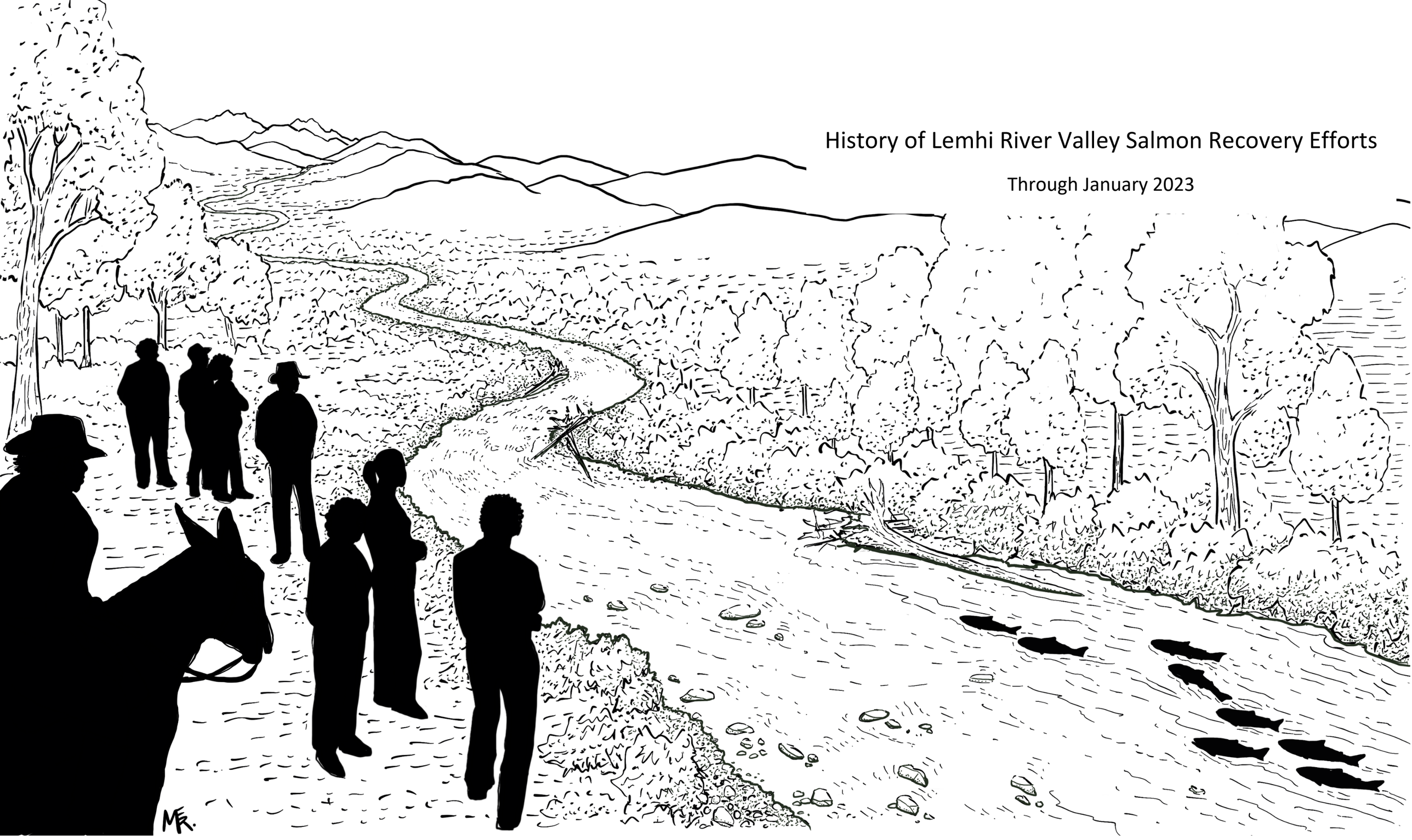
History of Lemhi River Valley Salmon Recovery Efforts

Through January 2023



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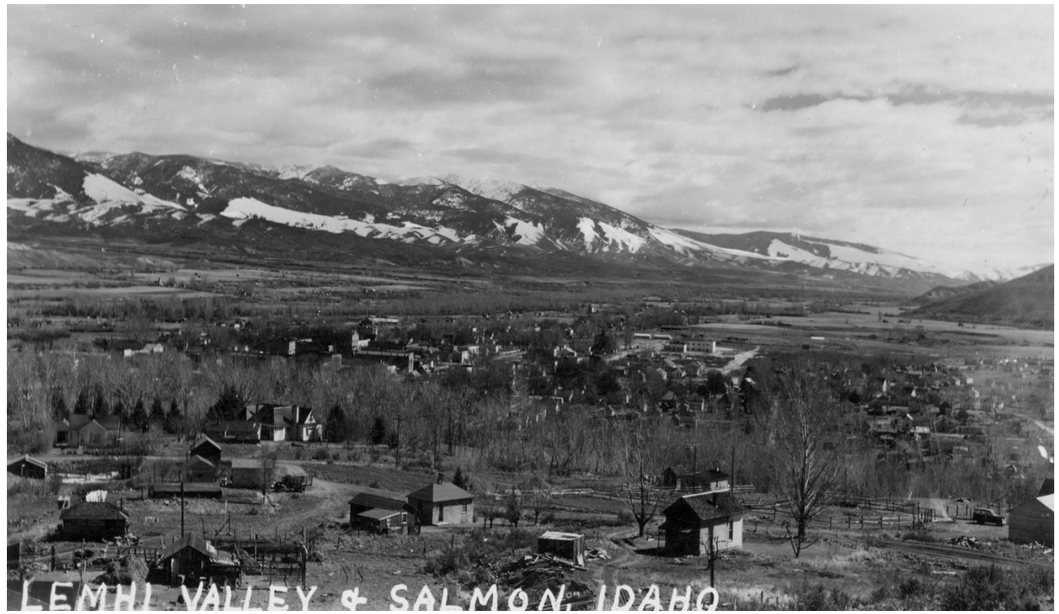
DEDICATION AND ACKNOWLEDGEMENTS

This document is dedicated to the people in the Lemhi River Valley and the larger upper Salmon River Basin willing to donate their time and energy to community-based salmon recovery efforts and to help us record this important time in Idaho history. Private landowners made the work described in this report possible by granting access for assessments on their property and by their active participation in projects.

As evidenced in the following pages, important changes will only take place through the cooperation of many entities and individuals. While it is not practical to acknowledge each participant, we would, however, like to recognize a critical few. Early contributors, among them Ralph Swift, Bruce Mulkey, Bob Loucks, R.J. Smith, Don Olson, Merrill Beyeler, Bob Thomas, Chuck Keller, Bruce Smith, and Mike Larkin, set the stage for collaboration. Model Watershed Program Project coordinators Ralph Swift, Jude Trapani, Glenn Seaburg, John Folsom, Russell Knight, Katie Slavin, Hans Koenig, and Daniel Bertram, along with support staff, have dedicated their time and energy to make these programs successful. We offer a special thanks to the interviewees for their memories and insights into this project (their names are provided in Appendix A). In addition, we appreciate the efforts of Annika Deutsch, Cindy Salo, Daniel Bertram, Abbie Gongloff, Amy Cassel, Clive Strong, Steve Wright, the Lemhi County Historical Society, and many others for their detailed information and contributions. We are very grateful for the effort that Hope Benedict provided with editing to bring this document to its final stages and where we are today.



(Clockwise from Top): Lemhi River Valley and City of Salmon, Idaho, circa 1930 (source: Lemhi County Historical Society); Elizabeth Snook with Chinook salmon, circa 1940s (source: Snook Collection, Lemhi County Historical Society); man with Chinook salmon at government fish trap on the Salmon River near the mouth of the Lemhi River, circa 1930s (source: Lemhi County Historical Society).

INTRODUCTION

History of Lemhi River Valley Salmon Recovery Efforts summarizes the efforts of landowners, community members, and government and non-governmental organization employees who created a collaborative set of programs designed to promote the recovery of Chinook salmon in Idaho's Lemhi River Valley. Fish recovery work began in this area in the 1980s and intensified in 1992 under the Endangered Species Act (ESA), with the listing of Snake River spring/summer Chinook. The overarching goal of this report is to document those steps (primarily from the 1980s to present) before the story fades from memory. With interviews and a review of relevant literature, it also serves to supplement *The Upper Salmon Subbasin Integrated Rehabilitation Assessment* (IRA),[i] which covered the pre-history of the Lemhi River Valley as well as human settlement and impact.

The Lemhi River Valley provided a unique opportunity for the local and regional communities to work together. They cooperated to restore salmon runs while maintaining the area's diverse culture and economy (primarily agriculture, forestry, recreation, and services). Lessons learned here could be applied to many communities in the Columbia River Basin and rural America. So far, the restoration efforts reflect the original intent—to be a model of conservation efforts at the watershed- or landscape-scale without leaving people behind. Uniting in this goal as early as the mid-twentieth century, participants intensified their efforts in the Lemhi River Valley in the early 1990s with the ESA listing of spring/summer Chinook salmon. The scientific results for fish had been documented, but the more social and political aspects had not. This is an attempt to remedy that omission before the community stories behind the scientific accomplishments have faded from memory.

In the interior Columbia River Basin, farming and ranching frequently developed adjacent to the spawning areas of spring/summer Chinook salmon and within the broad river floodplains. In addition to producing new generations of the iconic fish, these areas are the most conducive to growing grass and other crops essential for an agricultural economy. Prior to European settlement along the rivers in Idaho, Oregon, and Washington, native peoples relied heavily on salmon (augmented by many other resources) for sustenance. During the late nineteenth and early twentieth centuries, settlers increased, and they occupied and developed the river valleys in new ways, expanding agricultural production. But the natural, dynamic river processes, including floods and erosion, made agriculture and development difficult to manage; thus, rivers were mechanically straightened, and dams were constructed to reduce the risks. Myriad actions and government programs were implemented to change the landscape, prioritizing human needs. Although executed without malintent, this taming of the rivers proved detrimental to salmon populations and habitats.

Today, the interior Columbia River Basin has nine salmon and steelhead species listed in the Endangered Species Act (ESA). Two of these anadromous (fish that migrate from the river to the sea and back to the river to spawn) species are listed from the Lemhi River: Snake River spring/summer Chinook salmon and Snake

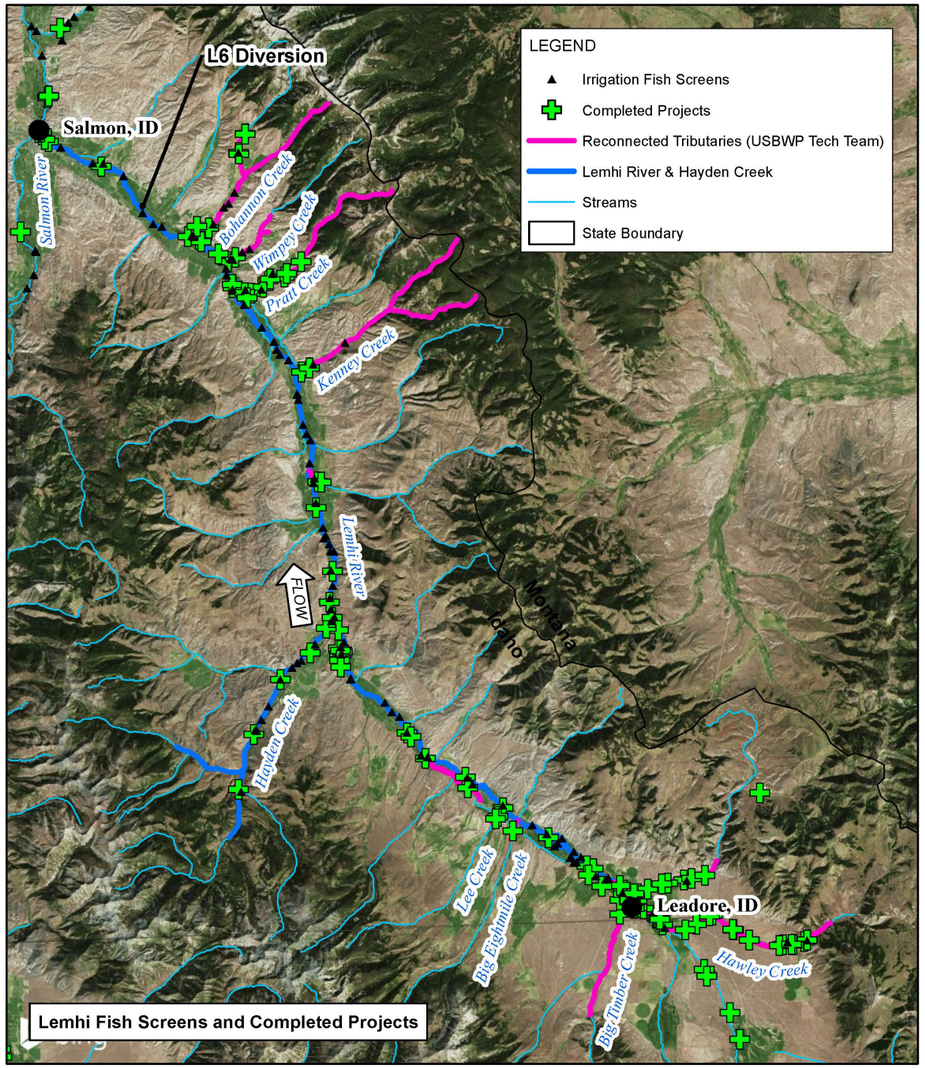
River steelhead. Numerous tribes, landowners, and agencies have been involved in efforts to restore the once strong runs of salmon and steelhead to Idaho and the greater region. The Idaho Governor's Office of Species Conservation (OSC) is working with these groups and individuals as well as with communities and non-governmental organizations (NGOs) to implement ESA recovery plans for Idaho's listed anadromous fish. A key approach is to improve or rehabilitate the habitat in order to increase the capacity of the riparian/riverine ecosystem. This will increase the productivity, abundance, survival, and overall health of these fish. The challenge is to do it in a way that provides a beneficial situation for everyone involved. Idaho's guiding principle is to recover species while maintaining a vibrant economy.[ii]

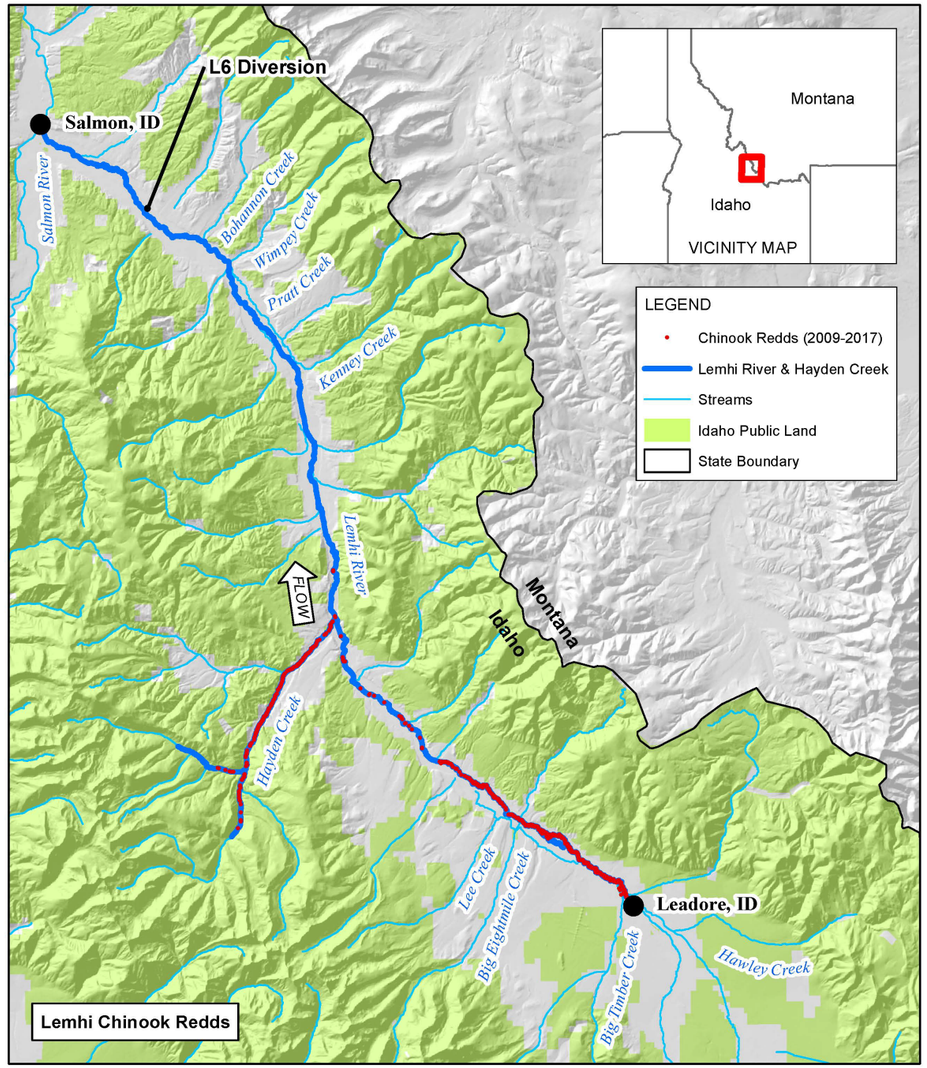
Organizationally, *History of Lemhi River Valley Salmon Recovery Efforts* begins with maps highlighting key features and projects. These are followed by four sections arranged chronologically. The final section presents conclusions about why Chinook salmon recovery endeavors in the Lemhi River Valley may be successful. At the end are lists of acronyms, entity descriptions, interviewees, and the documents reviewed in preparation of this history. The 1995 Model Watershed Plan, instrumental in the success of local recovery work, discusses key participants and their efforts in more detail.[iii] For additional information, as noted above, see *The Upper Salmon Subbasin Integrated Rehabilitation Assessment* and its appendices.[iv]

Lemhi River ~ Historical Images

Top: Fishing weir on the Lemhi River; Lower: unidentified man standing near weir on the Lemhi River—dates unknown. Source: National Archives

1986 (Ott Report) · 1989 (Irrigators' Plan) · 1992 (Chinook ESA Listing) · 1994 (Fish Flush) · 1995 (Model Watershed Plan) · 2000 (Juvenile Chinook Killed) · 2004 (Snake River Water Rights Agreement) · 2006 (Draft Section 6) · 2019 (IRA)





Source: Streams from National Hydrography Dataset; Reconnected Tributaries from Upper Salmon Basin Watershed Program; Aerial imagery from Microsoft Bing; 10m Digital Elevation Model hillshade from USGS

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Notes:
1 - Map detail is limited; intended for illustration only.

N

Applied Science & Engineering

Lemhi River Overview
for the US Bureau of Reclamation

1986 (Ott Report)
1989 (Irrigators' Plan)
1992 (Chinook ESA Listing)
1994 (Fish Flush)
1995 (Model Watershed Plan)
2000 (Juvenile Chinook Killed)
2004 (Snake River Water Rights Agreement)
2006 (Draft Section 6)
2019 (IRA)

SETTING THE STAGE: THE LEMHI VALLEY BEFORE 1986

In brief: Not only was the Lemhi River Valley the traditional homeland of the Shoshone-speaking Agaidika or salmon-eaters, but it was also crucial to Bannocks, Nez Perce, and other Shoshone groups during the regional salmon runs. In the nineteenth century, however, exploration, westward expansion, mining, and agricultural development threatened the stability of the indigenous peoples, the flora, and the fish and wildlife. By the 1870s, private ranches predominated the lands along the Lemhi River, where ranchers sustained their cattle in winter and grew hay in summer. Although cattle were in the higher elevations during the spring, summer, and fall months, they ranged public lands administered by the Bureau of Land Management and the United States Forest Service with little oversight until the 1960s—a situation that brought its own set of problems.

The twentieth century witnessed changes on an even greater scale. The construction of the Gilmore and Pittsburgh Railroad between 1909 and 1910 and the post-World War II installation of Highway 28 through the center of the Lemhi Valley resulted in a simplified and straightened Lemhi River. What had once been a multi-threaded and complex channel that supported high-quality fish habitat became a single-thread stream. It resembled an irrigation ditch or canal more than a river. The intensified need for water and streambed manipulation occasionally interrupted continuous waterflow in the mainstem of the river and in its tributaries. The resulting decline in salmon habitat, combined with extensive fish harvesting throughout the Columbia River, dam construction, and other detrimental activities, brought salmon numbers to catastrophic lows. The significant loss of salmon encouraged some to turn to the 1973 Endangered Species Act (ESA) for help in reversing the ominous trend.

Family displaying their Chinook salmon catch. Source: Herb Godfrey Collection, Lemhi County Historical Society

HISTORICAL CONTEXT

Prior to Euro-American settlement, the Lemhi River Valley and the larger Columbia River Basin were replete with salmon and steelhead. These anadromous fish migrated from the ocean to spawn in fresh water, rear the juvenile fish, and then the juveniles return to the ocean—making a complete cycle. They played a critical role in the life and economy of the indigenous population, but nineteenth-century exploration, trapping, mineral discovery, and permanent occupation introduced myriad changes. Many of the valley's resources were exploited and harvested, including the salmon and steelhead, beaver, and American bison. The significant reduction in their food supply had a profound and negative impact on the native peoples.

The Lewis and Clark Corps of Discovery introduced two centuries of unrelenting transformation. The Corps' descriptions of the abundance of fur-bearing animals sparked the American Western fur trade. Beaver fur, in particular, was prized for manufacturing durable waterproof hats. The United States and Great Britain shared occupancy of the Pacific Northwest in the 1820s. Independent fur trappers, the British Hudson's Bay Company, and other organized contingents trapped beaver and hunted game, including bison. In the mid-1820s, Hudson Bay Company commenced a "scorched stream" policy to trap out all the beaver south of the Columbia River and east across Idaho to discourage U.S. competition and settlement in the area. By 1830, when Hudson Bay trapper John Work traveled through the Lemhi River Valley with a brigade of trappers and their families, beaver were still present but much less abundant.[v]

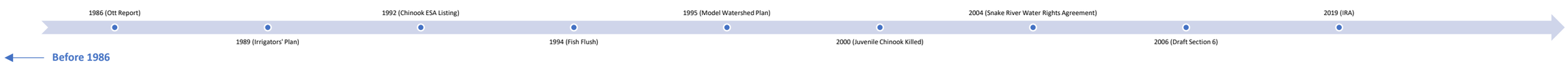
Trapper W.A. Ferris wrote a detailed account of his travels in the northern Rocky Mountains in the early 1830s. In the Lemhi River Valley (he called the Lemhi River the east fork of the Salmon River), Ferris described dense thickets of willow and large herds of bison. On August 23, 1830, he found *"numbers of salmon, forcing their way up the small streams, in this valley—many had so worn out their fins, that they could with difficulty avoid us when we endeavored to catch them, in our hands. With clubs and stones, we killed several of them, with which we regaled ourselves at noon, and my companions, amused themselves, whilst our horses were feeding, by adding to the numberless carcasses scattered along the shore, that had been taken and thrown away by the Indians."*[vi]

Within a decade, bison had disappeared, and local beaver populations had been brought to the brink of extinction. The unintended consequence of beaver depletion was the affect it had on fish. The loss of beaver dams deteriorated fish habitat conditions and contributed to the simplification of the region's rivers. In turn, this reduced the quality of spawning and rearing habitat and the capacity of the river system.

The discovery of gold in California in 1848 initiated a western mining boom, bringing an influx of prospectors to the West. Mining in and around the Salmon and Lemhi River Valleys began just after the American Civil War and increased exponentially into the early 1900s.

Although the Lemhi River was not substantially altered by mining, several of its tributaries, especially Kirtley and Bohannon Creeks, endured significant assault. Miners and other settlers needed land and water to support their growing mining and agricultural enterprises, giving rise to mining claims, homestead and desert land applications, and water rights declarations. In addition, communities needed timber for buildings, fences, and, later, for underground mine supports. Timber harvest and associated activities also affected the watershed and led to increased runoff, erosion, and sedimentation in many of the Lemhi's tributaries—all had a negative impact on the surrounding fish habitat.

In the last years of the nineteenth century, irrigation development and associated water claims were established in the mainstem Lemhi River and its tributaries.[vii] Irrigation ditches withdrew water from the river and distributed it across the floodplain. Farmers and ranchers cleared extensive areas of cottonwood trees and riparian shrubs to create more pastureland for livestock grazing. By the early 1900s, many tributaries and sections of the river sometimes ran completely dry due to forced physical changes and irrigation withdrawals. Tragically, summer irrigation needs coincided with the Chinook salmon spawning season, making their trek upstream all but impossible and cutting off a large portion of the spawning area (see Water Availability section for a continuation of this discussion). By the 1980s, only Hayden and Big Springs Creeks were connected to the Lemhi River year-round.



