Chapter 18—Dam Removal

The first two decades of the 21st century witnessed significant movement toward removing dams blocking or inhibiting salmon migration. According to the river advocacy group, American Rivers, 1,605 dams have been removed since 1912. These dam removals are arguably the most significant examples of environmental remediation of the early 21st century. But they happened on an ad hoc basis without the guidance of any comprehensive plan. And except for the dams on the Elwah River, one of which was the only dam within a national park, the removals occurred without congressional intervention. Instead, removal of the larger hydroelectric dams with federal licenses occurred largely through the operation of the Federal Power Act, a largely overlooked element of federal environmental law.

This chapter looks at the some of the most significant dam removals in the Pacific Northwest. Often removal occurred despite the existence of significant local opposition. The fish passage requirements of federal law for dam operators seeking license renewal encouraged licensees to agree to settlements with environmentalists calling for removal. The chapter focuses on the financing necessary to afford the costs of removal and the support of federal and state agencies and the public with a role in the dam relicensing process. It also examines the pending removal of Klamath Basin dams, which would be the largest dam-removal project in history, and efforts to remove the four federal dams on the Lower Snake River that have materially damaged salmon.

Removing the Elwah River Dams. The Elwah River on Washington's Olympic Peninsula rises in the Olympic Mountains and flows northward about 45 miles through Olympic National Park to the Strait of Juan de Fuca. Its ecosystem supports highly productive salmon runs, including massive chinook weighing over 100 pounds, which were an essential part native diets for at least 2700 years, but which had been disrupted by dams for over a century. The dams produced electric power for the peninsula, especially for local lumber mills, but were built without fish ladders, and thus devasted the Elwah's salmon runs, completely blocking over forty miles of spawning habitat in the upper river. After an early hatchery failed, the dam operators (who changed over the years) provided no mitigation until a 1975 agreement with the state required funding of a downstream salmon rearing channel and river flows that would facilitate salmon spawning in the lower river. Still, the Elwah salmon population dropped by 75 percent after dam construction. The remnants were mostly fall chinook that spawned in the lower river.

After the dams were built, Congress created the Olympic National Park in 1938, which included the reservoir behind the Glen Clines Dam, the only dam in a national park. When that dam required relicensing under the Federal Power Act after fifty years in 1976 (the Elwah Dam, which antedated the statute, had no federal license), the relicensing created controversy, including whether a relicensing was even possible, given that dams were not an authorized use in national parks. The local Lower Elwah Klallem Tribe, opposed the relicensing, as did a number federal agencies, including the National Park Service. Legal wrangling over this issue continued for years. The Government Accounting Office concluded that there was no authority to license a dam in a national park, but the

licensing agency, the Federal Energy Regulatory Commission (FERC) concluded it had jurisdiction, and consequently issued a draft environmental impact statement (EIS) on the relicensing in 1991. The draft EIS concluded that a feasible alternative to relicensing was dam removal that could restore the river's damaged salmon runs.

In what might be viewed as the inauguration of the dam-removal era, Congress, under the leadership of Congressman John Dingell (also a key author of the Northwest Power Act) resolved the dispute over federal jurisdiction over the relicensing by enacting the Elwah River Ecosystem and Fisheries Restoration Act in 1992. That statute granted the dams permission to continue operations until the federal government appropriated funds to purchase the dams, remove them, and restore the Elwah's ecosystem.

Funding the acquisition of the dams became problematic after the Republican takeover of Congress in 1994, and Congress provided no funds until after Senator Slade Gorton (R-Wash.) lost reelection in 2000. But federal appropriations for deconstruction of the dams began to appear between 2000 and 2010. Removal began in 2011 and was completed in 2014. Removal produced almost immediate and significant benefits: sockeye returns doubled by 2013 (after the removal of one of the dams) and nearly tripled the next year. Between 2013 and 2015 chinook redds (nests) increased by 350 percent. All indications are that the removal of the Elwah River dams was a smashing ecological restoration story.

Restoring the White Salmon River. The White Salmon River flows off Mount Adams in south-central Washington and flows southward to the Columbia on the Washington-Oregon border through canyons and confined valleys formed of basalt from historic volcanic eruptions. Until dammed for power largely for paper mills in 1912, the White Salmon provided pristine spawning habitat and a cold-water refuge for Columbia River salmon, but construction of the Condit Dam eliminated all but the lower three miles of the river for salmon, including Husum Falls, which had been a traditional fishing site of the Yakama tribe.

