DAM REMOVAL: UNCHARTED WATERS OF ENVIRONMENTAL POLICY

by

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ABSTRACT

Dam Removal: Uncharted Waters in Environmental Policy, Three Case Studies in the Pacific Northwest

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Dam removal is rapidly becoming a popular idea for river restoration. However, the social and policy side of the issue has been studied less. Removal decisions span complex jurisdictions, with wide ranging impacts. Diverse coalitions of stakeholders often form around these decisions. This thesis analyzes the relative impact of coalitions on dam removal decisions compared with differences in policy. I explore three case studies, the Elwha, Rogue, and Klamath Rivers and use interviews, document and archival research, to examine the impact stakeholder coalitions had on significant policy change. I employ Social Movement Theory and the Advocacy Coalition Framework to analyze how these coalitions form and what, if any, substantive impacts they have. Comparing these cases allows analysis of overarching themes to compare and contrast the issues raised in each case. While each decision has its own unique characteristics, there was overlapping concerns over fish runs, hydropower, and water rights. Tribal treaty rights were especially important on the Elwha and the Klamath, and showed a unique ability of tribes to effect policy change. In all these cases, the coalitions that formed were highly influential in policy decisions, likely more impactful than the individual groups would have been on their own. Each of these cases were lengthy and complex processes, oftentimes spanning decades from initial consideration to physical removal of the dams. This contrasts with physical restoration, which is often quite swift. Dam removal is highly contentious, highlighting the political polarization common today. Environmental issues have long been points of conflict, with dam removal certain to be an ongoing issue, it is likely that these decisions will continue to be complex and controversial.

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I. Introduction

Rivers are a vital and complex ecosystem, and they are deeply connected to people. Rivers provide many of the necessities for life, and we have often used them for our own purposes, altering the natural flow of the river to best suit our needs. The most basic way humans alter rivers is by constructing dams, however, now we are beginning to reckon with the damage this does to the natural ecosystem. While many dams are important sources of power, resources, and assistance in flood control, they often cause negative environmental impacts. Now in the push to restore river ecosystems, dam removal is becoming a more common idea, but it is a complex issue that deals with not only the natural sciences, but also legal, policy, and social issues. This thesis compares three rivers as distinct case studies, comparing the decisions that were made about dams on the Elwha River, the Rogue River, and the Klamath River.

Many studies have focused on the natural science side of river restoration. Fewer have focused on the social and political aspects of these decisions. Dam removal is heavily influenced by policy, as it intersects with multiple layers of government regulation, from local, state, federal and tribal governments. It is also further complicated by the private ownership of many dams and the intensely personal relationship that locals can have with these long-standing structures that can be seen as a key part of their communities (Doyle, Stanley, Harbor, & Grant, 2003b; Fox, Magilligan, & Sneddon, 2016a; Jørgensen & Renöfält, 2013). Due to the wide-reaching nature of these decisions, dam removal often creates coalitions among groups, both those that favor removal and those that want to save the structures. These decisions are also technically complex and typically have multiple different policy suggestions seeking to reach the same objectives,

sometimes taking massively different paths to reach those goals. This work seeks to find the driving force behind removal decisions. Do differences in policy determine outcomes, or do the political groups and coalitions that form around these issues have more impact?

As of 2016 there are over 90,500 dams throughout the United States that are more than 10 feet tall (ASCE, 2017). There are many different types of dams, and while it may seem obvious to define what a dam is, it is helpful to give a basic explanation of the differing types of structures. Embankment dams are the most basic types of dams. They rely on using gravity and a heap of soil or rock to hold back the force of the impounded water (Jackson, 1995). These are the simplest dams and were how most ancient dams were constructed. They are also highly susceptible to failure from erosion and washouts, as was seen in one of the most well-known flood disasters due to a dam collapse, the Johnstown Flood of 1889. Masonry gravity dams are a slightly more complex design, but still rely on a massive structure using gravity to hold back the force of the water. These structures simply use masonry rather than soil or rock (N. Smith, 1971).

Arch dams don't rely on gravity for stability; they are typically constructed in narrow canyons with hard rock walls, the arch curves upstream and allows the force of the water to be pushed out into the walls of the canyon, allowing it to resist the hydrostatic pressure (Jackson, 1995). Arch-gravity dams combine these methods; they rely both on gravity and the arch structure of the dam to hold back the force of the water. They are often massive structures and tend to be fairly stable, the Hoover Dam is one of the best known examples of this style (Stevens, 1988). Buttress dams also primarily rely on gravity for stability, but can be less massive than traditional gravity dams. These dams

often have a flat face upstream but are reinforced by buttresses built on the downstream side, lending strength and stability to the structure (Billington, Jackson, & Melosi, 2005).

Multiple-arch buttress dams were pushed by John S. Eastwood, an engineer and proponent of this style of dam construction. This style uses the principle of buttress dams while adding arch structures to the supporting buttresses. This allows for a dam to be built more quickly and economically, since it takes fewer resources to build than the comparable gravity dam (Jackson, 1995).

Another reason that dam removal is becoming more common and acceptable is the serious concerns over our aging and deteriorating infrastructure. On average a dam in the US is 56 years and over 15,000 of them are considered to be potentially high-hazard (FEMA, 2012). To upgrade this infrastructure would take a massive amount of funding, with some estimates around $45 billion needed to repair the over 2,000 dams that are classified as critical but high-hazard (ASCE, 2017). This is a major concern, especially because many dams are near population centers and a catastrophic failure could send walls of water and debris rushing through homes and businesses, killing people who live downstream. This was made obvious at the scare on the Oroville Dam in California in 2017, but also in the death of Kenny Angel in Nebraska in 2019 when the Spencer Dam on the Niobrara River failed and his house was swept away (Lieb, Casey, & Minkoff, 2019; White, Moore, Gottas, & Neiman, 2019). This was the first death in the United States as a result of a dam failure since 2006, but it is an area of increased concern, especially with the threats of more extreme weather events due to climate change in the future (Nagourney & Fountain, 2017; Patterson, Bita, & Helsel, 2018)

Another aspect of the consequences of damming rivers is the vast changes it creates in the river ecosystem. Environmentalists have often opposed the construction of dams, seeing the damage it can do to the river and the plants and animals that rely on the river. However, those concerns were often put aside by those who wanted to use the river for industry or for other economic purposes (Townsend, 2014). In the latter portion of the 20th Century and beginning of the 21st, the idea of dam removal started shifting from a radical, almost unthinkable proposal, to one that was becoming more acceptable. Especially when older dams began the process of renewing federal licenses the high cost of upgrading the structures to comply with modern safety and environmental regulations. This has caused a paradigm shift where large-scale removals have been completed, with many more being considered (Doyle, Stanley, Harbor, & Grant, 2003a; Foley, Bellmore, O'connor, et al., 2017). One of the best examples of this was the removal of the two large dams from the Elwha River in Washington state. This served as a nearly-perfect test case to show removal as a tool for restoration. The two dams on the Elwha were the only man-made alterations to the river, the majority of the watershed is pristine and protected by the boundaries of Olympic National Park. This example with be examined in this thesis and compared with the decisions on the Rogue River and the Klamath, both of which were more complex than the Elwha.

This study was done by interviewing people who were involved in the decision. As many differing viewpoints as could be included were used in the scope of this study. I wanted to speak to people from all sides of the issue, those who favored removal and those who fought to keep the dams, the company officials, government officials, management agency staffers, and those working for the tribes. The interviews allowed me

to gain insight into these cases by speaking to people who were directly involved, but I also relied on document analysis to look through the many legal agreements, court cases, and the extensive relicensing documents. This allowed examination into whether there were any common themes or overarching ideas that are shared in these three cases. These watersheds are all different, the state laws and ownership of the dams were different, but there are some similarities in concerns over endangered anadromous fish, water quality issues, and tribal treaty rights. This study looks to see if there are any similarities and overarching themes in dam removal decisions, and what that could possibly mean for future removal decision, specifically in the western states.

Dam removal also has some broader implications beyond ecosystem restoration. Dams do not only influence the river, but the effects can ripple out into larger societal impacts. While dams have provided a great deal of good for large portions of society, the negative effects have often been placed on the shoulders of already marginalized groups, who gain few to no benefits from the structures. For example, the dams of the Klamath River have provided cheap power to many of the residents in the area, but at the heavy cost of decimating salmon runs that the indigenous tribes rely on. While their traditional livelihoods and cultural practices have been impacted by the dams, the Klamath people have not benefited from the structures. In many places on their reservation they do not have power, even with the dams providing cheap power for other communities (Interview 1). Many dams were constructed in such a way that they provided economic benefits for broad swaths of the population, but with no consideration for those who were being harmed, and now some dam removal decisions are taking on a social justice and environmental justice lens.

These three case studies show while everyone in these decisions are working toward similar goals, there are vastly different understandings of the issues, and much disagreement on the best way to proceed. In all three cases, everyone involved was concerned over protecting native fish runs, while also making sure that agriculture was able to flourish, water rights were protected, and tribal rights respected. These issues came up in the majority of interviews, but there were wildly divergent ideas about how these goals should be met. There was also agreement that the coalitions were incredibly important to these decisions, but policy also played a key role. There were also competing understandings of science and selective use of facts to further political agendas. In addition, all three of these case studies showed that the idea of dam removal, while becoming somewhat more accepted, is also becoming entrenched in our political divide and like so many environmental issues before it, is becoming part of the culture wars that dominate our political sphere.

This thesis will explore the history and impacts that dams have had on our society and the river ecosystems they are a part of. Then, it will present an examination of a through case study for each river that delves into the legal, social, and regulatory decisions that ultimately decided the fates of the dams, and the implications that these may have for the future. Finally, these three case studies will be compared and contrasted to see if there are any overarching themes that may be a core issue around dam removal decisions, or if each dam removal is too unique to be compared to one another. Dam removal is likely to be important to environmental policy in the coming decades, especially as we wrestle with the challenges posed by climate change and an aging infrastructure.

II. Literature Review

One of the more recent trends in river restoration has been the removal of dams. This has been part of an effort to restore rivers to their more natural state, but also due to concerns about aging dam infrastructure. Many dams, especially across the western United States, were built decades ago and are now reaching the end of their expected lifespan. Maintaining and upgrading these structures is an expensive prospect, and dams have wrought highly impactful changes to river ecosystems and species, such as salmon. However, hydropower is highly effective at producing power with limited carbon emissions, something that is highly valuable when considering the threats from climate change and the desires to move to a lower-carbon footprint. Dams allow for water storage for uses during dry seasons, for irrigation, and for recreation. Dams have also been helpful in managing river flooding. The relationship between environmental policy and dams is a complex one, and dam removal must be considered from many different perspectives.

By looking at real-world case studies of dam removal, we achieve a more thorough understanding of the significance of removing these structures for restoring the ecosystem, as well as for the communities that live around and rely on the river. In analyzing dam removal, we must also understand the highly variable nature of river systems and how this may impact restoration projects. This paper will examine the broader implications that dam removal may have on other factors beyond the ecosystem, including economic and social justice, policy and political decisions that come along with these large infrastructure projects and restoration of the river ecosystem.

Overview of Historical Dams

Human society has long revolved around rivers. Many of our oldest civilizations sprang from river valleys, such as the Indus and the Nile. Rivers provide essentials that we need to survive, water, sustenance, and a method of transportation. For as long as people have lived near rivers, they have built structures that allow them to use the river for their benefits. The oldest known dam, the Jawa Dam located in Jordan, dates to roughly 3,000 BCE (Fahlbusch, 2009). A dam in its simplest form is simply a structure that restricts or stops the flow of water. The reservoirs that are created by dams are used in a multitude of ways, including irrigation for agriculture, water storage for human consumption, aquaculture, and hydropower production (Jackson, 1995). The earliest dams were constructed throughout the Middle East and Mesopotamia. These dams were typically low structures made from packed earth, and often used to control flooding and manage water for irrigation. In nearly every ancient culture, there is some example of dams being built, some highly intricate in their design and impact. Considered an engineering wonder of the ancient world, the Great Dam of Marib in Yemen began construction somewhere around 1750 and 1700 BCE; it was a packed earth structure that was between two rock structures, and was tied to them with complex stonework. This dam was triangular in cross section and nearly 2000 feet in length and 13 feet high (Biswas, 1967). The dam stood for centuries and was expanded and improved by different groups who controlled it though history. In roughly 115 BCE the dam was increased to nearly 46 feet tall, with two reinforced sluices, five spillways and a canal system that linked to a distribution tank. This massive improvement project took

centuries, and was not fully completed until 325 CE, but once finished allowed for 25,000 acres to be irrigated (Biswas, 1967).

The Romans were well known for their engineering and construction, with advanced canals and aqueducts to control the water supply. They were also among the first to see the possibility of dams forming large reservoirs to secure a water supply throughout the dry season (N. Smith, 1971). With the advances in creating a waterproof mortar and stronger Roman concrete, larger and more robust structures were able to be constructed (Smith, 1971). The highest dam built by the romans was the Subiaco Dams, built to create a pleasure lake for Emperor Nero's luxurious summer villa. With an impressive height of 160 feet, it stood as the tallest dam in the world until it was accidentally destroyed in 1305 due to a flood and disrepair (T. A. Hodge, 1992). While Roman engineers routinely used the standard dam designs seen in the ancient work, primarily embankment dams and masonry gravity dams, they also invented many new designs that would continue to be used by future generations. These included arch dams, buttress dams, arch-gravity dams, and multiple arch buttress dams (T. A. Hodge, 2000), all of which are now commonly used throughout the world.

While the Romans built the first arch dams, the Industrial Revolution during the 19th century gave us the skills both in engineering and construction to build these structures on a large-scale. Three dams were built in the British Empire that were considered forerunners to many modern dams (Hubert Chanson & James, 2001). These dams were all masonry dams, made with multiple arches. One of these was built near Parramatta, Australia in the 1850s to create a reservoir to supply water to the growing city, and was notable because it was the first engineered dam built in Australia and only

the second arch dam in the world that was built using mathematical designs. Australia also had what is possibly the world's first concrete arch dam, called the 75 Miles Dam, located near Warwick (H. Chanson, 1999). Throughout the 19th Century, engineering and scientific advances altered how dams were built, changing the approach to one heavily based on scientific principles and mathematics (N. Smith, 1971).

The 20th Century ushered in the era of the construction of truly large dams, as shown by the construction of the Aswan Low Dam in Egypt in 1902. When completed it was the largest masonry dam in the world (Cook, 2013). However, the initial height limits proved too short to provide adequate water for irrigation and the dam was raised twice. When complete its finished height was 118 feet above the riverbed and 6,400 feet long (Cook, 2013). The most well-known large dam, especially in the United States, is the massive Hoover Dam, a concrete arch-gravity dam constructed on the Colorado River (Stevens, 1988). Many dams were constructed during the Great Depression, as it was a good way for the government to quickly create jobs and build structures to help with flooding, irrigation, and power production (Doyle, 2018). Prior to the depression, the federal government was often unwilling to spend into debt, except in times of war. Due to the unprecedented economic stresses, Franklin D. Roosevelt unleashed the federal government to spend truly massive amounts of money to attempt to reinvigorate the economy. In 1929 federal spending on rivers was $57 million, it ballooned to over $128 million by 1937 (Doyle, 2018). Throughout the 20th Century, many large dams were built for hydropower and to help irrigate the more arid West, this construction included some of the well-known dams including the Glen Canyon Dam completed in 1966, the

Bonneville Dam in 1937, the Grand Coulee Dam in 1942, the Oroville Dam in 1967, and many more (Billington et al., 2005).

History of Dam Construction in the US

Rivers are a vital resource to provide water, food, transportation, and irrigation for agriculture. Their management has always been a contentious issue. As the United States became more industrial, many people sought to harness the power in rivers. Dams were seen as a way to control the flow of water, controlling flooding events, as well as storage for crop irrigation (Billington et al., 2005). Using the power of the river was also seen as beneficial for mills and manufacturing plants, especially along the fast-moving rivers that settlers encountered as they began living in the western United States. Dams were a source of controversy, even in the earliest cases of small, low dams being built by mill-owners along rivers. United States water law is based on English common law, which states that if the person owns the land around the water, they have the rights to use the water, but do not technically own the water. This leads to conflicts with other people who use or have claims to the water downstream. Initial rulings tended to side with people who opposed blocking the flow of water, but as the need for power increased officials began siding more often with mill owners, especially in New England where the textile industry was heavily reliant on mills (Billington et al., 2005).

Water is a far more complicated issue in the western United States, due to the arid climate and the extremely uneven distribution of water and precipitation. Water law in the West is highly associated with to the idea of "prior appropriation," which is basically the idea that the first person to claim the land also claims the water rights (Billington et

al., 2005). This system functions where there is abundant water, but during droughts it creates confusion and contention. As irrigation increased throughout the West, specifically in California, there were many legal challenges over who owned the water rights. California had been working under both the doctrine of prior appropriation, but also the idea that if you own the land around the area, you have rights to the water, sometimes referred to as riparianism (Billington et al., 2005). These two legal ideologies often conflicted with one another and in 1886 in *Lux v. Haggins*, the California Supreme Court held that riparianism was law, but an appropriator could have superior claims if they used the water before the owned acquired the property. The timing of when you claimed the water right was key to this decision. This was a very unpopular decision with the public, but it eventually became the law along the entire Pacific Coast, as well as the Great Plains (Billington et al., 2005). Throughout the Rocky Mountain states, water rights are solely governed by prior appropriation, often with the state in full control of granting water rights. Prior appropriation led to several large economic booms in the west, but the benefits were not enjoyed by all of society (Doyle, 2018). Large corporations and monopolies benefitted greatly but the environment was severely degraded and many of the poorer portions of society saw no benefit to the boom-bust cycles.

In the mid-1800's with the United States economy becoming more industrial, there was interest in making rivers more navigable (H. John Heinz Center, 2002). One of the proposed solutions was to install dams in specific locations to increase the depth of water in the river channel. There were also many who saw the benefits of creating reservoirs to store water for periods of drought. The first major dam project was completed by the Army Corps of Engineers on the upper Mississippi River. From 1883-

1912 they constructed six dams upriver of Saint Paul, Minnesota (Billington et al., 2005). In the west, diverting streams and rivers for irrigation was popular among the Anglo-American settlers, but it was quickly becoming apparent that larger dams would need to be constructed to meet the demands for water in the region (H. John Heinz Center, 2002), and to make rivers navigable to large cargo vessels. This was challenging due to the large costs that were likely to be associated with large dam projects on remote sections of river with difficult topography.

There were also conflicts between the conservation movement that was popular during the Progressive Era and industry forces who wanted to further develop resources. This came to a head during the fight over the dam in the Hetch Hetchy Valley in Yosemite. San Francisco officials wanted to dam the river to create a reservoir that would serve the needs of the city. This was opposed by many conservation groups and farmers who depend on the Tuolumne River. This case illustrated the deep divisions between conservation advocates like John Muir and the Sierra Club, who were seeking to preserve nature, and market advocates like Gifford Pinchot, the father of the US Forest Service, who viewed nature as a resource to be managed and used (Billington et al., 2005). In the end, the dam was approved by Congress in 1913 and completed in 1923, likely due to the sympathy from the fires that had devastated San Francisco after the 1906 earthquake, as well as industry pressure from the growing hydroelectric business (Doyle, 2018).

The pace of dam construction increased during the 20th Century due to interest in developing irrigation as well as hydropower throughout the nation. Nearly 12,000 dams were built between 1921 and 1950, nearly 30,000 between 1951 and 1970, and nearly 20,000 more from 1971-1999 (FEMA, 2012).This included many of the large-scale dams

that are well known, such as the Hoover Dam and the Grand Coulee. While these dams created huge economic and social benefits by providing power, water for irrigation, recreation opportunities, protection from flood events, and other positive aspects, there were also negative consequences (H. John Heinz Center, 2002). Large portions of society did not benefit from dam construction and some marginalized groups were actively harmed (Doyle, 2018). Dam construction on Native American reservations displaced numerous people and disrupted their cultural practices that had been practiced for millennia. Since dams inherently change the flow of the river, it altered many of the traditional food sources that tribes had relied on for millennia, and dam construction often flooded areas that held special significance to many tribes. For example, the Elwha people of the Olympia Peninsula's creation story tells of the Creator molding the people out of the mud from near the river, on a large flat rock that stood beside the river. This place was a sacred location to the tribe, but when the two dams were constructed on the Elwha River 1911, the reservoir flooded this location, cutting members off from this location for over a century until the dams were removed in 2012 and 2014 (Guarino, 2013).

The damage done by dams is more difficult to see, since the effects are a more diffuse, complex, and slow process. Throughout the 1960s and 1970s, while the modern environmental movement was becoming a political force, dams were still viewed as a net positive. Because the dam affects the entire watershed as a complex system, it was initially difficult to conceptualize the harm caused by the construction (Townsend, 2014). The damage done by a dam is less obvious than the pollution being emitted by a coal power plant, so it is easier to ignore, but that does not lessen the impact to the ecosystem.

Dams immensely affect the morphology of a river by changing water flow rates, temperatures, and oxygen levels, as well as severely disrupting the sediment transport downriver (Pess, McHenry, Beechie, & Davies, 2008).

Where dams have been removed there are immediate and long-term changes to the ecosystem (Ritchie et al., 2018; Warrick et al., 2015). Observations of dam removal have shown that there are immediate effects from the changes in water flow through the system. The most visually striking change is often the redistribution of sediment and other material downstream that had been trapped by the structures. Sediment is a vital part of a river ecosystem, providing structure to the river as well as habitat for fish and other animals who rely on the river. When dams are removed the sediment can redistribute through the system, and in some areas like the Pacific Northwest, the redistribution can be very fast (Ritchie et al., 2018; Rubin et al., 2017). Depending on the watershed, there can be concern if the sediment is contaminated and how that may affect the downstream ecosystem (Cantwell et al., 2014; Palanques et al., 2014; Rothenberger et al., 2017). Removing the dams also affects a number of other facets of the river ecosystem, from changing water temperature and oxygen rates to changing the morphology and path of the river's channel, as well as changing how fish and other species use the river as habitat (Brenkman et al., 2012; Breslow, 2012; Learn, 2010; Ritchie et al., 2018)

Dams intensely change river ecosystems and, in many cases, create ecological problems. In the Pacific Northwest, this is especially problematic where dams often block fish runs. Most of the initial dams were not built with any sort of fish passage and

attempts to retrofit to allow fish to swim upstream have been less than successful (Brenkman et al., 2012; Brewitt, 2019; Mcdermott, 2016).

Reasons Behind Increased Understanding of Removal

The debate around dam removal is beginning to shift as more people see the appeal of a restored river ecosystem. One of the primary benefits of dams is the ability to produce hydropower. However, as shown by the removal of the Elwha dams, alternative sources for power can sometimes be found elsewhere. Also, as societal views are shifting on environmental issues, more people are placing increased value on ecosystems themselves (Costanza et al., 1997; Farber, Costanza, & Wilson, 2002; Gowan, Stephenson, & Shabman, 2006).

As an example, during the debate over removal of the Elwha dams, which spanned multiple decades, from initial discussion and relicensing during the 1970's to federal legislation in the 1990's and finally removal in the 2010's, there was a primary shift in the argument. Over time, more value was given to a restored river ecosystem, rather than the industry's interest in keeping the dams (Gowan et al., 2006; Winter & Crain, 2008).

Decisions about removing dams can also be influenced by the economic argument of the costs associated with keeping the dams, and in some cases this is more influential than the environmental argument (Gowan et al., 2006). This factor is especially powerful in the Pacific Northwest, where older dams often do not include adequate fish passage for anadromous species and those can be extremely costly to install (Brewitt, 2019; Winter & Crain, 2008).

The coalitions that form around these debates can be complicated, and often have a large impact on the removal process. In the 20 years that it took from the initial serious consideration to remove the Elwha dams to actually beginning the removal process, the core coalition of advocates and Native activists remained stable. Throughout the process they were slowly able to bring the companies and government agencies involved in the decision onboard to favor removing the dams, which likely impacted their success in the long run (Brewitt, 2019).

An important force in many of the more recent dam removal cases has been the influence of Native activists and tribes. This is especially evident in the Pacific Northwest, where tribal treaty rights to fish provide a legal standing for arguing that dams should be removed due to their huge impact on tribally significant fish species. With an increasing amount of knowledge about the costs associated with dams and their impacts on the ecosystem there has been an increasing in support for removal efforts (Doyle et al., 2003a). River systems are increasingly understood to be fairly resilient ecosystems that respond well to recovery efforts. This is especially true when the restoration is well-planned and is managed by successful compromise and negotiations between multiple stakeholders (Hammersley, Scott, & Gimblett, 2018).

There is also the issue that the dams are aging and degrading. Many of these dams were built decades, some even over a century ago, and now are reaching the end of their expected life span (Griggs, Troy; Aisch, Gregor; Almukhtar, 2017). One serious concern about these aging structures is the threat of catastrophic failures (FEMA, 2012; Griggs, Troy; Aisch, Gregor; Almukhtar, 2017). Often the plans to retrofit and restore dams, both to comply with modern safety and environmental regulations, are prohibitively expensive

(Winter & Crain, 2008). The risk of aging dam structures was clearly shown by the near failure of the Oroville Dam in California in 2017. Construction of the dam began in 1961 and was completed in 1968 (California Department of Water, 1974). Unusually heavy rainfall in the winter and spring of 2016-2017 pushed the reservoir to its maximum levels, and the emergency spillways were needed to help control possible flooding (Koskinas et al., 2019; White et al., 2019). However, as rising lake water was being released, a massive crater opened in the major spillway designed to allow water to be safely released. This led to a chaotic emergency evacuation of nearly 200,000 people who were downstream of the dam. This crisis caused economic damage to the towns in the area, in addition to the psychological toll the residents experienced and the concerns they continue to have . It also cost the state of California an estimated $870 million to deal with the crisis (Patterson et al., 2018). This event clearly showed how dangerous aging dams can be. There are hundreds of thousands of dams across the United States that continue to get older. Often the options to either retrofit or remove, with removal sometimes being the less expensive option for dam owners. For example, dam removal on the Elwha River cost $325 million, which included the price of purchasing and removing both dams, as well as restoration efforts throughout the watershed (Mapes & Ringman, 2013; NPS, 2015)

A. Controversies around Removal Projects

In addition to the ecological arguments around dam removal, the issue is complicated by the economic and social issues that arise. During the debate around removing the dams on the Elwha, the primary concerns were environment and safety.

