# SCREENING WATER DIVERSIONS FOR FISH PROTECTION: A SURVEY OF POLICY, PRACTICES AND COMPLIANCE IN THE PACIFIC NORTHWEST

By
JAMES D. CRAMMOND*

*Unscreened surface water diversions damage and kill young fish. The decline of anadromous fish stocks in the Columbia Basin puts a premium on protection of juvenile salmon. State laws require screens on surface water diversions, but compliance has been poor. The Endangered Species Act and the Northwest Power Act have motivated and funded a massive remedial screening effort since 1991. Effective screens, installed with ratepayer and taxpayer funds, have dramatically improved fish protection at diversions. However, many harmful diversions remain. This paper concludes that, although progress has been swift, full compliance in 1996 is problematic. Greater incentives and enforcement are essential to complete screening in the Columbia Basin. After full compliance, maintenance and eventual replacement of screens are essential to the screening program's continued success. To avoid another Endangered Species Act "train wreck," states must transfer their screening experience to other watersheds in order to improve conditions for their native and resident fish.*

## I. INTRODUCTION

Surface water diversions are essential elements of irrigated agriculture; industrial processes, hydropower generation, and municipal water supply in the Pacific Northwest.[1] Without power screening, these diversions can capture and destroy thousands of young fish in a very short time. The survival of young fish is a critical link in the restoration and maintenance of Northwest fisheries. State and federal law has required screening for many years, but compliance has been poor. With anadro-

* James D. Crammond is an attorney hydrologist with Volcano Lake Consulting based in Portland, Oregon. J.D. 1993, University of Arizona College of Law; B.S. Hydrology 1990, University of Arizona. This article is the result of a contract with Northwest Water Law and Policy Project at the Northwestern School of Law of Lewis & Clark College, in Portland, Oregon. The Project is a non-profit think tank that explores water issues in the Pacific Northwest.

[1] For the purposes of this article, "Pacific Northwest" includes Idaho, Oregon, and Washington. Montana and Nevada are not included because migrating fish no longer originate in or return to those states' waters.

mous fish[2] struggling to rebound from the brink of extinction, the importance of screening has greatly increased.

This article deals only with those parts of the Columbia River system that support runs of anadromous fish. State screening statutes apply to all fish, however, and there are considerable opportunities to help resident fish[3] by screening diversions outside the Columbia River Basin.

"Screens" and "screening" are general terms for fish restrictions on diversion works. These may be physical barriers, behavioral barriers, or management strategies. The main emphasis of this article is on physical barriers.[4] Other strategies that rely on fish behavior, diversion management, or a combination of these may be equally effective and less costly than physical screens. A complete screening solution will likely require a combination of physical barriers, an understanding of fish behavior and instincts, and human intervention in flow regimes. Although surface water diversions can entrain adults, the problem is far more severe for young fish, which are the focus of this article.

No single beneficial use for water is clearly more destructive for juvenile fish[5] than another. Irrigation, stock watering, domestic and municipal water supply, power generation, mining, and fish hatcheries have essentially the same potential for damage; each one presents a different challenge for screening. Although the basic design and technology of screening is standardized, each diversion site is unique.

This article provides a background of fish screening statutes, policies, and enforcement efforts. It also identifies opportunities for improving compliance and fish survival. Part II discusses the potential of diversions to damage juvenile fish, types of screens, and estimated costs of screening. Part III surveys state, tribal, and federal law, agency regulations and other rules to reveal the framework of legal authority for screening. Part IV evaluates the compliance record and enforcement efforts of Idaho, Oregon, Washington, and the federal government. Part V draws some conclusions and offers suggestions for improvement.

## II. SCREENING: WHY, HOW, AND HOW MUCH?

### *A. Why Screen?*

Off-stream diversions of surface water direct fish to places where they have little chance for survival. Power generating turbines, agricultural fields, and water treatment plants are the major causes of decline in

---

[2] Anadromous fish are fish that hatch in freshwater, migrate to the ocean, mature there, and return to freshwater to spawn. Salmon and steelhead are examples of anadromous fish. NORTHWEST POWER PLANNING COUNCIL, 1994 COLUMBIA RIVER BASIN FISH AND WILDLIFE PROGRAM at G-1 (Dec. 15, 1994) [hereinafter NPPC PROGRAM].

[3] Resident fish spend their entire life cycle in freshwater. For Program purposes, resident fish includes landlocked anadromous fish, as well as traditionally defined resident fish species. *Id.* at G-11.

[4] Dams, fish ladders, and large hydropower screens are not treated in this article.

[5] Juvenile fish are those from one year of age until sexual maturity. NPPC PROGRAM, *supra* note 2, at G-7.

some fish populations.[6] Power turbines immediately kill forty percent of fish and injure or disorient the remainder so thoroughly that the fish are easy prey.[7] Unscreened municipal and agricultural pumped diversions kill one hundred percent of the fish that pass through the diversions.[8] Young anadromous fish are naturally inclined to follow the flow of the stream and cannot decide which exit ramp from the hydrologic highway is likely to lead to food and shelter. Physical barriers are considered a proven and highly effective method of redirecting juvenile salmonids.[9] Behavioral barriers—sound, electricity, or other strategies that take advantage of fish behavior patterns—are in development and remain largely unproven for anadromous fish.[10]

Recent inventories of anadromous fish in the Columbia Basin indicate an adult return rate of 0.02 to 0.5 percent.[11] For two-days in 1992, a single pump station on the Umatilla River destroyed an estimated forty-four thousand smolts.[12] This loss represented a potential adult population of 220 fall chinook: an amount equal to all the returning fall chinook in the Umatilla for 1991 and nearly half the returning adults in 1992.[13] In May 1994, a private hydroelectric plant on the Umatilla destroyed two thousand smolts.[14] For a recovering fishery, any avoidable loss is too much.

Unscreened diversions destroy fish and frustrate the best efforts of fishery managers and hatcheries.[15] No hard data exists on the number of fish killed by diversions every year, but the Office of Technology Assessment reports that properly screened diversions exclude more than ninety-eight percent of the fish.[16] The estimated cost of anadromous fish recovery in the Columbia Basin was between $350 million and $450 million in

---

6 Milo C. Bell, *Revised Compendium on the Success of Passage of Small Fish Through Turbines, Report for U.S. Army Corps of Engineers* (1991), cited in NATIONAL MARINE FISHERIES SERVICE, NORTHWEST REGION, EXPERIMENTAL FISH GUIDANCE DEVICES POSITION STATEMENT 1 (1995).

7 *Id.*

8 National Marine Fisheries Service, Northwest Region, Experimental Fish Guidance Devices Position Statement 1 (1995) [hereinafter FISH GUIDANCE DEVICES].

9 OFFICE OF TECHNOLOGY ASSESSMENT, INFORMAL PAPER ON FISH BARRIER TECHNOLOGY, at apps. A-15, E-1 (Apr. 13, 1994) (unpublished manuscript, on file with the Northwest Water Law and Policy Project) [hereinafter OTA INFORMAL PAPER].

10 *Id.*

11 This is an average range for returning fall chinook. Interview with Mike Hayes, Fisheries Biologist, Oregon Department of Fish and Wildlife (May 3, 1995).

12 *Oregon Sues Irrigation District Over Fish Kill*, NORTHWEST ENERGY NEWS, May/June 1994, at 29.

13 Telephone Interview with Mike Hayes, *supra* note 11 (citing figures from the Oregon Department of Fish and Wildlife status report of 1991-1992).

14 *Police Cite Hermiston Man over Smolt Kill in Umatilla*, THE OREGONIAN, May 15, 1994, at B5.

15 "Poorly maintained or inadequate screening could have serious impact on small or larval stage fishes." GEORGE A. SWAN ET AL., U.S. DEP'T OF COMMERCE, SURVEY OF FISH PROTECTIVE FACILITIES AT WATER WITHDRAWALS ON THE SNAKE AND COLUMBIA RIVERS (1980) (prepared for Bonneville Power Administration by authors from NMFS).