Condit Dam was built before the Federal Power Act required licenses for such dams, and until a 1965 court decision, it wasn't clear that Condit required a federal license. In 1968, the dam received a 25-year license. As the license neared expiration, FERC issued an EIS on relicensing the project, but federal fisheries agencies invoked their mandatory conditioning authority under the statute to impose fishway conditions requiring both upstream and downstream fish passage at the dam. The licensee, Pacificorp, determined that fish passage would make the dam uneconomical and proceeded to reach a 1999 settlement with the Yakama tribe and several environmental groups to remove the dam by 2006, giving the utility time to generate income from the project to pay for its demolition. A number of years of legal wrangling ensued, including whether FERC had authority to accept a utility's license surrender, questions about the water quality effects of releasing the sediment stored over the years behind the dam, and the opposition of local landowners and counties who objected to the removal. The legal processes finally played out in 2011, five years later than called for in the 1999 settlement, and the dam was removed that year, making miles of new habitat available. The salmon runs have returned, with the number

of spring chinook spawning in the river more than doubling and the number of fall chinook increasing by 50% between 2013 and 2014 alone. The river is now a prime mecca for whitewater recreation, receiving over 30,000 visits in 2014 alone.

Dam Removals in the Sandy River Basin. The Sandy River Basin, which drains the northwest slopes of Mt. Hood in western Oregon before emptying into the Columbia River, was the site two dam removals in 2007 and 2008. What is remarkable about the removal of the Little Sandy and Marmot dams is that their removals occurred with very little controversy. The licensee, Portland Gas and Electric, decided to surrender the licenses when they expired in 2004, rather than install fish passage that a new license would require, making their continued operation uneconomical.

Under a settlement with federal and state agencies and interested others, the utility agreed to pay all the costs of removal and restoration, and FERC quickly approved the license surrender. State and local approval of the removal also followed quickly, helped by the fact that the surrounding land was mostly federal, not private as in the case of the Condit dam, and there was no apparent local opposition. Natural river flows and restoration work restored miles of salmon habitat in the Sandy basin.

Rogue River Basin Dam Removals. Restoring Rogue River flows proved to be complicated, as four significant dams impeded salmon migration on a river whose lower reaches were designated by Congress as an initial federal wild and scenic river in 1968. The lowest of these dams, Savage Rapids, an irrigation dam built in 1921 with over 100 miles of irrigation canals, and whose diversion works were labeled by the federal National Marine Fisheries Service the worst dam-killer on the Rogue because of entrainment of downstream migrating juvenile salmon. The dam was the source of protracted disputes between environmentalists, the state of Oregon, and the Grants Pass Irrigation District, which possessed a water right to divert Rogue River flows.

In 1994, the state water board ruled that the operation of the irrigation project violated the public interest requirement of its water right, reduced its diversion by one-half, and required removal of the dam by 2001, a decision the Oregon Court of Appeals affirmed in 2000. Meanwhile, the federal National Marine Fisheries Service determine that the project unlawfully was taking listed salmon in violation of the Endangered Species Act and filed suit against the project. The district settled the case by agreeing to removal the dam by 2006, pending federal approval of funding the removal costs. Congress appropriated funds to remove the dam in 2007 and 2008, and removal occurred in 2009, culminating a quarter-century of controversy over the project and its effects on Rogue River salmon.

Fifteen and twenty miles above Savage Rapids were the Gold Hill and Gold Ray Dams. The former built to divert water for cement production in the 19th century and later reconstructed for hydroelectric generation, and then taken over by the city of Gold Hill for municipal water supply in 1969. The dam had fish ladders and screens but inflicted considerable salmon mortality in its diversion canals. When the city acquired a replacement water intake, the dam became entirely obsolete, and within a year, the city—

aided by private grants and little local opposition—was able to secure permits and remove the dam for $4 million in 2008.

The century-old Gold Ray Dam, which supplied considerable power to the Rogue Basin throughout the 20th century, was reconstructed in 1941, was eventually acquired by PacifiCorp but then abandoned to Jackson County in 1972. The county lacked the resources to maintain the safety of the aging structure or meet federal and state fish passage requirements. Those costs were estimated at $70 million, while removal costs were roughly $5 million. The Obama stimulus bill of 2009 supplied the removal costs, and the dam was removed the next year, after the Oregon Land Use Board of Appeals dismissed an 11th-hour challenge to the removal by some local opponents. The removal of Gold Ray allowed the mainstem of the Rogue to flow uninterrupted from its upper reaches to the ocean for the first time in over a century.