There was also a case to be made around the economic consequences and benefits to dam removal. When large-scale policy decisions are made, monetary concerns are often a primary interest for stakeholders. For example, the removal on the Elwha River was made a bit simpler because the dams were constructed to provide power for a paper plant in the area. In the 1990s when removal was first considered, the power would actually be cheaper purchased from the open market, when compared with the cost of upgrading the dams (Bender, 1997a).

There are many groups who can be impacted by the decisions to remove or keep a dam, including power companies who use the dams for hydroelectric power, farmers who use the reservoirs for irrigation, property owners who live along reservoirs, the tourism industry who relies on the area for enjoyment, anglers and tribal members who are concerned about fish, and many others (Brewitt, 2019). This often leads to conflict as people see the dam in many different ways; some see the benefits and will fight hard to maintain the dam; others see the harm and will push for removal. People also sometimes view the dams and the reservoirs they create as an integral part of the community identity and will push back against removal advocates, especially if they are from outside the community (Brewitt, 2019; Fox, Magilligan, & Sneddon, 2016b; Jørgensen & Renöfält, 2013; Ryan Bellmore et al., 2017; Saulters, 2014a). This is a common argument in many dam removal decisions.

The complex relationship between groups advocating for and against removal can be seen by competing, local organizations that have sprung up around the decision on Capitol Lake in Olympia. This is a particularly interesting case, because the dam that was built to create Capitol Lake was built purely for aesthetic reasons. When the Washington

State Capitol was designed in 1911 the architects Wilder and White proposed creating a body of water to serve as a reflecting pool for the Capitol buildings, which were to be built near the mouth of the Deschutes River. The dam was completed in 1951, with the construction of the 5th Avenue Dam, which impounded the Deschutes River and covered the existing estuary and tide flats (DES, 2016). The debate around this removal than becomes an argument between those who want to keep the structure for nostalgic reasons, with other arguing the dam needs to be removed and the estuary restored for ecological reasons (Garlesky, 2015). Advocacy groups are attempting to restore the estuary, but other powerful groups are fighting to save the lake, even though numerous studies have shown that estuary restoration is likely the best option to deal with the environmental issues present in the lake (Garlesky, 2015).

For most of the history of the U.S., tribal interests were not regarded as important as non-tribal forces, as evidenced by the long history of federal government dismissing tribal claims and frequent losses in court cases (Wilkins & Lomawaima, 2001). This has been seen especially when looking at the construction of dams and the negative impacts it had on many areas vital to tribes. For decades people have argued against dam removal by holding up the needs of agriculture or other economic interests, at the expense of tribal interests and treaty rights. Tribes and other activists were able to show they could use their interests and claims to pursue removal of dams. With the success of the removal of the Elwha dams, the Savage Rapids Dam on the Rogue, the Marmot Dam on the Sandy, and a growing list of other removals, there may be a paradigm shift occurring where the interests of tribal activists pushing for river restoration may have a more potent voice in

the discussion. This could be key to the largest removal decision that is currently being considered, the proposal to remove four large dams from the Klamath River.

When studying dam removal, it is often helpful to look at case studies of the different removal projects that have been completed throughout the United States. The following chapters of this thesis will examine three specific case studies in depth, the Elwha River in Washington, the Rogue River in Oregon, and the Klamath River in Oregon and California. While these cases are geographically separated, there can be overarching themes that present themselves, and may show broad trends in dam removal more generally. It is also helpful to examine the basics of the first time dam removal was ordered against the wishes of the dam owners, and how that emboldened advocates to push for dam removal and altered the views around dam removal, moving it from a radical, unthinkable idea to a possibility.

B. Kennebec River, Maine

Dam removal had been considered a fringe idea for many decades in environmental groups, however in 1999 it got a real-world test case when the Edwards Dam was removed from the Kennebec River. This dam was the first ordered removed by the Federal Energy Regulatory Commission (FERC) against the wishes of the dam owner (H. John Heinz Center, 2002). In this case, economic arguments around dam removal were useful to quantify the costs of the alternatives (Gowan et al., 2006). It brings the choices into clear and familiar terms for participants. By using standard economic demand theory, it is fairly easy to show that the cost caused by losing the power production of the dams is usually less than most people assume (Gowan et al., 2006). This makes dam removal a more palatable alternative for many people. It is also helpful

to be mindful of who is involved in the decision-making process. If vital viewpoints are excluded due to the rules and approaches to public policy, the outcome may be worse for various participants. An inclusive and open process is incredibly valuable, and often necessary for these removal projects to be approved.

There is often concern from property owners that dam removal will negatively affect their property value. Reservoirs are often seen as a source of recreation, but a case can be made that a restored river has more value than a stagnant reservoir. The removal of the Edwards Dam was a useful case study when comparing property value both pre- and post-dam removal. The dam was removed primarily to help restore fish access to 15 miles of historical spawning habitat blocked by the dam, while adding fish passage would cost 1.7 times more than removal (H. John Heinz Center, 2002). Lewis et. al (2008) found a positive effect on local property values, when focused on the local market comparing pre- and post-removal. After dam removal the price of property near the river began to rise, but this was most likely not simply due to the removal of the dam (Lewis, Bohlen, & Wilson, 2008). The authors thought that it was more likely due to the long-term restoration efforts that improved the ecosystem, of which removal of the dam was a component. Through these restoration efforts the Kennebec River now has much stronger runs of salmon and many other fish and aquatic species are showing improvement, which is leading to more interest in areas around the river. The removal of the Edwards Dam was an important portion of the restoration, but not the sole force behind rising property values (Lewis et al., 2008).

C. Future Removal Projects

Due to the success of previous dam removals and river restoration projects, it is becoming a more politically viable idea. For example, the tribes who live along the Klamath River in northern California and southern Oregon have been seeking removal of the dams for decades, but they are finally getting some traction. In 2010 an agreement was reached to remove four dams, in an attempt to restore the river system to benefit the tribes, the endangered fish populations, as well as the agricultural interests that rely on the river for irrigation. This is beginning to show that there may be a shift in the power dynamics between tribal and non-tribal interests (Gosnell & Kelly, 2010).

An agreement was reached on the Klamath dams, and is particularly notable, because the restoration effort is inclusive and multidimensional, seeking not only ecological restoration, but also emphasizing that economic and social needs must be met for all stakeholders involved in the process (Gosnell & Kelly, 2010). This is a hopeful sign that perhaps these contentious problems may lead to communities working together, rather than fighting in court to protect only their own narrow interests. Some portions of the community are now looking to benefits that could come along with a restored river (Gilman, 2016). There are new opportunities being planned for expanded tourism for whitewater activities and expanded fishing tours. While this decision is ongoing and still highly contentious, there is hope that previous removals will give knowledge and insight to make the process a success for all stakeholders.

The issue of dam removal is complex and contentious. Many of these structures have been present for decades or up to a century, and they have vastly changed the nature of the river systems themselves. They have also become a part of the culture of the communities that live near them. The reservoirs created by dams are popular recreation

areas, and removing the dam can be seen as taking away a part of the community's history and way of life (Brewitt, 2019). This leads to contentious political strife and there is often serious push-back from stakeholders who wish to see the dam remain (Fox et al., 2016b). There have been many successful dam removal projects, and there will likely be an increasing number in the future as the structures continue to age and the costs associated with repairing and relicensing can be unreasonable. The continuing push by advocates to restore these systems has become a more potent force, as the economic arguments have begun to shift in favor of removal.

Theoretical Framework

This study is relying on data from interviews of subjects who were involved in the three different dam removal decisions. Data from document and archival research is also used. Including legislation, court decisions, treaties, FERC filings, and many other official sources. In comparing these three case studies, several theories are used to try and further understand each removal decision, what relationship, if any, they have with one another, and how these may relate to broader ideas and movements. The primary theories that will be used are Social Movement Theory, Advocacy Coalition Framework, and Environmental Justice.

An important aspect of dam removal is examining how the political coalitions both for and against removal form, how that can impact the decisions, and how those coalitions change throughout the process. This will be studied through the lens of Social Movement Theory, which grew out of sociologists work in the early 1900's around collective behavior theory and was eventually summarized by two books in the 1990's by

Alberto Melucci and James Jasper, and Advocacy Coalition Framework, developed by Paul Sabatier and Hank Jenkins-Smith in the 1980's (Jasper, 1997; Melucci, 1996; P. Sabatier & Jenkins-Smith, 1993).

Social movement theory has emerged over the last few decades as researchers have investigated the rise in large social movements (McAdams, 2017; Sen & Avci, 2016). Social movement theory grew out of sociologists' previous study of collective behavior and was heavily impacted by the many large social movements that grew and managed to create policy change throughout the 20th Century, such as the Civil Rights Movement, the environmental movement, women's rights, and LGBTQ+ rights, and many other movements (Sen & Avci, 2016; Turner, 2013). By studying these social movements, researchers attempted to understand what made social movements form, and how they could successfully seek to change policy and political structures. This has led to a broad application of this theory to many different disciplines, from the social sciences, to policy analysis, regulatory decisions, and environmental policy. This makes it useful to attempt to understand dam removal decisions, as they have undergone a dramatic shift in views over the past several decades, as well as the many differing intersections of specialties that are involved in these decisions. Dam removal went from being considered a radical, almost impossible, idea, to one that is becoming more commonplace. This large shift in opinion in the space of a few decades is likely related to other movements that were affecting the politics of these decisions.

Advocacy Coalition Framework analyzes at how coalitions form and are maintained, how information can influence these coalitions, how the coalitions interact with the policy process, and how the passage of time impacts policy change the coalitions can

create (Sabatier, 1988). Advocacy coalition framework (ACF) takes into account how different organizations interact with varying levels of government to affect policy decision, and considers the belief systems of groups that also may impact what sort of policy outcomes they advocate for (Sabatier & Jenkins-Smith, 1993). By considering coalitions of varying organizations as one unit, it allows study of complex issues that can have many actors from multiple differing institutions. ACF also allows understanding that policy actors can be part of multiple coalitions, and there is often overlap between the groups based on shared goals and ideals (Cisneros, 2016). Since the framework was proposed, it has been used by many different researchers attempting to understand how political actors can work together to bring about policy change, it is especially useful for studying large-scale policy decisions, as it requires looking at long-term decisions over years or decades to understand how the coalitions were able to exert change (P. Sabatier & Jenkins-Smith, 1993). ACF also takes into account how individuals within the groups can learn and incorporate new information into the belief system and framework of their organization (Pierce, 2020). This is likely to be a key manner of understand dam removal decisions, because in many successful removals, there are large scale coalitions that forms among groups that broadly share related ideals and desires. These coalitions are often key in forcing policy change and creating a change from the status-quo (Brewitt, 2019).

While this study does not focus on Environmental Justice, it is an important consideration in each of these case studies. Many dams were built over the objections of indigenous people and tribal treaty rights have been an important factor in many of the legal decisions around dam removal decisions. Doctor Robert Bullard is often cited as

being the father of environmental justice as he has been one of the leading voices on environmental racism since the 1980s, when he began researching the disproportionate impact that race has on the environmental issues that people have to contend with (Bullard, 1993). Many studies over the years have shown that minority communities are often more severely impacted by pollution, industrial activity, and many other environmental issues when compared to white communities (Bullard, 1999; Bullard, Johnson, & Wright, 1997). This is especially true when researchers look at indigenous people, in addition to many treaty rights that have been violated throughout history, many tribes have been affected by environmental degradation and industrial pollution (Mauer, 2020; Norgaard & Reed, 2017; Schlosberg, 2004). While this paper will not focus on the environmental justice lens extensively, it is an important one to consider, especially when focusing on the Pacific Northwest. The indigenous people of this area often have deep ties to salmon and the rivers of the region, which are severely changed and impacted by dam construction.

It was also useful to consider a comparative approach to the many different policy documents that were included in the document and archival research. Traditional policy analysis focuses more on crafting policy decision to solve problems. Comparative studies, such as those in Knoepfel et al.'s book *Public Policy Analysis*. This approach allows consideration of the social actors who act within the political arena, while also considering the influence that institutions have on the substance of the policy. This framework also takes into account what resources are used by the differing stakeholders and how they can be used to emphasize their goals (Knoepfel, Larrue, Varone, & Hill, 2007). This is a useful approach when considering dam removal decisions due to the

large number of overlapping government agencies, tribal governments, corporations, and advocacy groups involved.

III. Methods

This study analyzed three different dam removal decisions as case studies to compare the policy solutions and political coalitions that form around removal decisions. The primary research questions asks if policy differences between the three cases explain the outcomes, or if the political coalitions have more impact on the final decisions. This allows for analysis of overarching themes and similarities in dam removal decisions, even when they are geographically separated. If these cases do not share overarching themes, it may be due to factors that are unique and intrinsically connected to the area. The analysis focused on comparing the distinctions between the three case studies, including differences in how the dams were used, legal issues around ownership of the dams, water rights, tribal treaty rights, local government concerns, and the differing policies in different states.

This study employs qualitative analysis using interviews and document and archival research. This chapter will outline the methods both for the interviews and the archival research, as well as the theoretical framework that will be used to analyze the data and produce conclusions.

Interviews

This thesis relied on qualitative interview data with individuals who were integrally involved in the dam removal processes in three case studies. To ensure a robust data set, I aimed to include a diverse set of voices by including activists who were both for and against removal, government officials from all levels, tribal officials and activists, scientists studying the area and helping plan the removal and restoration, and legal

experts who were involved in the process. While doing an archival and document based research of each case study, I kept notes of the key people involved in the cases and these were used for initial points of contact (see Table 1). Once interviewing commenced, I used snowball sampling to ask for other people I should contact. Initially I contacted potential participants by email and provided a letter of information about the study (see Appendix), and I then followed up with a phone call. The interviews ranged from 25 minutes to an hour and a half in length, were digitally recorded, and primarily conducted over Facetime, Zoom, or the phone. In all 11 interviews were conducted and represented multiple different perspectives and backgrounds across the three case studies (see Table 1).

Table 1: Interview Requests and Completed Interviews by Case Study

Case study	Requests sent/Backgrounds	Interviews completed
Elwha	10 requests sent, 1 tribe, 3 government officials, 1 anti-removal advocate, 4 pro removal	3 interviews done 2 government official 1 pro-removal activist
Rogue	7 requests sent 2 tribal officials, 1 government official, 1 anti-removal advocate, 5 pro-removal advocates	2 interviews completed 1 anti-removal activist 1 pro-removal activist
Klamath	15 requests sent 4 tribal officials, 2 Government officials, 3 anti-removal advocates, 6 pro-removal advocates, 1 company	6 interview completed 2 pro-removal advocates 1 tribal official 1 government official 1 anti-removal activist 1 company official

Interviews were semi-structured, using an interview protocol that varied slightly from case to case. Semi-structured design provided flexibility to offer follow-up questions depending on the responses of participants. Participants responses were kept

confidential, each was issued a specific number, which was the only identifier on the recordings, and names and numbers kept on one document that will be destroyed at the end of the study.

I transcribed the interviews verbatim and proceeded to code them. For the coding procedure I first read all transcripts, making note of prevalent themes. I also used my analysis of regulatory documents and other literature to create an initial of factors that seemed to impact the decisions. This allowed me to begin considering what themes that would be most prevalent when coding my interview data. Next, I read each transcript again to code for specific themes and to highlight quotes that seemed to be important. These themes were then compared across the case studies, to see if there were any similarities between the areas. Once the interviews and initial coding were complete, I analyzed what overarching themes were most present, and if there were any secondary themes that were present and required a second coding of the interviews.

Archival and Regulatory Document Analysis

To build a comparative case study for this thesis, rather than doing a traditional policy analysis, I instead used a variety of archival and regulatory documents to compare the different proposed alternatives in each decision. Typically policy analysis looks at a problem and seeks to create policy solutions to those problems (Knoepfel et al., 2007). Instead this research consisted of a comparative study of three different policy decisions made to deal with comparable issues. All of these case studies revolve around the ecological issues that dams create, specifically, all of them have a conflict with protections of threatened and endangered fish. This then creates a policy issue when the

dams go through the re-licensing process and companies are faced with the high costs of retrofitting the structures, as well as public pressure to remove the dam. This leads to looking for what the best policy solution is, which is often complicated by the many competing interests and the large number of stakeholders in these decisions.

To compare these policies, archival sources, primarily government reports and legal documents were used to examine the different solutions that were proposed to deal with the ecological issues that arose during the relicensing decisions. One of the important factors in most dam removal decisions is finding a leverage point that allows for a possibly massive change in the way these systems have been operating (Meadows, 2008). Most dams in the United States fall under the jurisdiction of the Federal Energy Regulatory Commission (FERC), which grants licenses under the Federal Power Act (FPA) for companies to run hydroelectric dams (Staff, 1995). These initial operating licenses cover 50 years, so due to the construction booms that we saw in the early to mid-20th Century, many of these structures are coming up for relicensing. This process includes holding the dams to the current legal requirements for environmental and safety, which provides an opportunity for interested parties to try and make massive changes to these systems (Chaffin & Gosnell, 2017).

A variety of documents were examined for this analysis (see Table 2 for a list of sources by case). Since there were differing policy structures in each case study some had legislation from a federal level, some had court decisions, while others were decided primarily through agreements I chose to compare the Environmental Impact Statements (EIS) that were created during each case study's re-licensing process. This gave me a consistent source of documents to compare the alternatives that were proposed for each

river, while the other policy records gave me useful background material to build my case studies. Each of the EIS's have several different recommendations that were proposed to deal with each dam's problems with fish passage, and by comparing these suggestions I was able to see if there were differences or similarities in the policy proposals. In addition, every dam removal case had fairly extensive litigation that occurred around it. Comparing these different court cases allowed me to look for similar legal challenges that were raised in the different cases, as well as comparing if the political coalitions remained cohesive throughout these decades-long battles, or if there was change in the makeup of the coalitions. The legal cases tended to be key turning points and were often used to create leverage points, specific events that allow for a change in the existing system and creates the potential for advocates to push for policy changes, that were important in the decision making processes (Meadows, 2008).

Table 2: Documents Analyzed by Case Study

Case Study	Documents
Elwha	EIS, 6 court cases, Elwha River Ecosystems and Restoration Act,
Rogue	EIS, Oregon Wilderness Act, 3 court cases
Klamath	EIS, Upper Klamath Basin Comprehensive Agreement, Klamath Hydroelectric Settlement Agreement, Klamath Basin Restoration Agreement, 5 court cases

Background Information on the Three Cases

This thesis focuses in-depth on three specific case studies, to provide a variety of views on dam removal, hoping to see if there are any overarching common themes or links between various removal decisions. The three case studies chosen are the Elwha River in Washington, the Rogue River in Oregon, and the Klamath River that covers both Oregon and California. These three were chosen because they are at different places in removal decisions, the Elwha dams have been completely removed, many large dams have been removed from the Rogue, while the Klamath is still in the process of deciding if removal will go forward. Also, by covering three different states this study can examine how differing state laws and government regulations can affect dam removal decisions. This also impacts the influence that tribal governments can have on these decisions, based on differing treaty rights and relationships with state governments. Tribal advocates have been key in many dam removal decisions, and they likely are going to continue to be heavily involved in any future removal decisions. It is important to understand their role in the process, both the harm that has been caused by the construction of these structures, as well as how they may be able to influence policy decisions going forward.

D. Elwha

The Elwha River is a powerful river that runs through Western Washington. It springs from the Elwha Snowfield, a perennial snowfield in the Olympic Range within the boundaries of Olympic National Park. This river has long been known for its runs of salmon and trout. It is one of the rivers in the Pacific Northwest that supports all five native salmon species (Coho, sockeye, pink, chum and chinook) as well as four trout

species (cutthroat, bull, steelhead, and Dolly Varden char) (Brewitt, 2019). Prior to the construction of the dams, the Elwha was known for plentiful salmon runs with exceptionally large salmon being common on the river. Before the dams were built approximately 400,000 salmon and steelhead were seen in the runs every year, with chinook weighing over 100 pounds being common, in most other rivers 40 pounds is the average (Brewitt, 2019; Guarino, 2013). Klallam tribal members tell stories of the monster salmon being the size of children and requiring multiple fishermen to link arms and essentially play tug-of-war with the fish, once they were gaffed. Prior to construction, fish had access to 70 miles of habitat up the river. After construction of the Elwha Dam in 1913 and the Glines Canyon Dam in 1926, they had access to less than 5 miles of river and numbers plummeted down to fewer than 4,000 salmon returning each year (Guarino, 2013). This case shows how dam removal can be involved not only in ecological restoration, but can play a powerful role in the fight for environmental justice. This is especially true in the Pacific Northwest because of the relationship between tribes and the State as co-managers of the fisheries.

The Lower Elwha Klallam Tribe have lived by the river for millennia, and it is deeply intertwined with the tribe, they relied on it for physical sustenance, but it also became a key portion of their spiritual and cultural practices as well. There is evidence of human activity along the Olympic Peninsula dating back to 12,000 years and a village that has been identified as Klallam was unearthed in 2003 and dated back to 2,700 years old (Guarino, 2013). The people of the Klallam lived throughout the Olympic Peninsula and relied heavily on fish for their sustenance, as well as other hunting and gathering. Because the area was so rich with natural resources, the tribes of the area were often able

to produce more food than actually needed to survive, and were likely among the wealthiest societies in North America (Brewitt, 2019).

To the indigenous people of the Lower Elwha Klallam Tribe, the Elwha River was not only a source of physical support, it was also considered to be their sacred lifeblood. The river sustained them, from the water, to the sustenance provided by the plentiful fish runs, to the vegetation that grows along the riverbanks. In their creation story, they were created from the soil of the river, and it was seen as their duty to protect and live alongside the river and the animals that depend on the river (Sadin, Vogel, & Miller, 2011). European exploration drastically changed the way of life of the tribes in the area. The population went through a devastating decline due to illnesses introduced from Western countries, to which the Native population were not immune. It is estimated that 80% of the population died as a result of contact with Europeans (Guarino, 2013).

The Elwha Dam was first conceived as an idea to provide power for the growing city of Port Angeles by Thomas Aldwell, who moved to the town in 1890. By 1908 he had created a company to begin buying land and gathering funding to build a dam on the Elwha River. Construction began at a site 4.9 mile upriver from the mouth in 1910 (Guarino, 2013). Washington state law did require fish passage to be part of any new dam built, but the Elwha Dam was completed by 1912 with no passage over the one hundred and five foot dam for returning fish. Game wardens and tribal members both documented fish returning to the river after construction of the dam being unable to return up the river, with many dying without spawning (Guarino, 2013). However, the Fisheries Commissioner took no action against the company, likely due to the economic interests that gave heavy preference to timber and hydropower industries. In an attempt to

circumvent compliance with the fish passage laws, Aldwell built a hatchery, attempting to claim that the dam created a tool for collecting salmon to supply the hatchery. It was built in 1915 but failed dismally after only seven years and nothing else was done to improve the situation (Brewitt, 2019).

The Lower Elwha Klallam Tribe fiercely objected to the construction of the dam, especially as it inundated many traditional villages and their creation site. In the creation story of the tribe, it is said that on a large flat rock, the creator scooped earth from near the river to form the people and then blessed them with the waters of the river. (Brewitt, 2019; Guarino, 2013). This location was sacred to the tribe and was inundated by the construction of the dams.

The tribe had little recourse to stop construction, and the feelings of anger and resentment were increased when the base of the dam, which had foolishly been built on gravel and not bedrock, blew out in 1912 and inundated the Klallam village below the dam with no warning. While this incident caused no deaths or major injuries, there was vast property damage and lasting worry over the safety of the dam, which was never tied to the bedrock (Guarino, 2013). To the members of the tribe, the blowout of October 31, 1912 became known as the "day the fish were in the trees" as any fish that were in the river were forced out by the rushing waters from the suddenly released reservoir (Brewitt, 2019).

Aldwell sold the Elwha Dam in 1916 and another dam, the Glines Canyon Dam was built eight miles upstream of the Elwha Dam by the Northwest Power and Light Company in 1927. This 210-foot structure was also constructed without fish passage, but the argument was made that no salmon were present in the upper river due to the Elwha

Dam, so there didn't need to be any fish ladders constructed (Brewitt, 2019). Initially the nineteen megawatts these two dams produced provided electricity for the settlers in Port Angeles, but not the Klallam Tribe. Quickly though, the town demanded more power than the dams could produce and they were ultimately used to provide power for a paper company, Crown Zellerbach, which gained ownership of the dams in 1937 and would operate them throughout most their lifespan (Brewitt, 2019). The forestry and timber industries were powerful economic forces in the Pacific Northwest, and provided the basis of much of the economy for most of the 20th century. The paper mill was the second-largest employer in Clallam County, employing 320 people (Brewitt, 2019).