16 FISH GUIDANCE DEVICES, *supra* note 8, at 2.

1995.[17] Comparatively, $7.5 million dollars for screening[18] seems to be a relatively small, but cost-effective measure.

### B. How Screens Work

Surface water can be diverted by means of gravity or pumping.[19] Gravity diversions are dependant on a change in elevation to propel water.[20] This change in elevation, or head, represents a significant amount of low-cost, renewable energy, available by carefully selecting the site of a project.[21] Dams are the most familiar gravity diversions. As a general rule, gravity diversions tend to have large cross sections and low velocities. A headgate on a canal is one example of a gravity diversion.

Pumped diversions require an external power source to lift water from a lake or stream. Generating this change in elevation, or negative head, was not practical until the advent of modern pumps and rural electrification in the 1930's. Today, 1000-horsepower pumps capable of moving enough water to irrigate hundreds of acres are commonplace. Pumped diversions have submerged intakes with small cross sections and high velocities. Diverters relying on pumps usually employ some type of screen on their intakes to protect expensive equipment.

Openings in a screen must be of the correct size and shape to exclude fish. Entrainment results when an opening is so large that it traps or swallows fish.[22] Intake velocities must also be slow enough to allow young fish to escape. High intake velocities can pin fish to an intake screen like a piece of paper on a vacuum cleaner nozzle, a phenomenon called impingement.[23] Even low velocity diversions can confuse and eventually exhaust young fish, making them easy prey, a condition called delay-predation.[24] Separately or combined, these phenomena kill juvenile fish.[25]

Properly designed and installed screens on gravity diversions are extremely effective.[26] However, small mesh screens are not enough; intake velocities must also be reduced. One way to reduce intake velocities with-

---

17 The costs of recovery as a whole are difficult to estimate because they depend on valuing foregone power revenues. Some well-reasoned estimates for annual salmon efforts range from $135 million to $150 million. Telephone Interview with Clayton Hawkes, Chair, Fish Screening Oversight Committee (Apr. 28, 1995).

18 This is the approximate budget for fiscal year 1995. *Id.* The Mitchell Act will provide approximately $4.5 million dollars for fiscal year 1996. 16 U.S.C. §§ 756-757 (1994). At this point, it is not clear whether the money will be administered by the National Marine Fisheries Service or the Bonneville Power Administration (BPA). BPA and the states will make up the balance of the screening budget for fiscal year 1996—approximately $3 million. Telephone Interview with Robert Austin, Fishery Biologist, Bonneville Power Administration (May 10, 1995).

19 DAVID H. GETCHES, WATER LAW IN A NUTSHELL (1990).

20 *See generally* JOHN A. ROBERSON & CLAYTON T. CROWE, ENGINEERING FLUID MECHANICS (3d ed. 1985).

21 *Id.*

22 FISH GUIDANCE DEVICES, *supra* note 8, at 2..

23 *Id.* at 1.

24 *Id.* at 2.

25 *Id.* at 1.

26 *Id.* at 1; OTA INFORMAL PAPER, *supra* note 9, at app. E-1.

out reducing water deliveries is to increase the cross-section of the intake. In the case of a pump, the intake pipe could be larger or the pipe could feed from a plenum with a large screened area. Similarly, gravity diversions can increase the cross section of the intakes or use larger screens to increase surface area. The National Marine Fisheries Service (NMFS) has released criteria for testing experimental screens.[27]

Behavioral barriers take advantage of fish instincts, physiology, or behavior to elicit a response—a "volitional taxis"—which either attracts or repels the fish.[28] Diverters have tried sound, walls of bubbles, chains hung across intakes, electric currents, light, and combinations of these methods.[29] None of these tactics have proven to be consistently reliable in excluding fish, and some actually aggravate entrainment and delay-predation.[30] Behavioral strategies usually fail because of uneven fish response, limited swimming ability, or because fish become accustomed to the stimulus. Recent developments in both ultra low frequency sound[31] and graduated electric fields[32] show promise, but are not yet in common use.

Another essential element of an effective screen is a bypass to return young fish to safer waters. "The screen and bypass shall work in tandem to move out-migrating salmonids (including adults) to the bypass outfall with a minimum of injury or delay."[33] Potentially, screens can concentrate disoriented and injured small fish at the bypass outlet and increase predation.[34] NMFS Juvenile Fish Screening Criteria thoroughly detail bypass construction and features to address potential predation, injury and delay problems.[35]

Diversion management is an important element in fish screening efforts. In many cases, operators can alter the rate and timing of diversions to reduce impacts on juvenile fish without expense or reduced efficiency.[36] Switching to ground water where wells are available, even for

---

27 FISH GUIDANCE DEVICES, *supra* note 8, at 5.

28 *Id.* at 3.

29 Telephone Interview with Steve Rainey, Fishery Biologist, National Marine Fisheries Service (Apr. 26, 1995).

30 *Id.*

31 Norwegian fishery biologists claim high success rates with ultra-low frequency sound (< 10 Hz) when tested on Atlantic salmon in a small scale field test to evaluate initial laboratory results. OTA INFORMAL PAPER, *supra* note 9, at app. A-11.

32 Telephone Interview with David Nichols, Oregon Fish Screening and Oversight Committee Coordinator, Oregon Department of Natural Resources (Apr. 26, 1995).

33 NATIONAL MARINE FISHERIES SERVICE, U.S. DEP'T OF COMMERCE, JUVENILE FISH SCREEN CRITERIA 6 (Feb. 16, 1995) [NMFS JUVENILE FISH SCREEN CRITERIA].

34 OTA INFORMAL PAPER, *supra* note 9, at app. E-2 (citing D.A. Neitzel et al., *A Fisheries Evaluation of the Wapato, Sunnyside, and Toppenish Creek Canal Fish Screening Facilities* (1990) (prepared by the Pacific Northwest Laboratory, Richland Washington for the Bonneville Power Administration, Portland, Oregon)).

35 FISH GUIDANCE DEVICES, *supra* note 8, at 5.

36 For example, a pumper might stretch their diversion out over a longer time to reduce the rate of flow, thereby reducing the possibility of impingement and delay-predation. In other situations, water users may be able to postpone diverting for critical days or hours while vulnerable fish are present.

short but critical periods, can reduce impacts on fish. More ambitious projects that reduce demand, such as off-stream storage and water use efficiency improvements, require capital investment. However, once diverters calculate the true cost of an interruption of their supply and possible state sanction for non-compliance, inexpensive instream pumps or fast and dirty bulldozed berms lose their economic luster. Though the tools for better management are initially expensive, they can increase long term productivity and increase property values. Properly screened diversions could approach the cost of a ground water well, a storage pond, or a program of medium scale efficiency improvements.[37]

In the Lemhi River, the Bureau of Reclamation (Bureau), in partnership with the Nature Conservancy, demonstrated how diversion management and water conservation can effectively address screening problems.[38] A landowner faced with a $625,000 screening mandate turned to the Nature Conservancy for assistance.[39] Through the purchase of neighboring land, the landowner consolidated two points of diversion into one.[40] The Nature Conservancy then received conservation easements on the purchased land.[41] The Bureau was able to finance these activities as a model conservation project and installed irrigation improvements to increase water use efficiency.[42] The measures saved screening costs, protected juvenile salmon, and kept water instream for fish. Relocating or redesigning diversions is expensive, but it may be a viable option if consolidation is possible and other benefits flow from the change.[43] Such an integrated strategy could be particularly attractive in Oregon and Montana where appropriators can reap benefits from conserved water.[44]

### *C. Cost*

Screening is expensive. Pump screens, including the cost of installation, average fifteen hundred dollars for every cubic foot per second (cfs).[45] Screens for pump intakes are available as "off-the-shelf" items, but usually require modification or fitting in order to function properly.[46] Op-

---

37 *See* discussion *infra* part II.C.