A longstanding Rogue Basin controversy concerned the Elk Creek Dam, located on major tributary of the river that had supplied over 40 percent of the basin's spawning habitat for coho. The federal Army Corps of Engineers began construction of the project in 1986 as the third of three flood-control projects, over the opposition of environmentalists worried about its effects on salmon. The environmentalists successfully challenged the project on NEPA grounds in the Ninth Circuit, which enjoined the dam's completion, reversing a lower court. But the U.S. Supreme Court then intervened and reversed the appeals court on a number of grounds, although it left the injunction in place pending the Corps' study of the adverse cumulative effects analysis of the dam and the other projects. Those effects, combined with other legal challenges based on the wild and scenic river status of the Rogue and other costs, finally convinced the Corps to stop construction of the one-third finished project in 1995.

Several years of controversy ensued over whether the project should be completed or removed until the federal National Marine Fisheries Service concluded in 2001 that the Endangered Species Act required the dam to be notched to permit fish passage. Finally, in 2007 and 2008, the Corps proceeded to demolish the middle portion of the structure to facilitate fish passage, leaving the concrete remnants of the dam on either side of the river as monuments to the long-running dispute.

The Klamath River Proposed Removals. Although there have been smaller dam removals in the Northwest in recent years, a dam removal project on the Klamath River—which flows from the Oregon Cascades over 250 miles to the Pacific Ocean in northern California—has garnered the most attention. The Klamath, which historically was the largest salmon-producing river south of the Columbia, was the mainstay of the Klamath and other nearby tribes for over 4000 years, producing nearly a million spawning salmon annually and shaping their cultures.

But beginning in the mid-19th century, non-native settlement in pursuit of gold, timber, and farmland transformed the environment of the Klamath Basin. Then, beginning in 1905, under the federal Reclamation Act, construction of hydroelectric dams and irrigation canals serving over 200,000 acres blocked salmon migration, reduced water

flows, and destroyed spawning habitat. By the late 20th century, Klamath salmon runs were just six percent of historic levels and receiving protection from the Endangered Species Act.

In 1913, the California Oregon Electric Company began constructing what became the Klamath Hydroelectric Project by building two dams that completely blocked salmon access to seven-five miles of the mainstem Klamath. Two other dams were constructed in the 1958 and 1962, which increased the blocked area to 300 miles. Together, the four dams of the Klamath project (there are a total of six dams in the project) supply power to some 1400 farms and 70,000 residences. The nearby Klamath Irrigation Project of federal Bureau of Reclamation included attracted homesteaders with its dams and over 185 miles of canals, supplying over 200,000 acres with irrigation water for potatoes, onions, barley, hay, and alfalfa.

Throughout the 20th century, irrigation and hydropower dominated Klamath water use, even though the Klamath tribes had signed a treaty in 1864 that the recognized their rights to harvest fish, hunt, and gather food. In 1983, the Ninth Circuit Court of Appeals recognized tribes' rights as dating from "time immemorial," superior to all other water rights. That recognition failed to provide meaning protection for the tribes' fishery until an Oregon Water Resources Department quantification of the tribes' water rights in 2012, some thirty-five years after the tribes' sought court recognition of their water rights. That decision in turn led to cutbacks on irrigation diversions to protect the habitat of the tribes' fish in 2013 and subsequently.

During the long-running suit over the tribes' rights, the U.S. Fish and Wildlife Service listed two upper basin fish—the Lost River sucker and the short-nose sucker—as endangered species in 1988. The upshot was that the Bureau of Reclamation had to store more water in upper basin reservoirs and increase upper basin water flows to improve fish habitat. These requirements, combined with a severe drought in the 1990s, proved catastrophic for Klamath River coho, which were ESA-listed in 1997.

In 2001, a Bureau plan that was upheld by a federal court called for operations that would protect both the upper basin fish and the lower basin coho. But under pressure from local irrigators, the new Bush administration abandoned that plan on grounds of faulty science, and in 2002 over 30,000 salmon perished in the lower Klamath due low river flows, warm temperatures, and toxic water quality. The fish kill also caused economic calamity for the northern California and Oregon ocean fishery, as closures produced over $100 million in losses in 2006 alone.

In 2004, with the Klamath Hydroelectric Project's federal license about to expire, the tribes, the fishing industry, and environmentalists began a campaign to remove the four hydroelectric dams, which provide no irrigation or flood control benefits. Four years later, the licensee, Pacificorp, decided that the water quality and fish passage improvements required for relicensing would make the dams uneconomical and in 2010 agreed to begin to remove the projects in 2020. An accompanying settlement, the Klamath Basin

Restoration Agreement called for restructuring basin water flows that would be financed by $600 million in federal funding not including the cost of dam removal.

