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A Wholistic, Environmental Approach to Washington's Repair Methodology of its State-road Culverts

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"S[almon] recovery is failing in Western Washington.
It's failing because the federal and state
governments are allowing habitat to be destroyed
faster than it can be restored…

We aren't failing because of a lack of funding, or a
lack of effort, or a lack of desire to recover salmon.
The reason is a lack of federal government
leadership and coordination toward a set of salmon-
recovery goals and objectives."

Billy Frank Jr., a Nisqually tribal member and the former chairman of the Northwest Indian Fisheries Commission [1]


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1. Billy Frank Jr., *Northwest Salmon, Tribal Cultures, and Treaty Rights at Risk from Disappearing Habitat,* THE SEATTLE TIMES, (August 4, 2011, 6:01 pm), http://seattletimes.com/html/opinion/2015822689_guest05frank.html.

2. United States Forest Service, *Stream Simulation Culvert Design and Performance: A USFS Perspective*, SCIENCE AND TRAINING LIBRARY, http://www.conservationwebinars.net/webinars/stream-simulation-culvert-design-and-performance/ (this picture is an example of a stream simulation culvert).

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I. INTRODUCTION

Judge Boldt issued an historic ruling in favor of Washington's tribes by holding that Washington can only "regulat[e] the off-reservation fishing activities of members of treaty tribes . . . to the extent necessary to protect the fishery resource."[3] While Washington's tribes have "the right of taking fish at usual and accustomed grounds and stations" according to treaties executed with Washington State,[4] prior to the "Boldt deci-

3. United States v. Washington, 384 F. Supp. 312, 401 (W.D. Wash. 1974) (emphasis added).

4. Treaty of Point Elliot, U.S.-Dwamish, Suquamish, and other allied and subordinate Tribes of Indians in Washington Territory, January 22, 1855, 12 Stat. 927.

sion," as it is commonly known,[5] Washington had been strictly regulating Washington tribes' fishing activities. In response, Washington's tribes confronted Washington State with "fish-ins" and protests that eventually led them to file suit against Washington in the United States District Court.[6] Unfortunately for each treaty party, the exact meaning of the treaty language "the right of taking fish at usual and accustomed grounds and stations" remains unclear.[7] Neither treaty party can be entirely certain of the exact contours of their treaty rights and obligations. Consequently, the meaning of the treaty language "the right of taking fish at usual and accustomed grounds and stations" has been the topic of heavy litigation, even after Judge Boldt's ruling.

From the Boldt decision, several subproceedings emerged in an effort to determine the application of Judge Boldt's ruling. As it pertains to this article, in 2013, Washington's tribes successfully litigated one such subproceeding in the United States District Court.[8] In this case, the court granted the tribes' motion for a permanent injunction and adopted their suggested order.[9] More specifically, the court found Washington State has a specific treaty-based duty to Washington's tribes that "attaches when the State elects to block rather than bridge a salmon bearing stream with a roadbed."[10] Essentially, the court found that Washington State has a duty to maintain, repair, or replace culverts that block the passage of anadromous fish.[11] Consequently, in response to the court's 2013 ruling, Washington State has been repairing culverts that act as anadromous fish barriers within its jurisdictional boundaries. However, as Washington's state agencies repair barrier culverts pursuant to their court order, each state agency has been using different culvert designs in its repair methodology.

The Washington state agencies' lack of a cohesive repair method is problematic when a state agency's implemented culvert design method negatively affects the salmon population. In brief explanation, from the Boldt decision and its subproceedings, Washington and its tribes have developed a duty that neither treaty party "may permit the subject matter

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5. Tassie Hanna, Sam Deloria, & Charles E. Trimble, *The Commission on State-Tribal Relations: Enduring Lessons in the Modern State-Tribal Relationship*, 47 TULSA L. REV. 553, 561 (2012).

6. Shannon Bentley, *Indians' Right to Fish: The Background, Impact, and Legacy of* United States v. Washington, 17 AM. INDIAN L. REV. 1, 4 (1992).

7. *See e.g.*, *United States*, 384 F. Supp. 401; United States v. Washington, 20 F. Supp. 3d 986 (W.D. Wash. 2013).

8. *United States*, 20 F. Supp. 3d 1022–1023.

9. *Id.* at 1023.

10. *Id.* at 1022.

11. *Id.* (anadromous fish, for the purposes of *United States v. Washington*, refers to salmon species, such as, coho, chinook, pink, sockeye, chum, and steelhead).

of these treaties to be destroyed." [12] While neither party has a treaty-duty to conserve the salmon population, a "fundamental prerequisite to exercising the right to take fish is the existence of fish to be taken."[13] Accordingly, Washington and its tribes do have a treaty-duty to protect salmon habitat to sustain the salmon population. [14] Washington's correction of its blocked state-road culverts is a key factor for Washington to recover its salmon population. [15]

As previously mentioned, Washington's state agencies have been using different culvert design methods as it corrects blocked state-road culverts. This article asserts that Washington should implement the "stream simulation" method as the primary method of repairing culverts that prevent the passage of anadromous fish through a memorandum of understanding between Washington and Washington's tribes for the reasons listed below. Part II explores the historical background between the state and the Washington tribes. Part III explains the importance of Washington's salmon runs. Part IV describes the problems that culverts can pose to salmon runs. Part V analyzes Washington's administrative policy governing state agencies with respect to these different culvert designs. Part VI argues for a memorandum of understanding between Washington and the Washington tribes that mandates the implementation of the stream simulation method as the state repairs culverts that block the passage of anadromous fish.

II. THE HISTORICAL BACKGROUND BETWEEN WASHINGTON AND THE "STEVENS TREATIES" TRIBES

The United States and the Native American people have a relationship founded upon historic government-to-government dealings and the United States' long-held recognition of the tribes' special legal status.[16] The Native American people derive their contemporary rights and obligations—which are unique to Indian law—from this special legal status.[17] The United States and the Washington tribes' legal relationship began when the United States "executed nine treaties with twenty-three

12. United States v. Washington, 520 F.2d 676, 685 (1975); *see also United States*, No. CV 9213RSM at *10.

13. United States v. Washington, 506 F. Supp. 187, 197–98, 208 (W.D. Wash. 1980), *aff'd in part and vacated in part,* 759 F.2d 1353, 1358–60 (9th Cir. 1985) (en banc).

