Supplemental Correspondence

Exhibit (H)

Public Correspondence received after November 21, 2019

From:	Michelle Tate
To:	April H Mack
Subject:	FW: _|/_ Potentially Risky URL in Email - Click Carefully _|/_ Comments on the Conservation Plan for Lamprey and Draft Administrative Rules
Date:	Thursday, December 5, 2019 10:25:34 AM
Attachments:	TCA Comments to the OFWC on Lamprey Conservation Plan and Admin Rules.pdf

Lamprey PC

From: David Moskowitz <theconservationangler@gmail.com>
Sent: Thursday, December 5, 2019 10:21 AM
To: odfw.commission@state.or.us; curt.melcher@state.or.us
Cc: Benjamin J Clemens <ben.clemens@oregonstate.edu>; Michelle Tate <michelle.l.tate@state.or.us>; Jim Myron <myrons@canby.com>; Travis Williams <travis@willametteriverkeeper.org>; Davia M Palmeri <davia.m.palmeri@state.or.us>; Shaun Clements <Shaun.Clements@oregonstate.edu>
Subject: _\|/_ Potentially Risky URL in Email - Click Carefully _\|/_ Comments on the Conservation Plan for Lamprey and Draft Administrative Rules

Dear Commissioners and Director Melcher:
I have attached a short comment on the draft ODFW Conservation Plan for Lamprey and some proposed amendments to the new draft rules.

I regret that I may not be able to attend the Commission meeting as our organizations' Board of Directors meets on Saturday and I have much to do to prepare.

The Conservation Angler supports the Lamprey Conservation Plan and offers the proposed amendments in order to hasten the development of best practices and shorten the period of review for future population assessments.

Very sincerely,

David Moskowitz

David A. Moskowitz
Executive Director
971-235-8953 (Direct)
www.theconservationangler.org

Conservation means fair and honest dealings with the future, usually at some cost to the immediate present. It is simply morality, with little to offset the glamour and quick material rewards of the North American deity, "Progress". Roderick Haig-Brown

December 5, 2019

Memo to the Oregon Fish and Wildlife Commission
David Moskowitz, Executive Director, The Conservation Angler
Regarding the Draft Administrative Rules for Lamprey Conservation

The purpose of this memorandum is to express support for the adoption of the Administrative Rules for the ODFW Conservation Plan for Lamprey (CPL) - with proposed amendments.

The Conservation Angler applauds the ODFW Staff in the Conservation and Recovery section for their work on the CPL. You may ask why an organization like TCA would be concerned about lamprey – and the answer is that this species has evolved with other anadromous fishes throughout Oregon and we believe that it is an important part of salmon and steelhead ecology that requires conservation and management attention. TCA finds the CPL to be as comprehensive as it could be considering the lack of data and understanding of basic lamprey life history.

The most important questions these rules must help answer is how ODFW will:

1. conserve lamprey in the face of uncertainty regarding their conservation status,
2. assess the impacts of multiple limiting factors on lamprey productivity,
3. exercise its authority where it is most direct, and
4. how ODFW influences its sister agencies who may possess direct management authority over land and water management practices that impact lamprey

Acting in the Face of Uncertainty:

Not knowing does not mean not doing anything. The precautionary principle requires an abundance of caution and does provide a path forward where decisions should be made which preserve the most options and cause the least harm.

The Ineffectiveness of Existing Land Management Practices:

The Lamprey conservation plan notes the existing array of state land and water management practices for agriculture, forestry, mining, land development, flood control, riparian area management, point and non-point-source water pollution control and out-of-stream water management.

While there are a dizzying number of statutes and administrative rules governing these practices (many having been "approved" by federal oversight agencies) the bottom line is that they are the result of legislative and administrative processes that are compromises that satisfy the interest groups but not the ecosystems that they are meant to protect. Oregon's land, water and air quality fails to meet standards that are healthy for fish, birds, wildlife, pollinators – let alone people in communities large and small.

ODFW Authority:

ODFW retains the bulk of its authority in managing the individual species under its charge. The charge is broadly defined as 'preventing the serious depletion of any indigenous species." ODFW primary asserts its authority in this regard by setting seasons on fish and wildlife, as well as by conducting population status research and status reviews. ODFW also retains authority to require, provide and protect passage of fish in Oregon waters. It may apply for instream water rights to protect fish and wildlife but relies on another agency to secure those stream flows. It is in these few areas that the administrative rules for lamprey should be focused – and in our opinion, tightened up.

<u>Proposed Amendments to the Draft Administrative Rules:</u>

1. **Developing in-water work best practices as proposed in OAR 635-500-6780 (6)(f)**

Current Language: Lines 66-68

(f) Establish in-water work Best Management Practices specific to lampreys to inform and provide guidance on key time periods for conducting in-water work, how to avoid lampreys, and how to salvage them.

Proposed Language: (f) Establish in-water work Best Management Practices specific to lampreys to inform and provide guidance on key time periods for conducting in-water work, how to avoid lampreys, and how to salvage them [**within 5 years of CPL adoption**].

2. **Tighten up Status Review Reporting Timelines as proposed in OAR 635-500-6780(7)(d)(B)**

Current Language: Line 94 - 96

(B) In 2040, and every 20 years thereafter, the Department shall conduct a complete status assessment, based on measurable criteria utilized in the CPL or developed afterward, of all population strata and lampreys covered in the CPL;

Proposed Language:

(B) In ~~2040~~ [2030], and every ~~20~~ [10] years thereafter, the Department shall conduct a complete status assessment, based on measurable criteria utilized in the CPL or developed afterward, of all population strata and lampreys covered in the CPL;

<u>Motion for the Commission:</u>

I move to amend the proposed new administrative rules – OAR 635-500-6780 - Implementing the Coastal, Columbia, and Snake Conservation Plan for Lampreys in Oregon by adding proposed new language at the end of the current sentence on line 68 and by substituting new dates for the existing dates in two places on line 94.

<u>Amended Motion to Adopt:</u>

I move to approve the Coastal, Columbia, and Snake Conservation Plan for Lampreys in Oregon, and adopt the associated proposed Oregon Administrative Rule set forth in Attachment 3, as amended.

From:	April H Mack
To:	April H Mack
Subject:	FW: Public Response to ODFW"s Coastal Pacific Lamprey Plan 2019
Date:	Thursday, December 5, 2019 4:13:44 PM
Attachments:	Coastal Pacific Lamprey Response 2019.pdf Attachment 2_2019 Fish Passage Priority List White Paper.pdf

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From: Sea Lion <sealiondefensebrigade@gmail.com>
Sent: Thursday, December 5, 2019 3:24 PM
To: ODFW Commission <odfw.commission@state.or.us>
Subject: Public Response to ODFW's Coastal Pacific Lamprey Plan 2019

Hello ODFW Fish and Wildlife Commissioners, here is my public response to ODFW's 2019 Coastal Pacific Lamprey Plan . I hope this is helpful for my sea lion and Pacific Lamprey friends.

For the marine mammals, wild cold water fishes, and the children of planet earth.

Ninette Jones
Sea Lion Defense Brigade Volunteer

We all deserve to eat.
We all deserve a safe place to sleep.
We all deserve a safe place that we can call home.

ODFW Fish and Wildlife Commissioners
4034 Fairview Industrial Dr. SE
Salem, OR 97302

"The recovery of Pacific lamprey may be linked to salmon recovery" (Close et al. 1995).

Hello ODFW Fish and Wildlife Commissioners, I have read the *Coastal, Columbia, and Snake Conservation Plan for Lampreys in Oregon* FINAL DRAFT, November 2019 and feel the need to respond. ODFW's acknowledgement of little to no knowledge of the Pacific Lamprey's biology, ecology and place in the ecosystem as a Key-stone species is a common theme throughout this report so scapegoating sea lions needs to end. Along with just assuming there is suitable passage to habitat available for Pacific lamprey the researchers guess at probability of occurrence of lamprey in streams and report that the ocean conditions **may** play a part in the Pacific Lasmprey's distribution, survival and recovery efforts. What we know for sure is that the ocean conditions and in river temperatures will play a part in wild cold water fish survival as warming waters in the Columbia River rise due to the 13 dams and increasing loss of snow pack due to climate change which will inhibit\ and kill cold water fish indirectly or directly.