Under the agreement to remove the dams, ratepayers and taxpayers will share in the costs of dam removal up to $450 million; any additional costs presumably would be on the federal government. However, Congress has proved decidedly uninterested in funding the $600 million restoration agreement, which expired in 2015. Nonetheless, in 2016, the federal government, the states of California and Oregon, and Pacificorp agreed to proceed with dam removal, and subsequent studies showed that dam removal would produce substantial ecosystem and economic benefits, including an increase of over 30,000 annual jobs. Removal would open up some 400 miles of mainstem and tributary salmon habitat.

The removal agreement called for the Secretary of Interior to decide whether dam removal was in the public interest, and the secretary decided that it is. The plan is for the licensee to transfer its federal license to a dam-removal entity, the Klamath River Renewal Corporation (KRRC), which in 2018 released a so-called "definite plan," specifying how the four reservoirs would be drawn down, the dams removed, and the formerly inundated lands restored beginning in January 2021. Removal of four dams simultaneously has never been tried before and is planned for January in the hope of minimizing the effects of released sediment on returning fish. The plan also calls for removal of associated infrastructure like canals, turbines, powerhouses, water intakes, and a fish hatchery. In the interim, PacifiCorp continues to operate the four dams in the project under annual federal licenses, earning revenues of $27 million per year. The license transfer to the removal entity requires approval by the Federal Energy Regulatory Commission (FERC), which granted a partial transfer in July 2020, requiring PacifiCorp to continue on as a co-licensee. As of this writing, the states of Oregon and Washington have signed an agreement with the Yurok Tribe, the Karuk Tribe, PacifiCorp and the KRRC agreeing to provide additional funds to the project in exchange for the FERC removing PacifiCorp as a co-licensee. FERC has yet to agree to the license transfer. Thus, despite steps forward, the largest dam removal project in history remains on hold.

Removing the Lower Snake River Dams. An even larger dam removal effort—though it would be premature to consider it a proposal at this point—concerns the four federal dams on the Lower Snake River (LSR dams). These dams, which Congress authorized in 1945 without mentioning their specific locations, with scant concern for the 140 miles of mainstem habitat they destroyed, present substantial obstacles for salmon which spawn in Snake River tributaries. The construction and operation of the LSR dams materially contributed to the ESA listings of Snake River salmon. The dams are a principal reason why the federal government has been unable to comply with the ESA for nearly two decades.

As detailed above in chapter 10, Congress authorized the LSR dams as make-work projects for soldiers returning from World War II, despite an estimated cost-benefit ratio of fifteen cents of benefit for every dollar of cost. The last of the LSR dams, which produce no flood control and in fact now require regular dredging by the Corps of Engineers to avoid flooding the cities of Lewiston and Clarkston, Idaho, was not completed until 1975.

Federal funding of the dredging amounts to a subsidy to the barging industry and the agricultural products (largely grain) it transports downriver. Even so, barge transport is down by about 50 percent over the last twenty years. Moreover, if the dams were removed, barging would still be available 130 miles away in Pasco, Washington, near the confluence of the Snake and Columbia Rivers.

About a decade-and-a-half after the last of the LSR dam was completed, the federal government listed Snake River salmon for protection under the ESA. But the dams' adverse effects on salmon runs was well-known well before the ESA listings. In an effort to reduce mortalities, for many years the Corps transported juvenile salmon by truck and barge to reduce mortalities of downstream migrants, and it still does so today. This "transportation" program created the odd situation of salmon being trucked on an interstate highway adjacent to the Columbia River, while agricultural products are barged on that river.

Although the transportation program has been unable to reverse a long-term decline in salmon runs, the federal government has continued to pursue it as mitigation under the ESA, rather than significantly alter dam operations or release increased storage water to boost flows in the Snake River.

As long ago as the 1990s, several studies indicated that removing the LSR was scientifically justified and economically affordable, including one by the Northwest Power and Conservation Council, which has some authority over BPA. However, nothing specific materialized over the next two decades.

Then, in 2018, spurred on by declines in Puget Sound Orca whale populations—whose chief food source are chinook salmon in decline in part due the LSR dams—the Northwest Energy Coalition (an alliance of a hundred environmental, civic, and human service organizations, progressive utilities, and businesses in Oregon, Washington, Idaho, Montana and British Columbia) reconfirmed the two decades-old studies. The coalition concluded that clean energy resources—like wind, solar, efficiency improvements, and storage measures—could replace the electric power produced by the LSR dams without requiring any fossil-fuel additions, such as from natural gas. In short, LSR removal would not increase greenhouse-gas emissions.

