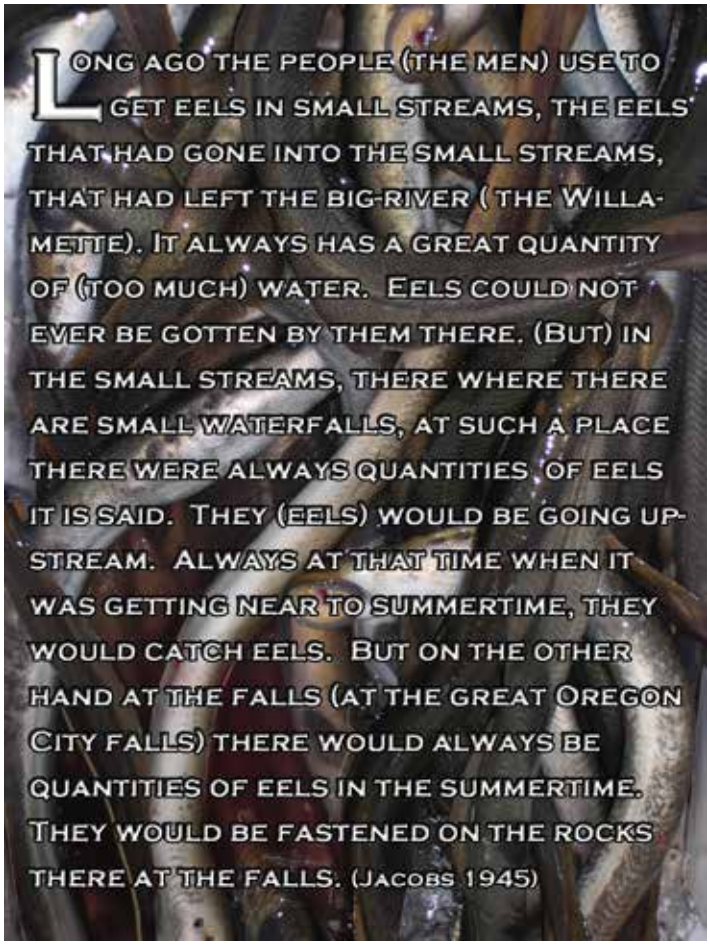

Figure 13. Eel Harvests.

Tribal dependence on lamprey as a food source pre-dates recorded history and lamprey remain an important food source to this day. Willamette Valley Tribes relied on lamprey as a nutritious and reliable food source that often supplied lean winter months. Pacific lamprey was and still is harvested by the members of the Confederated Tribes of Grand Ronde at Willamette Falls in Oregon City. At one time, lamprey were also harvested by Grand Ronde Tribal members near Rose Lodge on the coastal Salmon River. Lamprey migrated upstream annually from April through September and were relatively easy to harvest. Pacific lamprey can be boiled and eaten right away; it can also be dried or canned. The dried or canned lamprey could then be eaten later during the winter when other food sources were scarce. Today Tribal members continue to consume lamprey and use it for cultural purposes.

The Tribes also utilized by-products for medicinal purposes. Pacific lamprey oil was collected and used to condition hair and applied to the skin and ailing parts of the body. The oil was also collected and used in conjunction with purifying sweat baths.

Pacific lamprey provided the Tribes with a commodity that played a significant role in the commerce of the Willamette Basin. Willamette Falls is within the homelands of Clackamas Chinook and they controlled access to its abundant fish resources. They lived at, above, and below the Falls. Clackamas families had designated fishing sites surrounding the Falls and controlled neighboring and visiting tribal access. Close social and economic ties to the Clackamas through marriage and trade benefited other tribes who wanted to use the Falls (Archuleta 2005).

Tribes from throughout the Northwest would trade with the Clackamas to obtain lamprey as well as other native fish. Willamette Valley Tribes would secure lamprey from the Clackamas through gift-giving ceremonies.

Pacific lamprey as a resource contributed to the fishery that provided the Tribes with an intrinsic way of life. Historically lamprey was an important food source for many of the bands that now make up the Confederated Tribes of Grand Ronde. Lamprey continues to be a part of the Tribes' culture and is an important part of ceremonies and celebrations in addition to other foods collected and harvested seasonally.

With the Pacific lamprey decline in the Columbia River, Willamette River, and in many of the coastal streams, Oregon tribes are losing their traditions and way of life. The Salmon River and other coastal streams no longer have harvestable lamprey populations; harvesting is now only permitted at Willamette Falls. Since tribes are not able to harvest lamprey in traditional areas, Tribal members are having to travel greater distances and are relying more heavily on the Falls. Tribes from throughout Oregon come to harvest lamprey annually at Willamette Falls in June and July.

The decline in lamprey contributes to a loss of culture. With fewer lamprey, many young Tribal members do not know how to harvest or prepare this historically important subsistence food. Additionally, many young Tribal members are losing myths and legends associated with lamprey.

Early settlers and contemporary economies in recent times have industrialized Pacific lamprey. Early fur trappers used lamprey as bait for coyotes and sturgeon in the Willamette and Columbia Rivers. At the turn of the century, fish culturalists used ground raw lamprey to feed young salmon. In 1913, twenty-seven tons of lamprey were harvested for fish meal. From 1943 to 1949 lamprey were harvested for vitamin oil, protein for livestock and poultry, and fishmeal (Bonneville Power Administration 2005). More recently, lamprey harvest has been reduced to Willamette Falls and has been highly regulated.

F4. Pacific Lamprey Management Issues

Although there is a lack of historical data, there are indications of significant Pacific lamprey decline in abundance and distribution. The species has rarely been the focus of study. Much of the available information is adjunct to the monitoring of salmonids. Fresh water counts are problematic due to the difficulty in identifying larvae to the species level. However, evidence of the decline is pervasive and is acknowledged by federal, state, tribal, and private authorities (Federal Register 2004, Kostow 2002, Nawa et al. 2003).

Commercial harvest at Willamette Falls went from an average of 218,000 pounds per year during 1943 – 1952, to 13,000 pounds per year during 1969 – 2001 (Ward 2001). These figures do not account for harvest effort, but the drop could be evidence of decline. Counts at federal dams also show a decline. Lamprey counts on Columbia and Snake River dams in the late 1990s are 6% of what they were in the early 1960s (Columbia Basin Fish and Wildlife Authority [CBFWA] 2002). Counts at Winchester Dam on the North Umpqua dropped from 46,785 in 1966 to an average of less than fifty annually since 1995 (Nawa et al. 2003).

As a result of Pacific lamprey declines, ODFW prohibited commercial harvest at Willamette Falls in 2002. A personal use harvest was instituted and restrictions were designed to limit total annual harvest to approximately 5,000 lamprey. To further help reduce harvest pressure, in 2005 ODFW prohibited the use of lamprey as bait in recreational and commercial fisheries. Harvest levels between 2002 and 2005 were approximately 4,000 – 7,000 Pacific lamprey per year.

A variety of factors could be linked to lamprey decline, including: artificial barriers to migration, poor water quality, toxic contamination, harvest, predation by non-native species, stream and floodplain degradation, loss of estuarine habitat, decline of prey, ocean conditions, dredging, and dewatering (Jackson et al. 1996, Close et al. 1999, BioAnalysts, Inc. 2000, Close 2000, Nawa et al. 2003).

F5. Pacific Lamprey Management Objectives and Strategies

In order to meet management goals for Pacific lamprey, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

F5.1 – Objective – Assess Pacific lamprey populations

Investigate, research, and monitor Pacific lamprey populations to gain a better understanding of their distribution, status, and trends which provide a basis for scientifically supported management actions.

F5.1.1 *Strategy – Assess status and characteristics of lamprey populations*

F5.1.2 *Strategy – Assess limiting factors*

Research and develop methods to assess limiting factors for the lamprey populations present.

F5.1.3 *Strategy – Assess available habitat*

Develop methods to assess the quality and quantity of available aquatic habitat for lamprey for all life stages.

F5.1.4 *Strategy – Identify habitat types*

Develop methods to identify the stream habitat types that are preferred by both rearing ammocoetes and spawning adults.

F5.1.5 *Strategy – Develop a species identification key*

Develop techniques for improving identification of lamprey ammocoetes to species.

F5.1.6 *Strategy – Enhance lamprey populations*

Propose means by which the lamprey populations can be enhanced.

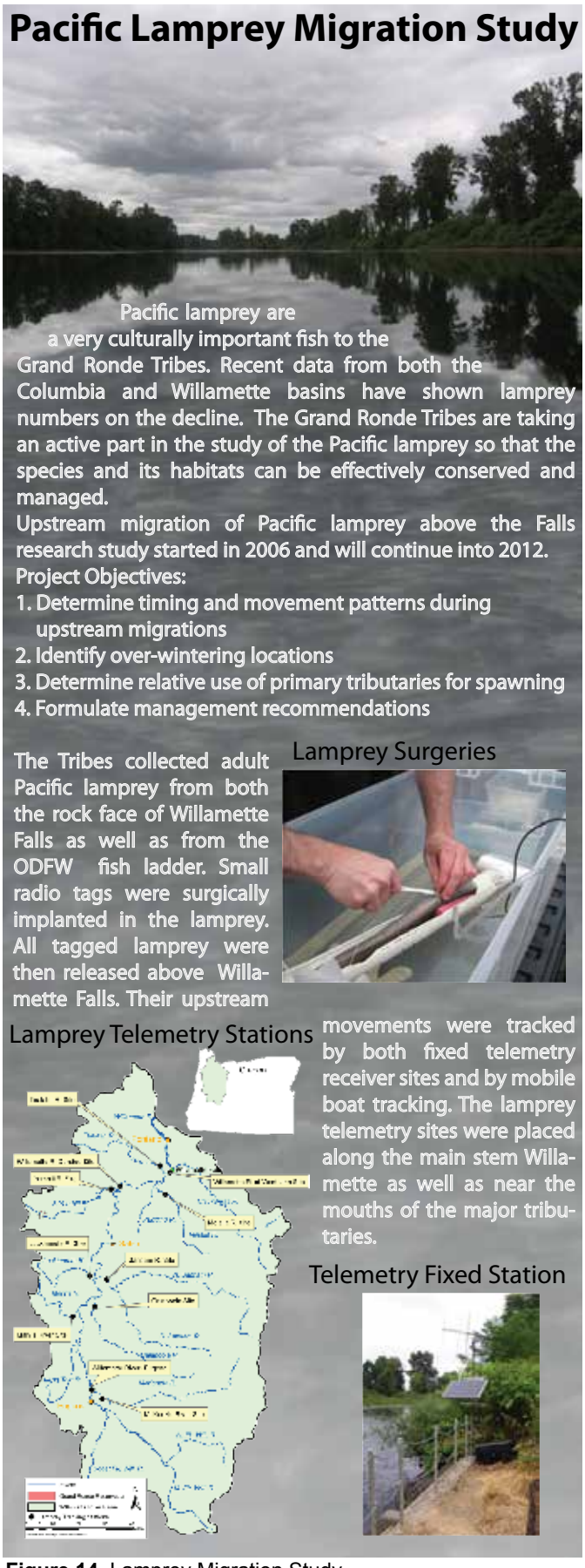

Figure 14. Lamprey Migration Study.

F5.2 – Objective – Restore and improve habitat

F5.2.1 *Strategy – Identify conservation areas and conduct restoration*

Identify areas likely to benefit from habitat enhancement and conservation. Where appropriate, conduct restorations efforts.

F5.2.2 *Strategy – Develop Pacific lamprey education and outreach*

Develop and implement Pacific lamprey education and outreach programs to provide information on the species, their current population status, and their importance to both Tribal culture and ecology.

F5.3 Objective – Improve Tribal member Pacific lamprey harvest opportunities and experiences

F5.3.1 *Strategy – Improve opportunities to restore traditional practices*

F5.3.2 *Strategy – Develop action plans to increase existing harvest opportunities and experiences*

Develop goals and objectives to improve the harvest opportunity and experience capacity currently available for Tribal members.

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G. Crayfish (*Pacifastacus*)

G1. Crayfish Management Goal

Maintain and improve crayfish populations and improve Tribal harvest opportunities and experiences for sustainable cultural and recreational uses for current and future generations.

G2. Crayfish Biology

Crayfish (crawdad, crawfish, and fresh water lobster) are in the order Decapoda, which also includes crabs, lobsters and shrimp. North America has two native families of crayfish, the Astacidae and Cambaridae. The genus *Pacifastacus* refers to all Astacinae crayfish native to North America, west of the Rocky Mountains (Bott 1950 as cited in Bondar et al. 2003). *Pacifastacus* has four extant species, three subspecies and two extinct species (Holdich 2002). Table 4 shows members of the Astacoidea superfamily that are native to Oregon.

Table 3. Crayfish Species Native to Oregon.