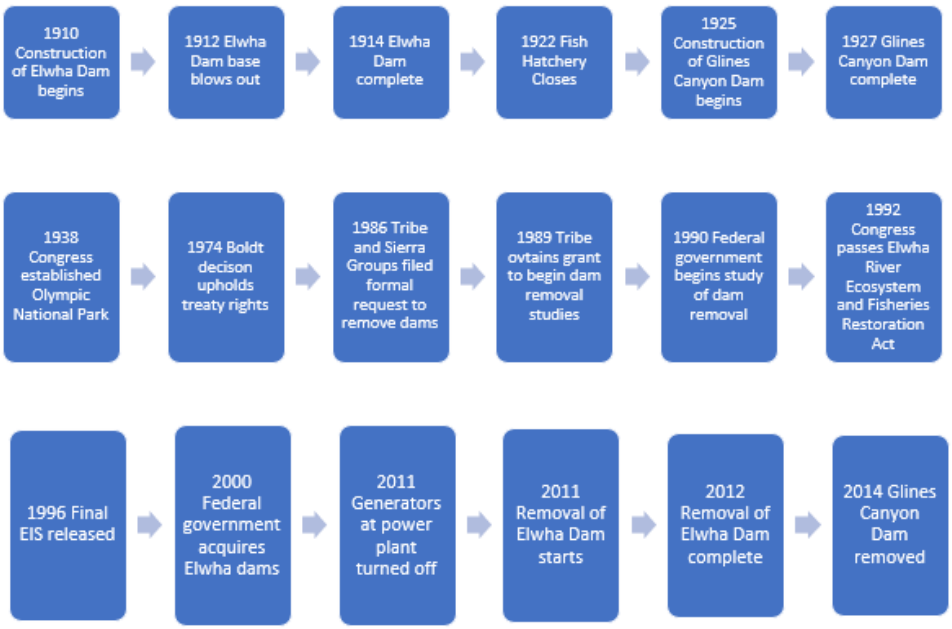
These dams drastically changed the flow and course of the river which had a large impact on the symbiotic relationship the Elwha Klallam people had with the river, and had dependent upon for generations. The reservoirs also drowned many of their sacred sites and traditional villages and usual hunting, gathering, and fishing areas (Sadin et al., 2011). The runs of the Elwha River were known to produce legendary large salmon, some weighing over 100 pounds, with runs so rich with salmon the Native people claimed you could walk across the river on the backs of the salmon (Sadin et al., 2011). For several decades after construction of the dams on the Elwha, fish populations remained somewhat strong, even with the truncated river. Returning salmon were often seen throwing themselves at the dam, futilely trying to pass the obstacle. The dam not only blocked fish from going upstream, it blocked sediment and organic material from coming downstream. This made the riverbed much more barren and difficult for fish to spawn in. The flow of the river was also managed by the company's demands for power, occasionally leaving the lower river dry and fish dying on the banks, or when more power

was required the flow would be increased causing floods that endangered both fish and people near the river. Tribal members were legally prohibited from gathering fish that were stranded by the river, and their complaints over the unnaturally managed river was a core component of their legal argument against the dam (Brewitt, 2019). Even as sustenance fishing became less common, sport and commercial fishing was becoming a powerful portion of the economy of the region. Many anglers advocated for changes, even going so far as to mail sacks full of dead fish to the Washington Department of Fisheries Director. Unfortunately, this didn't lead to political change in the decision making and the salmon runs continued to drop off throughout the decades, with the last big run of pinks being seen in 1963 and the Elwha sockeye becoming essentially extinct (Brewitt, 2019).

One of the primary arguments used to illustrate the harm the dams created was due to the treaties that had been signed between the tribes of the Olympia Peninsula and the United States government. The Treaty of Point of No Point was signed January 26, 1855 with the Skokomish, Chimakum and S'Klallam tribes ceding ownership of their traditional lands to the U.S. government, but importantly it guaranteed the tribes "[t]he right of taking fish at usual and accustomed grounds and stations…in common with all citizens of the United States." (Gates, 1955) These rights were not enforced, and many tribal members were in fact prosecuted, harassed, and even assaulted for fishing in areas they were guaranteed by treaty. The legal processes against the dams gained steam when the Lower Elwha Klallam Tribe gained federal recognition in 1968, and would further be upheld by decisions from the courts.

To preserve their rights, several of the tribes took their case to court in the mid-1900s, and in 1974 Federal District Judge George Boldt issued a sweeping ruling in the United States v. Washington case. This was a significant and sweeping affirmation of tribal rights, affirming they had the authority to take 50% of harvestable fish in their usual and accustomed areas (Brown, 1994; George & Boldt, 1974). In his decision, Judge Boldt recognized that treaty tribes had been systematically denied rights they were guaranteed in the treaty, ensuring that they had the rights to fish off their reservation. The state of Washington appealed this decision, with many officials ignoring the ruling outright. Many of these officials assumed the ruling would be overturned, on appeal to the Supreme Court. This was not true, in 1979 the Court upheld Boldt's decision (Brown, 1994). While this decision recognized the tribe's right to fish, and eventually moved to the tribes acting as co-managers of the state's fisheries, it did not deal with the obstruction that dams created for the Lower Elwha Klallam Tribe's rights. Throughout the 20th century the tribe had been advocating for removal, but as time went by the idea of removing dams began to become a more accepted, rather than radical, idea. This will be further discussed in the analysis of the case study.

Figure 1: Timeline of events for construction and removal of the Elwha Dams



E. Rogue

The Rogue River flows from its headwaters near Crater Lake in the Cascade Range to the Pacific Ocean. It has been known for plentiful salmon runs, rugged landscapes, and a fast-flowing wild river. It was one of the original eight rivers that were included in the Wild and Scenic Rivers Act, passed in 1968 (Brewitt, 2019). Indigenous tribes have lived near the river and its tributaries for at least the past 8,500 years, relying on the river for sustenance and cultural significance. The Rogue River supports runs of chinook and Coho salmon, as well as steelhead and cutthroat trout, it was considered one of the finest fisheries in the West. However, these fish runs have been dwindling throughout the years, leading the native fish species to be labeled a “species of concern” and in 1997 the Southern Oregon/Northern California Coast Coho salmon was federally listed as threatened on the Endangered Species Act (NOAA, 2014).

Native tribes relied on the river for fishing prior to dam construction, with salmon being a major portion of their diet. Initially, the contacts between Western explorers and the tribes were peaceful. The first Westerners that first encountered the native inhabitants of the area were fur trappers, with the name Rogue being given to the river by French fur trappers who called the river La Riviere aux Coquins, because they considered the natives rogues (coquins in French) (McArthur, 1985). However, the Oregon Trail and several gold rushes in the early 1800s brought waves of settlers, who used the natural resources with no restrictions, this lead to conflicts with the Natives who relied on these resources for their survival (Mcdermott, 2016). The number of Westerners entering the area increased dramatically after 1846 when a southern alternative trail was developed off the main Oregon Trail, mostly for people heading toward the Willamette Valley (Allen, Stuart; Buckley, Aileen; Meacham, 2001). There were fears, both among the tribes and white settlers, that this increase in contact between the two would lead to more violence, however throughout much of the 1830's-1840's violence was relatively limited. Most of the settlers passing through were happy to move through quickly, seeking their final destination in the Willamette Valley, with little contact with the Native inhabitants on the Rogue. The tribal members tended to leave those settlers passing through alone, glad to see them not lingering in the area. This peace did not last, especially as increasing prospecting along tributaries and the mainstream of the river.

Throughout the 1850's miners began to create camps along the river and white emigrants began to claim greater amounts of land and resources. The tribes fought back to attempt to protect their way of life. These clashes eventually led to the conflict that became known as the Rogue River War. This conflict erupted into open battles beginning

in 1855, throughout the 1850's Governor Stevens wanted to pursue a policy of displacing the natives and seizing their land. However, the U.S. Army opposed open land grabs. Western settlers began to attack indigenous villages and the commandant of Fort Lane, Captain Smith, attempted to smooth the tensions by having his men inserted between the settlers and the Natives (Schwartz, 1997). Eventually, in October of 1855 Captain Smith brought the Native women and children into the fort for their own safety. Unfortunately, the settlers then attacked the fort, killing 27 Natives. The tribal members struck back, killing 27 settlers in an attempt to even the score, but the attacks on native camps throughout the winter continued. In May 1856 Captain Smith attempted to arrange the surrender of the tribes to the US Army, however the tribes did not agree with this action and attacked the soldiers themselves ("Journal of the Rogue River War 1855," 1933). They continued to fight for another month, but eventually were forced to surrender and were sent to reservations.

This land seizure and forced relocation of the indigenous people allowed Western settlers to focus their economy on the river by concentrating on resource extractive industries such as mining, logging, commercial fishing, and agriculture (Benke, Cushing, 2005). Dam building along the river has always been controversial. Early structures that blocked fish passage were dynamited by disgruntled salmon fishers, but over time most of the river was blocked by dams that were used for irrigation and flood control, among other reasons. These dams were of a wide variety of sizes and for many different purposes. For example, the William L. Jess Dam was constructed in the 1970's for hydroelectric power as well as flood control, it is a large-scale dam, 345 feet high and 360 feet long. It creates the seventh-largest reservoir in Oregon in Lost Creek Lake and

blocks access to the river 157 miles upstream from the mouth of the river and impedes fish passage up river (Johnson, 1985). The Gold Ray Dam was constructed in 1904 for hydropower, and when this structure was built they did include a fish ladder to help with passage, the original log structure was later replaced with a 35 foot high concrete dam in 1941 that included a fish ladder and counting station (Freeman, 2009). It eventually became obsolete for hydroelectric power and was demolished in 2010. Many other small dams and structures had been constructed throughout the Rogue River watershed, both on the main stem of the river and along the tributaries. Most of these were to provide water for mining and irrigation, but public pressure and increased environmental interest in fish passage have led to removal or retrofitting many of these structures, by 2005 there were roughly 80 non-hydroelectric dams in the basin and only a few large reservoirs such as Lost Creek Lake (Benke; Cushing, 2005).Smaller diversion dams, such as the Gold Hill Dam, that were intended to provide small amounts of power and to divert water resources have been removed in the early 2000s to comply with environmental regulations (Polluck, 2008).

The Savage Rapids Dam was built with great fanfare in 1921 to serve the irrigation needs of the Grants Pass Irrigation District. It was a diversion dam that could be raised to allow a reservoir to form seasonally, to trap water to be used for the local farmers to irrigate their crops. The State of Oregon granted the Grants Pass Irrigation District a water right to divert 230 cubic feet per second from the Rogue in 1929 (Brewitt, 2019). This dam proved to be disastrous for salmon and steelhead runs, farmers recalled fish being diverted into irrigation canals and pumped onto the fields themselves, one farmer recalling that he “scooped hundreds of salmon out of his fields” (Arman &

Wooldridge, 1982). Screens were not installed on the turbines when lead to fish being churned up, and those fish that did manage to find the fish ladder installed alongside the dam, found their progress slowed and making them easy targets both for anglers and natural predators (Brewitt, 2019). The Rogue was well-known for its abundant fisheries, especially for plentiful wild salmon. It was the first river designed as a wild and scenic river by Congress in 1968, which protected eighty-four miles of the lower river, preserving habitat for wild salmon. The Savage Rapids Dam was the first obstacle that blocked returning adult salmon after they had traveled over 100 miles upstream from the Pacific Ocean, through near pristine river conditions (M. Blumm & Erickson, 2012). While attempts to create fish passage were made, it continued to be problematic (Mcdermott, 2016).

Problems with fish passage at the Savage Rapids Dam continued throughout the 20th century, with little improvement being made. In the 1960's biologists working for the Oregon Department of Fish and Wildlife classified it as the largest obstacle to fish passage on the entire Rogue River, engendering it the label of "fish killer" and "smolt pulverizer" (Brewitt, 2019). These problems with fish passage as well as changes to the regional economy and changing how water rights were allocated eventually lead to the removal of Savage Rapids Dam. The decision about removal quickly became heated and divisive. These high levels of fish mortality continued to be one of the prime reasonings behind removal consideration, and when the Oregon Water Resources Commission granted an extension for irrigation rights in 1994, it was dependent on exercising good conservation and fish passage plans to operate in the public's best interest. The commission mandated that to keep their water rights, the Savage Rapid Dam needed to be

removed, by 2001. It was argued that removing the dam would provide more benefits to the public than the expensive option to add fish passage to a low-cost irrigation system (M. Blumm & Erickson, 2012).

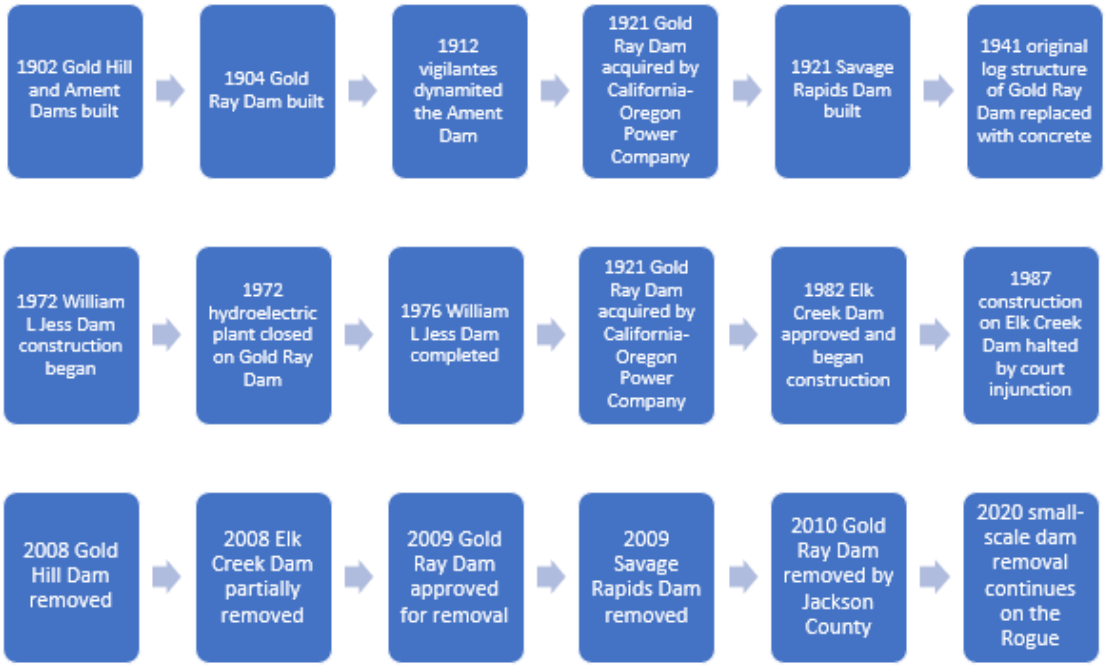
Removing the dam had few serious impacts, the water for irrigation could still be provided and there were no job losses that were going to be caused by removing the structure. Instead it quickly became a fight over community identity associated with affection for the dam (Brewitt, 2019). Grants Pass is a small community in southeastern Oregon and there had been serious talk to remove the dam starting in 1994, but it faced fierce pushback from community groups. The dam was not removed until 2009 after decades of acrimonious fighting. During the fight over this dam, many community members saw the advocates as outsiders and accused them of trying to ruin the community, that they saw a dependent on the dam.

Throughout the 20th Century, the demographics of the area changed considerably. The rural area shifted to a more suburban nature, with retirees becoming more common than farmers in the area (Nelson, 2005). Under Oregon water laws, the permit holders must prove that the water is being used in a beneficial way, which includes irrigation, mining, or water for stock animals. With the changing nature of demographics of the area by the 1980s significantly less water was used for irrigation, which lead to a weaker water rights claims, especially when combined with the significant problems with fish passage over the dam (Mcdermott, 2016). Even though the dam and canals were not as significant for irrigation purposes, they had created a somewhat unique ecosystem for the area. The canals that carried water through the Grants Pass area often leaked water, leading to a lush, green nature of the surroundings. When conversation began about

removing the dam, many residents opposed it, because they feared it would change the look and feel of their community (Brewitt, 2019).

While the dam no longer had any economic purpose, it supported no jobs, and it was a clear hazard to fish passage, the community saw it as part of their identity. Even though the state had mandated removal of the dam, throughout the 1990's members of the Grants Pass Irrigation District board of directors and water users fiercely fought against removal, even refusing a deal with the federal government that would have completely paid for removal of the dam as well as purchasing replacement pumps to maintain the water needed for irrigation. GPID used nearly one-third of their entire operating budget on legal fees from 1998-2000, topping $500,000, to oppose removal of the dams (M. Blumm & Erickson, 2012). Many conspiracy theories flourished in the community around activists and officials who were pushing for removal. Some community members looked to blame the liberal residents of Salem and Portland, others seeing it as an attempt of the federal government to take over local affairs, some even seeing it as an attempt by the United Nations to seize rural land and force residents into urban areas, showing an increasing cross between culture wars and environmental issues that is becoming more prevalent throughout the west (Brewitt, 2019; Inwood & Bonds, 2017). This case illustrates how complicated dam removal decisions can be, as they are not simply environmental or economic decisions, and there are complex issues from the many different stakeholders who are involved.

Figure 2: Timeline for construction and removal of the Rogue River Dams



F. Klamath

The Klamath River has an extensive watershed, covering almost 16,000 square miles that covers a diverse set of ecosystems. It crosses the arid high deserts of south-central Oregon, the rugged Cascade and Klamath Ranges, before eventually reaching the Pacific coast's temperate rainforest in California (Gilman, 2016; Saulters, 2014a). It is vital for many anadromous fish, including salmon, steelhead, and rainbow trout. These runs were important sources of food for the indigenous tribes who have lived in the area for at least the last 7,000 years, as well as being a significant cultural resource (Saulters, 2014a). There were complex trade and cultural relationship between the many tribes in the area around the different fish runs, with evidence of tribes coming together in large gatherings around the fish runs (Saulters, 2014a).

Initial contact between European-American explorers came in the 1820's when fur trappers from the Hudson Bay Company came looking for new resources. The conflicts between white settlers and tribal members were severely exacerbated by the California Gold Rush, which lead to a huge influx of new miners who were seeking quick riches from the Klamath River, not caring about the damage being done to the native tribes as well as the ecosystem. Native inhabitants were routinely slaughtered by miners and the legal system had little care to protect either their safety or rights. The first governor of California openly called for genocide of all Indians in the territory, and state laws were crafted to completely strip the indigenous people of any civil rights, essentially enslaving them even as California entered the Union in 1850 declaring themselves a "free" state (Hyer, Joel, Trafzer, 1999).

When the Klamath Tribes Treaty was signed in 1864, they ceded more than 23 million acres of their land to the United States government. The U.S. government forced three rival tribes to consolidate onto the Klamath Indian Reservation, to appease the demands of white settlers, which lead to conflict with government forces through 1873 (Saulters, 2014a). The three tribes who signed the treaty with the government retained their rights to fish, hunt, and gather into perpetuity, over the years though their land rights were eaten away. The General Allotment Act passed in 1887, it allowed the Bureau of Indian Affairs to break up the reservations, which had been communally owned by the tribes, and assign parcels of land to individual members. This then allowed any remaining reservation land to be acquired by non-Natives who could then purchase the land under the guise of making the land more productive (Wilkinson, 2006). This act slashed the tribal-owned land, and roughly 25 percent of their original lands went from collective to

individual ownership, while much of the other reservation land passed into non-Native hands. .

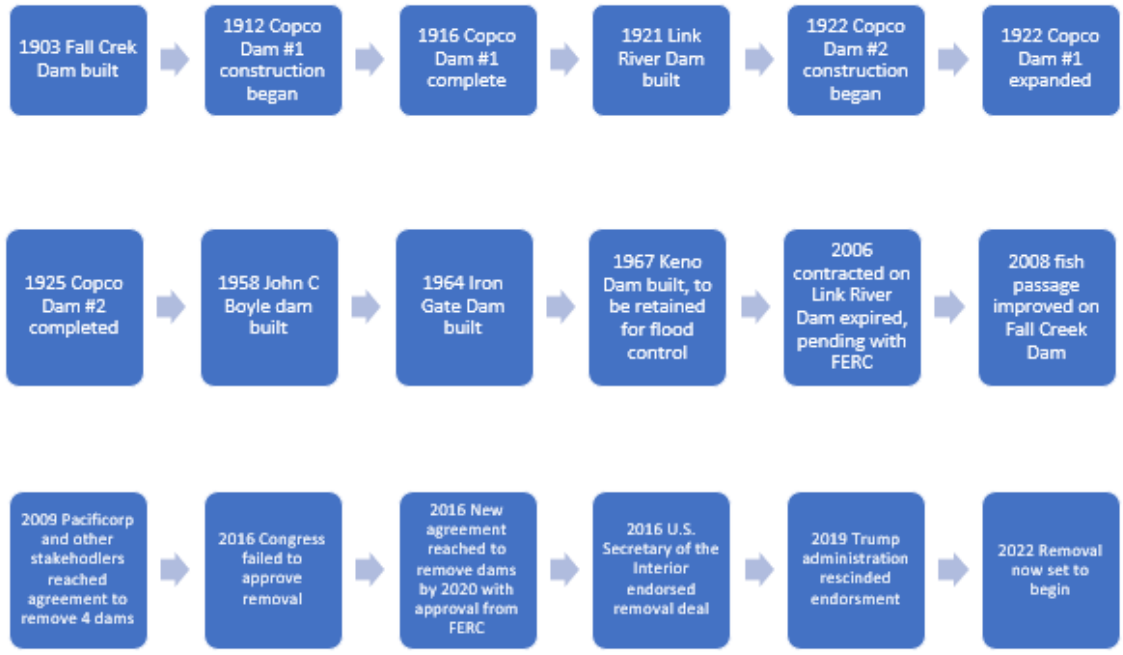
Even with these infringements into their rights, the Klamath Tribes were one of the wealthiest and most self-sufficient with their timber and grazing industries. Yet this prosperity was dealt a serious blow through the aggressive forced assimilation pressed by the U.S. government and the 1852 Klamath Termination Act, which revoked their federal status and revoked many services and land rights in exchange for money, taking the tribe from the second wealthiest in the nation to a poverty-stricken community (Saulters, 2014a). Even while many rights were being stripped from the tribe, there were provisions that protected their fishing, hunting, trapping, gathering and water rights. The Klamath Tribe was eventually re-recognized under the Klamath Restoration Act in 1986, although much land that was lost and the strength of the tribal governance has been diminished (Saulters, 2014a).

As the population around the Klamath increased and demand for water for agricultural irrigation and hydropower, many dams were constructed on the river throughout the 19th and 20th centuries. These dams were constructed due to settlers claiming water rights under the prior appropriation doctrine. This was the idea that you could claim water right essentially by practicing the idea of first come, first served, those who laid the first rights had priority over those who came later. It is commonly used throughout the western United States in regard to water rights. However, the Klamath Tribe have argued that their prior rights from treaties with the federal government supersede other claims (Gosnell & Kelly, 2010). The tribes also argue that their rights to gather fish are damaged by the presence of the dams. Four hydroelectric dams were built

from 1920-1960 including the JC Boyle Dam, the Iron Gate Dam, and the two Copco Dams. These dams create a multitude of issues on the river, including trapping sediment from traveling downstream and blocking access for returning fish to spawning grounds.

There has long been concerted efforts to improve these issues, or to remove the dams. However, when the dams were up for federal re-licensing in 2004, seeking another 50-year permit to operate, PacifiCorp included no provisions to allow fish access into nearly 300 miles of upriver habitat (PacifiCorp, 2004). In 2007, the federal government mandated that the dams must have fish ladders, which could cost upwards of 300 million dollars (Bailey, 2006). These ladders, to date, have not been installed, because the company has come to back dam removal as a more economically friendly process. These dams are still creating issues with water quality and blocking the migration of salmon and steelhead, causing environmental groups and Native tribes to push for broad reform in how the river is managed, including calls for one of the largest scale dam removal projects proposed in the United States, which will be discussed further in this paper (Gilman, 2016).

Figure 3: Timeline of events for construction and removal of the Klamath Dams



All three of these case studies show the incredible amount of complexity that comes with considering dam removal. The dams were often built in eras with much looser environmental regulation, and sometimes still ignored even those regulations that were in place. The ecological impact of the dams was often overlooked in favor of the positive aspects, such as power production, flood control, or water for irrigation. In all of these cases, there were treaty agreements with the tribes of the areas, which were often violated or overlooked. This factor became an important one when advocates began pushing for removal, as many of the tribal treaty rights supersede other water claims, and the impact of the dams on protected salmon runs became increasingly dire. The process of getting a decision to remove the dams spanned decades in all these cases, and that will be the focus of the results section. Each removal decision will be presented with information from interviews with individuals who were involved in the decisions, as well

as archival research into the regulatory documents, court decisions, and laws that were enacted.

IV.

V. Results

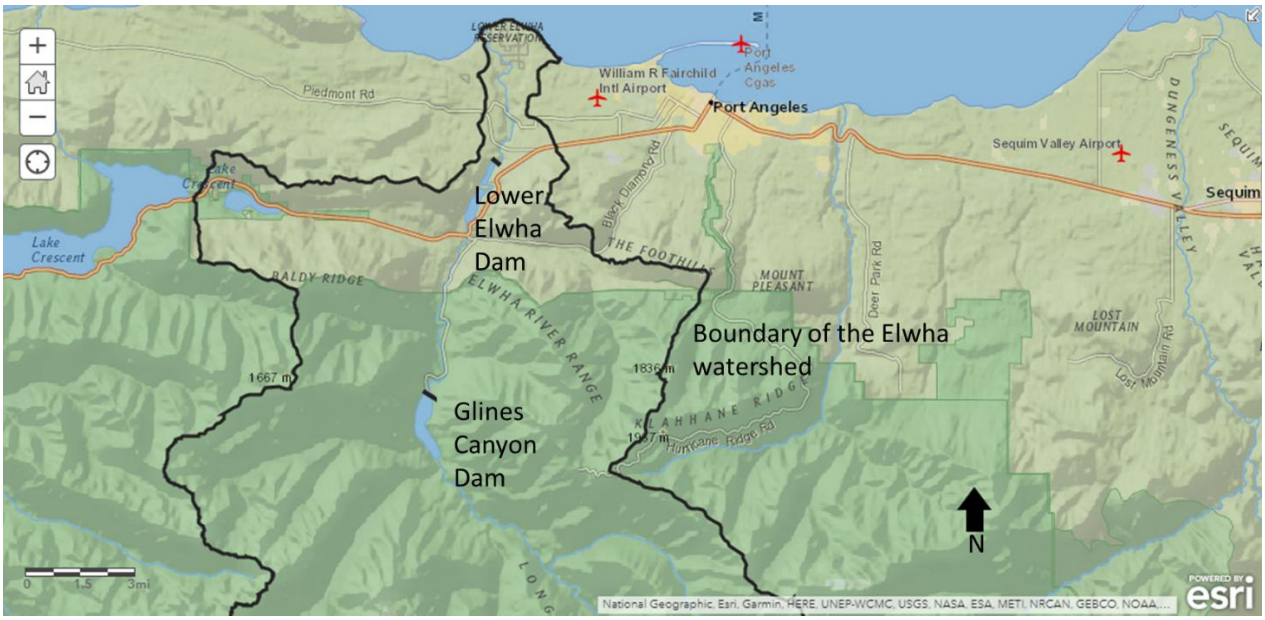
This thesis relies on a qualitative approach to explore three case studies of dam removal. This chapter will lay out a narrative chronological background of each case, using information gathered from archival and document analysis, including multiple court cases, pieces of legislation, and regulatory processes. These will present the important events and decisions that were involved in each case, as well as showing the important themes and issues that came up during each case. This will be augmented with information gained from interviews with individuals who were involved in these three decisions. I attempted to include voices from all sides of these decisions, to better understand the complexity and intricacy of the issues. These interviews provided a better understanding of which issues and themes were most important and relevant in each case. This provided a deeper understanding of what factors may be most influential in the dam removal decisions, and allowed comparisons across the three cases to analyze for overarching themes.

