THE LAST FISH OR THE LAST FISHERMEN? EVALUATING SUSTAINABLE FISHERY MANAGEMENT AND THE FUTURE OF THE COLUMBIA RIVER GILLNETTERS

by

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This thesis examines the environmental and socioeconomic tradeoffs of gillnet fishing on the Columbia River, a method with a long history to commercial fisheries in the area but marked by controversy due to its impact on endangered salmon and steelhead populations. While gillnets have been a central, historical, and highly effective fishing method in the region, their ecological costs elicit discussion about regulation, prohibition, and alternative fishing methods.

Using a comparative case study approach, this research evaluates four case study examples: Washington State Senate Bill 5296, the Select Area Fisheries Evaluation (SAFE) Project, the Bristol Bay Sockeye fisheries in Alaska, and Florida's 1994 net ban. Together, these cases illustrate how different policy frameworks shape ecological outcomes and community resilience. These examples show that science-based management and equitable co-governance, as in Bristol Bay, can sustain both fish populations and fishing livelihoods. In contrast, top-down bans implemented without transitional support, such as in Florida, prompt economic dislocation without clear ecological recovery.

By considering the Columbia River Basin within the context of these examples, this thesis argues that successful fishery management cannot rely on gillnetting restrictions alone. Rather, it is suggested that a holistic framework that integrates a variety of perspectives:

ecological science, Indigenous rights, economic equity, and community participation to name a few. Ultimately, this research shows that the future of the Columbia River gillnetters depends on aligning the survival of its salmonids to the survival of the communities who have long depended on them.

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Chapter 1: Introduction

The history of the Columbia River is one of abundance, loss, and contention. For centuries, its salmon runs were legendary and plentiful, originally sustaining Indigenous nations and later fueling the rise of the commercial fishing industry. Today, however, the river is at the center of a conflict: reconciling ecological recovery alongside the survival of multi-generational fishing communities. The question guiding this thesis, whether to save 'the last fish or the last fishermen,' captures the tension between conservation goals and socioeconomic justice.

Gillnetting, the practice central to this debate, is both efficient and controversial. Designed to entangle fish by their gills, gillnets have historically produced high quantities of fish at a relatively low effort, compared to trolling or hook and line, making the method the mainstay of Columbia River fisheries since the late nineteenth century. Yet, their efficiency has been linked to ecological decline. Gillnets are unable to discriminate between hatchery-raised salmon intended for harvest and the endangered wild stocks that migrate alongside them. This bycatch problem combined with habitat degradation, hydropower development, and climate change, have pushed many salmon runs towards extinction.

At the same time, Columbia River salmon hold a high economic and cultural value. A single "Columbia Springer" [1] can sell for more than $10/lb. above its Alaskan, Oregon, and Washington coast counterparts, making it the most expensive salmon in the world (Powells' Guide Service). Fishing communities along the river, many of them multi-generational, depend on these runs year after year. For these residents, gillnetting is not only a job but a cultural identity. This dual crisis, maintaining both fish stocks and fishing livelihoods, is not a new

[1] "Springer(s)" refers to early-run Chinook salmon that migrate the Columbia River. These salmon return to freshwater to spawn earlier than other runs. Ocean-caught Alaskan, Oregon, and Washington King can be caught in the springtime, but are not considered Springer Chinook.

conversation, but a decades old one marked by contentious policy debates. Since the mid-twentieth century, Oregon and Washington have alternatively banned and reinstated various gear types, attempted joint compacts, and experimented with selective fishing programs. Federal intervention through the Endangered Species Act of 1973 and U.S. v. Oregon of 1969 saw the legal implementation of state regulation and treaty-guaranteed tribal rights. Despite these efforts, the Columbia River salmonids remain in a state of ecological fragility and socioeconomic uncertainty.

This thesis explores whether a just transition, one that safeguards salmon recovery while sustaining the Columbia River gillnetters is even possible. It employs a comparative case study approach, examining where gillnet regulation or prohibition has been attempted, additionally exploring the viability of alternative fishing methods in the region: Washington State Senate Bill 5296, the Select Area Fisheries Evaluation (SAFE) Project, the Bristol Bay Sockeye fisheries in Alaska, and Florida's 1994 net ban. These cases provide a spectrum of outcomes, from ecological success and community resilience to economic collapse and ecological ambiguity. This research aims to highlight the conditions that determine whether fishery policy succeeds or fails. It argues that a sustainable future for fish requires frameworks that integrate science, equity, and cultural justice. In doing so, this research contributes to a growing body of academic scholarship that asserts the intersectionality of resource management and sustaining human communities.

Guide: Chapter 2 outlines the historical evolution of Columbia River fishing practices, situating gillnetting within the broader development of commercial fishing and early to modern ecological conservation regulations. Chapter 3 describes the methodological approach, detailing how comparative case studies were selected and analyzed. Chapter 4 presents findings from the four

case studies, exploring their ecological and socioeconomic impacts, while Chapter 5 analyzes these findings comparative to the Columbia River, drawing out common themes and lessons for future policy. Chapter 6 concludes by returning to the guiding question of whether it truly is possible to sustain both salmon populations and fishing communities, offering consideration and subsequent research for integrated, science-based resource management. Finally, Chapter 7 proposes directions for future research, particularly concerning the role of market incentives and eco-certifications in driving sustainable fishing practices.

Chapter 2.1: Historical Timeline

Late 1700s-Early 1800s: First Contact and Indigenous Traditions

Long before the arrival of European settlers, the Columbia River sustained one of the richest salmon fisheries in the world. For Indigenous nations residing along the river, such as the Yakama, Umatilla, Warm Springs, and Nez Perce, salmon was not merely a source of food but the foundation of cultural, spiritual, and economic life. Fishing methods like dip nets, spears, and platform fishing were adapted to fit the seasonal cycles of salmon migration and were governed by traditions that balanced harvest and ecological renewal, known as subsistence fishing. For the state of Alaska, subsistence is formally recognized and managed by the Alaska Department of Fish and Game as a legal and cultural right, prioritizing the customary and traditional harvest of fish for personal and community use over commercial or sport purposes. Oral histories among Indigenous people in Alaska, including the Tlingit, Yup'ik, and Dena'ina ,describe salmon as a sacred gift from the Earth, reflecting a personal moral responsibility to ensure the species' continued abundance (Thornton, 2012). Ceremonies such as a First Salmon feast embrace the sacred responsibility of ecological stewardship. These practices maintained salmon runs for years without depletion:

> Depending on how one defines "commercial fishing", its history on the Columbia River is as ancient as the culture of the people who first lived along its shores and caught its fish, or as comparatively recent as the first encounters between Indian tribes and the European and Euro-American fur traders and explorers, salmon, steelhead and other fish have cultural value to the tribes but also always have been trade commodities on the Columbia. (NWPCC, 2021)

The late-18th century marked a profound shift. In 1792, American Captain Robert Gray sailed

into the mouth of the Columbia River. His expedition, like the travelers that followed, took note of the abundance of salmon. A decade later, the 1805 Lewis and Clark expedition saw extensive trade with Native populations for salmon, recording the fish as both a staple of Indigenous diets and a potential commodity for Euro-American PNW expansion (Lichatowich and Lang, 2025).

By the early 1800s, the Hudson's Bay Company was exploring the ability to capitalize on this abundance through experimentation with commercial exports. In 1830, Captain John Dominis salted and packed 53 barrels of Columbia River salmon and shipped them to Boston to establish transcontinental trade. However, the long journey and high import tariffs proved unprofitable, and Dominis did not try again. While salmon were plentiful, infrastructure and economic markets were not yet in place to sustain large-scale exports, just yet.