14. Michael C. Blumm and Jane G. Steadman, *Indian Treaty Fishing Rights and Habitat Protection: The Martinez Decision Supplies a Resounding Judicial Reaffirmation*, 49 NAT. RESOURCES J., 653, 688 (2009).

15. *United States*, 20 F. Supp. 3d at 1009.

16. COHEN'S HANDBOOK OF FEDERAL INDIAN LAW, §1.01, at 2 (Nell Jessup Newton ed., 2012) [hereinafter COHEN'S HANDBOOK].

17. *Id.*

tribes and confederations of tribes and bands indigenous to the Columbia Basin and northwestern Washington" from 1854 to 1855.[18] Governor Isaac Stevens, acting as the lead negotiator on behalf of the United States,[19] negotiated a series of treaties known as the "Stevens Treaties."[20] The essential terms of the treaties that constitute the Stevens Treaties are, accordingly, identical to each other in all essential terms.[21] It is from the Stevens Treaties that the United States and the Washington tribes' treaty-based rights and duties originate.[22] However, the precise meaning of the United States and the tribes' treaty-based rights and duties has been the subject of heavy litigation.[23] In particular, both treaty parties have challenged the meaning of "the right of taking fish at usual and accustomed grounds and stations."[24]

In 1974, Judge Boldt ruled in favor of the Washington tribes by holding that Washington can only "regulate the off-reservation fishing activities of members of treaty tribes . . . to the extent necessary to protect the fishery resource."[25] Furthermore, the court found that Washington's tribes can enact and enforce regulations "relating to the exercise outside reservation boundaries by their members of fishing right secured to said tribes by treaty."[26] The tribes' fishing rights were found to be a "reserved right," as demonstrated by the treaties between the United States and the tribes. The court further held that these rights were to be "exercised in common with non-Indians, who may take a share which is fair by comparison with the share taken by the tribes."[27]

As previously mentioned, prior to the Boldt decision, Washington had been strictly regulating the Washington tribes' fishing activities.[28] In 1970, the United States filed a complaint against Washington, on behalf of seven treaty tribes, with regards to protection of off-reservation treaty-right fishing and for injunctive relief to provide enforcement with respect

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18. Vincent Mulier, *Recognizing the Full Scope of the Right to Take Fish Under the Stevens Treaties: The History of Fishing Rights Litigation in the Pacific Northwest*, 31 AM. INDIAN L. REV. 41 (2006–2007).

19. Bentley, *supra* note 6, at 2.

20. William Fisher, Note: *The Culverts Opinion and the Need for a Broader Property-Based Construct*, 23 J. ENVTL. L. & LITIG. 491, 499 (2008).

21. Mulier, *supra* note 18.

22. *See* COHEN'S HANDBOOK, *supra* note 16, at 2.

23. *See e.g.*, *United States*, 384 F. Supp. 401; *United States*, 20 F. Supp. 3d 986.

24. *See e.g.*, Treaty of Point Elliott, *supra* note 4 (This treaty was used in *United States v. Washington*, 20 F. Supp. 3d 986 (W.D. Wash. 2013), one of the United States District Court subproceedings following the Boldt Decision).

25. *United States*, 384 F. Supp. at 401.

26. *Id.* at 403.

27. *Id.* at 400 (the tribes 'reserved rights' are treaty-rights that are also reserved to treaty-tribes' descendants, indicating that these rights have no time limitations).

28. Hanna et al., *supra* note 5, at 560.

to those rights.[29] It is this complaint that resulted in the 1974 Boldt decision favoring the tribes.

In response to the 1974 Boldt decision, several subproceedings developed to delineate the contours of the Boldt decision's legal implications.[30] In 2001, the United States initiated a subproceeding, on behalf of some of the Washington tribes, to compel Washington to "repair or replace any culverts that are impeding salmon migration to or from the spawning grounds."[31] The tribes argued that Washington "has a treaty-based duty to preserve fish runs so that the Tribes can earn a 'moderate living.'"[32] They requested a declaratory judgment,[33] a prohibitory injunction,[34] and a mandatory injunction from the court to compel the state to act accordingly.[35] Both the tribes and the state stipulated that this subproceeding would only include culverts that block fish passage under state-roads. In 2012, in another landmark decision, the United States District Court once again ruled in favor of the tribes.[36] This decision is commonly referred to as the "Culverts Opinion."[37] In this case, the court found that Washington has a specific treaty-based duty that "attaches when the State elects to block rather than bridge a salmon bearing stream with a roadbed."[38] Consequently, Washington as a legal duty to *maintain*, *repair*,

29. *United States*, 384 F. Supp. at 327–328 (the plaintiff tribes were the Hoh Tribe, Makah Tribe, Muckleshoot Tribe, Nisqually Tribe, Puyallup Tribe, Quileute Tribe, and the Skokomish Tribe).

30. *See e.g.*, *United States*, 20 F. Supp. 3d 986.

31. United States v. Washington, No. CV 9213RSM at *1 (W.D. Wash. Aug. 22, 2007) (order denying motion for summary judgment) (United States filed on behalf of the Suquamish Indian Tribe, Jamestown S'Klallam, Lower Elwha Band of Klallam, Port Gamble Clallam, Nisqually Indian Tribe, Nooksack Tribe, Sauk-Suiattle Tribe, Skokomish Indian Tribe, Squaxin Island Tribe, Stillaguamish Tribe, Upper Skagit Tribe, Tulalip Tribe, Lummi Indian Nation, Quinault Indian Nation, Puyallup Tribe, Hoh Tribe, Confederated Bands and Tribes of the Yakama Indian Nation, Quileute Indian Tribe, Makah Nation, and Swinomish Tribal Community).

32. *Id.*

33. *Id.* at *2. "(1) the right of taking fish secured by the Treaties imposes a duty upon the State of Washington to refrain from diminishing the number of fish passing through, or to or from, the Tribes' usual and accustomed fishing grounds by improperly constructing or maintaining culverts under State-owned roads and highways; (2) the State has violated, and continues to violate, the duty owed the Tribes under the Stevens Treaties.").

34. *Id*. at *2 (requesting to bar Washington "from constructing or maintaining any culverts that reduce the number of fish that would otherwise return to or pass through the usual and accustomed fishing grounds of the Tribes.").