Many aquatic species will be threatened and are negatively effected by rising water temperatures, water quantity and loss of water quality. Marine mammals especially steller sea lions and Pacific Lamprey are both important parts of the PNW ecology and both species are known globally as environmental engineers --corner stone in food web for many species. Unbelievably, despite the peer reviewed evidence ODFW, still seeks to scapegoat and kill sea lions (California and Steller) for merely being and erroneously labeling them as threats to Pacific Lamprey for eating Pacific Lamprey from a Superfund site (Willamette River) and from the Columbia River where all the resident and migrating fish come with a consumption warning due to PCB's dioxins and heavy metals such as Mercury and Copper.

Although, Mother Nature intended sea lions and birds to eat lamprey because they can not go to the grocery store or order pizza like humans can ODFW does not support the ecology health and productivity that sea lions and Pacific Lamprey provide. The Pacific lampreys are Mother Nature's intended dinner for marine mammals as they are an important predator buffer for Chinook salmon. ODFW must move out of the dark ages and share fish and habitat with wildlife. ODFW and has a lot to learn about the ecology and biology of sea lions and Pacific lamprey and their amazing abilities as engineers of the ecosystem. Together these key-stone species are responsible for creating the ecosystem conditions to support salmon and other fresh water fish in the CR basin. The sea lions and Pacific Lamprey are known globally as productivity pumps—both species assists in supporting and sustaining large populations of a myriad of species of wild cold water fish throughout the PNW bio region by feeding the eco system so when sea lions get to eat the whole ecosystem gets to eat. Pacific Lamprey and sea lions both predate on the weak, old and genetically inferior species of hatchery fish. Humans are the only animals that target and predate on the biggest and the strongest endangered fish for sport.

In addition, Pacific Lamprey is higher in fat content than Chinook salmon and they have no bones, and they swim slower than game fish, so sea lions that need a lot of fatty essential oily fish to stay warm in cold water prefer them to bony shad and pike minnow. Because sea lions burn a lot of energy to swim to catch their dinner so they like the slow fatty parasitic fish because they do not have to burn so much energy as they do to catch the game fish, while they choke on bones to survive and stay warm. Unlike, most humans who will not starve and freeze to death if they do not eat Pacific Lamprey the sea lions will. ODFW must share this parasitic fish with the sea lions and ODFW must share Chinook salmon with the Pacific Lamprey because humans have many other food and habitat choices that the sea lions and Pacific lamprey do not.

Pacific Lamprey is parasitic and consumes Chinook salmon and they arrive in March to follow the spring run and the Pacific Lamprey predate upon both salmon and sea lions. Pacific Lamprey were once poisoned by ODFW from 1940-1980 from the Columbia River basin and her tributaries. Until recently ODFW deemed Pacific Lamprey a menace, a rough fish; a predator to salmon and fishermen complained like they do now about the sea lions that the Pacific Lamprey were eating to many of THEIR Chinook salmon so to appease the greedy cries of sport fishermen ODFW poisoned the Pacific Lamprey (whoops) from the Columbia River estuary despite Pacific Lamprey being a key-stone species in the PNW ecology.

Altogether, the sea lions and Pacific Lamprey have survived together just fine for over ten thousand years together despite ODFWs ruthless, erroneous and unwarranted lethal: management" attacks on both sea lions and Pacific lamprey for eating salmon from the Columbia River. Both the sea lions and pacific lamprey presence in the estuary ought to be looked on as a sign of estuary and river health -rebounding from years of human encroachment into their habitat, and human nutrient toxic overload and unregulated polluting by industries on the river.

Currently, ODFW erroneously omits sea lions as ecosystem engineers and up till recently they did not consider Pacific lamprey(key stone) as important parts of the Pacific North West ecology either. Key stone species like the steller sea lion and Pacific lamprey are the ecosystem engineers and these species are not a problem to wild fish like 13 dams, 400,000 greedy sport fishermen and 8,million humans inhabiting the Columbia River basin, building in flood plains and degrading habitat of Pacific Lamprey and Chinook salmon are..
ODFW scapegoats and kills sea lions under a fictitious guise of protecting endangered fish populations. ODFW is protecting sport fishing as they never mention in this report that the Pacific Lamprey eat Chinook salmon. As ODFW acknowledges Pacific Lamprey for the fish's cultural and commercial opportunity for extensive exploitative take for humans in this report and admits further knowledge is needed to raise ODFW's education regarding the biology, ecology and habitat needs of Pacific Lamprey and learn more about the important part they play in the ecology (pg 74).

"The recovery of Pacific lamprey may be linked to salmon recovery" (Close et al. 1995). On the same note sea lions are proven to contribute to Pacific Lamprey and salmon health and population recovery by being ecosystem engineers. Sea lions and pacific Lamprey are productivity pumps for the river and oceans. The sea lion's gut flora is like miracle grow for phyto-plankton and kelp beds—the sea lions and Pacific lamprey both create fish food and transport important nutrients up river and into the estuary that is corner stone in the food chain for other populations of wild fish.

Ecosystem engineers create ecosystems to sustain large populations of anchovy and sardine and Chinook salmon, and steelhead in the Columbia River estuary. In turn, Chinook salmon eat anchovy and sardines while Pacific lamprey eats Chinook salmon and steelhead. The sea lions and Pacific lamprey are important ecosystem engineers needed to create the habitat conditions able to support large populations of fresh water fish in our rivers and large populations of life in our oceans.

Moreover, with what we do know about Pacific lamprey is their loss to access quality water and habitat during different life- stages, loss of access and passage due to 42,000 identified man-made obstacles across Oregon that prohibits and inhibits wild fish migration to many parts of the region that is the opposite of the sea lions.
Sea lions are responsible for prey distribution throughout the estuary they providefood for scavengers and they weed out the weak fish, the sick fish and ODFW's genetically inferior of hatchery fish. Sea lions contribute to engineering the ecosystem to support large populations of wild fish that the State's hatchery fish do not. Washington State too has identified over 40,000 man-made obstacles such as dams, culverts, water diversions and water by-passes and irrigation systems that remain unscreened or the fish screens do not meet lamprey friendly criteria. Fish screens that are not maintained or not installed can cause fish loss in the millions in just one season.

In closing, combined threats of human anthropogenic causes, such as cold water loss, and loss of suitable spawning habitat and great reductions of key-stone species such as Pacific Lamprey and Steller sea lions in the Columbia River estuary undermines the productivity and sustainability of the wild cold water fish populations in the PNW ecology peer reviewed science supports. The Sea lions and Pacific Lamprey do not prohibit or inhibit wild cold water fish migration like 13 dams on the Columbia River do. Sea lions are not threats to Pacific lamprey survival like ODFW allowing ODOT to merely write a check instead of having to comply with ESA fish passage criteria on their culverts and water diversions across Oregon. Human greed and ODFW's lack of education about these key-stone species and their required habitat needs are immediate threats the survival of Pacific lamprey not sea lions. Sea lions and Pacific lamprey do not undermine wild fish populations-- they are both important species in the PNW ecology needed to engineer the PNW ecosystem to support large populations of wild cold water fish. Unlike ODFW's inundation of hatchery fish into the Columbia River that are well known to be competition to the wild fish, weaken the genetics and alter the very DNA of the wild endangered Chinook and steelhead in just one life- cycle for the sake of sport fishing. Unlike ODFW the Sea Lions and Pacific Lamprey contribute to health and productivity of our PNW ecology and they do not take salmon for mere sport or money, only, sustenance.