1830s-1860s: Early Commercial Attempts and the First Cannery

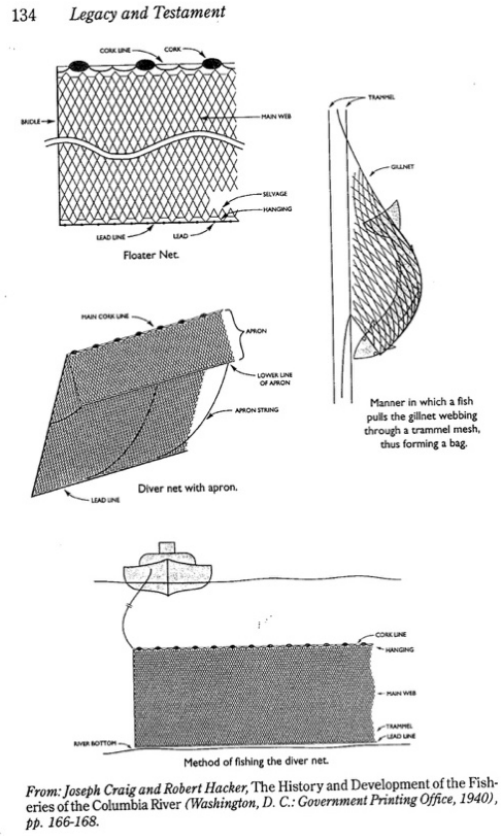
This period saw serious efforts to transform the salmon runs into market commodities. Early preservation techniques originating from the Atlantic region relied on salting, drying, and barreling were unsuited for Pacific salmon due to its high oil content. By the mid-nineteenth century, the increasing flow of settlers into Oregon and Washington brought higher demand. Immigrant communities from the eastern United States, Scandinavia, Finland, the Mediterranean, and the United Kingdom (Martin, 2008) brought with them different fishing skills, gear, and packing/preservation techniques. At the same time, innovation in food preservation increased the possibility of salmon as a commodity.

In 1866, the first salmon cannery was established on the lower Columbia, marking the beginning of commercial-scale fishing. This enterprise saw a rapid boom: within a decade, more than one hundred canneries lined the river, and by 1881 that number reached 1,200 (NWPCC, 2025). Salmon, once primarily a subsistence and trade item, had been transformed into a mass-

produced commodity fueling Pacific Northwest economic expansion and global trade.

Gillnet fishing uses vertical nets set in a water column, either anchored to the seabed, or drifting, designed to trap fish by their gill plates. These nets are constructed with specific mesh sizes depending on the head diameter of the target fish species. Fish will swim into the net, their bodies too large to pass through, and they will become ensnared behind their gill covers. Depth ranges from 15-140 meters, with length varying from 50-200 meters (MSC, 2023) depending on desired catch and area. Drift gillnets hang below the surface of the water and drift along with the current. It is commonly used to target migratory open water fish species swimming in shallower depths. Gillnetting allows for highly selective fishing based on net placement and mesh size; however, it is effectively non-selective and frequently results in overfishing, posing a serious challenge to fish conservation.

Table 1: Table below shows how gillnets work



From: Joseph Craig and Robert Hacker, The History and Development of the Fisheries of the Columbia River *(Washington, D. C.: Government Printing Office, 1940), pp. 166-168.*

Bycatch, the unintentional capture of non-target species, remains one of the most pressing criticisms of gillnetting. The National Oceanic and Atmospheric Administration (NOAA) is a governmental agency focused on climate, weather, oceans, and coasts, and on managing and conserving marine and coastal ecosystems through scientific and technological research. NOAA defines bycatch as "discarded catch of marine species and unobserved mortality due to a direct encounter with fishing vessels and gear" (NOAA, 2025). On the Columbia, bycatch is primarily of non-target fish stocks, such as endangered wild salmon and steelhead. Non-target catch is generally required to be released, but they may suffer injuries or mortality depending on how they were caught and handled (WDFW 2022).

Endangered Chinook, coho, sockeye, and steelhead, sturgeon, sea lions, and other varieties of fish, marine mammals, and birds can be impacted by gillnets. Bycatch is usually discarded, usually dead or dying, back into the water, leading to a broader disruption of marine ecosystems (NOAA, 2025). However, due to licensing and fishing regulations, many fishermen cannot sell or use non-target bycatch, putting them at a disadvantaged position regardless. Bycatch can also slow down the rebuilding of overfished/endangered fish stocks. Economically, bycatch can have a negative impact on fishermen. Tracking spatial data could show high bycatch of a non-target species, resulting in increased seasonal closures and regulations. On the Columbia River, gillnet fishing often overlaps with migration routes and feeding grounds, increasing the risk of unintended capture. Additionally, Columbia River fisheries are classified as mixed stock fisheries, meaning there are a mix of many different species and stocks present at the same time in the same location (WDFW, 2022)[2]. Gillnetting regulations have struggled to determine the best method to catch target stocks: healthy hatchery and wild fish, while avoiding other river fish like non-target stocks. These effects ripple down the ecosystem, affecting predator-prey relationships and ecosystem resilience.

This shift fundamentally altered the ecology of the river and the areas fishermen. The growing presence of immigrant fishermen introduced new methods such as drift gillnets, seines, and stationary traps, which were far more efficient than traditional Indigenous gear or western adaptations of said gear. Indigenous people, meanwhile, were becoming increasingly marginalized from the fisheries and fishing areas that had defined their way of life. Settlers asserted control over access to fishing grounds and commercial profits from runs, leading to conflicts over fishing rights and resources, one that continued to intensify (Lichatowich and

[2] Species refers to "formal taxonomy used to distinguish similar organisms that are genetically distinct." Stock is "an independent breeding population of the same species," genetically and geographically distinct.

Lang, 2025).

1870s-1890s: Industrial Peak and Early Decline

By the 1870s, the Columbia River had become famous, the epicenter of the global salmon industry. What had begun as a promising new industry quickly escalated into an intensive commercial operation. By the mid-1870s, the river was lined with canneries operating at full capacity, processing millions of pounds of salmon each year and shipping it domestically and internationally.

The symbol of this industrial transformation was the fish wheel. First constructed on the Columbia in 1876, these massive contraptions were powered by the river's current, positioned to scoop fish out of the water and drop them into a chute connected to the cannery, often with minimal human effort. At their peak, fish wheels could remove thousands of salmon from the river in a single day, a level of efficiency unmatched by other methods. For cannery operators, fish wheels represented modern industrial progress. For conservationists and sport fishermen, they represented overexploitation. Cannery operators, worried about the future of Chinook salmon, established the Columbia's first fish hatchery, the Oregon and Washington Fish Propagation Company in 1877 (NWPCC, 2025) to artificially supplement declining stocks. A fix rather than a recognition of the limits of natural resources. Hatchery fish are the primary target for Columbia River fishers. With upwards of now 200 salmon hatchery programs in the Columbia River Basin, they help support wild stocks and provide fish for commercial and individual harvest; 80% of all salmon and steelhead returning to the Columbia as adults are of hatchery origin (NOAA, 2025).

While the industry celebrated record harvests peaking at more than 42 million pounds in 1883 and 1884 signs of decline were visible. By 1890, total catch had fallen to 29.6

million pounds (NWPCC, 2025). At the same time, environmental pressures beyond overfishing compounded the problem. Irrigation projects and hydroelectric development in the upper basin were underway by the late 1880s, blocking tributaries and destroying spawning grounds. When fewer fish are unable to return upriver and more are being harvested before spawning, the long-term viability of the Columbia River salmon was under serious threat. There was not an adequate number of fish reaching their upriver spawning grounds, either because they were physically blocked or unable to escape harvest. At this point, fishermen and canneries' sights were set on Chinook, but by 1889, they began to accept steelhead, sockeye, coho, and chum (keta or dogfish) salmon to compensate for declining Chinook populations.

By the end of the nineteenth century, the scarcity was impossible to ignore. The Columbia River's resources had been transformed into a global fishery, but questions about whether the river could continue to bear the weight of industrial exploitation were being raised. Gillnetting regulations have struggled to determine the best method to catch target stocks. These effects rippled through the bottom-up ecosystem, affecting predator-prey relationships and ecosystem resilience.

1900s-1930s: Exhaustion and Early Regulations

The turn of the twentieth century saw the Columbia River salmon fisheries exhausted. Catches were a fraction of the record harvests in the 1880s (Lichatowich and Lang, 2025). The introduction of gasoline-powered engines in 1898 further accelerated fishing pressure, allowing gillnet boats to travel further, operate more efficiently, and fish independently of tides. Fishing, a once labor-intensive seasonal activity was transformed into a mechanized industry capable of exploiting the river with unprecedented reach.

By the 1910s, the intense pressure on the industry was unsustainable. Salmon catches continued to decline, and by the 1920s, runs had collapsed compared to their nineteenth-century abundance. Conservation advocates, scientists, and game fishermen began calling for restrictions on certain harvest methods. In 1918, Congress approved the Columbia River Interstate Compact to establish permanent, joint regulation of the lower river by the states of Oregon and Washington, doing little to slow the exponential decline. Fishermen frequently exploited loopholes by moving gear across state boundaries depending on which jurisdiction was more lenient. For example, lower Columbia gillnetters filed a petition to prohibit all fishing except for hook-and-line, a method using a long line with baited hooks, upstream of the Sandy River to eliminate all commercial fishing on the upper Columbia. Commercial fishermen of the upper Columbia responded with a petition to eliminate net fishing at night (gillnetters only fished at night because the salmon were unable to see their nets). Oregon approved both petitions causing a confusing chaos fueled by competition, superiority, and rage. Additionally, when the Oregon side of the river was closed, it would sometimes remain open on the Washington side (Lichatowich and Lang, 2025). The compact formally recognized both states' retainer over the Columbia; it did little to govern each states autonomy of regulation.