CHANGES TO THE LEMHI RIVER VALLEY

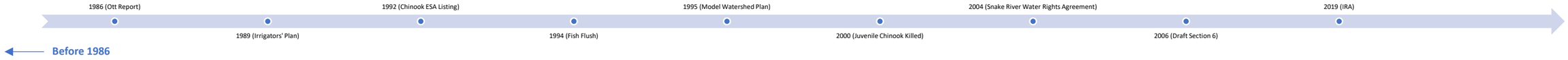
The changes that occurred in the Lemhi River Valley in the nineteenth century had a significant impact on the river system. Although the regional collective memory nostalgically recalls river conditions at the turn of the twentieth century, the Lemhi had already been substantially altered by that point and more modifications were coming. Continued mining and agriculture in the area required greater access and more utilities and supplies, resulting in additional significant physical and biological revisions to the river and its floodplain:

- **Increased Infrastructure and land use**
  - Completed in 1910, the Gilmore and Pittsburgh Railroad was built across the Lemhi River floodplain. In 1952, Idaho State Highway 28 was constructed through the valley. At the time, it was cheaper to move the river than to build bridges, so the river was straightened with rock material. As a result, it was shortened and simplified (a common practice at the time to improve irrigation—see DuPont ad, page 6), and river crossings were reduced. Highway construction altered or isolated five miles of the Lemhi River. Another ten miles were altered by machinery for flood control in 1957.
  - Between 1908 and 1954, Idaho Power operated a roughly 6-foot-tall diversion dam that spanned the lower Lemhi River approximately one mile upstream of its confluence with the Salmon River (see photo, near right). The dam affected fish migration and contributed to the elimination of the "summer" run of Chinook salmon that arrived around July each year and could not swim over the dam at the lower summer flows.
  - Many segments of the Lemhi River were cut off, blocked, straightened, or relocated to accommodate growing agricultural demands, resulting in further simplification of the river. For example, the section below the L6 diversion, along with twenty-eight out of thirty tributaries, became dewatered during most of the irrigation season. Only Big Springs and Hayden Creeks retained base flows that reached the river.
  - When heavy machinery became available after World War II, bulldozers were routinely employed to build low dams in the Lemhi to guide water into irrigation ditches and move gravel from the middle of the channel to the sides of the river. Removing gravel from the channel increased the river's velocity, and gravel deposited on the banks smothered riparian vegetation. In 1958, fish biologist Stacy Gebhards documented changes to 21% of the Lemhi's length. These changes increased gradients, scouring, and gravel deposition in the lower Lemhi, which increased the risk of flooding and reduced fish habitat—unintended but serious consequences.[viii]
  - As early as 1890, forage grasses in higher elevations had been reduced by the widespread grazing of cattle and horses associated with the mining industry (Smith 1973).
  - Grazing large numbers (over 100,000[ix]) of sheep in the early 1900s and an increase in cattle numbers by the 1960s transformed riparian vegetation and the natural conditions of upland grass. (Bill Platts, USFS, found that livestock grazing has a negative impact on riparian areas and fish habitat.[x])

Current scientific indicators underscore the understanding that these land-use practices, combined with the loss of beaver in the area, severely limited the number and extent of many species—not just salmon.[xi] The straightening of the river channels not only increased the river's velocity but also disconnected the Lemhi from its floodplain and side-channel habitat, which is essential for rearing salmon. The removal of vegetation reduced habitat quality and increased summer water temperatures. Water quality had been degraded by increased sediment. Many of these practices are tied to agriculture, and, although unintended, their effects reduced the likelihood of survival, particularly for the Chinook salmon eggs that are buried in gravel from fall through spring. It wasn't until the 1960s that federal oversight began to shift.

Lemhi River Idaho Power Diversion Dam approximately one mile upstream from the confluence with the Salmon River, circa 1930s. Source: Unknown

- **Vegetation Changes**
  - Tree removal in the channel and floodplain was a common practice by landowners as well as agencies, such as the Natural Resource Conservation Service (NRCS) formerly the Soil Conservation Service (SCS) and Lemhi Soil and Water Conservation District (LSWCD). Lemhi County regularly removed downed wood from the river channel to prevent damage to downstream bridges and irrigation diversions during high-water flows. Clearing trees outside the waterways also created more land for pasture and hay fields.



August, 1935 AMERICAN FORESTS 385

How DYNAMITE *streamlines streams*

Straightening of Pequest River in New Jersey by CCC workers stopped its yearly floods. Location of new channel is seen at right. Note temporary dam at left to provide volume of water for scouring blasted channel.

Explosion of dynamite charge by propagation excavates new channel.

Immediately after explosion, water is entering new channel, whose banks will be smoothed and "stream-lined" by the speedier flow of water.

CROOKED STREAMS are a menace to life and crops in the areas bordering on their banks. The twisting and turning of the channel retards the flow and reduces the capacity of the stream to handle large volumes of water. Floods result. Crops are ruined. Lives are lost. Banks are undermined, causing cave-ins that steal valuable acreage.

In many instances straightening out a stream has doubled its capacity for disposing of run-off water.

DYNAMITE may be used most efficiently and economically in taking the kinks out of a crooked stream. The dynamite is loaded along the length of "cut-off" channel. When fired, the dirt and other debris is heaved high in the air and is scattered over the adjoining territory—leaving practically no spoil-banks. In addition to the material actually thrown out, much dirt is loosened and is later scoured out by the water which rushes swiftly through the straightened channel.

Du Pont Dynamite has straightened many thousands of miles of crooked streams. Du Pont engineers have worked for years to develop the best blasting methods for the cleaning out and straightening of streams. All their data is in a 48-page book, "Ditching with Dynamite." It is for your use. Write for it.

Dynamite can help you do other jobs, too. It can help you build highways, dams; fight soil erosion; work quarries. Du Pont has an explosive for every purpose.

DU PONT
REG. U. S. PAT. OFF.

E. I. du Pont de Nemours & Co. Inc.
Explosives Department
6107 du Pont Building
Wilmington, Del.

American Forests advertisement, from 1935. Source: DuPont

Lemhi River Historical Images

Historical photos: Flooding of the Lemhi River after the installation of the Gilmore and Pittsburgh Railroad track, which was built across the floodplain, circa 1920s. Source: Lemhi County Historical Society.

1986 (Ott Report) · 1989 (Irrigators' Plan) · 1992 (Chinook ESA Listing) · 1994 (Fish Flush) · 1995 (Model Watershed Plan) · 2000 (Juvenile Chinook Killed) · 2004 (Snake River Water Rights Agreement) · 2006 (Draft Section 6) · 2019 (IRA)

← Before 1986

FEDERAL OVERSIGHT AND GRAZING

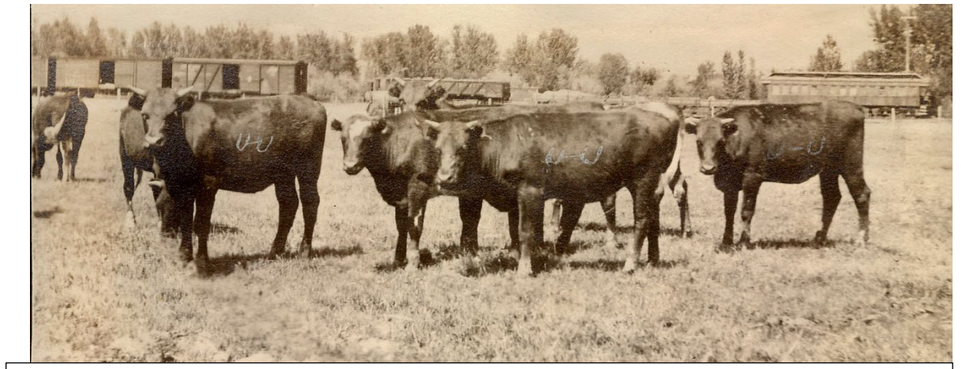
The ability to use public land (national forest, BLM, etc.) is critical to ranchers. Without it, they would have no choice but to increase grazing on their private lands, which are adjacent to the streams that provide almost 100% of the salmon spawning and rearing habitat in the Lemhi River system. Prior to the 1960s, grazing was not closely regulated, and ranchers shared "use areas" or allotments on National Forest and public lands for livestock. The quantity of livestock permitted in many allotments was often more than the land could support, especially in the lower elevations and pastures.

In the 1960s, the BLM formalized grazing allotments to reduce disagreements among permittees, and the US Forest Service increased allotment monitoring. With range allocations, ranchers generally turned cattle onto upland public allotments from May 15 to October 31. By mid-August, however, many herds moved down into the creek bottoms, preferring to graze near water and eat the remaining green grass and shrubs, instead of staying in the higher elevations where most of the forage grass grows.

Neither ranchers nor federal agencies considered heavy grazing in riparian areas a problem in the early days. Understandably, it was thought that vegetation recovered quickly in these wetter areas. However, overgrazing in riparian areas eventually reduces the shrubs and deep-rooted vegetation that not only shade the streams but also keep them from eroding. Extensive vegetation also helps maintain the cooler water temperatures that benefit fish. Before federal agencies had the funds to develop upland spring water sources or add fences to keep cattle in the high grounds, it was nearly impossible to keep them from moving down into stream bottoms. With recognition of the consequent problems, grazing allotment management changed. It eventually included dividing turn-out pastures, instituting rest-rotation grazing, adding fences, developing spring-water sites, and installing water troughs to keep cattle in the uplands and away from the streambanks.

Federal agencies gradually added specialists in range conservation, real estate, and wildlife biology during the 1970s. The National Environmental Policy Act of 1970 required a review of the environmental impact of federal actions. Another new law in 1976, the Federal Land Policy and Management Act, mandated multiple uses on BLM-managed public land. The implementation of the two necessitated that federal agencies increase oversight and regulation of grazing and other activities on public lands.

Initially, ranchers resisted the intensified supervision. Many considered the new regulations a demonstration of contempt for their livelihood. As tensions rose, government employees feared retaliation if they pointed out problems in range management to permittees, who frequently lodged a complaint against local federal staff with their state and federal representatives. Gradually, however, ranchers developed better relationships with range conservationists on public land. On private lands, too, conditions improved as ranchers and the U.S. Department of Agriculture Soil Conservation Service[xii] and Idaho Department of Fish and Game (IDFG) staff worked together. These cornerstone relationships were fundamental when it came to Chinook salmon recovery efforts in the area. (See Federal Shifts subsection in Chinook Salmon and Water, 1986–1999 for continuation of this discussion.)

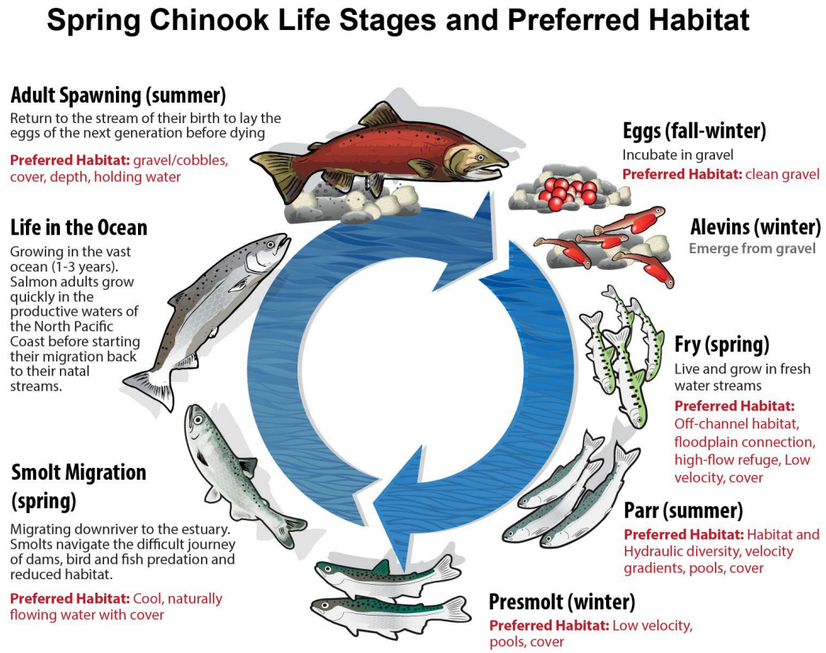


Cattle grazing near the Gilmore and Pittsburgh railroad tracks in the Lemhi River Valley (river channel in the background), circa 1920s. Source: Bolton Collection, Lemhi County Historical Society

Sheep in Lemhi River valley, circa 1920s. Source: Marshall Collection, Lemhi County Historical Society

CHINOOK SALMON

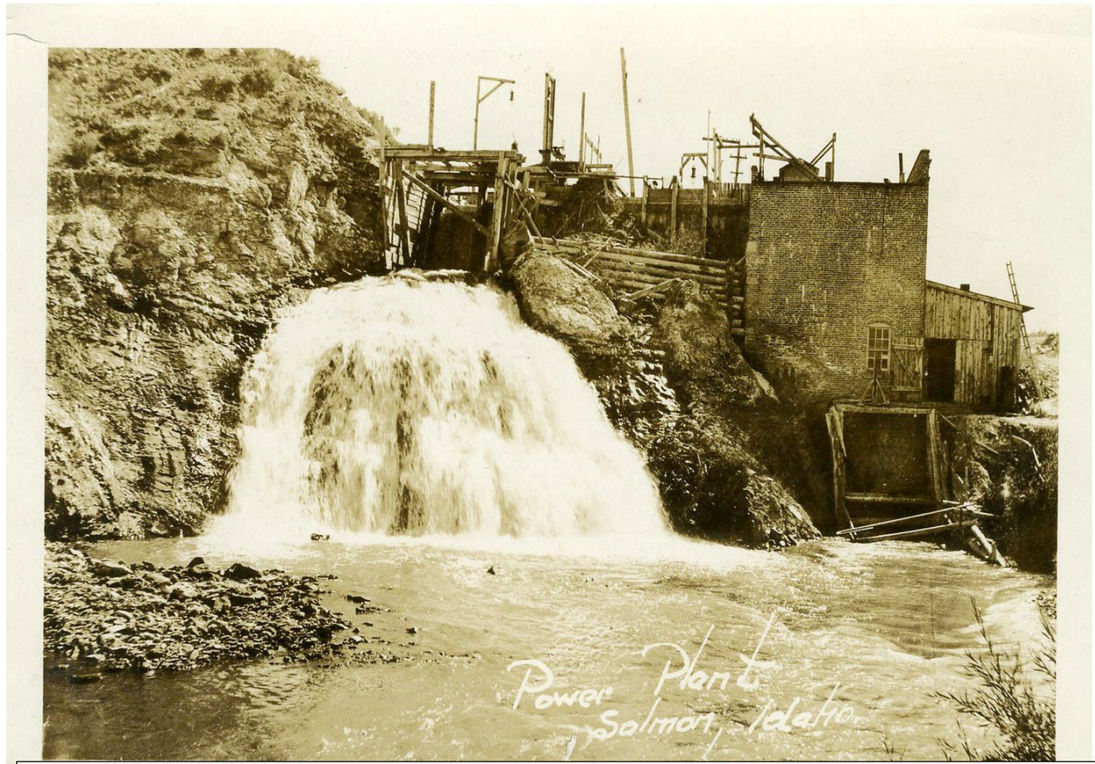
Salmon make their legendary migration from the mouth of the Columbia River to the headwaters of the Salmon River to spawn and die, a journey of about 900 miles. It is over 800 miles to the upper Lemhi River.



HISTORY OF CHINOOK IN THE LEMHI

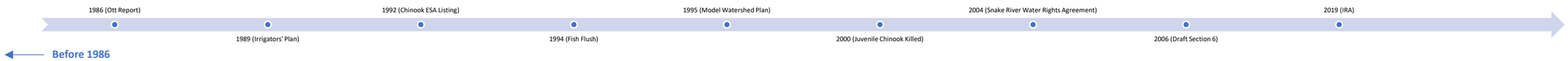
Two runs of Chinook salmon historically spawned in the Lemhi River (and were later referred to collectively as Snake River spring/summer Chinook salmon).

- Spring Chinook adults entered the mouth of the Columbia River in April/May to begin their journey. They arrived at the mouth of the Lemhi River in late May through June to migrate upstream to spawning grounds. Historically, they spawned throughout the Lemhi and the lower ends of its tributaries.
- Summer Chinook adults, which once arrived in the Lemhi in July and August, no longer make the journey. Most believe that their disappearance stemmed from two causes: (1) egg harvesting implemented to repopulate downstream waterways[xiii] and (2) from the construction and management of the Lemhi River hydroelectric dam in the 1920–1930s (see dams sidebar and photo to the right).



Lemhi River hydroelectric dam approximately one mile upstream from the confluence with the Salmon River, circa 1930s. Source: Unknown

When European settlers homesteaded the Lemhi Valley in the 1860s, the Agaidika[xiv] were harvesting fish from the prodigious runs. The new settlers—as had the Mormon Missionaries before them (1855-1858)—did the same. And memories detailing salmon fishing from the early years abound. Lemhi rancher R. J. Smith (former Chairman of the Lemhi Irrigation District) recounted that most of the salmon fishing in the twentieth century was done at the mouth of the Lemhi and farther up, between Tendoy and Leadore. Carmen Creek rancher Dave McFarland also grew up with stories of abundant salmon. Dave recounted that one local gentleman, born around 1910, regaled him with fish stories, including the opportunities provided by a "fish trap" built across the Salmon River. He told Dave that there were so many salmon in the water, it seemed like you could walk across their backs. The Lemhi County Historical Society has photos (see page 9) of the fish weir constructed each year during the early 1900s near Salmon City. It was built to ensnare salmon for harvest, and it gave locals the chance to witness thick schools of Chinook salmon attempting to continue their upstream migration. Older residents described their childhood activities of spearing, wrestling, "surfing" on, shooting, and catching salmon. Their parents remembered even larger runs of bigger fish. The community's memories of and yearning for salmon fostered a fertile arena for ideas to help the vanishing fish. Tribal memories, too, fed this palpable longing for the return of salmon to the Agaidika's traditional homeland. Salmon runs are still extremely important to



contemporary tribal members and are paramount in their pursuit of the treaty rights and traditional practices established through the Fort Bridger Treaty of 1868 and subsequent decisions. As early as the late 1800s, overfishing in the lower Columbia had led to numerous struggles over reducing and sharing salmon harvests, and legal problems continue. One of the cases, United States v. Oregon (initiated in 1968), is still litigating salmon management plans. This litigation stems from large harvests in the lower Columbia River, which significantly reduced the salmon available for upper Columbia River tribes to procure salmon according to their reserved treaty right. Fifty percent of the salmon runs must now be allowed to migrate above the lower Columbia to distribute the harvest more evenly.

Government fish trap on the Salmon River, circa 1930s. Source: Herb St. Clair Collection, Lemhi County Historical Society

Harvesting to support and maintain canneries depleted salmon runs substantially in the lower Columbia River from the 1840s through the 1920s. To reverse the downward spiral, the federal government operated a hatchery in the Lemhi near its mouth from 1920 to 1947. Fertilized eggs were shipped to hatcheries in Oregon and Washington. In 1926, it has been estimated that 5,000 females and 20,000,000 eggs were collected.[xv] The hatchery released juvenile fish in tributaries of the lower Columbia River, allowing the canneries to harvest the returning adults. The hatchery operated at the same time as the Idaho Power dam, and it is likely that the dam provided an easy spot to catch fish for egg harvesting (see photo to the lower right, page 10). Between the egg harvest and restricted access upstream, the Lemhi River's salmon population became so depleted that eggs from other areas were eventually brought to the Lemhi, altering the genetics of the local fish population.

Summary of Chinook Salmon Habitat and Abundance

The following text is excerpted with some omissions from Zell Parkhurst's 1950 Survey of the Columbia River and its Tributaries.

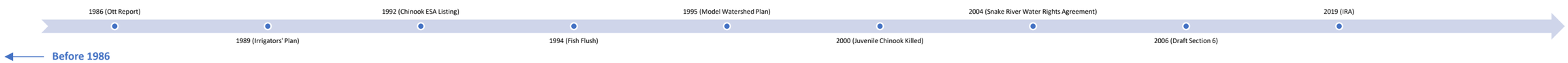
Lemhi River (June 30—July 8, 1941) Chinook salmon spawning area is abundant, of excellent quality, and well distributed. The Idaho Power Company maintains a diversion dam 6 feet in height at a point 1 mile above the mouth of the river. This dam is not equipped with fishways and is a barrier to salmon except during the June high water stage, when a few early-arriving Chinook salmon succeed in passing it. During low water periods the entire flow is diverted except for seepage. At the time of observation, the dam was impassable to fish, and was diverting 312 cubic feet per second into the canal leading to the power plant. The diversion is not equipped with any fish protective devices. The turbines probably do not greatly injure the downstream (juvenile) migrants.

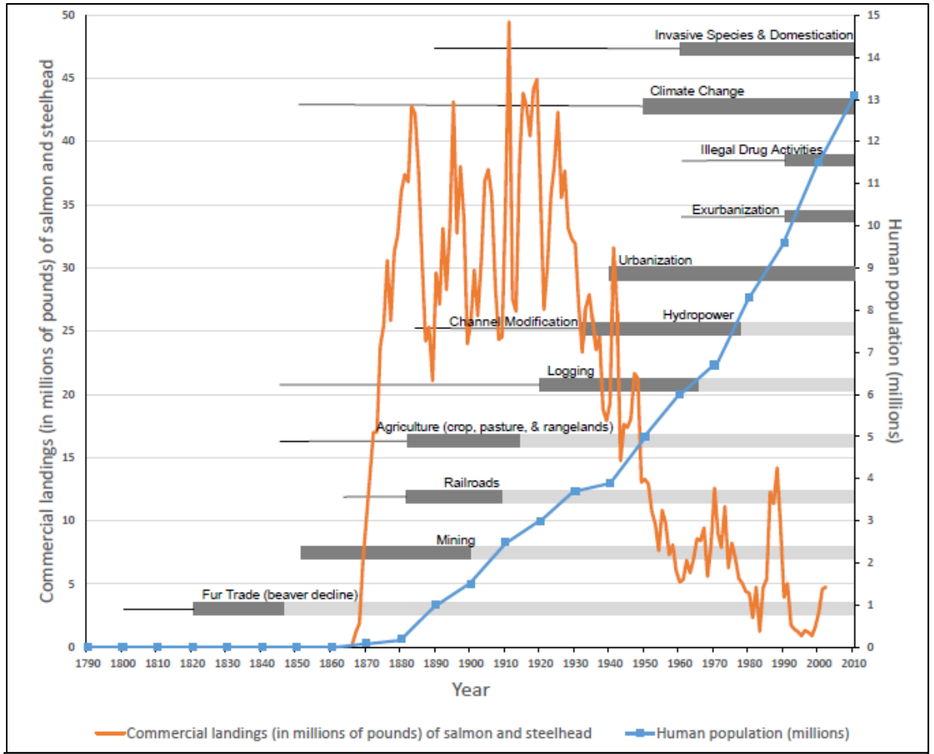
There is an irrigation dam 3 feet in height located 7.5 miles above the mouth (L6). No fishway is provided and the dam is a barrier at low water. There are numerous other small irrigation temporary wing dams on the Lemhi River all passable to fish. There are no fish screens on any of the water diversions from this stream.

At the terminus of the survey (at Leadore), the Lemhi River is formed by the union of several small streams, namely Canyon Creek, Eighteenmile Creek, and Texas Creek. The discharge of each of these headwater streams was approximately 2 cfs, and they were considered to be of little value to salmon because of their small size. The Lemhi River formerly supported an excellent run of Chinook salmon. The U. S. Fisheries Station at Salmon, Idaho conducted the artificial propagation of Chinook salmon on the Lemhi River during the years 1920-1933, but despite this effort the run has been depleted. No salmon were seen during the survey. The stream is of little value as a salmon producer at present, but it has great potential value.

Summary of Recommendations: Because of the greatly depleted condition of the Chinook salmon populations in the upper main Salmon River and upper Middle Fork, every effort should be made to protect and facilitate the natural spawning of the remnants of these runs. On the Lemhi River, a fishway should be constructed from the tailrace to the forebay of the Idaho Power Company's plant at Salmon, Idaho. An irrigation diversion dam located about 7 miles above the mouth (L6) should also be provided with a fishway and the diversion screened.

Source: Parkhurst, Z.E. 1950. Survey of the Columbia River and its Tributaries – Part VII (Snake River from above the Grande Ronde River through the Payette River). Special Scientific Report: Fisheries No. 40. U.S. Department of the Interior, Fish and Wildlife Service. November.