An ensuing 2019 report from the consulting firm, ECONorthwest, determined that LSR dam removal would produce broad financial benefits that would exceed the costs of dam removal, another reconfirmation of twenty year-old studies. However, this assertion is disputed by local river users (principally the barging industry, which—aided by the federal navigation subsidies—transports agricultural products cheaper than available trucks and rail) and local congressional Republicans.

Moreover, there is evidence that the power produced by the LSR dams is very nearly completely surplus to the region's needs, as between 2007 and 2018, BPA needed LSR dam power to meet contractual obligations for only two hours in 2009. In recent years, wind, natural gas, and solar power have exceeded the LSR hydropower six times

over, and surplus power like that produced by the LSR dams is often sold in the spring for little or nothing. In fact, one study concluded that had the dams been taken out in 2008, BPA could have met all its contractual obligations and saved about $100 million annually. Since the estimated cost of rehabilitating twenty-two power turbines at the four LSR dams is over $1 billion, a fair question is whether the region would be better off economically without the dams, which are major contributors to the 99 percent mortality rate that Snake River salmon suffer before they reach their spawning grounds.

Federal taxpayers, which support the current program of continued hydroelectric operations, truck and barge transportation, and hatcheries at a cost of about $550 million annually, may eventually resist such subsidies, in light of the fact that they have produced no evidence of salmon restoration and the existence of ready alternatives to the dams' power production and transport of grain to market. If the national interest in saving Snake River salmon, Puget Sound ocra whales, and reducing federal subsidies prevails, it will have to overcome the determined opposition to LSR dam removal by local barging interests and their congressional representatives. However, removal of the LSR dams was rejected in 2020 in the EIS that Judge Simon ordered on the operation of the hydroelectric system, a decision now under court challenge.

In early 2021, a proposal by Congressman Mike Simpson, a Republican from Idaho, brought new hope to LSR dam removal advocates. The proposal called for a one-time, federal payment to create a $33.5 billion "Columbia Basin Fund" (CBF). The CBF proposes a framework to breach the LSRs by 2031, implementation of new energy technologies to replace the lost hydropower, and compensation for communities and businesses that depend on the dams.

The LSR dam-breaching itself would remove the earthen berms and sediment, while leaving the physical concrete structures in place—a project estimated to cost $1.4 billion. The CBF focuses on dam removal beyond the LSRs, as well, creating a $500 million incentive fund for dam or diversion entities to voluntarily remove or mitigate their river structures.

Other noteworthy elements of the proposal included removing BPA Bonneville Power Administration from direct fish management duties, and the adoption of a Columbia Basin Dam litigation moratorium. The 35-year moratorium would halt litigation related to anadromous fish under the ESA, NEPA, and the CWA for the fourteen federal Columbia River System dams, the 12 federal projects on the Upper Snake River, and all FERC-licensed dams within the Columbia Basin greater than 5 MW.

The CBF includes a number of other aspects related to energy, agriculture, recreation, tourism, and community building. In essence, the CBF is an infrastructure and jobs stimulus package that centers around salmon recovery via dam breaching. The proposal met with immediate opposition from some Republican leaders in the Northwest, while most Democrats expressed hesitant approval. The CBF could be the first step in revolutionizing the Northwest's energy production and salmon recovery, although it faces several considerable hurdles, perhaps most notably, its high price tag.

Chapter 18—Bibliographic Essay

Most of the pre-2012 material in this chapter is from Michael C. Blumm & Andrew B. Erickson, *Dam Removal in the Pacific Northwest: Lessons for the Nation,* 42 Environmental Law 1043 (2012) and the many sources cited therein, many of which are legal documents. See also Philip M. Bender, *Restoring the Elwha, White Salmon, and Rogue Rivers: A Comparison of Dam Removal Proposals in the Pacific Northwest,* 17 Journal of Land, Resources and Environmental Law 189 (1997); Elizabeth Grossman, *The Undamming of America* (2002); William R. Lowry, *Dam Politics: Restoring America's Rivers* (2003). American Rivers keeps a list of dam removals nationwide, https://www.americanrivers.org/conservation-resource/american-rivers-dam-removal-database-now-available-public/.