The results section is organized by river, each case study will be presented in a sequential way from the first serious discussions around removal to the eventual decisions and removals in the cases of the Elwha and Rogue, and the current state of the ongoing discussion on the Klamath. The cases will also be organized in order of when the final decisions were made, beginning with the Elwha as the first major removal project, continuing onto the Rogue, and ending with the Klamath which is still in the decision process. In considering each of these cases, I will also examine the different policy

decisions that were made, the political coalitions that were created both for and against removal, and will seek to understand which had more of an impact on the process, the policy, or the coalitions.

Elwha River

Figure 4: Location of dams on the Elwha River



Key to most dam removals is an event or some leverage point that allows groups an in-road to advocate for change in the system. When removal of the dams on the Elwha River was seriously considered, there were multiple issues that were key to the discussion. One of the primary issues was the worry over fish passage, and the conflict with the tribal treaty rights of the Lower Elwha Klallam Tribe. There was also broader economic concerns, worries about possibly losing the important timber and milling industries, which were key to the economy of the area. There were also anxieties over water rights for the town of Port Angeles, concerns over aging infrastructure, and worries about the impact of trapped sediment. In many respects the Elwha was seen as less

complicated than other rivers, since most the land was already under federal protection, but there were many competing stakeholders and differing opinions about how to best manage the river.

G. Legal Challenges

As previously mentioned, the Lower Elwha Klallam Tribe fiercely objected to the construction of the dams on the Elwha River in the early 1920s, and had been advocating for their removal since they were constructed. At first, this was seen as a radical request, especially considering the power and influence wielded by the timber industry and other resource extractive sectors. The dams were built to provide power, initially for the nearby town of Port Angeles, then primarily for a paper mill (Crane, 2011). Early on, many people looked at these dams as a source of progress, as a way to literally bring the Olympic Peninsula out of the dark and into the modern era with surrounding cities like Seattle, as explained by a Seattle Times reporter who covered the Elwha decision:

> The Seattle Times is a very old paper, we've been around since 1886. So I knew that there would be really interesting archival newspaper stories to mine to look at the changing attitude towards dams even expressed in our own paper, which was indeed the fact it was fascinating to look at old newspapers all over the Olympic Peninsula and in Seattle, and see how people were rooting for these dams. You know, they were just regarded as lifesavers, they're finally going to literally turn the lights on the Olympic Peninsula, which felt like it was lagging way behind Seattle and even Port Townsend in development and this so it's important to remember what these were built which was to, to bring industry to the peninsula.

Even though the dams were breaking Washington laws around fish passage, it was ignored for decades (Guarino, 2013). Tribal advocates gained leverage in their fight against the dams with federal recognition of the Lower Elwha Klallam Tribe in 1968, and the Boldt decision in 1974, which gave the tribe more legal leverage in protecting the

salmon (Brewitt, 2019; Bruun, 1982; George & Boldt, 1974). This theme was key to the decision around the Elwha dams and was integral in the interviews, and was an important factor in many court cases, especially considering, the ability of the tribe to use their tribal treaty rights to attempt to protect and restore the ecosystem for healthy salmon runs. These legal arguments are often bolstered by an environment justice lens, particularly since the dam had been opposed by the tribe since the beginning, and they were being disproportionately negatively impacted by the dams. This was strengthened in Washington by the power of the Boldt decision, but is often present in other dam removal discussions. As illustrated by the quotes below, the tribe was an important and key member of the coalition pushing for removal, and their unique legal situation allowed them to advocate to protect the salmon and their treaty rights:

> So you can't diminish sort of the power of the fact that the tribe called for the removal of the dams in in protection of their treaty rights. So the importance of that which is tied into the legal decision of the Boldt decision.
>
> -Interview with an official at Olympia National Park

> The story of the Elwha dams is really a much more interesting story of the whole storyline of colonization and then industrialization of…the Pacific Northwest because you can see the whole story in one little geography of the Eddiz Hook and the Indian villages that were there and displaced by the colonization and then the industrialization of the area, including the damming of the Elwha River and then the building of big mills that were put right on top of where the village sites had been.
>
> -Interview with Seattle Time report who covered the Elwha removal

Another change that affected how dam owners operated was the 1965 US Supreme Court decision in the *Federal Power Commission v. Union Electric Company* case. This decision established that using any navigable streams in the U.S. for energy production and transmission required a federal license (Poland, 1969). This decision

forced dam operators to apply for licenses from the Federal Power Commission, including the Elwha Dam. Before this decision, only dams that operated on land owned by the federal government required a license from the FPC (Staff, 1995). Initially, the company that owned the Elwha Dam claimed that FERC (Federal Energy Regulatory Commission), the re-named Federal Power Commission, did not have jurisdiction, claiming the Elwha River was not navigable under the law. FERC disagreed and in 1979 stated it did have jurisdiction, but did not issue a license at that time (Dietrich, 1995).

The licensing around the upper Glines Canyon Dam was also complex, under the Federal Power Commission it had been granted a fifty-year license in 1926. However, the Olympic National Park was created in 1938 and the dam and reservoir were included in the park boundaries. Hydroelectric dams were not allowed to be created in national parks, thus creating a question about whether an existing dam could be re-licensed and essentially grandfathered in when construction of a new dam would be explicitly forbidden in that location. Crown Zellerbach, the company that owned both dams, hoped that it could be re-licensed and applied for a new license in 1973 (Brewitt, 2019). This regulatory complications that could have broader impacts on other dams, as is explained by a former fishery biologist who worked at both Olympic National Park and for the Lower Elwha Klallam Tribe:

> In the course of evaluating the process the solicitor's office federal solicitor's office determined that FERC did not have the authority to relicense that the Glines Dam because it was in Olympic National Park and therefore, the jurisdiction fell to the park and not to FERC. Nobody wanted to hear that the federal agents, Federal Energy Regulatory Commission did not have the authority to license all privately owned dams in the United States that that decision, then led to people saying well we need to come up with a settlement.

When projects licenses are up for renewal, FERC cannot grandfather in outdated features, instead each project must be treated as if it were an entirely new project and must meet current laws (Bryant, 1999). The environmental laws of the 1970's were far more stringent than the early 20th Century laws, when the dams were built. It quickly became apparent that fish passage and maintenance of the structures were going to be the key issues for both re-licensing decisions. Crown Zellerbach and the State of Washington reached a deal in 1975, which included building a Chinook hatchery and the Elwha Dam's water flows would not be artificially manipulated to maximize power, instead using the water as it flowed down from the headwaters (Fisheries, 1986).

H. Tribal Treaty Rights and the Boldt Decision

All of these decisions around re-licensing were further complicated by the Boldt decision in 1974. This decision was a sweeping and expansive change that would alter how Washington's rivers were managed, giving the tribes co-equal management of the fisheries, and affirming that they were entitled to half of the fish in the state. Before this decision, tribes had taken an estimated 2% of the annual catch (Brewitt, 2019; Bruun, 1982). The State of Washington initially argued with the ruling, interpreting it that native fishers had the right to fish in their accustomed waters, whether or not there were fish present due to obstructions, and that hatchery fish were not subject to this decision. In 1980 Judge William Orrick issued a decision that became known as Phase 2, following the retirement of Judge Boldt, that stated hatchery fish were included in the harvest, as well as provisions that upheld the legal requirement to conserve fish habitat (Monson, 1981). The Boldt decision continues to be a key tool for the tribes to protect fish and their habitat, and was cited in a case that was before the United States Supreme Court in

2018 that concerned culverts that blocked fish passage throughout the state of Washington (Bernton, 2018).

The Attorney General of Washington who argued against the Boldt decision was Slade Gorton. His involvement in this case helped him build a reputation and launch a political career that often had him working in opposition to tribal interests and rights (Hughes, 2011; Martin, 1996). This would later become important with his role in the decisions on the Elwha River. He would go on to win the U.S. Senate seat for Washington in 1980, and fail in a re-election bid in 1986. But then he mounted a successful bid for the other open Senate seat in 1988 where he served until he was defeated by Maria Cantwell in 2000 (Ammons, 2000; Wilma, 2003). Throughout his career, Senator Gorton was well-known for his hostility toward tribes and often was seen as an enemy of tribal interests (Martin, 1996).

While the Lower Elwha Klallam Tribe were not directly involved in *United States v. Washington*, they were guaranteed fishing rights under the Treaty of Point of No Point (Gates, 1955). While these Boldt and Orrick decisions guaranteed the tribe's right to 50% of the fish, with the obstruction of the dams there were often no fish in the river, making it difficult to harvest 50% of nothing. This lead to the view that to secure the rights guaranteed under the treaty, the Elwha River watershed had to be restored. Restoring the river also had the potential of leading to a cultural and economic restoration of the tribe (Mauer, 2020). However, even with these goals, dam removal seemed like an unreachable goal. In an attempt to rehabilitate the fishery, a hatchery was constructed in 1978 by the tribe, to guarantee them the fish they were entitled to. They also joined with

the other signatory nations of the treaty in 1974 to form the Point No Point Treaty Council to better manage the fisheries (Pinkerton & Keitlah, 1990).

I. Activists, Coalitions and FERC

Early on, the primary coalition that sprung up was pushing for removal of the Elwha dams. The core of this coalition was between environmentalists and the Lower Elwha Klallam Tribe, these primary members of the coalition would stay involved throughout the process and were key to pushing the policy forward. The unique legal and social power of the tribe and the outside resources that the environmentalists were able to bring to the table allowed this coalition to influence the regulatory and policy decisions being made around the dams. Throughout the process the coalition eventually expanded to include many stakeholders, from regulatory agencies to, eventually, even the company who owned the dams. But this process took many years and had to overcome competing interests and desires.

All of these legal decision had impacts on the licensing decisions that were being undertaken for the two dams, in 1976 the tribe got involved in the decision, as well as the Secretary of the Interior, in his role as the tribal trustee, since the Bureau of Indian Affairs is included in Interior (V. Egan, 2007). FERC continued to issue yearly operating licenses for the two dams, as these larger questions were being debated. By 1979 FERC had decided that the two dams would be considered together as one hydroelectric project, since the operations were interconnected and the company agreed with this determination (Dietrich, 1995). The Department of the Interior, which included many impacted agencies such as National Park Service, BIA, and USFWS, voiced concerns about the impacts and issues that the Elwha dams had caused, much of which had not been properly

mitigated, but this had little impact on the process (Meierotto, 1980). The dams continued to operate in limbo, with FERC continuing to issue yearly licenses throughout the 1980's (V. Egan, 2007).

The 1980's were a time where environmental activism was increasing throughout the Northwest, and when the campaign to remove the dams on the Elwha began to become serious. Bruce Brown published *Mountain in the Clouds* in 1982, it was hailed as a brilliant account of the decline of the Olympic Peninsula's salmon. It laid out, in detail, the underhanded dealings that led to the construction of the dams and the destruction of the fisheries, sometimes being compared to an environmental crime story and occasionally called the *Silent Spring* of the Elwha River (Brewitt, 2019). This book was often cited by conservationists and activists as the kindling that ignited their concern for the Elwha.

The activist most often cited as the spark of the campaign to remove the dams was Rick Rutz. Volunteering for many different environmental organization, such as the Seattle Audubon Society, the Mountaineers, and others, Rutz had been involved in several licensing decisions and became familiar with the strengths and limits of the FERC process. He saw the potential in the unlicensed Elwha Dam and unrenewed Glines Canyon Dam, and began preparing a motion to intervene in the process (Brewitt, 2019). Due to the shaky nature of FERC issuing annual operating licenses for the dams, there was an opening for environmental groups to become involved in the process.

Eventually he persuaded a coalition of environmental groups to get involved in the decision, they were eventually called the conservation interveners, when they officially intervened in May 1986. This coalition included Friends of the Earth, the

Seattle Audubon Society, the Olympic Park Associates and the Cascade chapter of the Sierra Club. All of these organizations had interests that were tied to the Elwha River, as well as dam and hydropower issues in more general terms. The Olympic Park Associates (OPA) also had valuable local connections, which allowed the coalition to hire Len Barson, a former staffer for Congressman Al Swift to serve as council (Brewitt, 2019). These groups formed the core of the environmental coalition and were involved in nearly every action in the decision on the Elwha Dams and were closely allied with the Lower Elwha Klallam Tribe. This coalition would be important to work with the tribe and form the core of the advocacy coalition that would work for decades toward removal of the Elwha dams. Throughout the interviews, the theme of the strength and broadness of the coalition came up as a key point that allowed those who were working toward removal a powerful tool to push their ideals and policies through the regulatory system. The cooperation of environmental groups, the tribe, and eventually recreational groups, agencies and the company is what likely made this a successful removal project.

This coalition became involved at a fortuitous time, in 1986 the Electric Consumers Protection Act set the precedent that environmental and recreational values were to be held as equally important as economic valuations and usage that were usually the basis for dam licensing (Echeverria, 1987). This allowed for environmental and recreation advocates to be on a more even footing with dam owners and lessened the heavy-handed advantages that dam owners had previously held in these decisions. This coalition of environmental organizations formed the core of the political coalition that began pushing for removal of the dams on the Elwha, and in coming years would be joined by a plethora of other environmental groups. This also allowed for a paradigm

shift where the importance of the environment was held as important as economic concerns, which also allowed for this issue of two, relatively, small dams in a remote part of Washington to be shown to be important to broader swaths of the population, as explained by a former fishery biologist for Olympic National Park and the Lower Elwha Klallam Tribe:

> Some interesting research done on kind of the early phases of determining the economic value of…knowing that there is a wild place on the Olympic Peninsula, where they did this nationwide interview with people, how much would it be worth to you to know that you know the Elwha River was free and it was billions I mean billions of dollars that people would be willing to donate to have a free and wild the Elwha River

The environmental groups weren't the only ones who were organizing in the mid-1980's. The Point of No Point Treaty Council was also preparing for the involvement of their signatory nations, and there was the beginning of a cooperative relationship between the tribes and the environmental groups (Pinkerton & Keitlah, 1990). Russell Busch was a lawyer who would represent the Elwha Tribe throughout the process, and according to some, he and tribal biologist Steve Ralph helped assist Rutz in preparing their intervention (Brewitt, 2019). The tribes were glad to have Rutz and the other environmental organizations joining them as allies in the fight, although Crown Zellerbach objected, citing the tardiness of these interventions. The advocates pointed to the stalled nature of the decision, citing no movement for years on the decision (Derrick, 1990). FERC accepted the interventions of both the tribes and the environmental groups in 1986, marking the true start of the struggle over the Elwha and the dams.

The shifting debate around dams and their impacts on the ecosystem put some agencies in a difficult situation. The management of the Elwha had not changed for

decades, but the re-evaluation of the dams' licenses caused some agencies to re-evaluate their own approaches (Clarke & McCool, 1996). Some of the changing attitudes and ideas were generational, as younger individuals began working in the agencies, they brought with them a different understanding of environmental issues. By the 1980's many of those who had entered their careers during the heyday of the environmental movement were now beginning to reach leadership positions within their agencies (Gross, 2006). Many government units were involved with the Elwha, and they formally banded together to form a working group in 1985, focused on restoration and relicensing. This working group covered a wide variety of agencies, the National Park Service, the Lower Elwha Klallam Tribe, NOAA's National Marine Fisheries Services, the Point No Point Treaty Council, the US Fish and Wildlife Service, and the Washington Department of Game (later the Washington Department of Fish and Wildlife). This association would be known as the Join Fish and Wildlife Agencies (JFWA) and would work together as a united front in regard to FERC. They also regularly disseminated information to the other groups, who had more freedom to push for restoration and removal, this broad coalition of regulatory agencies uniting to provide a consolidated opinion was helpful during the complex FERC process, as explained by a former fishery biologist for Olympic National Park and the Tribe (V. Egan, 2007):

> The federal agencies actually joined together in what they called the Joint Fish and Wildlife Agencies, the JFWA, that included the tribe. And actually the state. At that time the Department of Wildlife was separate from the Department of Fisheries so it included the Department of Wildlife, but those agencies working as a coalition provided a single opinion on every action that FERC was thinking about, and then later in writing the EIA's we would meet and come up with, okay, this is our…joint consolidated position.

There were many complexities over the process, in 1989 FERC issued scoping documents and a draft Environmental Impact Statement (EIS) in 1991 (NPS, 1994a). One of the primary complications was an argument over whether the Glines Canyon Dam was within FERC's jurisdiction (Busch, 2007). The law excluding national parks from the creation of dams was clear, but organizations concerned about electricity production, including FERC and Crown Zellerbach, argued that existing licenses that pre-dated the exclusion law could be re-licensed (Brewitt, 2019).

There was a suggestion for a work-around for the jurisdictional issues by Senator Dan Evans (R-WA). In 1986 he proposed the federal government buy the dams, but found little support for the idea. Antigovernment ideals and distrust toward the federal government are common among locals on the Olympic Peninsula (Dark, 1997; Loomis & Edgington, 2012). The idea of the federal government taking, even if it was purchased, private property was a deeply unpopular idea in an area that prides itself as being as far away as possible from Washington D.C. (Morgan, 2019). The environmental groups petitioned FERC in 1988, stating that the Glines Canyon Dam was not in their jurisdiction. A request was made by Rep. John Dingell (D-MI12) to have the non-partisan Government Accountability Office (GAO) study the matter and give their opinion. GAO responded that in their view, the dam did not fall into FERC's jurisdiction (General, 1990). This was a non-binding statement, but was important as it came from a well-respected, non-partisan organization known for thorough research.

J. Differing Ideas Around Restoration

One factor every stakeholder in the discussion around the Elwha agreed on was that the fisheries needed to be restored. The methods and type of restoration fueled much of the

debate over the years. The dam owners, for obvious reasons, favored restoration without removing the dams, however this was always going to be a complex prospect. After the environmental and tribal groups filed their interventions with FERC in 1986, the company proposed a convoluted prospect of restoration. This involved many proposals that involved combinations of trapping fish and hauling them above the dams, adding fish ladders, screens to protect the fish from the turbines, and altering the way water was released from the dam in a beneficial way for fish (Associates, 1990). This was not only staggeringly intricate it would have been incredibly expensive.

To the activists and tribes, this idea was inherently undesirable. It seemed like the company was attempting to put patches on the problem, not to solve the underlying issues in the river. The tribe had a full restoration in mind, defined by fish constantly being present in the rivers and able to move freely up and down (Busch, 2007). To the Elwha, their ancestors had settled at the mouth of the river for a reason, it provided for the people so long as they cared for the river. The river is deeply woven into the traditions and spiritual beliefs of the people, to see it fully restored would also be seen as a restorative force for the tribe itself (Crane, 2011).

Fish were not the only issue in the watershed, the artificial management of the river and the dams blocking sediment and organic material from traveling downstream for nearly a century severely altered the river's structures and dependent ecosystems. Sediment is crucial to the structure of a river, and the Elwha was severely sediment starved. Salmon and other fish were unable to make viable redds in the larger cobbles that dominated the lower river, caused reductions in eelgrass beds, and worsened coastal erosion which can threaten crab and mollusk species (Shaffer et al., 2008). This concept

was one that intrigued many people looking to restore the Elwha, including a Seattle Times journalist who was covering the removal decision. She said initially her editors thought it rather out there to be interested in sediment, but when looking at the broader picture it becomes fascinating, as she explains below:

> It's a glorious, interrelated engine of life and…it's also a whole physical process that gets rebooted, right, you suddenly had the delivery of big wood to the near shore and logjams and you have gravel and sediments and…you turn on a whole physical system which once again then can provide the basis for the biology to come back.

Throughout the early 1990s the company continued to support restoration with retention of the dams, but to all the other key players, the tribes, the environmentalists, and the agencies, it continued to look like the worst option (Interveners, 1989). While FERC did not take a public position on the 1991 EIS, a year later JFWA (the Joint Fish and Wildlife Agencies) publicly stated that dam removal was the best option, remarking that only the company's interests were best served by retention (Brewitt, 2019). The more studies that were done on restoration, the more improbable and unfeasible any restoration project could be completed without dam removal.

Another controversy was brewing that was unrelated to the attempted removal efforts, but which would profoundly impact them. In 1990 the northern spotted owl (*Strix occidentalis caurina*) was listed as threatened under the Endangered Species Act (Bonnett & Zimmerman, 1991). This had profound impacts on the timber industry, which was one of the dominant economic forces on the Olympic Peninsula. The owl relies on old-growth forests for its habitat, and with the listing that shut down timber operations in those forests. It created a furious backlash by the resident of the area and

had a devastating impact on the economy of the region (Bonnett & Zimmerman, 1991). It created the view of many in the area that environmentalists cared more about animals and the wild than people, creating a hardened opposition that saw dam removal as another front in the spotted owl wars.

This was further compounded by the fear of dam removal causing the paper mills to shut down, further damaging the economy of the area. The dams provided power for the mills and the company was concerned about having to purchase power as well as possibly pay for removal, while the county worried that if the mill were shut down it would lead to crippling job losses for the area (Crane, 2011). These concerns among residents of the area were common and often tied to deeper issues, as explained by an official for Olympic National Park below:

> It's a really, it becomes…more than just the question about whether or not these dams are really serving the best purpose, it becomes tied up in identity and questions about sort of who's…who has the right to say, how we're supposed to be living our lives and what we're supposed to be doing. It becomes much more question about that than I think it is. For some people…becomes a question about, you know, who is telling me how I'm supposed to be living and how my family earned a living…in the past and how my kids are going to…my grandkids are going to be earning a living and taking care of my family and into the future. And that's what it becomes a question of more than it becomes a question of about whether or not the dams are useful or not.

None of the stakeholders wanted the mills to close, so through much discussion and mediation, it was agreed in 1992 that the federal government would purchase the dams from the company, thus passing the financial burden from the company to the federal government (Busch, 2007).

K. Political Machinations

As the coalition pushing for removal of the dams began to create policy changes and began making removal seem more likely, other coalitions began to form to attempt to protect the dams and push back against changes for the local residents. This theme of pro-removal advocates being cast as outsiders, attempting to force locals to change their way of life was prominent in the archival research and was an underling thread in interviews.

As dam removal began to be considered a more viable option, anti-removal advocates began to organize, especially in the neighboring town of Port Angeles. Letters to the editor began appearing in the local paper extolling the virtues of the dams, the beauty of the lakes, and the clean hydropower (Brewitt, 2019). While people in Port Angeles hosted rallies attempting to sway the decisions on the dams, they had little power in the decision since the dams were privately owned and the watershed was within the park boundaries, most of the decision came down to the government and FERC. One portion of the decision that did explicitly affect the city was related to their water supply. The dams blocked sediment from moving downstream, and there was concern that the city's water could be overwhelmed by the released sediment. This was also a concern of the Lower Elwha Klallam Tribe, since they relied on the same water source (Busch, 2007). The concern over water rights and released sediment were common concerns in the interviews, as they were often brought up by the public during the decision process.

In 1991 advocates for removal, both environmental organizations and the tribes, took a bold step to finally solve the problem of the Elwha dams. The core coalition of environmental groups and the tribe petitioned the Ninth Circuit Court of Appeals to rule on the issue of jurisdiction on the Glines Canyon Dam (T. Egan, 1990). The threats of a

broad and sweeping judicial ruling or expensive litigation brought together legislators to try and craft a bill to manage dam removal. Al Swift (D-WA), Brock Adams (D-WA) and Bill Bradley (D-NJ) began to craft legislation to remove the dams, while preserving the economic support of the mill, and respecting and restoring rights to the tribe. Advocates rallied support from the public and the company seeing the increased support behind removal decided to support the legislation, which protected their economic interests and power concerns for the mill. This large coalition was often cited in interviews, as illustrate by the quotes below, as a key reason removal was able to move forward. Without cooperation among these groups it was seen as unlikely that the removal decision would have moved forward. These coalitions were able to band together and force policy change through the bureaucratic FERC process.

> Well, there were certain absolutely critical players. One was the Lower Elwha Klallam Tribe, of course, which pushed initially for removal and never give up. Secondly, the city of Port Angeles was an absolutely key player in terms of how the deal got done, and why it cost so much. And what they required and were given, total guarantee up, with no cost sharing in the legislation, something I don't think you'll ever see again in a political project. And so the city Port Angeles was very key player, the group Trout Unlimited was a very key player they came in into the Hail Mary rescue and when the whole deal was falling apart even after the legislation had been passed. They were they helped create a process by which citizens came to understand what a sweetheart deal this was for them actually, they were basically cooked without it because they'd have to deadbeat dams and they'd lose the jobs and have nothing to show for any of it. And this, you know, solves their problem. The feds paid for everything. They got full replacement power, they kept the jobs and, you know, sadly, those jobs have since gone away, for reasons that have nothing to do with the river, it's just changing economics. But in any event, the short answer to your question is city Port Angeles, the tribe, Trout Unlimited. And there were others there were some key lobbyists who nurtured this very skillfully through Congress. Norm Dick's, never would have happened without his every single year appropriations. I mean, this took like 15 separate congressional appropriations and he just never gave up on it.
>
> -Interview with Seattle Times reporter who covered the Elwha removal

> I think that what really made the Elwha project work was not because any one group… had more to offer. It was that each group had something very important to offer, and they were functioning as a coalition. The…federal agencies actually joined together in what they called the Joint Fish and Wildlife agencies the JFWA that included the tribe. And actually the state... we would meet and come up with okay this is our you know joint consolidated position. And further because there was a lawsuit involved. The, the parties to the lawsuit, were also getting together and coordinating their ideas. So, the nonprofit organizations Friends of the Earth and others…could do things, as could the Elwha Tribe that a Federal agency couldn't do, they could lobby. Federal agencies had other abilities that obviously Friends of the Earth couldn't like management responsibilities. So I would say it was a coalition of equals, and it was the fact that there was a coalition that made it possible. You know, I think the tribe, certainly was a focal point, because of their dependence on the river. But I don't think anyone would have been convinced based solely on the tribal concerns at that time.
>
> -Interview with former fishery biologist for Olympic National Park and the Elwha Tribe

This coalesced basically all the long-standing stakeholders in this issue on the side of removal, with some local opposition still present but with no real influence. This mega-coalition that combined not only the environmental activists and tribes, but also regulatory agencies and the company was crucial to moving forward with removal. The last hurdle was getting the legislation passed by Congress. Many lawmakers were nervous about passing a bill that expressly called for dam removal, seeing how it may be used to go after dams in their district. To get around this the text of the Elwha legislation calls for river restoration, which is not controversial, without mentioning dam removal (Elwha River Ecosystem and Fisheries Restoration Act, 1992). The bill passed at the end of the 102nd Congress and was signed into law by President George H.W. Bush on October 24, 1992.