The regulation of fishing gear became a new target. In 1926, Oregon voters banned fish wheels, viewing them as a symbol of environmental exploitation. Oregon operators would simply move across the river to Washington, where they continued to operate until 1935, when that state also outlawed wheels, as well as stationary nets, and seines. Oregon soon followed, leaving drift gillnets as the only legal gear for non-Indigenous commercial fishermen.

The 1930s also saw the expansion of irrigation projects and hydroelectric dams, compounding the pressure on salmonid stocks by destroying their spawning habitat and

obstructing migration routes. This was significant because salmon are an anadromous species that require upstream freshwater spawning ground to reproduce and any type of disruption in their migration can lead to decline. By 1933, more than half of the Columbia's historic spawning habitats had been lost. Even as regulatory bans curbed the most effective, and most dangerous, gear, the combined pressure of overfishing and habitat destruction continued to erode the river's runs. By the end of the 1930s, the Columbia River was no longer defined by a diversity of fishing methods once employed all along the river, traps, seines, wheels, and platforms, it was now narrowed to a single dominant technique: drift gillnets. Efficiency and regulatory outcomes entrenched gillnets as the backbone of the commercial fisheries for decades to come.

1940s-1950s: Demand, Hydropower Expansion, and Federal Oversight

World War II gave the Columbia a bite of what was to come: how to effectively navigate industrial demand for fish and the ecological decline of fish populations. The war identified salmon as a critical food source, and increasing pressure to maximize harvests increased even as fish populations decreased. Cannery operators and fishermen were encouraged to maintain production past limits, reinforcing the short-term logic of extraction over long-term conservation. At the same time, hydropower expansion permanently altered the river. The completion of the Bonneville Dam in 1938, followed by new projects throughout the 1940s and 50s, including the Grand Coulee Dam and Dalles Dam, provided electricity to wartime industries and contributed to postwar industrial growth. However, they devastated salmon runs. Dams blocked access to spawning grounds, altered water temperatures and flows, and reduced the survival rates for migrating juveniles.

Federal officials recognized the depth of the crisis. President Theodore Roosevelt had warned officials in the area as early as 1908 that divided state authority over the Columbia was a

volatile situation, and by the 1940s his words appeared prophetic. The federal government expanded its role in fishery management, funding hatcheries to supplement declining runs and commissioning studies on the impacts of dams and certain harvest practices. Yet alike the other stopgap measures, these interventions treated symptoms rather than root causes. Hatcheries could produce more fish, but they could not restore lost ecosystems or resolve overharvest.

The Oregon Legislative Assembly reported in 1943 that salmon were being impacted by blocked spawning and rearing habitats due to dams, water pollution, reduced water flows, high water temperatures, and overfishing. Commercial catch continued to drop through the 1950s and 1960s, averaging only 10 million pounds caught between 1953-1969. Once the most abundant salmon fishery in the world, the Columbia River was now a system fragmented by dams, dependent on hatcheries, and gear locked to a type whose ecological impacts would become the future focus of debate.

1960s-1980s: The Columbia River Treaty, Tribal Rights, and the Rise of Conservation Legislation

Ineffective and lax regulation efforts have played a large role in the decline of salmon and steelhead populations. Washington and Oregon enacted salmon harvest restrictions in the Lower Columbia from 1966-1988; however, they were poorly enforced. The lack of harvest protocol regarding the dramatic decline in the Columbia River salmon populations mixed with confusing regulatory efforts from both Washington and Oregon frustrated the federal government. President Theodore Roosevelt remarked:

> The salmon fisheries of the Columbia River are now but a fraction of what they were 25 years ago, and what they would be now if the United States Government had taken complete charge of them by intervening between Oregon and Washington. During these 25 years, the fishermen of each state have

> naturally tried to take all they can get, and the two legislatures have never been able to agree on joint action of any kind adequate in degree for the protection of the fisheries. (NWPCC, 2025)

The Columbia River Treaty, signed in 1961, calls for regional recommendations from a U.S and Canadian Entity coordinate management of flood risk and hydropower generation. It established a framework for sharing the benefits of the river's reservoirs, like financial compensation to the United States for downstream flood control and power generation (CRITC, 2025). The treaty also ensured periodic renegotiation to address environmental, social, and energy priorities (Canada & United States of America, 1964)

Founded in 1969, the *Columbia River Gillnetter* was a union publication focused on advocating for the rights, economic interests, and cultural identity of commercial gillnet fishers along the lower Columbia River, providing updates on relevant fishery policy and community issues impacting fishing families.

During this period, legal acknowledgement of Indigenous treaty rights fundamentally reshaped fisheries management in the area. The 1974 Boldt Decision reaffirmed the rights of Columbia Plateau tribes, such as the Yakama, Umatilla, Warm Springs, and Nez Perce, to harvest up to 50% of the fish at their "usual and accustomed places" as guaranteed under mid-nineteenth century treaties. The ruling also established co-management, requiring tribes and state agencies to coordinate on harvest allocation and conservation. For tribes, the decision represented both the restoration of sovereignty and the recognition of ecological stewardship paired with cultural survival. For Columbia River tribes, sustainability is tied to sovereignty, subsistence, and intergenerational justice. Tribal economies and food systems depend on the continued availability of salmon.

At the federal level, the Endangered Species Act of 1973 provided a new legal framework for protecting declining salmon runs. As Columbia River populations were listed under the act, fishery managers faced federal obligations to minimize incidental mortality and preserve critical habitats. The law requires federal agencies, in consultation with the U.S. Fish and Wildlife Service and the National Weather Service, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a "taking" of any listed species of endangered fish or wildlife. (EPA, 2025). Under the act, multiple salmon and steelhead runs in the Columbia River were listed as endangered beginning in the 1990s, leading to restrictions on commercial and recreational fishing. Federal agencies including the U.S National Oceanic and Atmospheric Administration Fisheries Services are tasked with enforcing these protections in combination with the U.S Fish and Wildlife Service. The Act requires the implementation of biological opinions and scientific assessments to guide the fish harvest levels and future conservation actions. Contemporarily, this has led to increased regulations on gillnet fishing, gear restrictions, shortened seasons or season closures, and monitoring of bycatch.

However, fishermen realized that they could still troll, a fishing method where a boat drags multiple lines with hooks and lures behind it, for salmon at the ocean's mouth of the Columbia when states closed the river. Gillnet fishing continued in the lower Columbia while the number of salmon and steelhead reaching their spawning grounds in the upper Columbia was declining. The Columbia River Compact only regulated harvests in the lower river, unable to guarantee that enough fish would make it far enough upriver to spawn.

Formed in 1977, the Columbia River Inter-Tribal Fish Commission works towards habitat restoration, hatchery reform, and advocacy for dam removal. More importantly, tribes have also experimented with traditional selective fishing gear, like traps and platforms. The culmination of these conservation trends came in 1988 with U.S. v. Oregon, which created the Columbia River Fish Management Plan. The agreement between federal, state, and tribal governments aimed to rebuild the areas historical fish runs and allocate harvests more equitably. For the first time since the first cannery opened on the river, there was a formal, multi-party management plan that recognized the interconnectedness of ecological and human systems.

Despite the clear federal and state concern for the salmonids, the Columbia saw little positive outlook. Hatcheries rapidly increased output to compensate for lost habitat, the efficiency of gillnets, and exponential decrease of wild salmon and steelhead runs.

1990s: The ESA Watershed and the Search for Alternative Fishing Methods

For decades, salmon and steelhead populations had declined. By the early 1990s, federal scientists concluded that some runs were at risk of extinction if safety measures were not put in place. On November 20 1991, the first Columbia Basin salmon species, the Snake River sockeye, was listed under the Endangered Species Act, followed by multiple listings throughout the decade; the Oregon Department of Fish and Wildlife has reported that Snake River Fall Chinook, Snake River Spring/Summer Chinook, Lower Columbia Spring/Fall Chinook, Upper Willamette Spring Chinook, Snake River Steelhead, Lower Columbia River Steelhead, Middle Columbia Steelhead, Upper Willamette Steelhead, and Columbia River Chum were classified as threatened species starting in April 1992. Upper Columbia Spring Chinook, Upper Columbia River Steelhead, and Snake River Sockeye were classified as endangered[3] starting in November 1991

[3] Threatened refers to species likely to become endangered in the foreseeable future. Endangered species are at immediate risk throughout all or a considerable portion of their range (U.S. Fish and Wildlife Service, 2025)

(ODFW, 2001). These designations triggered new protections, reshaping the management of the river's fisheries.