Source: Modified from Penaluna et al. 2016, Conservation of native Pacific trout diversity in Western North America. Page 292 Fisheries, Vol 42, No 6, June 2016

The University of Idaho and the Idaho Department of Fish and Game built a research hatchery in Hayden Creek in the 1960s to advance the science of production and slow the decline of salmon. Other issues outside the Lemhi Valley further eroded the returning salmon numbers: commercial, tribal, and recreational fish harvesting, along with development, pollution, and power dams on the Columbia and Snake Rivers—all took their toll.

In addition, irrigation diverted water—and fish—into fields. It also prevented many Lemhi tributaries from reaching the river, and the river itself went dry in places. The longest dry stretch, which was visible from the highway, was south and upstream of Salmon City (near Barracks Lane). The empty river was a problem and, for some, an embarrassment that was impossible to ignore. By the 1980s, Chinook salmon were not only disappearing from the Lemhi but also from the Salmon River. Community members wondered if the namesake of Salmon City and the spectacular Salmon River would be lost.

But this dire situation sparked positive change. The 1980 Northwest Power Act put the environment and the fish and wildlife on the same footing as power generation and the economy within the Columbia River Basin. The act established the framework for most of the salmon recovery efforts in the states of Idaho, Washington, Oregon, and Montana, much of which is still in place. Individuals worked together at multiple levels of politics and litigation to get federal legislation passed and signed into law.

Dams

From 1908 to 1954, the Idaho Power Company hydroelectric dam and power plant, located a mile upstream from the mouth of the Lemhi River, blocked adult Chinook salmon migration to spawning areas, except during high flows in June. Chinook eggs were collected at the dam between 1920 and 1933 to restock streams that had been heavily fished in the lower Columbia River Basin. The collection prevented most salmon from spawning in the Lemhi River.

Currently, the Lemhi River's Chinook salmon navigate eight hydroelectric dams in the Columbia and Snake Rivers on their way to and from the Pacific Ocean. Fish ladders let adult salmon pass above the dams, and juveniles spill over the mainstem dams, migrate through turbine houses and bypasses, or are captured and carried downriver on barges and trucks on their way to the ocean. However, the dams slow the river currents, which makes the journey more arduous and time-consuming than it had been before the dams.

Without the Northwest Power Act, salmon recovery in the Lemhi River and elsewhere in the Columbia River Basin would look very different than it does today.

The initial efforts to manage the salmon harvest and supplement populations with hatchery production were partially successful. Some residents recalled conditions in the 1960s and remembered people catching salmon through a variety of means (see fishing memories sidebar). They reminisced about large numbers of adult Chinook salmon returning in June and July to spawn in the upper Lemhi River in late August and early September. In 1964, for example, a biologist conducted a survey through the Beyeler ranch in Leadore (one of the spawning areas) and counted 300 redds (see life stages graphic), which represented approximately 750 salmon.[xvi] There were a significant number of fish in the valley, and they were an important food source for residents in the summer. Tribal harvest on the Lemhi River, however, was limited during that era due to restricted river access through private land.

Catching Chinook salmon at the government fish trap on the Salmon River at the city of Salmon, Idaho, similar to hatchery egg harvesting efforts on the lower Lemhi River below the Idaho Power Dam, circa 1930s. Source: Lemhi County Historical Society

Fishing Memories

Dave McFarland was told stories about locals setting up wooden picket weirs in the Salmon River at the island in Salmon, Idaho, in the early 1900s (see photo of picket weir and captured salmon on previous page). Salmon were so thick at the trap that it looked like you could walk on their backs. When the power dam at the lower Lemhi River was in operation, many salmon swam up the bypass canal and up to the dam where their progress upriver was impeded. The salmon would move downriver to attempt to get around the impediment, mostly between 4 and 6 a.m., and the Lemhi Shoshone would use lanterns to spot and spear the salmon.

Interviewees recalled significant fishing, particularly of salmon, from the 1950s into the 1970s, when the fish were still abundant. Fishing was big in the Lemhi and Salmon Rivers during these years; the fish were an important source of food for area residents in the summer. The best places to angle for salmon were upstream of Salmon City and on to Challis and Stanley, starting near McKim Creek at the "Darby Hole" and around Tendoy on the Lemhi River. Even in the 1950s, it was "combat fishing" with many people fishing at each deep pool and arguing over who had the best spots and opportunities.

The reduction in salmon numbers changed local fishing patterns in the 1970s and 1980s. Anglers had done very little steelhead fishing in Lemhi County up to this point because they preferred Chinook salmon; however, when the salmon season was closed in 1978, they turned to steelhead fishing in the Salmon River.

But fish populations began to dwindle again in the mid-1970s. The University of Idaho and the Idaho Department of Fish and Game performed experiments to improve hatchery techniques in the Lemhi River in the 1960s–1970s. These involved an adult trap just above Hayden Creek on the Lemhi River and the experimental hatchery facility on Hayden (see photo to the right). Improving runs was an ancillary goal of these experiments and met with mixed success.

Over time, the decrease in salmon in the Lemhi was the result of a combination of factors: changes in habitat, mortality during migration through the hydroelectric dam system, variable ocean conditions, harvest, genetic manipulation at hatcheries, along with competition and predation from fish, birds, and marine mammals. Additionally, variations in ocean productivity have had a significant impact on all runs of anadromous fish.

THE FUTURE OF CHINOOK

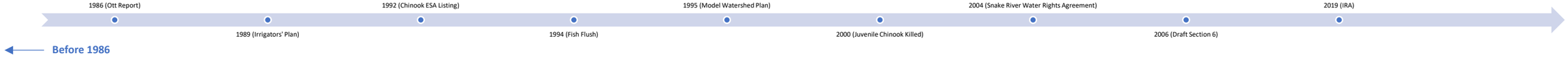
The dwindling number of adult salmon returning to the Columbia River caused federal agencies, states, tribes, conservation organizations, anglers, and commercial fishers to look for policy and management changes to reestablish anadromous fish runs. Government money was forthcoming for associated projects, but despite the significant dollars spent during the 1980s, fish numbers continued to decline.

The future of Columbia Basin salmon was weighed against power generation from dams, industries that used the power, and farmers who irrigated and shipped crops using the river system. The hydropower dams on the Columbia and Snake Rivers produced more than half the Pacific Northwest's electrical power and sent the excess outside the region. Some industries, including aluminum, came to the area for cheap hydroelectricity. Given the political and economic strength behind these interests, most of those supporting fish realized that if nothing were done, Pacific Northwest salmon would become extinct. Adding more tension, the salmon issue was further compromised by competition for control between the federal government and regional interests. Treaty-reserved tribal fishing rights contributed yet another level of complexity.

To save the salmon, tribal, state, and federal officials, in cooperation with conservation groups, proposed adding salmon to the nation's endangered species list. Federal experts conceded that saving the salmon would involve some pain but insisted that these *"fish are worth saving."*[xvii]

The Northwest Power Act of 1980 delayed the ESA listing for salmon by establishing a collaborative framework to look for solutions. This effort[xviii] brought together regional governments and agencies, tribes, and diverse interests. Bonneville Power provided funding, and Reclamation was a source of technical, engineering, and planning support for tributary habitat enhancement upstream of the mainstem Columbia and Snake River dams (the Northwest Power Act discussion continues in the 1986–1999 section below).

Hayden Creek fish hatchery (operated from 1920 to 1947), April 1965. Source: Tom Curet



Stacy Gebhards and the Vanishing Stream

Looking back on the start of his career five decades earlier, Stacy Gebhards recalled working in the Lemhi River Valley as his "dream job." He remembered that he could catch fish or "get a deer for the woodshed" and still be at work by 8:00 a.m. The IDFG fish biologist was determining the need for screens to keep migrating young fish out of irrigation diversions in the Lemhi—this subject became his 1959 master's thesis.

Gebhards first documented the degradation of Idaho streams and the resulting damage to fish populations in the Lemhi River. It is the work for which he is best known. In the late 1950s, he measured the miles of the Lemhi River isolated by the construction of Highway 28. In addition, he calculated the miles of channel altered by dam building for irrigation and the clearing of gravel from the streambed after the 1958 flood.

When he found similar damage to the Wood and Lost Rivers and their fish habitat in the late 1960s, Gebhards tackled the issue statewide. He inventoried streams and documented the amount of disturbance and its causes. He then electrofished* streams to compare the pounds of game fish supported in disturbed versus undisturbed reaches.

The study found that almost every mile of the 45 Idaho streams inventoried had been disturbed. These disturbances amounted to 38% of the total stream length. Over 60% of the disturbance resulted from road construction, approximately 20% from flood control activities, and 13% from mining. On average, adjacent undisturbed reaches supported eight times as many pounds of game fish. Perhaps most alarming were the lasting effects of disturbance: even 86 years after disturbance, game fish production remained 80–90% below undisturbed reaches.

Gebhards told the public what he found. For several years, each issue of the bimonthly IDFG magazine featured a "Wildlife Habitat Obituary" photo of damaged fish or wildlife habitat. He also created a film, *The Vanishing Stream*, about the damage done to Idaho's streams (this film and his articles are available at the Lemhi County Museum).

Source: Gebhards, S.V., R.F. Heberger, and C.D. Andrus. 2013 (est.). The Vanishing Stream: An Oral History of the Life and Times of Stacy Gebhards. Compact Disc set accessed at the Lemhi County Museum's Shirley Walker Lemhi County History Research Center.

*Electrofishing refers to a process used by fish biologists to stun fish temporarily with an electric pulse, thereby giving the biologist an opportunity to collect fish with a net to identify, measure, and release them.

Stacy V. Gebhards - Lemhi Valley Historical Photographs

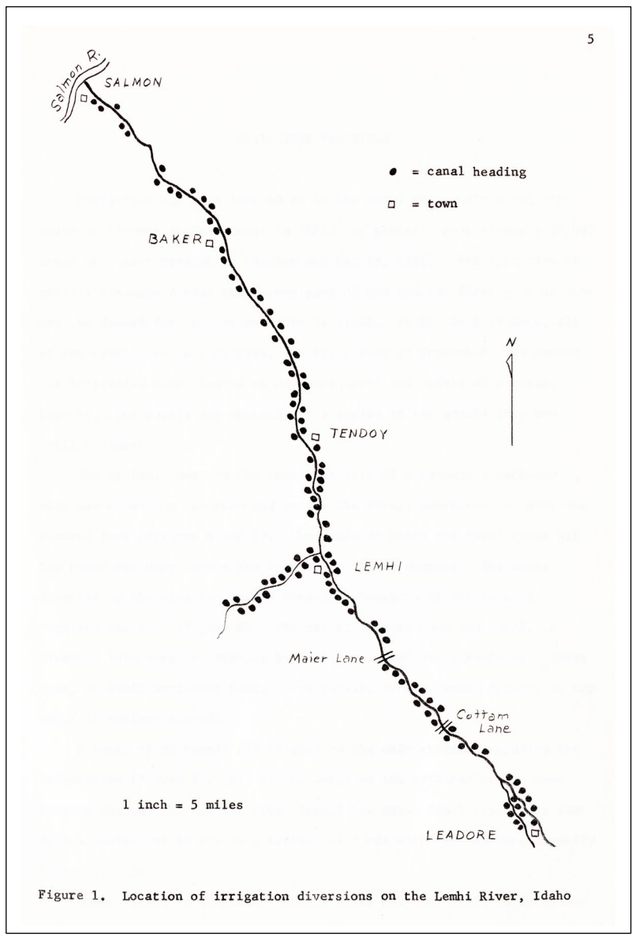
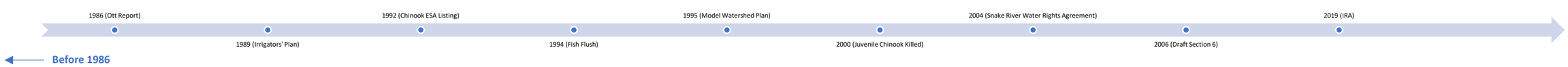
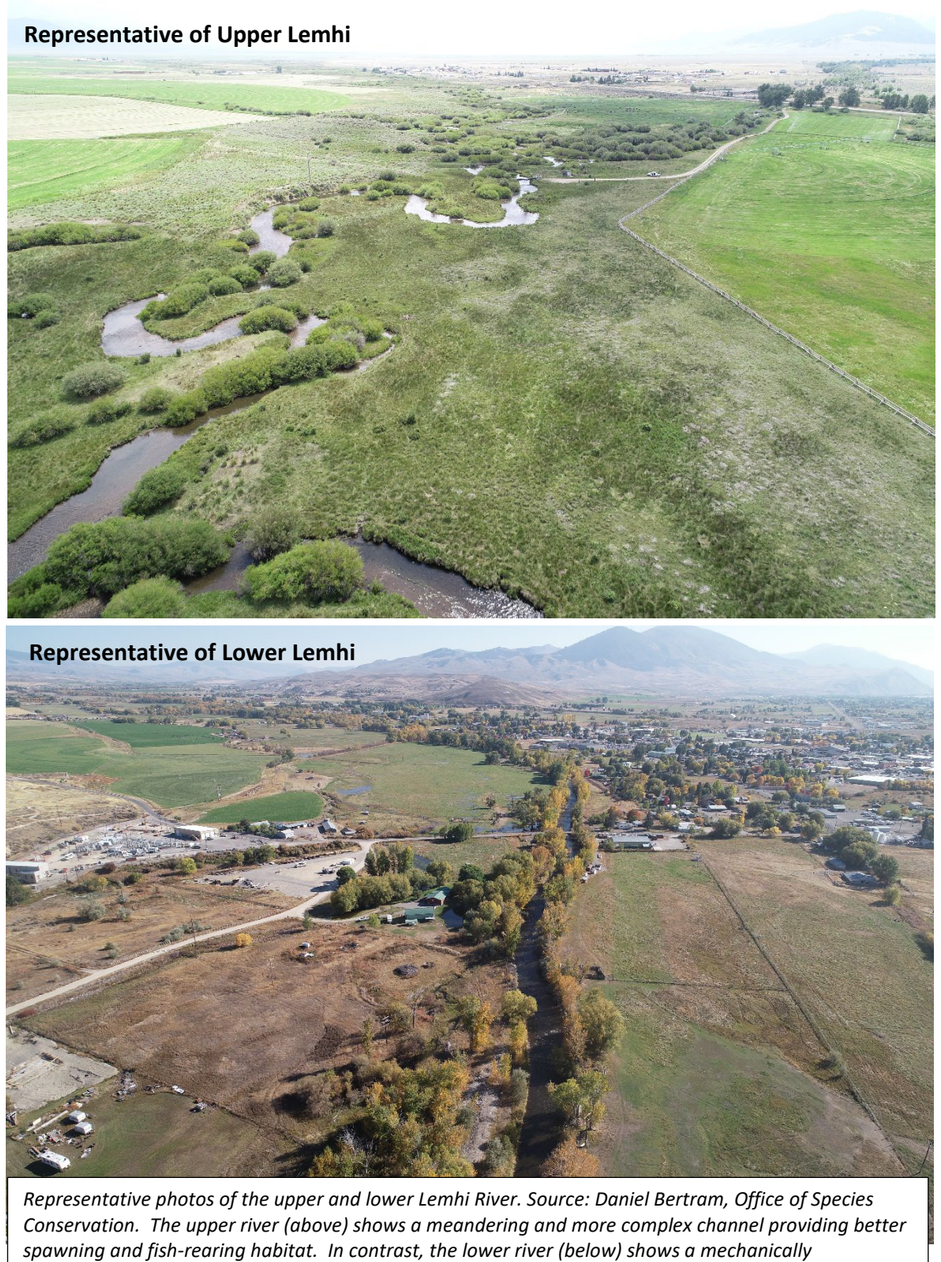


Figure 1. Location of irrigation diversions on the Lemhi River, Idaho

Above left: location of irrigation diversions on the Lemhi River; above right: perforated fish screen operated by waterpower on canal in the Lemhi Valley; lower left: perforated fish screen operated by electrical power in the Lemhi River. Photos and diagram, circa 1957. Source: Lemhi County Historical Society in the Gebhards Collections. "The Effects of Irrigation on the Natural Production of Chinook Salmon in the Lemhi River" by Stacy Gebhards. A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Fisheries Management. Utah State University, 1959.





Representative photos of the upper and lower Lemhi River. Source: Daniel Bertram, Office of Species Conservation. The upper river (above) shows a meandering and more complex channel providing better spawning and fish-rearing habitat. In contrast, the lower river (below) shows a mechanically straightened channel—straightened in an attempt to minimize flooding of the adjacent agricultural and residential floodplain areas around the City of Salmon. This condition substantially reduced fish habitat.

CHINOOK SALMON AND WATER, 1986–1999

In Brief: Although the collaborative group established through the Northwest Power Act sought to save the salmon, local concerns—including those about timber harvests and wolves—made progress slow and problematic.

The 1986 Lemhi Habitat Improvement Study or "Ott Report" assessed the Lemhi River and identified both the limiting factors for anadromous fish and the possible mechanisms to increase their survival. The study focused first on where irrigation diversion withdrawals periodically dewatered the river and tributaries. The ESA listing of Chinook salmon in 1992 and the federal adjustments in land management associated with the Clinton Administration demanded substantial change as soon as possible. Still, progress was slow. This recognition led to the Lemhi Water Conservation Demonstration Project and the Lemhi Model Watershed Project.[xix] Now, money was available to move forward with the necessary work, including the Idaho Department of Fish and Game screen program. The funds also enabled new restoration projects based on Ott Report recommendations. Early restoration efforts focused on keeping more water in the river, reducing the impact of grazing along the riverbanks, and reconnecting tributaries to the mainstem of the Lemhi. Despite occasional friction, the agencies and the community began working together to balance agricultural needs with fish needs.

FEDERAL SHIFTS

In 1993, Bill Clinton became president and appointed Bruce Babbitt as the Secretary of the Interior. Although Babbitt's early proposals for stiff increases in grazing fees on BLM-managed land and the establishment of standards for rangeland management were not passed, they left ranchers across the country unsettled.

Several factors influenced Lemhi County's perceptions of federal land management modifications, including those affecting timber harvesting. Significant changes occurred in the U.S. and world timber industries in the 1990s, among them dwindling supplies of the most lucrative old-growth timber, mechanization, and economies of scale for timber harvest and processing. Added to these issues was the protection of Pacific Northwest old-growth forests for the northern spotted owl—listed as threatened under the Endangered Species Act in 1990. These changes caused many small timber operations and sawmills to close, including those in Lemhi County. The spotted owl received blame for much of the decline in the U.S. timber industry and symbolized unpopular alterations in federal management. Although the listing of the Snake River sockeye salmon as endangered in November 1991 did not directly affect the Lemhi River (sockeye pass by the Lemhi as they migrate up the Salmon River to Redfish Lake and nearby smaller lakes to spawn), the listing intensified concerns in the community.

Thus, federal policy revisions affecting grazing (discussed in more detail in the Public Land section), timber harvest, and mining activities in Lemhi County left residents feeling as if they had little control over their livelihoods. The 1995 reintroduction of wolves in central Idaho, despite the ranchers' protests (they feared livestock depredation), added to the distrust.

In 1992, there was talk in the county that a listing of Chinook salmon could have dire consequences for agriculture. Even agency staff speculated that federal land-use programs might be suspended for an unknown period. The concern was region-wide.

After seeing the political backlash and economic effects of the northern spotted owl listing, both of Oregon's U.S. Senators wanted to avoid salmon listings. They coordinated a Salmon Summit in early 1991, which was the first time that diverse groups (power producers and users, tribes, fishers, and irrigators) joined to develop a plan to help salmon. Although the summit did not achieve its goal of avoiding salmon listings,[xx] the outcomes from the summit discussions were later incorporated into salmon recovery plans. As in the Lemhi, the groups at the Salmon Summit wanted recovery efforts to be locally planned and directed, not dictated by distant agencies.

WATER AVAILABILITY

Coinciding with federal policy changes, Lemhi River Valley residents were contending with a lack of water. Flows in the Lemhi River had decreased over the twentieth century due to irrigation diversions, reduced precipitation and snowpack, and warmer temperatures.[xxi] In years with smaller snowpacks and less rainfall, the stream flows did not meet the needs of irrigators, let alone those of fish.

By the 1980s, all but two tributaries (Hayden and Big Springs Creeks) were completely dewatered for much of the irrigation season, except for the traditional high-flow periods from late May through most of June. The Lemhi River, itself, was dammed and completely diverted for irrigation at diversion L6 (about 6 miles above the mouth of the river) in late April/early May and again from July through September. The period in April and May, known as the Mother's Day low, is due to warm spring conditions when grass and alfalfa begin to grow and often need to be irrigated. When ranchers diverted river water prior to the snow melting in the high elevations, the Lemhi could not meet the irrigation demand and became dry below L6. Other diversions also blocked Chinook adult migration (see irrigation diversion sidebar). The Lemhi River only reached the Salmon River in late May, most of June, and after irrigation ceased in the fall. As drier conditions set in, a part-time watermaster was hired to manage flows according to each water right.

Water users and fish managers recognized that the low-flow periods in early May and late summer had a negative effect on Chinook salmon and other fish. The Idaho Department of Fish and Game had long realized the dangers irrigation posed to migrating salmon. As early as 1938, the Mitchell Act funded salmon and steelhead production in the Columbia River, and a 1946 provision allowed funding to go individual states. Beginning in 1958, the Act was the instrument used to provide funding for irrigation diversion screening by the IDFG (see fish screen sidebar). It had no influence on water rights or irrigation withdrawals.

The Lemhi Basin Adjudication process commenced in August 1970 to formalize water rights in the Lemhi River Basin. Twelve years later, the Adjudication Court submitted a partial decree, but when the Snake River Basin Adjudication (SRBA, further discussed in the 2000–2015 section) began in 1987, it encompassed the Lemhi Basin Adjudication. The initial Lemhi Decree contained a provision allowing irrigators with decreed rights to continue diverting high flows as needed, in excess of their established rights. Understandably, the Lemhi irrigators sought to have this historical practice ruled a protectable water right in the SRBA but to no avail. Although the SRBA Court disallowed the irrigators' request, it did recognize the use of the "high flow" in the Basin 74 General Provision. High flow in this way is used only in specific areas of Idaho and is not a common provision or practice.

> Merriam-Webster defines the verb to **adjudicate** as "to make an official decision about who is right in (a dispute): to settle judicially." When water rights are adjudicated, officials determine if the claims are legal, the amount of water that can be used, and priority ranking during shortages.

As a result of the adjudications, various organizations formed, including Water District 74 (on the mainstem Lemhi and some of its tributaries) and Water District 74 W (for the headwater tributaries).

As the adjudication process evolved, the 1986 "Ott Report"[xxii] began its assessment of habitat conditions in the Lemhi with respect to survival challenges for anadromous fish. The study concentrated on irrigation diversions that dried up the lower reaches of the river to meet water rights. It also focused on the fish that were consequently delayed or killed in their migration downstream. Large losses of juvenile Chinook occurred in irrigation ditches. The study results suggested that increased Chinook survival could be attained by upgrading irrigation diversions, improving fish screening, and implementing one-day fish flushes (see fish flush sidebar).

Irrigation Diversions, Fish Flushes, and Fish Screens

Irrigation Diversions

Irrigation diversions in the Lemhi have ranged from early gravel pushup dams to today's permanent concrete structures with steel headgates to control flow and fish screens to keep fish in the river. At one time, there were approximately 90 diversions (Gebhards 1958) on the mainstem Lemhi River (referred to as "L" followed by a numeral, starting with L1 at the mouth). Water rights are associated with these diversions. The oldest water rights in the Lemhi River have priority over the newer ones. The oldest decreed water right is at L6, dating from 1866.

Fish Screens

A fish screen is placed at the head of an irrigation ditch, below the diversion headgate, to prevent fish from swimming down the ditch and potentially being delayed in their migration or killed.

Fish Flush

A fish flush is used to allow water to flow for a short time and "slingshot" fish through a dewatered channel. In the Lemhi River, the 1994 fish flush was made possible by water users agreeing to stop diverting water for one night (July 21). By releasing water all at once, the fish (in this case, primarily stranded adult Chinook salmon) were provided instream flow through a previously dewatered section at L6, allowing them to migrate upstream to spawn.