Please ODFW Commissioners share fish and various habitats with the sea lions and improve the passage and access to habitats to support the different life stages of Pacific lamprey in this 2019 plan. The health and productivity of the Columbia River estuary and bio- diversity of the PNW ecology will assist Pacific Lamprey survival through various life stages to sustain Pacific Lamprey, sturgeon, marine mammals, 120 other species that eat salmon combined with myriad of other endangered and threartened species of wild cold wild fish's whose lives depend on it.

Thanks for your support for wild fish and sea lions
Ninette Jones
Sea Lion Defense Brigade volunteer

"Bust up the Dams --Bust them up"

Coastal, Columbia, and Snake Conservation Plan for Lampreys in Oregon FINAL DRAFT, November 2019 43: **excerpt**:

Competition, Hybridization, Food source, Disease, and Other Competition with other species and disease from them are not thought to be limiting factors for lampreys in Oregon. Similarly, hybridization, food source, and other biotic factors are not thought to be limiting factors for lampreys in Oregon.

Translocation has been used as a "stopgap" measure until passage improves for lamprey to become self-sustaining (CRITFC 2011). However, releasing lamprey may unintentionally have negative effects on local, naturally-producing, native lampreys. For example, hatchery salmonids may impact wild fish through competition, disease transmission, and genetic effects that can reduce the overall reproductive success and productivity of naturally spawning populations (ORAFS 2017).

Competition, disease, genetic effects of released hatchery lamprey and translocated lamprey are not limiting factors in ODFW's 2019 Pacific Lamprey plan although scapegoating key stone species and other marine mammals are.

"The CPL defines limiting factors as the physical, biological, or chemical conditions of the environment that constrain the abundance, productivity, diversity, or distribution of a population or a species," *Coastal, Columbia, and Snake Conservation Plan for Lampreys in Oregon* FINAL DRAFT, November 2019 (pg 32).

Sea lions and Pacific lamprey do not fit the above mentioned definition of ODFW's limiting factors. Sea Lions and Pacific lamprey are regulating species abundance, distribution of prey and increasing bio- diversity. Non- human animal predators such as sea lions and Pacific Lamprey provide essential food sources for scavengers, remove the sick and weak individuals from prey populations .

"Maybe it's more accurate to describe pinniped poop as the nearshore fertilizer equivalent to a gardener's Miracle-Gro because it promotes the well-being and lushness of phytoplankton populations, from giant kelp beds to microscopic marine algae."

Comparisons of areas with and without keystone, and eco system engineers' species native non human animal predators will be he;lpful to ODFW to better understand how apex predators provide greater biodiversity and higher densities of individuals, while areas without apex and key –stone predators experience species absences. Without apex predators there is the potential for unchecked predation by other lower predatory species, overeating of vegetation by herbivorous prey species and increased competition that ultimately affects the species richness and abundance within the systems. Changes in vertebrate density and composition can have local and even global impacts: the decline of Pleistocene megafauna may have impacted methane production and thus atmospheric temperature researchers have discovered.

Therefore this shows is that non human animal predator removal programs no matter how expensive; are not, a worthy investment as a means, to increase and protect populations of endangered salmon and steelhead because there will always be another predator species that will move in and fill the nitch of the targeted species. This is not a theory and it is well documented that although BPA funds expensive incentive programs such as the pike minnow removal program which has been successful in removing large numbers of pike minnow from the CRS--- their populations still outnumber wild salmon populations
At the same time BPA funding the removal of the pike minnow is assisting the ability of the small mouth bass population to proliferate and which they now out compete the wild fish for resources as well they heavily predate on Snake River- juvenile Chinook salmon and Pacific Lamprey.

The facts are that hatchery salmon, pike minnow and NIS fish populations have all increased throughout the CRS no matter how many sea lions or seabirds ODFW unjustly kills below the Bonneville Dam. And the cruel Wasteful use of tax payer dollars under the guise of salmon so called recovery does not look likely to change without serious hatchery reform, and a commitment to protecting the social relationships that support the web of life in a wild ecosystem verses a "conduit" (Lichatowich, J. 2013) a packaged river ecosystem devoid of wild life except ODFW's hatchery "products" Lichatowich J.

The mighty turbulent once filled with a series of rapids the CR ought not to be viewed as mere aquatic highway there to serve only the human animal and get ODFW's hatchery products to market (Lichatowich J) because this does not protect the river ecology that supports populations of wild fish and nor does it increase populations of wild cold water fish and marine mammals.

The real threat to pacific Lamprey and Chinook salmon are that dam reservoirs are filled with populations of hungry bass, pike minnow,yellow perch, and channel catfish whose diets consist of millions of baby smolt a year as the youngsters float down river to the sea.

"Predation" on salmon is heaviest as baby salmon are pushed towards their adult habitat the sea, says Dr. Gary Grossman. NOAA's own Beth Sanderson 2009 discovered that non-native fish now make up the majority of fish populations in the CRS and prohibit and inhibit increasing populations of wild cold water fish that ought not to be underestimated. So there is supporting evidence that baby lamprey also need to be pushed towards the sea in a timely manner or will suffer the same fate behind the dams in the warming slack water reservoirs that baby salmon smolt do from pike minnow, small mouth bass and other non-native fish populations that now make up the majority of fish populations in the Columbia/ Willamette Rivers.

"A US Fish and Wildlife Survey found that Cormorant predation had NO Impact on the number of returning adults to the CRS,"

Altogether sharing is a behavior that most parents will like their kids to engage in. Sharing stops wars and so let us stop denying these animals' the right to eat fish in their own home when they have no other food and habitat sources.

Humans have many other food and habitat choices that the sea lions do not and so not sharing fish with wildlife on the CRS sets a very bad example for the children of planet earth when they learn that The Fish and Wildlife Commission allocates Chinook salmon for tomato fertilizer, and factory farmed pigs yet, none for the sea lions and the Pacific Lamprey whom can not order pizza.

In addition people want to see the bombing of sea lions with M80's below the Bonneville Dam and CRITFC chasing them with speed boats cease along with the trapping and killing of these social, gregarious, intelligent and loving beings for merely being,

Therefore the time is now to teach our kids the truth about the important ecological part Sea lions and Pacific lamprey play in wild salmon recovery in the CRS and demand that ODFW does the same.

It is time to honor Mother Nature and be respectful and kind to the human and non- human animals in the CRS and in the Pacific Northwest Bioregion that we share the planet with.

The sea lion's diet and their short life in the wild maybe fourteen years tends to fluctuate by location and prey available and in the most abundance. Both sea lion, Pacific Lamprey and wild Chinook lives will be determined by the behaviors --be it good or bad and the philosophical stance of ODFW commissioners and the other agencies that govern the CRS.

NMFS's own researchers tell us the most abundant populations in the CRS are NIS fish such as bass, walleye, yellow perch, channel catfish, shad and hatchery fish. Therefore it can easily be championed that Sea Lions aid the State of Oregon in their wild salmon and Pacific lamprey recovery efforts by consuming NIS & hatchery fish.

At least 54% of the resident fish species in Washington, 50% in Oregon, and 60% in Idaho are non-natives (Sanderson, et al.2009). Hatchery returns in spring are timed to meet the demands of purse seines, and sport fishing not wild cold water fish.

"Unfortunately the endangered salmon reside in a highly altered habitat difficult to establish a hierarchy on the cause effecting salmon mortality. Consequently assigning a value to potential increase in of salmon abundance that will be produced by predator control is problematical when compared to increases potentially from other remediation of other negative influences such as degraded habitat, altered flow regime and contaminants. "Dr. Gary Grossman.

"The volume of plant plankton has declined across much of the world over the past century, probably as a result of rising global temperatures. But the decline appears to have been steepest where whales and seals have been most heavily hunted." The fishermen who have insisted that predators such as seals and sea lions should be killed might have been reducing, not enhancing, their catch," https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3350522/ .