While this lead to much celebration, it was far from the end of the struggle over removal. By 1994 the Interior Department had produced a study showing dam removal was the only way to fully restore the river (NPS, 1994b). Even with this study and the

policy recommendations, the political world was shifting and not in favor of dam removal. In 1994 the Republicans swept the elections in what became known as the Gingrich revolution. Marked by their anti-big government views and disdain for environmental issues, it marked a giant challenge for the Elwha removal. The greatest challenge came in the form of the newly-elected Senator, former Attorney General, Slade Gorton (R-WA). He relied on support from Eastern Washington, where the dams on the Snake River are of concern to the locals (Bernton & Mapes, 2020; M. C. Blumm, Lucas, Miller, & Rohlf, 1998). Gorton chaired the Senate Interior Appropriations Subcommittee, where he controlled the fund appropriated under the Elwha Act. There he was able to severely underfund the project, effectively stopping it, in 1997 President Bill Clinton requested $110 million for removal, Gorton released $4.7 million (Brewitt, 2019). This was illustrated in my interview with a former fishery biologist who worked for both Olympic National Park and the Lower Elwha Klallam Tribe during this removal process, he explained the funding process in the following quote:

> So, the Elwha Act was passed. And that was really important. But then, it was very difficult to get any funding dedicated to actually implement this new Act. And I remember sitting in, I was working for the Elwha tribe at the time and we were meeting with Senator Gordon's staff about the project. And his comment was something like, well I think I can come up with a million dollars a year to fund the project at the ultimate cost to the project would have taken us 200 and something years to complete…but the tribe was willing to do that because it kept advancing the project, right, it wasn't it wasn't dead it was something that kept it as a, as a possibility.

L. Anti-Removal Activists Gather

While this was occurring in Washington D.C., on the Olympic Peninsula local opposition to dam removal was organizing around a new group. A group called Rescue Elwha Area Lakes (REAL) made up of locals were opposed the removal plans and played

up anti-government messages began asserting themselves in 1994. The group used tactics that environmental advocates had used against them, focusing on trumpeter swans (*Cygnus buccinator*) that used the lakes during their migration (Chastain, 2010).

> Well, I think for some of the opponents, they just looked for they…at a certain point, I think they just began grasping at straws for ways to derail the removal project, so, when they…tried to use the Endangered Species Act to stop dam removal. So they looked at things like, I believe it was, trumpeter swans that used…the lakes. And so…they tried to use the Endangered Species Act, that they couldn't remove the dams because the endangered swans were using the lakes for habitat. So you couldn't remove the dams because there was endangered animals there and I think that that probably gave them great joy that they were using…an environmental law to thwart the environmentalists and things like that
>
> -Interview with official from Olympic National Park

REAL also argued that removing the dams would in fact harm salmon, due to the released sediment (Chastain, 2010). These tactics, as well as their appeals to antigovernment sensibilities of the area, allowed them to gain political clout and their efforts gave Gorton political cover to oppose removal. Throughout the removal decision, the Endangered Species Act was important and was often referenced during interviews, it was used by both sides of the argument to attempt to lend weight to their own arguments. It is a good example of how science and environmental policy can be twisted and weaponized for political gain.

All of the acrimonious fighting and holdups concerned many of the local citizens, who lacked any sort of strong and coherent voice in the debate. All involved agreed that delay was helpful to no one, so in 1995 the Elwha Citizens' Advisory Group (CAG) was formed. This was a 12 member board made up of well-respected local residents who were mostly neutral about dam removal, with a few exceptions. While the coalitions that had formed around this decision were quite important and had influenced a great deal of

the policy decisions to this point, they had their own political goals and were not neutral arbiters at this point. Key to moving a decision forward is bringing all the stakeholders to the table and discussing the differing proposed solutions, this can be especially helpful if locals are involved who do not have strong opinions about removal. This point was brought up multiple times in interviews as a key turning point in the process, as the quotes below explain:

> And I talked to colleagues at the park who were involved for the whole process, Brian Winter was the project manager. And…he would be someone who I think was instrumental from the Park Service side because…he was here for the whole entire time. And one of the things that he said that was really instrumental was that the Congressman, I believe it was Norm Dicks and maybe Senator Bill Bradley, that they set up a community sort of group that brought together different members of the community, both for and against dam removal, and they…set up this community advisory committee and they came together. And they heard from the experts. And they…were really instrumental, I think (in) coming to some consensus.
>
> -Interview with official from Olympic National Park

> Things looked somewhat bleak until there was an ad hoc committee formed, which didn't include the tribe or any of the federal agencies, and they, to their credit, they were formed with people who are in favor of dam removal, people who were very much opposed to dam removal. And they spent a considerable amount of time, evaluating what dam removal would mean to the city of Port Angeles and…to the resource but more to the city of Port Angeles, and they, ultimately their decision was that they supported dam removal, because they were operating on 100% consensus. They supported dam removal.
>
> -Interview with former fishery biologist for Olympic National Park and the Elwha Tribe

The group reached out to those involved in Washington D.C., asking if they would want the advice from a local group and the positive response gave them the go-ahead to pursue a balanced plan. CAG reached out to all stakeholders and heard from a

variety of differing perspectives. They eventually suggested a cautious approach to remove the dams that satisfied nearly all groups, with the exception of REAL, and showed that despite some vocal opposition there was local support for removal (T. Egan, 1990). This group was cited often in the interviews as important and key to gaining approval from locals in the area and significantly helping to push dam removal forward. The group considered many of the issues that were consistently brought up as concerns, water rights, economic impacts, tribal rights, restoration efforts, and infrastructure issues. Concerns over the aging infrastructure were well-illustrated in the interview with a former fishery biologist for Olympic National Park and the Tribe, in an experience he had with a state committee's visit to the dams:

> There was subsequent…attempt at the state level to kill dam removal. And that one…personally involved them. The state legislature, I forget which committee, it was natural resources something committee held a field visit to the Elwha to look at the magnificent dams and talk about dam removal. And it happened to be the day of a massive rain event and a huge storm. And I had just finished giving a presentation on dam safety and how this dam, the lower dam, was not supported on bedrock that it was essentially dirt fill underneath a concrete bridge. So they had that in their mind and we went out on the dam, and it was shaking with water coming through. And I could see the, the guy who was opposed to dam removal who had organized the site visit, as he's looking at all his cohorts. Very alarmed standing on the shaking dam, he really…I could see his face recognize that he had lost his chance with the legislature.

This pulled the rug out from under REAL, weakening any claims they made to continue opposing the removal. At the same time, the Park Service released a draft EIS that found that removal would be unexpectedly easy from an engineering perspective and that the sediment could be allowed to naturally re-distribute (NPS, 1994a; Shaffer et al., 2008). The EIS compared five alternatives to meet the policy objectives of restoring all runs of native anadromous fish and restoration of the Elwha River ecosystem; 1) taking

no action, 2) retaining both dams and adding mitigation, 3) removing the Glines Canyon Dam only, 4) removing the Elwha Dam only, and the proposed action 5) removal of both dams. The document also predicted that removal would be a boon for the region's economy, by increasing tourism and recreation. Marv Chastain, the vocal advocate for REAL disagreed with these findings, but it further weakened the calls to retain the dams.

Even with support for removal coalescing, Slade Gorton remained opposed and continued to use his power to withhold money and attempt to protect the Snake River dams. In a final power play, he introduced an amendment to the Elwha Act that would prohibit any alteration of all the dams on the Snake and Columbia Rivers (Hughes, 2011). He face political blow-back from this and he finally dropped his opposition in 1999 and stopped blocking funding, some thought it was an attempt to help his re-election campaign (Hughes, 2011).

M. Removal Moves Forward

In February of 2000, all the major stakeholders, the tribes, the environmental organizations, the federal government, and the companies signed an agreement approving the government purchase of the dams. By March, the company had officially turned the dams over to the Bureau of Reclamation, who would operate the dams, hopefully bringing the process closer to completion. While the process moved forward on a federal level, anti-removal tension continued among the local resident of Port Angeles, with many public displays and letters to the editor, but it had no real political power to change the process. With Gorton's defeat by Maria Cantwell (D-WA) in the 2000 election, appropriation for the Elwha project shifted to Representative Norm Dicks (D-WA) who was a long-time supporter of removal and an avid sport fisherman. Throughout the

coming years he carefully appropriated funds to keep the project moving, without stripping too much from the Park Service's annual budget (Brewitt, 2019).

Removal began with many studies to ensure that there was good understanding of the state of the river, so restoration goals could be set realistically (Duda, Freilich, & Schreiner, 2008; Shaffer et al., 2008; Winter & Crain, 2008). There was also preparation that was done along the river to help restoration, for example adding logjams along the lower river and nurseries raising native plants to help with re-vegetation efforts. There were also other construction projects that needed to take place before the dams could be removed, a new water treatment plant was built to ensure that Port Angeles water was protected from the increased sediment load of the undammed river (NPS, 2010).

The coalition of environmental activists, tribal members, and agencies continued to work to promote this project to the public, hoping that perhaps people would see the benefits of this project and possibly increase interest in other environmental issues. The different groups that made up this coalition continued to work together, from American Rivers creating three-dimensional models showing a restored Elwha River and Olympic National Park hiring artists to create scenes of a renewed river (Chew, 2007). However, there were still many skeptics among the locals who were sad and afraid to see the dams go.

There were delays in building the water treatment facility. Ground was broken in 2008 but due to water quality issues removal was pushed back initially to 2009 and then again to 2012, although this date was then moved up a year due to the federal stimulus bill of 2009 (Brewitt, 2019). In these intervening years, much of the public in the region became more comfortable with the idea of removal, it was seen as a project that had the

potential to be influential and bring attention to the community. The removal plans went ahead and June 2011 saw the generators on both dams stop for the last time (Gottlieb, 2011).

Removal began with a large celebration and removal ceremony that praised the cooperation that was needed by so many agencies, activists, tribal members, and environmental groups. It was attended by many prominent politicians and dignitaries, including Obama's Interior Secretary Ken Salazar as an administration representative ("Secretary Salazar Applauds Beginning of Restoration of Elwha River, Largest in U.S. History | U.S. Department of the Interior," 2011; Warren, 2011). The dams were essentially removed concurrently, without the long wait that was suggested in some of the initial policy documents. The lower Elwha Dam was removed first, with the Glines Canyon quickly following. Both dams were removed after controlled draw-downs of the water in the reservoirs, which allowed management of the silt releases to avoid spawning salmon and trout (Staff, 2011). The dams were then taken down with careful demolition and some explosives, with the Elwha Dam being completely removed by March 2012 and the Glines Canyon Dam following by 2014 (Crary, 2013; Mapes, 2016a; NPS, 2019). There have been some ecological and physical issues since the dams were removed, some of the replanting has failed and the river has shifted in unpredictable ways leading to some trail, campground and road wash-outs, as well as problems that have occurred with the water treatment plant (Mapes, 2016b; Ollikainen, 2018; Rice, 2015). But many of the restoration efforts saw speedy changes to the ecosystem once the dams were removed, from sediment redistributing throughout the system and massively changing the structure of the river and delta, to fish finding their way back up the river, and elk and bears being

seen in the former reservoir sites (Mapes & Ringman, 2013; Ritchie et al., 2018; Slobig, 2014). This swift restoration process was described in an interview with a Seattle Times reporter who covered the entire process in the following quote:

> Generally speaking with nature, it abhors a vacuum and if you create a place for life, to be it will be there. And sure enough, I mean, like right away fish started coming back and not just salmon but you know forage fish in the near shore and then animals that eat those, animals start changing their behavior distribution and baseline health and, you know, it's a glorious, interrelated engine of life and…it's also a whole physical process that gets rebooted, right, you suddenly had the delivery of big wood to the near shore and logjams and you have gravel and sediments and you know, you turn on a whole physical system which once again then can provide the basis for the biology to come back. It's an, it's an intertwined revival. It's a physical one. And it's a biological one and the to support each other.

N. Conclusions

In many respects the Elwha River provided a near-perfect test case for how dam removal could be used as a river restoration tool. The watershed is exceptionally pristine since the majority is protected by the boundaries of Olympic National Park. The only man-made impact on the river was essentially the two dams that had impeded its flow for over a century. It seemed to be the perfect ecological test case to see if dam removal could restore an ecosystem and if salmon runs could be brought back. It is likely to remain a good laboratory for restoration techniques and can be studied in future years, since further human impacts and development are unlikely, except the possible impacts of climate change. Many advocates hope that it can remain a true refuge and stronghold of salmon and the ecosystem they support, as well as an inspiration for future dam removal projects (Montgomery, 2003; Warrick et al., 2015).

Throughout the removal process, the basic policy goal of restoring the river and protecting the salmon was agreed on by all groups who were involved. The debate often focused around how to best meet those objectives. The complexity of dam removal decisions is often due to the large number of groups that are involved who all have different values, views, and goals for the project. Each person interviewed for the case study emphasized, the coalition of these groups as important in this decision. It showed how a large coalition can be key to resolving these complex issues and pushing something as momentous as dam removal forward. But bringing these coalitions together brings additional complications. In the case of the Elwha, different stakeholders had different perspectives on the river and the removal. For industry, the river is a useful tool and a source of power and capital. For the environmentalists, the river is an ecosystem that needs to be protected or restored from man's influence; it is seen to have value but not as something to extract resources from. Management agencies have to operate within their own regimented spheres with goals and values that are based in their organization, and sometimes may be reined in by laws, rules, and regulations. The tribes have a dual role of protecting their sovereignty and wielding their power through government-to-government relationship and treaty rights, but also have deep cultural and spiritual ties to the river and the surrounding environment.

One key to understanding the removal decision on the Elwha is the importance of finding leverage points, where there was both the opportunity and the political will to make changes in how the system functioned. The fact that the dams were up for relicensing from FERC were key as, it allowed the consideration of different policy solutions and allowed for political coalitions to begin to form. This then lead to the

creation of the Elwha Act, and then the creation of a firm plan after advocates forced a new leverage point by taking the case to court and forcing compromise and action. Even though this process spanned decades, the core of the advocacy coalition did not change much, the same core groups remained involved and continued to add allies along the way. In the end, bringing together the mega-coalition that included not only these core environmental and tribal groups, but also the management agencies and the company likely proved to be key in moving removal forward. This coalition was not a firmly united group, as they all had differing values and roles, but they all were able to work together seeing a common goal in their purpose.

The jurisdiction of the Elwha dams was relatively uncomplicated in that it was always going to play out on the federal level due to the FERC relicensing role, the tribal treaty rights, and the location in a national park. This lead to backlash and reaction from many of the locals around Port Angeles, and showed some deeper cultural fissions. Much of the local push-back was focused around anti-government views and the urban/rural divide we see in other political issues. Many of the pro-removal advocates were from Seattle or other urban areas, and many locals saw this as another skirmish in the plot of urban elites to control their homes and take away their voices. Interviewees often brought up these conflicts when considering water rights, the impact to the local economy, the complexities around hydropower, and the shared desire for a restored river. The Elwha joined a long line of contentious environmental issues such as wolf reintroduction, the spotted owl wars, land acquisition and many other sources of tension between rural and urban areas.

These conflicts were even deeper when considering the role of the tribe. There is a long history of resentment and even blame place on the tribe for dwindling fish numbers (Brewitt, 2019). These conflicts have often shown an undercurrent of racism (Guarino, 2013; Mauer, 2020), because while people from Port Angeles would complain that the locals were not being listened to, the tribe certainly had more claim to being local than any other group. This conflict over who was defined as a local, as well as how the dams became a part of the identity of the community was an important underlying idea. That was illustrated by this quote from an official at Olympic National Park:

> It's a really it becomes, it becomes more than just the question about whether or not these dams are really serving the best purpose it becomes tied up in identity and questions about sort of… who has the right to say, how we're supposed to be living our lives and what we're supposed to be doing. It becomes much more question about that than I think it is. For some people, for some people becomes a question about, you know, who is telling me how I'm supposed to be living, and how my family earned a living…in the past and how my kids are going to…my grandkids are going to be earning a living and taking care of my family and into the future. And that's what it becomes a question of more than it becomes a question of about whether or not the dams are useful or not. And for, for tribal members, it's, you know, it becomes a question of…it's almost the inverse of that, right? You know, for…100 years, this dam had been in place and nobody asked us whether or not it was going to impact the way that our ancestors had made a living or whether our, our kids and grandkids are going to have an opportunity to make a living. So it's kind of the inverse of a coin. And if they could only just see one another and see that they're really arguing about the same thing. They might be able to hear one another. But they can't. They, they aren't able to do it.

The deep ties and importance of the river and its restoration to the tribe are difficult for other groups, even those who work with the tribe, to understand. The Lower Elwha Klallam Tribe opposed the dam from its initial construction, and did not waiver in their convictions. Throughout the interviews, their persistence and position were often cited as key to the success of the project.

The Elwha River now stands as a free and restored river. It was one of the first large-scale dam removals and has served as a model for multiple other coalitions that have come together to remove other dams. It shows the complex nature of these decisions and the importance of coalition-building to accomplish a successful restoration project.

Figure 4: Images of dammed river and current free-flowing river

Tom Banse

Northwest News Network

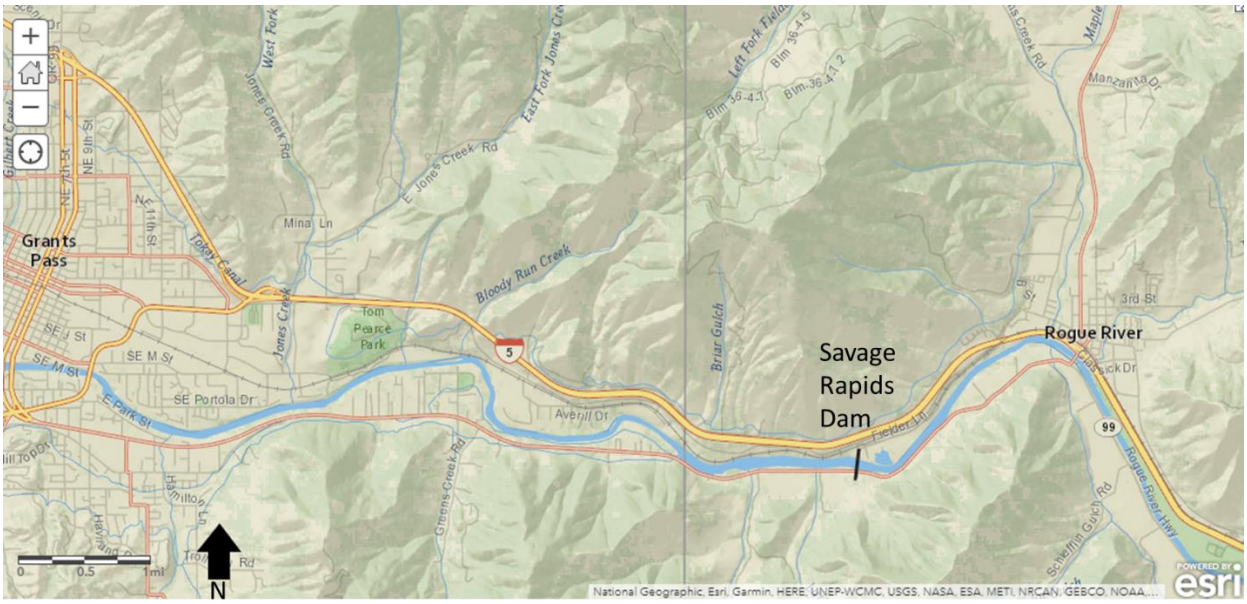
The lower Elwha Dam, before removal began.

Lindsay Walters

Photo taken of the restored and free-flowing river, standing on the site of the former dam structure

Rogue River

Figure 6: Map of the Savage Rapids Dam on the Rogue River



O. Water rights, Salmon, and a Shifting West

Water rights have always been a hot topic in the Western United States. It is an area with many powerful rivers, but also large swaths of high mountain deserts and arid areas. Indigenous tribes often used the rivers to sustain themselves but when settlers began migrating to the West they brought with them societies that were structured around agriculture and irrigation, which lead to many dams being built across the West. The Savage Rapids Dam was built on the Rogue River to provide irrigation for the Grants Pass Irrigation District. While it provided a great deal of prosperity for the valley, it came at a steep cost for the renowned fish runs of the Rogue. As time went on and the economy of the valley shifted away from primarily agriculture, activists began seeing an opportunity to challenge the water right granted by the State of Oregon and to possibly remove the Savage Rapids Dam.

By the early 1990s a group of organizations who were interested in restoring the Rogue to a free-flowing river began seeking dam removal options, these core groups were WaterWatch of Oregon, American Fisheries Society, and Rogue Flyfishers (Brewitt, 2019). By this point, Oregon Water Resources Division (OWRD) had already lowered the water right that had been initially granted to Grants Pass Irrigation District (GPID) due to lower use of irrigation for agriculture in the area to 96.94 cfs (cubic feet per second) in 1982 (GPID, 2019). Throughout the 1980s OWRD continued studying how much water GPID actually used, and in 1985 they recommended only 20 cfs was actually required for beneficial purposes. GPID disagreed and in 1989 applied for 90 cfs. Eventually the Bureau of Reclamation, along with GPID, began a study to improve water management and fish passage in the area. During this study, the state granted them temporary water diversions at their historic levels (GPID, 2019; BOR, 1995). The uncertainty around how strong GPID's claims on the water rights allowed the groups interested in removing the dam and restoring the river a leverage point that allowed them to begin discussions about changing the policies around the Savage Rapids Dam. A former staff attorney for WaterWatch reflected on how and when they knew they had a case for dam removal:

> And we were monitoring, I say we, basically Tom, at that point WaterWatch had pretty much just volunteer staff monitoring the state process in connection with proving up on the Grants Pass Irrigation Districts right. And we knew that they didn't, they were not irrigating enough lands to justify the amount of water they needed to operate. And so the state finally proved up on the right and cut the District's water right to divert water in half. And so the district had to come back and apply for additional water right for additional water. And that's when we that that we identified that as our leverage point to start a discussion with the Irrigation District.

P. Save the Rogue v. Save the Dam

A strong coalition was forming between environmental groups and anglers who had a deep interest in restoring the Rogue River its free-flowing state. The Rogue was one of the initial Wild and Scenic Rivers recognized when the Act was passed by Congress in 1968 (Wild & Scenic Rivers Act, 1968). The group was bolstered by the legal and administrative experience that WaterWatch had in dealing with complex water rights cases, and a willingness to pursue the case through the court system. A former attorney for the group explained how they worked with other groups to build the case for removal of the Savage Rapids Dam below:

> So I did, what WaterWatch is, we're sort of experts on the water law and sort of state administrative procedures. And we focused on the water and other things. So when we needed expertise, like an ESA (Endangered Species Act) or something like that, we retained Earth Justice. And we worked with Earth Justice, who just incredible group of attorneys…they helped greatly. And then we work with other groups too. We I mean, we all build a coalition of basically local sport fishing groups, commercial fishing interests from the coast, sport fishing industry groups.

GPID had been friendly with anglers in the past, previously they had helped improve the fish ladders and fish passage, but when the coalition began focusing on cutting the water right, the relationship became far more contentious. The coalition of environmental groups and anglers began making a unique argument to cut the water right, arguing that the supplemental water would only seep out of the canals, and would not actually be used in a beneficial way, which made a relatively strong argument for the state of Oregon to cut the water right (Whitworth, 2001). The idea of beneficial use is fairly common in arid Western states, where the doctrine states that no water user can appropriate more than is actually needed for a specific beneficial use, this type of water right is sometimes seen as a better way to allocate scarce water rights than the usual

doctrine of prior allocation (Toll, 2011). This showed a unique aspect of this case, the arguments around the water right gave outside groups a leverage point to push for removal of a privately owned diversion dam, which is not part of the federal licensing process seen in both the Elwha and Klamath dams. The issue of water rights was by far the most prominent theme present in interviews about the Rogue, since it was the primary force that brought about the discussion around removing the dam. It also showed the competing themes of water rights for agriculture and fish, which was another key theme in discussing the Rogue and examining court cases.

While the coalition of environmentalists and anglers were pushing through state bureaucratic paths and in the courts, GPID was still deeply committed to keeping their dam, as was the local community of Grants Pass. There were candlelight vigils held by supporters hoping to keep the dam, as well as grassroots efforts to create groups to rally public support for saving the dam (Brewitt, 2019). A local journalist reflected on this contentious time:

> They (the public) were really involved. In fact, I did a man on the street column. And we asked a question, do you think the dam should be removed and 80%. Okay, I need to back up, I do a Best of Valley publication every year in which is a reader survey, you know, favorite restaurants, favorite teacher..the whole thing. And I had political questions. And the question was, and I don't know, 1994 or 95 or 6, I asked a question, do you think that the dam should be removed? You know, we get three or four hundred responses on that survey? And 80% said, no. Yeah. 80% said no. So the public was involved, I knew all about it. And most of them are not very happy in my opinion.
>
> Interview with local journalist in Grants Pass who covered the case

Many of these groups were locals who benefited from the water, for example homeowners who had built boat docks to take advantage of the lake or businesses that

benefited from tourists, however they had no real legal standing, as they were not actually a part of the irrigation district. They tangentially benefited from the water but did not have legal standing to file suit. There was one particularly aggressive group that formed, called the Association to Save Savage Rapids Dam and Lake (ASS, their chosen acronym). The leader of this group was a well-known local Republican named John DeZell and he was key in filing a multitude of nuisance lawsuits to a wide range of individuals involved in the decision. These suits are typically known as SLAPP (strategic lawsuit against public participation) suits (Canan, 1989; Hurley & Shogren, 1997) and included a huge range of individuals from local activists up to the Secretary of the Interior (Bender, 1997a).