Image 1: Image shows the entirety of the Columbia River Basin

For gillnetters, the consequences were immediate and severe. Because gillnets could not selectively target hatchery-raised fish while simultaneously avoiding wild, ESA-listed species, managers had to cut back and impose new restrictions, leading to low landings. By the mid-1990s, Columbia commercial harvests were a fraction of their former levels, and many fishing families were struggling to make ends meet. State agencies experimented with license buyback programs intended to reduce fleet size, but they offered little relief for the communities whose economic base was collapsing.

The continued decline also sparked political conflict. Conservationists and sport-fishing advocates called for an outright ban on non-tribal gillnets in the lower Columbia, arguing that the gear was incompatible with endangered species recovery. Gillnetters countered that they were being scapegoated for broader ecological problems such as dams, pollution, and ocean conditions, all factors beyond their control. The resulting polarization echoes earlier periods of conflict, but the stakes were higher now: entire communities were facing erasure because they

were reduced to a conservation indicator.

In 1993, the Select Area Fisheries Evaluation (SAFE) project was created as a collaborative effort between Oregon and Washington. By relocating fisheries to off-channel sites and relying on hatchery release, SAFE sought to allow targeted harvest of hatchery fish to minimize impacts on ESA-listed wild runs. The program represented a real attempt to reconcile conservation with community survival.

2000s-Present: The Struggle for Survival

New challenges and heightened conflicts characterized the twenty-first century. By the 2000s, the ecological crisis was undeniable. Federal courts repeatedly rejected salmon recovery plans prepared by NOAA fisheries: Columbia River Basin/Federal Columbia River Power System (FCRPS) Biological Opinions (BiOps), ruling that they failed to adequately protect endangered species (National Wildlife Federation v. National Marine Fisheries Service, 2008) Judges ordered stricter harvest regulations, increased spill over from dams to help juvenile salmon migrate (intentional release of water over dams spillways to allow salmon to migrate safely past turbines) and greater scrutiny of hatchery practices. For commercial fishermen, this meant shorter seasons and reduced quotas once more, intensifying the economic strain that had already plagued gillnetting communities since the 1990s. Ecological stressors compounded the crisis. Warming water temperatures and recurring droughts reduced salmon survival in tributaries. Marine heatwaves such as the 2014-2016 “Blob” (NOAA, 2019) devasted ocean survival rates. Salmon migration routes shifted, and sardines were spawning farther offshore. In 2015, low snowpack and a summer heatwave led to massive deaths, with hundreds of thousands of fish perishing before spawning. Species shifted north toward cooler waters, warm water species were found in Alaska, and around 95% of ESA-Winter Chinook eggs were lost to

drought. These climate-driven shocks underscored the already fragile runs (NOAA, 2019).

The political battle over gillnets ignited. Effective in 2008, Oregon Administrative Rule (OAR) 635-042-0010 outlines procedural rules for commercial fishing gear. It is unlawful for a gillnet to be stationarily fixed, left unattended, or used in conjunction with another boat or net (OAR, 2008). In 2012, Oregon approved a plan to phase out gillnets in the mainstream Columbia by 2017, relocating commercial fishing to off-channel areas. The policy was celebrated by conservationists and sportfishermen but bitterly opposed by commercial fishermen, arguing that it would devastate rural communities. Implementation lost momentum due to lack of funding for alternate gear, inconsistent enforcement, and resistance from fishermen. By 2017, the phase-out was only partially achieved, with Oregon quietly rolling back the provisions. Washington State followed a similar trajectory. In 2016, the Washington Fish and Wildlife Commission voted to phase out gillnets, aligning with Oregon's policy. But commercial pushback quickly mounted, and by 2019 the commissions reversed the earlier ruling, reinstating gillnets on the lower river. Columbia River fisheries policy was deeply polarized; advocates of a ban saw the reversals as political surrender, while fishing families celebrated their communities' efforts, as gillnets were necessary to preserve their livelihoods.

The Recovery Plan for Snake River Sockeye Salmon was created in 2015 in coalition with federal, state, local, and tribal partners. The Snake River is the largest tributary for the Columbia River Basin. Naturally spawned and residual sockeye salmon originating from the Snake River basin were listed as endangered in 1991, their habitat designated as critical a couple years later in 1993. The plan focused on four ESA-listed salmon and steelhead: Snake River sockeye, Snake River Spring/summer Chinook, Snake River fall Chinook, and Snake River steelhead, with the primary goal to recover the natural population of Snake River sockeye and

support the removal of the species from the endangered species list (NMFS, 2015). While hatchery-reared fish are often the intended targets of catch, wild and endangered populations are frequently caught as bycatch. Traditional gillnets are not bycatch friendly, even if the fish live to be non-selected, the trauma and time in water contribute to mortality once released. These specific populations are critical to the long-term survival of their species. They have suffered disproportionally due to gillnet-induced mortality and injury from entanglement, either while caught or after release. NOAA has committed to a five-years review of the recovery plan. 2021's review affirmed that all four ESA-listed populations continued to remain endangered or threatened. No delisting was recommended. The population outlook for Snake River salmonids remains fragile.

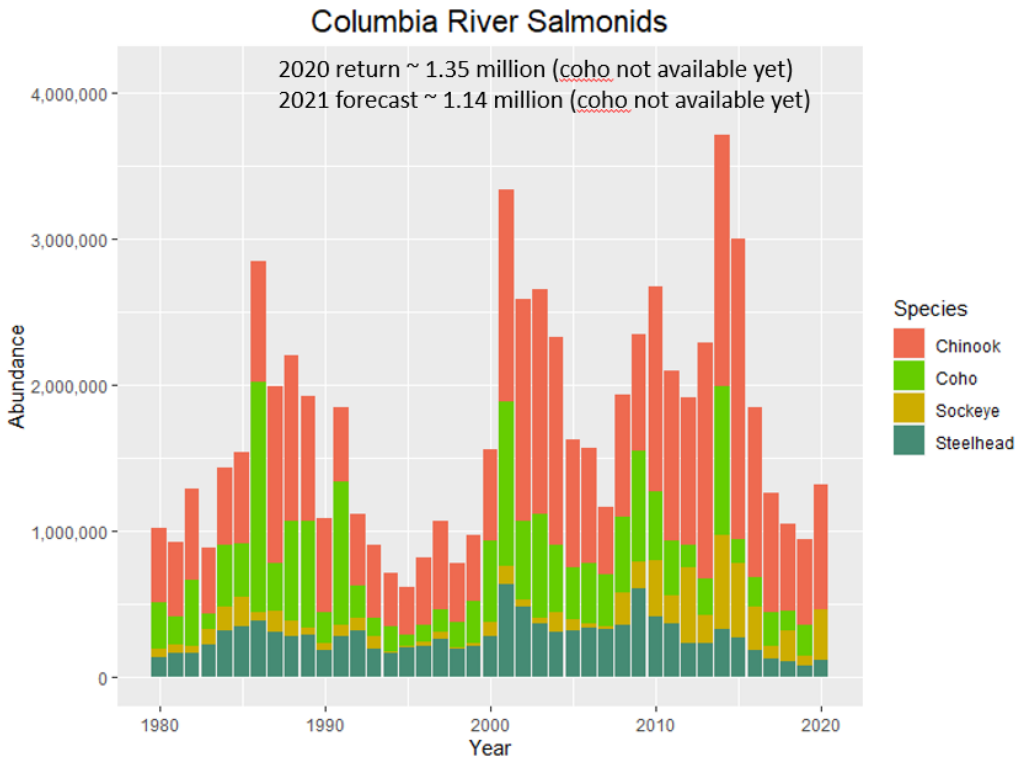
Fishery managers and scientists were experimenting with alternative gears that were compatible with the terrain of the Columbia and intended to reduce bycatch of ESA-listed species. Purse seines, pound nets, and tangle nets were tested on the lower river, with mixed results.