35. *Id*. at *2 (requesting that Washington be required to "(1) identify, within eighteen months, the location of all culverts constructed or maintained by State agencies, that diminish the number of fish in the manner set forth above, and (2) fix, within five years after judgment, and thereafter maintain all culverts built or maintained by any State agency, so that they do not diminish the number of fish as set forth above.").

36. *United States*, 20 F. Supp. 3d at 1022–1023.

37. Fisher, *supra* note 20, at 511.

38. *United States*, 20 F. Supp. 3d at 1022.

and *replace* state-road culverts that prevent the passage of anadromous fish.[39]

III. SALMON'S IMPORTANCE IN THE PACIFIC NORTHWEST

The Culverts Opinion is particularly impactful to the Washington tribes because fish—and most importantly salmon—have a fundamental cultural, religious, and social importance to the Native American people.[40] The court's reference to the term 'anadromous fish' in the Culverts Opinion is a general reference to salmon;[41] while a 'salmon run' is defined as the migration of salmon up a river from the sea for the purpose of spawning.[42] The Stevens Treaties were negotiated and signed by the United States and the tribes with the understanding and expectation that—at that point in time—salmon were an inexhaustible resource.[43] Unfortunately, as the salmon population stands today, the Pacific Northwest's salmon population is steadily decreasing from "overfishing, loss of habitat, hydroelectric dams and competition from hatchery-raised salmon."[44] Salmon may have been abundant when the Steven Treaties were signed, but that is not the reality of the situation today.

In relation to salmon as a shared resource, Washington and Washington's tribes have treaty-based right and duties to each other.[45] These rights and obligations are implicitly incorporated within the treaties' fishing clauses, not expressly incorporated through articulated provisions.[46]

At the time the Stevens Treaties were negotiated, the tribes were "personally assured . . . that they could safely give up vast quantities of land and yet be certain that their right to take fish was secure."[47] The Boldt decision interpreted the Stevens Treaties fishing clauses as binding Washington and its tribes with treaty-based rights and duties to each other with respect to salmon.[48] From this decision and the proceedings that arose in response to it, a duty developed that "neither the treaty Indians nor the state on behalf of its citizens may permit the subject matter of

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39. *Id*. (emphasis added).

40. Fisher, *supra* note 20, at 497.

41. *United States*, 20 F. Supp. 3d at 1006.

42. OXFORD DICTIONARIES, http://www.oxforddictionaries.com/definition/english/salmon-run (last visited April 3, 2015).

43. *United States*, 20 F. Supp. 3d at 1019.

44. Saskia de Melker, *The Northwest's Salmon People Face a Future Without Fish*, OPB (Aug. 9, 2012, 11:00 PM), http://earthfix.opb.org/communities/article/salmon-climate-change-video-environment/; *see also* United States v. Washington, 20 F. Supp. 3d 986, 1002, 1020 (W.D. Wash. 2013).

45. *See e.g.,* Treaty of Point Elliott, *supra* note 4; *United States*, 384 F. Supp. at 400.

46. Mulier, *supra* note 18, at 43.

47. *United States*, No. CV 9213RSM at *10.

48. *See e.g.,* Treaty of Point Elliott, *supra* note 4; *United States*, 384 F. Supp. at 400.

these treaties to be destroyed."[49] Consequently, both Washington and the Washington tribes have treaty-based rights and duties with respect to restoring the salmon population and remedying practices that result in salmon depletion.

From an environmental standpoint, the salmon population's decline in the Pacific Northwest is particularly concerning to both the state and the tribes as salmon are fundamental to Washington's coastal ecosystem.[50] To give an example, the loss or exclusion of salmon—due to blocked culverts—has the possibility to "alter and undermine the sustainability of natural communities"[51] as the entire aquatic ecosystem is interconnected.[52] Most importantly, as an aquatic resource, [53] salmon supports other forms of life as a food source. [54] Thus, the presence or absence of salmon also affects whether other species can use the same habitat. [55] For the past twenty years, federal agencies have been working with states and treaty tribes to increase the wild salmon populations by "restructur[ing] fisheries, updat[ing] hatchery practices, and allocat[ing] funding to restore wild, naturally spawning stocks listed for protection under the Endangered Species Act.[56] Unfortunately, salmon is still a dwindling resource that needs to consistently managed and fairly dispersed.[57]

IV. WASHINGTON'S DUTY TO REMEDY BLOCKED STATE-ROAD CULVERTS

Washington's correction of its blocked state-road culverts is a key factor in recovering the salmon population. One specific cause of salmon depopulation and salmon habitat degradation has been blocked culverts—i.e. "culverts . . . [that] do not allow [for] the free passage of both adult and juvenile salmon upstream and downstream." [58] Unfortunately, Washington's blocked culverts are so numerous and affect such a large area of land that they have a significant total impact on salmon produc-

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49. United States v. Washington, 520 F.2d 676, 685 (9th Cir. 1975).

50. *Salmon Confidential,* 2013, http://www.salmonconfidential.ca/watch-salmon-confidential-documentary/.

51. U.S. Department of Agriculture., Stream Simulation: An Ecological Approach to Providing Passage for Aquatic Organisms at Road-Stream Crossings, at xvii (2008), http://www.fs.fed.us/eng/pubs/pdf/StreamSimulation/hi_res/%20FullDoc.pdf.

52. *Id.* at xxvi.

53. *Id.* at 1–1.

54. Mulier, *supra* note 18.

55. U.S. Department of Agriculture, *supra* note 51, at 1–1.

56. Washington Department of Fish & Wildlife, *Conservation,* http://wdfw.wa.gov/hatcheries/mass_marking.html (last visited April 3, 2015).