> Oh, I forgot to mention there was there was an attorney running for congress down here. And he filed suit against a lot of agencies and organizations and, and individuals including myself for slandering Savage Rapids dam and…a number of other things too. And of course, that was also dismissed but it was a kind of a crazy suit that that attorney eventually he won didn't get very far in the in this campaign.
>
> Interview with former staff attorney for WaterWatch

The intention of these suits was to try and stop environmentalists from speaking in public against the dams, and as with many SLAPP suits the claims were fairly frivolous, but it was not truly a case trying to win a particular legal victory, instead it was an attempt to bog the activists down in a lengthy, expensive, and draining legal process (Staff, 1994). By resorting to this tactic, it did show the weakness in the political and legal positions of those trying to save the dam, they could use public pressure and attempt to slow the coalition down with court cases, but they had few strong policy procedures to push their agenda. In some respects this shows an interesting reversal from other

environmental fights, more typically the environmental groups are the scrappy upstarts attempting to push back against powerful institutions and corporations, but here the dam savers groups were playing defense. This particularly different from the Elwha and the Klamath.

Q. Decision on Savage Rapids

The Bureau of Reclamation continued their ongoing study in two different directions, one a water conservation study that was completed by outside experts and a fish passage study that was done by BOR. In 1994 they released to the public a draft Environmental Impact Statement (EIS), giving their recommendation to restore fish runs along the Rogue. BOR identified dam removal, with replacement pumps to provide for GPID's irrigation needs, as the preferred alternative. This plan was estimated to cost $10 million, while reworking the dam and creating adequate fish passage would cost $15 million (BOR, 2005). The EIS also recognized that removal would not only increase the fish runs, it would also allow for many other public benefits to having a free-flowing Rogue that made it an attractive proposal and would allow OWRD (Oregon Water Resources Department) to grant GPID the supplemental water rights they had been seeking (Bender, 1997b; Whitworth, 2001). While these finding were broadly accepted among agencies and environmental groups, there was still push-backs on the local level disputing many of the findings. This conflict between the needs of water for fish and agriculture was a common theme throughout the decision around the Savage Rapids Dam, and is likely to be common among other removal decisions where irrigation is key to the local economy. A former lawyer for WaterWatch explained the decision making process around the Savage Rapids Dam:

> I'll first talk about Savage Rapids dam. So what we did is, because of the water right issue, we filed a protest which started a negotiation…We reached an agreement in 1990 to two years to negotiate and that agreement was to have the state issue a four year temporary additional water right permit so the district could continue to operate. But with the obligation on the district to do a water conservation study to see how they could reduce their water use and to study the fish passage alternatives at the dam…Multiple adverse impacts this dam was having on both adult and juvenile fish and the Bureau's planning report…that indicated that…it was reducing this fish escapement at the dam by 22%. Which, whether high or low estimate, the point was, is there (were) multiple problems with the ladders, the screening, the reservoir pool and so on and so forth…it's very expensive to try to fix the ladders, and you are never able to solve all the fish passage problems, even with ladders, ladders, never work fully as well …the Bureau's report showed that it was cheaper to remove the dam, the Savage Rapids Dam and replace it with pumps that could actually, were safer for the district to use…brand new pumps were ultimately actually quite a good deal for the district to get modern infrastructure to replace the old infrastructure and still be made whole and get a guarantee of their water and be out from under liability for harming and endangered fish species and so on and so forth.

This lead to some hard decisions for the GPID board, since they obviously could not foot the bill, either for removal or the more expensive upgrades, they had to seek funding from the federal government for the project. This also lead to a realization that the GPID would have to work with the environmentalist groups to have a successful project. Several of the groups, including WaterWatch were open to helping GPID find funding for the project, but it made an awkward alliance. GPID was faced with dealing with the reality being presented to them, to continue as an irrigation district they needed to protect their water rights, and even if they managed to save the dam they would face a steep uphill of incredibly expensive repairs and upgrades, and without any support they would be pressed to find the funds. Several attempts were made to try and raise the funds from GPID patrons, but when a survey was done only 28% of respondents showed any willingness to pay to save the dam, and while local advocates attempted to raise the funds they were unsuccessful (Gregory, 1993a, 1993b).

Seeing no alternatives, the GPID Board unenthusiastically voted to remove the dam in January 1994 (GPID, 2019). This vote attached conditions, which the board published as an ad in the local newspaper. These included: a permanent water right of 149 cfs, outside funding for pumps, power, and restoration, guarantees of support from environmental groups and agencies, forgiveness of debts from the BOR, and the right to change their decision if local funds for fish passage could be raised (Brewitt, 2019). While plans moved forward and funding was being gathered at the federal level, despite the many assurances this would be cheaper for the community and provide greater benefits, removing the dam still remained an incredibly unpopular idea among the people of Grants Pass.

R. Local Pushback Against Outsiders

As was seen in the Elwha, the deep and complex relationships between environmental advocates and local communities exist throughout the Pacific Northwest and were evident in the case of the Savage Rapids Dam. The conflict over the listing of spotted owls that lead to so much conflict in the Olympic Peninsula also occurred along the Rogue. One of the hotspots of the owl wars was Roseburg, Oregon, which is only an hour's drive north of Grants Pass. Many of the anti-removal advocates first experience with environmental politics was this conflict, and it lead to tension and distrust and the widespread view of outsiders as the enemy (Loomis & Edgington, 2012). The suspicion and dislike that was simmering within the community quickly lead to seeing the salmon as simply a replacement for the owls, and a way for outsiders to force changes on the locals. This conflict is continuing and in some cases escalating throughout the West, for example, in 2016 anti-government protesters took over a wildlife refuge in eastern

Oregon that showed many of these anti-government ideals are weaving into environmental issues as a further escalation of the current culture wars (Inwood & Bonds, 2017). A former staff attorney reflected on how these conflicts have played out in dam removal decisions:

> Dams are kind of symbolic, they represent to many people The Taming of the West, progress and you know, why remove a good dam a lot of people are, don't understand that you know, dams serve a wide variety of functions and some are still doing that and are providing great benefits to society, but many are not and many are also harmful, but a lot of people just are there's some people that again, it's kind of an ideological issue into them they think every dam is providing great benefits.
>
> Interview with former staff attorney for WaterWatch
>
> But it's still dam removal, it's still itself is still one of those sort of ideological issues that in the political arena is still a very, very hot topic. One of our later dam removals, you know, we had the Oathkeepers got involved and they showed up with their, you know, packing their guns and tried to delay the start of decommissioning and one project, you know…
>
> Interviewer: Which dam was that?
>
> That was Fielder Dam and tributary, but that was just a very short you know, one morning blip where they were hoping that you know, they made a little show and then it went away.

The community was also deeply unhappy with the idea of losing their seasonal lake. While the water for irrigation would be replaced by the pumps, there were no plans to save the lake. The community had long enjoyed the recreation created by the lake, but that was not the purpose of the dam and their water rights were dependent on irrigation, which could be replaced by the pumps. While there was a great deal of local push back, including petitions that garnered tens of thousands of signatures, they were met with the difficulty that they had no legal claims to the dam or the water. This lead to a public

campaign to frighten local residents that this was a first step in some vast conspiracy to destroy property rights and force locals to change their way of life (Gregory, 1994). GPID attempted to push back on some of these arguments by pointing out that the water would still flow through the canals, even without the dams, and would keep the area artificially green and lush, although this idea was not well understood by the greater public who feared losing the dam would make the area brown and arid (Brewitt, 2019). All this local conflict lead to an unusually contentious GPID Board election and saw the ousting of those who had voted for removal.

Luckily for those who were fighting to keep the dam, this coincided with the conservative power shift lead by Newt Gingrich, which helped elevate Brady Adams, Republican of Grants Pass to President of the Oregon State Senate. From this new position of power, he attempted to help save the locals from what he saw as excessive government overreach, and attempted to push bills through protecting GPID's water rights and lessening the power of state agencies to make decisions and rule changes (Brewitt, 2019). However, Adams position could only do so much and he quickly ran into issues with Governor John Kitzhaber, who was a staunch environmentalist. Finding themselves at an impasse, the governor and senator created the Savage Rapids Dam task force (Bender, 1997a).

S. Task Force

The task force was appointed in December of 1995 and included a wide coalition of agency staff, citizens of Grants Pass, environmental advocates, anglers, and members of GPID's board. This broad coalition was an attempt to bring together all the stakeholders of the issue, making sure that both pro- and anti-removal voices were

present in an effort to overcome the political and cultural divisions that had sprung up around this issue. The formation of these large and diverse coalitions was a common theme among all three case studies, a diverse alliance, especially one that brings together the advocates as well as the dam owners and operators, helps achieve progress. Dam removal decisions are complex, and often get decided through court decisions or regulatory processes; nonetheless, getting a large group of stakeholders to work together is often key to having a successful removal. This process also requires compromises, where no one group typically gets everything they want, but it can be a way to break a deadlock around removing a dam. This strategy of assembling large coalitions of stakeholders has become more common throughout the West, as expanding population has led to conflicts between traditional industries and environmental protections (Thomas, 2003; Walker, 2006).

While the coalition intended to come to a unified conclusion, there was a great deal of disagreement among members of the coalition about the amount of damage being done to the salmon by the dam, and there were concerns over trapped sediment, even though there was no indication the sediment posed any danger, many in the community had heard about other removals with contaminants in the sediment and used this as an argument against removal (Foley, Bellmore, O'Connor, et al., 2017b; Grant & Lewis, 2015; Palanques et al., 2014). These themes and disagreements are illustrated by the quotes below, from a local journalist and a former staff attorney for WaterWatch:

> They always brought up the fish, even though a study showed that fish runs were better than ever. And they tried to say that that dam was harming them and there was no, there was no data whatsoever that proved that, but he kept harping on that. And that the pumps would do the job just as well.

-Interview with local journalist who covered the removal decision

> But the idea of removing dams for the sake of removing dams is not what it's about. It's about river restoration, fish restoration, and also an acknowledgement that you know, some dams are still providing a lot of societal benefits and they're not really subject to removal. But there are many, many hundreds out there…throughout the Rogue basin we have these small old irrigation diversion dams or diversion dams for mining activities and many of them are abandoned or could be better served by pumping system.

-Interview with former staff attorney for WaterWatch

> I mean, if you want to do restoration that has immediate impacts and long term, permanent benefits, especially when you're on streams with anadromous fish, but even streams that don't have an anadromous fish, because fish move up and down most systems dam removal is just a very, very good way to provide multiple benefits. I mean, dams caused so many different impacts on a system…besides delaying the adults and killing adults coming upstream and affecting juvenile fish, or blocking juvenile fish from getting back up into a…habitat during the warm summers, or flooding spawning areas, or stopping gravel recruitment, or all these things. Well, with a removal you return a river back to natural river processes and you can get the benefits. If you couple some of these removals with riparian restoration and other good things, you can provide some very productive and high quality habitat.

-Interview with former staff attorney for WaterWatch

When the task force released its first report in October of 1996, it was unclear and contained a messy mix of recommendations. They recognized that the dam was an issue for fish, but instead of removal, favored retention with improved fish passage (Task Force, 1996). This recommendation was not agreed on by many, with several agencies signing on only after assurances they would not be bound to the recommendations, and many environmental advocates and anglers disagreed, saying removal was the only option to save the fish. These recommendations were not legally binding, and the governor eventually rejected them. This task force had little impact on changing the deadlock around the dam, and in some cases only inflamed the already contentious debate

around the dam, police were called to one GPID board meeting, and another meeting ended when the audience began throwing chairs (Brewitt, 2019). The political deadlock continued, and the dam continued operating under the status quo.

T. Listing of Salmon on ESA

Something that offered a new leverage point for those looking to remove the Savage Rapids Dam came in 1997 when the Southern Oregon Northern California coho salmon (SONCC) was listed as threatened under the Endangered Species Act (Stout et al., 2012). This was something that agencies had been warning as a possibility for years, and changed how GPID would have to deal with fish passage. It also allowed environmental activists and anglers some additional legal weight to their arguments about how bad the conditions on the Rogue were. Some locals argued this was unnecessary, as many of the coho runs were some of the largest on record, but these were more related to released hatchery fish, rather than the endangered species.

> The first thing is the main driver where people have been looking at these dams or main reason is because of the tremendous adverse impacts they have been having and the potential tremendous benefits you can gain from removal. Now, having said that, the other driving forces you have to have some trigger or leverage, just start a discussion.
>
> -Interview with former staff attorney for WaterWatch

Even with this listing, many anti-removal activists were emboldened by the task force decision, which they mistakenly viewed as a legally binding document. In 1997, GPID reversed themselves and officially voted against dam removal, but the Water Resources Department reminded GPID that they had to show progress toward removal to keep their water right, making the vote fairly inconsequential (Brewitt, 2019). GPID

found little support, and more importantly no funding, both from political allies and their own patrons, so in August the board formally rescinded their July decision. While they had little legal power and few technical or scientific defenses, those trying to save the dam had a deep well of local support, much of it based on conspiracy theories and warnings of vague outside threats that were coming to take away a traditional way of life. This anti-government, anti-regulation ideology is a fairly common theme when looking at dam removal, and other environmental issues, and is becoming increasingly heated throughout the West, especially when considering the changing populations, demographics, and economies of many Western states.

In the next election, GPID's patrons recalled the board chair and elected several staunch supporters of the dam to replace the board members who had voted for removal. This led to a contentious period where under the leadership of Dennis Becklin, GPID tried to make the argument that the non-irrigation aspects of the dam were essential to the way of life in Grants Pass (Buck, 1998). The board attempted to demonstrate it was still doing due diligence in pursuing removal, however in 1998 OWRC denied GPID's water rights, finding that they were not complying with the deal to work at removal, GPID appealed this decision up to the Oregon Court of Appeals (Brewitt, 2019). This fight was further complicated because now endangered coho were traveling up the fish ladders, bringing in a new set of regulations, and while GPID commissioned a study that claimed there was low fish mortality, this study has been widely criticized for shoddy methodology (Long, 1998b). This new federal involvement further angered many of the locals, as they feared government overreach and the perceived threat of their liberties and rights being taken away by the federal government.

This lengthy fight between GPID and both state and federal agencies continued throughout 1998 with anti-removal activists bringing up their unproven fears of sediment and attempts to find funds to improve fish passage to preserve the dam. These conflicts eventually lead to a federal injunction being placed against GPID. The dam was raised for the 1998 irrigation season, even though it was well understood they were likely violating the ESA (Long, 1998a). Irrigation was briefly halted by an injunction and orders from the Ninth Circuit to find a solution for the rest of the season. After all of this, Earthjustice decided it had seen enough and announced its intention to sue GPID over violations in the ESA, they were joined by several other fishing and environmental groups (Brewitt, 2019). This fight was becoming increasingly expensive for GPID, who had to significantly raise the rates on their patrons and still faced a steep budget shortfall. Many patrons began to voice their concerns over possibly losing their water rights and the increasing prices, and while many locals were deeply opposed to removal, they were not willing to pay their own money to keep the dam (Bender, 1997a). By late 1998 facing an angry group of patrons and increased budget issues, the board began to back down from their full-scale attempt to save the dam.

U. A Final Decision

In 1998 all the parties involved in the Savage Rapids case were forced into mediation, rather than letting it play out in the courts. This was somewhat similar to the earlier task force, but the threats to the irrigation district were more significant, and the stakeholders here were deeply involved in the issue, and more committed to making negotiation work to come to a consensus to solve the long-standing issues. There were several months of closed-door negotiations and relative calm, but Becklin decided to take

the opportunity to introduce his own, rather unrealistic, proposal for dam removal. This was likely not made in good faith, but instead to be used to score political points against environmental groups, and a district judge ordered him to comply with the gag order (Duewel, 1999). GPID patrons were also stressed with several pump failures and issues with fish screens, which began to make the dam look like a serious financial liability and further weakened the arguments around keeping the dam. The board presented a plan for dam removal to the patrons in 2000, and it was approved (Brewitt, 2019). One of the final nails in the coffin came in 2000 when one of the turbines broke, leaving patrons without water and with an incredibly expensive replacement bill. The patrons were angry about the costs that had been put into saving the dam.

With agreement between the majority of the stakeholders finally coalescing around removal, federal and state agencies began studying pump designs and funding became available. Senators Smith (R-OR) and Wyden (D-OR) unveiled the Savage Rapids Dam Act of 2000 (G. Smith & Wyden, 2000; G. Smith, Wyden, & Walden, 2005). This bill was marked with public cooperation between GPID, WaterWatch, and Trout Unlimited. While there was still distrust and unease among many in the area, the realization that the dam had to be removed was finally becoming a widespread sentiment.

V. Removal Goes Forward

In July of 2001 saw the board voting to join a consent decree with all the other stakeholders, both a formal and legally binding statement, to approve of dam removal. Several vocal anti-removal board members spoke against this measure, but the rest of the board approved. This deal ensured that their water right would be protected, all litigation would be dropped, and they would no longer be in violation of the ESA (Brewitt, 2019).

August 27, 2001 all the stakeholders, NMFS, OWRD, GPID, BOR, and WaterWatch signed the consent decree, which allowed the stakeholders to present themselves as a unified coalition seeking the best for the irrigation district, the residents of Grants Pass, and the Rogue River. This also gave them a strong position to pursue federal legislation. National environmental and sport fishing groups began to give assistance and funding, and the coalition grew to be a mega-coalition of highly varied groups, all seeking removal of the dam. This is often a key feature in successful removal cases, once a large and robust coalition comes together and begins working toward a common goal, it is more likely to have a successful removal project.

This coalition did run into some issues, especially when members of Congress began fearing this would be a slippery slope to lead to removal of larger dams. According to a former staff attorney for WaterWatch, this is quite often a stumbling block for removal decisions, as some members of Congress will be unwilling to vote for any removal decision that might be seen to threaten dams in their districts:

> So I think we're making some big progress and making it easier to remove more dams. But at the same time, it's still, the politics around dam removal are still very, very intense. And for a lot of people too, it's kind of well, if you remove this dam, it'll put pressure on removing other dams that we don't want removed. Bigger dams.

The support of the entire Oregon delegation helped to push the legislation forward, but funding was difficult to find. Eventually Senators Wyden and Smith removed the words dam removal from the legislation, and instead framed it as protecting irrigation water for farmers and restoring the Rogue River, to appeal to both conservatives and liberals (Duewel, 2002). The legislation passed in 2003 as part of an

Energy and Water Development bill (Energy and Water Appropriations, 2003). The last hurdle was to find the funds. Funding came in bit by bit throughout the early 2000s, but the majority of it came in 2006 when GPID received $13 million, followed by another $15 million the next year (GPID, 2019). The last of the funding came through in the American Recovery and Reinvestment Act of 2009, which also included funding to remove another Rogue River dam, Gold Ray (Brewitt, 2019).

The summer of 2008 was the last Savage Rapids Lake would exist, and for many of the local residents it was filled with nostalgia and some remaining anger about the upcoming removal. The dam was removed on October 9, 2009 in a fairly standard deconstruction project. Two days post removal, a flotilla of removal advocates came down the newly freed river. Salmon quickly returned to the river, and the runs seem to be doing well with abundant and healthy returns (Learn, 2010). There have been some issues, sediment has been slow to redistribute and there have been some issues with the pumps, including paying for the electricity to run them. This issue about needing to pay for power has become a common problem brought up by those opposed to removal, and in an ironic twist they often frame it around issues of climate change, as illustrated by a journalist who covered the case:

> They've got those pumps now that use so much megawatts of energy, whereas in before when they had the dam they were producing, they were producing electricity. And now they're consuming it. So that's great. That's great for global warming. And yeah, they had they had something that just was gravity fed and then produced electricity. And they had, they had a plan to fix the dam. So we're not harming the fish. The fish would be able to get through and cheaper plan to do it than what those pumps costs. And now they'll produce I don't know how many megawatts of electricity you have to use to keep those pumps going.

While there are some issues, the catastrophic ideas projected by many anti-removal activists have not come to pass. Water continues to flow through the canals, irrigators have their water each summer, while the Rogue now flows free and presents no impediments for fish. The relative success of this project has given WaterWatch a good relationship with the community and has allowed for the removal of several other dams along the Rogue, as a former staff attorney for WaterWatch explained:

> I think what we're finding out from the fact that now we've there been many dam removals successfully completed across the country and including here, the science on one how to do dam removals, how to manage sediment, the quick recovery we're finding in river systems, and the benefits that can accrue and the in the fact…we've got a country with thousands and thousands of dams and many of them are very old. There's aging infrastructure. Some of the dams are abandoned, some of them are safety hazard. Some of the functions of these dams can be better served and other means. So there's a lot of things coming together. So I think at least within the, it's not such a new thing anymore, and we know more, a lot more about it and we know it can be done safely and that it can create that the short term impacts are well outweighed by the long term benefits from these removals, at least in terms of achieving benefits for healthy rivers and fish populations and things like that, and recreation and so on.

W. Conclusions

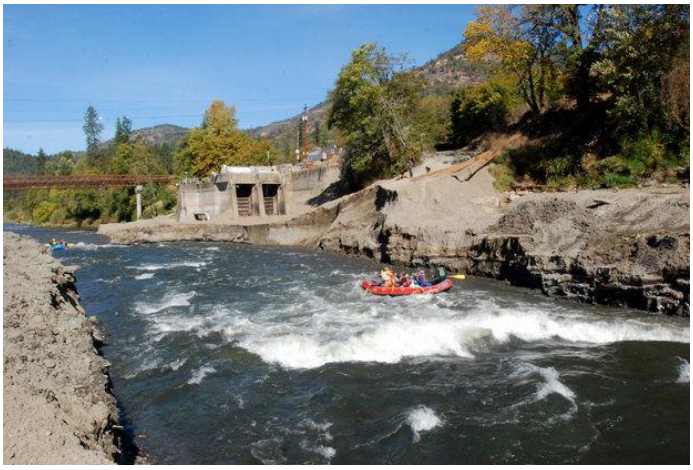
The Savage Rapids Dam was a complex case, showing the interplay between a privately owned dam and water rights that regulate a public good. It was a case that showed the necessity of specific leverage points to attempt to change the status quo, in this case GPID's shaky water claims, and the listing of the coho under the ESA. Both of these allowed coalitions to force change and challenge preconceived notions and ideas. This case also showed how the public can be deeply involved, and how these decisions can quickly go beyond simple policy and environmental issues and become part of the larger culture and political struggles in society. Dam removal is likely going to continue

to be contentious going forward, but the Rogue showed how quickly an ecosystem can come back when the impediments are removed. Water rights are a major issue for most dam removal, but it was especially key on the Rogue. The initial leverage point that allowed the dam removal discussion to begin was GPID's water right claim. This set up a somewhat familiar fight between the needs of agriculture for water and the needs of a free flowing river for fish. This was a constant source of conflict throughout the discussion around the Savage Rapids Dam, but it was further complicated by fears over a changing West.

Figure 7: Images of the dammed river and post-removal

WaterWorks

The Savage Rapids Dam, raised for the summer irrigating season, prior to removal.

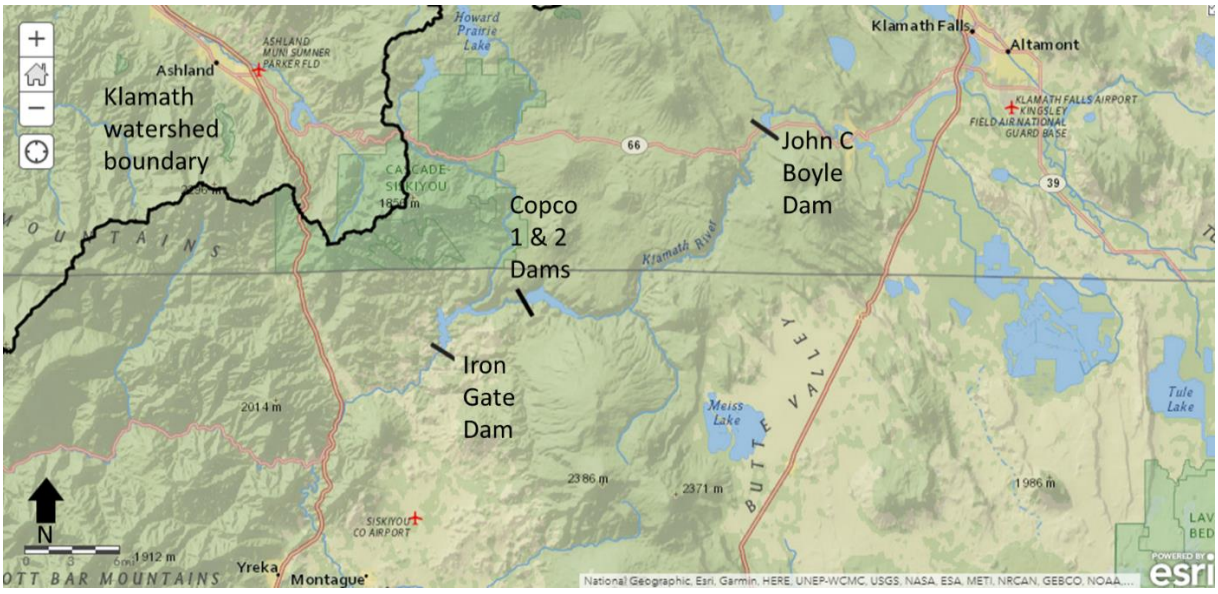


Associated Press

Boaters float past the former dam site after removal was completed.

Klamath River

Figure 9: Map of dams on the Klamath River



The tribes around the Klamath River have long been advocating for the removal of several dams in the river. However, in the late 1990s and early 2000s there were several crises that showed the deep issues on the river and gave advocates ammunition in their arguments for removal. At the root of many of the issues on the Klamath is entrenched in its odd combination of an irrigated economy in the driest section of the watershed and a large commercial and recreational fishing economy in the wettest section of the watershed (Doremus & Tarlock, 2008). These two industries have vastly different needs for water management and allocation and lead to many of the conflicts on the river. Throughout interviews completed for the Klamath case, these themes were consistently mentioned as key concerns, from all sides involved in the decision. Water rights, economic impacts, concerns over fish runs, tribal concerns, agricultural concerns, the

need for power, and worries over infrastructure were consistently the key points of contention and concern.