Pacifastacus leniusculus klamathensis	**Klamath Signal Crayfish**
Pacifastacus leniusculus leniusculus	**Signal Crayfish**
Pacifastacus leniusculus trowbridgii	**Columbia River Signal Crayfish**
Pacifastacus gambelii	**Pilose Crayfish**
Pacifastacus connectens	**Snake River Pilose Crayfish**

The signal crayfish (*Pacifastacus leniusculus*) is the most studied of all the species. There are three subspecies of signal crayfish (*P. leniusculus*): *P. leniusculus klamathensis, P. leniusculus leniusculus, and P. leniusculus trowbridgii.* Morphological differences distinguish these sub-species from one another (Hamr 1998). Signal crayfish can be found as far north as British Columbia in Canada, as far south as central California, and as far east as Utah and Montana. Pilose crayfish (*Pacifastacus gambeili)* are found from eastern Oregon to Utah and Wyoming.

Three non-native crayfish have been found in Oregon: the invasive red swamp crayfish *(Procambarus clarkii),* the exotic ringed crayfish *(Orconectes neglectus neglectus)* and the rusty crayfish *(Oroconectes rusticus)*. Non-native species of concern includes the northern crayfish *(Oroconectes virillis)*. Color and size of crayfish varies with each species as well as diet and age. Color can change with changes in diet (Ball 2001); they are found in black, brown, red, pink, blue, gray, and green. Some are found in solid colors, while others may display multiple colors (Holdich 2002). Juveniles are often a light tan color that may turn to deep red as an adult.

Crayfish in the United States can vary in size, typically ranging between two to six inches (Ball 2001). The body of a decapod crustacean, such as a crayfish, is composed of nineteen body segments grouped into two main body parts, the fused head and thorax (cephalothorax) and the abdomen; body parts are housed in a hard external skeleton. They have a sharp snout, movable stalked eyes, and a pair of large pincers on their front legs. Crayfish have two pairs of sensory antennae on their heads and use feather like gills to breathe.

Crayfish are omnivores and feed on a wide variety of foods including: vascular detritus, woody debris, algae, aquatic plants (macrophytes), invertebrates (including other crayfish), fish, and fish eggs. Crayfish diets change with age; juvenile crayfish generally filter feed and scrape algae (Budd et al. 1978). Crayfish use both mechanics and chemoreception to find food. Crayfish are stimulated to feed when compounds are released by animals (e.g. amino acids) and plants (e.g. carbohydrates) (Hatt and Bauer 1982, Tierney and Atema 1988) and by hydrodynamic disturbances caused by moving prey (Breithaupt et al. 1995). As crayfish grow larger, they are able to eat both small and large plants as well as are able to crush and consume large snails. Signal crayfish, in particular, can consume between 0.22% – 6.02% of their body weight per day (Mason 1975, Guan and Wiles 1998).

Crayfish may spawn anytime during late summer to fall. Hormones that are regulated by photoperiod and temperature control the timing of crayfish spawning (Holdich 2002). In September the first egg bearing females appear. Females usually carry eggs for a period of about seven months. The eggs are carried over the winter and hatch in late April through June (Wevers et al. 1992). Crayfish do not have a larvae stage; small juvenile crayfish actually

hatch out of the eggs (Holdich 2002). The young crayfish attach to the female for a short time by a thread like material (Wevers et al. 1992). After molting once or twice, the young crayfish begin to forage away from the mother, only returning if threatened (Reynolds et al. 1992).

When crayfish grow they shed their exoskeleton by molting. Young crayfish molt about every week. Adult crayfish may molt several times a year (Holdich 2002) and typically males will molt more frequently than females. When they first shed their exoskeleton, the crayfish is soft and vulnerable to predation. It can take up to several days for a new exoskeleton to fully harden.

Many factors affect the age and size of a crayfish at maturity including: water temperature, water quality, food supply, and crayfish density (Westman et al. 1993).

Crayfish are found in bodies of water that do not fully freeze to the bottom. Typically crayfish prefer small brooks and streams where fresh water is continuously flowing and shelter from predators is available; crayfish have also been found in large rivers. They can be negatively affected by low water flows (Wevers et al. 1992). Crayfish can tolerate a wide range of temperatures, but optimum temperature range is 18°C to 25°C. For signal crayfish, optimal growth occurs at 22.8°C (Firkins and Holdich 1993, Westman et al. 1993).

Crayfish are sensitive to calcium and pH levels. Medium to hard water with a slight alkaline pH of 7.5 to 8.5 is ideal. Calcium in excess of 5mg/L is necessary for adequate re-calcification of the exoskeleton after molting (Lowery and Holdich 1988). Crayfish also require relatively high levels of dissolved oxygen (Holdich 2002). Crayfish are sensitive to waters polluted by pesticides and industrial waste (Wevers et al. 1992).

Substrate diversity has been shown to strongly influence both density and size of crayfish in residing areas. Studies have shown river substrate material to be the single most important variable related to total crayfish abundance (Kirjavainen and Westman 1999). Crayfish prefer rocky stream beds with large substrate as well as areas around submerged wood (Bondar et al. 2003). Current velocity and direction may also influence crayfish habitat preferences (Mason 1978).

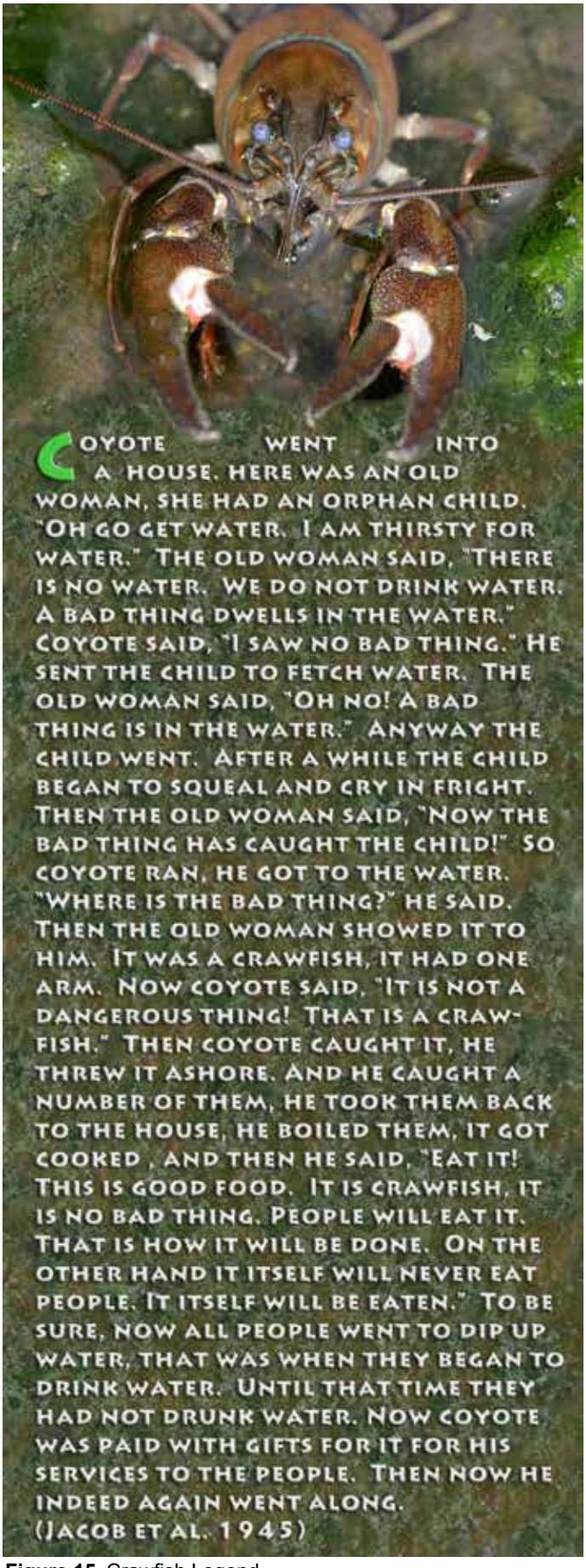

Figure 15. Crawfish Legend.

Crayfish play a key role in aquatic ecosystems both as predators and as prey. Crayfish display opportunistic feeding habits as carnivores, detritivores and herbivores; this yields crayfish as key player in energy transfer between trophic levels (Holdich 2003).

Crayfish in the Coast Range are prey to fish including the mountain whitefish and the northern pike minnow, avian predators including herons and kingfishers, and terrestrial mammals including raccoons, otters, and mink (Hogger 1988). Most crayfish are eaten by other fish during the summer and typically younger crayfish are most easily preyed upon.

When crayfish populations are high, it can affect the aquatic food web structure as well as affect aquatic habitats. Large crayfish populations influence aquatic habitat structure by creating burrows in the substrate and by over-consuming aquatic plants.

G3. Crayfish Cultural/Economic Aspects

Traditionally, crayfish were used by Tribal members as food only and were eaten boiled. Oregon has recorded history of crayfish harvesting dating back to 1893; harvesting is known to have occurred long before this date (Wevers et al. 1992).

G4. Crayfish Management Issues

Habitat loss, degradation, and alteration are linked to declines in crayfish populations. In addition to habitat changes, chemical pollution and the introduction of non-native organisms also influence declines. Non-native aquatic species spread disease and prey upon eggs, young native fish, and amphibians as well as cause destruction to native aquatic plants, communities, and habitats (EPA 2009).

The introduction of non-native crayfish can negatively impact local ecosystems. Confirmed non-native species found locally include the rusty and the northern crayfish. The rusty crayfish has been an issue in the mid-western United States and elsewhere. It has recently been found in the John Day River of Oregon (Olden et al. 2009). At this time, the rusty crayfish has not been found outside of the John Day River in the Northwest region. The northern crayfish has been found to have a widespread distribution in the Columbia River Basin (Larson et al. 2010). The best control method is to prevent the introduction of these non-native species.

G5. Crayfish Management Objectives and Strategies

In order to meet management goals for crayfish, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

G5.1 – Objective – Assess crayfish populations

G5.1.1 *Strategy – Assess crayfish species*

G5.1.2 *Strategy – Assess status and characteristics of crayfish populations*

Develop methods to assess the status and characteristics of crayfish populations in streams.

G5.1.3 *Strategy – Assess available habitat*

Develop methods to assess the quality and quantity of available crayfish habitat.

G5.1.4 *Strategy – Assess limiting factors*

Assess limiting factors for the crayfish populations present.

G5.1.5 *Strategy – Enhance crayfish populations*

Assess crayfish population enhancement techniques. Evaluate population enhancement needs.

G5.2 – Objective – Protect, enhance, and restore crayfish habitat for all life stages

G5.2.1 *Strategy –Enhance nutritive cycle*

Monitor and enhance the nutritive cycle within streams.

G5.2.2 *Strategy – Identify enhancement and conservation areas*

Identify areas for habitat enhancement and conservation.

G5.2.3 *Strategy – Aquatic invasive species education*

Educate Tribal members and community members on ways to protect aquatic habitat from non-native invasive species.

G5.3 Objective – Improve Tribal member crayfish harvest opportunities and experiences

G5.3.1 *Strategy – Improve opportunities to restore traditional practices*

G5.3.2 *Strategy – Develop action plans to increase existing harvest opportunities and experiences*

Develop goals and objectives to improve the harvest opportunity and experience capacity currently available for Tribal members.

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H. Columbian Black-tailed Deer (*Odocoileus hemionus columbianus*)

H1. Columbian Black-tailed Deer Management Goal

Maximize the population and health of Columbian black-tailed deer on Tribal lands and in state authorized hunting and fishing areas. Maximizing the population is important keep black-tailed deer numbers near the upper capacity to improve Tribal hunting opportunities and experiences.

H2. Columbian Black-tailed Deer Biology

Deer are members of the family Cervidae of the genus *Odocoileus*. Two species of deer are found in Oregon, mule deer (*Odocoileus hemionus*) and white-tailed deer (*Odocoileus virginianus*). There are two subspecies of mule deer, (*Odocoileus hemionus hemionus*) which occupy lands east of the Cascades and Columbian black-tailed deer (*Odocoileus hemionus columbianus*) which occupy lands west of the Cascades. Black-tailed deer are the only subspecies of *Odocoileus* on Tribal lands and the Trask Wildlife Unit.

Black-tailed deer prefer the earlier seral stages of the Coast Range. They can best be described as an "edge species." While not uncommon in mature forests, they tend to prefer the edge of forests that provide higher forage values and dense brush for cover. The diet of black-tailed deer in our region has been well documented (Crouch 1968, Miller 1968, Maser et al. 1981). Black-tailed deer tend to be browsers, favoring more woody plants; they are selective for trailing blackberry, red huckleberry, thimbleberry, salal, and various forbs and grasses.

Black-tailed males, or bucks, average 140 to 150 pounds. Bucks tend to be solitary but some form groups that generally stay together until the rutting season begins. Antlers start to grow in April or May, finish growing, and lose their velvet in August or September. Antlers are shed in January through February and are rarely shed all at once. Bucks will occasionally use their antlers in combat with other bucks, but threatening and aggressive displays are more common (Dasmann and Taber 1956). Mature bucks have an average annual home range of 248 acres. Bucks often leave their home range during the rut presumably to look for mates. The rut typically occurs from late October through December. Bucks seldom surpass nine years of age.

Mature does are mutually antagonistic toward each other often spacing themselves 295 feet or more from each other during conflict (Maser et al. 1981). Most does will breed for the first time as yearlings, though occasionally fawns will breed. The gestation period for does ranges from 183 to 203 days (Brown 1961). Does typically give birth from mid-May to mid- to late-June. Does bred for the first time typically produce a single young with twins more common in subsequent years. More than 90% of the does older than seventeen months in age will be pregnant. There appears to be no loss of fecundity with age in does (Jordan and Vohs 1976). Does may live up to fifteen years.