LOCAL RESPONSES

Bruce Mulkey's family has ranched in the Lemhi for generations. Mulkey remembers, *"It really hit me one day. Dad died in 1988, and I was haying along the river and thinking about how he liked to chase salmon. I got to thinking that it'd be nice if my kids could do that."* Mulkey interrupted his story at this point to say he hates fishing before going on. *"I was on the LSWCD [Lemhi Soil and Water Conservation District] board and on the water district board. I said something about salmon to a couple people, but they said, 'They're a people problem,' which they were—people trying to get to the river to fish for salmon without asking permission. So, I let it drop until the LSWCD's 5-year plan was coming up. Then I said, 'Let's do something,' and it sort of snowballed from there."*

When the Lemhi Soil and Water Conservation District board wrote its new five-year plan in the mid-1980s, Mulkey made sure they included an action item encouraging ranchers to work on fish recovery. Over the following two years, an Irrigators' Committee, comprised of Mulkey, Bob Loucks (former University of Idaho County Extension Agent), and R.J. Smith, attended meetings within Water District 74 to encourage irrigators to be proactive on anadromous fish recovery efforts. Loucks remembered, *"We were all concerned that an ESA listing would bring in U.S. Fish and Wildlife Service and NMFS. We could foresee everyone spending a ton of money on litigation and lawyers. Instead of doing anything to actually help fish recovery, we would just spend our efforts in litigation. Probably 90% of the ranchers were on board when recovery efforts actually started. The other 10% are still not convinced that any action was worthwhile."*

With the backing of the Lemhi Irrigation District and Water District 74, the Irrigators' Committee consulted the Ott Report to clarify the issues. It highlighted the need to increase instream flow in the Lemhi and underscored the detrimental effect of screen diversions on salmon migration. The alternatives laid out in the report gave the valley a head start in the race to fund salmon habitat work. The University of Idaho, the Lemhi Irrigation District, the local Soil Conservation Service[xxiii] and several ranchers[xxiv] drafted a plan to better

manage the district's water. The district coordinated with the Idaho Department of Fish and Game and the Forest Service to develop the 1989 "Irrigators' Plan" to amend irrigation practices and reduce juvenile salmon mortality.

With the threat of lawsuits from environmental groups, agencies and ranchers recognized the heightened need to work in concert. Ranchers did not want to lose their livelihoods, and agencies did not want to go through time-consuming and disheartening lawsuits. No one wanted to be the target of litigation over irrigation and land uses. Locals were interested in and willing to change to help salmon and themselves. Not surprisingly, there were times when tempers flared, especially in the first 10 years, but strong leadership and facilitation led to compromise and collaboration, effecting solutions that worked for all parties—at least most of the time.

Although Lemhi County is approximately 92% federal land, nearly 100% of the salmon habitat in the Lemhi River Valley is on private land. This unique situation requires cooperation and compromise. The Natural Resources Conservation Service works with producers on private land to help improve their operations while protecting natural resources. During this pivotal period, key supervisory staff at federal and state agencies learned from ranchers and worked to improve communications. This promoted a partnership between local agencies and ranchers to meet the Endangered Species Act requirements and realize their mutual interest in avoiding ESA-related litigation. The Beyeler Ranch in Leadore provides a good example of what working together can achieve. In 1996, the Bureau of Land Management, U.S. Forest Service, Idaho Department of Fish and Game, and Shoshone-Bannock Tribes installed fencing and planted willows along the river on ranch property to reduce the impact of cattle on salmon spawning and rearing habitat. In the process, residents and agency staff learned to talk with and trust each other.

The 1980 Northwest Power Act (review in "The Future of Chinook" subsection here) established funding from Bonneville Power's revenue to mitigate salmon and steelhead losses in the Columbia River Basin states of Washington, Oregon, Idaho, and Montana. The Northwest Power Planning Council managed the funds and requested that Bonneville Power and the Bureau of Reclamation set up pilot projects in each of the states. Reclamation developed Water Conservation Demonstration Projects while BPA developed Model Watershed Projects. In Idaho, the Model Watershed Project (MWP) began with the Lemhi River and eventually came to include the Pahsimeroi and East Fork of the Salmon Rivers; today, it has further expanded, encompassing all tributaries from the mouth of the Middle Fork of the Salmon upstream through the headwaters and is referred to as the Upper Salmon Basin Watershed Program (USBWP).

LEMHI WATER CONSERVATION DEMONSTRATION PROJECT

The Bureau of Reclamation's Tributary Enhancement Water Conservation Demonstration Projects occurred in Idaho, Oregon, and Washington.[xxv] With additional funding from Bonneville Power, Reclamation provided expertise in planning, engineering, and construction. The water conservation demonstration projects aimed to show the improvements that could be accomplished in stream flow, habitat, and passage conditions for anadromous fish. In other words, these community-based efforts strove to improve tributary habitat for salmon. The federal agencies coordinated closely with water users and the Lemhi Soil and Water Conservation District for local input and on-the-ground knowledge.

In 1991, the Lemhi Demonstration Project first focused on the L6 diversion on the Lemhi River (**see dam progression graphic**). Historically, irrigators used heavy equipment to create gravel pushup dams, diverting the entire river and leaving the streambed dry, sometimes for months at a time. The initial phase of the demonstration project consisted of new weirs at L6 and L7 to allow irrigation water to be withdrawn and added a fish ladder. The next part concentrated on diversions L3a-L5 where gravel pushup dams had also been blocking fish passage. The project consolidated diversions, eliminating L4 and L5 and replacing the L3a pushup dam with a fish-passable weir. This created a system that allowed adult and juvenile fish to migrate successfully when water flowed in the lower Lemhi River.

(LEMHI) MODEL WATERSHED PROJECT

The Lemhi community was united in wanting to help salmon survive. Recognizing that they would need outside funding for salmon recovery, they wanted the work to be based locally and managed by the Model Watershed Project, which organized in 1992. The MWP was placed under the administration of the Idaho Soil Conservation Commission[xxvi] and partnered with the Lemhi and Custer Soil and Water Conservation Districts. Locals were concerned that decreasing their normal irrigation would dry up agricultural land in the Lemhi River Valley. They advocated for Ralph Swift (Natural Resources Conservation District) to lead the effort as the Model Watershed Coordinator. The MWP's goals were to assess conditions within the watershed, implement actions to help rebuild salmon runs, and work collaboratively for a sustainable fish environment while supporting the local economy. Model Watershed employed the Ott Report and the Irrigators' Plan as starting points for the process, which resulted in the Model Watershed Plan for the Lemhi, Pahsimeroi, and East Fork of the Salmon River (Plan).[xxvii]

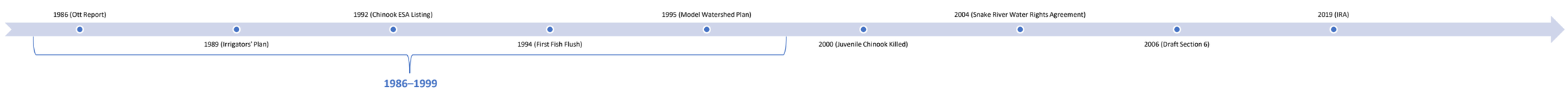
In support of Plan development and at the request of Ralph Swift, Jude Trapani (BLM fish biologist) coordinated a large-scale stream habitat inventory with twenty-two other local and regional biologists in 1994. This study and other investigations helped identify and prioritize the MWP goals and future improvement work. The Plan identified inadequate flows as one of the major problems. Consequently, the first goal was to increase instream flow (further discussed in the 2000–2015 section) and make irrigation diversions safer for fish. The Plan also noted the deterioration of stream and riparian habitat and functional river conditions relative to historical levels. The Upper Salmon Basin Watershed Program worked with landowners to develop restoration projects, seek and manage funding support, assist with the permitting process, oversee implementation, and monitor project outcomes. These early relationships—built on trust—paved the way for additional projects to be implemented.

The Upper Salmon Basin Watershed Program is supported by its Advisory and Technical (Tech Team) Committees. The Advisory Committee directs the development of policy issues and programs from a local perspective.[xxviii] The Tech Team brings together local and regional scientific knowledge about salmon and their habitat. The first series of meetings in the early 1990s focused on screening and instream flow issues. Discussions focused on fish biological needs and, during the planning stages, provided a forum for ranching perspectives, presented by R.J. Smith from the Lemhi Irrigation District. After the geographical area was expanded in 2000 to include the entire upper Salmon River Basin, the Tech Team grew to include a much larger set of participating agency staff. Lemhi Irrigation District watermaster Rick Sager and Idaho Department of Water Resources contractor Bob Loucks joined the team, bringing local knowledge of agricultural needs and social concerns. The Tech Team continues to be an integral part of the USBWP process, assisting in project proposal development, ranking a vast array of local issues, and providing technical expertise.

EARLY SALMON RESTORATION PROJECTS

The early successes of the Lemhi Water Conservation Demonstration and Model Watershed Projects went a long way in establishing trust among the various parties. Additional fish recovery projects (focused, at this time, on keeping more water in the river and reconnecting tributaries to the mainstem) continued through the 1990s, as described in the sections below. Funding from the Bureau of Reclamation and Bonneville Power proved critical, and Reclamation also provided expertise to build fish-safe diversions to complement the IDFG fish screen program.

In the 1990s, fish habitat improvement in the Lemhi centered on reducing fish losses at irrigation diversions and increasing instream flow. The measures implemented are introduced in the Irrigation Diversions, Fish Flush, and Fish Screens sidebar and are further detailed below:



- The 1994 fish flush was tried with the goal of helping adult salmon migrate upstream to spawn and juvenile salmon migrate downstream to the Salmon River. Only adults were monitored for successful passage during the flush.
- Improved irrigation diversion headgates and fish screens were installed to keep fish from becoming trapped and to control water better.
- Irrigation diversions were consolidated to reduce impediments to migrating fish, increase instream flow in the high-demand section of river below L6, and lower the costs of constructing diversions and screens. These projects reduced the number of diversions on the mainstem Lemhi River from about 90 to 68.
- Where feasible, flood irrigation systems were converted to sprinkler systems to make water delivery points safer for fish and diminish the amount of water needed for irrigation. Sprinklers also increased crop yields by applying water more evenly, and it reduced the labor needed to irrigate.

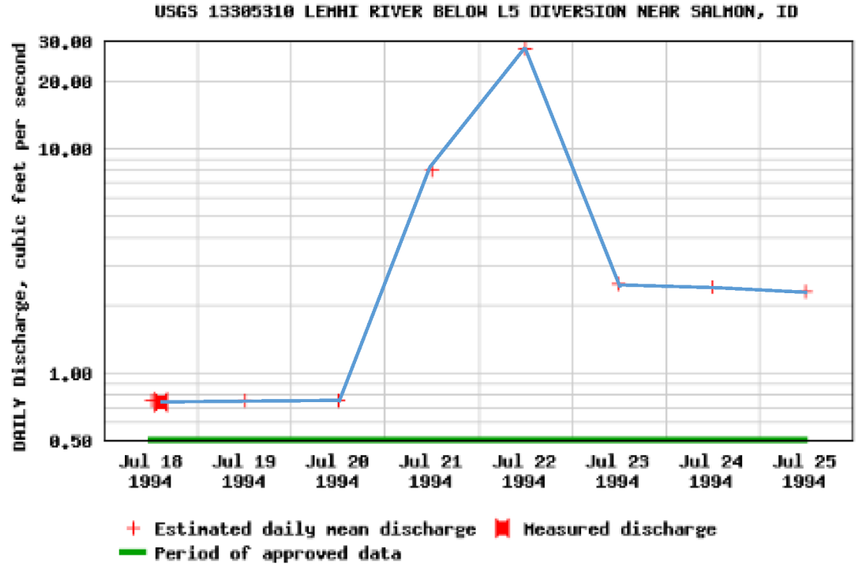
FISH FLUSH

There was a time when dewatering the lower Lemhi River during peak irrigation demands was seen as an unsightly and regrettable, although necessary, part of life in Lemhi County. Unfortunately, the resulting dry sections of the Lemhi River completely blocked migrating fish. With the decline in Chinook salmon numbers and the 1992 Endangered Species Act listing, agencies and irrigators developed a way to assist their migration.

While in the Peace Corps in India, USFS fish biologist Bruce Smith learned how to stimulate fish migration by holding water back, then releasing it all at once. Bob Loucks remembered that Smith said, *"We don't need a ton of water; if we can get just enough water, they'll run to Leadore."* Planning for such an effort began in 1993, and in June 1994, the Model Watershed Project orchestrated a volunteer effort among irrigators to stop water diversion for one night to determine how much water could be accumulated for a flush.

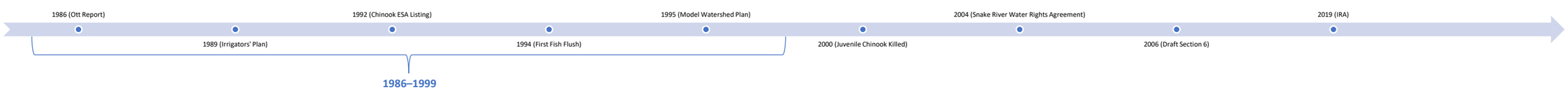
In 1994 (a dry year), after surveys from IDFG and Shoshone-Bannock tribal biologists observed salmon staging in the Salmon River at the mouth of the Lemhi below the dewatered section; consequently, irrigators agreed to release water for a 12-hour period to allow the fish to migrate upstream. Local Model Watershed participants, irrigators, and biologists gathered on the evening of July 21 to monitor the rising water and watch for migrating salmon. The watermaster expected about 30 cubic feet per second (cfs) to re-water the dry section, but an impressive amount of water filled the dry riverbed. Loucks recalled that the river flow increased quickly after diversions were turned off, and it flowed at over 30 cfs for 24 hours (Lemhi River Flow at L-5 1994 Fish Flush image). To see if salmon were able to make it through this section of river, IDFG staff set up a simple detection method, lining a short portion of the river bottom with white plastic and shining spotlights into the water. In theory, this should have made the large fish visible as they swam upstream. The high-water flow, however, created turbidity, and it was difficult to see, let alone count, fish. The number of adult Chinook salmon migrating that year was small, and only two were observed swimming up the Lemhi River, but it was a big step for the fish recovery partnership.

Lemhi River Flow at L-5
1994 Fish Flush



IRRIGATION DIVERSION CONSOLIDATION

Reclamation's Lemhi Water Conservation Demonstration Project consolidated diversions to help Chinook salmon survive. This process required creative thinking and complex planning and included the legal procedures for moving a state water right. Rancher Don Olson was motivated to participate in the early stages because the L5 diversion on his ranch fell in the dewatered section of the river below L6. Getting water to fulfill Olson's water right and irrigate his property was not an easy process. He had to use a gravel pushup dam, which needed to be rebuilt frequently during the irrigation season. Complicating matters, diversion L5 was junior to the L6 water right (the oldest on the river). This meant it had to be closed when the water flow dropped to base levels, and the river went into regulation (allocating water according to right). To ameliorate the situation, Olson worked with the Idaho field office of The Nature Conservancy (TNC) and purchased the adjacent property upstream. To make this possible, TNC developed a conservation easement that reduced the purchase price by restricting development, mining, and other rights. Their arrangement allowed Olson to move the L5 water right upstream and consolidate it with diversion L8a. This eliminated the L5 diversion, and Olson no longer had to put heavy equipment in the river to receive water.



Successful projects like this one, which helped both fish and rancher, paved the way for other innovative approaches. Olson's experience showed that ranchers were heard and could provide input, encouraging more ranchers and water district members to work with the government for mutually beneficial solutions. Local agency biologists and managers proved open to these projects and finding "win-win" resolutions remains the guiding principle.

INSTREAM FLOW

Efforts to increase flows in the high-demand section of the Lemhi River below L6 grew steadily during the 1990s. As previously discussed, the Bureau of Reclamation funded the installation of new diversion structures, fish ladders, and diversion consolidations in the L3a to L7 section of the lower Lemhi River.[xxix] This resulted in structures that allowed safe fish migration and ensured sustainable agricultural operations.

Voluntary water releases offered the only mechanism during this period to provide consistent stream flows for fish migration, but sufficient water was critical to sustain ranching. Significant planning went into looking for alternatives to strike this delicate balance—it had to be done right. Losing local support would be detrimental to working on the private lands so important to salmon. But to allow the continued dewatering of the river threatened ESA enforcement action, which could result in the cessation of irrigation as well as litigation for salmon recovery relief. With the fish-friendly diversion infrastructure in place and the potential for more available water in the lower Lemhi, a mechanism was needed to facilitate voluntary flow agreements to secure water instream: ***the Lemhi River needed a minimum stream flow water right.*** But before that could happen, locals would need support from the Idaho state legislature.

Bob Loucks, Bruce Mulkey, and R.J. Smith led the instream flow process by approaching the Committee of Nine (see definition block in the late 1990s. The committee, whose members are elected by the water districts of the upper Snake River plain, is a knowledgeable and influential Idaho water group. Loucks explained, *"We knew we couldn't pass anything in the legislature without them."* Both the committee and the Idaho water users agreed to support the legislation. Further details are given in the 2000–2015 section.

FISH SCREEN PROGRAM

The Idaho Department of Fish and Game started fabricating and installing fish screens for irrigators in the Lemhi River Valley in 1958.[xxx] That year, fish biologist Stacy Gebhards estimated that almost 423,000 young fish, or over 27% of the fry emerging from gravel, died in irrigation canals in the Lemhi.[xxxi] He recommended screening irrigation diversions.[xxxii] The screens keep migrating fish from entering diversions and fields (see fish screen sidebar). Fish that are not killed outright in diversions can be seriously injured, especially if caught in multiple diversions on their travels. In the early 1990s, the IDFG screen program was upgraded,[xxxiii] and the Model Watershed Committee was formed concurrently to address screening program complexity, prioritize funding, and implement the best technical solutions. The committee worked very well with local water users.

The **Committee of Nine** is a board serving the irrigation districts of the upper Snake River. This board has a long history and knowledge of Idaho Water Law and is very influential on state water policy. Due to their experience with water banking, they were consulted on the Lemhi River water bank proposal and provided essential support.

In the early 1990s, the fish screen program received a large new shop and a new manager, Chuck Keller. Keller had worked previously as a BLM fish biologist in Lemhi and Custer Counties and with the Yakima River fish screen program. The Yakima program was the first to develop and refine fish screens for diversions. Sharing his knowledge and techniques improved the Lemhi program, which included a comprehensive inventory and plans to upgrade screens in order of priority (a determination based on the benefits for salmon and steelhead). But the increased funding and programs enabling this process caused some locals to be wary of government oversight. When the National Marine Fisheries Service contracted a helicopter flight in the summer of 2000 to film the dewatering of the lower Lemhi as part of an assessment, a few believed that black helicopters were surveilling and arresting people. However, the MWP and their partners continued to work diligently with federal agencies to complete fish projects, downplaying suspicions but also paying close attention to the needs of local ranchers.

During this time, the IDFG fish screen program hired several local people as managers, fabricators, technicians, and screen tenders. New employees born and raised in Lemhi County had good relationships with friends and family members who ranched. These trusted connections helped the screen shop's credibility and increased the program's acceptance. For example, Lemhi County native Larry Weeks helped establish access easements across private land to construct and maintain fish screens. He was also able to help plan and negotiate diversion consolidations and transfers. Where appropriate, Weeks assisted ranchers in upgrading from flood to sprinkler irrigation. The switch to sprinklers improved ranchers' hay production by applying water more evenly, reducing labor costs, and cutting the water needed. The result? More water for fish!

The screening process is not a stagnant one. The program consistently improves screen designs to ease operations for the irrigator and to meet adjustments in the National Marine Fisheries Service criteria. Over the years, fish safety hasn't been their only concern as they modify. After a dog drowned in one of the screens, the shop improved the design to make it safer for nonaquatic creatures. In addition, the Natural Resource Conservation Service played a critical role by contributing engineering support for lockable and controllable headgates at the irrigation diversion points. Further improvements allowed the watermaster to send the appropriate water volume (according to decreed right) down the ditches, which could then be properly screened. The screens were designed for a specific flow, maximizing fish survival and ensuring that irrigators received their water allocations.

Researchers found that from 2003 to 2008, out-migrating smolts (young Chinook salmon) encountered from 41 to 71 water diversions in the Lemhi. The study estimated that 71.1% of these would die if none of the diversions in the Lemhi were screened, and that only 1.9% would be lost if all diversions were screened.[xxxiv] The screens also ensure that juvenile fish can migrate downstream in fall and spring with little delay. Reducing the time it takes migrating juveniles to move downstream increases their survival, which reinforced support for the fish screen program and demonstrates the importance of sufficient instream flow.[xxxv]

Chinook salmon on a redd (nest) Upper Lemhi. Source: Jude Trapani

HAYDEN CREEK WORK

Hayden Creek, the Lemhi's largest tributary, has always been an important component of the Chinook salmon habitat. In fact, the Fort Limhi missionaries reported in their 1857 journals that they had harvested seven wagonloads of dried salmon from one of its tributaries, Bear Valley Creek.[xxxvi]

On a 1995 field tour, the Model Watershed Project, ranchers, and agency staff witnessed a salmon spawning in a diversion structure in Hayden Creek—fish getting into irrigation systems and fields had become a chronic problem. This brought new perspective to the group as they considered how best to improve irrigation practices upstream of the L6 reach and increase salmon habitat and survival. Salmon that spawn on a gravel push-up dam are at risk if the irrigator should need to rebuild the berm because these actions would disturb the eggs. Cooperative efforts to assess the river system were critical to the process of keeping fish in the mainstream flows. With the realization that salmon were spawning in Hayden Creek, the BLM and USFS employed spawning surveys, which were later administered by IDFG. These surveys underscored the importance of Hayden Creek to the overall habitat. Surveys since then have shown variability in the distribution of salmon between the upper Lemhi River and Hayden Creek. Chinook spawning is split between the Lemhi (approximately 60%) and Hayden Creek (approximately 40%).

GRAZING MANAGEMENT

In addition to early restoration projects focused on maintaining an adequate stream flow, grazing management modifications to benefit fish were being made on both private and public land. The Endangered Species Act requires that biological assessments be developed to review and evaluate all use permits[xxxvii] for possible effects on the listed species. The BLM and USFS struggled to adjust permitted activities, like grazing and logging, to comply with these ESA requirements. In response to the listings of fish, the USFS and BLM eventually adopted the Pacific Anadromous Fish Interim Management Strategy (finalized in 1995), which limited disturbance activities, such as logging, to within 300 feet of fish-bearing streams on federal land.

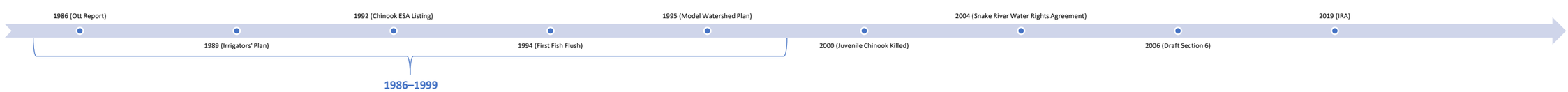
Fencing projects and grazing management adaptations on private and BLM- and USFS-managed lands were implemented to protect riparian areas (see definition block) and water sources from overgrazing. In the past, being able to feed and water cattle along the streams had made cattle and sheep operations easier. Now, however, ESA funding pays for new fencing and water developments, which allows ranchers to care for livestock without sacrificing salmon habitat. These complementary improvements have helped improve relationships between grazing permittees and agencies. In addition, efforts to recover riparian vegetation like willow, alder, and cottonwood trees will protect the streambanks and shade the water for better salmon habitat.

PRIVATE LAND

Three pilot projects were completed on private land in the upper Lemhi River Valley in the late 1990s. The Model Watershed Project joined the National Resources Conservation Service, BLM, IDFG, USFS, and the Shoshone-Bannock Tribes on its first private land project to install riparian-pasture fencing on Merrill Beyeler and Bob Amonson's ranches near Leadore. Beyeler was, and is, an innovative rancher and an early adopter of many salmon habitat improvements, including the first MWP grazing management plan. The Beyeler fencing project was a learning experience in design, carried out with great enthusiasm (refer to page 15). Beyeler remembers that this first project was observed with concern by his neighbors.

Merriam-Webster defines the adjective **riparian** as "relating to or living or located on the bank of a natural watercourse (such as a river) or sometimes of a lake or a tidewater." The condition of riparian vegetation affects the condition of aquatic habitat. Good fish habitat is shaded by riparian vegetation that protects the streambanks from eroding sediment into streams.

Lemhi Valley Historical Photo: Chinook Redd in Hayden Creek, August 1957. Source: Lemhi County Historical Society in the Gebhards Collections. "The Effects of Irrigation on the Natural Production of Chinook Salmon in the Lemhi River" by Stacy Gebhards. A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Fisheries Management. Utah State University, 1959.