38 Telephone Interview with Cindy Lunte, Nature Conservancy Land Steward for Idaho (May 4, 1995).

39 *Id.*

40 *Id.*

41 *Id.*

42 *Id.*

43 *Id.*

44 Oregon allows individuals to capture up to 75% of the water from conservation efforts and apply it to new uses with the original priority date. OR. REV. STAT. § 537.470(3) (1995). Montana allows appropriators to retain salvaged water for use on site and limits transfer to instream use to the state instream flow program. MONT. CODE ANN. § 85-2-419 (1995). Conservation projects are a main source of water for Washington's trust water rights program. WASH. REV. CODE ANN. § 90.42.030 (West Supp. 1996). Conserved or salvaged water in Idaho returns to the public domain and becomes appropriable. IDAHO CODE § 42-104 (1990).

45 Telephone Interview with John Johnson, Engineer, Oregon Department of Fish and Wildlife (May 12, 1995).

46 *Id.*

erators routinely install screens on pump intakes for protection of expensive equipment. However, not all pump screens meet the NMFS criteria.

In the Pacific Northwest, an average price for gravity screens is difficult to find because each site has very different requirements. Land acquisition, soil type, stage fluctuation, access, power sources, and a host of other factors influence price.[47] Foundation and site improvements necessary for installation may account for eighty percent of the screening cost.[48] Previous state programs that did not conform to NMFS criteria were able to fit flat plate screens to those diversions of less than four cfs for approximately one thousand dollars.[49] Screen constructors familiar with NMFS-compliant gravity diversions estimate an average cost of forty-five hundred dollars per cfs, which does not include site acquisition, surveying, and design costs.[50] The average cost of an installation in Oregon is ten thousand dollars.[51] As a general rule, the cost per cfs decreases as diversion size increases.[52]

Improvements in screen technology will lower prices.[53] "Portable" or modular gravity screens, analogous to the off-the-shelf screens for pumps, are now in production in Oregon and Washington.[54] These prefabricated flumes with rotating drums are more easily installed in small diversions, require no concrete forming, and bolt together in the field.[55] Portables will most likely lower costs to near or below twenty-four hundred dollars per cfs.[56] Promising designs for small diversions have been built for less than three hundred dollars per cfs.[57] Other improvements, such as solar

---

47 NMFS JUVENILE FISH SCREEN CRITERIA, *supra* note 33, at 1-3; OTA INFORMAL PAPER, *supra* note 9, at app. E-3.

48 OTA INFORMAL PAPER, *supra* note 9, at app. A-16. Pacific Northwest projects allocate a smaller percentage of the total cost to site improvement, probably because the screen systems are more complex than those in non-ESA watersheds. Construction is still a large percentage of the total. Telephone Interview with Charles Keller, Fishery Program Supervisor, Bureau of Reclamation (May 2, 1995).

49 Simple, low-cost flat plate screens are still being installed in "non-ESA" watersheds in Oregon and are the predominant type in Idaho's Salmon Basin and throughout California. Telephone Interview with David Nichols, *supra* note 32; *see also* OTA INFORMAL PAPER, *supra* note 9, at app. A-16.

50 Telephone Interview with Charles Keller, *supra* note 48; *see* John Easterbrooks, COST PER CFS FOR ROTATING DRUM FISH SCREENS (Apr. 17, 1995) (on file with the Northwest Water Law and Policy Project).

51 David Nichols, Protecting Fish at Water Diversions, Address at the Oregon Water Law Conference (Nov. 3-4, 1994).

52 At an undetermined point between 30 and 80 cfs, the average price drops to approximately $3000. Easterbrooks, *supra* note 50. Diversions greater than 210 cfs show further reduction to approximately $1700 per cfs. *Id.* Price per cfs appears to go up with diversion size in flat plate, non-NMFS compliant screens. OTA INFORMAL PAPER, *supra* note 9, at app. A-16.

53 Telephone Interview with Charles Keller, *supra* note 48.

54 *Id.*

55 *Id.*

56 *Id.*

57 Telephone Interview with Ladd Henderson, Manager, Santiam Water Control District (May 15, 1995).

power for drum rotation, automated drum operation, and use of plastic screens, can lower costs and make installation easier.

Behavioral fish screening systems, referred to as behavioral guidance technologies, are touted as much lower in price than physical barrier screens. One manufacturer of acoustic barriers claims that they cost ten to twenty times less than screens.[58] Considering the size of the screening task and the limited resources to perform it, the money-saving potential of behavioral screens will drive further research and development. However, not enough of the behavioral screens have been installed and evaluated in order to predict prices for installation, maintenance and operation. The costs of companion physical screens and management strategies to improve behavioral screen performance are also unknown.

Maintenance is critical for a successful screen campaign. During the thirty-five years that the Mitchell Act[59] has funded screening activities in Idaho, the Idaho Department of Fish and Game (IDFG) has hired summer screen tenders.[60] This year, ten screen tenders were paid close to minimum wage to clean upstream "trash racks"[61] and maintain diversions in good working order during the irrigation season.[62] In Washington, the operator is responsible for maintenance.[63] In Oregon, the state Department of Fish and Wildlife (ODFW) has assumed the responsibility for cleaning and maintenance under a temporary statute.[64]

The maintenance costs for screens vary greatly depending on size, flood conditions, turbidity, location, and the quality of the original installation. Operation and maintenance costs "tend to be high for the first year, then drop off to a lower level and average out for a few years until the costs increase after five to seven years to as high or higher than average when replacement of major parts becomes necessary."[65] In the Yakima River Basin, annual operation and maintenance costs for Phase I screen facilities have averaged thirty-two hundred dollars.[66] Low flows, clean water, and medium sized screens combine to deliver annual operation and management costs of one thousand dollars at Town, Washington.[67] Annual maintenance costs in Oregon range from five to ten percent of the

---

58 OTA INFORMAL PAPER, *supra* note 9, at app. A-17 (citing Interview with P. Novakovic, Energy Engineering Services Company (Mar. 1994)).

59 16 U.S.C. §§ 755-757 (1994); *see* discussion *infra* text accompanying notes.

60 Telephone Interview with Charles Keller, *supra* note 48.

61 Trash racks function to keep debris and fish out of turbine intakes at hydropower projects.

62 Telephone Interview with Charles Keller, *supra* note 48.

63 Telephone Interview with John Easterbrooks, Washington Fish Screening Oversight Committee Coordinator, Washington Department of Fish and Wildlife (May 1, 1995).

64 1991 Or. Laws 858, § 2(4).

65 OTA Informal Paper, *supra* note 9, at app. A-17 (quoting Memorandum from Kirk Robinson to the Attendees at the Yakima Office of Bonneville Power Association (Oct. 12, 1993)).

66 OTA INFORMAL PAPER, *supra* note 9, at app. E-3 (citing Letter from John Dyson, U.S. Bureau of Reclamation to the Office of Technology Assessment (Mar. 28, 1993)).

67 *Id.*

initial project cost.[68] Idaho's screen tender program in the Salmon River basin has an estimated annual labor cost of forty-six thousand dollars.[69] There is a need for screens that are mechanically simple and easy for small diverters to maintain. Maintenance forestalls, but does not preclude, replacement.[70]

With the market price of agricultural water rights ranging from ten thousand dollars to more than twenty-five thousand dollars per cfs,[71] screening is a worthwhile investment to protect an important right. If the alternative to screening is interruption of the water right, either by state law or the Endangered Species Act of 1973[72] (ESA), forty-five hundred dollars per cfs begins to look reasonable to insure one's water right. Fortunately for diverters, the federal government and, to a lesser extent, the states are providing funds for screening.