H3. Columbian Black-tailed Deer Cultural/ Economic Aspects

It would be difficult to overstate the importance of deer and elk to the Tribes. Every part of the deer was utilized. Deer provided food, tools, ornamentation and clothing from the time that Native Americans first set foot in North America (Thorsgard 2009). It remains an important food source and is a cultural pursuit that transcends the ages.

Hunters also camouflaged themselves with deer heads while stalking their prey and were renowned amongst neighboring tribes for their use of skillfully trained dogs for tracking and hunting (Jacobs 1945). In addition to mastery of the bow and arrow, rope traps were used by Molalla hunters to catch deer in small passes along the trails (Zenk and Rigsby 1998). The first deer that a person ever killed was not allowed to be eaten by the hunter, but had to be prepared and served to others (by the hunter).

H4. Columbian Black-tailed Deer Management Issues

Black-tailed deer populations appear to have declined throughout western Oregon since the 1980's based on ODFW hunter harvest, hunter success rate, and field survey data (ODFW 2008). Harvest data from the Oregon Department of Fish and Wildlife shows that statewide harvest (western Oregon) of black-tails declined from approximately 45,000 deer annually in the late 1980s to average less than 24,000 from 2000 through 2011 (ODFW 2013). While changes in the number of controlled hunt tags and elimination of "hunter's choice" in 1994 contributed to reductions in harvest and overall hunter success rates, they are unlikely to account for the entire decline.

Black-tailed deer populations of primary concern to the Tribes are those within the Trask Wildlife Unit, a Tribal hunting area in northwestern Oregon. In the Trask Unit, total black-tailed deer harvest declined from approximately 3,000 in 1985 to 995 in 2011 (ODFW 2013). Tribal harvest shows a similar decline from high harvests of 120 and 121 in 1992 and 1994, respectively, to a low of 52 in 2012. At the same time, the number of issued tags increased in 1994 with the elimination of "hunter's choice" and the resulting shift to controlled antlerless hunt tags, but has declined through 2012.

In response to the apparent black-tailed deer decline and resulting low hunter success, the Tribes have worked with ODFW to address the issue. From the black-tailed deer working group in 2002 to the Black-tailed Deer Management Plan completed in 2008 and the more recent Action Plan for the Trask Wildlife Unit, the Tribes have been a consistent partner. Collectively a number of issues have been identified as likely limiting factors for black-tailed deer populations: habitat, predation, human population growth, disease, illegal harvest, and hunting.

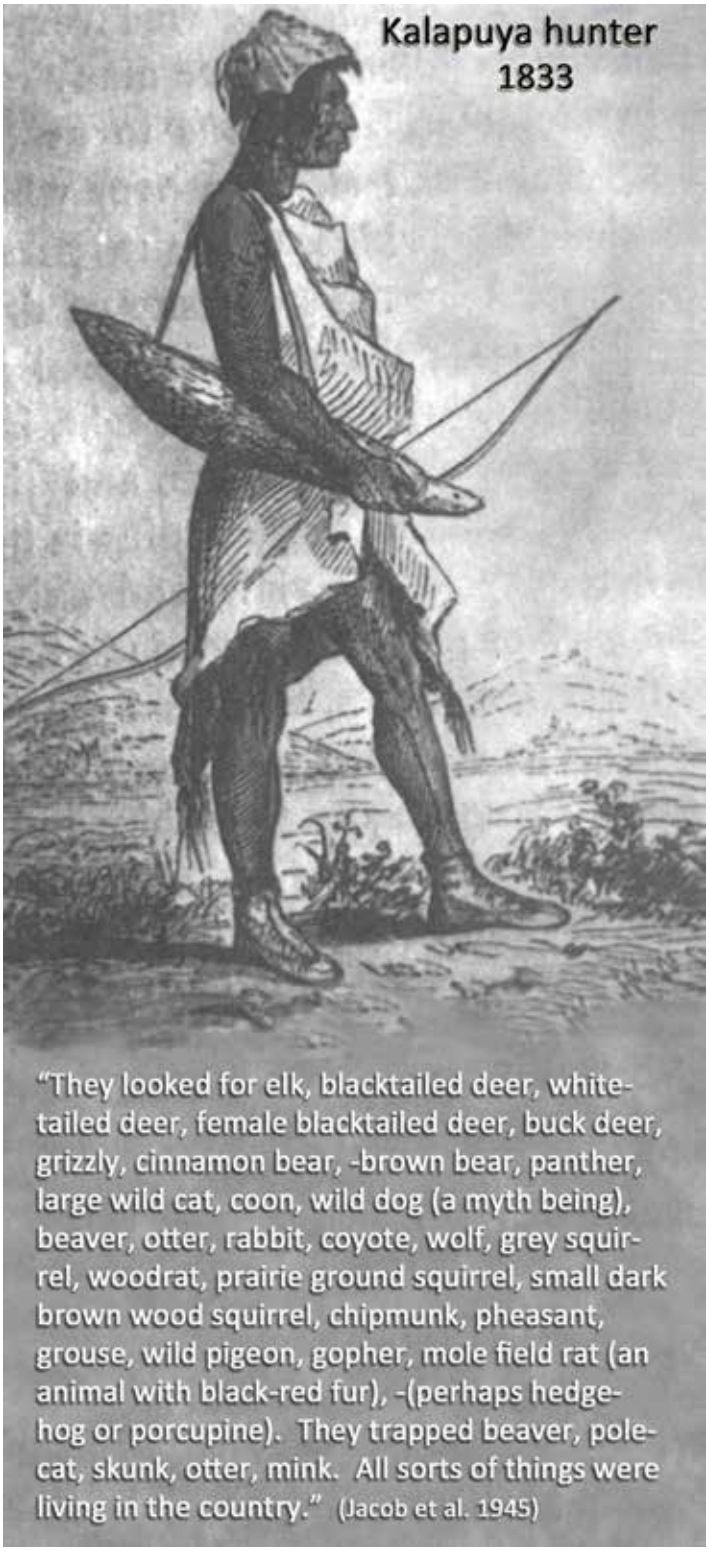

Figure 16. Kalapuya Hunter.

Habitat: Habitat modifications within western Oregon have been quite extensive. In forested areas, changes from early seral vegetation to older timber types have reduced the quantity and quality of available forage. A reduction in timber harvest

on federal lands, managed under the Northwest Forest Plan, has likely reduced the amount of high quality forage available to deer. There also appears to be an increase in intensive vegetation management on private timberlands which reduces the amount of early seral stage vegetation and the amount of available forage. Urbanization, conversion to agriculture, and development in rural areas has also resulted in a loss of suitable deer habitat. While agricultural lands provide some habitat for deer, urbanization and development of agricultural lands continues to adversely impact deer populations.

Human Population Growth: Human population growth is expected to continue in Oregon, especially in the Willamette Valley, and is likely to have a continuing impact on black-tailed deer populations. Urban areas will continue to expand, changing land uses and permanently modifying habitat, resulting in a loss of suitable deer habitat.

Disease: A number of diseases and syndromes are a threat to black-tailed deer populations. Deer Hair-Loss Syndrome (DHLS) occurs when deer lick and scratch themselves until they lose their hair in an attempt to ride themselves of exotic lice. During harsh winters, the lack of insulating body hair can lead to hypothermia and death. During milder winters affected deer seem to be able to recover. Fawns and does seem to be affected more often than adult bucks. Hair loss was first discovered in black-tailed deer in Washington in 1996 and it was observed to spread rapidly south through Oregon to California. The cause is hypothesized to be related to an exotic louse species that is native to Asia, now found on black-tailed deer. Research has been conducted by state and federal agencies on the cause of DHLS.

Deer Hair-Loss Syndrome has usually been observed at lower elevations but more recently cases have been observed above 1,000 feet. Severe to moderate cases have been documented by Tribal biologists starting in 2007. Deer can die from complications with this syndrome and to what degree the deer population on Tribal lands has been infected is not known at this time.

In 2009, ODFW reported the results of the Tribal deer/elk tissue samples which had been submitted for disease monitoring. One disease samples were tested for was Adenovirus Hemorrhagic Disease

Black-tailed Deer

Black-tailed deer remains a very culturally significant species. The Tribes have employed a number of programs to assess deer health and numbers and to improve habitat. Some of these programs are listed below.

MONITORING

The USDA trained CTGR Fish and Wildlife Department staff on the immobilization and capture of deer. A deer study was also conducted that provided valuable information on the local black-tailed deer, such as home ranges and areas of use. The elusive behavior of this species pushes the Tribes to continue research on other potential study methods and collaboration opportunities to increase knowledge on the black-tail deer populations.

DISEASE SAMPLING

The Tribes have been monitoring for Chronic Wasting Disease, Adenovirus, and Hair-Loss Syndrome for a number of years. To promote hunter participation in black-tailed deer and Roosevelt elk disease monitoring, the CTGR Fish and Wildlife Department established outreach and incentive programs for hunters. Every hunter that brings in their harvest for sampling gets placed in a drawing for gift card prizes. When hunters visit the CTGR's Natural Resources Division they receive a brochure that includes drawing and disease monitoring information.

FOREST MEADOWS

In the Tribes' current management plan, there has been construction of 100 acres of forest meadow. Construction of forest meadows will help reduce stress being placed on the deer populations by improving the quantity and quality of deer and elk forage on the Reservation. Routine maintenance and regular monitoring will occur. The soils will be tested and amended as necessary to aid forage growing conditions. Currently, plans are in the works to develop methods that will evaluate the quantity and quality of forage in the meadows.

Figure 17. Black-tailed Deer Programs.

(AHD). Oregon Department of Fish and Wildlife reported at least one of the twelve samples submitted tested positive for exposure to AHD. A deer can be exposed to this disease and be a carrier but not actually die. Individuals sick with the disease will die anywhere from three to five days after exposure. Research is currently under way by ODFW to estimate how many deer exposed to AHD have survived. To what degree the deer population on Tribal lands has been exposed or been infected by AHD is not known at this time.

Chronic Wasting Disease (CWD) could be the single greatest threat to black-tailed deer populations in western Oregon. The Tribes, in cooperation with ODFW, have been collecting tissue samples from deer to test for CWD. Fortunately, CWD has not been observed yet in Oregon. Outbreaks of CWD in other states have greatly affected deer populations, hunting opportunities, and local economies. Attempts to control a CWD epidemic in Wisconsin assessed killing deer as a method (Bartelt et al. 2003).

Hunting: Hunting has the potential to be a threat to black-tail populations, especially if combined with other factors such as disease, habitat modification, predation, and lack of population information. The Tribal and ODFW working group does not believe that black-tailed deer populations are currently over-hunted, but recognizes the potential for over-hunting. Currently, there is no direct black-tailed deer population data from which to assess the impact of hunting.

Predation: Black-tailed deer predation can be variable among different populations. The rate of predation on black-tailed deer in the Tribal hunting area has never been determined. It is currently unknown if predation is problematic.

Illegal Harvest: The effect of poaching on deer populations is relatively unknown and difficult to quantify. In a southern Oregon study, poaching accounted for 10% of mortality in which the cause of death could be determined (Ricca et al. 2002). Illegal hunting pressure in the region is thought to be relatively high according to local law enforcement officials (Hoodenpyle 2010).

In 2008, ODFW published the Oregon Black-tailed Deer Management Plan to develop long-term management strategies throughout the state. In 2012, a Black-tailed Deer Action Team was formed to collaborate on strategies of the management plan and includes representatives from the State and the Tribes, as well as other agencies and private landowners.

H5. Columbian Black-tailed Deer Objectives and Strategies

In order to meet management goals for Columbian black-tailed deer, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

H5.1 – Objective – Evaluate black-tailed deer habitat

Develop method to evaluate quality of black-tailed deer habitat.

H5.1.1 *Strategy – Characterize existing habitat*

Investigate opportunities to utilize the existing forest inventory and growth model to evaluate existing habitat quality now and in the future.

H5.1.2 *Strategy – Evaluate forage quantity and quality*

Evaluate the seasonal quantity and quality of the forage provided.

H5.2 – Objective – Assess black-tailed deer health

Expand efforts to assess black-tailed deer health.

H5.2.1 *Strategy – Conduct testing for Deer Hair-Loss Syndrome*

H5.2.2 *Strategy – Conduct testing for Chronic Wasting Disease*

H5.2.3 *Strategy – Conduct testing for Adenovirus Hemorrhagic Disease*

H5.2.4 *Strategy – Investigate and implement testing on other health related issues*

H5.2.5 *Strategy – Research methods to conduct field physical health assessments*

H5.3 – Objective – Seek opportunities to improve black-tailed deer habitat

H5.3.1 *Strategy – Assess optimum forage seed mix*

Assess optimum forage seed mix to maximize the quantity and quality of forage.

H5.3.2 *Strategy – Maximize forage production*

Conduct soil testing and develop recommendations

for soil amendments to maximize the quantity and quality of forage.

H5.3.3 *Strategy – Develop management plan for forest meadows*

Develop a long term management and maintenance plan for forest meadows developed under the Natural Resources Management Plan.