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Oregon Department of Fish and Wildlife Fish Screening and Passage
Program Priority Unscreened Diversion Inventory 2019 Prepared By: Pete Baki

"Thousands of water diversions remain unscreened in Oregon, placing fish at risk." (Pg. 2, 5) Curt Melcher, Interim ODFW 2013 -15 fish screen report. http://tinyurl.com/ojsybay

https://youtu.be/BsAaNn2OZsA
30,000 blocked fish passages

Oregon Department of Fish and Wildlife Fish Screening and Passage Program Priority Unscreened Diversion Inventory February, 2013Prepared By: Pete Baki

Coastal, Columbia, and Snake Conservation Plan for Lampreys in Oregon FINAL DRAFT, November 2019

The Case for Breaching the Four Lower Snake River Dams to Recover Wild Snake River Salmon Carl Christianson, Biologist, retired USACE; Sharon Grace, Attorney; Jim Waddell, P.E., retired USACE1

(Hassemer et al. 1997) http://bioscience.oxfordjournals.org/content/52/8/713.full

Dambacher JM, Rossignol PA, Li HW, Emlen JM. 2001. Dam breaching and chinook salmon recovery. Science. 291: 939

Bakke, M Bill. CHRONOLOGY OF SALMON DECLINE IN THE COLUMBIA RIVER 1779 TO THE PRESENT Based on the historical record Brown, Larry, Chase, Shawn Mesa, Matthew, Beamish, Richard, and Moyle, Peter, editor Published by the American Fisheries Society Publication date: December 2009.

Theurer et al. (1985) in the Tucannon River in southeastern Washington. This study shows how human-caused changes in riparian shade and channel morphology contributed to increased water temperatures, reduced available spawning and rearing space, and diminished production of steelhead and chinook salmon

USEPA (United States Environmental Protection Agency). 2002. Columbia River Basin fish contaminant survey, 1996-1998. EPA 910-R-02-006, Seattle, Washington, USA. 284pp. (C7)

https://www.youtube.com/watch?v=ysa5OBhXz-Q How wolves Change Rivers)

https://lewisandclarkjournals.unl.edu/search?utf8=%E2%9C%93&qfield=text&qtext=phoca+rock

https://lewisandclarkjournals.unl.edu/item/lc.jrn.1806-02-23

B. Mc Millan 2008 Researching Columbia Sea lion Population

1888 Map (section of original), Columbia River at Celilo Falls. (Click to enlarge). Original Map: Map of Columbia River from The Dalles to Celilo, Oregon, 1880. Scale 1:30,000. Relief shown by contours. Shows a section of the Columbia River, including fall and rapids, water gauges, and "basaltic" region.

https://academic.oup.com/bioscience/article/64/4/279/2754168/Using-Beaver-Dams-to-Restore-Incised-Stream

https://oregonencyclopedia.org/articles/the_dalles_dam/#.WIonG_IggfI

Alexander Ross described Celilo as the "great rendezvous" of native traders, as "the great emporium or mart of the Columbia " Pinnipeds such as sea lions and seals followed salmon up the Columbia as far as Celilo Falls

. ***In 1841 GeorgeSimpson wrote "these animals ascend the Columbia in great numbers in quest of the salmon." –Source: Friends of Celilo https://www.critfc.org/wp-content/uploads/2018/04/Synth-Threats-LAMPREY-ISAB-response-2017.pdf

1981, Dr. Grossman has been a professor of animal ecology from the University of Georgia. His primary research areas are "population dynamics and habitat selection and fishes." He has published over one hundred and fifteen scientific papers, cited over 5,000 times. For the last twenty years has been advising fisheries agencies in California. In addition, in 2013 led a public hearing on the effects of fish predation on endangered salmonids that produced a technical report. He has recently completed a general review.

https://youtu.be/qmDLMNXkwuo

https://youtu.be/qoNrU5CAw3U

https://youtu.be/05dOvpcfnDw

https://youtu.be/j-MuMkkYpnk

Theurer et al. (1985) in the Tucannon River in southeastern Washington. This study shows how human-caused changes in riparian shade and channel morphology contributed to increased water temperatures, reduced available spawning and rearing space, and diminished production of steelhead and chinook salmon

USEPA (United States Environmental Protection Agency). 2002. Columbia River Basin fish contaminant survey, 1996-1998. EPA 910-R-02-006, Seattle, Washington, USA. 284pp.

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http://www.king5.com/tech/science/environment/snake-river-dams-examined-after-decades-of-lawsuits/393726964

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DEQ REMAP REPORT : http://tinyurl.com/qdvounb

National ocean acidification study finds Northwest among hardest-hit regions. http://tinyurl.com/onqvxz7

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.Zimmerman MP. 1999. Food habits of smallmouth bass, walleyes and northern pikeminnow in the lower Columbia River basin during outmigration of juvenile anadromous salmonids. Transactions of the American Fisheries Society. 128: 1036-1054

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American Fisheries Society. 128: 1036-1054

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Seattle Journal of Environmental Law: Salmon Hatcheries as Fish Factories: Forgetting the Lessons of Leopold

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http://tidelines.org/columns/scoop-pinniped-poop-0

The management of most industrialized marine fisheries is tending towards avoiding serial depletion of top predators (Worm and others 2009),

http://phys.org/news/2012-05-sea-lions-fuel-ocean-life.html

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0013255

http://tinyurl.com/qbu4q9k

Fritts AL, Pearsons TN 2006. Effects of predation by nonnative smallmouth bass on native salmonid prey: The role of predator and prey size. Transactions of the American Fisheries Society135: 853–860.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3350522/

(Sanderson 2008 study) http://bioscience.oxfordjournals.org/content/59/3/245.full

https://today.oregonstate.edu/archives/2016/feb/dna-evidencesalmon-shows--hatcheries-cause-substantial-rapid-genetic-changes

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Oregon Department of Fish & Wildlife

Fish Screening and Passage Program

2019 Statewide Fish Passage Priority List

April 19, 2019

Table of Contents

Executive Summary

Populations of migratory fish are dependent on their ability to access quality habitat in order to complete important ecological life history strategies. In Oregon, this often means migratory fish must travel extensive distances through various habitats to complete these life histories. Unfortunately, their passage is often blocked by man-made (anthropogenic) features which act as barriers to fish movement, defined in Oregon Revised Statutes (ORS) 509.580 (1) as Artificial Obstructions. There are currently 42,780 inventoried artificial barriers in Oregon that can potentially inhibit fish movement. Due to the volume of these barriers and the associated cost of repairing them, only a small proportion receive attention each year. Oregon Department of Fish and Wildlife (ODFW) has constructed a prioritization list of 591 barriers (Appendix A) to identify barriers that maximize the return of native migratory fish to critical habitats. Scoring criteria are calculated to estimate the amount of habitat gained for purposes of prioritizing artificial obstructions at which fish passage would benefit native migratory fish in the State of Oregon.

As had been completed in previous efforts, we used the methodology of ranking high priority barriers within the State of Oregon following the scoring equation developed by ODFW and approved by the Oregon Fish and Wildlife Commission (OFWC) in 2013. In developing the 2019 prioritization list we made changes in habitat quality, grouping of barriers, and weighting parameters based on the presence of listed endangered and threatened species that were adjusted from the 2013 report. Efforts were made to better quantify parameters within the 2013 model while attempting to limit subjective criteria. The specific details of these changes are explained within the prioritization methodology section of this report. Despite improvements within the methodology there are still assumptions made in the development of the 2019 list that are based on professional judgement by ODFW staff. Many fish passage barrier models use a cost-benefit analysis that we determined to not be appropriate for such a large scale statewide prioritization list that lacks cost estimates for each barrier and subsequently cost estimates are not used within this prioritization effort. The prioritization list continues to be a robust methodology that builds upon the 2013 effort by representing the highest priority barriers for native migratory fish passage in the state. Instead of ordering each artificial obstruction numerically, the 2019 prioritization has been organized into the top ten and an additional 16 groups, with each group representing barriers of similar priority ranking rather than a sequential numbering approach. We used a K-means cluster analysis to partition the data into the respective groupings.