Table 2: Comparison of fishery type with assessment of major metrics

Gear	Pre/Post 2013 Policy	Catch Rates	Bycatch	Released Fish Condition	Gear Investment Cost	Chance of Success
Merwin Trap	Pre	Low	Low	Moderate	High	Low
Tangle Net	Post	Low	Low	Fair	Low	High
Purse Seine – Summer	Post	Moderate	High	Good	High	Low
Beach Seine – Summer	Post	Low	High	Good	Moderate	Low
Purse Seine - Fall	Both	High	Moderate	Good	High	High
Beach Seine - Fall	Both	High	High	Good	Moderate	High
Purse Seine – Shad	Post	High	Moderate	Good	High	High
Pound Net – Fall	Post	Moderate	High	Good	High	Moderate

Salmon and steelhead returns hit record lows in 2015, 2019, and 2021, deepening hatchery dependence.

Table 3: Columbia River Salmonid Returns 1980-2020, including 2021 forecast (NWPCC, 2021)



The operation of the Columbia's extensive hydropower system in the four Lower Snake River dams has come under federal review for its role in disrupting fish migration. Legal challenges like the National Wildlife Federation v. National Marine Fisheries Service in 2021 have pushed the federal government to modify dams as part of broader recovery strategies for endangered species.

In 2023, Washington's legislatures introduced Senate Bill 5297, which proposes to ban non-tribal drift gillnetting on the lower River beginning January 1, 2025. The bill also establishes a voluntary buyback fund to compensate non-tribal fishers. This was preceded by a state buyback effort in 2022, which retired around 85% of Columbia River gillnet licenses using $14.2 million in funding. SB 5297 was passed, receiving bipartisan support by conservation groups and the Oregon governor's office. In legislative hearings, proponents emphasized that drift gillnets are

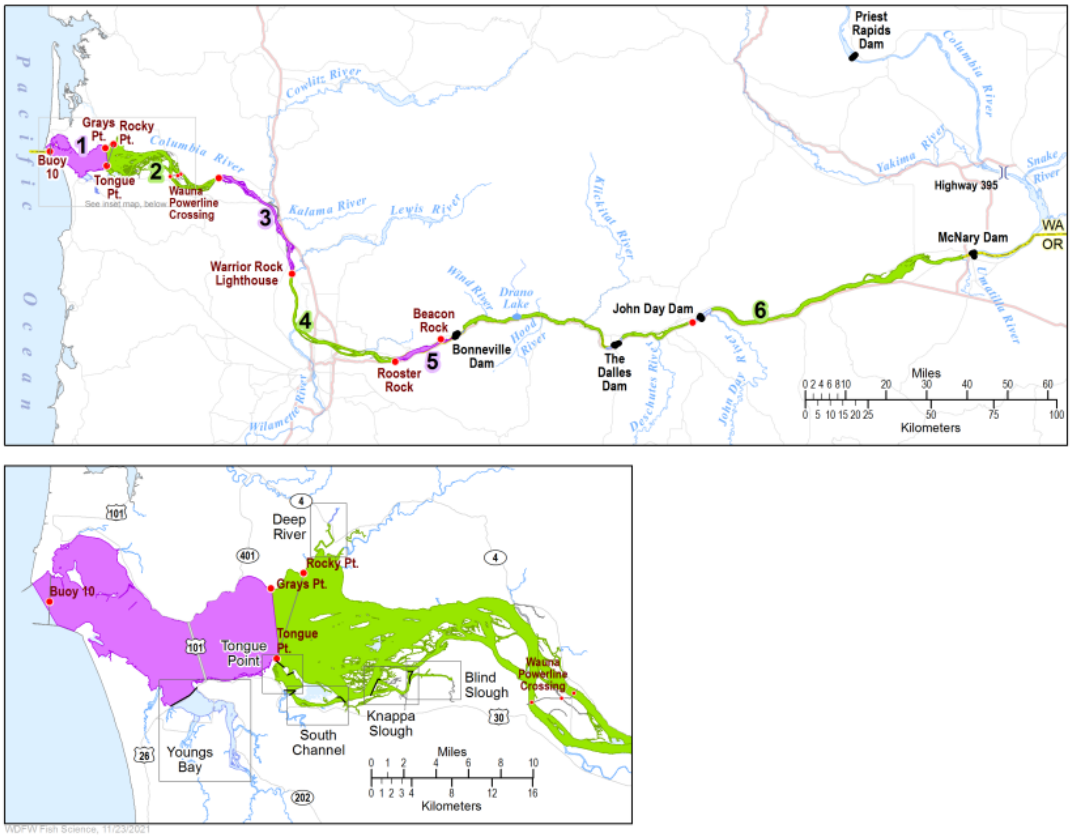
poorly suited for mixed-stock fisheries and argued that shifting harvest impacts towards conservation or selective methods would benefit wild escapement (Washington State Legislature, 2023). Oregon attempted similar reforms in 2025, introducing House Bill 3827, aimed at restricting gillnet fishing in the mainstem and requiring permit renewal only for active fishers. The HB was dead as of June 27, 2025 (Oregon Legislature, 2025).

Contemporarily, drift net fishing occurs during winter, spring, summer, and fall from zones 1-5, starting at the mouth of the upstream Columbia River to Beacon Rock, Washington (NOAA, 2021). The zones were created in U.S. v. Oregon (commercial fishing in the Columbia River occurs in two fisheries and six zones. Zone 6 is the Indian-only commercial fishery area. Non-Indian commercial fishing occurs in Zones 1-5 between Bonneville Dam and the ocean) composes the direction of the Columbia River fisheries. Zones 4-5 are Chinook-directed, while zones 1-3 are coho-directed. In zone 4-5 the minimum mesh sizes range from 8-9-inches depending on the month.

As of March 2024, Columbia River Chum Salmon, Lower Columbia River Chinook Salmon, Lower Columbia River Coho Salmon, Lower Columbia River Steelhead, Middle Columbia River Steelhead, Snake River Fall Chinook, Snake River Spring/Summer Chinook, Snake River Steelhead, Upper Columbia Steelhead, Upper Willamette River Chinook, and Upper Willamette River Steelhead remain threatened species. Lower Columbia River Coho, Snake River Sockeye, and Upper Columbia River Spring Chinook are classified as endangered (ODFW, 2024). Lower Columbia Coho is classified as endangered at the state level and threatened at the federal level. While there are slightly more species listed due to refined monitoring techniques, there has been indication of improvement with the Upper Columbia

River Steelhead changing from endangered to threatened, while all other previously listed species maintained their threatened status.

Table 4: Fishing zones on the Columbia River



Fishermen have been experimenting with mesh size, length of time in the water, and other parameters since 1955 to allow for more run selectivity, allowing smaller and weaker fish to escape. Over the subsequent decades, additional restrictions were put in place, including seasonal closures, gear limitations, catch quotas, and areas where fishing on the Columbia River was permitted. The 21st century has shown some optimism; juvenile fish survival because of access to spawning habitat and fish passage at dams are a good sign. However, runs have always fluctuated between abundance and scarcity; more time is needed to determine the outlook for the

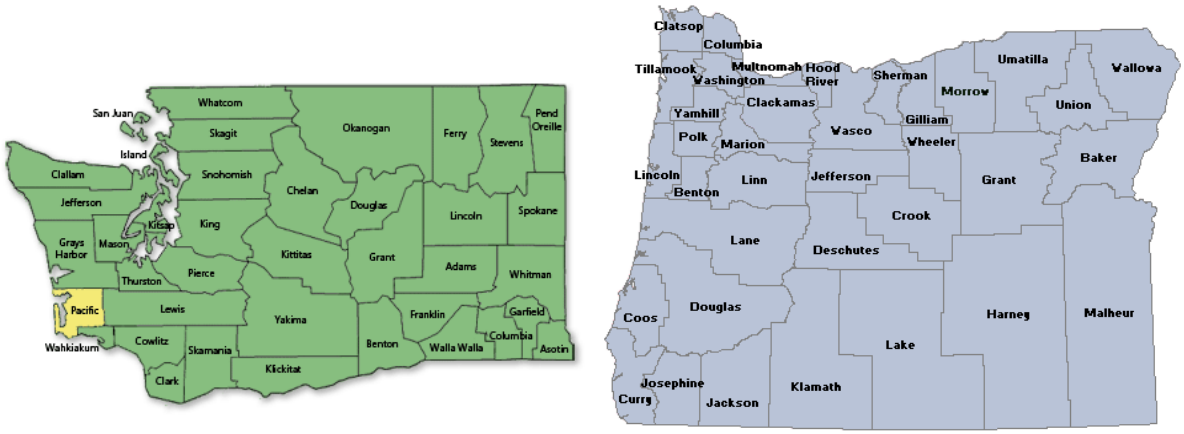
river. All these measures have struggled to repair the long-term damage. Gillnetting plays an important piece of a dangerous equation.