H5.3.4 *Strategy – Develop methods for measuring forage quantity and quality*

Develop methods to evaluate the quantity and quality of forage in forest meadows.

H5.3.5 *Strategy – Evaluate overall quantity and quality of deer habitat*

Evaluate overall quantity and quality of deer habitat and identify opportunities for improving habitat conditions.

H5.3.6 *Strategy – Continue to work collaboratively*

Utilize existing knowledge under the Oregon Black-tailed Deer Management Plan and remain involved in meeting the goals and objectives of the Black-tailed Deer Management Plan.

H5.4 – Objective – Quantify black-tailed deer populations and buck/doe ratios

H5.4.1 *Strategy – Research methods to assess deer populations*

Research and implement methodologies to estimate black-tailed deer populations.

H5.5 – Objective – Evaluate causes of mortality

Evaluate hunting pressure and other sources of mortality for black-tailed deer.

H5.5.1 *Strategy – Evaluate predation*

Evaluate methods to assess predator population and its effects on the deer population.

H5.5.2 *Strategy – Assess hunting pressure*

Evaluate methods for assessing the level of hunting pressure.

H5.5.3 *Strategy – Assess effects of road related mortality*

Assess road related mortality and its effect on deer populations. Evaluate and implement measures to mitigate negative effects.

H5.5.4 *Strategy – Conduct a deer mortality study*

Assess causes of mortality within deer population. Collaborate with federal and state studies.

H5.6 – Objective – Report on the objectives and strategies listed above

H5.6.1 *Strategy – Produce a state of black-tailed deer report*

Assemble a report on the known status of black-tailed deer and detail progress made on meeting the above objectives in a State of Black-tailed Deer on Tribal Lands report to the Natural Resources Manager and Tribal Council.

H5.7 Objective – Improve Tribal member black-tailed deer hunting opportunities and experiences

H5.7.1 *Strategy – Improve opportunities to restore traditional practices*

H5.7.2 *Strategy – Develop management plan to increase existing hunting opportunities and experiences*

Develop goals and objectives to improve the hunting opportunity and experience capacity currently available for Tribal members.

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I. Roosevelt Elk (*Cervus elaphus roosevelti*)

I1. Roosevelt Elk Management Goal

I2. Roosevelt Elk Biology

I3. Roosevelt Elk Cultural/Economic Aspects

I4. Roosevelt Elk Management Issues

I5. Roosevelt Elk Management Objectives and Strategies

I6. Roosevelt Elk References

I1. Roosevelt Elk Management Goal

Maximize the population and health of Roosevelt elk on Tribal lands and in state authorized hunting and fishing areas. Maximizing the population is important keep Roosevelt elk numbers near the upper capacity to improve Tribal hunting opportunities and experiences.

I2. Roosevelt Elk Biology

Elk are members of the deer family Cervidae of the genus *Cervus*. There are two subspecies of this genus in Oregon; Roosevelt elk (*Cervus elaphus roosevelti*) that occupies the land west of the Cascades, and Rocky Mountain elk (*Cervus e. nelsoni)* that occupies lands east of the Cascades. Roosevelt elk are the only subspecies of elk on Tribal lands and in the Trask Wildlife Unit.

Mature Roosevelt elk bulls average about 500 pounds but can reach over 1,000 pounds in weight. Mature cows average about 400 pounds but occasionally reach 600 pounds in weight. Cow elk may live to over twenty years in age and bulls can occasionally reach fifteen years.

The social organization of this species explains behaviors that are unique to this species of cervid on Tribal lands. Elk tend to be herding animals with cows and younger animals often forming bands of various sizes that stay together for much of the year. Elk live in a matriarchal society where adult bulls live apart from adult cows and younger animals during the nonbreeding season.

Bulls tend to be solitary most of the year but may form herds in May and June. By mid-summer bulls disperse and begin searching for untended females or females tended by less formidable bulls (Harper

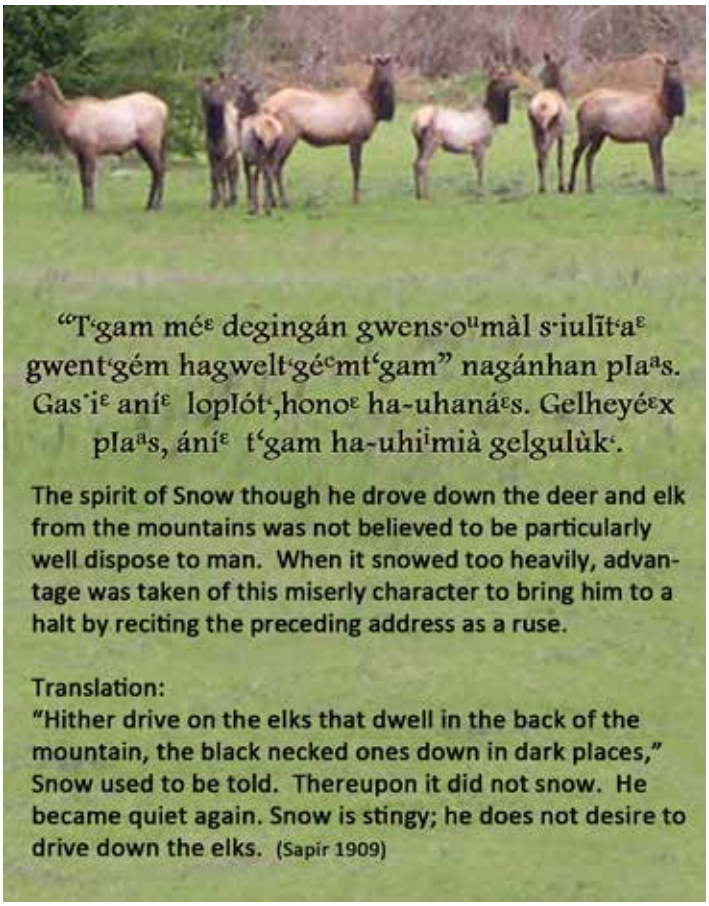

Figure 18. Legend of Snow and Elk.

et al. 1987). The competition among bulls to breed or establish a breeding harem of cows is amongst the most dramatic collection of behaviors of wildlife in our region. The senses of sight, sound, scent and touch are all used by a rutting bull to advertise for breeding cows. Bugling, horning, urine spraying and wallowing are some of the behaviors used to advertise for cows and to display dominance. Rutting bulls will also resort to direct physical combat to protect a harem and scare off would be suitors.

Most breeding is done during the last week of September and first week of October. Young are usually born in late May or early June after a 255-day gestation period. Most cows produce one young though twins can occur. Roosevelt elk cows usually produce young every other year.

Elk can be migratory with some herds known to migrate over fifty miles. However, not all elk migrate and the term migration is generally reserved for elk that move considerable distances to access ranges that are seasonally inaccessible

and whose movements are consistent in timing and consistent within the herd. Under this definition, Tribal elk in our region are not migratory but they may still move considerable distances in response to changing forage conditions.

Elk seek the earlier seral stages of the Coast Range forests for forage while utilizing older forests for hiding and thermal cover. The proximity of these two habitat types is also important. It is estimated that 90% of foraging areas used by elk are within 400 feet of cover sufficient to hide 90% of a standing elk at 200 feet (Verts and Carraway 1998).

I3. Roosevelt Elk Cultural/Economic Aspects

Pacific Northwest Tribes were efficient and capable hunters who used communal drives, snares, pitfalls, nets and deadfalls. Lewis and Clark describe Tribes using all of these methods (Toweill and Thomas 2002). Settlers also utilized elk first for personal use and latter in the 19th century for "market hunting."

As with deer, every part of the elk was utilized. Elk provided food, tools, ornamentation and clothing (Jacobs 1945). Elk remain an important food source and cultural pursuit that predates recorded history.

I4. Roosevelt Elk Management Issues

Elk were historically plentiful in the Northwest prior to European settlement. By the late 1800s the population had crashed and by 1910 elk had reached their lowest numbers. The State of Oregon started regulating elk hunting in 1899 and completely closed elk hunting from 1909 until 1932 (ODFW 2003).

Early efforts to restore elk involved transplanting elk from Jackson Hole, Wyoming to Billy Meadows in Wallowa County in 1912, again in 1913, and from Billy Meadows to Crater Lake in 1917. These transplants did not exceed more than fifteen elk at a time and cannot account for the rapid recovery in range and number. By 1922, numbers had increased greatly in Oregon including Tillamook County. In the late 1960s and early 1970s, the state implemented an aggressive effort to reintroduce Roosevelt elk into the Oregon north coast area including the Trask. Grand Ronde Tribal members began seeing elk back in our region in the early 1970s.

Key issues that need to be addressed when managing elk populations are the loss of suitable habitat, disease, and illegal harvest.

I5. Roosevelt Elk Management Objectives and Strategies

In order to meet management goals for Roosevelt elk, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

I5.1 – Objective – Evaluate quality of elk habitat

Develop method to evaluate quality of elk habitat.

I5.1.1 *Strategy – Evaluate cover for elk*

Estimate current and future quantity of cover.

I5.1.2 *Strategy – Evaluate elk forage*

Define forage utilization.

I5.1.3 *Strategy – Evaluate spatial requirements of elk*

Evaluate spatial requirements of elk.

I5.1.4 *Strategy – Develop capabilities to evaluate forage quantity and quality*

Develop survey protocol, training and equipment necessary to provide precise estimates of forage quality and quantity.

I5.2 – Objective – Seek opportunities to improve elk habitat

I5.2.1 *Strategy – Evaluate forest meadow soils*

Evaluate forest meadow soil conditions and provide a prescription to improve soils for maximum forage production.

I5.2.2 *Strategy – Identify best forest meadow characteristics*

Identify the parameters that are producing the most utilized forest meadows and establish them as criteria for future meadow construction.

I5.2.3 *Strategy – Develop forest meadow management plan*

Develop a management plan for forest meadows developed under the Natural Resources Management Plan, covering invasive species control, reseeding, elk use, etc.

I5.2.4 *Strategy – Evaluate overall quantity and quality of elk habitat*

Evaluate overall quantity and quality of elk habitat and identify opportunities for improving habitat conditions for elk.

I5.2.5 *Strategy – Seek partnerships to improve elk habitat*

Seek opportunities to work with private landowners, state, and federal managers to restore, retain, or develop elk habitat.

I5.3 – Objective – Evaluate elk health

Expand efforts to assess elk health.

I5.3.1 *Strategy – Investigate methods to evaluate elk health*

Keep informed on current technologies and techniques to evaluate elk health and pursue other cooperative opportunities with the state.

I5.4 – Objective – Research methods for quantifying elk populations and bull ratios

I5.4.1 *Strategy – Assess elk migration*

I5.4.2 *Strategy – Research best methods for determining elk population structure and numbers*

I5.5 – Objective – Evaluate elk mortality

Evaluate hunting pressure and other sources of mortality for elk.

I5.5.1 *Strategy – Evaluate effects of predators*

Evaluate methods to assess predator population and its effects on the elk population.

I5.5.2 *Strategy – Evaluate effects of hunting pressure*

Evaluate methods for assessing hunting activities and their effects.

I5.5.3 *Strategy – Track elk mortality*

Develop system to track and record elk mortalities.

I5.6 – Objective – Report on the above objectives and strategies

I5.6.1 *Strategy – Produce a state of elk report*

Assemble a report on the known status of Roosevelt elk on Tribal lands and detail progress made on objectives of the plan in a State of Roosevelt Elk on Tribal Lands report to the Natural Resources Manager and Tribal Council.

Figure 19. Forest Meadow Remote Camera Photo.

I5.7 – Objective – Develop relationship with the state to work on elk

Establish a method for working with the state in a cooperative effort to improve the habitat and health of elk.

I5.7.1 *Strategy – Maintain appropriate contacts with the state*

Establish the appropriate contacts with the state and keep and maintain a dialogue with the state concerning elk issues in western Oregon.

I5.8 Objective – Improve Tribal member elk hunting opportunities and experiences

I5.8.1 *Strategy – Improve opportunities to restore traditional practices*

I5.8.2 *Strategy – Develop management plan to increase existing hunting opportunities and experiences*

Develop goals and objectives to improve the hunting opportunity and experience capacity currently available for Tribal members.

I6. Roosevelt Elk References

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J. Upland Game Birds

J1. Upland Game Bird Management Goal

J2. Upland Game Bird Biology

J3. Upland Game Bird Cultural/Economic Aspects

J4. Upland Game Bird Management Issues

J5. Upland Game Bird Management Objectives and Strategies

J6. Upland Game Bird References

J1. Upland Game Bird Management Goal

Maintain and improve the health and habitat of the upland game bird populations to improve Tribal hunting opportunities and experiences.

J2. Upland Game Bird Biology

The following is a list of Upland Game Birds that are currently found in Oregon and are species of interest to the Tribes.