57. Bentley, *supra* note 6, at 2.

58. *United States*, 20 F. Supp. 3d at 1020–1021.

tion.[59] For example, the Washington State Department of Transportation (WSDOT) has 989 culverts that must be corrected, and 825 of these culverts affect significant habitat.[60] When these barrier culverts are not repaired, thousands of miles of salmon's spawning and rearing habitat is inaccessible.[61] Fortunately, the correction of blocked culverts has an immediate and positive impact on salmon production as salmon will rapidly re-colonize the upstream area that was previously unavailable to them and the returning adults will spawn in the upstream habitat.[62] Additionally, salmon's presence in its native habitat benefit other species that salmon support.[63]

The free passage of salmon through culverts is critical for salmon recovery as culverts are the structures used to pass roads over streams and streams under roads.[64] In the case of adult salmon, if a culvert blocks the upstream passage of fish, then portions of the streambed become useless for the salmon to spawn in.[65] In the case of juvenile salmon, if a culvert blocks the stream area where fish grow, then the salmon may not be able to properly feed themselves or escape from possible predators.[66] Additionally, if these salmon are unable to travel downstream, they will be unable to reach the sea and develop into mature salmon.[67]

Moreover, it is important to note that culverts can prevent fish passage without physically blocking fish from passing upstream or downstream.[68] A change in the salmon population's stream habitat can prevent fish passage like the physical barrier a blocked culvert presents.[69] Improperly designed culverts can cause several problems for salmon: (1) "loss of spawning and rearing habitat," (2) "loss of pools and other complex habits," (3) "elimination of riparian vegetation," (4) "changes in litter and food sources," (5) "improper filtration of sediment," as well as other adverse consequences.[70] These changes in salmon's stream habitat can act as barriers to fish passage, in addition to the other aquatic species

59. *Id.* at 1014.

60. *Federal Court Injunction Related to Fish Passage,* Washington State Department of Transportation, http://www.wsdot.wa.gov/Projects/FishPassage/CourtInjunction.htm (last visited April 3, 2015) (these numbers are subject to change as new information is collected).

61. Blumm, *supra* note 14, at 678.

62. *United States*, 20 F. Supp. 3d at 1017.

63. U.S. Department of Agriculture, *supra* note 51, at 1–3.

64. *United States*, 20 F. Supp. 3d at 1004.

65. *Id.* at 1020.

66. *Id.*

67. *Id.*

68. *See* U.S. Department of Agriculture, *supra* note 51, at xxvi, 1–1.

69. *Id.* at xxvi, 1–1.

70. *United States*, 20 F. Supp. 3d at 1014.

that share the stream.[71] While there are a variety of options available to remedy blocked culverts,[72] the culvert design method that most "closely simulates the characteristics of the natural stream channel" is the least likely to inhibit fish passage.[73] That said, culvert design is an emerging field that has been consistently and rapidly evolving over the past century.[74] In the Culverts Opinion, the court referred to three primary culvert design methods: (1) hydraulically designed culverts, (2) no-slope method culverts, and (3) stream simulation method culverts.[75] Of these three primary culvert design methods, the stream simulation method is the only approach that designs culverts that simulate the natural stream channel as closely as can be replicated.[76]

A. Hydraulically Designed Culverts

The hydraulically designed culvert was not designed—like the stream simulation method was—to simulate the natural stream channel and allow for the free movement of all aquatic species.[77] This culvert design method was developed in response to fish barriers that are created by a stream's velocity and depth when a culvert is perched above a streambed.[78] It is designed to perform with predetermined water velocities and predetermined water depth flows based on the swimming abilities of specific target fish species and age class.[79] A major shortcoming of the hydraulically designed culvert is that the design method is "tied to a single life stage of a specific species and the hydraulic performance of the structure, *rather than the continuity of stream processes*."[80] Other stream functions, besides salmon passage, are constrained by hydraulically designed culverts—for example, water-borne debris and sediment cannot properly pass this culvert-type.[81] The hydraulically designed culvert can only be applied under exceptional circumstances where the use

71. *See* U.S. Department of Agriculture, *supra* note 51, at 1–1.

72. *United States*, 20 F. Supp. 3d at 1004 (some of these remedies include, bridges, different types of culvert design methods, and the relocation of roads to avoid the streams and waterways used by salmon).

73. *Id.*

74. R.J Barnard, J. Johnson, P. Brooks, K.M. Bates, B. Heiner, J.P. Klavas, D.C. Ponder, P.D. Smith, and P.D. Powers, *2013 Water Crossing Design Guidelines*, WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (2013), http://wdfw.wa.gov/publications/01501/wdfw01501.pdf [hereinafter Barnard].

75. *See generally*, *United States*, 20 F. Supp. 3d.

76. U.S. Department of Agriculture, *supra* note 51, at xxiii.

77. U.S. Department of Agriculture, *supra* note 51, at xvii; *See also* Barnard, *supra* note 74, at 9.

78. Barnard, *supra* note 74, at 9.

79. *United States*, 20 F. Supp. 3d at 1005.

80. Barnard, *supra* note 74, at 105. (emphasis added).

81. *Id.*

of a bridge, no-slope culvert, or stream simulation culvert is not appropriate.[82]

B. No-slope Culverts

No-slope culverts were also not designed—as stream simulation culverts are—to simulate the natural stream channel and allow for the free movement of all aquatic species.[83] The no-slope culvert design option is most appropriate for small streams[84] and generally does not require any special design expertise or land survey information.[85] The idea behind this method is that private landowners can provide fish passage through their properties at minimal expense and in a simple, understandable way.[86] As the name implies, this culvert type is installed flat against the ground, allowing for the natural movement of the stream's bedload to then maintain a stable bed inside the culvert, under the assumption that a broad range of fish species and sizes will be able to swim through it.[87] However, no-slope culverts are not appropriate for high gradient channels (or sloped channels) as the inappropriate implementation of this culvert-type often leads to stream habitat degradation and eventually blocks the passage of salmon.[88]

C. Stream Simulation Culverts

The stream simulation method is "an approach to designing crossing structures (usually culverts), that creates a structure that is as similar as possible to the natural channel."[89] A stream simulation culvert is specifically "designed to create or maintain natural stream processes within the culvert"[90] and to allow for free movement of any aquatic species through the natural stream channel.[91] Continuity through the stream habitat allows aquatic species to access habitats, avoid adverse conditions, and seek food and mates, which are all essential activities for a species' survival.[92] A stream simulation culvert is designed to be at least as wide as the stream bank with an additional buffer zone.[93] The stream simula-

82. Barnard, *supra* note 74, at 104.

83. *See* U.S. Department of Agriculture, *supra* note 51 at xvii; *see also* Barnard, *supra* note 74, at 9.

84. *See United States*, 20 F. Supp. 3d at 1005.