On the Elwha dams and their removal, there is a good deal of material; see Jeff Crane, *Finding a River: Am Environmental History of the Elwha* (2011); Jeffrey J. Duda, et al., *Baseline Studies in the Elwha River Ecosystem Prior to Dam Removal: Introduction to the Special Issue,* 82 Northwest Science (special issue) 1 (2008); Robert C. Wunderlich, et al., *Restoration of the Elwha River Ecosystem,* Fisheries (Aug. 1994); Nat'l Parks Serv., *Dam Construction: History of the Dam Construction,* www.nps.gov/olym/historyculture/dam-construction.htm; Lower Elwha Tribe, *Dam Removal: History of Elwha Dam,* http://www.elwha.org/damremoval.html; American Rivers, *Elwha River Restoration: Background and History,* www.americanrivers.org/initiatives/dams/projects/elwah-river-background.html; Nat'l Parks Conservation Ass'n, *History of Hydropower on the Elwha River,* http://www.npca.org/protecting-our-parks-aor-land-water/great-waters/elwah-dam-history.html.; U.S. Bureau of Reclamation, *Elwha and Glines Canyon Dams, Elwha River near Port Angeles, Washington,* http://www.usbr.gov/pmts/sediment/projects/ElwhaGlinesCanyon.htm; Elwha Watershed Info. Res., *History of Elwha and Glines Canyon Dams,* http://www.elwahinfo.org/elwah-river-watershed/dam-removal/history-elwah-and-glines-canyon-dams.

Bruce Brown's *Mountain in the Clouds: A Search for the Wild Salmon* (1982) fueled the dam removal movement. Linda V. Mapes, *Breaking Ground: The Lower Elwha Klallam Tribe and the Unearthing of Tse-whit-zen Village* (2009), provided the tribal perspective; the tribe was part of the Treaty of Point-No-Point, Treaty of Point No Point, Apr. 29, 1859, 12 Stat. 933, which includes the treaty fishing rights discussed above in chaps. 4-9. The federal statute authorizing dam removal was the Elwha River Ecosystem and Fisheries Restoration Act of 1992, Pub. L. No. 102-495, 106 Stat. 3173 (1992), codified at 16 U.S.C. sec. 796-97. The EIS on the removal was Nat'l Park Serv., *Final Environmental Impact Statement: Elwah River Ecosystem Restoration* (1995).

On the Condit Dam and its removal, see PacifiCorp, *History of the Condit Hydroelectric Project* (2002), http://www.pacificcorp.com/content/dam/pacificorp/doc/Energy_Sources/Hydro/Hydro_Licensing/Condit/HAERReport.pdf; Federal Energy Regulatory Comm'n, Office of

Hydropower Licensing, *Condit Hydroelectric Project Final Environmental Impact Statement* (FERC No. 2342), http//:www.pacificcorp.com/Energy_Sources/Hydro/Hydro_Licensing/Condit/Final_Environmental_Impact_Statement_FEIS_1996.pdf (1996). For analysis, see Charlton H. Bonham, *The Condit Dam Removal and Section 18 of the Federal Power Act: A Coerced Settlement,* 14 Journal of Environmental Law and Litigatio 97 (1999); David H. Becker, *The Challenges of Dam Removal: The History and Lessons of the Condit Dam and Potential Threats from the 2005 Federal Power Act Amendments*, 36 Environmental Law 811 (2006). The fishways provision of the Federal Power Act is section 18, codified at 16 U.S.C. sec. 811; state water quality certification is required by section 401 of the Clean Water Act, 33 U.S.C. 3341. The Condit settlement is *Condit Hydroelectric Project Settlement Agreement*, FERC Project No. P-2342-011 (Oct. 21, 1999), http://elibrary.ferc.gov/idmws/nvcommon/NVViewer.asp?Doc=146919.0. The state environmental impact statement on the dam's removal, which was supplemented several times between a 2005 draft and 2010, is Wash. Dept. of Ecology, *Condit Dam Removal, Final Second Supplemental Environmental Impact Statement* (2010). A spectacular video released by National Geographic captures the explosion that removed the dam in November 2011, https://www.youtube.com/watch?v=4LxMHmw3Z-U.