J2.1 Blue (*Sooty*) Grouse (*Dendragapus fuliginosus*)

Blue (sooty) grouse is is a species of forest-dwelling grouse native to North America's Pacific Coast Range, including Oregon. It is a solitary bird that inhabits forested mountainous areas dominated by conifers (Zwickel and Bendell 2004). Most upland game birds migrate down from higher elevation in winter, but blue (sooty) grouse actually migrates up in winter, spending the entire winter in the canopy of trees (ODFW 2004a). Migration down from higher elevation occurs during nesting season (Farrand 1988). Blue (sooty) grouse is the largest of the native forested grouse. It can reach up to twenty-one inches in length. Males are gray to bluish-gray with a red to yellow-orange comb over the eyes and a yellow neck sac surrounded by white coloration. Females are mottled grayish-brown with a dark tail (Farrand 1988). Nests are grass/leaf-filled ground scrapes, often near water located on the forest edge. Females incubate approximately six to eight eggs for about twenty-six days and care for the hatchlings until September. Young will begin to fledge within seven to ten days of hatching. Grass and forbs are important sources of food and cover while young broods are developing. In winter, blue (sooty) grouse is dependent on conifer needles and buds for food. Typically in-season berries and insects are eaten during the remainder of the year (ODFW 2004a).

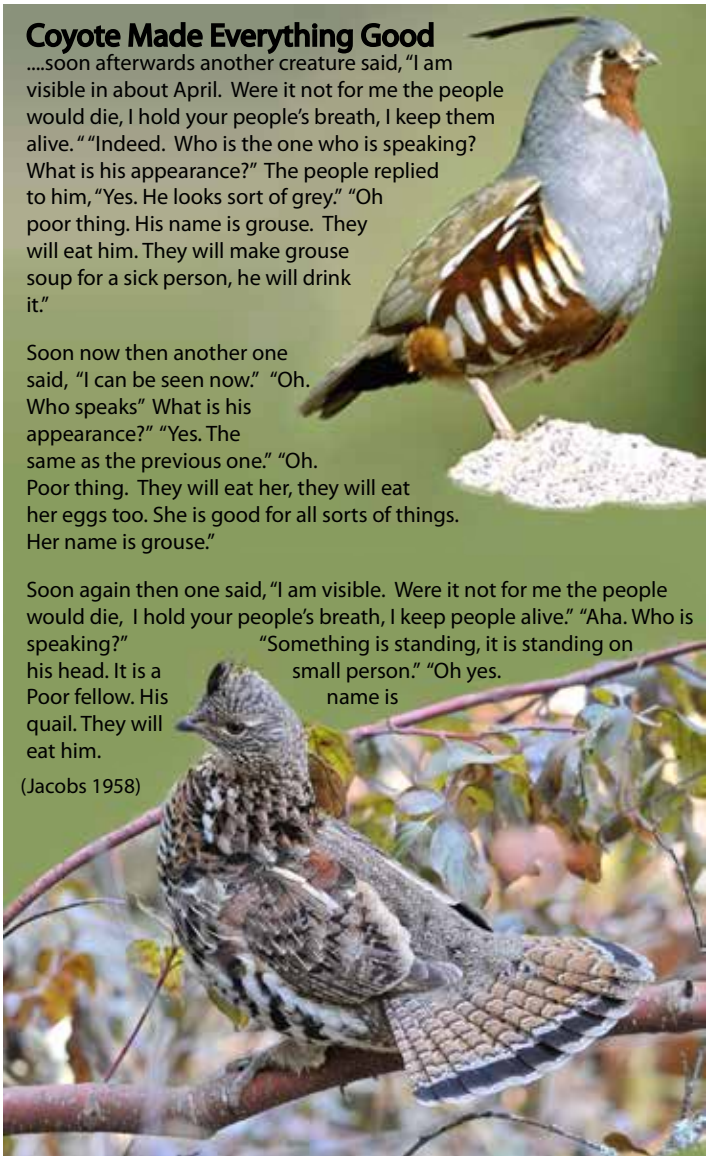

Figure 20. Coyote Made Everything Good. (Photo credit: US Fish and Wildlife Service, Eugene Beckes).

J2.2 Ruffed Grouse (*Bonasa umbellus*)

Ruffed grouse is native to Oregon and is one of the most widely distributed native game birds found in the state (ODFW 2004a). Ruffed grouse inhabit mixed forestland, preferring a deciduous component (especially willow, alder, and aspen) to coniferous stands; it makes use of the brushy regrowth in newly cut-over areas. Ruffed grouse display two different colors dependent on location. On the east side of Cascades it is gray and on the west side it is brown. In spring, males make drumming sounds with their wings, which is known to be a pre-mating gesture. The drumming sound

is loud and can be heard from a long distance (ODFW 2004a). Drumming is used as a territorial display, keeping other male ruffed grouse at a distance. As a courtship display, it is used to draw in females (Atwater and Schnell 1989). Males defend a breeding territory of ten to thirty acres. Females utilize riparian areas to build ground nests in which incubation for nine to twelve eggs lasts approximately twenty-three to -four days. Females hatch only one brood per year and care for the young for approximately ten to twelve days before the young become independent. Ruffed grouse is considered a browser and consumes mostly plant matter such as leaves, buds and fruits. Ruffed grouse is almost exclusively vegetarian, but newly hatched young primarily consume insects and invertebrates (Atwater and Schnell 1989).

J2.3 Mountain Quail (*Oreortyx pictus*)

Mountain quail is native to Oregon and found in most mountainous areas of the state (ODFW 2004a). Mountain quail is a secretive bird that inhabit open forest and woodland areas containing brushy undergrowth. It also selects forest-meadow edges and brushy regrowth areas following timber harvest (USFWS 2008). Mountain quail has two straight plume feathers extending back from the head. It has a dark blue-gray head and breast. The throat is chestnut in color outlined in white; wings and back are reddish brown with brightly barred flanks (Farrand 1988). Males and females are similar in appearance; females are slightly duller in color and have a shorter head plume. Ground nests are constructed within about a half-mile of water in a breeding territory that ranges from five to fifty acres. Males and females both incubate ten to twelve eggs for approximately twenty-four to -five days (USFWS 2008). Generally, only one brood is produced per year; once hatched, female and young remain in a one square-mile area (USFWS 2008). Mountain quail consumes almost exclusively seeds, but can also consume some green plant matter and invertebrates. Major predators of this species include Cooper's hawk, great-horned owl, coyote, bobcat, and weasels (USFWS 2008).

J2.4 California Quail (*Callipepla californica*)

Several sources claim that California quail is not native to Oregon or, at most, not outside of the southernmost portion of Oregon. Oregon Department of Fish and Wildlife lists California quail as native to Oregon but limited to small geographical regions (Budeau 2005). Since this species is locally present and hunting of it is regulated, it will be addressed in this plan. However, since it is not native to Tribal lands it will be categorized as non-native.

California quail is found in a variety of habitats including chaparral, sagebrush, oak woodlands, and foothill forests as well as residential areas and neighborhood parks (Farrand 1988). It can be found in and around the Grand Ronde community and Tribal lands. It is grayish in color with a distinctive tear drop shaped head plume. Their plump bodies vary from grayish to brown with scaly markings on the lower breast and abdomen. Males are particularly elegant with a black throat, chestnut patch on abdomen, a bluish gray breast, white flank speckles, and a white stripe on the forehead and around the neckline (McIlvaine 2000). Females differ from males in that females have a smaller head plume and lack the unique facial markings and black throat (McIlvaine 2000). Males defend a territory during the breeding season only. Females incubate ten to seventeen eggs in a ground nest for eighteen to twenty-three days. Young are dependent for only about ten days and will stay with the family covey until fall. Generally only one brood is produced; however, two clutches can be hatched in an exceptionally good year or in moderate climates. California quail consumes almost exclusively seeds and green plant matter, but does consume some invertebrates during spring. Wild berries are consumed when available (McIlvaine 2000).

J2.5 Wild Turkey (*Meleagris gallopavo*)

Wild turkey is not native to Oregon or the west coast states; it was introduced to the west coast around 1877. Two of the five wild turkey species in North America can now be found in Oregon: the Rio Grande turkey (*M.g. intermdiea)* and the Merriam's turkey (*M.g.merriami*) (ODFW 2004b). Since these species are present locally and hunting is regulated, it will be addressed in this plan.

Wild turkey is found in open woodlands, oak habitats, and riparian areas, which most commonly occur around the Grand Ronde community. Wild turkey is a large bird with long legs, neck and tail (Farrand 1988). Wild turkey home range varies

from 370 to 1,360 acres (Porter 1992). Males and females flock separately, except during the breeding season when a male defends a harem of five or more females. Each female will incubate a single clutch of approximately a dozen eggs in a shallow ground nest; after four weeks, eggs will hatch and young remain with the hen through winter. Diet varies based on food availability and is mainly plant-based; invertebrates and small vertebrates are also consumed. Acorns are preferred in winter.

J3. Upland Game Bird Cultural/Economic Aspects

Native species: blue (sooty) grouse, ruffed grouse, mountain quail

Traditionally, grouse and quail were primarily used for food; feathers were not considered valuable. Blue (sooty) grouse were preferred over ruffed grouse (Jacobs 1945).

There are not a lot of stories about quail. However, it was said that Grandmother Grouse was the one who gave Raccoon his stripes by beating him with a stick. It was held that a grouse coming to your home was a bad omen and that, if the grouse came into the home, something bad was imminent for one, or some of the occupants.

J4. Upland Game Bird Management Issues

J4.1 Native species: blue (*sooty*) grouse, ruffed grouse, mountain quail

J4.1.1 *Forest grouse: ruffed grouse and blue (**sooty**) grouse*

Western Oregon grouse hunting can be difficult due to environmental factors. Dense coniferous cover, frequent rainfall, and fire suppression have negative effects on grouse survival and hunter success (ODFW 2004a). Radio telemetry studies have shown that hunting has little impact on the population size of grouse in Oregon, even in areas of high hunting pressures. Grouse exhibit a natural ten-year cyclic population trend, which is similar to snowshoe hares, lynx, red fox, and prairie grouse (Atwater and Schnell 1989). Studies have shown that annual rainfall, in addition to movement, reproduction, and mortality, determines the relative abundance of grouse in the fall (ODFW 2004a).

Ruffed grouse is widely distributed throughout Oregon and is a highly sought after game bird within the state (ODFW 2004a). It is an edge species, utilizing meadows and regeneration harvests where brushy growth meets timber (ODFW 2010). Western Oregon provides ample habitat for ruffed grouse (ODFW 2010). Key habitat elements include understory of small hardwoods, shrubs, and fruit-producing bushes (USFS 2004). Early successional stages of plant growth on logged-over areas are ideal (USFS 2004). Practices that produce hazel thickets and alder stands while reducing large, solid areas of salal are useful west of the Cascades (WFWP 1998). Roosting occurs in heavy Douglas-fir, spruce and hemlock forests (WFWP 1998).

Fire is the best disturbance to create new growth and favorable ruffed grouse habitat. However, fire cannot always be utilized as a management technique. Regeneration harvesting provides similar early seral characteristics, but is not as environmentally effective as fire. Optimal stand regeneration growth to promote grouse habitat generally takes ten to twelve years after disturbance (Atwater and Schnell 1989). One of the most important habitat management activities is the creation of “edges” where different types of cover meet (WFWP 1998). The most effective grouse management technique is to maintain a continuous, dispersed rotational disturbance on forty acres or more of contiguous habitat (Atwater and Schnell 1989).

Unlike ruffed grouse, blue (sooty) grouse has a more restricted geographic distribution confined to western North America (Zwickel and Bendell 2004). Blue (sooty) grouse inhabits mostly coniferous forest and open meadow type areas (WFWP 1998), requiring medium to large forest openings (USFS 2004). It is closely associated with Douglas-fir and true firs (USFS 2004). Blue (sooty) grouse is generally found near water sources (ODFW 2010). In Oregon, the creation of openings in dense forest is necessary to create new growth of grasses and forbs (WFWP 1998). However, meadow openings colonized by natural forest succession eliminates blue (sooty) grouse habitat.

J4.1.2 *Mountain quail*

Mountain quail prefers high elevation, dense woodland habitats along the Pacific Coast of the United States (Farrand 1988). It inhabits brushy regeneration harvests and nests within a half mile of water (Csuti et al. 1997). Recently, this species

has declined in the mountainous areas of eastern Oregon and prescribed harvest limits are low (Csuti et al. 1997, USFWS 2008).

In western Oregon, mountain quail provides some of the most difficult game bird hunting available due to the difficult mountainous terrain of its habitat (Budeau 2005). The status of this species on Tribal lands is unknown. Currently, hunting regulations of mountain quail match those of California quail, in terms of open season and harvest limits.

J4.2 Non-native species: California quail and wild turkey

J4.2.1 *California quail*

California quail is among Oregon's most widely distributed game birds, found in urban, agricultural, and wildland habitats (Budeau 2005). It is most often hunted in conjunction with other species; approximately 1% of the statewide harvest of California quail occurs in western Oregon (Budeau 2005). Hunting regulations of California quail match those of mountain quail, in terms of open season and harvest limits.

J4.2.2 *Wild turkey*

Wild turkey adapts well to a wide variety of environments and has increased its habitat range throughout the past several decades (Porter 1992, Wunz 1992). Turkey populations and range are continuing to expand (ODFW 2004b). Adults are long lived at six or more years of age and have high reproductive capabilities (Porter 1992). Populations can be exponentially successful when first colonizing new areas (Porter 1992).