85. Barnard, *supra* note 74, at 24.

86. *Id.*

87. Barnard, *supra* note 74, at 23.

88. Barnard, *supra* note 74, at 25.

89. U.S. Department of Agriculture, *supra* note 51, at xxiii.

90. *United States*, 20 F. Supp. 3d at 1004.

91. U.S. Department of Agriculture, *supra* note 51, at xvii.

92. *Id.*

93. *United States*, 20 F. Supp. 3d at 1004; Barnard, *supra* note 74, at 31.

tion design aims at retaining the stream's channel dimensions, slope, and streambed structure as much as possible to maintain the stream's natural water velocities and depths.[94] The premise behind this culvert type is that "if [a] fish can migrate through the natural channel, then [it] can also migrate through a man-made channel that simulates [the natural channel]."[95] A stream simulation culvert eliminates the need to consider individual species of fish or the particular life stages of those species, as all aquatic species are unchallenged by passage through the culvert.[96]

There are significant benefits to implementing a stream simulation culvert compared to a hydraulically designed culvert or a no-slope culvert. For example, a stream simulation culvert more effectively transports sediment, [97] which prevents a build-up of sediments in the river from clogging salmon's gills.[98] Additionally, stream simulation culverts provide superior fish passage and overall habitat benefits in comparison to hydraulically designed culverts and no-slope culverts.[99] The stream simulation method—in comparison to the other design methods—provides stream continuity that allows all aquatic species free, unhindered passage through the culvert to access habitat, avoid adverse conditions, and seek food and mates.[100]Furthermore, the stream's water depths and velocities remain as diverse as that of a natural channel.[101]

V. WASHINGTON'S CURRENT LAW REGARDING CULVERT REPAIR METHODS

As the law stands today, "[n]o state, federal, or tribal manual or regulation [mandates] the use of the stream simulation [method] in the design, construction, or maintenance of culverts;" although many agencies prefer its use in salmon bearing streams.[102] The State agencies primarily responsible for Washington's culverts are the Washington Department of Fish and Wildlife (WDFW), the Washington State Department of Transportation (WSDOT), the Washington Department of Natural Resources (WDNR), and the State Parks.[103] Both the WDFW and the WSDOT recommend the use of the stream simulation method to correct

94. U.S. Department of Agriculture, *supra* note 51, at xxiii.

95. Barnard, *supra* note 74, at 29.

96. *Id.*

97. *United States*, 20 F. Supp. 3d at 1004.

98. KCTS9, *A River Returns*, PBSVIDEO (Oct. 24, 2013), *available at* http://video.pbs.org/video/2365091774/.

99. *United States*, 20 F. Supp. 3d at 1019.

100. U.S. Department of Agriculture, *supra* note 51, at xvii.

101. *Id.*

102. *United States*, 20 F. Supp. 3d at 1004.

103. *Id.*

blocked culverts.[104] Additionally, the National Marine Fisheries Service and the United States Forest Service, as federal agencies, also currently recommend the use of the stream simulation method.[105] Considering all the above, it is fair to say that the agencies responsible for correcting blocked culverts recognize the benefits and advancements in culvert design that coalesce in the stream simulation method.

The Washington Administrative Code (WAC) governs these state agencies with respect to the construction of hydraulic projects and their performance in the form of rules and policies.[106] The WAC mandates that "any person who wants to conduct a hydraulic project must get a construction permit called the hydraulic project approval (HPA) from the department."[107] The HPA's purpose is to "ensure that construction or performance of work is done in a manner that protects fish life."[108] While the department will incorporate new science and technology as it becomes available, "[t]hese provisions [within WAC Chapter 220-660] reflect the current and best science, technology, and construction practices related to the protection of fish life." [109] To ensure that each project is compliant with Chapter 220-660 of WAC, the department reviews each HPA on an individual basis.[110] It would be fair to say, based upon the department's review process, that the WAC favors an ecological approach to the construction of Washington's hydraulic projects and their ultimate performance. Given the various agencies involved and design methods, Washington should focus on implementing a primary method for multiple agencies to uniformly follow.

VI. A MEMORANDUM OF UNDERSTANDING: IMPLEMENTING THE STREAM SIMULATION METHOD AS WASHINGTON REPAIRS BLOCKED STATE-ROAD CULVERTS

This article asserts Washington should begin this process by implementing a memorandum of understanding with Washington tribes, mandating the use of the stream simulation method as Washington repairs its blocked-state road culverts. By agreeing to implement the

104. *United States*, 20 F. Supp. 3d at 1004; *see* Mike Barber, Susan Cierebiej, Jon Peterson, and Kathy Prosser, *WSDOT Fish Passage Performance Report*, WASHINGTON STATE DEPARTMENT OF TRANSPORTATION 42 (June 30, 2014), *available at* http://www.wsdot.wa.gov/NR/rdonlyres/A1839029-6AF4-4BED-9446-DDC164069A2D/0/2014FishPassageAnnualReport.pdf [hereinafter Fish Passage Report].

105. *United States*, 20 F. Supp. 3d at 1004.

106. *See* WASH. ADMIN. CODE § 220-660 (2014).

107. WASH. ADMIN. CODE §220-660-010 (2014) (the term 'person' includes individuals, public or private entities, and organizations according to WAC 220-660-030).

108. *Id.*

109. WASH. ADMIN. CODE §220-660-020 (2014).

110. *Id.*

stream simulation method, Washington and the Washington tribes would provide a uniform methodology throughout the state with respect to culvert repair, foster the overall ecological benefits that follow from the use of the stream simulation method, and maintain consistency with current Washington policy that states that its regulations represent the best available science, technology, and construction practices with respect to protecting fish life.[111]

A. Memorandum of Understanding

A memorandum of understanding is "a formal business document used to outline an agreement made between two separate entities, groups or individuals."[112] It may be used "to cooperatively work together on an agreed upon purpose or meet an agreed objective and outline the discussed terms of a new relationship."[113] Recently, various Washington agencies and institutions have enacted memorandums of understanding with tribal nations in Washington.[114] As the relationship between Washington and the Washington tribes is a government-to-government relationship, cooperative management or co-management has been seen as the cornerstone of the state and tribes' current working relationship.[115] A memorandum of understanding would advance the co-management relationship between the state and the tribes.