On the Sandy River projects and their removal, see Barbara Taylor, *Salmon and Steelhead Runs and Related Events of the Sandy River Basin: A Historical Perspective* (1998); U.S. Forest Serv., *Upper Sandy National Watershed Analysis* (1996); Settlement Agreement Concerning Removal of the Bull Run Hydroelectric Project, at p. 76 (FERC No. P-477-024, Oct. 24, 2002), http://digital.library.ucr.edu/cdri/?dam=Marmot_Dam; Federal Energy Regulatory Comm'n, No. 477-024, *Final EIS: Bull Run Hydroelectric Project, Oregon* (2003); Portland General Electric, *Marmot Dam Removal in 2007 Has Returned Sandy River to a Wild, Free-Flowing River,* http://www.portlandgeneral.com/community_environment/initiatives/protecting_fish/sandy_river/default.aspx; Bureau of Land Management, *Sandy River Basin Plan: Final Plan Released for the Sandy River Basin,* http://www.blm.gov/or/dostricts/salem/plans/sandy_river_index.php.

The most contested of the Rogue River dam removals was Savage Rapids Dam. On its demise, see Joe S. Whitworth, *A Relic Dam Dislodged by a Dormant Doctrine: The Story of Beneficial Use and Savage Rapids Dam,* 5 University of Denver Water Law Review 183 (2001); WaterWatch, *Savage Rapids Dam Removal*, http://waterwatch.org/programs/freeing-the-rogue-river/savage_rapids-dam-removal; Bureau of Reclamation, *Draft Environmental Assessment: Fish Passage Improvements, Savage Rapids Dam, Grants Pass Project*, Oregon (2005), http://digital.library.ucr.edu/cdri/documents/SavageRapids_DEA.pdf. The court decision affirming the state Water Resources Control Board's finding that the Grants Pass Irrigation District had violated the terms of its water right was Grants Pass Irr. Dist. v. Water Res. Dept., 1 P.3d 480 (Or. App. 2000). Congressional funding of $28 million to remove the dam was through the Energy and Water Development Appropriations Act of 2004, Pub. L. No. 108-137, sec. 220, 117 Stat. 1827, 1853 (2003).

On the removal of the Gold Hill Dam, see George Kramer, *Oregon Inventory of Historic Properties, Section 106 Documentation Form: City of Gold Hill/Dam Removal Project* (2007); U.S. Army Corps of Engineers, *City of Gold Hill's Joint Permit Application Form* (2007), http://digital.library.ucr.edu/cdri/documents/GoldHillDam_RemovalApplication.pdf. The Gold Ray dam removal is explained in Office of Habitat Conservation, Nat'l Marine Fisheries Serv., *Biological Assessment for the Removal of Gold Ray Dam* (2010), http://recpg.org/NR_upload/Gold%20Ray%20Dam/Other%20Technical%20Reports/Gold%20Ray%20Dam_BA_Final_ToNMFS_1.pdf; Funding of the removal came from the Obama Administration's economic stimulus package enacted by Congress in the American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, div. A, 123 Stat.115, 129 ((2009).

The long-running Elk Creek Dam saga includes the U.S. Supreme Court's decision in Or. Nat'l Res. Council v. Marsh, 490 U.S. 360 (1989), discussed in Marion D. Miller, *The National Environmental Policy Act and Judicial Review After Robertson v. Methow Valley Citizens Council and Marsh v. Oregon Natural Resources Council*, 18 Ecology Law Quarterly 223 (1991). On the continuance of the construction injunction due to a failure to properly assess the cumulative effect of the dam in the context of nearby projects, see Or. Nat'l Res. Council v. Marsh, 845 F.Supp. 758 (D. Or. 1994). See also Oregon Wild, *Elk Creek Dam Timeline*, http://www.oregonwild.org/waters/elk_creek_dam/elk-creek-dam-timeline; U.S. Army Corps of Engineers, *Operations: Elk Creek Dam*, http://www.nwp.usace.army.mil/Locations/RogueRiverBasin/ElkCreek.aspx.; WaterWatch, *Notching the Elk Creek Dam*, http://waterwatch.org/programs/freeing-the-rogue-river/notching-the-elk-creek-dam.