Two key wild turkey habitat factors are trees and grass; woodlands provide for nesting and roosting while grassy openings provide forage (Porter 1992). Wild turkey builds ground nests, typically at the base of a tree, in lateral cover which obscures horizontal vision from predators. In Oregon, Douglas-fir stands that have been thinned or selectively cut to less than 50% cover host ideal nesting opportunities (Porter 1992, Lutz and Crawford 1987). Savannas are the best habitat condition for young turkeys (Porter 1992). Natural fire disturbances produce savanna habitat and fire enhances grass and forb structure, seed production, and food availability (Porter 1992). Actively managing for early seral stage forest can improve food sources and habitat continuity for wild turkey.

In the late 1960s, transplant programs in Oregon took hold, which is beyond historic distributions of wild turkey (Porter 1992). In 1961, sixty wild-trapped Merriam's turkeys were released in north central and northeastern Oregon; only those on the eastern slope of the Cascades maintained a viable population (Wunz 1992).

According to Wunz (1992), there is considerable potential for maintaining a sustainable wild turkey population in the wetter areas of the Willamette Valley and further west of the Cascades. To manage for wild turkey populations in western Oregon, Lutz and Crawford (1987) suggest thinning Douglas-fir pole stands (10cm (3.94 inches) to 20cm (7.87 inches) in diameter) to densities of 616 trees per hectare.

Currently, Oregon's spring turkey season is among the most liberal in the United States (ODFW 2004b).

J5. Native Species Upland Game Bird Management Objectives and Strategies

Blue (sooty) grouse, ruffed grouse and mountain quail

In order to meet management goals for native upland game birds, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

J5.1 – Objective – Maintain a self-sustaining, healthy population of native upland game birds on the Tribal lands

J5.1.1 *Strategy – Population estimate*

Evaluate a method to establish a population estimate for each species.

J5.1.2 *Strategy – Monitor populations*

Monitor ruffed grouse population trends by conducting annual spring drumming counts. Conduct hooting surveys to assess presence/absence of blue (sooty) grouse. Utilize ODFW survey protocols to standardize data collection and evaluate data across landscape.

J5.1.3 *Strategy – Population prediction*

Assess the potential effects of an increase in these populations on local resources; specifically related to disease, displacement, and damage.

J5.1.4 *Strategy – Maintain population*

Evaluate land management decisions and take appropriate mitigation measures to maintain the native upland game bird populations.

J6. Non-native Species Upland Game Bird Management Objectives and Strategies

California quail and wild turkey

Habitat for both of these species is available but located more in the lower elevation lands, rather than on higher elevation lands. In order to meet management goals for non-native upland game birds, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

J6.1 – Objective – Assess non-native upland game bird populations

J6.1.1 *Strategy – Population estimate*

Evaluate a method to establish a population estimate for California quail and wild turkey.

J6.1.2 *Strategy – Population prediction*

Assess the potential effects of an increase in these populations on native species and local resources; specifically related to disease, displacement, and damage.

J6.1.3 *Strategy – Evaluate population*

Evaluate land management decisions, and take appropriate mitigation measures to manage the non-native upland game bird populations.

J7. All Oregon Upland Game Birds

J7.1 – Objective – Assist in with ensuring that upland game bird populations are managed

Assist with ensuring that upland game bird populations are maintained to meet the cultural and subsistence needs of the membership.

J7.1.1 *Strategy – Assist with development of management plans*

Review and comment on federal and state land management plans and project proposals.

J7.2 Objective – Improve Tribal member upland game bird hunting opportunities and experiences

J7.2.1 *Strategy – Improve opportunities to restore traditional practices*

J7.2.2 *Strategy – Develop action plans to increase existing hunting opportunities and experiences*

Develop goals and objectives to improve the hunting opportunity and experience capacity currently available for Tribal members.

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K. Cougar (*Puma concolor*)

K1. Cougar Management Goal

To maintain a viable cougar population while minimizing human-cougar conflicts. Strive to improve Tribal harvest opportunities and experiences.

K2. Cougar Biology

Cougar (*Puma concolor*), also known as puma, mountain lion or panther is a member of the cat family Felidae. Cougars in Oregon range from five to nine feet in length and weigh between eighty to 210 pounds (Maser 1998). Minimum home range can vary depending upon the type and productivity of the environment. Occupied habitat generally consists of established male and female territories with transients of both sexes that roam all occupied areas. Resident males usually require a minimum home range of fifteen square miles (Hornocker 1969) but more typically male home ranges exceed sixty-four square miles (Maser 1998). Female home ranges may overlap and can be as few as five square miles (Hornocker 1969) but usually exceed thirteen square miles (Maser 1998). Cougars do not use all areas of their home range equally and often linger in one location usually in association with a kill (Seidensticker et al. 1973). Male territories commonly overlap female territories. Male cougars will tolerate the incursion of other males into their territory but will not associate with the other male. This behavior of mutual avoidance is facilitated by visual and olfactory marks and determines the distribution of cougars in the wild (Hornocker 1969, Seidensticker et al. 1973). Females also show this antisocial behavior but are more likely to share some common areas (Hornocker 1969). Home ranges are established through prior rights and are altered after death or movement of the residents (Maser et al. 1981).

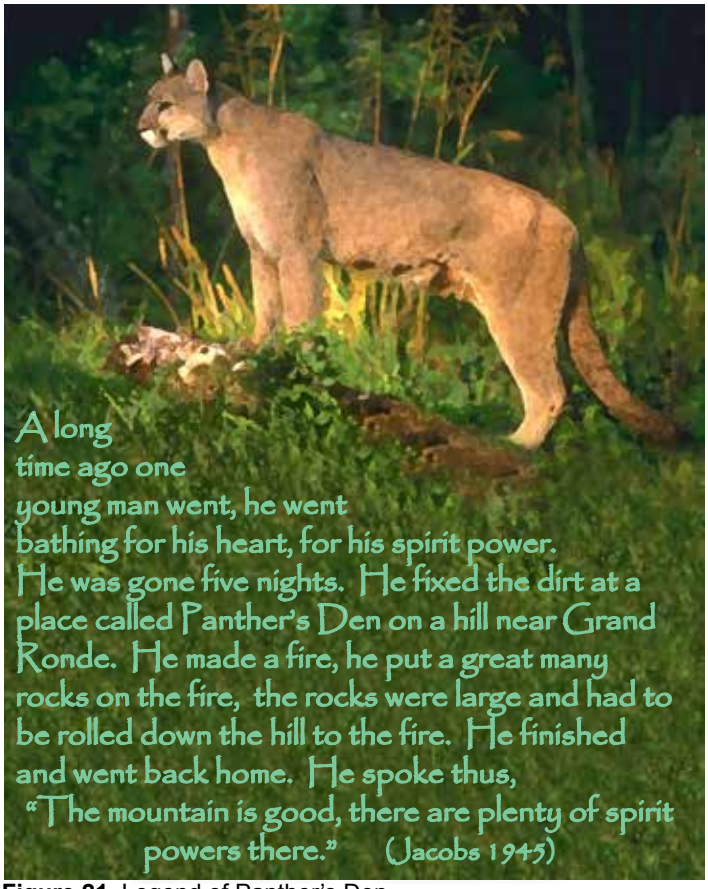

Figure 21. Legend of Panther's Den.

Cougars are primarily ambush predators and rely on their ability to stealthily approach their prey and attack from close range (Hornocker 1971). Deer and elk are the primary prey items for cougar although porcupine, hare, grouse and various other small mammals including carrion also make up part of their diet (Maser et al. 1981). It is estimated that cougars kill one deer every seven to fourteen days (Hornocker 1981, Robinette 1961). This interval is likely to be longer when other small prey is available or when elk are taken (Hornocker 1969).

Breeding usually is limited to males and females with established territories (Maser et al. 1981). Breeding and birthing can occur at any time of the year yet evidence shows that most birthing occurs between June and September (Robinette et al. 1961). A litter of three kittens is most common but this can range from one to five. Gestation is ninety-one to -seven days. Young will remain with the female until their second winter. Once independent, young become transients until they can find a vacant territory, establish residence, and achieve breeding status (Maser et al. 1981).

K3. Cougar Cultural/Economic Aspects

Traditionally, the use of cougar parts was limited to certain people. Most frequently, teeth and claws were used for ornamentation by people with cougar power; hides could only be used by people with cougar medicine. Cougar medicine was considered strong but unpredictable, thus it was seen as a more dangerous medicine to posses (Zenk 1976).

K4. Cougar Management Issues

Cougar management is fraught with very challenging issues. The secretive nature of the species makes their study very difficult and often inaccurate (Van Dyke et al. 1987). Human-cougar conflicts have heightened public sensitivities. Cougar is a large predator that has been known to kill humans. Human safety issues are not discountable to the Tribes and while there is some evidence that the risk to humans may be increasing (Beier 1991, Wilson 2010) the issue is emotionally charged and the perceived risk is often disproportional to the actual risk. People rarely develop attitudes about cougars from a direct encounter, but rather through popular media or popular belief (Riley 2000). There is also evidence that popular media can have a stabilizing affect on the perceived risk level of large predators (Gore 2005). Our strategies should involve staying up to date on cougar issues in the area and maintaining open communication with the membership. Our actions should involve keeping the membership aware of the actual risk, what can be done to minimize these risks and how their involvement can aid in the management of the species.

Another source of potential conflict with humans and cougars is the danger of livestock, domestic pets, and other species of interest, particularly deer and elk. For livestock and pet issues, the most effective strategies will likely include maintaining communication with the membership about the actual level of risk, methods for reducing risks, and the role the Tribes can play on their behalf to address the issue.

Deer and elk are very important species to the Tribes. They remain a vital subsistence and cultural resource to the Tribes. Deer are the primary food source for cougars with elk being taken when the opportunity occurs. Adult cougars are thought to consume approximately one deer every seven to ten days on average (Cooley 2008, Hornocker 1970). Cougar predation becomes a more controversial subject among hunters when hunting success drops and the assumed number of deer is low in relation to the assumed number of cougars. If these assumptions prove true, cougar and other carnivore predation can have a significant negative impact on game species. Unfortunately these assumptions are often wrong or very hard to test. There are many examples of established deer survey methods providing significantly erroneous data (McCullough 1982, Collier et al. 2007, Neff 1968) and the assumed cougar population is often at odds with the actual number (Lambert et al. 2006). The desire for greater predator control can become a costly and ineffective path to improve deer numbers. Predator control has had limited value when the deer population is at or near habitat carrying-capacity (Ballard et al. 2001). Our strategy for this potential conflict should involve better estimates of the deer population in relation to habitat carrying-capacity and better assessments of cougar numbers and their impact on game resources.

K5. Cougar Management Objectives and Strategies

In order to meet management goals for cougar, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

K5.1 – Objective – Assess cougar population

Assess cougar population level given the biological carrying-capacity.

K5.1.1 *Strategy – Assess cougar population*

K5.1.2 *Strategy – Assess acceptable cougar carrying capacity*

Assess acceptable carrying capacity based on prey species and land base size being managed; monitor population level; and provide education on cougars.

K5.2 – Objective – Evaluate cougar impact on game species

Evaluate cougar impact on other game mammal species.

K5.2.1 *Strategy – Evaluate cougar impact on game species*

K5.2.2 *Strategy – Assess deer and elk relationship to the current carrying-capacity*

K5.3 – Objective – Reduce human conflicts with cougars

K5.3.1 *Strategy – Inform Tribal membership of risks*

Use available media to inform the Tribal membership about cougars, risks, what can be done to minimize risks, and what to do if encountered.

K5.3.2 *Strategy – Record sightings and evaluate potential risks*

Develop database of reported sightings and maintain dialogue with state about reported sightings and concerns.

K5.4 Objective – Improve Tribal member cougar harvest opportunities and experiences

K5.4.1 *Strategy – Improve opportunities to restore traditional practices*

K5.4.2 *Strategy – Develop action plans to increase existing harvest opportunities and experiences*

Develop goals and objectives to improve the harvest opportunity and experience capacity currently available for Tribal members.

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L. Black Bear (*Ursus americanus*)

L1. Black Bear Management Goal

To maintain a balance of predator-prey populations while also maintaining a long-term viable population of black bear. Strive to minimize human/black bear conflicts. Strive to meet cultural, subsistence and recreational needs of Tribal membership and to improve Tribal harvest opportunities and experiences.

L2. Black Bear Biology

Black bears are members of the Ursidae family and are present in Oregon throughout the Cascade Range and west to the Pacific Ocean (Verts and Carraway 1998). The most productive environments for bears are lands which provide contiguous habitat with limited urban development (Burt and Grossenheider 1952). They tend to be solitary and prefer dense understories of mixed deciduous-coniferous forests and riparian zones. Black bears are attracted to early successional forest communities; seven to twelve years post regeneration harvest provides brushy growth needed for cover (Verts and Carraway 1998).

Black bears forage seasonally across a variety of forest habitat types. They are omnivores eating a variety of vegetative material including grasses, forbs, acorns, nuts, fruit, berries, and the cambium layer of trees (Csuti et al. 1997, Verts and Carraway 1998). They are opportunistic hunters preying on small mammals, fish, and birds as well as scavenge for carrion. They mate in summer but implantation does not occur until November or December (Csuti et al. 1997, Verts and Carraway 1998), resulting in a gestation period of approximately three months and birth occurring in January or February (Lindzey and Maslow 1977a). Females reproduce once every two years, typically having an average of two cubs that are dependent for under a year (Lindzey and Maslow 1977a).