Accomplishments Report (2013-2018 (Appendix B): The final priority list from 2013 contained 534 high priority fish passage barriers. In 2013, there were 27,800 artificial obstructions documented in Oregon within the Oregon Fish Passage Barrier Data Standard (OFPBDS) database. Current inventory of barriers in Oregon has been a major task by many stakeholders and ODFW resulting in a two fold increase in the number of artificial obstructions within the inventory over the past 5 years, however, many more barriers exist that have not been identified. Since the development of the 2013 prioritization list, 75 of the barriers have had projects implemented to restore fish passage, comprising 14% of the total high priority barriers. We identify some projects in Appendix B that illustrate the work and importance of this tool to improve access of native migratory fish to critical habitat that was previously inaccessible.

Introduction

Connectivity of aquatic habitat is important to Pacific Northwest fish populations because access to specific and varied stream habitats are important elements for sustained fish production and maintenance of habitats. When streams are fragmented, restricted movement of fish is just one impact. Reduced connectivity also affects water flow, alters the streams capacity to acquire, move, and deposit soil and sediments; and changes the stream's ability to modify the stream-bed and channel through erosion. Improving connectivity between the Pacific Ocean and their tributary streams support increased production of native migratory fish populations. Because fish require different physical and chemical conditions as they grow and reproduce, connected habitats are essential to their survival and reproduction. Generally, sustained fish production is compromised when habitats become poorly connected or of poor quality; ensuing declines in fish populations often lead to repercussions throughout the fish community. Loss and degradation of fish habitat, and fish passage barriers, have reduced the capacity of many Pacific Northwest fisheries to permit maximum sustained productivity for desired fish populations.

Policy framework in Oregon: Fish passage prioritization and inventory is a requirement of the ODFW's Fish Passage Program (FPP) through Oregon Revised Statute (ORS) 509.585 (3). This statute states that ODFW shall "complete and maintain a statewide inventory in order to prioritize enforcement actions based on the needs of native migratory fish." Furthermore the statute states that the Department shall update the priority list every 5 years. The last fish passage priority list was approved by the Oregon Fish and Wildlife Commission in 2013.

As noted, the priority list shall be based on the needs of native migratory fish. More specifically, the base requirements of the priority list are identified in Oregon Administrative Rule (OAR) 635-412-0015 (2). This rule states the following:

> The priority list shall be based on the needs of native migratory fish.
>
> (a) The prioritization shall consider the following factors relative to each artificial obstruction for all native migratory fish currently or historically present at the artificial obstruction:
>
> (A) the quantity of native migratory fish habitat which is inaccessible,
> (B) the quality of native migratory fish habitat which is inaccessible,
> (C) unique or limited native migratory fish habitat which is inaccessible, or should remain inaccessible for fish management purposes,
> (D) the biological status of the native migratory fish,
> (E) the level of fish passage currently provided at the artificial obstruction,
> (F) the presence of other artificial obstructions upstream and downstream and the timeframe native migratory fish will be able to utilize restored passage, and
> (G) existing agreements with the Department regarding fish passage.
>
> (b) The prioritization may utilize existing Department information or professional judgment in the absence of information specific to a given site.
>
> (c) The priority list shall contain one artificial obstruction per Oregon sub-basin, which shall be ranked across the state.

Various spatial planning techniques for fish passage project prioritization have been used across the country. Frequently, fish passage restoration occurs at the site-scale opportunistic approach. More recent efforts to increase habitat gain have addressed fish passage at the watershed-scale. Fish passage prioritization techniques include scoring and ranking, stepwise scoring and ranking, scenario analysis, optimization, or complete enumeration. Complete enumeration is an obvious approach to examine all potential combinations of barrier removals, but is only practical for small sets of barriers. Scoring and ranking entail assigning each option a score based on associated criteria and sorting that list to identify top projects. This method has the advantages of being computationally efficient, flexible, transparent, and does not require a high degree of technical expertise or computer software. Stepwise scoring and ranking includes spatial interdependence that ranks each barrier independently and as projects are completed all other barriers are re-scored, a new ranked list is created, and the process is repeated. Optimization can be used to find efficient solutions when multiple barriers are selected and spatial interdependence between costs and benefits is a factor. Optimization is advantageous in that it provides techniques to identify efficient sets of projects from an extremely large number of possible alternatives. Disadvantages of Optimization include uncertainties with knowing project costs and enumerating large numbers of barriers in a typical watershed and computing connectivity indices.

This document outlines the approach that was used to score high priority barriers identified by ODFW District Fish Biologists and group the barriers into similar levels of priority. The general approach was to select a priority barrier, summarize upstream mapped fish habitat metrics in miles, by species, and to assess mapped habitat (either current or historical) upstream of priority barriers for quantification and habitat quality purposes. Blocking and partially blocking barriers, upstream of the priority barrier, also were summarized specific to species and habitat metrics. The Oregon Fish Passage Barrier Data Standard (OFPBDS) specifies a common model be used to represent geospatial fish passage barrier information which is central to the spatial analysis of this prioritization methodology. The Utility Network Analyst toolbar in ArcMap was used to trace the geometric network upstream from each artificial obstruction and select the habitat distribution reaches. Once the reaches were selected the length of upstream habitat was quantified, the closest upstream barrier was identified and the total number of upstream barriers was summarized. In ArcGIS 10.6 the geometric network tools require manual input for setting trace start points and for running traces. The ArcGIS 10.6 geometric network tracing capabilities are built so they will support improved automation of tracing from each barrier. Geometric network takes this a step further and builds connectivity and flow direction into the stream dataset, enabling analysis up or down the stream network. Additionally, barriers can be built into the network and can be used to initiate or stop network tracing operations. Questions such as, "how many miles of coho habitat are located upstream from this barrier?" can be answered by analyzing the data on a geometric network. While this data model supports the measurement of habitat gains at any particular barrier and other barrier prioritization metrics, it also requires that data inputs meet stringent criteria in order to provide viable results. Therefore the OFPBDS provides a tool to support our resource planning to ensure limited restoration dollars are spent addressing priority barriers.

A consistent and accurate spatial model of a watershed and stream network provides the backbone of a successful prioritization effort. A spatial model of the stream network helps pull together disparate datasets into an analytical framework by building spatial relationships between barriers, habitat measures, and the stream network itself. Accurately locating and compiling physical characteristics of each anthropogenic barrier on the stream network is an essential step for prioritization. Artificial obstructions are defined as any dam, water diversion, dike, berm, levee, tide or flood gate, road, culvert, or other human-made device placed in the waters of this state that precludes or prevents the migration of native migratory fish. Although infrequently included in prioritization efforts, natural barriers such as waterfalls, estuary sedimentation, beaver dams, and debris jams can influence the outcome of connectivity analyses. These barriers are natural components of the landscape, are often transient, and can be advantageous for some species (e.g. prey refugia). Natural barriers are omitted from this prioritization ranking as directed in ORS 509.585 (3) and OAR 635-412-0015 (1) to prioritize artificial obstructions that are human-made structures.