Chapter 2.2: The Resilience of Columbia River Gillnetters

Where there are resources, people will plant their roots. With a history of more than 150 years fishing on the Columbia, gillnetters have found home in small towns, villages, and rural areas along the lower hundred miles of the river.

Communities along the lower Columbia remain concentrated in four coastal counties Clatsop, Pacific, Grays Harbor, and Wahkiakum with "Pacific County [being] the 4th most fish dependent county in the nation." (Washington State Legislature, 2023)

Image 2 and 3: Showing the counties in relation to each respective state



"Snag unions" were formed to pull debris off areas that would tear their nets, as well as "drift rights," codes of behavior and rules governing the areas communities were located in. In 1879, they formed the Columbia River Fishermen's Protective Union (CFRPU), which is still in existence today. The union worked to address issues of concern, like the price of fish and seasons and environmental issues. In the 1930s, the CFRPU filed the Columbia River's first anti-pollution suit. Declining runs hit gillnetting communities hard by the 1990s. Fewer fish were being caught on top of lower prices being received by fishermen for salmon:

> The Pacific Fisheries Management Council's "Review of 2002 Ocean Salmon Fisheries: notes, "For 2002, income impacts associated with the Columbia River commercial catch are estimated to be $7.7 million, compared to $7.0 million in 2001, and a 1987 through 1997 average of $14.2 million (inflation adjusted)." (Martin, 2008)

The 1990s downturn greatly impacted gillnetters. Of the four counties (where 66% of gillnetters reside), all ranked in the lowest per capita income field of $14,000-$19,600 according to a 2000 U.S. Census report. These counties also exceeded Oregon's and Washington's state rates for adult drunk driving arrests, child abuse, adult and juvenile drug arrests, and adolescents suicide attempts. Frances Clark of Chinook, Washington, and fishermen Alan Takalo in 1996 commented on the impacts of the decline of fish stocks from the view of a fishing-dependent community:

> The value of the Columbia River gillnet fisher is so low, the industry is so depressed, people are taking mortgages against their life insurance. There is stress, divorces. We haven't fished on summer Chinook since 1964, and the fish aren't rebounding. We have a right to fish. The gillnetters started in 1853, and that was before the treaties were signed.
>
> It was a good life until the last few years. I fished many seasons – early fall, late fall, bluebacks, spring. You always had one season that would come through for you and help pay the bills. Your whole life was geared that way. Now you pretty much rely on Alaska. You can't make a living here on the river.

This thesis does not claim that the decline in fish stocks directly caused poor socioeconomic outcomes in these counties, but it does highlight a strong correlation. According to a study

conducted by the Northwest Power and Conservation Council's (NWPCC) Independent Economic Analysis Board, the loss of salmonid has reduced both commercial and recreational game fishing opportunities, shrinking economic abundance in many river-dependent communities (NWPCC, 1999). When populations lose access to core resources-like viable fishing stocks that underpin their economy and cultural identity, and widespread dislocation may happen. In the case of the Columbia River gillnetters, the collapse of fish populations meant more than the loss of a stream of income; it disrupted generational livelihoods, tattered social structures, and contributed to a deterioration in community well-being. River economics are extremely complex, multifaceted issues. The system of dams created starting in the early 1930s created recreational fishing opportunities in the many reservoirs of the river. When recreational fishing and hunting increase in the basin, related activities support local businesses, including guide services and gear shops. Additionally, flood control protects communities hundreds of miles away, like Portland, Oregon. On the other hand, the declining salmon and steelhead populations has a negative effect for the River's cultural development.

2.2.1. Refusing to Die

In the face of declining fish stocks and increasing regulatory pressure, gillnetting communities have resisted obsolescence by remaining resilient in many ways, a "you people just refuse to die" (Martin, 2008) narrative. Fishermen developed their portfolios within the occupation, using buybacks to invest in other fishing businesses and permits. Some sold their Washington licenses and used the money to buy an Oregon gillnet license (Martin, 2008). They are also looking to adapt to new technologies that allow for more harvest selectivity: tangle nets, live boxes, and fishing in Select Area/Select Area Fisheries Evaluation Project (SAFE) fisheries. Tangle nets are like the younger brother to gillnets; they employ smaller mesh and lighter

material to entangle the fish by their jaw rather than gills. This design also allows for more selective fishing and increases the survivability of bycatch when released. Compared with traditional gillnets, tangle nets have been shown to reduce spring Chinook mortality because they allow for an abbreviated soak time, shorter net, and more meticulous removal of fish from the net. Additionally, when used in conjunction with a revival/live box, a box that allows a continual flow of fresh water directed at the fish's face, a reduction in the physiologic stress on coho following their gillnet capture was shown (Ashbrook et al, 2004). However, they also tend to be less efficient in catch volume than gillnets, with fishermen often reporting increased handling time. The Washington Department of Fish and Wildlife has approved the limited use of tangle net, with adoption showing mixed results (2022).

Live boxes are another method that addresses issues with fish survival and release. These boxes allow fish that have been caught in nets to recover in a controlled environment with a continual flow of fresh water. The design of the boxes reduces handling stress and increases the likelihood of fish survival when released. Similar to tangle nets, live boxes are just one part toward the shift to more sustainable fishing methods, but their implementation is limited by costs and the need for additional economic and social resources (WDFW, 2022).

2.2.2. Challenges in Adopting Alternative Methods

Despite the growing pressure to move away from gillnetting, the transition faces hurdles. Economic barriers are a common concern. New gear requires upfront investment and often results in a lower return. Margins are very risky here, especially for small-scale fisheries. There is also concern about the uncertainty and inconsistent market premiums for selectively caught fish. If fishermen are not compensated or compensated enough for using sustainable practices, their margins become even thinner. Cultural resistance is another factor. For many Columbia

River gillnetters ,particularly non-tribal, multi-generational fishers, abandoning the gear that has been passed down and supported their families for decades is akin to giving up a piece of their identity. Martin notes that gillnetting is not just a livelihood but a “cultural institution.”

There is light at the end of the tunnel for the Columbia River fish. Consumer awareness about fishing practices has caused a rise in demand for fish caught using more selective methods, such as hook-and-line. Organizations like the Marine Stewardship Council have set eco-cert standards that reward sustainable practices with market recognition and in turn, consumer trust. For the Columbia River fisheries, aligning with consumer expectations may unlock new market opportunities, bridging the gap between tradition, regulation and innovation (MSC, 2023).

Chapter 3: Methods

This thesis used a qualitative, comparative case study approach to evaluate the environmental sustainability and economic viability of alternative fishing methods in comparison to gillnet fishing on the Columbia River. This method allows for an in-depth analysis of fishing practices and their impacts on the environment and the communities.

This thesis used four comparative case studies: Washington State's Senate Bill 5297, SAFE Zones, Bristol Bay, Alaska, and the 1994 Florida Net Ban. Case studies were selected based on relevance to gillnetting regulation or prohibition, availability of environmental and economic data pre-and post- regulation, the presence of both Indigenous and non-Indigenous perspectives during the process of legislative drafting. Each case offered a lens through which to assess the challenges and outcomes of transitioning away from gillnetting practices.

Data was drawn from a diverse range of both qualitative and quantitative sources, including, local reports from state agencies and environmental organizations , historical biographies and ethnographies from those documenting long-standing fishing communities, policy documents and legislative records related to fisher management, gear restrictions, and sustainable conservation goals.

Two analytic strategies were employed: thematic coding and content analysis, and comparative case study analysis. Qualitative Data Analysis included interviews, local reports, historical biographies, and policy documents which were analyzed using thematic coding and content analysis. Case studies were compared to identify similarities and differences noting environmental impact, the economic viability of alternative fishing methods, and the effectiveness of those methods.

Chapter 4: Findings

4.1 Washington State's Senate Bill 5297

Introduced in 2024, Senate Bill 5297 proposed a plan to phase out non-tribal gillnet fishing in the Lower Columbia River by 2027. The bill allocated $14.2 million for a voluntary buyback program to buyback 85% of active Columbia River gillnet licenses (Coastal Conservation Association, 2025). This legislation was a response to a 2022 Washington Department of Fish and Wildlife (WDFW) report that provided recommendations to transition mainstem gillnet fisheries to alternative, selective fishing methods. The bill recognizes that non-tribal gillnet use negatively impacts mixed stock fisheries in the lower river, where wild and ESA-listed stocks live amongst fin-clipped harvest-produced salmon (hatchery-released eggs).