Two key arenas where memorandums of understanding have been used are in co-management relationships regarding tribal education and environmental concerns. As one example, a Washington institution and some of the Washington tribes have collaborated to further Native American students' education.[116] Additionally, federal agencies have collaborated with the Native American people, especially with respect to shared

111. *Id.*

112. USLEGAL, *Memorandum of Agreement Law & Legal Definition*, http://definitions.uslegal.com/m/memorandum-of-agreement/ (last visited April 10, 2015).

113. *Id.*

114. *See e.g.,* Statewide Agreement American Indian Vocational Rehabilitation Services and Dept. of Social and Health Services Division of Vocational Rehabilitation and Dept. of Services for the Blind (Dec. 12, 2012–Jan. 4, 2015); WASHINGTON STATE DIVISION OF VOCATIONAL REHABILITATION, 2013 DIVISION OF VOCATIONAL REHABILITATION 7.01 PLAN, at 77 (2013), *available at https://www.dshs.wa.gov/sites/default/files/SESA/oip/documents/JJ&RAImplemetation%20Plan.pdf*; Memorandum of Understanding for the creation of the Washington State University Native American Advisory Board to the President (Nov. 8, 1997–June 18, 2013), *available at* http://native.wsu.edu/tribal-liaison/mou/MOU8-28-13.pdf [hereinafter Washington State University Memorandum].

115. Jovana J. Brown, *Treaty Rights: Twenty Years After the Boldt Decision*, 10 WICAZO SA REVIEW 1, 5 (1994).

116. Washington State University Memorandum, *supra* note 114; Barnard, *supra* note 74, at 29.

environmental concerns.[117] The National Park Service and several Washington tribes enacted a memorandum of understanding to clarify responsibilities and expectations in their shared interest in the resources within and around the Olympic National Park.[118] A memorandum of understanding between Washington and the Washington tribes implementing the stream simulation method would be consistent with their past government-to-government agreements with respect to shared interests and goals.

More specifically, a memorandum of understanding has previously been enacted between a tribal nation and federal and state agencies in order to restore a fish species. The Minnesota Department of Natural Resources (MDNR) and the United States Department of the Interior, Bureau of Indian Affairs committed to a memorandum of understanding with the Red Lake Band of Chippewa Indians in order to recover the walleye population in the Red Lakes.[119] The parties were also committed to the sustainable management of the fisheries resources of the Red Lakes. In order to fulfill these purposes, the parties established the Red Lakes Fisheries Technical Committee to "review and access fish stock status and management of the Red Lakes and to recommend to the respective governments, those procedures, regulations, policies, and practices that will rehabilitate and conserve the fishery resources of the Red Lakes."[120] The agreement was signed on April 9, 1999. Given the existence of a memorandum of understanding between a tribal nation and a state agency to recover a fish species, a memorandum of understanding between Washington and its tribes implementing the stream simulation method would be consistent with another state's action facing a similar problem.

B. Benefits of a Uniform Culvert Repair Methodology

Furthermore, a memorandum of understanding between Washington and the Washington tribes implementing the stream simulation method as the state repairs blocked culverts would provide a uniform method-

117. Memorandum of Understanding between National Park Service and Hoh Indian Tribe, Jamestown S'Klallam Tribe, Lower Elwha Klallam Tribe, Quileute Indian Tribe, Port Gamble S'Klallam Tribe, and Skokomish Indian Tribe (July 10, 2008), *available at* http://www.nps.gov/olym/learn/management/upload/Tribal-ONPMOU-Print%20Final.pdf [hereinafter National Park Memorandum]; Memorandum of Understanding between the Red Lake Band of Chippewa Indians, the Minnesota Department of Natural Resources, and the United States Department of the Interior, Bureau of Indian Affairs (Jan. 28, 2010), *available at* http://returnoftheredlakewalleye.com/2010_mou.pdf [hereinafter Red Lake Band Memorandum].

118. National Park Memorandum, *supra* note 117.

119. Red Lake Band Memorandum, *supra* note 117.

120. *Id.*

ology throughout the state with respect to how blocked culverts are repaired. It is imperative to consistently implement the stream simulation design method in addressing blocked state-road culverts for two primary reasons: (1) the stream simulation method represents the best, most recent science improving culvert design, and (2) the correction of blocked state-road culverts is a key factor in recovering the salmon population. As Washington's blocked culvert problem stands today, state and federal agencies use a range of different methods to repair blocked state-road culverts; and, as previously mentioned, no state, federal, or tribal manual or regulation mandates the use of the stream simulation method in either the design, construction, or maintenance of culverts.[121] The variation in methodology—between the three culvert designs—by state and federal actors and their tribal counterparts can further contribute to the decrease in salmon population through a variety of factors. This variation is problematic as the purpose of fixing the blocked culverts was to address the recovery of the salmon population.

1. Streamline Simulation Science

The stream simulation method represents the most recent science improving culvert design and is environmentally superior compared to hydraulically designed culverts and no-slope culverts. By mimicking conditions found in the natural streambed where the culvert is placed, the stream simulation method considers salmon habitat as well as the actual passage of salmon.[122] For instance, while the no-slope culvert design method does consider salmon habitat as it allows for the natural movement of a stream's bedload to maintain a stable bed inside the culvert,[123] it does not provide continuity to all aquatic species like a stream simulation culvert. Another example of the failure of the hydraulic culvert is that it is primarily designed to target a specific species, whereas the stream simulation method targets the stream habitat.[124]

Additionally, because the stream simulation method eliminates the need to consider a specific fish species or age class, a stream simulation culvert does not act as a fish passage to some salmon and an effective barrier to others.[125] While, in the case of no-slope culverts, it is assumed that a broad range of different fish species and sizes will be able to swim

121. *United States*, 20 F. Supp. 3d at 1004.

122. Wash. St Dep't of Transp., *Fish Barrier Correction Construction Process*, http://www.wsdot.wa.gov/Projects/FishPassage/FishBarCorrection.htm (last visited April 16, 2015).

123. Barnard, *supra* note 74, at 23; *United States*, 20 F. Supp. 3d at 1005.

124. Barnard, *supra* note 74, at 105.

125. *Id.* at 23.

through the culvert,[126] the stream simulation culvert is superior as it operates under the principle that "if fish can migrate through the natural channel, [then] they can also migrate through a man-made channel that simulates it."[127] Likewise, the stream simulation method is superior to the hydraulically designed culvert, as the latter method is designed around the swimming abilities of a target fish species and age class, which effectively blocks fish outside its target fish species and age class.[128] The stream simulation method thereby provides passage to the broadest range of fish species and ages, as a fish that was meant to pass through the stream channel can do so.