Prioritization Methodology

In order to score and rank artificial obstructions each barrier received a score based on the associated habitat and fish metrics. The list was then sorted to identify projects that maximize the amount of habitat made accessible to native migratory fish. The equation has been set up so that habitat is a multiplicative portion of the model and fish species are an additive portion of the model. Therefore, the habitat metrics comprise 60% of the total points and the fish species metrics comprise 40% of the points. The 2013 prioritization model provided the framework for the updated 2019 prioritization model as described here:

$$\left((Quantity\ x\ Quality)x\ \left(\frac{Level\ of Passage}{5}\right)\right) + (n(\#listedNMF) + 20(\#NMF) + 15(\#autoup) - 15(\#autodown)$$

Habitat Quantity: In the past iteration of this list from 2013, river habitat quantity has been quantified using stream length and was used in the 2019 process to be consistent. This factor is the amount of habitat accessible to native migratory fish if passage were provided at the priority barrier. It is averaged across the species that would most likely utilize that habitat. This factor is based on the linear distance (miles) of fish habitat that would become accessible to the species currently present below the barrier, if passage were provided. This value is summed by the amount of miles between the priority barrier and the next complete barrier upstream, or the amount of habitat available up to an upstream barrier, natural barrier, or the end of fish use. Habitat quantity is scaled by using a ranking system that assigns a point value according to the range of average miles of inaccessible habitat upstream from the artificial obstruction. This point system is based on a weighted average score from the fish habitat distribution mapping in order to balance the habitat and fish parameters of the equation. The mileage ranking classes are as follows:

- >300 miles = 130 points
- 200-299 miles = 115 points
- 100-199 miles = 100 points
- 50-99 miles = 85 points
- 25-49 miles = 70 points
- 10-25 miles = 55 points
- 3-9 miles = 40 points
- 1-2 miles = 25 points
- < 1 mile = 10 points

Habitat Quality: Few prioritization projects address habitat quality beyond a general notion of the expected habitat condition of a focal taxa. Habitat Quality could be incorporated into these analyses through pre-existing mapping projects, surrogates for habitat quality (e.g. land use) or environmental variables (e.g. stream temperature, catchment area, or low flow yield). We developed a multivariate regression tree analysis based on environmental variables including catchment area, mean summer water temperature, and species association abundances. Mean summer water temperature was the highest 30 day average water temperature between the months of July and August. Regression tree analyses distinguished seven segment types based on mean summer temperature and network catchment area (Figure 1). Nonmetric multidimensional scaling analyses suggested that fish assemblages differed among segment types. Species that were indicative of specific segment types generally had habitat requirements that matched stream segment attributes. The classification system we developed performed significantly better than subjective weighting of habitat quality metrics.

We developed four categories of species associations (SA I–IV) that represented distinct thermal and physical characteristics of Oregon Rivers based on known fish species distributions. Species associations were truncated based on 32 species of native migratory fish as defined under OAR 635-007-0501. Development of the first level of the classification system was a multi-step process in which differences in fish abundance in SA I–IV (Table 1) were related to differences in mean summer stream temperature and catchment area using regression trees. Multivariate regression tree analysis was used to relate differences in fish abundance to differences in mean summer stream temperature and catchment area with regression tree sizes constructed using a complexity parameter of 0.01 (Figure 1). Because of the connection between rivers and the Pacific Ocean, drastically different ocean-influenced fish assemblages can occur within large rivers depending on habitat conditions and therefore the similarity of species associations in large river habitats was a result of the non-migratory behavior where coefficient of concordance tests allowed to test whether the species associations in large rivers were significantly co-occurring. This resulted in a distinct tree for species associations in medium to large rivers (Figure 1).

After running the multi-variate regression tree analysis, river segment classification was determined using a nonmetric multidimensional scaling (NMDS) technique to summarize patterns of fish assemblage structure and habitat variables. Multivariate analysis of variance was used to test for differences in segment scores. SA I was the most abundant assemblage at summer stream temperatures less than 18.1 °C (Figure 1). SA I was also the most abundant species association at temperatures as cool as 16.1 °C for segments with catchment areas between 74 and 250 km². Similarly, SA III was the most abundant species association when catchment areas were less than 74 km² and summer stream temperatures were warmer than 19.0 °C; it was also the most abundant species association at catchment areas between 250 and 735 km² with summer stream temperatures warmer than 18.1 °C (Figure 1). Based upon the attribute partitions identified by multivariate regression tree and the resulting changes in presence of the species associations, seven river segment types were identified as: cold headwater (CDH), cold stream or river (CDS), cool headwater (CLH), cool stream (CLS), warm headwater (WH), medium river (MR), and large river (LR). Three additional segment types were eliminated based on non-concordance. Because physical habitat provides the template for evolution of organisms and organization of communities, physical attributes are considered adequate for developing biologically meaningful classifications (Frissell et al. 1986; Imhof et al. 1996). Additionally, the wide availability of GIS databases of landscape attributes (e.g., catchment area, surficial geology, landscape topography, and climate conditions) that control instream features, such as water temperature and discharge, makes it possible to classify streams across large areas such as the state of Oregon.

This parameter of the prioritization model represents the quality of habitat upstream of the priority barrier that fish would gain access to if the barrier were passable. Habitat quality is quantified based on the river segment classification with points associated with biologically meaningful characteristics. Habitat Quality scores are assigned based on the connectivity to upstream habitat within each of the seven river segment types from 7 points (access to all segment types), 6 points (access from Warm River to multiple upstream segment types)…..to 1 (point) for connectivity with a single river segment type. Scoring habitat quality based on this system provides an increase in the overall habitat value based on the physical habitat benefits provided by fish passage above the artificial obstruction. Connectivity to multiple river segments is possible with each segment type contributing to the cumulative habitat quality score. The assumption is made that the more accessible specific and varied stream habitats (number of different segment types) above the barrier, the higher the value of habitat gained and therefore potential fish production is increased. Furthermore, the cumulative scoring of habitat quality provides benefits to barriers that increase access to cold water refuge that may benefit fish stocks under future climate change scenarios.

<u>Level of Fish Passage:</u> Large and small barriers differentially affect the ability of an organism to move, and no two barriers in a watershed perform identically. The proportion of organisms passing a structure is typically summarized as a passage rate (i.e. passage efficiency or barrier passability). Ideally, each barrier would have a unique site-specific value of passability. However, passage rates must often be estimated for many barriers within a watershed, and a site-by-site analysis is often cost-prohibitive. Depending on the scope of the analysis, a binary view of passage may be sufficient (i.e. pass or no pass) or a continuous view of passage may be required (i.e. a rate between 0 and 100%). Passage rates can be categorized based on empirically derived passage rates (e.g. direct observation and filming) or analytically derived passage rates (e.g. genetics, statistical models, Fishxing software). In the absence of empirically derived passage rates at each artificial obstruction we

developed a standardized rating methodology. The scale, values, and descriptions used at each barrier in this prioritization are provided below:

- 5 - barrier to all native migratory fish,
- 4 - barrier to some native migratory fish adults and/or species,
- 3 - barrier to some native migratory fish adults and/or species for only part of migration period,
- 2 - barrier to all native migratory fish juveniles,
- 1 - barrier to some native migratory fish juveniles and/or for only part of migration period.
- 0 - Full volitional passage for all native migratory fish species, adults and juveniles.

Anything ranked less than a 5 (complete barrier) will reduce the overall priority (cannot receive full credit for habitat being blocked if not a complete barrier). The "level of passage" rating will reduce the priority score based on the relative degree (percentage) of complete blockage at the barrier. The level of passage is applied to the upstream habitat value (Quantity and Quality), because anything less than a complete barrier indicates that fish are already accessing the habitat upstream at varying degrees depending on the severity of the blockage. Therefore, any score less than 5 for the "Level of Passage" ranking will **reduce** the overall score for habitat upstream by a factor of 20 percentage points.

L<u>isted Native Migratory Fish</u>: This factor addresses fish in need of passage below the barrier that are listed as "threatened" or "endangered" under ODFW state listed species or the federal Endangered Species Act (ESA). The presence of listed fish increases the priority ranking of a barrier. For each "listed" fish species present at the barrier, respective status points will be added to the priority ranking. There is no maximum score possible for this factor; however, the highest number of ESA listed fish at any given site was four during the 2013 and 2019 review of current native migratory fish species present below a barrier. A greater weighting factor was applied to a barrier where the presence of listed species occur as follows:

a. 40 Points associated with "Endangered" status
b. 30 Points associated with "Threatened" status
c. 15 Points associated with "Special Concern" status

<u>Species Diversity:</u> This factor addresses the number of native migratory fish species or stocks in need of passage at the priority barrier (# of species or stocks that would utilize the habitat upstream of the barrier). For each native migratory fish species or stock present there is 20 points awarded. The highest number of native migratory species present at a barrier on the 2019 list was eleven species, therefore the maximum number of points allocated was 220 points. Native migratory fish species are identified in OAR 635-412-0005 and include 32 fish species.