## III. LAWS, RULES AND STANDARDS

State and federal fish managers in the Pacific Northwest recognized the fragility of the seemingly inexhaustible Columbia River salmon runs.[73] Harvest of wild chinook salmon peaked in 1883 at forty-three million pounds,[74] and the total harvest of wild salmon peaked at fifty million pounds in 1911.[75] As the fishery declined, competition for the resource increased and states began to impose stricter fishing laws for the Columbia River.[76] The 1918 Oregon-Washington Compact allocated the shrinking salmon resource, but only between the two states.[77] The first

---

[68] Telephone Interview with David Nichols, *supra* note 32.

[69] Telephone Interview with Charles Keller, *supra* note 48.

[70] Changing standards for screens may render some installations obsolete. Although some screens have very long lives, one significant flood event can destroy even the best designed installation.

[71] This estimate is based on water right purchases for agricultural and commercial uses in central Idaho during 1995. Prices vary widely with location, quality, and demand. *Transaction Update*, WATER STRATEGIST, Jan. 1995, at 15.

[72] 16 U.S.C. §§ 1531-1543 (1994). *See infra* text accompanying notes 95-101 for a brief discussion of ESA authority to foreclose diversions where they affect endangered or threatened species.

[73] "Effective protection to the salmon on their spawning grounds can be established only by concurrent action on the part of Washington, Oregon and Idaho." McDonald, *The Salmon Fisheries of the Columbia River Basin*, 14 U.S. FISH COMM'N. BULL. 152, 167 (1895), *cited in* Dale D. Goble, *Introduction to the Symposium on Legal Structures for Managing the Pacific Northwest Salmon and Steelhead: The Biological and Historical Context*, 22 IDAHO L. REV. 417 (1986).

[74] Goble, *supra* note 73, at 448.

[75] *Id.*

[76] *Id.* at 446-453.

[77] Priv. L. No. 65-123, 40 Stat. 515 (1918); *see also* OR. REV. STAT. § 507.010 (1995); WASH. REV. CODE § 75.40.010 (1994); Goble, *supra* note 73, at 450 n.133.

screening statute appeared in Oregon in 1898.[78] Washington and Idaho followed in 1905[79] and 1919,[80] respectively.

There was growing concern in the 1930's over federal dams on the mainstem of the Columbia that threatened to interfere with fish passage and further depress the salmon fishery. State legislatures addressed dams and fish passage as early as the 1890's.[81] By the 1940's, states updated these laws and enacted more explicit fish passage and screening statutes. In 1938, Congress passed the Mitchell Act, a generally-worded statute that committed the federal government to fund salmon rearing and research efforts in the Columbia basin to compensate for the runs lost because of hydropower development.[82] Over the last fifty years, state and federal agencies installed hundreds of screens on irrigation diversions in the Columbia basin.[83] State and federal law set the framework for current screening efforts.

### *A. State Law and Measures*

Oregon law requires that screens installed at the operator's expense[84] for all diversions in waters that contain game fish.[85] However, significant non-compliance problems prompted the legislature to try positive incentives to improve compliance. In 1987, Oregon revised its tax code to allow those who screened to deduct fifty percent of their net costs.[86]

In 1995, to further improve screening compliance, the Oregon state legislature offered further incentives and eased the requirements for those diverting less than thirty cfs.[87] The new statute limits financial liability to the lesser of five thousand dollars or one third of the screening costs.[88]

---

[78] 1898 Or. Laws, § 36. Any person who operated a ditch, canal, or millrace had to construct a screen of sufficient fineness, strength, and quality to exclude any fish when required to do so by the Fish Commissioner. *Id.* Destruction of fish was probably actionable before the statute appeared. Theoretically, riparians could have brought a suit alleging negligent operation of a canal to the detriment of their fishing right. No cases are reported. *See, e.g.*, 1902 Or. Laws 1, § 5008.

[79] 1905 Wash. Laws p. 143, ch. 78. Any flume or ditch near a hatchery or "mountain trout" (steelhead) habitat must have a state-approved screening device. The statute required a 0.25 in. (6.4 mm) mesh size for screens. *Id.*

[80] 1919 Idaho Sess. Laws p. 233, § 39. Screening is intimated by 1909 Idaho Sess. Laws p. 86, § 4, which prohibits wanton or wasteful destruction of fish.

[81] *See, e.g.*, 1872 Or. Laws p. 27, § 9; 1881 Wash. Laws § 1173; 1893 Idaho Sess. Laws p.160, § 18.

[82] 16 U.S.C. §§ 755-757 (1994).

[83] NPPC Program, *supra* note 2, § 7.10A, at 7-53.

[84] *Id.* If the owner will not screen, the Oregon Department of Fish and Wildlife can install a screen and sue for compensation. OR. REV. STAT. § 498.311(2) (1995).

[85] OR. REV. STAT. § 498.311(1) (1995).

[86] OR. REV. STAT. § 315.138(2) (1995).

[87] OR. REV. STAT. § 498.311 (1995) states: "Any person who diverts water . . . *shall* install, operate and maintain, at the expense of the person, all fish screening or by-pass devices that the State Department of Fish and Wildlife determines necessary . . ." (emphasis added). 1991 OR. LAWS 858, § 2, retains the agency discretion, but offers cost sharing, a limit of one installation a year per owner, design support, and waivers for technical infeasibility and financial hardship.

[88] 1991 Or. Laws 858, § 2(3).

The statute also provides that Oregon shall assume maintenance, cleaning, and repair costs.[89] The legislature set up a "Fish Screening Subaccount" of the State Wildlife Fund to finance this effort.[90] Under this statute, Oregon upgraded their compliance effort by creating a priority list of harmful diversions and established a cost-sharing program.[91]

The Oregon Water Resources Department (OWRD) requires compliance with applicable law as a condition for an application to appropriate water. OWRD will not issue a certificate of water right, the step that actually vests the water right, if a user has not complied with the screening statute.[92] The penalty for failing to screen is not laid out; however, the state has the power to ask for an injunction[93] and prosecute for illegally taking game fish.[94] Tampering with or removing a screen is prohibited,[95] and violators could be prosecuted for first degree criminal mischief.[96] The interim screening statute allows a diverter to remove an obstructed screen with seven days written notice to the department or immediately, if there is an emergency situation threatening crops or livestock.[97]

Washington law requires screening for surface water diversions in game fish waters at the owner's expense.[98] Diverters must submit plans for fish protection to the state before commencing diversion.[99] Washington's Department of Ecology (DOE) and Department of Fish and Wildlife (WDFW) work cooperatively to ensure that new diversions comply with the screening statute and other applicable laws.[100] Those who lawfully diverted surface water before 1955 are exempt from the screening statute and can only be encouraged to comply voluntarily.[101] Washington has not

---

89 *Id.* § 2(5).

90 OR. REV. STAT. § 496.300 (1995).

91 *Id.*

92 Mike Frazier, Fish Screen Programs in Oregon: The State Department of Fish and Wildlife and the Northwest Power Planning Council 11-12 (Mar. 19, 1992) (unpublished manuscript, on file with the Northwest Water Law and Policy Project). Not every project must have a screen. ODFW and ODWR communicate about conditions and limitations on diversion projects in fish-bearing waters. Telephone Interview with David Nichols, *supra* note 32.

93 OR. REV. STAT. § 498.346 (1995).

94 Each salmon or steelhead illegally taken carries a fine of $125. OR. REV. STAT. § 496.705(2)(h) (1993). If the fish are endangered species under state or federal law, the penalty rises to $500 per fish. OR. REV. STAT. § 496.705(2)(k) (1993).

95 OR. REV. STAT. § 498.311(5) (1995).

96 *Id.* § 164.365. The offense would likely surpass the $500 dollar damage limit required by OR. REV. STAT. § 164.365 because screens cost far more than this and the taking of one endangered fish is a $500 dollar fine under Oregon law. OR. REV. STAT. § 496.705(2)(k).