2. Significance of Blocked Culverts to the Decreasing Salmon Population

Implementing the stream simulation method is vital as Washington's blocked state-road culverts effectively decrease the salmon population in more ways than by simply preventing the passage of fish. Admittedly, both no-slope culverts and hydraulically designed culverts allow some salmon to pass through to varying degrees. However, neither simulates the characteristics of a stream channel and both can constrain other stream functions.[129] A stream simulation culvert's minimization of overall habitat degradation is significant because it allows "all aquatic species to move freely through [crossing structures] . . . to access habitats, avoid adverse habitats, avoid adverse conditions, and seek food and mates."[130] Habitat degradation can render a stream channel unusable or particularly challenging for fish passage.[131] It can also negatively impact the ecological system dependent on salmon.[132]

To conclude, as the stream simulation method represents the most recent science improving culvert design and its implementation is particularly significant to Washington's blocked state-road culvert problem, the stream simulation design method should be uniformly applied to repair Washington's blocked culverts. State and federal actors use a range of different methods to repair blocked culverts, some of which can further contribute to the decrease in the salmon population. This variation is problematic as Washington's correction of its blocked culverts was supposed to aid in the recovery of the salmon population.

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126. Barnard, *supra* note 74, at 105.
127. *Id.* at 32.
128. *Id.* at 108.
129. *See id.* at 56, 108.
130. U.S. Department of Agriculture, *supra* note 51, at xvii, 17.
131. *Id.*
132. U.S. Department of Agriculture, *supra* note 51, at 1–3.

The stream simulation design method provides for the most effective fish passage and provides for the most overall stream habitat benefits, allowing salmon to continue their life processes undeterred. [133] With a memorandum of understanding implementing the stream simulation method statewide, blocked culverts would be effectively repaired resulting in a benefit to the recovery of the salmon population.

C. The Ecological Benefits of the Stream Simulation Method

The stream simulation method provides the most ecological benefits compared to the no-slope culvert design option or hydraulically designed culverts, fostering a sustainable solution as Washington repairs its blocked state-road culverts. By comparing the principles behind each method, the stream simulation method considers not only the preservation of the salmon population, but the ecology of the stream system as a whole. The stream simulation method was developed to maintain the physical and biological integrity of the entire stream system, including existing populations of fish and other wildlife species that use the steam. [134]

In comparison, no-slope culverts and hydraulically designed culverts are primarily designed around fish passage (not the stream system as a whole). For instance, as previously mentioned, hydraulically designed culverts are focused on the passage of a specific subset of salmon, [135] while the no-slope culvert allows a broader range of passage. [136] A no-slope culvert and a hydraulically designed culvert's missing consideration is particularly significant because habitat fragmentation contributes to "population declines of many fish, and crossing structures that are barriers are a large part of the problem." [137] The stream simulation method provides continuity through the stream habitat allowing aquatic species to access habitats, avoid adverse conditions, and seek food and mates, all of which are essential activities for a species' survival.[138]

Additionally, the stream simulation method protects stream functions, such as sediment transport, fish and wildlife passage, and the movement of woody debris, [139] unlike no-slope culverts and hydraulically designed culverts. While previous design practices—i.e. no-slope culverts and hydraulically designed culverts—focused on designing culverts

133. *United States*, 20 F. Supp. 3d at 1019.
134. U.S. Department of Agriculture, *supra* note 51, at 17.
135. Barnard, *supra* note 74, at 105.
136. Barnard, *supra* note 74, at 23.
137. U.S. Department of Agriculture, *supra* note 51, at 17.
138. *Id.*
139. *Id*. at 24.

for the passage of target species during that species' migration, [140] the stream simulation method does not.[141] These past practices do not provide the best ecological results as sustaining the salmon population requires that salmon of all life stages must be able to pass through the culvert—not just the targeted design fish. [142]

Sustaining the entire aquatic stream ecosystem is essential as the ecosystem is inextricably linked and many species are dependent upon each other for food and other essential interactions. [143] Moreover, as the salmon population depends on a healthy and diverse ecosystem, "it is essential to focus on habitat quality and continuity for aquatic communities rather than for individual species."[144] It is paramount that culverts act neither as a barrier nor a filter for aquatic life, as is the case with no-slope culverts and hydraulically designed culverts.

Additionally, in order to maintain the stream habitat, a culvert must accommodate the full stream channel so that it does impede a stream's downstream transport of floodwater, sediment, or woody debris as narrower, traditional culverts do. [145] Put simply, the long-term conservation of salmon requires the maintenance of a stream as a healthy and ecologically viable ecosystem.[146] Moreover, it is essential that salmon remain in their stream habitat as the presence or absence of fish can affect whether other species are able to use the stream habitat. [147] On the whole, the loss of a species due to migratory barriers can seriously "alter or undermine the sustainability of natural communities." [148]

To conclude, the stream simulation method provides the most ecological benefits compared to no-slope culverts or hydraulically designed culverts, fostering a sustainable solution as Washington repairs its blocked state-road culverts. Neither no-slope culverts nor hydraulically designed culverts consider the stream ecosystem as a whole, as the stream simulation method does. Both no-slope culverts and hydraulically designed culverts solely focus on fish passage—a consideration that was previously considered best practice, but which the stream simulation method replaces in scientific advancement. [149] Furthermore, the stream simulation method approaches Washington's blocked state-road culvert

140. *Id.*
141. *Id.* at xvii, 17.
142. *Id.* at 24.
143. *Id.* at 26.
144. *Id.*
145. U.S. Department of Agriculture, *supra* note 51, at 26.
146. *Id.* at 31.
147. *Id.* at. 33.
148. *Id.*
149. *Id.* at 24.

problem from an ecological approach that, in the end, fosters an environment where salmon are likely to be cultivated rather than challenged. Salmon are supported through the stream simulation method's continuity as fish can freely move through culverts to access habitats, avoid adverse conditions, and seek food and mates. [150] Lastly, the stream simulation method's continuity encourages a normal dynamic stream habitat that helps to prevent stream habitat degradation and blocked salmon passage. [151] The ecological approach of the stream simulation method therefore fosters a sustainable method for fish passage compared to no-slope culverts and hydraulically designed culvert.