The bill also designated an Emerging Commercial Fishery (ECF) to oversee the use of "alternative commercial fishing gears, such as pound nets, beach seines, and purse seines" in a limited capacity. The director of the WDFW, Kelly Susewind favors the addition of more selective gear types, stating that having a diverse range of gears would benefit both managers and small fishing businesses by allowing them to promote salmon conservation while utilizing harvestable resources. Susewind recognizes that alternative gears may not yet be a viable replacement for gillnets, yet. However, having a diverse suit of gears that can be tactically deployed situationally is an appropriate course of action to pursue.

Gillnets exceeding 1,000 feet and drag seines for catching salmon were illegal to operate in Washington waters starting January 1, 2025. Commercial fishermen are prohibited from retaining incidentally caught salmon as well.

While Bill 5297 is very recent, it has gained support from conservation organizations and sportfishing groups like Wild Steelheaders United and Northwest Sportsman Magazine, which

see it as a "huge boost for struggling populations of wild steelhead and salmon throughout the Columbia-Snake Watershed." The Northwest Sportfishing Industry Association believes that "SB 5297 could face pretty stiff cross-currents… no fishery governed by tribal co-managers is impacted at all anywhere in Washington state waters," stressing concern that new legislation has no effect on tribal fisheries. However, it has been met with opposition from generational Columbia gillnetters, commercial fishermen, and seafood processors, who view it as an attempt to push commercial fishers out of the river. In a staff summary of the public testimony to SB 5297, it is criticized as divisive in nature, not focused on conservation, but about allocating more fishing to recreational fisheries:

> The entire seafood industry in the Pacific Northwest is opposed to this bill. It is not collaborative, does not advance conservation, and is not science based. It will eliminate rural fishing communities, commercial fishermen, and fish processors around the state… The small gillnetting community is not the factor driving salmon to endangerment. (Washington State Legislature, 2023)

Shannon Moore, a Puget Sound gillnetter believes that "the human footprint of the last 100 years is why we are where we are, not Lower Columbia gillnetting" (NW Sportsman Magazine, 2023). Organizations including Salmon For All, West Coast Seafood Processors Association, Pacific Seafoods, the Association of Washington Businesses, and 27 more organizations signed a letter against the bill.

The bill drew both support and criticism from tribal fishery representatives. Robert de los Angeles, chairman of the Snoqualmie Tribe, favored the bill. He speaks highly of the teaching of his ancestors to fight to protect what cannot speak; salmon. Angeles states that the bill has no impact on treaty fisheries and rights, "only affect(ing) nontribal gillnetters in the Lower

Columbia, who were otherwise enjoying an unearned privilege to fish the big river" (NW Sportsman Magazine, 2023). On the other hand, Gerald Lewis, chairman of the Yakama Nation, List Wilson of the Lummi Nation, and Kadi Bizaveva, a fishery manager for the Stillaguamish tribe all opposed the bill because it attempts to denigrate their preferred way of fishing.

4.2 SAFE Zones: Experimentation Zones

The Select Area Fisheries Evaluation (SAFE) Project was initiated in 1993 to create experimental fishing areas to test the viability of hatchery-reared fish and methods that support salmon conservation. The project's primary goals were to "maximize harvest of returning adults while minimizing the catch of non-SAFE stocks" and to "develop fisheries that provided greater protection for depressed and listed stocks."

The first SAFE fisheries were established in locations like Tongue Point (Astoria), Blind Slough, Deep River, and Steamboat Slough, with Youngs Bay serving as a control group. The project has shown positive outcomes, with SAFE Springer showing a 85% survival rate compared to 76% from non-SAFE hatcheries. The number of fish harvested also increased significantly, with winter and summer harvests for Chinook growing from 155 in 1955 to 11,699 in 2002. SAFE Zones account for a portion of non-tribal commercial harvests for coho, Springer, and fall Chinook, while also having a lower impact on non-target stocks compared to mixed-stock fisheries.

SAFE's success demonstrates the importance of providing support to fishers who are willing to try new methods. This approach can help balance the economic needs of fishing communities with the goals of conservation, providing a path forward for the Columbia River.

4.3 Bristol Bay, Alaska: A Model of Gillnet Sustainability

Bristol Bay, located in southwestern Alaska, is home to the largest sockeye salmon fishery in the world, harvesting between 30 and 60 million sockeye annually (Bristol Bay Regional Seafood Development Association, 2021). The fishery utilizes drift gillnets.

Bristol Bay became the first U.S. fishery to be certified as sustainable by the Marine Stewardship Council in 2000. Bristol Bay has managed to avoid the severe ecological pitfalls associated with gillnetting. The fishery's success is attributed to its science-based, adaptive management, which was established after the state took over industry oversight in the 1950s. The primary management goal is escapement, which focused on ensuring enough salmon return to their spawning ground to maintain the population. Fishery exclaves are solely focused on sockeye salmon and utilizing the best methods with minimal bycatch. The Alaska Department of Fish and Game uses real-time monitoring and surveys to make game-time decision about when to open or close the season to make these escapement goals.

The institutional framework of Bristol Bay is a key to its success. The fishery uses permit buybacks and limited entry to prevent overcapitalization and overuse of gear. There is also a strong coordination between state and federal agencies to ensure consistent enforcement and monitoring. Indigenous participation and co-management, involving organizations like the Bristol Bay Native Association, has been vital in creating long-term stewardship. This model demonstrates that with the right institutional structure and science-based approach, even gillnet fishing can be managed sustainably.

4.4 Florida Net Ban: A Case Study

In 1994, Florida voters approved Amendment Three, also known as the net ban, which outlawed the use of all entangling nets, including gillnets and trammel nets, in state waters. The

legislation was aimed at mitigating ecological damage caused by bycatch and habitat degradation, targeting unsustainable fishing practices as the culprit. By eliminating net use, Florida sought to protect vulnerable species and promote long-term ecosystem aid.

The ban has had significant economic repercussions for Florida's commercial fishing industry, affecting "an estimated 1,500-2000 fishers and their families in coastal communities throughout the state, as well as seafood processors, restaurants, retailers and wholesalers, and other related industries. Florida's commercial seafood industry contributes over $1 billion to the state's economy annually, with a dockside value of around $200 million for finfish and shellfish (during this period), ranking the state fourth nationally in terms of dockside value (Smith, et al. 2000). For many small-scale commercial operations who relied on gillnets, the transition to alternative gear presented financial challenges. The Florida Fish and Wildlife Conservative Commission (FWC) provides alternative recommendations, like hook-and-line, cast nets, and vertical longline systems, most requiring substantial initial investment in new equipment, making compliance difficult (Smith et al, 2000) Consequently, the net ban caused measurable job losses and a decline in the number of active commercial fishers in Florida, reshaping the demographic and economic landscape of the state's coastal communities.

Florida's experience demonstrates the consequences of conservation-focused regulation implemented without sufficient consideration for the socio-economic reality of the affected communities. The net ban illustrates a tension mirrored in the Columbia River region, where gillnet restrictions have provoked debates over balancing ecological protection and the livelihoods of the gillnetters. Furthermore, the environmental outcomes of the ban were complex. While certain species, like manatees and dolphins, showed measurable improvements in population stability and entanglement mortality, the effects on broader fish stocks was

inconclusive (Smith et al. 2000). Some commercial salmon catch showed little recovery, suggesting that net reduction likely mitigated bycatch, but other factors such as habitat loss, pollution, and pressure on stocks from the alternative methods continued to negatively influence ecosystem dynamics.

Chapter 5: Analysis

This chapter conducts a comparative analysis of the case studies presented in Chapter 4, highlighting the different approaches to fishery management and their ecological and socioeconomic outcomes. The four cases: WA State Senate Bill 5297, SAFE Zones, Bristol Bay, Alaska, and the 1995 Florida Net Ban provide a spectrum of outcomes, from successful, sustainable management to community-damaging policy, underscoring the critical need for a holistic approach to fishery management, an approach that considers both environmental and human factors.

5.1 Washington State Senate Bill 5297

Bill 5297 represents a modern attempt to navigate the complex nuances of commercial fishery management. The bill proposes a phased phase-out of all non-tribal gillnets and includes a voluntary buyback program to assist fishers in the transition. While supported by conservation groups, the legislation has faced opposition from gillnetters and processors who fear it will lead to the same economic and social hardships experienced in Florida.