Beyeler Ranch riparian pasture. Source: Merrill Beyeler

A related, and perhaps more complicated, restoration effort was simultaneously underway in Panther Creek, a tributary to the main Salmon River. Its history of litigation due to pollution stemming from the Blackbird Mine brought multiple organizations to the project.[xxxviii] It also led to opportunities for further restorative action. Plans were implemented to clean up the mine site, install water filtration for heavy metals, and eventually reestablish fish that had been eradicated below the mine. Off-site mitigation was one of the settlements, and the agencies coordinated with the Model Watershed Project to look for opportunities to contribute to Chinook salmon habitat improvement outside of Panther Creek. They identified Karl Tyler's ranch on the upper Lemhi River as a good location. A key partner, Tyler was willing to allow litigation settlement funding to pay for fourteen miles of fencing along the Lemhi River and the adjacent Big Springs Creek, which incorporated over eight miles of critical stream reaches for salmon spawning and rearing. Tyler wanted to participate to show others, including the environmental community, that ranchers would and could do projects that benefit fish and agriculture.

Watermaster Rick Sager played an important role, sharing information on projects as he traveled among the irrigators. He saw and heard which agency projects were working for ranchers and spread the word. Small pilot projects let agencies improve their methods while neighboring ranchers watched to see how things would work out. Despite the initial distrust, several other riparian fencing projects followed the Beyeler, Amonson, and Tyler projects along the Lemhi River, including the Cottom Ranch, McFarland Livestock, and the Muleshoe Ranch. Their successful efforts increased the miles of protected vegetation and stream habitat.

PUBLIC LAND

While work was beginning on private land in the Lemhi River, federal land management agencies adjusted their approach as mandated. The 1992 ESA listing of Chinook salmon enforced by the National Marine Fisheries Service required the BLM and Forest Service to change grazing management where needed. The two agencies had to assess all federal permits to ensure their management plans addressed adverse effects on stream and riparian habitats.

Endangered Species Act requirements thus strengthened the agencies' position to improve areas suffering substantial degradation from long-term grazing. Their related endeavors resulted in fewer ESA violations and less third-party litigation. And these actions appealed to groups like the Western Watersheds Project and the Idaho Conservation League, organizations interested in better ecological conditions. The BLM Manager and USFS District Ranger led the search for solutions on federal land that would bring grazing into compliance with the ESA, and they continued to find economically viable options for local ranchers.

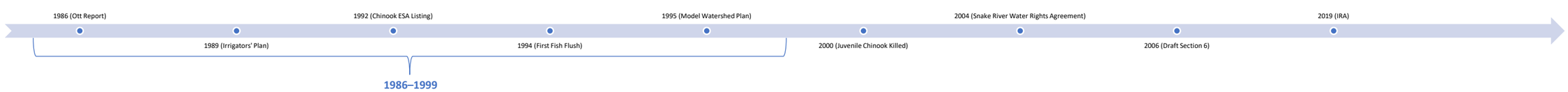
Before the ESA listing, permittees often contested BLM- and USFS-proposed changes and frequently complained to their state representatives, demanding to be left alone. The Idaho BLM State Director and USFS Forest Supervisor needed to manage these new considerations and address the ranchers' fears of being shut down by the National Marine Fisheries Service and thus losing their livelihood. Previously installed USFS cattle-exclosure fencing on Big Eightmile, Purcell Spring/Texas, and Hawley Creeks helped establish important "refuge" areas, but further protections were needed. The BLM and USFS moved forward with new grazing agreements that would benefit fish and have the least negative impact on traditional grazing. As each federal grazing allotment was reviewed under the ESA for its effect on Chinook salmon and subsequently on steelhead and bull trout, some permittees had difficulty transitioning to new policies that emphasized stream and riparian habitat improvement. Ecological conditions in streams and riparian areas had been traditionally ignored because they recovered faster than the upland sage-steppe habitat and were critical for watering livestock.

New funding was allocated to the agencies for grazing assessments and the construction of fencing and water developments, helping ranchers comply with new stream management requirements while still allowing grazing. This example of evolving livestock management on both BLM and USFS allotments has been applied to all locations in the Lemhi River.

The additional data collection and analysis required by the listing of the Snake River Chinook salmon resulted in an influx of new hires by federal and state offices. The new hires were primarily fish biologists and natural resource staff who were more likely to be young and have graduate degrees. They also included a higher percentage of women. The new employees not only added to the local economy, but they also did things a little differently. BLM and USFS staff increased their interactions with ranchers on both their public allotments and their private lands. Their sincere interest to understand the ranchers' situations and plan new ways of managing resources again helped to improve relations.

Jude Trapani remembered using the "picnic test" as an indicator of whether grazing in riparian areas was balanced—would you want to take your family there for a picnic? Agency staff had critical insights from these on-the-ground conversations with ranchers like Bruce Mulkey. Trapani said, *"What we really want is cattle to spend more time in the uplands away from the streams so the willows can grow and be thick along the stream."* This was the first time Mulkey had specifically heard the reason for keeping cattle out of the riparian area. He said, *"Why didn't you tell me that you wanted willows when we first started? I can get you willows!"*

As implementation of the new regulations progressed, there were, of course, difficulties. One such example occurred with rancher Don Olson, who had become chairman of the Model Watershed Project Advisory Committee in 1993. The following year, his family leased a ranch on Hayden Creek, where his cattle grazed the adjacent BLM- and USFS-managed allotments. Hayden Creek was the only Lemhi tributary at the time where salmon still returned to spawn. Because of the sensitivity of the Endangered Species Act and potential litigation over grazing permits, these allotments were under scrutiny. As evidenced by BLM assessments,



previous overgrazing of some riparian areas had caused increased sediment to be carried down Hayden Creek, where salmon spawn and rear. Although no fish-bearing streams were present on Olson's grazing allotments, the resulting water quality harmed salmon downstream. Temporary electric fencing and cattle herding were attempted to keep the riparian areas in good condition that year but were not enough to show habitat improvements. The Bureau of Land Management, concerned about lawsuits from an environmental group, issued the decision to close the allotment early. Because it meant a large financial loss, Olson was understandably upset when he was required to move cattle from the BLM-managed allotment and back onto private land six weeks early.

That year, Olson hosted the Lemhi Soil and Water Conservation District's range tour on the allotment. During the tour, he brought up the need to balance grazing on public and private land in the interests of both salmon and ranchers.[xxxix] Participants recognized that if the BLM and USFS closed grazing allotments, ranchers with federal permits would be forced to keep their cattle on private land. This would substantially increase cattle feeding along the Lemhi River and further degrade its salmon habitat. Thus, federal agencies and ranchers worked together, planning new ways to facilitate grazing and improve salmon habitat conditions simultaneously.

By the end of 1994, many ranchers were shifting gears, realizing that they needed to manage their allotments not only for grazing but for fish habitat. They understood that natural resource litigation posed a serious threat to their livelihoods. Instead of contacting their state or federal legislators, permittees were starting to work with the agencies to improve conditions.

PROGRESS THROUGH RELATIONSHIPS

The 1990s was a time for building relationships, clarifying issues, listening to multiple perspectives, establishing teams and committees, and planning for policies and projects to address the complexities of salmon recovery. This collaborative work took a herculean effort of dedicated people from all walks of life who were interested in bringing salmon back to the Lemhi without harming the economic and cultural values of the community.

Work to improve salmon habitat in the Lemhi was built on a foundation of interconnected relationships among the residents of this remote area. People worked together because they were relatives and friends, and because they lived in the same small community. When federal and state agency staff listened to area residents and tried to understand their lives, values, needs, and concerns, the two groups could operate together effectively. In addition to acknowledging the strong landowner participation in improving conditions for salmon, the Lemhi Irrigation District, the Lemhi Soil and Water Conservation District, and the Cattle and Horse Growers Association also recognized local fishery biologists for their part in the combined efforts to help water users and fish.

Agencies listened to everyone affected by an issue, then consulted experts on legal and policy matters. By identifying possible solutions, communicating with the state legislature and regulatory agencies, and educating water users about new instream flow patterns, surprises and problems could be avoided. Educational programs focused on the benefits of fish habitat improvement became an important tool in maintaining community support. Other efforts, like the Lemhi County land-use planning document, helped foster relationships for more collaborative management. But even with many landowners willing to participate in projects to benefit salmon, the restoration work could not have been done without federal funding.

What happened in the Lemhi River Valley in the 1990s provides a good example of local leadership, especially from within the agricultural community. These men and women addressed a complex issue and reached out to state government and other key players to help shape policy instead of pointing fingers and embracing litigation. Despite twenty-first-century challenges, they continue their collegial work to find new solutions.

WORKING TOGETHER

Salmon returns to the Lemhi River hit the lowest numbers on record during the 1990s. Lemhi rancher Merrill Beyeler remembered that the 1980s and early 1990s were *"dark days, sad days" for fish—and for people—in the Lemhi River Valley."* Beyeler suggested, however, that those times were *"also maybe the best days, because they…became exciting days."* Historically, relationships between ranchers and the local, state, and federal land management agency staffs were often difficult. Beyeler remembered that ranchers felt they had had a good year if they saw USFS staff three times, and the staff only saw them once. Even seeing an IDFG pickup used to make Beyeler wonder if he'd done something illegal. But with the new concentration on building better working relationships, there were also exciting aspects for ranchers like Beyeler, who saw opportunities to make improvements for both fish and ranchers.

Although it may have been a difficult time, a constellation of factors aligned to help salmon in the Lemhi River and its tributaries. At federal and state agencies, supervisory staff led by example and showed their staffs how to listen to and learn from ranchers. Dave Krosting, manager of the local BLM office, is remembered warmly whenever residents talk about salmon habitat work in the Lemhi. He listened to ranchers and suggested ways the agency could help them meet their goals. IDFG Regional Supervisor Gary Power emphasized to his staff the importance of understanding first, before trying to be understood. The USFS Leadore District Ranger Dick Ward worked closely with ranchers on their allotments. Ralph Swift, retired National Resources Conservation Service Range Conservationist and former MWP Coordinator, worked with ranchers to improve their private land and agricultural operations. Agency staff followed suit and worked to communicate clearly with ranchers. Not only did agency employees work to inform the ranching community about fish and natural resource issues, but the agricultural community also coached the agency staff on what it takes to raise livestock and irrigate fields. Rather than reacting to situations as adversaries, they learned to work together for a common goal, and small successes led to bigger ones.

The Lemhi County community is small, isolated, and strong. It's a place where people depend on each other. When asked why the community came together to help fish, now-retired University of Idaho Lemhi County Agricultural Extension Agent Bob Loucks said, *"I think it worked because we had a history of working together; there was trust in the group. We realized we had to work with the government too."* Lemhi rancher Don Olson acknowledged, *"We're all for the fish and the community. We're community-minded, we want to take care of everyone. We did it our way; we knew it was going to happen."* Lemhi rancher Bruce Mulkey agreed, *"They let us do it our way; it's not a top-down deal, driven by people who don't know the area. My family came in the 1870s, and I'd like to see people continue to ranch here, because that's all that's left. If the cattle leave, the county will dry up and die."*

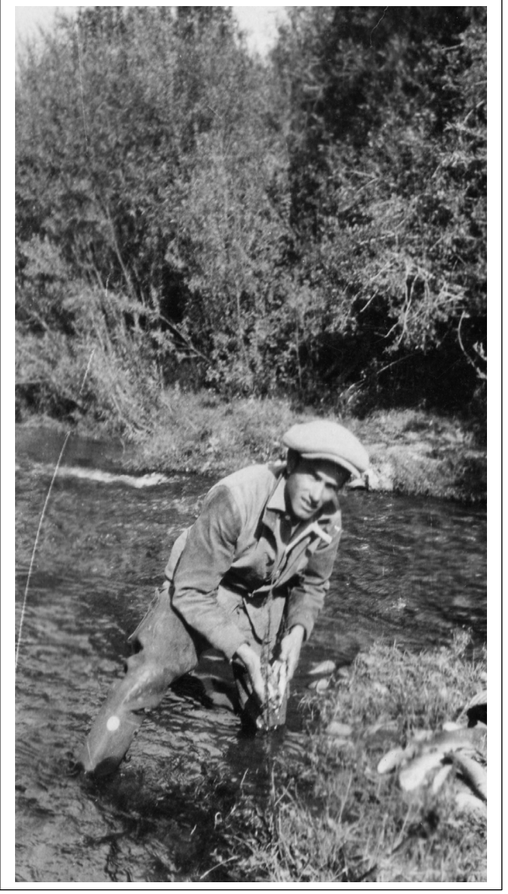
Former Regional Fishery Manager for the Idaho Department of Fish and Game and current Regional Supervisor Tom Curet pointed out*, "Families sit in the same bleachers and float and fish the same section of river."* Curet sees both ecological and social aspects of salmon recovery in the area. He asked, *"What's the social cost of losing something that's been so much a part of the community?"* Ralph Swift added, "*There was a wealth of knowledge about the fish on the river. And the people who lived on the river wanted to make sure it didn't cost them their livelihood: cattle, hay, and irrigation."*

The 1990s may have seemed particularly dark, but residents still remembered the contentious debate over the establishment of the Frank Church River of No Return Wilderness Area in the 1980s. Outfitter Jerry Myers wondered if that experience made people in Lemhi County want to avoid another such conflict over resource management and, more specifically, over fish. In addition, the Challis Experimental Stewardship Program,[xl] begun in 1978, provided an early example of how federal agencies and private landowners could work together. Participants in that program recognized that it increased cooperation and trust, and their successes encouraged those in the Lemhi River Valley to follow suit.

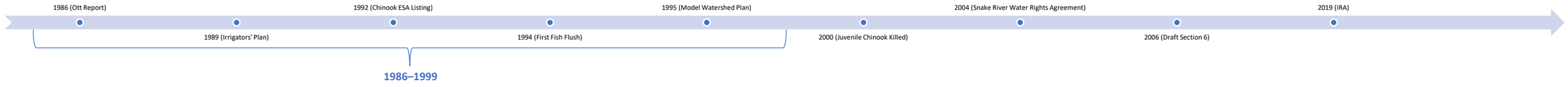
In Dave McFarland's view, Lemhi County is a place where division by class or wealth or position has little influence. For the most part, people in Lemhi County view themselves as equals, making it easier to work on community-based restoration.

Support came from outside the valley, too. The Model Watershed Project, 1992–2007, has since expanded to the Upper Salmon Basin Watershed Program under the Idaho Governor's Office of Species Conservation (OSC). OSC is dedicated to planning, coordinating, and implementing the State of Idaho's decisions to preserve, protect, and restore species listed as "candidate," "threatened," and "endangered" under the Endangered Species Act. This work is done in coordination with Idaho's natural resource agencies and input from the citizens of Idaho while taking into consideration the state's economic vitality.

Lemhi River Historical Images



Fishing in the Lemhi Valley - left: photo taken by photographer William Fowler; above: Snyder Family Collection. Source: All photos in the Lemhi County Historical Society



(Top to Bottom): Hawley Creek fish screen (source: Cindy Salo); USBWP and Lemhi Soil and Water Conservation District field tour on the Lemhi River circa 1995 (source: Jude Trapani).

ISSUES GUIDING FISH HABITAT IMPROVEMENT, 2000–2015

In Brief: Instream flows remained the priority in the Lemhi River Valley in the early 21st century. The discovery of dead juvenile Chinook salmon in a dewatered section of the lower Lemhi River in 2000 resulted in the National Marine Fisheries Service becoming more heavily involved in the area, requiring multiple legal agreements. New science and different issues brought shifts in streamflow management and the oversight of local programs. Work continued to focus on tributary reconnections, irrigation system improvements, and instream habitat, promoting the enhancement of salmon habitat but also protecting the area's economic needs.

State support and legal counsel for subsequent agreements came from attorney Michael Bogert of Governor Dirk Kempthorne's office and Clive Strong from the state Attorney General's office. Strong worked extensively with local groups providing expertise on water law, the Endangered Species Act, and irrigation issues.

INSTREAM FLOW NEEDS AND SOLUTIONS

As described in the previous section, low flows and the periodic dewatering of the lower Lemhi were the first issues the Lemhi River Valley community tackled in the 1990s. Everyone agreed that fish need water and that dewatering delays or prevents their migration. The diversion changes of the 1990s made water management easier and more efficient. And because heavy equipment was no longer needed due to improvements at L6, L7, and other diversions to create and maintain gravel pushup dams (see dam progression illustration), water quality also improved.

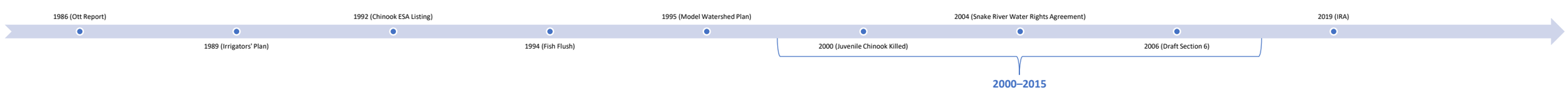
During the 1990s and early 2000s, almost all the Lemhi River diversions were modified with more permanent headgate-control structures. The Idaho Department of Fish and Game also installed state-of-the-art fish screens to keep fish out of irrigation systems that could injure and kill young fish. The focus of work then shifted to increasing permanent instream flow in the reach below L6. Continued collaboration was essential: irrigators wanted to protect their water rights; fish biologists and conservationists wanted enough water in the river to protect fish and allow them to migrate safely.

In addition, the Idaho Department of Environmental Quality developed the Total Maximum Daily Load for the Lemhi River Basin in 2000, compiling an extensive data set on conditions and recommendations for improvements. These would need to be considered as work progressed.

NATIONAL MARINE FISHERIES SERVICE INVOLVEMENT

Events in the spring of 2000 threatened to fray the rapprochement between ranchers and government agencies. In May 2000, three dead juvenile Chinook were found in the dewatered section below L6. Shortly after, two adult salmon were killed in the lower Lemhi when they became trapped in the rotating mechanism of an irrigation diversion. In response, the National Marine Fisheries Service (NMFS) threatened to take action against the water users for an unauthorized "take," or killing, of an ESA-listed species. Tensions increased when investigating, NMFS biologists crossed onto private land without permission, which increased the community's distrust in the government process. These events highlighted the importance of the *local* agency staff who worked on ESA issues with private landowners—people who were their neighbors and friends.

In response to the salmon deaths and to avoid litigation, Governor Kempthorne asked his legal counsel Michael Bogert and deputy attorney general Clive Strong to mediate the dispute between Lemhi irrigators and the NMFS.[xli] Strong and Bogert expended considerable time communicating with federal agencies, local water districts, and the Lemhi County community. Their process allowed them to bring ESA regulatory agencies, local irrigators, and land resource users together in an agreement. Although complicated, the results would merit the effort.



As conditions stood, Lemhi ranchers knew that the NMFS could force them to stop irrigating without compensating their losses. They also realized that curtailing water rights would wreak economic havoc in the Lemhi River community. The State recognized that Chinook salmon had to have instream flow in the lower Lemhi but that ranchers would need compensation if there were to be a successful agreement. To achieve both, a series of Lemhi Conservation Agreements was established between 2001 through 2004.[xlii]

To begin, the NMFS agreed that if the established minimum flow were maintained at L6, they would cooperate with the State of Idaho and landowners to avoid ESA citations. In the new arrangements, NMFS, the State, and the irrigators negotiated specific flow requirements for ESA-listed Chinook salmon and steelhead. Intending to sustain more consistent flows for safe fish migration through the L6 diversion, they agreed upon a minimum instream flow of 25 cfs below the L6 diversion to start. This would increase over time to 35 cfs from April 1 – June 30 and 25 cfs from July 1 to the end of the irrigation season in October. These proposed agreements[xliii] went beyond the previous Irrigators' Plan (see additional Section 6 Conservation Agreement discussion under SRBA and the Snake River Water Rights Agreement).

Legislation to this effect arrived on the floors of the Idaho State Senate and House of Representatives. In 2001, legislators sponsored the Lemhi bill, which fostered a minimum stream flow in the lower Lemhi River. The bill passed without a dissenting vote, [xliv] establishing a Minimum Stream Flow water right at the L6 diversion. The protected flow below the diversion would be thirty-five cubic feet per second (cfs) 80% of the time between March 15 and June 30. It would be twenty-five cfs 100% of the time between March 15 and November 15 each year. Stemming from this legislation, agreements—coordinated between the Idaho Water Resources Board and water users—were voluntary, and no one gave up water without compensation.

Subsequent annual renewals and permanent subordination agreements ensured the continued effort to maintain the base flow of 25 cfs passing over the L6 diversion and on to the Salmon River. In addition, a settlement in 2022 created minimum stream flows for Bohannon, Big Timber, Canyon, and Hayden creeks and created a new water right for channel maintenance on the Upper Lemhi River at the McFarland Campground.

Water Right vs. Instream Flow

Merriam-Webster defines the noun **water right** as "a right to the use of water (as for irrigation)."

The noun **instream flow** is defined as "water flows and levels in a stream or other waterbody and in reference to rivers" by the North American-based Instream Flow Council.

Water rights are administrated by a state permitting system. To establish a water right, the water user must divert water to a beneficial use and must continue to use the water to maintain their right. In times of water shortage, older water rights supersede more recent ones (i.e., more recent ones may go without water).

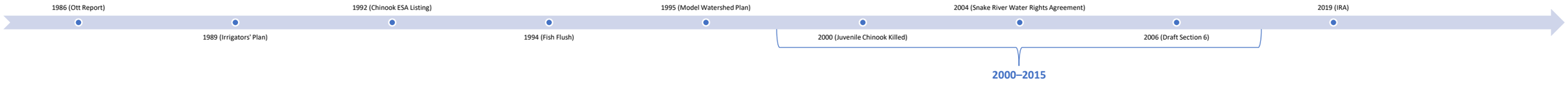
In the Lemhi River, the Idaho Water Resource Board (IWRB) holds a minimum stream flow water right in the reach that begins at the L-6 diversion and ends at the confluence with the Salmon River. This minimum stream flow water right is an established water right and the beneficial use is for instream flow rates of 25-35 cfs. The IWRB can call for the 25-35 cfs when the flows are not being met using subordination agreements with senior water right holders on the Lemhi River. The purpose of the minimum stream flow "is to provide for the passage of anadromous fish in the authorized river reach."

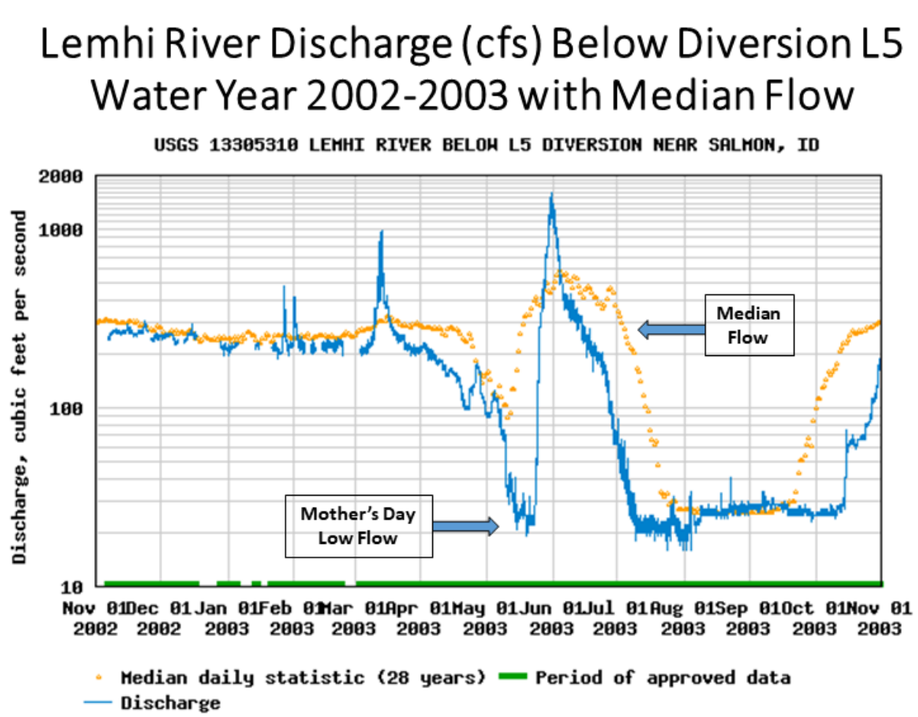
Salmon recovery planning has been an evolving process—demonstrating the willingness of partners to work together to accommodate changing conditions and emerging information. For example, the Lemhi Model Watershed Plan was the foundation for the early 2000 conservation plans, and the 2000 plans laid the groundwork for the 2004 Snake River Water Rights Agreement.

METHODS TO ESTABLISH INSTREAM FLOW

The natural stream flow in conjunction with irrigation water withdrawal was insufficient to satisfy the legislated minimum; consequently, the Lemhi irrigators and National Marine Fisheries Service agreed on a "market-based transaction" program to achieve the desired flow. Bonneville Power Administration would pay irrigators to spill water in annual and permanent voluntary agreements "to not divert." For the first two years, Reclamation provided funding to pay senior water rights holders to lease their rights to the Lemhi Rental Pool. Then, the Idaho Water Resource Board rented them to meet the minimum stream flow past L6 during the irrigation season.