Black bears den beneath downed trees or hollowed trees and logs in late October and are inactive for an average of four months, occasionally emerging from the den (Lindzey and Meslow 1976). Predenning and postdenning time periods are associated with low activity in comparison to non-denning time period activity levels (Lindzey and Meslow 1976). Females weigh 100 to 265 pounds; males weigh 150 to 300 pounds (Verts and Carraway 1998). In Oregon, black bears have a home range of about one to one and a half square miles. Oregon black bear home ranges are smaller than other parts of United States because the Pacific Northwest provides such high quality habitat (Lindzey and Maslow 1977b). Black bears can reach a short distance speed of thirty miles per hour and can live up to thirty years or more (Burt and Grossenheider 1952).

L3. Black Bear Cultural/Economic Aspects

Bears were considered by some tribes to be human and they were generally not allowed to be hunted or eaten. When hunting was allowed for ceremonial purposes, only male bears were hunted and only certain people were allowed to be involved with the hunt, usually based on a hereditary right or power granted by the bear spirit. Many stories surround black bears, especially involving bears taking in and raising children. Black bear medicine was considered to be strong but unpredictable (Thorsgard 2009).

Black bear meat, hides, and body parts cannot be sold for profits. There is an underground, “black” market for bear gall bladders which are sold illegally.

L4. Black Bear Management Issues

Black bears can cause damage to trees and timber production by removing bark and consuming cambium and sap (Verts and Carraway 1998). This typically occurs when there is a lack of nutrients in the diet (Lindzey and Maslow 1977b).

Black bears are opportunistic scavengers and can become conditioned to garbage dumps and unattended campsites. Conflict can be anticipated due to the highly valued timber resources on Tribal lands and human recreational activities in the campground and on trails. Once a black bear is exposed to easily accessible food, the bear will continue to visit the site. This behavior creates

nuisance individuals which can pose a threat to human safety. Transplanting nuisance individuals is not feasible in terms of necessary resources and there is considerable evidence that black bears return to native soil when removed (McCollum 1973). Additionally, there is little unoccupied habitat where bears could be released. Therefore, extermination is often the only solution.

The population of black bears on Tribal lands is unknown. It would be difficult to estimate a population given their secretive and solitary nature.

Black bears are considered game animals in Oregon and. will be managed as a game species on Tribal lands and harvested for ceremonial use. The state implements harvest regulations and permits.

L5. Black Bear Management Objectives and Strategies

In order to meet management goals for black bear, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

L5.1 – Objective – Maintain healthy black bear populations

L5.1.1 *Strategy – Population estimate*

Estimate black bear population.

L5.1.2 *Strategy – Records*

Keep records for longitudinal population trends and historical use.

L5.1.3 *Strategy – Public education*

Develop recreational signage and outreach programs educating public about risks associated with black bear encounters and the importance of "Keeping Wildlife Wild."

L5.1.4 *Strategy – Assist with data collection*

The Tribes would like to work collaboratively with the regional ODFW office in collecting black bear information.

L5.2 – Objective – Reduce natural resource damage and human conflict

L5.2.1 *Strategy – Harvest*

Maintain and evaluate harvest regulations.

L5.2.2 *Strategy – Reduce human conflicts*

Remove problem individuals consistent with state regulations.

"Both the black and the grizzly bear were hunted. For the former, men had to sweat for five days before starting out on the hunt, using fir-twigs on the coals, to give the body an aromatic odor. After this preparation, the hunters would go to the bear's den, talk to the bear for some time and beg him to come out and be killed. In the case of grizzlies, the hunters had to dance the war dance before starting out, just as if they were to hunt a human enemy. Reaching the den, a number of short, sharp stakes were driven into the ground in front of the opening, and then, as the bear came out and was engaged in tearing down and clearing out of the way this obstruction, he was shot under the neck." (Dixon, 1907)

"It is said that when a bear was killed, a feast had to be given. All the meat was cooked at once, and had to be eaten then and there. It must never be dried. The skull was not saved, however, the hide was dressed for use as a robe, etc." (Drucker, 1937).

"The Indians had watertight cooking baskets or pots as they called them. These baskets were of various sizes, usually about five quarts. Water was put in them and very hot rocks were dropped in the water to make it hot. As they cooled, they were taken out and other hot rocks were used in the same manner until the water was boiled hot. It did not take long to boil the water. In the meantime, venison, bear or any kind of meat was cut up into small pieces and dropped into the water which was thickened with tar-weed flour. The result was Indian mulligan stew which was very popular. The fact that the meat was more hot than cooked did not bother the Indians who rather preferred their meats raw or semi-raw. They would all squat around the pot and scoop the stew out with their hands,"
(Virginia Hartin McKay, a later Douglas County pioneer b.1863).

It is important to note some natives saw eating bear as a taboo because of its similarity to humans. Those individuals that took on the spirit power of the bear would not eat the meat.

Figure 22. Black bear. (Photo credit: Ryan Poplin)

L5.2.3 *Strategy – Public education*

Educate Tribal membership and the public about black bears, their behavior in association to locating easily accessible food sources, and the likely result this behavior will have. Stress the importance of limiting food accessibility by bear-proofing food storage and removing all garbage from site. Post educational signs about black bear at the campground, on hiking trails, and other recreational sites.

L5.3 Objective – Improve Tribal member black bear harvest opportunities and experiences

L5.3.1 *Strategy – Improve opportunities to restore traditional practices*

L5.3.2 *Strategy – Develop action plans to increase existing harvest opportunities and experiences*

Develop goals and objectives to improve the harvest opportunity and experience capacity currently available for Tribal members.

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M. Coyote (*Canis latrans*)

M1. Coyote Management Goal

To maintain a balance of predator-prey populations while also maintaining a long-term viable population of coyote. Strive to meet cultural, subsistence and recreational needs of Tribal membership and to improve Tribal harvest opportunities and experiences.

M2. Coyote Biology

Coyote is a member of the dog family, Canidae. The scientific name *Canis latrans* literally means "barking dog" in latin. Other names for coyote include brush wolf, prairie wolf, and American jackal (Voigt and Berg 1999). Two of the nineteen geographic subspecies of *Canis latrans* are found in Oregon: the larger and paler *Canis latrans lestes* is found east of the Cascade Range and the smaller and more richly colored *Canis latrans umpquensis* subspecies is found west of the Cascade Range (Hall 1981). Although related to the wolf, coyotes are much slimmer and smaller than wolves. Coyotes have dense fur which makes them appear larger than they really are. Oregon coyotes typically weigh between twenty-two to thirty pounds (Audubon Society 2010). Females are usually smaller than males. Body length can vary from forty-eight to sixty inches with a tail length of about sixteen inches (Voigt and Berg 1999). Coyotes have a long head with a gentle sloping forehead, distinct yellow eyes, black nose, and prominent canine teeth. Their ears are wide, pointed and erect. Their necks are thick with fur and can appear oversized for its body. Their long tongue often hangs down between their teeth (Bekoff 1978). Fur is long and soft and typically light brown to brownish orange, darker towards the tail where the black-tipped hair becomes wavy. Their throat and abdomen are a lighter gray or white color. Color and marking variations occur between individuals as well as regionally between coyotes found east and west of the Cascades (Verts and Carraway 1998). Coyote coats become dense during late fall and molt once a year starting in late spring (Bekoff 1978).

Like the wolf, coyotes are well known for their yelping and howling cry which is a sequence of high pitched bayings. They can be heard between sunset and sunrise, especially at dawn or dusk. They are rarely heard during the day (Bekoff 1978).

Coyotes were found on the plains, prairies, and deserts of central and western North America when the Europeans arrived (Kilgo et al. 2010). Populations with the highest density were found in the Great Plains region and in the south-central region of the United States (Hygnstrom et al. 2005). With the elimination of large predators and alterations in landscapes, coyotes have been allowed to expand into habitat ranges throughout North America. Coyotes can be found in a variety of habitats, from remote forests to highly urbanized areas (Verts and Carraway 1998). They den in burrows in the soil, between rocks, under downed trees, in thick brush, and even in culverts.

Coyotes appear to be monogamous, remaining together for several years. Females have one estrus annually, lasting four to five days and breed between January and March (Voigt and Berg 1999). Both males and females can breed at one year of age when conditions are optimum, but both sexes typically breed after age-one (Bekoff 1978). Gestation last from sixty to sixty-three days (Voigt and Berg 1999).

Coyotes can be found as lone individuals (transients), pairs, or in groups of three or more called packs (Bekoff 1978). A pack is led by a mated pair, the alpha male and alpha female. These two individuals are the only breeding pair in the pack. The remainder of the pack is typically composed of genetically related individuals, either offspring of the mated pair or unrelated individuals accepted by the mated pair (Bekoff and Wells 1980). Most coyotes can be found living in packs, fewer as mated pairs, and even fewer as lone individuals or transients. A lone individual is the least desirable position, most often held by yearlings who have left their pack or individuals that are disabled, diseased, or elderly (Andelt 1985). Transient individuals often have a much higher mortality rate than pairs or packs (Andelt 1985).

Home ranges depend on several variables such as pack size, food distribution and abundance, availability of adequate denning sites, and overall habitat conditions (Bekoff 1978). Food availability is most likely the biggest influence on home range size. The more scarce food is the greater the home range will be.

Coyotes are primarily carnivores, consuming carrion, rabbits, and small rodents. Coyotes are opportunistic and can consume a variety of foods including fawns, birds, insects, fruits, vegetables, human garbage, compost, outdoor pet food, and small pets (Verts and Carraway 1998).

Humans are the biggest threat to coyotes, accounting for 90% of their deaths. Coyotes are killed either on purpose or on accident by guns, poison, traps, vehicles and farm machinery. Black bears, wolves, cougars and eagles are natural predators of coyotes (Bekoff 1978). Parasites and diseases that affect coyotes include heartworm, hookworm, distemper, canine hepatitis and rabies (Voigt and Berg 1999).

M3. Coyote Cultural/Economic Aspects

Thousands of coyotes were killed in Oregon as well as in other western states by trappers and hunters during the 20th century (Verts and Carraway 1998). The federal government, state wildlife management agencies, stockmen organizations, and counties paid trappers and hunters to kill coyotes to help reduce livestock losses. Despite elimination efforts, coyote populations increased throughout Oregon as well as throughout North America (Verts and Carraway 1998).

Coyotes were and still are trapped and killed for the sale of their pelts (Verts and Carraway 1998). Approximately 500,000 coyote pelts are harvested annually in North America (Deems and Pursley 1978). Coyotes are an unprotected predatory animal in Oregon and may be hunted throughout the year. Coyotes are most often harvested during winter (mid-November to mid-February), when their winter coats are prime (Stains 1979, Obbard 1987).

M4. Coyote Management Issues

Coyotes can cause damage to a variety of natural resources such as livestock, poultry, and crops (Hygnstrom et al. 2005). Coyotes are also regarded as a nuisance in and around urban areas due to

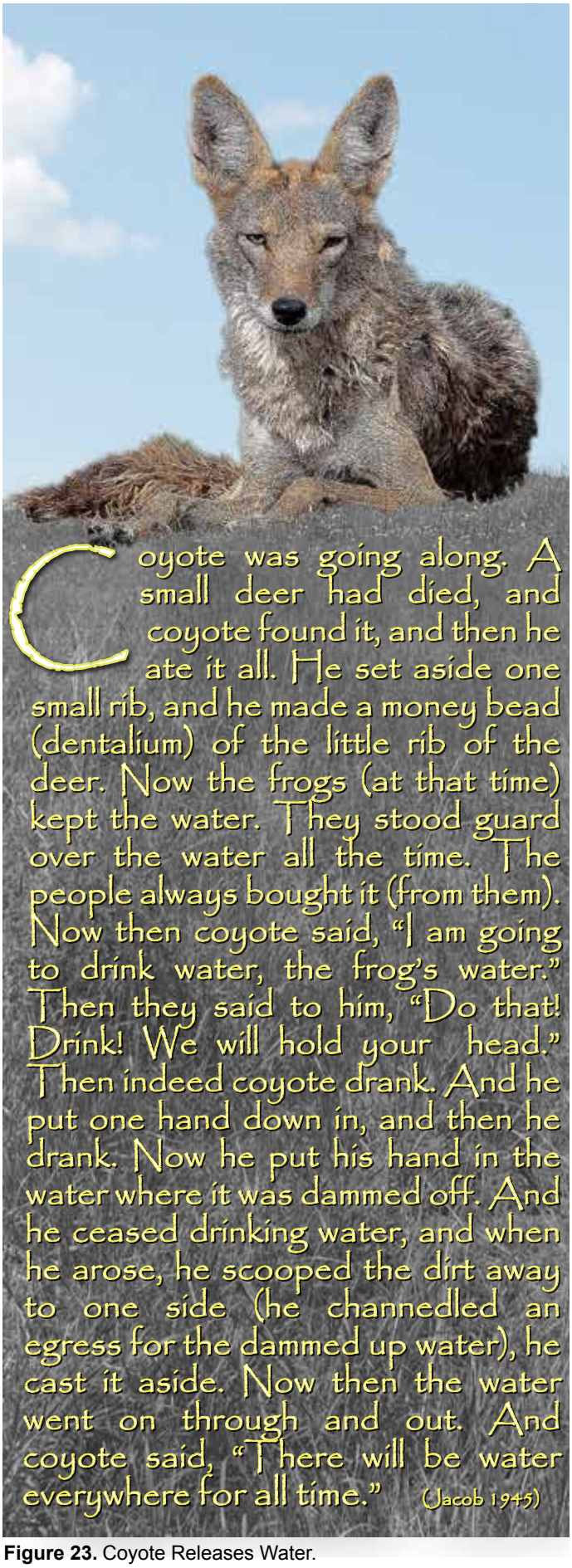

Figure 23. Coyote Releases Water.

their predation on domestic pets. Management practices in the past have focused on lethally controlling nuisance individuals within a population if and when conflict occurs. Contrarily, coyote populations have responded to these control measures with increased fecundity (Csuti et al. 1997). Several studies have documented 30% – 100% increases in reproduction rates or densities in areas where coyotes are intensively controlled (Voigt and Berg 1999). When coyotes are killed, the population structure becomes disrupted. This stimulates populations to increase their breeding efforts as well as results in larger litters. Coyotes are also known to quickly move into adjacent areas where coyotes have been previously removed (Voigt and Berg 1999).