D. Maintaining Consistency with Current Washington Policy

Furthermore, the stream simulation method maintains consistency with current Washington regulatory policy that states that its provisions represent the "current and best science, technology, and construction practices related to the protection of fish life."[152] The department allows for the incorporation of "new science and technology as it becomes available, and will allow alternative practices that provide equal or greater protection for fish life."[153] As previously stated, no-slope culverts and hydraulically designed culverts have been replaced in scientific advancement by the stream simulation method.[154] A major flaw of hydraulically designed culverts is that it constrains other stream functions besides salmon passage—for example, water-borne debris and sediment cannot properly pass this culvert type.[155] While no-slope culverts allow for the natural movement of its bedload and the passage of a broad range of fish,[156] this method does not take a step further to maintain the stream's natural processes or allow all fish that could migrate through a natural channel to pass through a no-slope culvert.[157] The steam simulation method is now the best practice of culvert methodology.[158]

Since the department is amenable to incorporating "new science and technology as it becomes available," a memorandum of understanding mandating the use of the steam simulation method by Washington's state agencies would be within current Washington policy, assuming that the state agency followed all the rules associated with Chapter 220-660

150. *Id.* at 17.
151. U.S. Department of Agriculture, *supra* note 51, at 41.
152. WASH. ADMIN. CODE §220-660-020 (2014).
153. *Id.*
154. U.S. Department of Agriculture, *supra* note 51, at 24.
155. Barnard, *supra* note 74, at 105.
156. *Id.* at 23.
157. *Id.* at 29.
158. *United States*, 20 F. Supp. 3d at 1005.

WAC.[159] A memorandum of understanding mandating the use of the stream simulation method as Washington repairs its blocked state-road culverts would provide consistency to the inconsistent approach being applied by various state agencies. As the situation currently stands today, different culvert methods are being applied by each state agency—although the WDFW and WSDOT recommend the use of the stream simulation method as Washington repairs its blocked culverts. While Chapter 220-660 WAC allows for different approaches that comply with Chapter 220-660 WAC's provisions, as argued below, the practical benefits of a flexible approach are outweighed by the stream simulation method's superior environmental benefits.

VI. WASHINGTON AGENCIES SHOULD NOT RETAIN FLEXIBILITY TO REMEDY STATE-ROAD CULVERTS WITH OTHER DESIGN METHODS

Washington agencies should not retain the flexibility to implement hydraulically designed culverts or no-slope culverts, although some would argue that Washington's agencies necessarily need three culvert design options to respond to the new and different problems that each blocked state-road culvert creates. While retaining the three culvert design methods without mandating the specific use of the stream simulation method does allow Washington agencies the flexibility of choice as they remedy blocked culverts, this choice is inappropriate in light of the stream simulation method's superior environmental benefits, as exemplified earlier in this article.

It is true that Washington's agencies have delineated the circumstances where each culvert design method is appropriate,[160] and that Chapter 220-660 WAC allows for different approaches that comply with its provisions.[161] However, the circumstances where a hydraulically designed culvert or a no-slope culvert is more appropriate than a stream simulation culvert proves to be the exception to the general rule that the stream simulation method is to be preferred for its superior environmental benefits. To give an example, the WSDOT, in the past twenty years, has moved from "retrofits and hydraulic design methods for fish passage to . . . stream simulation."[162] Additionally, the WDFW explicitly states that there are "drawbacks" to both the hydraulically designed method and the no-slope method and that the stream simulation method is the most common culvert design in Washington.[163] While allowing Washington's

159. WASH. ADMIN. CODE § 220-660-020 (2014).
160. Barnard, *supra* note 74; Fish Passage Report, *supra* note 105.
161. WASH. ADMIN. CODE § 220-660-020 (2014).
162. Fish Passage Report, *supra* note 105.
163. Barnard, *supra* note 74, at 9.

agencies a choice between three culvert design methods would allow them a flexible approach as they remedy blocked state-road culverts, this flexible approach is outweighed by the stream simulation methods superior environmental benefits—a method that has both Washington and the Washington tribes' best interests in mind.

VII. CONCLUSION

Washington should implement a memorandum of understanding mandating the use of the stream simulation method as Washington repairs blocked state-road culverts as ordered in the Culvert Opinion. Washington has been repairing blocked culverts that prevent salmon passage within its jurisdictional boundaries; however, Washington's agencies have been using different repair methods to comply with the United States District Court's order. The stream simulation method should be implemented over the no-slope design method or the hydraulically designed method because the stream simulation method represents the current scientific advancement of culvert design and signifies the best practice in the field today. By agreeing to implement the stream simulation method, Washington and the Washington tribes would provide a uniform methodology throughout the state with respect to culvert repair, foster the overall ecological benefits that follow from the use of the stream simulation method, and maintain consistency with current Washington policy that states that its laws "reflect the current and best science, technology, and construction practices related to the protection of fish life."[164]

A memorandum of understanding is the best approach to implementing the stream simulation method throughout Washington because Washington and the Washington tribes have a government-to-government relationship where cooperative management or co-management has been seen as the cornerstone of its current working relationship.[165] Implementing the stream simulation method throughout Washington as the state repairs blocked state-road culverts would provide a uniform methodology throughout the state with respect to how the blocked culverts are repaired.

It is imperative to consistently implement the stream simulation design method in addressing blocked state-road culverts because the stream simulation method represents the most recent science improving culvert design and blocked culverts are a significant impediment to the decreasing salmon population. Moreover, the stream simulation method provides

164. WASH. ADMIN. CODE § 220-660-020 (2014).

165. Brown, *supra* note 115, at 5.

the most ecological benefits to the stream eco-system as a whole, compared to the no-slope culvert design option or hydraulically designed culverts, fostering a sustainable solution as Washington repairs its blocked state-road culverts. As the stream ecosystem (that salmon are a part of) is inextricably linked, it is necessary to implement a solution that considers the stream ecosystem, instead of a solution that targets a specific salmon species and age. Overall, a memorandum of understanding implementing the stream simulation method as Washington repairs its blocked state-road culverts is the best method to foster an environment that will hopefully lead to an increase in the salmon population—a result that both Washington and the Washington tribes desperately need.