This first step was not a long-term win-win situation because participating ranchers who leased their water for the season could not divert in the fall when abundant water was in the river. This meant their hay fields and pastures were drier going into winter than they otherwise would have been. Moreover, early agreements focused on the summer low-flow period and did not address the frequent Mother's Day low in mid-May (see graph below), when irrigation often begins at the same time juvenile fish begin their downstream migration.





Source: USGS National Water Information System

In 2001, the Idaho Department of Water Resources hired Bob Loucks to work with their staff and valley irrigators to develop water agreements. Not only did Loucks know the area, but he also had a long history of involvement with the process and was known and trusted by the various groups, agencies, and ranchers involved. He was conversant with the state Attorney General's staff, members of the Idaho Department of Water Resources Board, and Idaho's congressional representatives. In other words, Loucks understood ranching as well as Idaho water law and its associated legal complexities.

Building upon what was already in place, Loucks and Water Resources developed policies to establish permanent and more effective methods of maintaining the minimum stream flow. The resulting non-diversion agreements at L6, between the Idaho Water Resources Board and water users, now provide greater flexibility than previous endeavors. With the new arrangements, irrigators must restrict their water delivery only when the minimum streamflow is not met. Natural flows at L6 vary based on annual snowpack and runoff conditions, and in good water years, there may be very few days of restricted delivery. Water users are only paid for the days that they spill water as part of the instream flow agreements. This change saves agencies money because it lets them pay for water only when it's needed to maintain minimum instream flows, not when a specific date is reached. Irrigators share the burden of not irrigating for short periods but can still produce their crops. This complicated solution came from the desire to help salmon, to have traditional agricultural production, and to avoid litigation and ESA violations.

Lemhi rancher Bob Thomas was an early participant in the water transaction agreements. He worked with Jack Haynes (Reclamation) to evaluate his options. Thomas said he had always wanted to take his family to Disneyland but couldn't because he was so busy during the summer irrigating and haying. But, Thomas thought, if he only had irrigation water until June 30th and agreed not to irrigate the remainder of the summer season, he could harvest the first cutting of hay in early June as usual and realize a modest second crop by month's end. This would provide most of the hay necessary to feed his cattle through winter. The resulting reimbursement would compensate for lost production in July, August, and September, enabling him to buy the additional hay his stock needed. Thus, he could take his family on vacation because he would have the time and money to do it. Early participants, like Thomas, showed the community the benefits and encouraged others to follow suit.

CONSERVATION EASEMENTS AND PERMANENT SUBORDINATION AGREEMENTS

A conservation easement is a voluntary, legal arrangement that permanently restricts some land uses to protect conservation values. In the Lemhi River Valley, conservation easements are agreements generally orchestrated between a private landowner and The Nature Conservancy or the Lemhi Regional Land Trust. These easements often have elements associated with land and water uses and have been an important tool in achieving the instream flow objectives of twenty-five and thirty-five cubic feet per second below the L6 diversion.

Permanent subordination agreements are contracts between the Idaho Water Resources Board and a water user to restrict water delivery at L6 so that target flows can be met—leaving more water in the river and increasing streamflow past the L6 diversion. They only affect the water right(s) listed in the agreement and do not limit development rights on the associated property.

Both conservation easements and permanent subordination agreements are attached to the property deed and exist in perpetuity. But the distinction is crucial because while both are permanent, they serve different purposes, and their values (and compensation) are structured differently. While each requires an appraisal, the permanent subordination agreements use a "before and after analysis," which determines the property's value both with and without water. Having a subordination agreement tied to a property and water right allows the landowner to maintain their decreed water rights in their name and continue to irrigate when the Lemhi River minimum streamflow is being met (see water right vs. instream flow sidebar). The difference is the value of the water right.

The Lemhi Minimum Stream Flow has a priority date of 2001, which is junior to all irrigation water rights decreed in the Snake River Basin Adjudication. Therefore, the Idaho Water Resources Board must form agreements with senior water rights holders (1900 and earlier) to meet and maintain the Lemhi minimum stream flow. Without these agreements, the Lemhi River below L6 would still likely be dry for weeks and possibly months every irrigation season.

In 2009, seven permanent subordination agreements were developed by the Bonneville Power Administration (BPA) funded Idaho Water Transactions Program.[xlv] These permanent contracts secured approximately fourteen cfs and made planning and management easier.

The Lemhi River Valley community's response to flow restoration projects has been mixed. Some ranchers welcomed the various opportunities and signed the agreements. Others consolidated their diversions and modified their irrigation systems to help augment flow for the benefit of salmon. Federal funding provided for the structural improvements, and ranchers were compensated for spilling their water past L6 or for agreeing to pump from new diversion points. However, some irrigators remain leery, especially of the "in perpetuity" restrictions on private land.

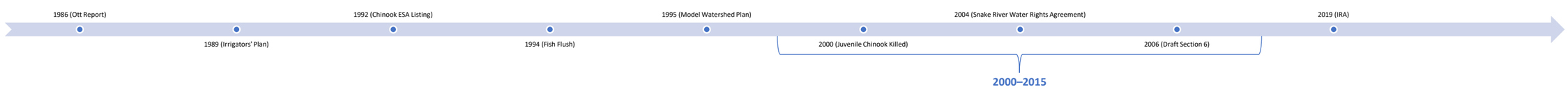
Upstream view of L4 in summer 1994 before elimination of diversion (left). Downstream view of L5 in summer 1994 before elimination of gravel berm (right). Source: Bob Loucks

SRBA AND THE 2004 SNAKE RIVER WATER RIGHTS AGREEMENT

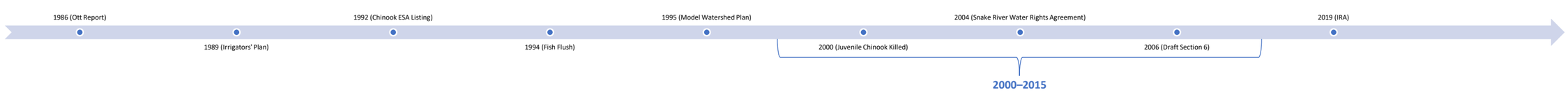
The variety of methods used to claim water rights has often led to confusion and conflict. In 1987, the State of Idaho asked the Fifth District Court of the State of Idaho to make an official decision on water rights in the Snake River Basin, which encompassed the Salmon River and its tributaries. By 2014, over 150,000 water rights had been legally determined, including those in the Lemhi River Valley.

Before the adjudication, using unallocated "high flow" water from the Lemhi during spring runoff was considered a water "use" rather than a full water right. Lemhi irrigators hoped the Snake River Basin Adjudication would elevate the traditional practice to a recognized legal right. However, the USFS, tribes, and the Idaho Conservation League protested this conversion, and irrigators did not have the funds for a legal response.

In addition, the Nez Perce Tribe claimed instream flow rights to provide habitat in traditional fishing places. As part of the SRBA process, the 2004 Snake River Water Rights Agreement (including the Nez Perce Agreement) set minimum instream flows and established a fund for anadromous fish habitat rehabilitation in the Salmon and Clearwater River Basins. The SRBA decision in 2004 included the USFS and Nez Perce Tribe and contained settlements for both parties.[xlvi]



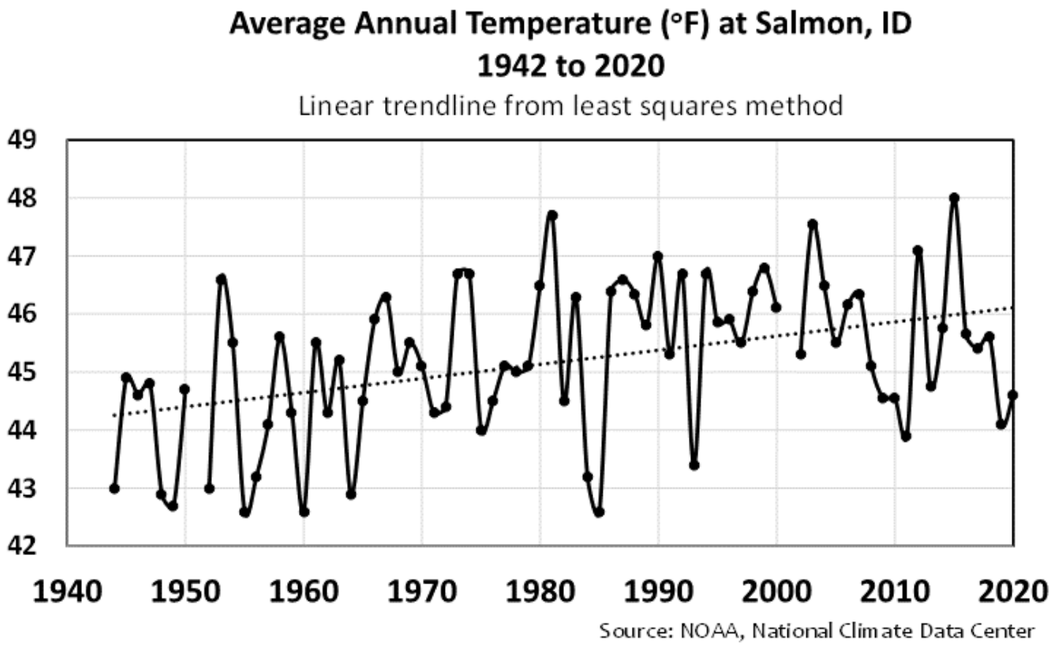
Below is the diversion dam progression illustration described at the beginning of the 2000–2015 section.

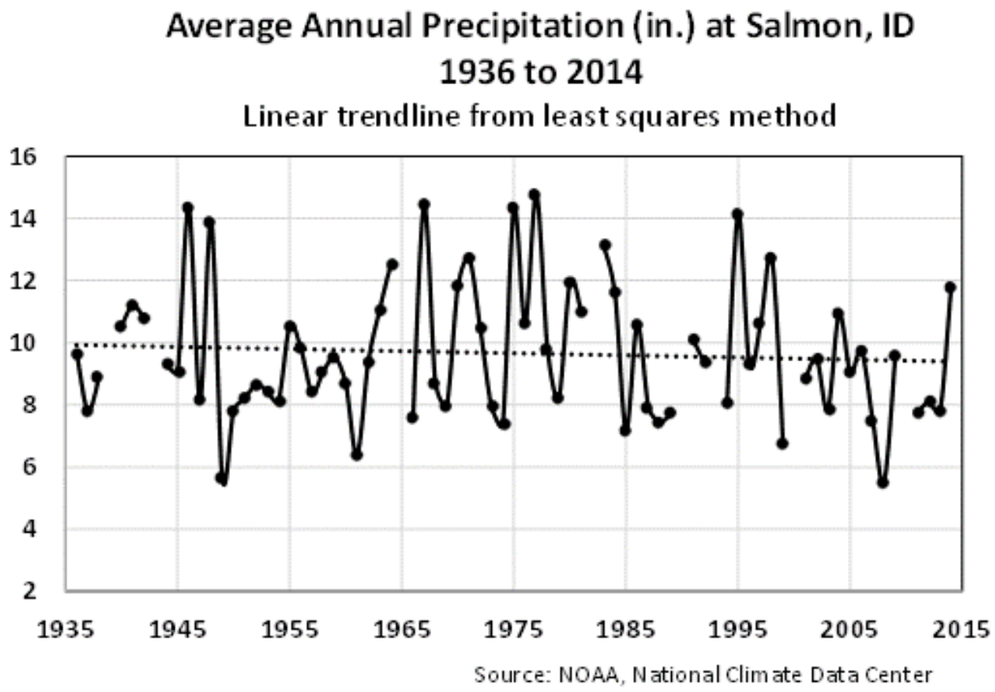


WATER SUPPLY OVER TIME IN THE LEMHI RIVER VALLEY

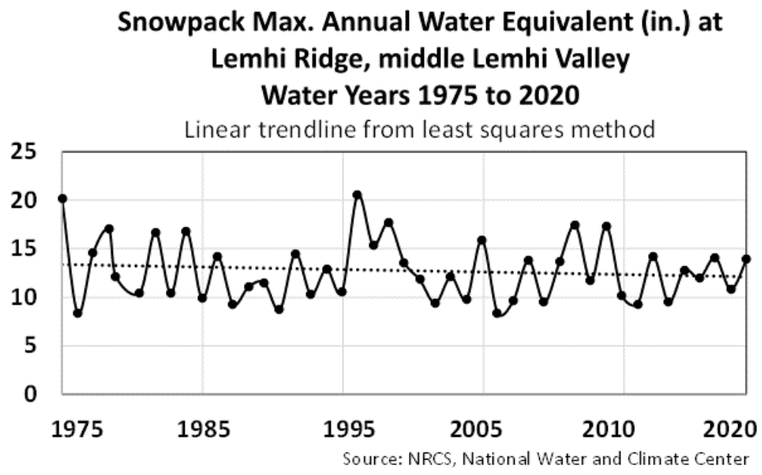
Despite the complexity of surface and underground waterflow patterns, studies, combined irrigators' long-term observations, have provided substantial insight into how the river system is connected and moves through the Lemhi River Valley. The University of Idaho, in partnership with the Lemhi Irrigation District and irrigators, has developed a waterflow model (MIKE Basin Model) that quantifies volume as the water moves through stream channels, ditches, agricultural fields, and groundwater pathways. The model provides insight into water management for both irrigation and fish. The information documents how water moves based on time, location, physical setting, weather, water use, and other variables. Refining the model to further improve understanding of the interconnections is ongoing.

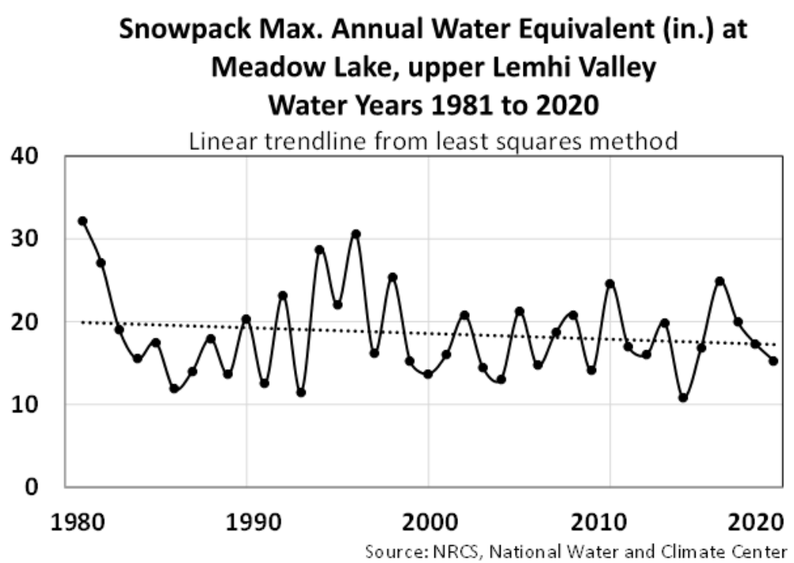
Now, there are other issues with which to contend. Temperatures have risen and precipitation has fallen since the mid-20th century (see graphs below). Official weather data in the upper Lemhi is incomplete, but Leadore rancher Merrill Beyeler has seen conditions change in the upper Lemhi River Valley firsthand. Snowpacks are disappearing earlier in the spring; the thirty-year running precipitation annual average was ten to twelve inches in the 1990s, and now the area gets about eight inches a year. *"There's just less water in the system,"* Beyeler said.





Winter snowpack above the Lemhi River Valley has also decreased since the late twentieth century (see graphs below). Irrigators in the Lemhi use a combination of decreed water rights and additional high-flow water provisions from the Snake River Basin Adjudication decree. Since the Lemhi does not have a storage reservoir, and much of the valley is still flood-irrigated, high-flow water is important to junior water rights holders.[xlvii]



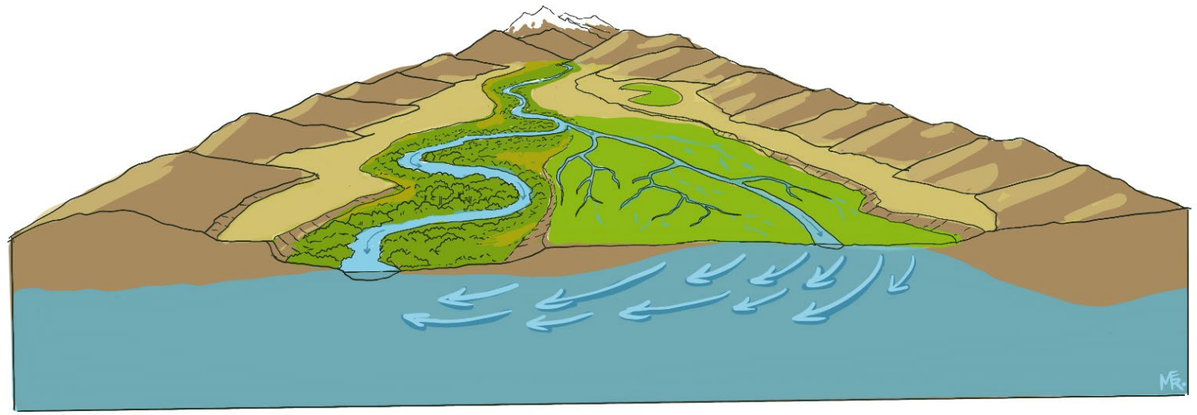


Applying water to fields during high-flow periods can improve agricultural production. This practice can also increase the short-term "storage" of water in the valley by adding it to the groundwater aquifer. Studies have found that this water can remain in the aquifer from two days to three months or more, depending on the location.[xlviii] The reaches in the upper Lemhi River Valley near the town of Leadore are areas that locals say soak up water, which later emerges downstream.

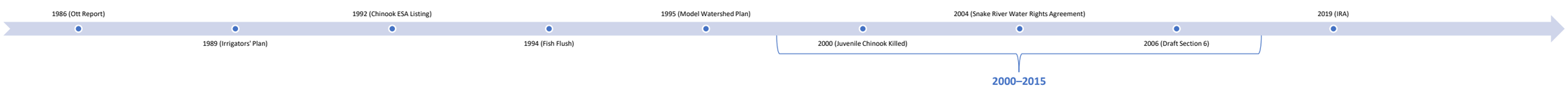
The impact on fish from flood irrigation and high-flow diversion practices, however, can be both helpful and harmful. On the helpful side, reducing the high-flow peaks during the spring snowmelt season by diverting the overflows into irrigation ditches and onto fields spreads the water out. This mimics the pre-agriculture floodplain and beaver-dam wetland ecosystem historically found in the Lemhi watershed. Local observation indicates that this practice allows water to percolate into the soil and alluvial rock and supplies the aquifer; the water cools underground and then seeps out to increase late summer streamflow in some areas. The resultant cooler spring water benefits the salmon that are spawning and rearing in those areas. Negative repercussions for fish habitat include stream reaches where flow is reduced below baseflow levels, decreasing available habitat and thus limiting capacity, especially in the tributaries. Additionally, diminishing the frequency and magnitude of high flows in the natural stream channels can degrade instream and floodplain habitat. Reducing peak "flushing flows" can change the conditions by increasing fine sediment in the gravels, which may minimize fish-egg survival.

Many ranchers have converted from flood to sprinkler systems, which complicates the understanding of water movement in the Lemhi Valley. Sprinkler systems apply water more efficiently, requiring less water from the river. Interestingly, this change may have a positive effect on ground- and surface-water relationships.

Hay production has increased in the Lemhi Valley over the past forty years, with irrigation improvements, new varieties of alfalfa, more efficient ways of applying fertilizer, and new methods for harvesting and storing hay for winter feed. Sprinkler systems have helped increase crop production and reduced labor costs. When rancher Carl Ellsworth came home from college in the early 1980s, many upper Lemhi River Valley ranchers could not grow enough to feed their cattle through the winter and following spring. Rancher Merrill Beyeler often relates that many trucks used to bring hay into the Leadore area—and take money out. Forty years later, with improved farming and irrigation systems, ranchers grow more hay, and some even sell hay outside the area, despite the decline in precipitation and snowpack.



Groundwater-Surface Water Interaction (Recharge) Illustration (Inter-Fluve)



TRIBUTARIES ARE RECONNECTED TO IMPROVE SALMON HABITAT

While much of the fish-related work in the Lemhi River Valley prior to the 2000s concentrated on water quantities, the focus shifted to ensuring that the water in the river provided the right habitat for Chinook salmon and steelhead. Reconnected tributaries provide water for fish and agriculture, create habitat for growing juveniles and spawning adult salmon, and reestablish connections between groundwater and surface water that benefit all water users. Part of the 2004 Snake River Water Rights Agreement was to reconnect 10 tributaries to the Lemhi River to benefit salmon and steelhead; currently, there have been a total of 16 tributaries reconnected with the Lemhi River, for a total of 72.5 miles; 10 of these tributaries still dry up periodically and many of the tributaries do not reconnect all the way to the headwaters.

Once fish have safe passage and adequate flow to migrate, the next steps are to ensure good spawning and rearing habitat. High-quality spawning habitat has numerous riffles and pools with nearby cover, as well as gravel streambeds with very little fine sediment. High-quality rearing habitat for juveniles also comprises pools and slower water velocities. It contains complex channels and has vegetative cover with large woody debris, creating prime habitat and shading the water, minimizing the warming effects of the sun. More recent suitability and capacity studies published in 2019 have refined the understanding of salmon habitat needs.[xlix] Data shows sufficient spawning habitat in the Lemhi but is deficient in rearing environment.[l]

The USFS and BLM monitored temperatures in numerous tributary streams on federal land in the 1980s and 1990s, but little data was available for the mainstem Lemhi. Starting in the mid-1990s, the BLM, and the Idaho Departments of Fish and Game and Environmental Quality began monitoring stream temperatures in the Lemhi River. The Bureau of Reclamation also funded flow assessments to quantify water requirements in tributaries, such as Big Timber, Big Eightmile, Bohannon, Eighteenmile, Hayden, Hawley, and Canyon creeks. The studies demonstrated that these streams send cooler, higher-quality water to the mainstem Lemhi, improving spawning and rearing habitat. Nonetheless, daytime temperatures were sometimes still too warm for Chinook spawning and rearing in July, August, and early September. In addition, although tributaries were cooler, irrigation withdrawals from all but Hayden and Big Springs Creeks prevented them from reaching the Lemhi River during most of the irrigation season. This meant that cooler tributary water only reached the river during high flows in mid-June.

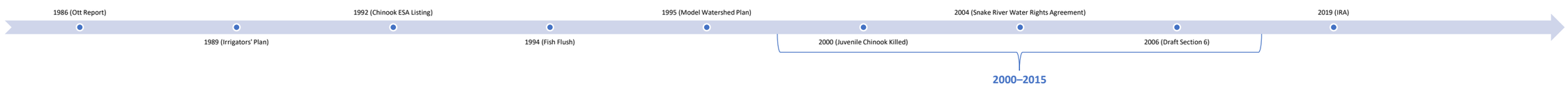
The Upper Salmon Basin Watershed Program Tech Team prioritized tributary reconnections by weighing the needs of fish alongside sociopolitical and biological issues. The latter included opportunity, irrigation practices, cost-benefit ratio, and groundwater recharge concerns. The team's planning led to the Screening and Habitat Improvement Prioritization for the upper Salmon River Basin. But the situation was complex. Each tributary had a unique history and set of challenges that complicated its reconnection and potential for habitat improvement. For example, in the 1920s, Hawley Creek had been rerouted to flow through a ditch year-round to increase the volume of water reaching the agricultural fields. Without water, by the 1990s, the native riparian vegetation along its former natural channel had been replaced by sagebrush.

At the same time, USBWP continued to work with agricultural producers along the Lemhi River to improve streamside riparian vegetation to stabilize eroding banks, improve water temperatures, and increase instream cover. Their efforts reduced the fine sediments washing into streams and improved riverbed conditions for spawning and rearing. Greater riparian vegetation helped keep stream temperatures cool by shading the water. Woody vegetation also improved fish habitat by providing pools and protective cover for young fish. And reconnected tributaries delivered even more cool water to the mainstem Lemhi River, increasing salmon survival.

Federal funding for the tributary reconnection and habitat improvement work has mostly come from the Bonneville Power Administration through the Fish and Wildlife Program, the Pacific Coastal Salmon Recovery Fund, the Natural Resource Conservation Service, and the 2004 Snake River Water Rights Agreement, all coordinated by the State of Idaho. Typically, Bonneville Power has funded staff time for planning and monitoring, irrigation infrastructure and habitat improvements, and water flow agreements. In some cases, BPA has provided 20 years of electricity to power sprinkler systems in areas that directly benefit salmon.