X. Water Rights, Irrigators, and Fish

The Klamath Project is a water-management project under the Bureau of Reclamation. It supplies water to farmers, but also to several wildlife refuges in the basin. Through a system of dams and canals, the Project supplies irrigators with water and the power produced by the hydroelectric dams. This project has benefitted the farmers who got both water and power incredibly inexpensively, an agreement signed in 1917 set the irrigators rate at 0.6 cents per kilowatt hour, this rate was not increased until 2004 (Doremus & Tarlock, 2008, Interview 8). In 2004 PacifiCorp, the company that now owns and operates the dams, sought to end this subsidy, and increase the rates to be on par with what other consumers were paying. This rate increase did eventually happen, but was wildly unpopular in the basin. While the concerns about losing hydropower capabilities is common in many dam removal decision, in the Klamath it was an added point of contention due to the changing subsidies and the uncertainty about how removing the dams may affect the status quo of the people who have relied on this relatively cheap power source for generations. This was explained by an employee of the Pacific Coast Federation and Fisherman Association, one of the groups pushing for removal:

> But in any event, so things were changing in the Upper Basin. The other thing is this. Remember that the irrigators have to pump water from place to place. And they had for more than…almost 100 years. They had a low subsidized very, very low power rate for irrigation water. Their power rate was set in 1917 at a fraction of a penny per kilowatt hour…So they were frozen in time and their rates were grandfathered in license renewal in (19)57. So that right up to 2006 they had 1917 power rates, a fraction of a penny, when the standard rate was about seven cents a

> kilowatt. So they had a super deal, virtually free water…They had a tremendous unfair advantage competing with their neighbors who are not on the project that went away in 2006 when the license expired, their subsidy disappeared. A huge shock to them…Under modern law, those kinds of discriminatory power rates are illegal. But they were grandfathered in from 1917. So all these things changed right underneath the farmers then, so I sort of feel sorry for these guys, but they were living in a fool's paradise to all along. Highly subsidized federally subsidized fool's paradise.

The demand for water for irrigation in the upper portion of the Klamath basin has had negative impacts on the rich salmon and steelhead fisheries of the lower Klamath. When the Copco Dam was constructed in 1918, there were initially plans to add a fish ladder, but the company refused to build more than one. This would likely be an ineffective solution given the dam's height of 132 feet, and the lack of screens to protect outgoing young fish from the turbines. A hatchery was built instead, but even with this salmon and steelhead populations declined after the dam became operational (Doremus & Tarlock, 2008; Hamilton, Curtis, Snedaker, & White, 2005). The construction of the Iron Gate Dam downstream of Copco Dams 1 and 2 in 1964 created another barrier to fish passage, as it was also constructed without fish ladders but did include another hatchery.

Y. Tribal Treaty Rights

The indigenous tribes of the area, the Klamath, Yurok, Kuruk, and Hoopa have fought many legal battles to protect their rights to fish the river, as well as their claims to water rights. The claims of the Klamath Tribe have been complicated, as they are a tribe with no reservation due to the Klamath Termination Act, passed in 1954, which essentially dissolved the tribe and split the tribal land up among the members of the tribe. This was disastrous for the tribe, and while they were restored to tribal status after decades of work with the passage of the Klamath Restoration Act of 1986, this only

restored their status, not the land or reservation (Haynal, 2000; Ulrich, 2010). While termination ended the federal relationship between the U.S. government and the Klamath Tribes, their treaty rights to water and fishing were protected, and the courts have upheld the tribe's claim to the senior water rights in the basin, with a key decision in *United States v Adair* (Sudbury, 2004; *United States v. Adair, 187 F. Supp. 2d 1273 (D. Or. 2002)*, 1983). In the lower basin, the Yurok and Hoopa both have federal treaties that recognize their rights to fish and water to support a healthy fishery, and while the Karuk do not have any explicitly protected treaty rights, they are fighting to be similarly recognized as the other tribes in the basin are, but the lack of a ratified treaty makes their legal claims more difficult to prove.

The Yurok and Hoopa fishing rights were explicitly recognized when, in 1993 the Secretary of the Interior got agreement from the Secretary of Commerce that the two tribes were entitled to 50% of the fish harvest (Solicitor, 1993). This was then challenged in court by commercial fisherman, who argued that the tribes could not claim these rights. This was decided when the Ninth Circuit issued a sharp order in *Parravano v. Babbitt* stating that it did not matter if the water and fishing rights were derived from treaties or executive orders, they are legitimate rights held by the tribe (*Parravano v. Babbitt, 861 F. Supp. 914 (N.D. Cal. 1994)*, 1995). Due to prior rulings, the tribes and many legal scholars believe the claims should carry the priority date of rights held since time immemorial, although this is heavily contested by irrigators. While all of these rights have been upheld in the courts, using them to affect the water flow and fish passage on the Klamath has been a difficult and complex process. These tribal treaty rights and the demand of agriculture were another theme that was common when interviewing those

involved in this decision. There is a great deal of conflict between the demands of farmers, who have been accustomed to plentiful water, and the tribes who are attempting to enforce their treaty rights to protect salmon runs. The quotes below illustrate the disagreement over who has claims to the water rights on the Klamath:

> Many attorneys and the common knowledge is that this isn't even a legal thing because in Oregon water law, they don't allow what's called a subordinating water right. Which means you can't split it up. And you have first in time first and right. So what this did was it allowed the tribe to make a call on the upper basin water, which to many have 1864 water rights and not make a call on the 1905 project water rights, that's against Oregon water laws.
>
> Interview with farmer/rancher anti-dam removal activist from the upper basin

> But the interesting thing is this, this is a bit of a side issue, but the Klamath tribes never ceded their fishing rights they kept that and when they were reinstated, those fishing rights were enforceable in court as the law of the land because there were federal treaties. Those fishing rights imply water rights. And so they had the senior water right now, per federal court order. Federal law and as a matter of state laws, people, water rights are primarily a state law issue now senior water right was adjudicated and after 46 years, a few years ago, decided, indeed that they determined in doing that they do have the senior water rights. So they're a holder of the senior water rights they essentially own all the water and the upper basin. Interesting, and that's a big fight because the irrigation system is right below that. And the irrigation is a federal project and the federal contracts and water rights impinge on the state water rights and tribal water rights. It's a big fight that has to do with water.
>
> Interview with employee of Pacific Coast Federation and Fisherman Association, pro-removal

All of these battles over water quality and fishing rights came to a head in the 1990s and early 2000s. The Endangered Species Act first came into play in the basin with the 1988 listing of the Lost River sucker and shortnose sucker, which went by relatively unnoticed by the public. However, water management had been increasing complex and adversarial with the 1997 listing of the Southern Oregon-Northern California coho salmon and the designation all accessible river reaches in the range of the coho to be

critical habitat (Doremus & Tarlock, 2008). This included the Klamath main stem up to where it is blocked by the Iron Gate Dam. This listing had led to several complications, one being that since the ESA prohibits taking any listed species, fish runs can be shut down to commercial finishing anytime a listed coho may be present. Even if there are abundant other runs, this sometimes prohibits fish from being harvested due to the poor strength of the Klamath runs, as was explained by an employee of a commercial union representing fishermen.

> The runs from the runs in Sacramento were among the record to record top runs, but we couldn't catch them. And we were closed, all the way down to Monterey, where we had one Klamath fish per 50 to 60. Others all the way up to the Oregon-Washington border where we had about 1 fish per 70. Because we were in a zero high risk regime, whenever there was any possibility of incidental catch of the wrong fish and the weak stock, we were closed.

This has led to cooperation among the tribes and the commercial fisher, even when they were on opposing sides in the *Parravano v. Babbitt* case to come together to work on strengthening the runs on the Klamath and supporting dam removal as a possible solution. This listing also had impacts on the Klamath Project, while federal irrigation projects are under contract to deliver water, the courts have upheld that it is still subject to consult with ESA requirements which has been applied to both fish and migratory birds in the upper basin lakes (Wilson, 2002). This shows how many of the prominent themes in the interview intersect with one another, and sometimes compete with one another. The cooperation between tribes and commercial fishers shows concerns over fish, and while both groups have an economic reason to want to protect the runs, for the tribes there are additional motivations. The tribes, fishers, and farmers are all concerned

over water rights, but often for competing reasons, which leads to the complexity of the debate.

Z. Trouble in 2000

After several above-average water years that did not stress the water allocation on the river, with an exceptionally dry year in 2000 all those plans fell apart. There were serious disagreements among officials at the Bureau of Reclamation, trying to balance the needed fill in the reservoirs for the suckers, the minimum flows required downstream for the salmon, and the demands of the irrigators. The Bureau completed a draft biological assessment in November, long after the plan had gone into effect with the final assessment not complete until January 2001. This lead to litigation of violating the ESA in *Pacific Coast Federation of Fishermen's Associations v. U.S. Bureau of Reclamation*, citing the Bureau for violating section 7 of the ESA, by not ensuring their plan would not jeopardize listed fish or harm critical habitat (Doremus & Tarlock, 2008).

An exceptionally dry winter of 2000-2001 pushed the already strained water allotments to a breaking point. On recommendations from wildlife agencies, water allotments for irrigation were severely limited in some cases and completely denied in others. Water was delivered to the wildlife refuges to support the sucker species and to maintain flows for the salmon but no water was allotted from Upper Klamath Lake for irrigation, farmers and local officials appealed the decision, at the director of Vice President Dick Cheney 70,000 acre-feet of water were released to some farmers, but the majority within the Project were allotted no water (Clarren, 2001). Irrigators went to court, but while the court recognize the economic harm this would cause them, the damage done to the listed ESA species was seen to be more severe, and the water rights

of the tribes were superior to the irrigators. The closing of the Klamath Project headgates immediately fanned the flames of controversy, with the plight of the irrigators finding a great deal of sympathy throughout the West, becoming another front in the culture wars that encompass so many environmental issues (Clarren, 2001). The farmers set up a so-called “bucket brigade” to pass water into the canals, as well as setting up irrigation lines that bypassed the headgate in symbolic protests (Staff, 2001).

The fall of 2002 brought another challenge to the basin. Initially, winter rains were heavy and water rose in the reservoirs, making many believe that water would be abundant this year. The headgates were opened in March, with the Interior Secretary Gale Norton claiming there was plenty of water for fish and farms (Interior, 2002). However, by the end of April it was becoming obvious that there was not enough water to supply all the requests. Irrigation deliveries had not reached the maximum, but already the water below the Iron Gate Dam was so low, biologists were having to rescue juvenile salmon from puddles. Where the previous year the farms had lost out to the fish, this time the fish paid the price. The irrigators were provided with water and the flows below the Iron Gate Dam were reduced in the midst of the fall chinook run (Doremus & Tarlock, 2003). This species is unlisted, but the effects on the fish were catastrophic, a massive die-off occurred where more than 30,000 salmon died in the lower Klamath in September of 2002 (Levy, 2003). The fish were killed by crowding into the warm, shallow water and the spread of two common parasites (Belchik, Hillemeier, & Pierce, 2004). This infuriated fishers, tribal members, and environmentalists who gathered some of the dead fish and sent them to the Interior Department’s headquarters.

All this started coming back in 2001, in 2001 the water crisis hits the upper basin; they lost a third. Not all they would like to portray it, but they lost a third of their annual allocation. The trouble is their whole system was geared on a full allocation. So they had to fallow lands, lands went idle. They had to scramble for water, it was a big mess. 2002 the Bush administration came in vowing to help the farmers out. So they forced the water to be open that year, even though the scientists and their own agency was saying it was a bad idea, and it would kill fish. And indeed, it did kill fish. We had the worst we had the worst fish kill adult fish kill in the whole history of the basin, possibly the whole history of the United States. And some 70,000 spawners as they were headed up to a lay their eggs died in a river of poor water quality caused by too little water in the river. And disease was rampant and epidemic throughout the population. And they were fish covering the sides of the river all the way up from the mouth all the way up to the dams. It was a mess. I was down there and the whole place stank like dead fish thousands and thousands of dead fish everywhere.

> Interview with employee of the Pacific Coast Federation and Fisherman's Association

Figure 10: Image of fish kill of 2002

JOE CAVARETTA / AP PHOTO

This fish kill continued to ripple impacts throughout the salmon fishing industry in the following years. Nearly an entire generation was lost before they could

successfully spawn, so in 2005 and 2006 when the fish born in the fall of 2001 and the survivors of the 2002 fish kill returned, the runs were so weak it forced shutdowns up and down the coast, even when other runs were some of the strongest on record. This lead to a disaster declaration from the government and support for the struggling fishing industry (Wyden, 2007). These constant crisis situations led to discussions about how to fix the larger problems throughout the watershed. These issues were obvious in the interviews, where the concerns over water rights were clearly connected with economic concerns, although the solutions to those problems was often dependent on who was being interviewed, farmers would argue the water was necessary for the crops, while tribal members, environmental activists, and fishers would argue that it was more important to protect the salmon runs. Eventually, after years of attempting to patch together a solution, there was a consensus throughout the watershed that there needed to be some sort of agreement formed.

AA. Coalition Forms

Talks began in 2005 to try and craft an agreement that would create a legal structure around water rights and use of the Klamath River. This was a large group that included all involved stakeholders, the tribes, the counties, private individuals, companies, the states of California and Oregon, irrigation districts, and environmental groups. The formation of this coalition coincided with another important regulatory process that had serious implications for the Klamath. The Iron Gate Dam, the lowest dam on the river and the largest barrier to fish passage, was licensed in 1956, the initial 50-year license officially expired March 2006, but has been extended on a one-year basis

while the FERC proceedings occur (Spain, 2007). This has given activists and tribal interests a tool to pursue removing the four dams on the Klamath River.

The array of stakeholders involved in the negotiations was mammoth and complex. It included the states of Oregon and California, several counties in both states, the Klamath and Yurok Tribes, seven non-governmental organizations that included environmental organizations like California Trout and Trout Unlimited, and private individuals and companies. Any time an agreement is trying to be reached by such a large and multifaceted coalition, it takes time to come to an accord. By 2009 a draft had been assembled that proposed solutions for restoring fish runs and habitat, while also protecting the water and power needs of irrigators, local communities, and wildlife refuges in a sustainable manner (USFW, 2009). This agreement stated that dam removal was necessary for the restoration, and the company who owned the dams, PacifiCorp agreed with this. Several different companies had owned the dams over the years, and initially had not been in favor of removal. Activists staged several protests to push the company toward removal, by showing up at shareholder meetings to show the impact of the fish run declines on the tribes, as well as pointing out the economic problems this could cause the company, this process was explained in several interviews by individuals involved in the protests:

> The dam owner PacifiCorp was owned by a Scottish multinational energy company so 30 of us went to Scotland three years in a row and crashed the shareholders meeting. They sold PacifiCorp to Warren Buffett's Berkshire Energy so we into Omaha, Nebraska and crashed their shareholders meeting three years running, and it took a lot of grassroots organization and strategy and a lot of volunteers. So I would say thousands of people have participated in protest demonstrations and written letters Just for Klamath dam removal.
>
> Interview with natural resources advisor for the Kuruk Tribe

> We sent two trips to Scottish Power… Scottish power was considered the greenest company in Europe in terms of power, electrical that they really had a reputation for being a really green environmentally conscious company. It was a shock to the investment community in Europe when we lead a coalition of tribal people and commercial, recreational fishing and farmers to their shareholders meeting and picketed them. The tribes in full regalia with the drums and the dancing, ourselves and farmers, there was our little implementation, and hats and stickers and banners….Keep in mind this Scots are well familiar with, with economic and cultural genocide they suffered at the hands of the English for a long time. The Scots were really sympathetic to the Indians because there was cultural and economic genocide. The Indians you understand the Indians in the lower basin were…their salmon, which they live on, that's the main source of their livelihoods were gone more and more every year and 60 to 80% of the reservation has no electrical power, so they get absolutely no benefit for the loss of their salmon…the Scottish Parliament actually passed a resolution condemning Scottish Power for owning dams had no fish passage for salmon."
>
> Interview with member of the Pacific Coast Federation and Fisherman's Association

The agreement became known as the Klamath Basin Restoration Agreement (KBRA) and was officially signed on February 19, 2010 with a deadline for the U.S. Congress to pass legislation to implement the KBRA by January 1, 2016. The process of bringing this coalition together is explained by an employee of the Pacific Coast Federation and Fisherman's Association:

> And we started collecting people together for the first time, all across the basin up and down. tribal, farmers, fisherman, NGOs, local folk, City, County, everybody was there to talk about how we can solve these problems…(eventually reaching) two agreements. One was the Klamath Basin Restoration Agreement, KBRA, that dealt primarily with the water and river restoration, a 50 year aggressive river and habitat restoration program. It was tied to dam removal because, again, dam removal was a condition precedent to be doing anything in the river that made any sense. And the Shepherd agreement became the KHSA, Klamath Hydro Power Settlement Agreement. And the idea was to get those approved by Congress and funded through Congress. And that was attractive to the company.

While this agreement had broad support from many of the stakeholders, it was deeply unpopular among many of the residents of the Upper Basin. While many in the

Upper Basin would like there to be salmon in the river, dam removal is an intensely unpopular idea, especially given the deep conservative, rural identity that is a part of the watershed. To many in the area, dams are seen as a powerful tool we used to tame the West, and they have been integral to the lives and livelihoods that families have built over generations in the area. Many deeply resent those they see as outsiders wanting to come in and take away their dams. This is illustrated by the quotes below, one from a farmer and rancher in the upper basin, who is deeply opposed to removal and another from an employee at PacifiCorp:

> So far to date, the citizens of Klamath County and the citizens of Siskiyou County where all four these dams are located are adamantly against dam removal. There is no way you can get around that. Siskiyou County had, I think it was…I think the number on that ballot they had 80% of their citizens voted against dam removal. I put an advisory ballot measure on the ballot when I was in Commissioner seat. And we had the same results, but it was 73%, if I remember correctly, said no the dam removal.
>
> I was asked by Senator Wyden and I, later on as a commissioner in 2013 to testify in the committee hearing on the Senate side, Wyden and McClintock are pretty much on opposite sides say 90% of the issues back in Washington. And at that hearing and after the hearing, I met with Senator Wyden and his staff and quite a few other folks there and I literally begged him to, because he was trying to put together a water settlement outside of KBRA, and I begged him to not put dam removal in there because that would kill it, no matter what they put in. And that's exactly what happened. It killed that deal that's called the Upper Basin Agreement. And I didn't really agree with the Upper Basin Agreement either it was better than the KBRA by far, but it didn't go far enough.
>
> Interview with farmer/rancher from the area who is opposed to removal
>
> And so…just, it's a symbol. So, you know, in the in the conservative areas….dam removal is just another is just another instance where the state governments in Sacramento and Salem, in Washington, DC are, you know, teaming up with environmentalists and tribes to, you know, give another blow to their way of life is kind of how they see it.
>
> Interview with employee of PacifiCorp

The KBRA required approval from Congress, but they failed to pass the legislation by the time required in the agreement. Politics began to play a large role in the

fight over this issue, as dam removal became another proxy war in our polarized political scene, as was illustrated by an employee of the Pacific Coast Federation and Fisherman's Association:

> We structured it so that there was no federal money in the end for dam removal. And although we were going to the Fed to try to short circuit the very long, tedious FERC process…we wanted to short circuit that and get just signed on by the Feds…The problem is that the whole political dynamic in the country changed the tea party revolt came in the house switched to Republican dominated by the Tea Party people. They were not prone…they don't like government. And the idea is that government coming in and approving dam removal when dam removal is itself not popular in those counties that is dominated by conservative Tea Party types. It was a big problem. And so we couldn't get it through Congress…they were playing to that crowd so they were opposing dam removal, even though there is no viable option to keep the dams, even though keeping the dams would cost…far more than removing them.

Since the deadline had passed without approval, the involved parties renegotiated the deal which became known as the Klamath Hydroelectric Settlement Agreement (KHSA). This agreement is avoiding dealing with Congress, instead using the FERC relicensing process. The KHSA calls for the transfer of the dam's licenses from PacifiCorp to the Klamath River Renewal Corporation (KRRC). KRRC is a non-profit organization created by the KHSA, to remove liability from PacifiCorp for the dam removal process. The settlement was agreed to by the stakeholders in 2016, but is caught up in the FERC process. Initially the Obama Administration supported the agreement, but the Trump Administration has been much less enthusiastic (Arthur, 2019). This back and forth nature of the decision and current uncertainty is explained by an employee of PacifiCorp:

> I think that's the main point. It's just some people kind of assume this is all done. So…I often have to relay…there's some uncertainty there. I mean, the administration changed. Well, that was new FERC commissioners. So we, you know, we don't know which way it's going to go…I guess that would be my only

> kind of caution is to not, not assume that it's very much still in in the process. And I'm sure…the other people you will talk to, you know, probably like the KRRC, he talks more as if this is this is done.
>
> So there's two components of it. They, the first thing they have to do is approve transferring the license from PacifiCorp to the KRRC, but then they would still have to approve the KRRC is planning to remove the dams. So there's, there's two steps, and neither one of them's happened.
>
> Interviewer: So if they say no on both is it just you to go back and make a new agreement?
>
> Well, that that would be the hope is…the company would certainly prefer to have a settlement that…our preference would be to go tweak the settlement, to try to get it over the finish line. But…the other party's that would be up to them…who knows, the tribes may say, you know, what, we've waited long enough, we're done. We're going to just show up at your door and, you know, demand you do it. So it could become a protracted battle again…if that kind of thing happened.

And this is where the Klamath dams issue is. The stakeholders directly involved in the decision have agreed to this plan, but it is awaiting approval from FERC. While people I spoke to at KRRC were hopeful that approval would be coming soon, and dam removal would be able to begin in 2022. However, others were more cautious that it is not a foregone conclusion that it will proceed. While the dams do remain highly controversial, especially in the Upper Basin, some in the process are beginning to see a slight lessening of the opposition. But there are still many who fiercely object to the removal, but their legal ability to hold up the process may not be significant. This deep divide over the future of the dams on the Klamath are illustrated by a staffer for Rep. Jared Huffman, who represents a district in the Lower Basin, and a farmer/rancher activist from the Upper Basin:

> Well, it certainly was controversial…especially up in the in the Upper Basin, kind of as things move toward that…the dams are private assets…the PacifiCorp can decide to decommission them if it wants, and I think that was a hard pill for a lot

> of people in the Upper Basin to swallow. But it's…it's reality. And that's, what's allowed under the Federal Power Act. So I think, in fact…much of the controversy is kind of past us. Not that there isn't still people who want to see the dams remain, and all that. But I mean…you're not seeing the same level of controversy, as you were…6,7,8,9 years ago, when…that was really, that was the plan and when the agreements were signed, so I think most of its behind us, not that all of it is but the most of its behind us in terms of the controversy.
>
> Congressional staffer for Jared Huffman

> I think it'll stay very controversial. Because especially the way it's been done, it's been done behind closed doors. People, the citizens were not represented well. We had a county commissioner here before I was in office that was supposedly representing the citizens in Klamath County. All three of the current, at that time, all three of the county commissioners that supported this were voted out, all three. And it was mainly because of dam removal and the KBRA.
>
> Farmer/rancher from the Upper Basin, anti-removal activist

BB. Conclusions

The decision on the Klamath shows how complex and multi-layered dam removal decisions can be. This is a complex watershed, with many competing interests and demands on a stressed watershed. The prominent themes throughout the interviews revolved around water rights, and how those affected the other industries and related economic concerns. Due to the competing water rights, many of the decisions have been dragged through court cases, and when agreements have been crafted they have been derailed by competing political concerns. There is a deep social divide in the basin, evident in the interviews, whereby people are working off almost completely opposite concerns, and sometimes even opposing facts. The fights over water rights and allocations were further compounded with worries over an aging infrastructure and possible loss of, relatively, cheap hydropower. For many years, residents of the upper basin were fortunate to have a cheap source of power, however they were not the ones dealing with some of the downsides of the dams. The tribal members of the lower basin

did not benefit from the hydropower produced while dealing with the disruption to their traditional ways of life that the dams caused. All of these competing concerns over water, economic security, hydropower, and fish were prominent throughout interviews and show why this issue has been so contentious and complex.

Figure 11: Image of the Iron Gate Dam

Image of the Iron Gate Dam, which is the closest dam to the mouth of the river. It and three other dams upriver are being considered for removal.

Gillian Flaccus Associated Press

VI. Discussion

By examining these three case studies, we can see that each dam removal case is a complex mix of environmental, social, political, and economic issues. While each case has its own unique characteristics, there are some themes and ideas that are commonly found throughout these cases which are useful to try and understand dam removal decisions more broadly. This section will seek to compare and contrast these cases to see what topics were shared among them and how that impacted each decision. It is also useful to consider these ideas and how they may come up in future dam removal decisions.

This thesis evaluates what had more of an impact on removal decisions: the specific policy differences or the strength of the coalitions that formed around the process. In looking at this question, several theories are useful to examine and analyze these case studies, including social movement theory, advocacy coalition framework, and environmental justice. These theories are useful to examine how movements form around environmental issues and dam removal decisions specifically, as well as how coalitions can function to force change in policy and in a bureaucratic structure.

When examining the Elwha, it quickly became evident that a strong coalition had formed between environmental groups and the Lower Elwha Klallam Tribe. This was important and became the base of the expanding coalition. The FERC relicensing of the dam allowed this coalition to begin attempting to push for removal in a serious and sustained way. By being committed to the same goal, it allowed the coalition to function as a united front and affect real policy change within the system. While this was a lengthy

process, spanning over two decades, in the end the coalition was able to reach their goal, with both dams being removed and the river fully restored.

In the case of the Rogue, another strong coalition formed but this time the core groups were environmental groups and anglers. The Rogue has long been known for strong salmon runs, however these were threatened by numerous dams being constructed on the river. The Savage Rapids Dam was well-known as a threat to fish, which was why the coalition targeted it for removal. The coalition was able to bring removal into serious consideration because they were able to challenge Grants Pass Irrigation District's water right. While the area had been heavily based in agriculture when the water right was first granted, the demographics had shifted, with far fewer households relying on irrigation. In this case a coalition heavily based on the local residents also formed to try and save the dam. Both these coalitions worked to push the policy decisions toward their goal. After decades of conflict, the environmentalist and anglers eventually succeeded in removing the dam, and the irrigation district preserved their water right.