97 1991 Or. Laws 858, § 2(5).

98 WASH. REV. CODE ANN. § 77.16.220 (West Supp. 1996); *see* also WASH. ADMIN. CODE § 220-110-190(5) (1995).

99 WASH. REV. CODE ANN. § 77.16.220 (West Supp. 1996).

100 DOE and WDFW share enforcement responsibilities with field representatives well versed in the rules and statutes of each other's departments. Telephone Interview with John Easterbrooks, *supra* note 63.

101 WASH. REV. CODE § 77.16.220 (West Supp. 1996).

issued new water right certificates for over two years, a functional moratorium caused by budget constraints at DOE.[102]

Beginning in 1987, the WDFW inventoried all pump stations on subbasins tributary to the Snake and Columbia rivers.[103] The next year, the state legislature funded a capital improvement program that gave small diverters their first screen for no charge on these tributaries.[104] Washington also builds and installs screens for gravity diversions on these tributaries; diverters typically share ten to fifteen percent of the cost.[105] Diverters must pay for the operation and maintenance of these installations.[106]

The Director of WDFW may close, and keep closed, any non-exempt diversion that is not in compliance until it is properly equipped.[107] Any violation of sections 77.16.210 and 77.16.220 of Washington law is a misdemeanor offense, punishable by a minimum fine of $250 or imprisonment in county jail for no less than 30 days.[108] Each fish killed constitutes a separate offense.[109]

Idaho statutes also require screening for all diversions.[110] Operators must install and maintain state-approved screens at their own expense.[111] However, for the last thirty-five years, Idaho Department of Fish and Game (IDFG) has used federal funds to assume responsibility for screening the most damaging diversions.[112] Neither the state nor the diverters have contributed significantly to screening.[113] IDFG may install and maintain screens on gravity diversions of less than 125 cfs, provided that there is no interference with the flow in the diversion.[114] An Idaho statute also gives IDFG the authority to enter private land to install screens.[115]

IDFG and the Idaho Department of Water Resources (IDWR) do not have an interdepartmental arrangement that insures screening on every diversion. Apparently, IDWR only asserts jurisdiction over Idaho Code section 42, while IDFG only considers the provisions of section 36.[116] However, IDWR occasionally conditions water rights on screening and

---

102 Telephone Interview with Cynthia Nelson, Washington Department of Ecology (May 1, 1995).

103 Telephone Interview with John Easterbrooks, *supra* note 63.

104 *Id.*

105 *Id.*

106 *Id.*; WASH. REV. CODE ANN. § 77.16.210 (West Supp. 1996).

107 WASH. REV. CODE ANN. § 77.16.220 (West Supp. 1996).

108 *Id* § 77.21.010.

109 *Id.*

110 IDAHO CODE § 36-906(b) (1994).

111 *Id.*

112 Idaho's fish screening program began in 1958. It is funded under the Mitchell Act. 16 U.S.C. §§ 775-757 (1994); *see generally* DAN SCHILL, NATIONAL MARINE FISHERIES SERVICE, EVALUATING THE ANADROMOUS FISH SCREEN PROGRAM ON THE UPPER SALMON RIVER (1982).

113 Telephone Interview with Charles Keller, *supra* note 48.

114 IDAHO CODE § 36-908 (1994).

115 *Id.*

116 Telephone Interview with Shelley Keen, Water Resources Supervisor, Idaho Department of Water Resources (May 4, 1995).

other considerations.[117] Non-compliance with the screening statute or the destruction or bypass of a screen constitutes a misdemeanor offense for each day the violation continues.[118] However, Idaho has never used the screening statute in an enforcement action.[119] Under the statute the penalty would be between twenty-five to one thousand dollars per day, and one hundred dollars per chinook.[120]

### *B. Federal Law and Measures*

Federal statutes indirectly address diversion screening. The Endangered Species Act[121] gives the listing agency broad authority over any activity that would constitute the "taking" of an endangered or threatened species.[122] Killing fish with improperly screened diversions clearly fits within the ESA's definition of "take." NMFS, the listing agency, can compel diverters to comply with screening regulations or stop pumping to avoid "taking" juvenile salmon.[123]

Glenn-Colusa Irrigation District (GCID) challenged the power of the ESA to curtail state water rights on the Sacramento River in California.[124] GCID had valid state water rights to 720,000 acre-feet of water from the river.[125] GCID's pumps withdrew from 300-2900 cfs during the peak irrigation season, with an average rate of 2,000 cfs.[126] Although the intakes were screened, an estimated 400,000 to 10,000,000 protected winter run chinook fingerlings died every year.[127] The court found that the ESA could be enforced prior to the development of a recovery plan and without the need for an environmental impact statement.[128] GCID's underlying state water right offered no protection against the ESA.[129]

California sued Glenn-Colusa in 1929 for killing or damaging sixty-seven percent of the forty-five hundred food and game fish caught in nets by a series of seining operations in the Sacramento during their irrigation season.[130] In a decision based strongly on public trust principles, the court reasoned that a water right does not give a diverter the right to in-

---

117 *Id.*

118 IDAHO CODE § 36-909 (1994).

119 Memorandum from Jude Pate for Columbia River Inter-Tribal Fish Commission 11 (Mar. 31, 1992) (on file with the Northwest Water Law and Policy Project).

120 IDAHO CODE § 36-1402 (Michie 1994 & Supp. 1995).

121 16 U.S.C. §§ 1531-1544 (1994).

122 Threatened species are protected unless specifically excluded by federal regulations. *Id.* § 1533(d).

123 The ESA gives NMFS power to compel screening and set standards for screens. *Id.* The ESA also gives NMFS injunction and enforcement powers. *Id.* § 1540; *see generally* Endangered Species Act § 9, 16 U.S.C. § 1538 (1994) (prohibiting certain acts by all persons within the jurisdiction of the United States).

124 United States v Glenn-Colusa Irrigation Dist., 788 F. Supp. 1126 (E.D. Cal. 1992).

125 *Id.* at 1129.

126 *Id.* at 1129.

127 *Id.* at 1130.

128 *Id.* at 1134-35.

129 *Id.*

130 People v. Glenn-Colusa Irrigation Dist., 15 P.2d 549, 551 (1932).

jure public resources.[131] The court found the absence of a screen a public nuisance under both state statutes and common law principles.[132] This case foreshadowed the California Supreme Court's now-famous decision in the Mono Lake case.[133] Both the 1929 Glenn-Colusa and Mono Lake case point to the potential of alternative legal theories to enjoin diversions which damage public resources.

The U.S. Forest Service, Bureau of Land Management, and Bureau of Reclamation must include screening provisions on any permit issued to diverters.[134] Under section 10 of the River and Harbors Act of 1899, the U.S. Army Corps of Engineers (Corps) issues permits for activities that require structures on navigable waters of the United States.[135] Section 404 of the Clean Water Act[136] also applies when there is filling or dredging of a navigable waterway. Strict interpretation of section 10 would require every pump station or gravity diversion on the Columbia and Snake Rivers to have Corps approval. Until the mid-1980's, many Columbia basin diverters did not obtain Corps permits, and the Corps was primarily concerned with water diversions as physical impairments to navigability. More recently, Corps permit criteria include fish protection as well as state design and operation standards. These standards include screening diversions for protection of fish. The Corps may exercise broad powers to shut down or remove dams and equipment for failure to comply with permit provisions.[137] In Washington, where the Corps stipulated that diversions must conform to all state laws, permits have become a powerful tool to ensure compliance with state screening statutes.[138]

The Mitchell Act of 1938[139] authorizes the federal government to pay for salmon hatcheries and other measures necessary to protect fish from the effects of the development and operation of federal dams in the Columbia Basin. Administered by NMFS, Mitchell Act money has been an essential ingredient of screening efforts in the Pacific Northwest.