The Upper Salmon Basin Watershed Program, represented by Katie Slavin and Jude Trapani, being recognized by the USFS and BLM at the North American Wildlife and Natural Resources Conference as the 2003 Conservation Project of the Year. Source: Jude Trapani

The Upper Salmon Basin Watershed Program has been instrumental in the difficult task of reconnecting the Lemhi River and its tributaries. Their broad knowledge and varied membership have eased the way. In fact, Mike Edmondson (OSC) has worked with many regional efforts and says, *"I have never run across or been involved with a group that works so well together as the Upper Salmon. Everyone treats each other very well with good open communication. There are members that don't live in Salmon but fit in and participate fully with this group. They're welcomed. There is great collaboration and a huge emphasis on the resources."*



Aerial photographs of restoration projects on the Lemhi River. Source: USBWP

MORE SCIENCE, NEW CHALLENGES, 2016–PRESENT

In Brief: Water management and groundwater recharge concerns continue to require balance between fish and agricultural needs. The Integrated Rehabilitation Assessment used the latest research findings to help prioritize future habitat improvement, and habitat projects are now larger, more complex, and more expensive.

WATER MANAGEMENT AND GROUNDWATER RECHARGE CONCERNS

The focus shifted from instream flows to improving salmon habitat in the first part of the 21st century. Issues of groundwater recharge, delayed instream flow, lower-than-optimal stream flows, and water temperatures persist in the Lemhi River and its tributaries. Water management will always be critical in the valley and requires a balance between agricultural needs and the needs of fish, with an ultimate goal of delisting Chinook salmon and steelhead and restoring them to healthy and harvestable abundance.

The recharge issue is a textbook example of adaptive management. Changing the diversion points and irrigation infrastructure improved agricultural productivity while increasing streamflow for ESA-listed fish. The Idaho Department of Water Resources studies (conducted in the 2000s) of groundwater-surface water interactions[li] and dye tests show some of these interactions but are difficult to quantify. The studies, observed by irrigators and watermasters, continue to work toward understanding the effects of diverting water in open irrigation ditches and percolating that water into the groundwater system, with the water then flowing back into the river later in the irrigation season.

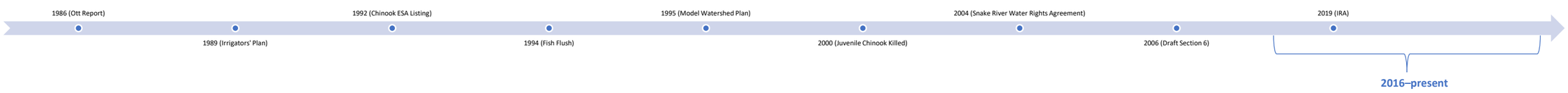
Not surprisingly, ranchers' opinions on flood vs. sprinkler irrigation vary depending on where they live in the valley. Many irrigators on the lower Lemhi would like upper Lemhi ranchers to continue flood irrigation because they consider that method a better way to retain water in the river and to augment flows in August and September. However, ranchers on the upper Lemhi often prefer to save money and labor and can realize higher yields by converting some areas to sprinkler irrigation.

Although great strides have been made, there are even better ways to balance irrigation withdrawal for the benefit of agriculture and still provide high-quality fish habitat. The water resources in the valley are, however, limited. As more ditch water was put into pipes and sprinkler systems, ranchers noticed reduced water flows in area springs. Luckily, there are researchers, funding, and technology dedicated to learning more about the wiser use of water. And, critically, most community members willingly listen to and look at options designed to modify irrigation practices if fish and agricultural benefits can be obtained in concert. The most recent projects are much more extensive than earlier efforts and center on spawning and rearing habitat restoration. Recent studies show the need for the more complex river channels and habitat of the past to realize the ESA recovery goals for Chinook salmon and steelhead.[lii]

INTEGRATED REHABILITATION ASSESSMENT SCIENCE AND PROCESS

In 2016, the planning teams for the Upper Salmon Basin Watershed Program saw the need for and benefit of using new science for the next phases of planning and implementation. New technology and statistical modeling have since been used to estimate available spawning and rearing habitat capacity for fish in the Lemhi River and some of its tributaries; this has helped refine program goals and tie the work in the upper Salmon River Basin to other regional restoration projects. It also led to the Integrated Rehabilitation Assessment document and subsequent planning tools and stream assessments to assist project planners and find funding for applications.

The Rehabilitation Assessment redefined the understanding of how much habitat is currently available and demonstrated that the river system would at least need to double (and perhaps quadruple) to allow sufficient salmon recovery to meet the goals of an Endangered Species Act delisting decision. Although the Rehabilitation Assessment also determined that sufficient spawning



habitat is available in the Lemhi to support recovery, fine sediment and stream temperatures are of concern for salmon egg survival. But even if adult salmon returned to spawn at recovery goal numbers, the river does not have the capacity to rear their juvenile fish. As a result, the Lemhi anadromous fish population cannot recover unless rearing limitations are addressed. The assessment further indicated that efforts to improve habitat quality should emphasize rearing juvenile fish and included information on their behavior. [liii]

Climate change adds more complexity to the issue. Restoration at higher elevations is beneficial because of the cold water generated from melting snow. In other words, as climate change trends continue, larger-scale restoration efforts will be concentrated in these higher-elevation river systems, like those in the upper Salmon River Basin, including the Lemhi River. Consequently, tributary reconnection projects are a good idea because increasing instream flow in the cooler tributary streams, even a small amount, could help alleviate higher water temperatures in the main Lemhi, especially during the hot summer months. Having good juvenile salmon rearing habitat results in growing larger fish and increases their numbers and survival through the rearing period.

CONTINUED FISH RECOVERY AND HABITAT IMPROVEMENT EFFORTS

The evolving science surrounding fish recovery, combined with discovering solutions to issues as they develop, has led to complementary advances in projects in the Lemhi River Valley. Project development incorporates the latest scientific investigations, which show how to improve salmon and steelhead survival. Permanent subordination agreements for irrigation withdrawal continue to be an effective tool with willing landowners. Implementing new techniques, such as low-tech beaver dam analogues, naturally increases groundwater recharge and, with less expense, improves fish and wildlife habitat.

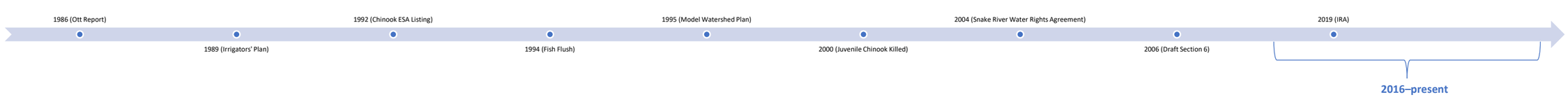
The complexities of groundwater recharge are still controversial. Irrigation systems have evolved over the past 20 years and include more modern center-pivot sprinkler systems. Government-funded sprinkler and irrigation diversion consolidation projects have been coordinated through widespread cooperation.[liv] The goals are to increase fish survival and reduce costs by decreasing the number of diversions while still complying with National Marine Fisheries Service policies. Additionally, salmon habitat enhancement projects include scaling back the water volume diverted from various key tributaries to allow more water to flow into the mainstem Lemhi River at crucial times. These projects result in more cool water flowing into the Lemhi River from its tributaries[lv] and create better habitat for salmon and steelhead and allow their access to tributaries previously blocked by irrigation diversion structures.

Example of cattle grazing in a riparian pasture along the upper Lemhi River in a situation compatible with fish and wildlife habitat. The Beyeler Ranch was the first riparian pasture project designed to have cattle grazing at targeted times of the year, which allows deep-rooted wetland and riparian plants to reestablish and thrive. Source: Merrill Beyeler

With bigger projects targeting the restoration of natural river processes, letting the regional community know about the benefits of these projects has become a significant part of Upper Salmon Basin outreach. Some ranchers remain skeptical of the cost-benefit ratio of these large-scale projects. They are also dubious because fish have not returned in greater numbers, even with the far-reaching improvements to the all-"H" concept. [lvi] Additionally, project planning, implementation, and adaptive management adjustments have occasionally been slower than some would like, especially with diversions and irrigation systems. Planning, permitting, and implementing may take over two years—a problematic timeline for an irrigator.

Measuring success has been a difficult process—locally and regionally. The Endangered Species Act consultation process for the Columbia River Power System has used several methods to evaluate tributary habitat health for anadromous fish, including the extensive 2008 Expert Panel process. Other methods compile achievements into categories: increase in the volume of instream flow, number of fish screens installed, miles of accessible habitat, and riparian acres protected and improved.

Most of the difficulty comes from implementing projects that directly tackle local limiting factors. Due to the wide range of components that reduce salmon survival,[lvii] the numbers of Chinook salmon returning to the Lemhi River have increased slightly from the low returns in the early 1990s, but have not increased substantially toward meeting the NMFS Recovery Plan goal.[lviii] Many have asked, "With all the work that has been accomplished to date, why are there not more fish returning?" While blaming others outside the Lemhi River Valley for slow salmon population recovery is easy, the current Upper Salmon Basin Watershed Program Coordinator Daniel Bertram says, *"There is plenty that we can do locally and that we have control over."*



The Idaho Department of Fish and Game leads annual monitoring to count the number of salmon redds, estimating fish return and the number of juvenile salmon produced. Monitoring is difficult and time-consuming, but the research does show improvement because of fish screens and habitat improvement. Yet much is still not understood or quantified about the current number of juveniles produced compared to the number of adults returning; if that number goes up, success can be demonstrated.

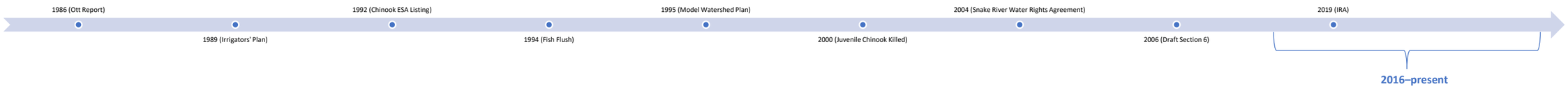
There are also other ways to measure the benefits of community-based salmon recovery efforts. For instance, the National Marine Fisheries Service has issued no ESA violations. Nor have any associated lawsuits been filed against ranchers over private-land irrigation practices in the Lemhi River Valley since the start of the Model Watershed Project. However, litigation has occurred during the same period over irrigation practices and permitting on public and National Forest lands. Nonetheless, project funding has built a local "restoration economy," supporting businesses and employees ranging from local construction contractors to agency staff and non-governmental organizations, including the Lemhi Regional Land Trust, Trout Unlimited, The Nature Conservancy, and others.

Many benefits stem from fish recovery efforts: large-scale complex habitat restoration increases fish capacity; reconnecting tributary streams can increase groundwater recharge by putting water back in historical channels; beaver dam analogues slow water down as it leaves the system to percolate into the aquifer; and diversion and irrigation upgrades allow for easier water administration and better crop production. New fish screens give irrigators ESA protection and reduce fish mortality. On top of that, implementing practices to reduce fine sediment deposits in the upper Lemhi River and its tributaries improves the chances of salmon eggs surviving to the fry and juvenile life stages.

Restoring natural river processes is the key to fish habitat improvement. In the Lemhi River, this means converting the straightened, simplified, single-thread path back to something resembling the multi-threaded and dynamic historical channel, which comprised a diversity of habitat types and was surrounded by dense, native, woody riparian vegetation that provided cover, structure, and shade. Re-establishing habitat complexity is the current direction for restoration projects. Projects in the Leadore area with restored stream channels preliminarily show reductions in icing damage in the winter (ice can increase erosion and kill juvenile fish and their food) and increases in groundwater recharge, along with improved spawning and rearing habitat.

The need for water by agriculture and fish is not a conflict in which one group must win; instead, it requires collaboration to identify ways to balance these requirements. The Rehabilitation Assessment demonstrated that simply having instream flow will most likely not create the rearing capacity needed to recover Chinook salmon; sufficient instream flow *and* habitat complexity are essential to provide opportunities for young fish to grow and survive. Thus, a foundation has been built for the next generation to effect creative solutions, improving instream habitat so that the river can provide maximum fish benefits *and* sustain the agricultural needs of the basin.

These examples of the Lemhi River above Hayden Creek illustrate the difference between a lesser manipulated reach that is influenced by groundwater and has a highly sinuous, multi-threaded channel with pools and narrow width-to-depth ratio stabilized by dense willow vegetation (top) and a more modified section that has been straightened during road construction. It is overly shallow and wide with plane-bed conditions (bottom). Flow is from right to left in both. Source: Reclamation



THE LATEST

Now, year-round instream flow in the entire Lemhi River and improved diversions make migration safer and faster for adult and juvenile salmon. Landowners willing to work toward this goal drove its realization. Also essential for these pivotal steps was funding for new diversion structures, fish screens, and piping and sprinkler systems to replace some flood irrigation operations. These have created more water for instream flow in critical reaches. Cooperating with ranchers enabled habitat improvement and also allowed Upper Salmon Basin Watershed Program partners and the Lemhi community to protect and sustain ranching operations. This collaboration has kept ranchers on the land and in the community, participating in civic groups and supporting local businesses. Critically, maintaining working ranches in the Lemhi protects open space and ecologically important riparian areas from development. Ranchers and anadromous fish both need water; projects in the Lemhi River Valley substantiate that those needs can coexist.

Jeff Peterson worked on the Bureau of Reclamation's lower Lemhi diversion structures and flow agreements. He remembered receiving advice from coworkers experienced with ESA issues on other rivers in the Columbia River Basin. They suggested alternatives, which included consolidating all the diversions into two canals beginning at Leadore and providing a delivery system for each irrigator. Peterson pointed out that those solutions were not applicable because of the nuances and complexities of the Lemhi. He explained that springs and flood irrigation have the potential to help maintain river flows as the river progresses downstream. Also, the water volume at Leadore is insufficient to meet all the irrigation needs in the valley. These intricacies require creative thinking and collaboration to reconnect the river system, piece by piece, to benefit the salmon and maintain the agricultural needs for irrigation water.

Jeff Allen (former Office of Species Conservation lead for ESA fisheries issues and currently one of two Idaho members of the Northwest Power and Conservation Council) says, *"If society wants salmon and wants fourth and potentially fifth generation agriculture to continue in places like the Lemhi River, and if people knew that a significant portion of their power bill was going to pay for habitat improvement and irrigation infrastructure that keeps agriculture continuing in places like Lemhi County and that the ranchers in turn would work a little harder and work a little smarter for the benefit of salmon and steelhead that that would be worthwhile, I think that's how government is supposed to work. That's not radical, that's not income redistribution, that's helping the ranching community in places like Lemhi County stay on the land and helping the residents that use the hydroelectric power and are provided the opportunity to have all the modern comforts based on the electric power grid system like having my house a comfortable 70° and my TV turning on whatever I wanted to, that's a good investment."*

Clive Strong looked back on the work in the Lemhi and said that the loss of Chinook salmon runs in the Lemhi and Salmon River *"didn't happen overnight and isn't going to be solved overnight. But maybe piece by piece, and if we get enough pieces of the puzzle put together, we can see a picture develop, and we'll make progress."* The State of Idaho is currently working with water users to put together a new agreement that will address high-flow use and formalize fish-benefitting water volume in the tributaries. Ingenuity is needed to safeguard the flow via a minimum stream-flow mechanism and through flushing flows for instream habitat benefits. Accomplishments at L6 serve as the template for these.

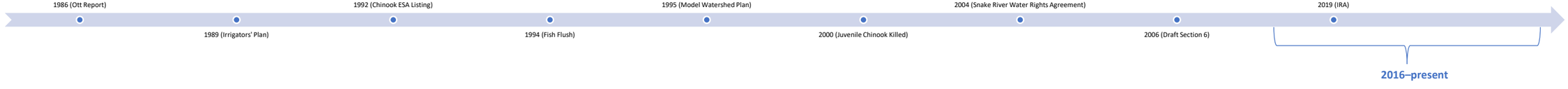
The agreement to protect the high-flow practice in the Lemhi Basin constituted an important element in the 2001 Lemhi Conservation Plan and the Lemhi Minimum Streamflow requirement. This practice became the source of much controversy in the Snake River Basin Adjudication and was only recently resolved by the 2022 Lemhi River Basin Comprehensive Settlement Agreement, which created five new instream-flow-water rights in the Upper Lemhi Basin, allowing for a mechanism to provide additional water volume for spawning and rearing in the Upper Lemhi and certain tributary streams.

Idaho Senate Concurrent Resolution 137 (passed at the 2020 legislative session) established the current goals to provide sufficient viable habitat to sustain anadromous fish populations while maintaining the agricultural lifestyle of the basin. Despite the inherent conflict, a balance has been struck in the Lemhi River Valley, and the resolution seeks to optimize meeting all needs to the best extent possible. As Clive Strong said, *"With crisis comes opportunity."* The provision for high-flow claims was preserved in Resolution 137 but not as a "water right." As of 2021, negotiations recommenced to formalize these claims into a recognized water right in exchange for certain conservation measures from irrigators. Earlier successes in the Lemhi River Valley transpired from incorporating local input and knowledge, and these will also be instrumental in determining current and future water rights applications.

As fish recovery continues in the valley, projects are diversifying to include larger-scale habitat restoration and instream flow. As indicated above, the Integrated Rehabilitation Assessment clarified the understanding of habitat conditions in the Lemhi. It identified—especially for fish overwintering in the river—the essential requirements to meet the goal of an ESA-delisting decision.

Many years of building partnerships between local landowners and agencies, implementing numerous projects, and monitoring the results have paved the way for a new focus on habitat restoration in the future. Fish will always have a need for both water and habitat, and it's important to remember that both must be available in appropriate quantities for the recovery of the species. When the Lemhi River Valley's Chinook return in greater numbers, the target is for them to find both safe passage and excellent spawning and rearing habitat.

Juvenile Chinook salmon. Source: OSC Team 2019



CONCLUSION

The Lemhi River Valley community has worked together for more than four decades to provide better conditions for Chinook salmon. Local ranchers and agencies shared a desire to restore the ecological and social values of the Lemhi's salmon runs. With the help of federal funding and state guidance the community came together for fish. Those herculean efforts have reestablished many of the migratory needs of the iconic fish treasured in the region. The ranchers on the Lemhi River have worked hard to keep the valley's Chinook salmon here for the next generation. Their work has not stopped.

INSTREAM FLOW EFFORTS

When funding for salmon recovery efforts became available in the early 1990s, Lemhi Valley irrigators already had a plan to address how water was used for agriculture and to identify options that could benefit instream flow for fish. Both Reclamation's Water Conservation Demonstration Project and the BPA-funded Model Watershed Project were initiated to support this proposed work in the Lemhi.

When the first Lemhi ranchers worked with the MWP and partners on early fish recovery projects, the community noticed. After Merrill Beyeler installed the first private-land riparian fencing on his property, his phone started ringing. Beyeler's neighbors just knew that all the government activity at his place must mean trouble. He remembered, *"They asked over and over, 'Are you in trouble?' and 'Are you going to jail?'"*

Other early participants recognized opportunities to improve their ranching operations and family lives. Don Olson and Joe Tonsmeire proposed the first instream flow-related conservation easement in Lemhi County. The innovative pair suggested a partnership with the MWP, The Nature Conservancy, and Reclamation to buy a neighboring property. The land was in just the right place to allow the consolidation of irrigation water rights and eliminate the L5 diversion, a common location for the river to become dewatered due to irrigation withdrawal. Bob Thomas irrigated from the L6 diversion and recognized that there could be a new way to manage water. Agreements not-to-divert compensated certain irrigators for spilling their water and providing late-season flow for fish passage.

When dead salmon were found in the Lemhi River in 2000, the National Marine Fisheries Service threatened legal action. By this time, the ranchers and the agencies knew that working together offered the best hope for a solution. At the time, Tom Curet remembered, *"Having both the State Attorney General and the local fish biologists from IDFG, BLM, and USFS standing with the ranchers really helped solidify the relationship."* Merrill Beyeler observed that the community wanted agriculture to maintain its historically important role in the valley, but the solidarity also demonstrated a determination to keep the cultural legacy of Chinook salmon and steelhead in the Lemhi River.

HABITAT RESTORATION EFFORTS

The first decades of salmon recovery in the Lemhi witnessed solutions to the obvious problems: giving fish the water they need and preventing their deaths in irrigation systems. While the community was implementing new and creative ways to increase instream flow in the lower Lemhi River and creating safe passage for salmon with fish screens and tributary reconnections, researchers focused on exactly what salmon need at each stage of their lives. New findings from the 2019 Integrated Rehabilitation Assessment inform the ensuing restoration projects based on current river system conditions. The rehabilitation assessment found that while the Lemhi provides a good amount of spawning habitat, juvenile rearing habitat is deficient.

Current work concentrates on improving and increasing this rearing habitat for juvenile salmon. When the Lemhi's Chinook return in greater numbers, the goal is that they will find both safe passage and excellent habitat. As Tom Curet observed, *"The resident fish populations are using the improved habitat to express their life histories as they haven't for half a century. None of the things we've done are for naught. The work's been good for water quality, good for resident fish, and good for the community. It would be awful if we looked up the Lemhi and some areas weren't being farmed; but they still are. We haven't compromised the community by protecting the fish."*

The collaborative habitat improvement work seen in the Lemhi River Valley requires many elements: dedicated ranchers and biologists with the desire to learn from each other; technical knowledge to know what to do and where to do it; creative solutions; patience for all the various agency processes; and the funding to support it. Bob Loucks deemed the people who pioneered the process "incrementalists." The work happens one step at a time with thoughtfulness and the merging of information, knowledge, and wisdom.

Is this past, present, and future work achieving the twin goals of restoring salmon and maintaining a viable community? So far, yes. The original intentions have been realized: to establish a model for conservation in the Lemhi River Valley without leaving people behind. In rancher Merrill Beyeler's view, *"We can manage water and resources to take care of everyone."*

Daniel Bertram acknowledged, *"Personally, I feel we are surrounded by nothing but success for what we can control in this basin."*

Adult Chinook salmon. Source: Rob Richardson

ACRONYMS AND ABBREVIATIONS

BLM	Bureau of Land Management
BPA	Bonneville Power Administration
CE	conservation easement
cfs	cubic feet per second
ESA	Endangered Species Act
IDFG	Idaho Department of Fish and Game
IDWR	Idaho Department of Water Resources
IRA	Upper Salmon Subbasin Integrated Rehabilitation Assessment
IWRB	Idaho Water Resource Board
Lemhi SWCD	Lemhi Soil and Water Conservation District
MSF	Minimum Stream Flow
MWP	Model Watershed Project (now USBWP)
NGO	non-governmental organization
NMFS	National Oceanic and Atmospheric Administration's National Marine Fisheries Service
NRCS	Natural Resources Conservation Service (formerly Soil Conservation Service)
OSC	Idaho Governor's Office of Species Conservation
Plan	1995 Model Watershed Plan for the Lemhi, Pahsimeroi, and East Fork of the Salmon River
Reclamation	Bureau of Reclamation
SBT	Shoshone-Bannock Tribes
SRBA	Snake River Basin Adjudication
TNC	The Nature Conservancy
USBWP	Upper Salmon Basin Watershed Program (formerly MWP)
USFS	United States Forest Service

DESCRIPTION OF KEY AGENCIES AND ORGANIZATIONS

The following provides a brief description of the roles of key agencies and organizations described in this report. It is not exhaustive but is intended to be a reference as the report is read.