<u>Auto up Factors</u>: This category provides ODFW District Biologists the opportunity to incorporate additional point values to an artificial obstruction based on un-quantifiable factors. For various reasons there are management options to protect natural resources and fish populations by prevention of invasive species, inaccessible upstream habitat gain, inaccessible estuarine habitat gains, ecological gain, and fish management alternatives. Estuarine habitat gains and upstream habitat gain are of immediate importance. For each "auto up" factor identified, 15 points will be added to the prioritization scoring. A maximum of 60 points (4 auto ups) can be supplementary to the overall score for each site. Auto-up categories may include, but not be limited to the following:

- Historical habitat inaccessible for a unique stock of fish or limited species distribution
- Access to Estuarine habitat
- Artificial obstruction affects large population of fish

- Access to side channels or limited habitat types within a stream reach blocked by the barrier
- Over 100 miles of additional potential fish habitat = 3 “auto-ups” (45 points)
- Over 50 miles of additional potential fish habitat = 2 “auto-ups” (30 points)
- Conservation need/uplift

Auto down Factors: This category has been identified by ODFW staff as factors that should be considered to decrease the overall priority of a barrier. For each “auto-down” factor identified, 15 points are subtracted from the prioritization ranking. A maximum of 60 points (4 auto-downs) can be subtracted for each site. Auto down factors may include the following, but are not limited to this list:

- Complete blocked barriers downstream prevent historic or current native migratory fish
- Fish management concerns (non-native fish, or other concerns)
- 10 or more complete barriers upstream = 2 “auto-downs” (-30 points)
- Multiple complete barriers upstream where the habitat gain is less than one mile of inaccessible habitat
- Waiver or exemption has been granted through existing ODFW agreements

Summary: The final priority list contains 591 high priority artificial obstructions partitioned into 16 groups. Of the 42,780 artificial obstructions inventoried in Oregon as of January 2019, these high priority obstructions comprise less than 2% of the overall known barriers to fish passage in the state. The priority list represents the highest priority barriers for fish passage in the state. Providing fish passage at artificial obstructions for complete barriers will increase habitat that was previously inaccessible to native migratory fish, while addressing passage at partial passage sites will increase the duration of fish passage. The overall priority ranking and the prioritization model is primarily based on biology. This assumption is supported by Oregon Administrative Rules, which state that “the priority list shall be based on the needs of native migratory fish.” ODFW also recognizes that other factors also come into play when prioritizing sites for fish passage restoration. Whether the other factors are socio-economic in nature, or common sense driven, they help to provide a more complete picture of important considerations for a given site. The list is comprised of barriers in each of the 18 fish districts across the state, providing a good geospatial representation of barriers. During this revision of the fish passage prioritization, efforts were made to quantify habitat quality with less subjective results. The prioritization model serves as a tool to assist in making natural resource decisions based on where the greatest habitat gains can be expected to benefit native migratory fish. ODFW recognizes that the science and information regarding fish passage barriers is ever evolving and future prioritization will be updated as new information becomes available.

Figure 1. Multivariate regression tree showing the habitat quality divisions within Oregon rivers. Abbreviations are as follows: CDH = cold headwater, CDS = cold stream or river, CLH cool headwater, CLS = cool stream, WH=warm headwater, MR=medium river, LR = large river, JUL is mean summer stream temperature between the months of July and August (°C), and AREA is stream catchment area (km²).

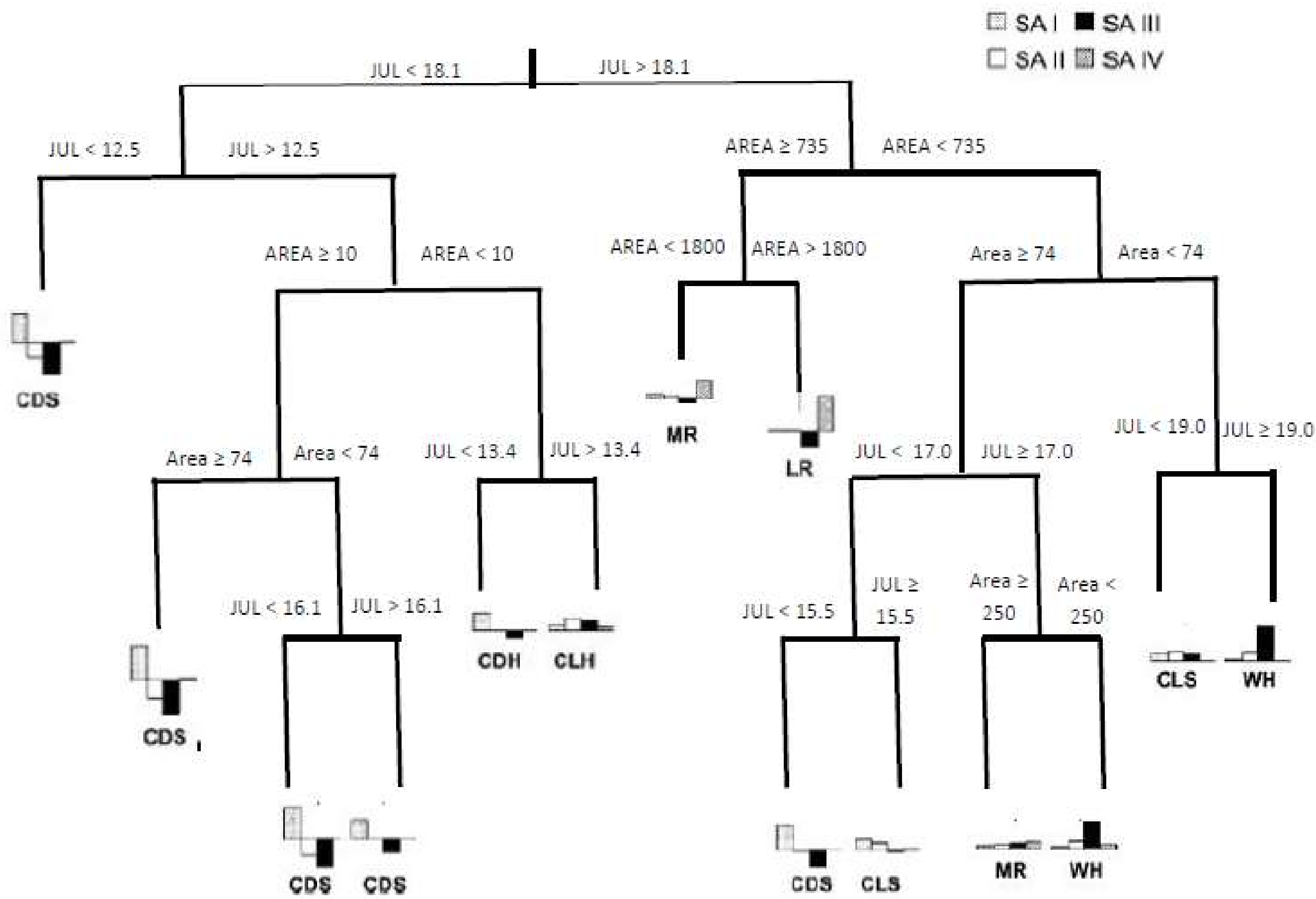

Table 1. Fish species associations (SA) used in developing habitat quality metrics for Oregon river segments. SAII, low species associations had a significantly low level of concordance, but were clustered in proximity to each other.