Funding for screening also comes from Bonneville Power Administration (BPA). The Northwest Power Act of 1982[140] (NWPA) established the Northwest Power Planning Council (NPPC). The purpose of the NPPC was to take necessary measures to equally balance the needs of the fish

---

131 *Id.* at 552-53.

132 *Id.* at 551.

133 National Audubon Soc'y v. Superior Court of Alpine County, 33 Cal.3d 419 (1983) (explaining that public trust imposes a duty of continuing supervision over the use of appropriated water, and the state is not confined by past allegation decisions incorrect in light of current knowledge or current needs).

134 NPPC PROGRAM, *supra* note 2, §7.10A.5, at 7-55.

135 33 U.S.C. § 401 (1994); *see generally*, 33 C.F.R. § 320 (1994) (outlining Corps' general regulatory authority and procedures).

136 33 U.S.C. § 1344 (1994).

137 33 U.S.C. § 401(b).

138 Telephone Interview with John Easterbrooks, *supra* note 63.

139 16 U.S.C. §§ 756-757 (1994).

140 Pacific Northwest Electric Power Planning and Conservation Act, 16 U.S.C. § 839 (1994).

with power production.[141] To this end, the NPPC developed the Columbia River Fish and Wildlife Program (NPPC Program). The NPPC Program and later NMFS biological opinions identify BPA as the appropriate funding source for screening.[142] Screening measures were first introduced as an amendment to the NPPC Program in 1991.[143]

In 1992, the NPPC created a Fish Screening Oversight Committee (FSOC) to coordinate remedial screening efforts, which were disorganized and inconsistent prior to the Salmon Summit of 1992.[144] The FSOC consists of representatives from the three states, in addition to representatives from the BPA, the NMFS, and several tribes. This committee sets screening priorities, allocates funds to those priorities, and shares technical information. FSOC's emphasis has been on the Snake River Basin, with particular attention to the Grand Ronde and Salmon rivers.[145] The NWPA explicitly states that it will not interfere with state water rights, which would indicate that the FSOC has little enforcement power.[146] In practice, enforcement is the province of local law enforcement agencies, who have coordinated their efforts under the umbrella of the Salmon Enforcement Team (SET) and the Columbia River Law Enforcement Council (CRLEC).[147] BPA funds these law enforcement groups for education, equipment needs, and enforcement campaigns.[148]

### *C. Tribal Law and Measures*

The Yakima, Shoshone-Bannock, Umatilla, and Nez Perce Tribes do not have explicit rules or laws for screening diversions.[149] The FSOC counts and evaluates tribal diversions on the mainstem Snake and Columbia rivers. Generally these tribes have tried to comply with the NMFS fish passage standards in salmon waters and are achieving good compliance.[150]

---

141 16 U.S.C. § 839(a) (1994).

142 NPPC PROGRAM, *supra* note 2, § 7.10A, at 7-53; NATIONAL MARINE FISHERIES SERVICE, U.S. DEP'T OF COMMERCE, ENDANGERED SPECIES ACT-SECTION 7 BIOLOGICAL OPINION ON THE REINITIATION OF CONSULTATION ON 1994-1998 OPERATION OF THE FEDERAL COLUMBIA RIVER POWER SYSTEM AND JUVENILE TRANSPORTATION PROGRAM IN 1995 AND FUTURE YEARS (1995) [hereinafter NMFS BIOLOGICAL OPINION]. The NWPA provides that BPA "pay all costs necessary to produce, transmit, and conserve resources to meet the region's electric power requirements." 16 U.S.C. § 839(4) (1994).

143 Memorandum from the Northwest Power Planning Council to Interested Parties 6 (Aug. 21, 1991) (on file with the Northwest Water Law and Policy Project).

144 Telephone Interview with Robert Lothrop, Attorney, Columbia River Inter-Tribal Fish Commission (May 1, 1995).

145 Telephone Interview with Clayton Hawkes, *supra* note 17.

146 16 U.S.C. § 839g(h) (1994).

147 Telephone Interview with Rusty Middleton, Salmon Enforcement Team (May 6, 1995).

148 Telephone Interview with Steven Vigg, Fishery Biologist, Bonneville Power Administration (Nov. 5, 1994); Telephone Interview with Rusty Middleton, *supra* note 147.

149 The Department of the Interior (DOI) is responsible for approving tribal water resources codes. DOI has had a moratorium on approval of these tribal codes since the mid-1970s, leaving the Tribes without functional natural resources laws.

150 Telephone Interview with Clayton Hawkes, *supra* note 17.

### D. Uniform Screening Standards

Prior to 1990, each state had different flow and construction standards for screening structures.[151] NMFS first promulgated standards for pumps and gravity diversions in 1990 and again in 1992.[152] Washington has adopted virtually identical standards as the criteria for compliance with state law.[153] Pump diversions must have a screen with a mesh of 0.0938 inch (2.38 mm) measured across the narrowest dimension.[154] Water velocity through the screen may not exceed 0.4 feet per second (.012 meter per second), and bypass flows must move fish away from the screens within sixty seconds.[155] Gravity diversions usually feature perforated rolling drums set at an angle to the flow direction and channels to return fish to the stream.[156] Each installation is unique to conform to local conditions, but must follow the NMFS guidelines.[157]

Diverters who have engineered and built screens find that the NMFS guidelines provide good general guidance.[158] However, the guidelines neither provide a blueprint nor guarantee that a screen design will automatically be satisfactory to the state and federal agencies. NMFS guidelines may require diverters to monitor the performance of screens that facially comply with the NMFS guidelines, but are new or unique designs.[159]

## IV. Compliance and Enforcement

### A. History of Compliance

Federal, tribal, and state governments have supported an intense campaign to bring water diversions on the mainstem Columbia and Snake rivers into compliance with state law and federal guidelines. A series of reports contracted by BPA and the Corps in 1980, 1981, and 1982 brought the problem of fish screening into sharper focus.[160] George Swan reported in the surveys that "[a]fter completion of our two year study it is apparent that the screening program for withdrawals as currently managed is not in the best interests of fish production or fish protection."[161]

In 1993, BPA, through the CLREC, funded a compliance survey covering pumped diversions in the preceding ten years and found compliance

---

151 Telephone Interview with John Easterbrooks, *supra* note 63.

152 *Id.*

153 *Id.*

154 NMFS Juvenile Fish Screen Criteria, *supra* note 33, at 5.

155 *Id.* at 4.

156 *Id.* at 6-9; Telephone Interview with John Easterbrooks, *supra* note 63.

157 *Id.*

158 Telephone Interview with Ladd Henderson, *supra* note 57.

159 NMFS Juvenile Fish Screen Criteria, *supra* note 33, at 1.

160 BPA contracts DE-A179-79BP10684 (1980) [hereinafter 1980 BPA contract]; DE-A179-80DP18490 (1981) [hereinafter 1981 BPA contract]; and U.S. Army Corps of Engineers contract DACW68-78-C-0051 (1982) [hereinafter Corps contract] (on file with the Northwest Water Law and Policy Project).