- **BLM** — federal agency that administers grazing and other permitted activities on public land; works with neighboring private landowners to help producers improve their operations while protecting natural resources; piloted salmon spawning surveys on Hayden Creek; conducts assessments and habitat improvements on tributary streams; conducts stream temperature monitoring
- **BPA** —lead federal agency that developed and continues to provide funding the Model Watershed Project (MWP, now USBWP) in conjunction with the Northwest Power and Conservation Council through the Fish and Wildlife Program; federal agency that provides funding through the Columbia Basin Water Transactions Program
- **Committee of Nine** — a board serving the irrigation districts of the upper Snake River; influential on state water policy; consulted on the Lemhi River water bank proposal and provided essential support
- **Idaho Attorney General's Office** — facilitated meetings between Lemhi irrigators and NMFS to avoid litigation
- **Idaho Soil Conservation Commission** (now the Idaho Soil and Water Conservation Commission) — formerly administered the MWP/USBWP
- **IWRB** — responsible for the operation of programs that support the sustainable management of Idaho's water resources; programs include the Idaho Water Supply Bank and the Idaho Water Transactions Program
- **Idaho Department of Environmental Quality** — state agency that conducts stream temperature and water quality monitoring
- **IDFG** — lead state agency for fish and wildlife management; administers the fish screen program; conducts fish population and habitat monitoring
- **Lemhi SWCD/Custer Soil and Water Conservation District** — partners with Idaho Soil and Water Conservation Commission to provide MWP contract administration and project guidance; is the lead local collaborative entity for conservation work
- **Lemhi Irrigation District and the Water Districts** (part of IDWR) — manages water rights; employs watermaster to oversee water distribution
- **Lemhi Regional Land Trust** — develops and manages conservation easements; plans and implements projects
- **MWP/USBWP** — guiding and "umbrella" entity for salmon recovery work established under the Northwest Power Planning Council and works with landowners to develop restoration projects, seeks and manages funding support, assists with the permitting process, oversees the work, and monitors outcomes; former screening committee used to address the complexity of the screening program, prioritize funding, and implement best technical solutions
- **NMFS** — lead agency for administering and enforcing ESA issues for anadromous fish
- **NRCS**, formerly Soil Conservation Service — works mostly on private land to help producers improve their operations while protecting natural resources; played an important role in the fish screen program (increasing effectiveness and quality of surveys and designs)
- **Northwest Power Planning Council/Northwest Power and Conservation Council** — lead entity for Northwest Power Act efforts for resource and power issues; coordinates with BPA's Columbia Basin Fish and Wildlife Program to establish a collaborative framework to look for solutions to salmon decline and manage associated funds
- **OSC** — lead Idaho state agency for ESA issues and coordinates closely with federal, state, and local agencies and groups; Administration entity for the USBWP since 2008
- **Reclamation** — began involvement at Northwest Power Planning Council/Northwest Power and Conservation Council request by providing funding and expertise in planning, engineering, and construction, working with private landowners through project sponsors to help producers improve their operations while protecting natural resources, developed Water Conservation Demonstration Projects, provided expertise to build fish-safe diversions to compliment the IDFG fish screen program, and funding flow assessments in tributary streams; after 2000, began working as an action agency on habitat restoration at NMFS's request
- **SBT** — historical inhabitants of the Lemhi River valley; since the 1980 Northwest Power Act, SBT have received funding under the BPA Fish and Wildlife Program to enhance and restore fish and wildlife and associated habitat; SBT were consistently involved in the MWP in the 1990s and have provided some assistance with program planning, project development, and construction
- **TNC** — develops and manages conservation easements
- **USFS** — administers grazing and other permitted activities on National Forest Lands; works with neighboring private landowners to help producers improve their operations while protecting natural resources; conducts assessments and habitat improvements on tributary streams; conducts stream temperature monitoring

DISCLOSURE

Support for this document comes from the Idaho Governor's Office of Species Conservation (OSC), and funding was also provided by the U.S. Bureau of Reclamation. This document is intended to be a non-technical record of the recent fish recovery efforts of the Lemhi River watershed. The primary author of this document was Jude Trapani, who worked as a fishery biologist for the Bureau of Land Management from 1991–2012 and with the U.S. Bureau of Reclamation from 2012–2018. Substantial contributions were provided by staff from Rio Applied Science and Engineering, Interfluve, OSC and Reclamation.

APPENDIX A: LIST OF INTERVIEWEES

Name	Current or Past Affiliation	Name	Current or Past Affiliation
Jeff Allen	Idaho Office of Species Conservation/Northwest Power and Conservation Council	Jerry Myers	Outfitter, Fishing Guide, Trout Unlimited
Rocky Barker	Journalist	Don Olson	Landowner - Rancher
Daniel Bertram	USBWP Coordinator	Mark Olson	Natural Resources Conservation Service
Merrill Beyeler	Landowner - Rancher	Dale Peterson	Business Owner (Peterson Metal Products, Leadore)
Carter Borden	DHI Water & Environment, Inc.	Jeff Peterson	Bureau of Reclamation
Allen Bradbury	USBWP Project Planner	Gary Power	Idaho Fish and Game
Morgan Case	Program Manager for the Idaho Water Resource Board	Eric Rothwell	Bureau of Reclamation; Idaho Department of Water Resources
Amy Cassel	Program Manager for the Idaho Water Resource Board	Rick Sager	Water District 74
Chad Colter	SBT	Al Simpson	Bureau of Reclamation
Tom Curet	Idaho Fish and Game	Katie Slavin	Lemhi Soil and Water Conservation District; USBWP
Jeff DiLuccia	Idaho Fish and Game	R.J. Smith	Lemhi Irrigation District
Mike Edmondson	OSC	Lynn Stratton	Idaho Fish and Game
Carl Ellsworth	Lemhi Irrigation District and Water District 74	Clive Strong	Idaho Attorney General's Office
Trent Jones	The Nature Conservancy	Ralph Swift	Natural Resources Conservation Service; Model Watershed Project/Upper Salmon Basin Watershed Program
Bob Loucks	Agricultural Extension Agent, University of Idaho	Karl Tyler	Landowner - Rancher
Lou and Cindy Lunte	The Nature Conservancy	Kristin Troy	Lemhi Regional Land Trust
Ryan McCutcheon	Idaho Department of Water Resources	Ken Troyer	National Marine Fisheries Service
Dave McFarland	Landowner - Rancher	Scott Turner	Trout Unlimited, Landowner
Nikos Monoyios	Landowner - Rancher	Kathy Weaver	Idaho Soil Conservation Commission
Bruce Mulkey	Landowner - Rancher		

Model Watershed Project (now USBWP) site tour of the Lemhi River diversion L5, circa 1994. Source: USBWP

APPENDIX B: LIST OF DOCUMENTS REVIEWED AND USEFUL LINKS

Barker, R. 2004a. "Drought Threatens Salmon as Lemhi River Reaches 50-Year Low." Idaho Statesman. April 23.

Barker, R. 2004b. "Failed Salmon Projects Leave Ranchers Vulnerable." Idaho Statesman. April 29.

Barker, R., and P. Larmer. 2001. "Lemhi Pact Aims to Protect Salmon." Idaho Statesman. July 19.

BLM Idaho Falls District. 2013. "Rangeland Stewardship Award Nomination." Salmon Field Office.

Clark and Selk. 1994. "Salmon Summit: case study #3." Yaffee and Wondolleck, Negotiating Survival: An Assessment of the Potential Use of Alternative Dispute Resolution Techniques for Resolving Conflicts Between Endangered Species and Development.

Columbia Basin Partnership Task Force. 2020. A Vision for Salmon and Steelhead: Goals to Restore Thriving Salmon and Steelhead to the Columbia River Basin. Phase 2 Report of the Columbia Basin Partnership Task Force of the Marine Fisheries Advisory Committee. October.

Davis, T. 1995. "Babbitt cedes grazing reform to Congress." High Country News. January 23.

Donato, M.M. 1998. Surface-Water/Ground-Water Relations in the Lemhi River Basin, East-Central Idaho. U.S. Department of the Interior, U.S. Geological Survey in cooperation with the Bureau of Reclamation. Water-Resources Investigations Report 98-4185.

Dorratcaque, D.E. 1986. Lemhi River Habitat Improvement Study, Final Report. Prepared by Ott Water Engineers, Inc. for the Bonneville Power Administration. February.

DuPont. 1935. "How Dynamite Streamlines Streams." American Forests advertisement. August.

Ecovista. 2004. Salmon Subbasin Management Plan. Prepared for Nez Perce Tribe Watershed Division and Shoshone-Bannock Tribes. May.

Ferris, W.A. n.d. Life in the Rocky Mountains: A Diary of Wanderings on the Sources of the Rivers Missouri, Columbia, and Colorado from February, 1830, to November, 1835.

Gebhards, S. 1958a. Fish Loss in Irrigation Canals on the Salmon River Drainage as Determined by Electrical Shocker. Special Report. Idaho Fish and Game, Vol. 4, No. 45. Salmon, Idaho, as cited by Idaho Office of Species Conservation. 2010. Upper Lemhi River -- Acquisition. Project Proposal.

Gebhards, S. 1958b. Stage Reduction and Channel Relocation on the Lemhi River and the Effects on Fish Production. Idaho Fish and Game, Salmon, Idaho.

Gebhards, S. 1959a. The Effects of Irrigation on the Natural Production of Chinook Salmon (*Oncorhynchus tshawytscha*) in the Lemhi River, Idaho. M.S. thesis, Utah State University.

Gebhards, S. 1959b. Preliminary Planning Report: Salmon River. Idaho Department of Fish and Game.

Gebhards, S.V., R.F Heberger, C.D. Andrus. 2013 (est.). The Vanishing Stream: An Oral History of the Life and Times of Stacy Gebhards. Compact Disc set.

Haws, F.W., J. Fletcher, and E. Israelsen. 1977. Hydrologic Consideration for the Proposed Finding of Water Rights in the Lemhi River Basin, Idaho. A study prepared for the water users at the request of Kent W. Foster (Holden, Holden, Kidwell, Hahn & Crap) and James C. Herndon (Attorney at Law). April 8.

Idaho Code. 2001. ID Code § 42-1506 Lemhi river -- Minimum stream flow appropriation.

Idaho Fifth District Court. 2007. Snake River Basin Adjudication/Nez Perce Agreement Consent Decree.

Idaho Fifth District Court. 2012. Partial Decree Pursuant to I.R.C.P.54(b) for General Provisions in Basin 74.

Idaho Governor's Office of Species Conservation. 2017. Upper Salmon Basin Watershed Program Advisory Committee Charter. Adopted May 25, 2012, and modified February 1, 2017.

Idaho Recorder. 1924. "Fish traps installed." July 25.

Idaho Soil Conservation Commission. 1995. Model Watershed Plan, Lemhi, Pahsimeroi, and East Fork of the Salmon River. November.

IWRB - Streamflow Enhancement & Minimum Streamflow Committee. 2013. Water Transactions Program - Lower Lemhi Parameter Subordination Agreement.

Lemhi Herald. 1913. "To take salmon eggs for use of Oregon hatchery." July 31.

Lemhi Irrigation District and Water District 74. 1992. Irrigators Plan to Improve Fish Passage on Lemhi River. June 12.

Loucks, R.R. 2000. Reports of Projects 1993–2000, Lemhi River, Pahsimeroi River, and East Fork of the Salmon River, Salmon, Idaho. December.

Nisbet, P. 1993. "Grassroots and R.A.G.E. want Babbitt removed." Recorder Herald. November 11.

NMFS (NOAA Fisheries). 2017. ESA Recovery Plan for Snake River Spring/Summer Chinook Salmon (*Oncorhynchus tshawytscha*) & Snake River Basin Steelhead (*Oncorhynchus mykiss*). November.

OSC Team. 2019. Upper Salmon Subbasin Habitat Integrated Rehabilitation Assessment. Prepared by Biomark ABS, Rio Applied Science and Engineering, Bureau of Reclamation, Idaho Governor's Office of Species Conservation, Trout Unlimited, and The Nature Conservancy. June.

Parkhurst, Z.E. 1950. Survey of the Columbia River and its Tributaries – Part VII (Snake River from above the Grande Ronde River through the Payette River). Special Scientific Report: Fisheries No. 40. U.S. Department of the Interior, Fish and Wildlife Service. November.

Platts, W.S. 1981. Influence of Forest and Rangeland Management on Anadromous Fish Habitat in Western North America, Effects of Livestock Grazing. General Technical Report PNW-124. Prepared by the USDA Forest Service Anadromous Fish Habitat Program. April.

Quinn, T.P. 2005. The behavior and ecology of Pacific salmon and trout. American Fisheries Society and University of Washington Press.

Recorder Herald. 1933. "Salmon still coming up." July 19.

Recorder Herald. 1992. "BLM & Salmon Summit." February 6.

Recorder Herald. 1992. "USFS to report on existing activity to NMFS by Aug. 15." July 16.

Recorder Herald. 1993. "Forest Service shuts down local timber sale operators." November 18.

Recorder Herald. 1993. "Lemhi irrigators plan to provide water for Salmon." May 13.

Recorder Herald. 1993. "Our economy in jeopardy: A tip of the iceberg – NMFS plays dictator over Salmon National Forest." November 11.

Salmon Herald. 1926. "3 million fall chinook salmon eggs." November 17.

Shoshone-Bannock Tribes. 1992. Letter regarding Historical Creeks with Salmon, to Dick Buster, Bureau of Land Management—Salmon District, from Keith Tinno, Fort Hall Business Council. February 18.

Smith, E. 1973. The History of the Salmon National Forest.

Snook, R. 1993. "NMFS biologist see area for first time." Recorder Herald. November 18.

Snook, R. 1993. "Task Work Group answers local residents' queries." Recorder Herald. December 2.

Spinazola, J. 1998. A Spreadsheet Notebook Method to Calculate Rate and Volume of Stream Depletion by Wells in the Lemhi River Valley Upstream from Lemhi, Idaho. U.S. Department of the Interior, Bureau of Reclamation. March.

State of Idaho, 2004 Conservation Agreement in the Lemhi River Basin

Stuart, T. 1993. "Salmon and conservative politics." Recorder Herald. January 7.

Stuebner, S. 1995. "Festering Idaho mine to be cleaned; others remain." High Country News. August 21.

Stuebner, S. 1995. "Salmon campaign fractures over how to include people." High Country News. February 20.

Swift, R. 1996. "Endangered Salmon, Turning Emotions into Action." Watershed '96: A National Conference on watershed Management Proceedings. Baltimore, Maryland. June 8–12.

Trapani, J. 1998. BPA Fish and Wildlife FY 1998 Proposal for the Idaho Model Watershed Habitat Projects.

Trapani, J. 2002. Upper Salmon Basin Watershed Project, Stream Habitat Inventory Report. February.

Unknown. 2005. Framework for the Implementation of Habitat Actions in the Lemhi River Basin Pursuant to Section II.A.8 of the Term Sheet. March 31.

Unknown. 2005. Lemhi Conservation Plan, Chapter 4 (Conservation Measures). Draft for Discussion Only.

Unknown. n.d. Appendix B: Overview of the Upper Salmon Model Watershed.

Unknown. n.d. Lemhi Conservation Plan, Chapter 3 (Conservation Measures). Draft for Discussion Only.

Unknown. n.d. Lemhi County Code of the West.

U.S. Forest Service. 2000. Letter regarding Lemhi River "Fish Flush," to John Folsom, Idaho Model Watershed Project, from Bruce H. Smith, Forest Fisheries Biologist. August 21.

Walker, Jr., D.E. 1994. Lemhi Shoshone-Bannock Reliance on Anadromous and Other Fish Resources. Prepared for the Idaho Bureau of Land Management. Technical Bulletin No. 94-4. April.

Walters et al. 2012. "Quantifying cumulative entrainment effects for Chinook salmon in a heavily irrigated watershed." Transactions of the American Fisheries Society.

Work, J. 1971. The Snake Country expedition of 1830-1831: John Work's field journal. Edited by Francis D. Haines, Jr.

Many useful documents are available through the USBWP's online library here: https://modelwatershed.idaho.gov/resources/library/

The following YouTube links also provide a useful overview of the area and restoration efforts.

https://www.youtube.com/watch?v=2z7yfCa6Wpc (Life on the Range 2021; An overview of the award-winning Life on the Range video series, sponsored by the Idaho Rangeland Resources Commission.)

https://www.youtube.com/watch?v=HI1GXVZNClU (Life on the Range - Lemhi Ranchers enhance fish habitat via 25-year harmonious partnership)

https://www.youtube.com/watch?v=UldrtOnp1n4&t=6s (Life on the Range - Lemhi Ranchers enhance fish habitat via 25-year harmonious partnership)

https://www.youtube.com/watch?v=m_JxCV52xDQ (Life on the Range - Pahsimeroi ranchers help restore fish habitat)

https://www.youtube.com/watch?v=w37rKb7FErI (KIFI Local News - Lemhi Ranchers Restore Fish Habitat)

https://www.youtube.com/watch?v=5dw4n2yNjwE (Life on the Range - Lemhi River ranchers: Welcome home Chinook salmon)

https://www.youtube.com/watch?v=0uJrXo8i8j8 (Life on the Range - Karl Tyler inks conservation easement to protect prime salmon habitat)

https://www.youtube.com/watch?v=Et0LlSoYooA (Bureau of Land Management - Hands-On Restoration: The Hawley Creek Story)

https://www.youtube.com/watch?v=dOag3mV0mPE (Bureau of Land Management - Fish Habitat Restoration Means Jobs in Lemhi County)

ENDNOTE

[i] OSC Team 2019
[ii] Text in the two paragraphs preceding this endnote was used with permission from one of the authors, Mike Edmondson, as published in the Columbia Basin Partnership Task Force (2020).
[iii] Idaho Soil Conservation Commission 1995
[iv] OSC Team 2019
[v] Work 1971
[vi] Ferris n.d.
[vii] Idaho Soil Conservation Commission 1995
[viii] Gebhards 1958
[ix] Smith 1973
[x] Platts 1981
[xi] OSC Team 2019
[xii] Now the Natural Resource Conservation Service—NRCS.
[xiii] This practice was established by the U.S. Bureau of Fisheries, now the U.S Fish and Wildlife Service.
[xiv] The Agaidika or salmon eaters were removed to the Shoshone-Bannock Fort Hall Reservation in 1907, forty-one years after miners moved into the area in 1866 and fifty-two years after the dissolution of the short-lived (1855-1858) LDS Salmon River Mission (later nicknamed "Fort Limhi" after a figure in the *Book of Mormon*). Despite the brevity of the mission, the name "Limhi" (albeit misspelled) stuck and was applied to the river, the valley through which it flows, one of the mountain ranges, and finally, the county. The Agaidika have been referred to as the "Lemhi Shoshone," differentiating them from those in other areas.
[xv] Tom Curet PowerPoint presentation
[xvi] The National Marine Fisheries Service recovery plan is to have 2,000 salmon on average per year for the Lemhi River.
[xvii] Rollen Schmitten, NMFS, personal communication
[xviii] Led by the Northwest Power Planning Council—now the Northwest Power and Conservation Council and funded by the Bonneville Power Administration [BPA], U.S. Bureau of Reclamation [Reclamation], and the U.S. Army Corps of Engineers.
[xix] Funded by the Bureau of Reclamation and the Bonneville Power administration, respectively.
[xx] On April 22, 1992, Snake River spring/summer Chinook salmon runs were listed as threatened, and steelhead followed in 1997.
[xxi] National Oceanic and Atmospheric Administration, National Data Climate Center
[xxii] Dorratcaque, 1986.
[xxiii] Now the Natural Resources Conservation Service—NRCS.
[xxiv] Bruce Mulkey, R.J. Smith, Bob Thomas, and others.
[xxv] These included the John Day and Grande Ronde/Wallowa system in Oregon and the Yakima River in Washington.
[xxvi] (now the Idaho Soil and Water Conservation Commission)
[xxvii] Idaho Soil Conservation Commission, 1995.
[xxviii] Committee members are selected by the current sitting group, and the committee holds public meetings four to six times per year. It recruits representatives from the agricultural community, the Lemhi Soil and Water Conservation District, Forest Service, BLM, conservation groups, recreational groups, county commissioners, the Shoshone-Bannock Tribes, and the Lemhi and Custer County Agricultural Extension Offices.
[xxix] The L6 and L7 diversion dams were replaced. The L5 diversion was deleted, and its accompanying water right was moved upstream to L8A. The L4 diversion was merged with L6, and the associated irrigation changed from flood to sprinkler. The L3A diversion was modified with a fish ladder.
[xxx] This was done through the Mitchell Act of 1938.
[xxxi] Gebhards, 1959a.
[xxxii] Gebhards, 1959b.
[xxxiii] Enabled by Mitchell Act and Bonneville Power funding.
[xxxiv] Walters, et al. 2012.
[xxxv] Chinook salmon juveniles have three possible stages of rearing in the Lemhi River and vicinity:

1. Juvenile salmon begin to migrate at about 2-3 months of age—hatching from the gravel in February-early April and then heading down to the Salmon River and on to the estuary/ocean. These fish are too small to track and little is known of their movements. It is clear, however, that very few, if any, currently make it back as adults.
2. Juvenile salmon spend their first spring, summer, and fall in the Lemhi River growing quickly. This group then migrates from the Lemhi River into the Salmon River and spends the winter in Idaho before its journey to the estuary/ocean the following spring. These fish are tracked with Passive Integrated Transponders (PIT tags) to monitor migration and survival. This group is the most numerous of the year's cohort amounting to about 60-70%.
3. Juvenile salmon spend their first year in the Lemhi River and then migrate to the estuary/ocean the following spring. These fish typically survive better to return as adults but currently make up less than 30% of the cohort.

[xxxvi] The missionaries shipped many wagonloads of salmon to Salt Lake City. Although the Mormons viewed the salmon as a seemingly renewable and abundant resource, the Agaidika already recognized the fragility of their food supply, compromising their relationship with the missionaries.

[xxxvii] (grazing, timber, mining, recreation, etc.)
[xxxviii] Among them, Noranda, Inc.—the mine owner, the National Marine Fisheries Service, USFS, and the Idaho Department of Environmental Quality.
[xxxix] These events continue to be opportunities for ranchers and BLM and USFS staff to get together to discuss conditions and ideas regarding public grazing allotments.
[xl] The Challis Experimental Stewardship Program, created by Section 12 of the Public Rangelands Improvement Act of 1978, was established to alleviate reductions in grazing lands for regional ranchers, promote a stable local ranching economy, and facilitate a better working relationship among agencies, landowners, public land users, and others who hoped to achieve innovative and appropriate rangeland management.
[xli] Other long-term partners and relevant organizations took part in the negotiations. These were the Model Watershed Project, Idaho Department of Fish and Game, Bonneville Power Administration, the Bureau of Reclamation.
[xlii] These became the framework for the Salmon and Clearwater Components of the 2004 Snake River Water Rights Agreement, which included the Nez Perce Agreement (also a settlement component).
[xliii] Among the Lemhi Irrigation District, Water District 74, the State of Idaho, and the Model Watershed Project.
[xliv] In fact, Loucks remembered Lenore Barrett (Idaho State Representative for District 8B) saying it was the only instream flow legislation for which she voted. The Idaho Legislature passed HB 358 in April 2001, which authorized the Idaho Water Resource Board (IWRB) to appropriate a Minimum Stream Flow (MSF) water right at the L6 diversion.
[xlv] Funding for these came from the Bonneville Power Administration via the Columbia Basin Water Transactions Program and from the Pacific Coast Salmon Recovery Fund.
[xlvi] The court's decrees provided the basis for the 2006 draft of the Lemhi Section 6 Conservation Agreement, which was intended to protect irrigators from third-party lawsuits. The agreement is still in draft because the National Marine Fisheries Service wants an instream flow that irrigators consider unrealistic. Because ongoing restoration work and collaboration continue to improve survival rates for fish in the Lemhi River Valley, finalizing this agreement has been postponed.
[xlvii] During high flows, irrigators whose rights were decreed in the Lemhi Basin Adjudication are not limited to their decreed water right but can divert as much water as their ditch can hold, as long as it does not interfere with another user's water right and is put to beneficial use.
[xlviii] Haws 1977
[xlix] In particular, the Upper Salmon Subbasin Integrated Rehabilitation Assessment—IRA.
[l] This is relative to the recovery goal of 2,500 adult Chinook salmon (Idaho Governor's Offices of Species Conservation Team, 2019).
[li] Haws 1977, Donato 1998, Spinazola 1998
[lii] OSC Team 2019
[liii] Most juvenile salmon out-migrate to spend the winter in the Salmon River, perhaps because of suboptimal rearing conditions in the Lemhi system. The lower Lemhi has above-optimal summer temperatures and below-optimal winter temperatures, reducing the survival and condition of juveniles. Higher summer temperatures in the lower river have, for the most part, eliminated Chinook spawning below the mouth of Hayden Creek. Estimates show there is enough spawning habitat in the Lemhi River for Chinook to reach recovery goals; however, habitat capacity for juvenile rearing is significantly below levels to meet recovery goals.
[liv] In addition to ranchers, those involved in these projects include the Upper Salmon Basin Watershed Program, Lemhi Soil and Water Conservation District, Natural Resources Conservation Service, and the Idaho Department of Fish and Game screen program.
[lv] Kenney, Bohannon, Big Timber, Eighteenmile, Hawley, Canyon, Big Eightmile, and Lee creeks.
[lvi] Salmon harvest, hydropower dam impacts, habitat, hatchery influences, and predation from fish, birds, and marine mammals.
[lvii] Including those from the Columbia River dams, harvesting, ocean survival, water quality, predation from birds, marine mammals and fish, and others.
[lviii] Two thousand adult Chinook on average per year and 1,000 Snake River Basin adult steelhead.