Realizing these methods were not effective, the livestock industry has shifted the focus from elimination efforts to controlling damage caused by coyotes. Livestock managers are now using guard dogs and appropriate fencing to help protect livestock (Verts and Carraway 1998).

It is illegal to relocate a coyote in Oregon. It is also illegal in Oregon to hold a coyote in captivity. The legal method to remove a nuisance coyote is euthanasia (Audubon Society 2010). In order to help prevent problem coyotes in urban areas, a few human behavioral modifications may be employed including securing garbage cans and compost bins and eliminating pet food bowls outdoors. Coyotes can be a danger to pets. Pet safety can be improved by keeping them indoors, on a leash, or within a fenced yard (Audubon Society 2010).

The state manages coyote hunting with a general hunting license, or a Furtaker's License (which allows trapping and hunting), or a Hunting License for Furbearers.

Coyotes are common on Tribal lands and in the Grand Ronde community. The number of coyotes in the area is unknown. Estimates of coyote densities are extremely difficult to obtain and verify (Verts and Carraway 1998).

M5. Coyote Management Objectives and Strategies

In order to meet management goals for coyote, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

M5.1– Objective – Assess role of the coyote in ecology of area

M5.1.1 *Strategy – Assess coyote population*

M5.1.2 *Strategy – Assess rate of predation*

Assess the rate of predation by coyotes and its effects on other game species.

M5.1.3 *Strategy – Develop site specific management plans*

Develop site specific management plans where wildlife predation is high, especially regarding deer population and fawn predation.

M5.2– Objective – Reduce natural resource damage and human conflict

M5.2.1 *Strategy – Avoid coyote conflicts*

Educate Tribal members and surrounding community on ways to help prevent coyote conflicts.

M5.3 Objective – Improve Tribal member coyote harvest opportunities and experiences

M5.3.1 *Strategy – Improve opportunities to restore traditional practices*

M5.3.2 *Strategy – Develop action plans to increase existing harvest opportunities and experiences*

Develop goals and objectives to improve the harvest opportunity and experience capacity currently available for Tribal members.

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N. Bobcat (*Lynx rufus*)

N1. Bobcat Management Goal

To maintain a balance of predator-prey populations while also maintaining a long-term viable population of bobcat. Strive to meet cultural, subsistence and recreational needs of the Tribal membership and to improve Tribal harvest opportunities and experiences.

N2. Bobcat Biology

Bobcat belongs to the cat family, Felidae. The scientific name is *Lynx rufus*. Felis means cat in latin, and rufus means red or reddish. There are twelve subspecies of bobcat of which two occur in Oregon. The *Lynx rufus fasciatus* which is found west of the Cascade Range and the *Lynx rufus pallescens* which resides on the east side of the Cascades (Hall and Kelson 1959).

Bobcats are twice the size of a domestic house cat. Females are considerably smaller than males. Bobcats have a gray to yellowish coat in winter and reddish to brown coat in summer, reflecting their two annual molts (Verts and Carraway 1998). They have a whiskered face, black tufted ears, long legs compared to its body and a small head (Anderson and Lovallo 2003). They have distinctive black bars on their forelegs and black spotting over their body. They are named for their short black tipped stubby tail (Verts and Carraway 1998).

Bobcats are an adaptive species and live in a wide range of habitats. Bobcats can be found in forested areas, semi-desert habitats as well as urban edges. They are also known to adapt well to swampy areas, farmland and arid lands (Anderson and Lovallo 2003). In Oregon, bobcats are more commonly found in early successional forested areas. These areas are thick with brush and tend to have more abundance of prey (Verts and Carraway 1998).

Bobcats are polygamous breeders and will have several mates throughout their lifetime. Female bobcats are polyestrous. A female's estrous cycle lasts approximately forty-four days (Verts and Carraway 1998, Anderson and Lovallo 2003). The length of gestation seems to be "either variable or not known precisely" (Verts and Carraway 1998). Most sources note the gestation period to be about sixty-three to seventy days (Anderson and Lovallo 2003). In Oregon, most births occur in May or earlier with some births occurring as late as August (Verts and Carraway 1998). On average two to four kittens are born. The average lifespan of a bobcat is twelve years.

Bobcats are territorial and prefer to be alone. Interactions between bobcats are brief and infrequent. The only time they come together is to mate, or when a female is raising kittens. Bobcats of the same sex do not share the same home range. A male bobcat will not allow another male to use its home range and the same applies to females. However, males and females will allow each other to use the same home range (Mallow 2003).

Bobcat home ranges are strongly dependent on the quality of habitat and prey availability. Male home range sizes average 4,900 acres and female ranges average 2,900 acres (Mallow 2003). In general, the higher the quality of habitats and prey densities, the smaller the bobcat home ranges. As a result of female ranges being smaller than male ranges, a single male has access to two or more females in his range with which he can mate (Mallow 2003).

Bobcats will defend their ranges using territorial markers. Types of markers include urine, feces, scrapes and tree scratches placed both within their territory and on the perimeter of their home range (Mallow 2003).

Home ranges often follow roads, streams, or other natural contours. Range sizes do shift seasonally. For example, males tend to expand their boundaries during the breeding season in order to maximize opportunities to find a mate. When rearing young kittens, females often appear to use less area because of the need to tend to their litter (Mallow 2003).

Bobcats are strictly carnivorous. In Oregon, as elsewhere, they feed largely on mammals, especially those in the 0.5kg (1.1 pounds) to 3kg (6.6 pounds) range, but sometimes take birds and occasionally other vertebrates. They are capable of

taking deer and livestock, but usually select younger and smaller individuals (Verts and Carraway 1998). Bobcats usually hunt during dusk and dawn and eat largely snowshoe hare, cottontail rabbit, squirrel, porcupine, deer and domestic sheep. They also feed on mice, voles, shrews, reptiles, birds, bats, turkey, grouse, insects, but mostly rabbit size animals (Bluett 1984, Verts and Carraway 1998).

Human activities account for the majority of bobcat mortalities in areas where hunting and trapping are permitted. Starvation, predation, disease, and parasites are some natural causes of mortality. Mountain lions are one of the few wild predators of bobcats. Foxes, coyotes, and great horned owls are known to prey on young bobcats (Verts and Carraway 1998).

N3. Bobcat Cultural/Economic Aspects

Furbearers, like bobcats, are a valuable renewable natural resource in Oregon. The value of the bobcat pelt market was practically nothing in the 1960s but reached a peak of more than $600,000 in 1985 (Gum and O'Conner 1987). During the 2006 – 2007 winter, 1,299 Oregon furtakers harvested 4,500 bobcats, the highest total bobcat take since 1989. Statewide, average bobcat pelt prices continue to remain high with 2007-2008 average pelt price of $265.29 representing the highest average price recorded in Oregon (Whittaker 2008). The continued demand for bobcat pelts from foreign markets is one reason for the current high prices. With these high prices, hunting and trapping efforts for bobcat are expected to remain high (Whittaker 2008).

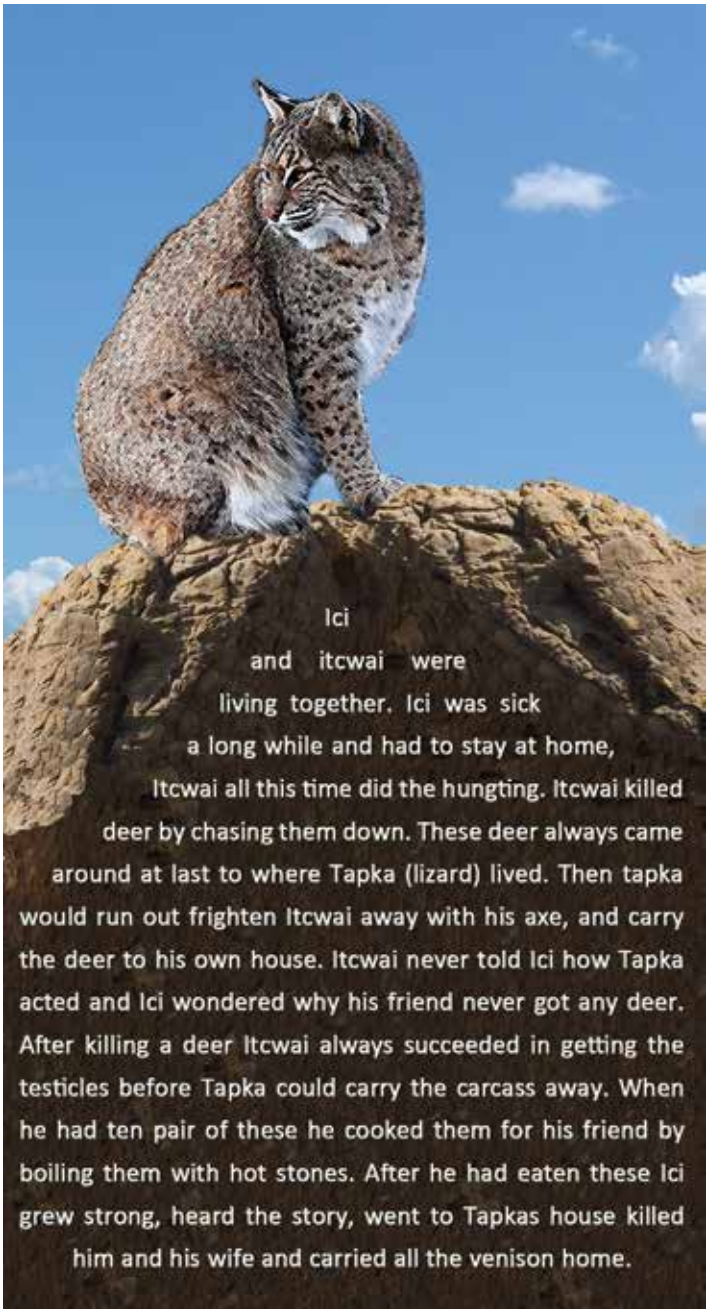

Figure 24. Ici, Itcwai and Tapka (Curtis Nd).

N4. Bobcat Management Issues

Bobcat is listed by the Council on International Trade in Endangered Species (CITES) in Appendix II, which means it is not considered threatened with extinction, but that hunting and trading must be closely monitored. Each animal must be tagged and harvest numbers recorded (Whittaker 2008). All exported pelts are required to be tagged with a permanent attached number which identifies the species, state of origin, and year of harvest (Anderson and Lovallo 2003). The state manages bobcat harvesting in Oregon by a bobcat record card prior to hunting or trapping, which is available from ODFW for a fee. Furtakers are required to turn in the lower jaw from all harvested bobcat along with information on location, date and sex. Jaws are used in age determination which assists in monitoring the species population. Bobcat populations in the United States are doing relatively well (Woolf and Hubert 1998).

The management goal for Tribal lands will be to maintain a viable and sustainable bobcat population while also managing it as a furbearing species.

N5. Bobcat Management Objectives and Strategies

In order to meet management goals for bobcat, the Tribes developed several objectives along with strategies designed to meet those objectives, which may be implemented in the action area.

N5.1 – Objective – Assess bobcat populations

N5.1.1 *Strategy – Assess bobcat populations*

Work collaboratively with federal and state agencies to assess and monitor bobcat populations; Investigate two primary methods: catch per unit effort (CPUE), and the distribution of sexes and ages with the harvest (Whittaker 2008).

N5.1.2 *Strategy – Assess role of the bobcat in ecology of area*

Work with federal and state agencies to assess ecological role of bobcat.

N5.2 Objective – Improve Tribal member bobcat harvest opportunities and experiences

N5.2.1 *Strategy – Improve opportunities to restore traditional practices*

N5.2.2 *Strategy – Develop action plans to increase existing harvest opportunities and experiences*

Develop goals and objectives to improve the harvest opportunity and experience capacity currently available for Tribal members.

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