SA I	SAII	SAII, low	SA III	SA IV
Bull trout	Chum Salmon		Bridgelip Sucker	Green Sturgeon
Cutthroat trout	Coho Salmon	Pit-Klamath lamprey	Lost River Sucker	White Sturgeon
Rainbow trout	Chinook Salmon	Sockeye salmon	Largescale Sucker	Redtail Surfperch
Miller Lake Lamprey	Pacific lamprey	Klamath lamprey	Modoc Sucker	Eulochan
Mountain whitefish		Northern Pikeminnow	Klamath smallscale Sucker	Surf smelt
Redband Trout			Klamath Largescale Sucker	
Mountain Sucker			Tahoe Sucker	
Goose Lake Sucker			Warner Sucker	
			Shortnose Sucker	
			River lamprey	
			Redband Trout	

APPENDIX A

2019 Prioritization list

(See attached spreadsheet)

APPENDIX B

Accomplishments Report (2013-2018)

The final priority list from 2013 contained 534 high priority fish passage barriers. In 2013, there were 27,800 artificial obstructions documented in Oregon. Since the development of the 2013 prioritization list, a total of 75 barriers have been addressed for fish passage or removal, comprising 14% of the total high priority barriers. Some of the key accomplishments during this time are:

Brownell Dam Removal (NE Oregon, Group 3 Barrier Removal)

The Umatilla River has historically been diverted for agricultural purposes. The Umatilla Basin Project allows water users to have their water pumped from the Columbia River in exchange for water to remain in the channel of the Umatilla River for fish. Therefore, diversion dams, such as Brownell Dam (RM 1.0) are no longer needed to divert water. This dam was identified as a high priority on the 2013 ODFW Statewide Fish Passage Barrier Inventory list. The Brownell diversion dam was one of the oldest dams on the river and was the first passage impediment fish encounter on their upstream migration. Brownell Dam was approximately 4 feet high and 395 feet long, with a fish passage channel that was blasted into the bedrock in the early 1980's. It provided inadequate jump pools during low flows, with reports and observations of fish jumping in bedrock areas in year's past. The dam had not been used for diversion purposes in over 20 years and had since fallen into disrepair, with one side being breached. This breach had caused the majority of the water to flow through the area, and not through the fish notch. This structure was documented as a fish passage impediment, for all life stages of native fish species including steelhead, Chinook salmon, coho salmon, lamprey, and redband trout. A major dam failure in 2011 further compromised fish passage. A study conducted by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) in 2017, showed that of 60 fish radio tagged, only 18 fish passed the dam. It also showed that 16, of the 18 fish, passed through the breached section of the dam where there was exposed rebar and cable, while none utilized the fish passage notch, and two moved through the west portion where there is no passage. Removal of the Brownell dam structure and curb will decrease passage delays, therefore allowing fish to move upstream faster and arrive at spawning grounds in better condition for spawning activities. Removal will also benefit passage for juvenile downstream migration, since the majority of the flow was being funneled through the breached portion of the dam and not the fish passage notch.

Walcott Fish Ladder (Little Butte Creek, Group 3 Barrier)

The Walcott diversion structure is a seasonal concrete stop-log irrigation dam that blocks fish passage when in use, particularly during the late summer/early fall period when fall Chinook salmon are starting to move into the upper reaches of Little Butte Creek. During the offseason when the stop-logs are out, the diversion structure is an impediment to fish passage at low flows. Upstream migration of winter Steelhead, Klamath Smallscale Suckers and Pacific Lamprey are impacted as well as juvenile fish and federally listed Coho salmon. ODFW staff constructed a concrete pool and weir fishway with a dual orifice configuration to meet the needs of all native migratory fish present. Walcott Diversion is a State of Oregon high priority fish passage restoration project that opened up significant amounts of native migratory fish habitat. In particular, fall Chinook will have improved access to 25 miles of the Little Butte Creek system, increasing their total habitat in the upper Rogue River watershed by 23 percent.

Wiwaanaytt Creek (John Day Watershed, culvert replacement)

The purpose of this project is to remove two corrugated metal culverts that are fish passage barriers on Wiwaanaytt Creek. The first culvert is located at milepost 3.46 on Forest Service RD 2645. The bottomless arch culvert spans 12 feet, with a height 6'3" and a length of 84 feet. The second culvert is located at milepost 0.04 on Forest Service Rd #295, off of Forest Service Rd 2645. The bottomless arch culvert spans 13 feet with a height of 5.1 feet and length of 70 feet. Wiwaanaytt Creek is listed as designated critical habitat for Mid-Columbia River Steelhead by National Marine Fisheries Service. These culvert replacements are a high priority for the Middle Fork John Day River steelhead population (2nd priority) in the Mid-C Plan for the limiting factor of impaired fish passage. Replacing the current culverts which were fish passage barriers with bottomless arch culverts will benefit stream channel function and increase aquatic connectivity for Mid-C steelhead, redband trout and resident fish species present.

E. Fork S. Fork Trask River Dam Removal (North Coast, Group 5 barrier removal)

The EFSF Trask Dam, built in 1970, was 9 feet tall and 100 feet wide. It had been operating as a diversion structure that delivered water to an existing fish rearing pond. This project restored the site to pre-dam conditions by completely removing the existing dam and associated structures including the dam apron, cutoff walls, sheet piling, concrete abutments, fish ladder, and fish screen. Dam removal was completed in 2016 during two phases. The stream was re-graded and a low flow passage channel was constructed. Phase two included removal of the remainder of the dam and the fish screen. This project improved passage for multiple species to gain access to habitat in the upper East Fork Trask. The dam previously acted as a partial barrier due to difficulty of some species navigating the steep pass ladder, and due to reduced flows in the ladder during use of the rearing pond in summer. Natural passage restoration at this side provided multiple benefits to native migratory fish species.

Wimer Dam (SW Oregon, Top 10 barrier removal) Wimer Dam (RM 10.3) was an irrigation dam located on Evans Creek, a major tributary to the Roque River in Jackson County, Oregon. Wimer Dam removal was a top restoration priority for the upper Rogue District. The dam was a concrete arch structure with a weir crest length of 93 ft and average height of 9 ft. Dam removal resulted in improving longitudinal stream connectivity and fish passage for endangered Southern Oregon/Northern California Coast Coho salmon, fall Chinook salmon, summer and winter steelhead, native suckers, Pacific lamprey, and resident trout. The relic concrete diversion structure was not used for diverting water and served no functional purpose. Large amounts of quality habitat exist above Wimer Dam including West Fork Evans Creek which maintains good flow and cold summer temperatures.

Figure 1 and 2 River Design Group photo credit

North Unit Diversion Dam (Central Oregon, Group 10). Located in Bend, Oregon, the North Canal Dam fish ladder is a vertical slot fish ladder intended to pass native redband trout and other native migratory fish present in the upper Deschutes River. The fish ladder is comprised of 50 pools measuring 5' wide by 6'-8" long, and a 9-inch pool to pool differential. The fish ladder is owned and operated by three irrigation districts: Swalley, Central Oregon Irrigation District, and North Unit Irrigation District. Fish Passage by redband trout was confirmed through the use of PIT tag Array technology installed in the lower and upper pools of the ladder.

Oak Ranch Creek (North Coast, Group 6 culvert replacements) Oak Ranch Creek is a tributary stream of the Nehalem River. Fish passage issues have persisted for decades at two crossings on Oak Ranch Creek along Apiary Road in Columbia County, Oregon. The mainstream of Oak Ranch Creek at the Apiary road crossings were a native migratory fish impediment until each crossing was removed and replaced with a pre-cast concrete open bottom arch. Each crossing now provides access into the upper basin for native migratory fish species. These culverts were limiting fish access to seven miles of essential habitat for Chinook salmon, Coho salmon, winter steelhead, and cutthroat trout.