161 1981 BPA contract, *supra* note 160.

had not improved in those years.[162] For sites within Oregon—from Bonneville Dam to the Oregon state line on the Columbia—compliance had actually slipped from sixty-five percent to sixty percent.[163] However, in the intervening 10 years, the number of instream pumps increased from 27 to 190.[164] A subsequent underwater survey of Oregon diversions in 1994 revealed that eighty-three percent were "technically" out of compliance.[165] Problems included improper mesh size, holes in screens, no screens, and clogged or insufficient screen area.[166] However, the 1994 survey noted the overall spirit of cooperation and concern among diverters.[167]

In Washington, the situation was not much better. The initial 1993 survey estimated 519 pumps on the Columbia in Washington, up from 178 in 1980, with no higher than 65% compliance.[168] A follow-up effort found four hundred pumps on the Columbia by August 1994.[169] An inspection of eighty sites in March 1994 found a forty percent compliance rate.[170] Problems included improper mesh size, debris accumulation, poor maintenance, holes, insufficient screen area, and the absence of screens.[171] On major tributaries, Washington Department of Fish and Wildlife (WDFW) found 621 pumped diversions with a 26% compliance rate.[172] The latest count for Washington salmon waters is 145 gravity diversions at 40% compliance and approximately 800 pumped diversions between 55-60% compliance.[173]

Twenty-nine pump stations on the lower Columbia and Snake rivers received non-compliance notices in January 1994.[174] In June 1994, eight sites received notices of impending legal action and were given thirty days

---

162 Memorandum from Lt. Lawrence Kraft, Oregon State Police (OSP) to Columbia River Law Enforcement Committee 1 (July 19, 1993) (on file with the Northwest Water Law and Policy Project).

163 *Id.* at 4.

164 Memorandum from Storment Ray Assoc. to Lt. Larry Kraft of the Oregon State Police 2 (Mar. 23, 1993) [hereinafter STORMENT RAY REPORT] (on file with the Northwest Water Law and Policy Project).

165 CRIS, Inc., Final Report on the Phase II Fish Screen Inspection Program on the Columbia River 2 (May 5, 1994) (unpublished report prepared for the Oregon Dep't of State Police, on file with the Northwest Water Law and Policy Project).

166 *Id.*

167 *Id.* at 3.

168 STORMENT RAY REPORT, *supra* note 164, at 2-3.

169 STATE OF WASHINGTON DEPARTMENT OF FISH AND WILDLIFE HABITAT PROGRAM, WASHINGTON DEPARTMENT OF FISH AND WILDLIFE COLUMBIA/SNAKE SCREEN COMPLIANCE PROGRAM, PROGRESS UPDATE 1 (Aug. 15, 1994) [hereinafter SNAKE SCREEN COMPLIANCE PROGRAM].

170 WASHINGTON DEP'T OF FISH AND WILDLIFE, COLUMBIA/SNAKE SCREEN INSPECTION PROGRAM, PROGRESS UPDATE 2 (Mar. 29, 1994) [hereinafter SNAKE SCREEN INSPECTION PROGRAM].

171 *Id.*

172 WASHINGTON DEP'T OF FISH AND WILDLIFE CAPITAL PROJECT PUMP DIVERSION INVENTORY RESULTS AND SCREENS INSTALLED (OR PENDING) BY SUBBASIN, 1987-1994, tbl. 2 (1994) [hereinafter WDFW CAPITAL PROJECT INVENTORY] (on file with the Northwest Water Law and Policy Project).

173 JOHN EASTERBROOKS, WDFW FISH SCREENING FACT SHEET 1-2 (Jan. 6, 1995) (on file with the Northwest Water Law and Policy Project).

174 SNAKE SCREEN INSPECTION PROGRAM, *supra* note 170, at 3.

to fix or upgrade screens.[175] On the last day of the grace period, the last owner responded with a plan to improve the intake.[176]

Washington has decided to accept a plan for compliance in lieu of repair or upgrades at "complicated" sites.[177] WDFW accepts some technically improper diversions because they comply with former screening requirements. State statutes allow WDFW to upgrade these antiquated or deteriorated screens at state expense.[178] The screen owner is responsible only for replacement of the original design and any maintenance costs.[179]

### *B. Current Compliance Efforts*

Based on ESA criteria, screening compliance on the Columbia River in Washington and Oregon has improved since 1993. FSOC reports that Washington diverters are one hundred percent in compliance; Oregon expects to achieve one hundred percent compliance in 1996; and Idaho is approximately fifteen percent complete.[180] Oregon's and Idaho's programs to screen gravity diversions are accelerating, mainly due to an infusion of Mitchell Act and BPA funding. Idaho will address pump screening as they go through the gravity diversions.[181] New "screen shops"—state-operated, federally-funded design and construction centers—are tackling fifty projects per year, up from ten per year in 1994.

The FSOC figures are mostly borne out by the individual state's reports, but do not reflect the work yet to be done on important salmon tributaries. Washington's stated goal is "essentially 100% compliance" in the lower Columbia and Snake by Spring 1995, and the same for the upper Columbia and Okanogan by Spring 1996.[182] The Yakima and Entiat have twenty-six diversions that will be difficult to fit with screens. The Methow has six diversions remaining.[183] The state has not given attention to the Walla Walla, and it remains a low priority because only steelhead migrate there.

Initial survey results for mainstem diverters in Oregon indicate a ninety-five percent compliance rate.[184] Oregon is on pace to screen forty gravity diversions each year; one hundred need attention in the Deschutes River subbasin alone.[185] In addition, Oregon has an aging fleet of gravity screens with an average age of twenty-five years, and a large group over

---

175 SNAKE SCREEN COMPLIANCE PROGRAM, *supra* note 169, at 3.

176 *Id.*

177 *Id.* at 4. "Complicated" sites are very large or have difficult access, limiting topographic or geologic factors, or large stage changes in the source stream.

178 WASH. REV. CODE § 75.20.061 (1994).

179 WDFW's policy is to pay the difference between the diverter's statutory obligation and the cost of an effective screen. Telephone Interview with John Easterbrooks, *supra* note 63.

180 Telephone Interview with Charles Keller, *supra* note 48.

181 *Id.*

182 SNAKE SCREEN COMPLIANCE PROGRAM, *supra* note 169, at 2.

183 Telephone Interview with John Easterbrooks, *supra* note 63; *see* WDFW CAPITAL PROJECT INVENTORY, *supra* note 172, at tbl. 2.

184 Telephone Interview with David Nichols, *supra* note 32.

185 *Id.*

forty years old.[186] Amortization schedules provided to the legislature this year were based on a fifteen-year average device life.[187] While mainstem diversions may be nearing full compliance, tributaries important to salmon recovery still need work in Washington and Oregon.

Idaho has 278 gravity diversions (eighteen percent in compliance) and 234 pumps (zero compliance) on major rivers where chinook and sockeye salmon are present.[188] The number of diversions on small tributaries is unknown, but in the Salmon River basin alone there are several hundred.[189] Screening efforts are essentially starting from scratch in Idaho. Idaho's Department of Fish and Game (IDFG) struggled for many years, building and maintaining a limited number of screens for gravity diversions with Mitchell Act funding and no state money. IDFG has neither statutory authority to install screens on pumps[190] nor a coherent state policy addressing the issue.[191]

In 1993 and 1994, BPA and NMFS cost-shared the construction, outfitting, and staffing of a new screen shop in Salmon, Idaho.[192] The Idaho screen shop will use off-the-shelf screens for pumps and manufacture screens for gravity diversions.[193] Screening gravity diversions in Idaho presents its own challenges. For example, on the Lehmi River, appropriators are allowed to divert flood and excess waters in addition to their decreed rights.[194] A typical three cfs diversion may need a screen designed for a thirty cfs flow in order to be effective at times critical for fish.[195] IDFG is willing to pay a reasonable amount for the screens, with diverters to cover the excess, but no one can agree on what "reasonable" means.[196]

The 1995 biological opinion does not set time lines for screening compliance, and is vague about the success of the program. "[A]ctual removal of illegal diversions, correction of stream alterations, and installation of screens on irrigation pumps has not yet begun. Continued BPA funding is uncertain beyond 2005, and there is no firm estimate of when these corrections will occur."[197] The FSOC has drafted preliminary timelines for full compliance that reach into the next century. Compliance will be very good in the lower Snake, mainstem Columbia, and many of the larger tributaries. However, compliance is doubtful in the Salmon, Clearwater, Yakima, Entiat, Deschutes, and other rivers. In addition, compliance may be very difficult to measure. It appears that NMFS' approach to screening will be akin to that taken in the 1993 biological opinion with "relatively

186 *Id.*
187 *Id.*
188 Telephone Interview with Charles Keller, *supra* note 48.
189 *Id.*
190 IDAHO CODE § 36-908 (1994) (authorizing screening only on gravity diversions).
191 Telephone interview with Charles Keller, *supra* note 48.
192 *Id.*
193 *Id.*
194 *Id.*
195 *Id.*
196 *Id.*
197 NMFS BIOLOGICAL OPINION, *supra* note 142, at 65.

small steps, minor improvements and adjustments—when the situation literally cries out for a major overhaul."[198]

## V. CONCLUSIONS

State law in the Pacific Northwest requires owners to screen diversions, pay for screening, and maintain screens in working order. Owners of diversions have generally been willing to comply, but many owners have limited financial resources. Cooperation of larger diverters has been good in Oregon and Washington. However, a continuing duty to monitor their screens for effectiveness creates an open-ended liability that makes many uncomfortable. NMFS and the states should consider allocating more maintenance and operation responsibility to the diverters and assume more of the fishery monitoring and enforcement.