This case highlights the ongoing tension between the need for a just transition that preserves and honors the cultural heritage of fishing communities. Keys to the bill's success will depend on the effectiveness of its support mechanisms, like gear retraining programs and fair financial compensation, to help gillnetting communities adapt without losing their identity and livelihoods.

Furthermore, the commercial and economic implications of the bill extend beyond gear regulation. Stakeholders will be closely watching how this legislation might affect the national seafood market for Columbia River salmonids. In particular, the price of Springers next year will be highly anticipated, as it may serve as an early indicator of how the bill's implementation is

influencing market dynamics. High market prices can drive away consumers, a potentially positive outcome for fish populations, but negative for fishermen. Whether the legislation can achieve its conservation goals and economic resiliency will serve as a potential model to follow or lesson to avoid for other states grappling with similar challenges.

5.2 SAFE: Experimentation Zones

On the Columbia River, SAFE zones offer a promising, collaborative approach. Established as experimental fishing grounds, the SAFE project has successfully demonstrated that area-specific fisheries can be designed to maximize the harvest of hatchery-reared fish while minimizing the impact on threatened and endangered wild stocks. Additionally, the program is supported by state and local partners, like the WDFW, ODFW, and county fisheries. The success of SAFE zones lies in their ability to provide a viable path forward for fishers who are willing to adapt, showing that it is possible to balance conservation goals with the economic needs of the community. However, adoption can be difficult as previously stated. This approach serves as a potential model for how a transition away from traditional gillnetting can be managed incrementally and with the support of the fishing industry.

5.3 Bristol Bay, Alaska

Bristol Bay serves as a model of sustainable gillnet use under exceptionally specific conditions. Its success is not accidental but is the result of a deliberate, science-based management strategy. At the core of this success is management that prioritizes escapement goals, ensuring enough sockeye are allowed to reach their spawning grounds to sustain future generations, while employing real-time data partnered with adaptive decision-making. Fishery managers in Bristol Bay employ a suite of monitoring tools to adjust opening and closures within the season, sometimes daily. This methodological effort allows for quick responsiveness in the

face of environmental changes and biological variability.

The institutional framework is exhaustive. The region operates under a limited entry system, capping the number of fishing permits in circulation during a given year to prevent overcapitalization and excessive fishing pressure. Additionally, permit buyback programs further reduce the pressure on fish populations and maintain economic viability for fishermen. The collaborative framework between state agencies, federal managers, and the Alaska Native tribal organization also help ensure that both scientific expertise and cultural traditions equitably inform management decisions. As a result, the fishery supports thousands of jobs and generates hundreds of millions of dollars in annual revenue, all while sustaining one of the largest wild salmon runs in the world, a number that is only increasing (Bristol Bay Regional Seafood Development Association 2021)

While Bristol Bay offers valuable insight into institutional design, science-based regulation, and stakeholder coordination, it cannot serve as a one-size-fits-all solution for other regions like the Columbia River. Its commercial fishery targets almost exclusively sockeye salmon. Single-species dominance simplifies management considerably, allowing for highly efficient and targeted gillnet operations. In contrast, the Columbia River supports a rich diversity of salmonid populations, including Chinook, coho, sockeye, chum, and steelhead, genetically distinct fish that return at different times of the year. In a multi-species, multi-run region, no single method can provide the precision required to fully avoid the potential harm to protected populations while still supporting a viable harvest. Gillnets lack the selectivity needed to distinguish between hatchery-origin and ESA-listed fish when they are migrating together. As a result, the successful methods employed in Bristol Bay cannot be directly applied to the Columbia River.

5.4 Florida Net Ban

In stark contrast, the 1994 Florida Net Ban is a cautionary tale. While the policy's intent was conservation, its implementation was a top-down approach that failed to account for the human cost. The ban had devastating economic consequences for the state's commercial fishers, leading to job loss, financial hardship, and the destruction of a multi-generational way of life. The lack of institutional support for fishers to transition to new types of gear or into another industry exacerbated these problems, causing social and cultural dislocation for many families. The Florida experience highlights the danger of enacting sweeping policy changes without providing adequate resources and support for the affected communities.

5.5 The Columbia River's Path Forward

Ultimately, the analysis of these case studies provides valuable lessons for the future of the Columbia River salmon fisheries. The challenge is designing a systematic solution that addresses both ecological and social concerns. Bristol Bay's success demonstrates that sustainable management is achievable when policies are built on sound science, adaptability, and community collaboration. The Florida failure shows the importance of a holistic transition, where economic and social factors hold as much weight as environmental concern.

Achieving ecological sustainability on the Columbia River requires more than gear restrictions; it calls for a systemic shift in how fisheries are managed and funded. Multi-stakeholder management frameworks, investments in selective gear subsidies and training programs, integration of climate resilience in planning fisheries management, as well as continued research into fish mortality, habitat health, and socio-economic outcomes for the Columbia all need consideration. To ensure both ecological recovery and economic fairness

cannot be a tradeoff. The Northwest Council's 1999 report captures the dichotomy of this arduous request perfectly:

> Where local economies are dependent upon using the river and surrounding resources, improving fish and wildlife by retarding other uses of the land and water may be viewed as an economic threat. The taking of economic livelihoods from traditional communities through regulatory action or resource planning is often viewed by those communities as unfair and unwarranted. The clash of values and objectives between traditional commodity production and environmental preservation cannot be resolved by the analysis of economic effects. But the estimated magnitude and spatial distribution of economic impacts can be a useful guide to policy-makers.

These are foundations for the future of the region. Without abundant and healthy salmon runs, the Columbia River fisher, regardless of any method, cannot survive. The Columbia's path forward, therefore, must take a hybrid approach that combines selective harvest methods, expansion of SAFE zones, and scientifically-informed hatchery reforms. Is this strategy coming?

Chapter 6: Conclusion

The future of the Columbia River is a complex and deeply rooted challenge: the struggle to balance the ecological recovery of endangered salmonids with the economic and social well-being of multi-generational fishing communities. This thesis has examined these tensions through the lens of gillnet fishing, a practice that is both a historical foundation of the region's commercial fisheries and a significant point of contention in modern conservation efforts. Through a comparative analysis of four case studies, this research has demonstrated that achieving a sustainable future requires a systemic shift in how fisheries are managed, one that moves beyond simple gear restrictions and embraces a holistic, collaborative approach.

This conflict proposes the ethical question: is it worse to kill the last fish or incidentally decimate a community of generational fishermen? The answer, as explored through the case studies, is that neither outcome is acceptable, and the pursuit of one at the expense of the other ultimately leads to failed legislation. This thesis challenges the notion that these two outcomes are mutually exclusive. It also pushes back against the perspective that harvest efficiency is king and fishermen will always adapt to restrictions in ways that counteract conservation guidelines. Instead, research suggests that policies must be co-created with fishing communities to be effective and equitable, encouraging conservation innovation. Therefore, the next critical question is: who deserves a role in the decision-making process? The analysis of the Bristol Bay fisheries, with its full-bodied system of co-management, shows that all stakeholders, from government agencies to fishermen, must be involved to foster a sense of shared stewardship. The Florida failure illustrates the danger of excluding those whose livelihoods are directly affected. A participatory model can create sustainable and equitable policies around fishing that can endure for the future generations of fish and fishermen.

Ultimately, this thesis argues that the ecological recovery of the Columbia River's salmonid populations and the socioeconomic justice of its fishing communities are fundamentally linked. While the impact from Senate Bill 5297 is highly anticipated, the solution lies not in simply banning a fishing method, but in redefining how the river and its communities are managed and supported.

In 2026, sustainable fishery management on the Columbia must focus on selective harvest models that aim to maximize the yield of hatchery fish while limiting impacts on ESA-listed wild species. For non-treaty Columbia River gillnetters, their future is restricted. The eventual phase-out of gillnets is concrete, and gillnetters' ability to adapt or redirect in a dying industry is limited.

This thesis argues that despite the exhaustion of wild populations and dwindling runs, harvests will never truly end. Instead, the fishing industry is being redesigned repeatedly to function through a maze of gear changes and zoning rules. The Pacific Northwest must accept that commercial fishing is the backbone of the Columbia River. Angling will never stop, even if it is practiced on the brink of extinction atop a perpetual cycle of experimental areas and adaptive restrictions. Ultimately, the choice is binary. The industry can no longer postpone the final judgement; the future of the Columbia will be determined by whether society chooses to save the last fish or the last fishermen.

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