The Klamath Basin controversy has a rich literature, highlighted by Holly Doremus & A. Dan Tarlock, *Water War in the Klamath Basin: Macho Law, Combat Biology, and Dirty Politics* (2d ed. 2008). See also Kyna Powers, et al., Congressional Research Serv., RL 33098, *Klamath River Basin Issues and Activities: An Overview* (2005); Glen Spain, *Dams, Water Reforms, and Endangered Species in the Klamath Basin*, 23 Journal of Environmental Law & Litigation 49 (2007); Mathew G. McHenry, *The Worst of Times: A Tale of Two Fishes in the Klamath Basin,* 33 Environmental Law 1019 (2003); David N. Allen, *The Klamath Hydroelectric Settlement: Federal Law, Local Compromise, and the Largest Dam Removal Project in History,* 16 Hastings West-Northwest Journal of Environmental Law & Policy 427 (2010); Thomas P. Schlosser, *Dewatering Trust Responsibility: The New Klamath River Hydroelectric and Restoration Agreements,* 1 Washington Journal of Environmental Law & Policy 42 (2011); Michael A. Swiger & Sharon L. White, *Rebuttal in Defense of the Klamath Hydroelectric Settlement Agreement*, 1 Washington Journal of Environmental Law & Policy 297 (2011) (a response to Schlosser). The ESA listings for the Shortnose Sucker and the Lost River Sucker are at 53 Fed. Reg. 27,130 (July 18, 1988) (codified at 50 C.F.R. § 17); the listing of the coho is 62 Fed. Reg. 24,588 (May 6, 1997) (codified at 50 C.F.R. § 223.102). The court decision upholding the 2001 plan calling for greater fish projection in the operation of the Klamath projects is Kandra v. United States, 145 F.Supp.2d 1192 (D. Or. 2001). PacifiCorp

unsuccessfully challenged the prescription of installation of fishways in the relicensing in Klamath Hydroelectric Project No. 2006-NMFS-0001 (NOAA Fisheries, Sept. 27, 2006).

The removal of the LSR dams merited a full chapter in *Sacrificing the Salmon: A Legal and Policy History of the Decline of Columbia Basin Salmon* 279-308 (2002), including numerous citations. See also American Rivers, *Lower Snake River, Id, Or. & Wa,* http://www.americanrivers.org/initiatives/dams/projects/lower-snake-river-id-or-wa.html. The judge who oversaw federal ESA compliance of Columbia Basin dam operations, after retiring, called for removal of the LSR dams, see Scott Learn, *Judge James Redden: "We Need to Take Those (Snake River) Down,"* Oregonian (Apr. 25, 2012). Judge Redden's handling of the case is examined in Michael C. Blumm & Aurora Paulsen, *The Role of the Judge in Endangered Species Act Litigation: District Judge James Redden and the Columbia Basin Salmon Saga*, 32 Stan. L. Rev. xx (2013). The complaint challenging the federal agencies' 2020 EIS rejecting the removal of the LSR dams is *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Svc.,* No. 01-0640-SI (D. Or. Jan. 19. 2021), available at https://earthjustice.org/sites/default/files/files/1404_2308-1_proposed_eighth_supplemental_complaint.pdf.

For a discussion of the flood risk the dams pose to Lewiston, Idaho, see Stephen Hawley, *Recovering a Lost River: Removing Dams, Rewilding Salmon, Revitalizing Communities* 101-33 (2011). The 2018 study examining the affordability of removing the LSR is Northwest Energy Coalition, *The Lower Snake River Dams Power Replacement Study* (2018), https://www.nwenergy.org/wp-content/uploads/2018/04/LSRD-Study.pdf. The ensuing study calling into question the Northwest Energy Coalition study's assumption of the need to replace LSR power after removal and suggesting that had the dams been removed in 2008, the region would have saved $100 million, is Anthony Jones & Linwood Laughley, *Bonneville Power Administration and the Lower Snake Dams: The Folly of Conventional Wisdom*, Rocky Mountain. Econometrics (June 2018), http://www.rmecon.com/examples/BPA%20&%20LSRDs%206-5-18.pdf. For an article discussing the alleged costs and economic feasibility of removing the LSR dams, see Michael C. Blumm & Doug DeRoy, *The Fight Over Columbia Basin Salmon Spills and the Future of the Lower Snake River Dams,* 9 Washington Journal of Environmental Law and Policy 1 (2019).

The Columbia Basin Fund proposal can be accessed at Congressman Mike Simpson's website: https://simpson.house.gov/salmon/. For additional information on the CBF, see Columbia Basin Bulletin, Idaho U.S. Rep. Simpson Proposing Sweeping $32 Billion 'Columbia Basin Fund' to Finance Lower Snake River Dam Breaching (Feb. 5, 2021), https://www.cbbulletin.com/idaho-u-s-rep-simpson-proposing-sweeping-32-billion-columbia-basin-fund-to-finance-lower-snake-river-dam-breaching/; Lynda V. Mapes, *GOP congressman pitches $34 billion plan to breach Lower Snake River dams in new vision for Northwest,* The Seattle Times (Feb. 7, 2021), https://www.seattletimes.com/seattle-news/environment/gop-congressman-pitches-34-billion-plan-to-breach-lower-snake-river-dams-in-new-vision-for-northwest/.