Limited law enforcement resources, limited funds, and political pressure make a widespread, enforcement-oriented compliance effort very unlikely. Perhaps a friendlier, less confrontational approach with diverters will foster cooperation. Where states have tried to enforce screening laws, their efforts have lacked resolve. In a standoff with pumpers in Washington's lower Columbia, WDFW and DOE decided to accept screening plans instead of shutting down diversions.[199] Oregon sent stern letters to pumpers on the Columbia and was fortunate to have large voluntary compliance.[200] The screening statute has never been enforced in Idaho.

Federal law may inexorably, if reluctantly, be headed for a clash with state law in a battle for supremacy over water rights. Though the order of the day has been accommodation for diverters, *Glenn-Colusa* indicates that NMFS has the necessary tools to shut down water users until they comply with the screening statute.[201]

Although some recent state cases might suggest that the public trust doctrine is in disrepair in the Pacific Northwest, the doctrine still exists. Someone may sue to cease these diversions under a public trust theory, state nuisance law, or the state's Administrative Procedure Acts. Litigation is often an effective complement to incentive and subsidy programs.

Diversion owners are obligated under state law to pay for part or all of the screening projects. NPPC's Fish and Wildlife Program recommends that all screen and passage facilities be completed no later than the end of 1996. The NPPC Program directs NMFS to "[i]dentify resources that will be needed to accomplish screening and passage work . . . . The presumption is that diversion owners will contribute a significant amount of funding for installation and maintenance of screens."[202] Diverters in Washington and Oregon have contributed to screening efforts through

198 Idaho Dep't of Fish and Game v. National Marine Fisheries Serv., 850 F. Supp. 886, 900 (D. Or. 1994).

199 Telephone Interview with John Easterbrooks, *supra* note 63. In that case, Judge Marsh criticized NMFS' overall effort and did not single out screening for special censure.

200 Telephone Interview with David Nichols, *supra* note 32.

201 People v Glenn-Colusa Irrigation Dist., 15 P.2d 549 (1932).

202 NMFS BIOLOGICAL OPINION, *supra* note 142.

those states' generous cost-sharing and tax incentive programs. In all three states, diverters, as recipients of a valuable public resource, should contribute more to screening. While many have *paid out* large sums, most diverters have *received* huge federal, state, and ratepayer subsidies for deigning to comply with the law. If taxpayers and ratepayers must buy compliance, they should insist on a better value.

Viewed from another perspective, an effective fish screen is just one aspect of a legal diversion sufficient to perfect a state water right. State headgate and water use monitoring statutes are another.[203] Fish screening offers an opportunity to modernize as well as legalize diversions. Although these measures are unpopular with water users, it is worthwhile to remember that there are still no final adjudications of water rights in the Pacific Northwest.

Screens have the potential to work a "physical" adjudication of water rights. Screen projects often require a complete rebuilding of diversion works and must be sized according to maximum diversion rates. Diversion inventories could give state adjudication courts and water managers valuable information about water rights. In some cases, this could work to the diverters' advantage because screens are designed to accommodate maximum flows. Screen projects can easily incorporate headgates and monitoring devices. The projects can also make water administration easier and more fair. In a few years, screening for fish protection may accomplish something the legal system has never accomplished in the Pacific Northwest.

Diverters have valid complaints about screening. Even if properly designed, screens increase drag and cause pumps to consume more power.[204] Clogged screens interfere with full delivery of an appropriative right, and a broken screen could cause a shut-down to protect fish. Uncertainty about water undercuts effective planning.

The screening guidelines do not give a clear picture of what constitutes an effective screen. Also, there is limited information about what works in the field. A clearinghouse for approved effective designs, for which the state and federal agencies would take over effectiveness monitoring, would hasten compliance and improve certainty while preserving fish.

Owners of pumps and canals can avoid future problems, both technical and legal, with well-designed and installed screens systems. Buying quality and budgeting for maintenance and replacement is not unfamiliar territory; diversion works are business equipment. For these owners, the most difficult aspect of this transition will be paying for something that has traditionally been free or cost very little.

Because diversion screening has the potential to make water appropriations more costly and less certain, it is imperative that states act to overcome diverters' hesitation and bring them into compliance with state

---

203 NPPC PROGRAM, *supra* note 2, § 7.10A.4, at 7-55.

204 *See* Janis Carpenter, Enforcement of Instream Water Rights (May 1995) (unpublished study paper, on file with Northwest Water Law and Policy Project).

laws. Oregon's tax incentive is a useful model. However, when it was introduced in 1988, the diversion community responded with a resounding silence. Perhaps the changes to the tax code were not well publicized, but consumptive water users are usually a savvy group at tax time. Cost sharing with owners will continue as a useful and necessary program, but ability to pay should be an operative principle. Adjudication courts or state water agencies might give screened diversions a presumption of validity or a more favorable quantification of water right. Bypass flows from properly constructed screens could easily be quantified as instream flow and, with the legislatures' cooperation, offered to owners as an incentive to screen.

After compliance, maintenance and eventual screen replacement will be the issues. Ratepayers, states, tribes, and the federal government have supported a massive screening effort. Shifting maintenance responsibility to the owner seems fair. Even the best screens available wear out and need periodic maintenance. Cleaning and basic maintenance are continually necessary during an irrigation season. In Oregon, ODFW has temporarily assumed this burden and is vying for shrinking state funds to continue the program. Mainstem screens will likely receive continued support from the Mitchell Act and BPA. However, owners have a legal duty to maintain their screens and are in the best position to render periodic maintenance and repair. When more costs are shifted to owners, innovative designs and methods will likely follow and bring prices down.

Columbia basin salmon recovery projects receive the lion's share of funds and attention, largely because of the Mitchell Act and the listing of three salmon species under the ESA. However, native and resident fish—from suckers to bull trout—are at the mercy of state budgets. Washington funds one person in a half-time position to monitor all diversions in the Pacific fishery area. Outside of the salmon-bearing waters in eastern Washington, there are virtually no screened diversions.[205] Oregon has adopted a proactive approach by spending state funds in non-salmon watersheds and federal funds on the Columbia.[206] Idaho turned down federal funding to staff the Salmon, Idaho screen shop.[207] Instead of becoming dependent on federal and ratepayer funding, states should transfer their experience with mainstem screening efforts to other watersheds in order to head off problems that are looming with other vulnerable species.

Screening diversions is an invitation to improve water and fishery management throughout the Columbia basin. Good stewardship and wise use of resources requires this investment in our natural heritage.

---

205 *See* ROBERSON & CROWE, *supra* note 20.

206 Telephone Interview with John Easterbrooks, *supra* note 63.

207 Telephone Interview with David Nichols, *supra* note 32.