The decision along the Klamath shows a sharp political divide between the lower and upper basin. At the root of this problem is the conflict between the anglers who rely on the salmon and steelhead runs in the lower basin, and the farmers who rely on irrigation in the upper basin. There is a large coalition that has come together, with the core groups being the Yurok and Kuruk Tribes and commercial and recreational anglers. This coalition has expanded and come to several formal agreements around removal, making sure that the interests of everyone are protected. However, it has run into issues getting approval at a federal level. There is broad agreement, including from the dam

owners, that removal is the best option, but it is still highly contentious and on uncertain footing.

CC. Leverage Points

Each of these three removal decisions had their own unique characteristics and problems. Comparing and contrasting how the policy decisions were made, what paths were taken, and how coalitions formed around the issue, it gives light to the broader context of dam removal decisions. Dam removal has become a powerful tool for river restoration, but it also comes along with many complicated issues (Foley, Bellmore, O'Connor, et al., 2017a; Ryan Bellmore et al., 2017). Each one of these cases relied on advocates finding leverage points where they could force the system to change, rather than simply continuing to operate as they had for decades. In the cases of the Klamath and Elwha, the FERC relicensing process was key. Both these rivers contained dams that were federally licensed, and when those licenses were up for renewal it allowed a closer look at the environmental damage that was created by the dams (Doremus & Tarlock, 2003; Hammersley et al., 2018; Mauer, 2020). This process also allowed the indigenous tribes of the area to bring legal challenges associated with their treaties with the federal government (Guarino, 2013; Saulters, 2014b). There was no strong tribal advocates present on the Rogue River in Oregon, nor was the dam a federal licensed property, so the FERC process was not involved in this decision. However, advocates, which included a strong coalition of environmental groups and anglers, were able to find a leverage point around the water right granted to the Grants Pass Irrigation District from the state of Oregon (Mcdermott, 2016).

Finding a leverage point was key in discussions around all three removals. Systems, especially highly bureaucratic policy agencies, typically do not want to challenge the status quo (Meadows, 2008; Roxas, Rivera, & Gutierrez, 2019). These leverage points are places that allowed outside activist groups to have a voice in the decision, and the ability to push changes in policy. These interventions were key in the removal decisions in all three cases. In the Elwha and Klamath the relicensing process under FERC presented a leverage point for interested groups; in the case of the Klamath this process is still ongoing. In the Rogue case, the leverage point was an outdated water right that activists could challenge based on the changing demographics of the area. All three cases illustrate how complex a dam removal decision is, often involving huge numbers of stakeholders with high varied objectives and desires. There is also the added complexity of the layers of bureaucratic and administrative jurisdictions that are involved. All three of these decisions involved local, state, federal, and tribal governmental organizations. They all ended up being challenged in both state and federal courts, and all required some form of federal legislation. This is likely why most dam removal decisions take decades to move from initial inquiries into removal to actually removing the structures. It's somewhat ironic that the social and policy side of the argument can take decades to resolve, when studies have shown that restoration of the rivers when the dams are removed is actually incredibly swift (Grabowski, Denton, Rozance, Matsler, & Kidd, 2017; Ritchie et al., 2018).

DD. Common Themes

When looking at these three comparative case studies, there were certain themes that were more prevalent throughout the interviews. Unsurprisingly, every interviewee

brought up concerns over fish and power. Especially in the Pacific Northwest with our numerous anadromous fish species and our reliance on hydropower, these are likely always going to be concerns for any dam removal decision. The decisions often come down to balancing the risks and rewards of removing the dams. With the Elwha, the power produced was quite low and could easily be replaced and the reward of restoring a pristine watershed helped push removal as a preferred option. The Savage Rapids Dam on the Rogue River was primarily used for irrigation, it only produced enough power to run the pumps, but replacing that power was a concern for people who did not want the dam removed. However, the dam was also known to be one of the most dangerous dams for salmon on the Rogue. This reputation as the "salmon-killer of the Rogue" helped to make removal a better option, especially when considering the cost of improving fish passage (Bender, 1997b; Brewitt, 2019). The dams on the Klamath River are a mix of power producing and irrigating, which is further complicating that process. The Klamath also has a species of salmon listed under the Endangered Species Act, which adds to the legal argument for removal.

Concerns over fish were common in all three case studies, which is hardly unsurprising in the Pacific Northwest. All of these rivers have well-known runs of anadromous salmon and steelhead, which have all been impacted by the construction of dams. However, these concerns were often points of contention that were used by groups involved in the decisions to push their own narratives. Scientific studies and data were often cited, sometimes in manipulative ways, to further political narratives. Many who oppose dam removal would often claim that the dams had no impact on fish, instead arguing that the indigenous tribes were doing more harm by harvesting salmon. This lead

to a common point of tension, between non-Native locals and the tribes. In both the Elwha and Klamath, the tribes have been heavily involved in seeking to remove the dams, using their tribal treaty rights to lend weight to legal arguments (Mauer, 2020; Saulters, 2014b). Fish runs have long been incredibly important to the Pacific Northwest, they are deeply woven into the history, traditions, and mythologies of the indigenous people, most of whom were completely ignored when the dams were constructed. On both the Klamath and the Elwha, tribes have guaranteed tribal rights to gather fish from their usual and accustomed areas, but the dams blocking the rivers made it impossible to collect salmon since the fish cannot access the river. Courts are beginning to side with tribes, most clearly and impactfully seen in the Boldt decision which granted Washington's tribes 50% of the yearly harvest and made them co-managers of the fisheries, along with the State of Washington (Brown, 1994). While this decision only directly impacted Washington State and not other states, courts are beginning to take upholding treaty rights more seriously, which is often helpful for activists attempting to remove dams.

This concern over fish can also lead to some unexpected partnerships. On the Rogue the main advocates pushing for removal were a combination of angler and sport-fishing groups and environmental groups (Bender, 1997b). While these two groups may have different reasons for wanting healthy salmon runs, their overlapping concerns over the declining runs on the Rogue allowed them to build a strong partnership that lasted for decades as the removal decision worked its way through the courts and legislative processes. On the Klamath, there is a strong relationship between a union that supports commercial fishermen and the Klamath and Yurok Tribes (Gosnell & Kelly, 2010).

These two groups are often in opposition with one another, even filing filed court cases against one another arguing about how to allot the salmon harvest. However, their overarching concern for the endangered fish runs has allowed them to work together to try and remove the dams and restore the river.

Hydropower is another common concern that came up in every interview done for this thesis. Hydropower is a relatively clean energy source, when compared to other carbon-intensive sources like coal or oil, although it is not completely carbon-neutral and there are other environmental concerns (Song, Gardner, Klein, Souza, & Mo, 2018). These environmental concerns can include but are not limited to, degraded water quality, trapping sediment and organic material upstream, and blocking fish passage (Townsend, 2014). Players in each three case studies shared concerns over power, but this was not an overwhelming priority. The dams on the Elwha were relatively small, the power was being used run a timber mill, the power needed by the company could easily be purchased from the grid for less than keeping the dams would cost. Along the Rogue, those who oppose dam removal were concerned that they would have to buy their power from another source to run the irrigation pumps. While this is an increased cost as opposed to producing power from the dam, it is a relatively small amount of power. The dams on the Klamath are a bit more complicated, as several of them do produce hydroelectric power. Any deal to remove the dams must include how the communities will continue to have access to power. Locals who are against removal often believe that it will cause a large spike in their electricity rates. However, due to grandfathered laws and agreements some of these customers had been paying artificially low rates for decades, so while there may be some increases, all the removal agreements have had

provisions to make sure that the power lost from dam removal will be replaced for the residents of the upper basin (Doremus & Tarlock, 2008). PacifiCorp is a massive energy company, producing large amounts of power with their holdings throughout the West. Their dams on the Klamath only contribute about 2% of the power produced by the company yearly nationwide. Replacement power alternatives, including renewables, are readily available to the company (Aschibrenner, 2012). While players in the three case studies expressed a small concern around power production, it is likely to be a much more complex and prominent issue if larger dams are ever considered for removal, such as the dams on the Columbia River.

Water rights were another deeply interwoven theme in all these case studies. Water law is complex, and in many portions of the West, it is highly contentious. It is common in dam removal for nearly every stakeholder to have some claim to a water right, often for competing interests. There are also complications when those with legal water rights are in conflict with locals who maybe have benefited from the dams in the past, but have no legal claim on the water. This was seen in the decision around the Savage Rapids Dam on the Rogue. The dam was built to provide water specifically for the Grants Pass Irrigation District, so the water right only applied to those who were members of the district. However, the local town of Grants Pass had benefited greatly from the dam, from the leaky canals making the area artificially green, to the lake that was created when the dam was raised each summer and allowed for tourism and recreation (Brewitt, 2019). This created conflict between many of the locals who deeply opposed dam removal, but had no real legal weight in the decision. It also lead to conflict between members of the community who were irrigators, who looked at the expensive

and drawn-out process as a threat to their water, and those community members who were not, but wanted to keep the lake and the other benefits without being willing to pay for the upkeep. Along the Klamath River water rights are also incredibly complex and even more contentious with a huge amount of conflict between irrigators and the tribes and fishermen. When the Klamath Project was created, irrigators in the upper basin were promised water, and for decades their needs were often prioritized by the government. However, in recent years the tribes and the anglers have found success in the court system. These cases have likely been bolstered by the listing of one of the salmon species under the Endangered Species Act, as well as a greater recognition of tribal claims to the water rights. Most tribal treaties claim that the tribes hold these rights "from time immemorial" which would give them the superseding claim to the water rights (Osborn, 2013). This is still highly contentious and likely to be a key argument going forth in the decision. The Elwha had relatively few arguments over water rights, as the majority of the watershed is protected by Olympic National Park, although there were some concerns raised by both the Lower Elwha Kallum Tribe and the city of Port Angeles over drinking water quality, which has created a few issues continuing to this day. It is likely in every dam removal decision that water rights are going to be a key component of any decision or agreement, and if larger dams are being considered, it likely to be ever more contentious, especially in more arid regions.

Concerns about changes to local industries and businesses were a common theme among interviewees. From concerns about impacting the timber industry on the Elwha, to agriculture, tourism and fishing on the Rogue and Klamath. Economic arguments are often used by both sides of the debate. Balancing the value of a restored river ecosystem

is complex when looking at the more traditional values associated with dams, such as power production or irrigation capability. However, as more dams are being removed and more evidence is being shown as to how quickly a river can be restored, with relatively little outside input, the value is being seen as more valuable by larger portions of the population (Grabowski et al., 2017; Hammersley et al., 2018; Ryan Bellmore et al., 2017). It is also becoming evident with our aging infrastructure, that many of these dams have outlived their usefulness. In many cases it is more expensive to upgrade the dams to meet safety and environmental standards, especially since they often do not provide the benefit that they once did. This was very evident in the Elwha removal, where the dams had long outlived their purpose and the cost to upgrade them vastly outweighed their usefulness. It also bolstered the argument that given how pristine and protected the watershed was, these dams were the only man-made impact on the river and removal would allow it to be a completely free-flowing river once again. In many cases, this made the Elwha the perfect first test case of how a river would respond to removal and restoration. Most other rivers will have added economic concerns and complications. Both the Rogue and the Klamath have competing economic interests. In those cases the key argument is between people who would benefit from restored fish runs versus the farmers who rely on the water for irrigation. Through a great deal of negotiation and compromise, deals can be made that balance the interests of these competing groups, but it is often something that is highly controversial and quite often ends up being litigated.

As mentioned tribal interests and concerns were incredibly important in the cases on the Elwha and Klamath, but this can be highly variable depending on where the dams are located. Both the Elwha and Klamath have a strong involvement of the local tribes,

and they have both been incredibly important advocates for removal. However, along the Rogue there was little involvement of tribal members because there was not a local tribe that had any strong legal or historic claims to the area. Tribes have a long, complex, and difficult history and relationship with the government. Many of the tribes strongly opposed the dams when they were built, but their concerns were overlooked by the government in favor of the white settlers in the area. As time has passed, the courts have begun to more actively seek to protect the treaty rights that were guaranteed to the tribes, though these rights were often ignored from the initial signing of the treaties. The Boldt decision in Washington State was incredibly important to give legal weight to the arguments of the tribes, and allowed the Lower Elwha Klallam Tribe to push for removal of the dams on the Elwha. Even though the process took decades, in the end the involvement of the tribes was key to pushing removal ahead (Guarino, 2013; Mauer, 2020). In the Klamath River case, the Yurok, Karuk, Hoopa, and Klamath Tribes have been deeply involved in pushing for removal, at various points in the process. They were involved in the two agreements that have been created between all the stakeholders, and have been involved in the court cases and bureaucratic processes that are continuing to this day. Their treaty claims, along with the protections of the ESA, give a great deal of weight to seeking removal of the dams. The involvement of tribes in removal decisions also allows those who are interested in river restoration to bring in new sources of traditional knowledge. Many of these tribes have lived along these rivers for centuries, and they have passed down the traditional ecological knowledge that can be a boon to modern scientists seeking to understand these complex ecosystems. These decisions can also involve aspects of environmental justice, as the needs, concerns, and rights of the

tribes were ignored. Restoring these rivers allows for a renewal and restoration of the tribal members as well (Mauer, 2020).

EE. Political Polarization and Anti-Government Alt-Right Conspiracy Theories

While at first glance environmental issues may seem like an odd place for political polarization and culture wars, these decisions often become mired in larger political battles with starkly drawn lines, typically pitting the usually more liberal and urban environmentalists against the more conservative and rural locals. There is a long history in the environmental movement of disagreements sparking between the urban/rural divide that is becoming more prominent in our larger political environment (Gimpel, Lovin, Moy, & Reeves, 2020). From the spotted owl wars to larger issues such as climate change, many environmental issues have become deeply partisan (Antonio & Brulle, 2011; Bonnett & Zimmerman, 1991). We are even beginning to see some overlap between the extreme alt-right and militia movements with environmental issues, as seen in the takeover of the Malheur National Wildlife Refuge in Oregon in 2016 (Inwood & Bonds, 2017). Dam removal is another environmental issue that has become staunchly involved in these partisan battles, which often makes the process even longer and more difficult to move along. In all three case studies, there was clear evidence of these political tensions and the friction it often created between the coalitions that formed around efforts to remove the dams. This conflict over dam removal often ends up pitting environmentalists, tribal members, and other activists, against the locals, who tended to be more rural and conservative communities.

These decisions showed evidence of conflict between the locals, who tended to be more conservative and rural and the activists, who were often seen by the locals as outsiders attempting to force them to change their world view and way of life. There was somewhat less conflict in the case of the Elwha, since the dams were relatively removed from the community and they were on land that was federally owned. The debate over the Elwha dams reignited resentments and conflicts between many of the locals on the Olympic Peninsula that had been common during the spotted owl wars and the disagreements with outside environmental activists (Brewitt, 2019; Loomis & Edgington, 2012).

By comparison there are deep and highly contentious relationships between the locals and the coalitions pushing for dam removal of the Savage Rapids Dam on the Rogue and the Klamath dams. Much of the opposition in the Savage Rapids case was based on locals being deeply unhappy about those they perceived as outsiders coming in and forcing them to change. In some cases this involved buying into conspiracy theories about dam removal being the first step toward federal takeover of rivers and lands, forcing people off the land and into cities, and ultimately surrendering to the United Nations (Brewitt, 2019). Many of these rather outlandish ideas fit neatly into the distrust of government that is becoming more prominent among conservatives. This makes fertile ground for politicians who oppose dam removal to create problems and slow down the process, whether it is at a state or federal levels.

In many respects, both side of this argument illustrate how social movements evolve from collective behavior and ideals can create change in policy and to political structures (Pyrozhenko, 2018; Saulters, 2014b). The environmental movement has been

studied through the lens of social movement theory, with how quickly it gained recognition and made real change throughout the 1970s (Coglianese, 2001; Diani, 1992). Researchers now are beginning to look into the alt-right and conservative ideals around distrust of government and how these new social movements are seeking to change policy and politics (Forchtner, 2019; E. Hodge & Hallgrimsdottir, 2019; Salazar, 2018).

The Klamath clearly shows this divide as well, with the more conservative and irrigation-dependent communities of the upper basin firmly against dam removal, while the more liberal communities downriver much more supportive of removal. This can be seen when looking at the actions of the two congressmen who represent the districts of the upper and lower basins. Congressman LaMalfa who represents District 1 in California, has been extremely opposed to any movement to remove the dams, and has done everything in his power to stop the process. On the other side of the aisle, Congressman Huffman of California's District 2, has been an outspoken advocate for removal and has allied himself with the tribes who are seeking removal of the dams.

Many researchers and analysts believe that the current political polarization is growing deeper, and is being seen in a variety of issues and venues. It is likely one that we will continue to see impact dam removal decisions going forward, especially as many dams are located in areas that are more likely to be rural and conservative, and it could be an area of increasing tensions and issues for future removal decisions.

FF. Coalitions are Key to Sustaining Change

The key factor often cited in interviews was having a strong and diverse coalition of groups working together. To better understand how these coalitions work, advocacy coalition framework (ACF) is a useful concept. ACF examines how coalitions work

together to impact policy, typically by treating the coalition as a single unit that is pushing toward a shared goal. This is true of the coalitions that formed both to remove the dams and to save them. These coalitions were made up of different individual groups with differing ideals, but they banded together to push toward a commonly shared goal. This allowed the coalitions to get involved in the lengthy, complex, and heavily technocratic policy process. This is especially important given how lengthy the process was, from initial consideration of removal to making a final decision. Some of this is due to the complex nature of these decisions. Dam removal often involves overlapping jurisdictions, including local, state, and federal laws and regulations, tribal treaties and governments, private companies who own the dams, and the many other stakeholders who have an interest in the decision. This can create a highly contentious environment, especially given the political polarization that is becoming more prominent in these decisions.

Dam removal is also complex because of the many layers of approvals and studies that must be done. Removal projects basically go through the same permitting process that would occur if you were building a new structure. A former lawyer WaterWatch explained, "Dam removals…even though they are restoration projects, you still have to go through the same type of permitting, as you would if it was a developmental project." These regulatory processes are quite complex and slow, and one feature that was key to moving removal forward, especially on the Elwha and the Rogue, was a large coalition of diverse groups who were all willing to work together to push the issue forward. These mega-coalitions are complex due to the wide range of ideals and desired end result, and can often include stakeholders who have opposed one another at other times. Coalitions

also form for those attempting to oppose removal, typically focused around local organizations that attempt to build around the ideas of saving the community and banding together against outsiders. These can also include organizations like the local Chamber of Commerce or irrigation districts.

Considering how complex these coalitions are and how important they are to the dam removal process moving forward, it is useful to analyze how they function and how they interact with multiple levels of government to help push policy decisions. Advocacy coalition framework is a method of studying coalitions by looking at them as one unit and seeing how many actors can come together to affect change in policy (P. Sabatier & Jenkins-Smith, 1993), particularly large-scale policy decisions, which many dam removals are. These coalitions can typically function because there is an overlapping goal that all the organizations share, even if they have other differing ideals. This shared goal allows these groups to form a flexible and strong group that can affect real change, even when dealing with corporations with many more resources and institutional barriers. The larger and more diverse the coalition is also allows for intervention at different points, depending on the skills and backgrounds of the differing coalition members. For example, the tribes were able to intervene in court cases due to the treaty rights, while environmental groups were able to leverage laws like the Endangered Species Act, and regulatory agencies were able to provide input and recommendations during Environmental Impact Studies.

All three of these case studies highlighted a mega-coalition that had formed, but typically the core groups were involved from the beginning and often remained the center of the coalition until the end of the process. Each case had a unique coalition, dependent

on the specifics of the case, for instance, in the Elwha and Klamath decisions the tribes of the area are heavily involved and allied with other groups who are interested in river restoration, such as environmental groups or commercial fishers. In the case of the Rogue, there was not a strong tribal presence, but there the core groups were environmental groups and commercial and sport fishers.

These core groups alone likely could not have sustained the coalition over the decades that each of these decisions spans, so including other groups that are impacted by the decision become key to building a successful coalition. This includes reaching out to wider audiences, such as nationwide environmental groups, but also involving stakeholders who may not share ideals, such as the corporations that own the dams. Throughout the interviews, multiple interviewees brought up how key it was to get the company onboard, while it is not a guarantee, once the coalitions found agreement with the owners the process often began to move much more smoothly. Including as many stakeholders as possible in the coalition is also important because often these decision require federal legislation, which necessitates a great deal of effort and sustained lobbying to push forward.

Building large coalitions to work to a common goal is a complex and messy process. It is something that can be challenging to put together, but also to keep together over the long time spans it takes to move through the policy process of a dam removal decision. However, it is likely the only way that groups will be successful in pushing the policy in the direction that they want. Attempting to force change on a system, not only requires a leverage point that allows the change to begin, but also a large and committed group that will continue forcing the system to move.

GG. Challenges of Failing Infrastructure and Climate Change

While dam removal is a relatively new idea in environmental restoration, it is likely to be one that continues to be prominent in the coming decades. In the United States, we have a problem of an aging and failing infrastructure. Many of the dams in the U.S. were built decades ago and are reaching their life expectancy. With this comes safety risks, as we have seen from the near-failure of the Oroville Dam spillway in California in 2017 and the complete failure of the Edenville Dam in Michigan in May 2020 (Einhorn, 2020; Koskinas et al., 2019; Nagourney & Fountain, 2017).

With climate change shifting temperatures and weather patterns in the West, the stresses on these structures is likely to increase. Longer, hotter summers will lead to lower water flows, while heavier rainstorms could lead to increased flooding events and strain on the dams. This is leading to exploration about how to best to manage the infrastructure, due to the oftentimes prohibitively high costs of completing repairs and upgrades. While increased monitoring and inspection may help to alleviate some problems, removals are often seen as another useful tool to deal with the problems (Beatty et al., 2017; Choi, Jun, Liu, Kim, & Moon, 2020). But others are looking at the likely water shortages which may be caused by climate change and proposing that more dams should be built to increase water storage capacity (Perry & Praskievicz, 2017).

All of these environmental concerns are likely to intersect with infrastructure issues, water management, and safety concerns in the future. The United States has hundreds of thousands of aging dams across the county. There is likely not one decision that is right for every dam, so the process of deciding on whether to remove the dam or

keep it in place is likely going to be one that continues to be incredibly important going forward.

VII. Conclusion

Humans have long sought to bend nature to our needs and desires, and our manipulation of rivers through dams is a prime example of this behavior. However, damming up rivers has had huge impacts on the related ecosystem that rippled out farther than initially understood. As we began understanding our impact on the ecosystems, removing dams has shifted from a radical to acceptable idea in environmental policy. While dam removal is becoming more understood and recognized as a method of river restoration, it is still highly controversial and the social impacts are less well understood. This thesis analyzed three case studies of dam removal for common ideas, themes, and overlapping narratives that may relate to dam removal more broadly. While each dam removal is unique, there are some themes that seem to be prominent in most decisions. Not surprisingly, most people involved in these decisions brought up concerns over power, fish, water rights, the economy, and tribal rights. There were also broader concepts that became evident in all three cases; the increased political polarization and urban-rural divide, concerns over climate change, and failing infrastructure. What became most evident was the importance of strong and broad coalitions to actually force policy change to occur.

Dam removal is an inherently policy-heavy subject, there are many overlapping jurisdictions and bureaucratic processes involved the process. However, these systems inherently favor the status quo and are unlikely to shift without outside pressure. In each of these three dam removal decisions, finding leverage points and using the power of a strong coalition was key to creating policy change. Dam removal leverage points could be relicensing as was the case on the Elwha and the Klamath, or a change in water usage

and therefore a challenge to the water right claims as was seen on the Rogue. Both of these leverage points allowed the coalitions to begin influencing policy and shaping changes within the system. Managing these broad coalitions can be complex, especially since the groups will often have different ideals or backgrounds, but if they share a common goal it allows them to band together to exert pressure on the system. While policy decisions around dam removal is important, policy does not appear to be the primary force that is driving the decisions. The coalitions and the pressure they can apply have much more influence on altering policy and making the decision go forward.

The common themes found in all three case studies are somewhat unsurprising, and likely to be serious concerns for most dam removal projects. Hydropower is widespread throughout the Pacific Northwest, and is seen as relatively green way to produce power, although it does have some drawbacks as previously discussed. Any removal of hydropower dams will have to address how that power will be replaced. These three case studies involved relatively small amounts of hydropower, but it will likely be a much more prominent question if larger dams are considered for removal. Fish passage was one of the key concerns for all of these dams, and was often related to concerns over tribal rights. This relationship is an important one as tribes have a unique legal power in using their treaty rights to attempt to protect fish runs. Increasing concerns over threatened fish runs, especially in the Pacific Northwest, could be an important factor in future removal decisions. Water rights are almost always contentious in the West. This is likely to becoming increasingly difficult as pressures from climate change mount. Many of these conflicts over water rights also come down to economic worries. Many dams were built to irrigate and provide power to towns, so when removal is

proposed many people worry about what the impacts will be to their way of life. That was the case especially in the Rogue and the Klamath. In both those cases there is a deep conflict over who has the right to use the water, and often a clash of culture and identity between opposing communities.

While much of these dam removal decisions are bureaucratic and technocratic, there is also a deep social engagement in this process. Dams are a complex symbol that mean quite different things to people. In many more rural and conservative areas, dams are seen as a symbol of taming nature and using the resources to better human lives. In many of these areas the dams are used for irrigation and are deeply linked to the well-being and livelihoods of the people in the area, so the dams essentially become a part of the community. This leads to a great deal of conflict then when removal is proposed. As was seen with the Savage Rapids Dam, as well as along the Klamath, many locals feel deeply connected to the dams and worry that removal will harm their community. But for many removal advocates, especially environmentalists and tribal advocates, dams are seen as something that is disrupting a natural process and harming the broader ecosystem, not to mention for some tribes their ability to practice their legal rights to harvest fish. To these advocates, removing the dam is restoring balance and allowing the ecosystem to repair itself from the damage that has been done. To many people there is an inherent value in a restored ecosystem and a free and wild flowing river. This is especially powerful in the Pacific Northwest where removing dams allows anadromous fish to return to spawning grounds that have been long blocked. It is especially meaningful for Native activists, and can be seen as a way to not only restore the natural ecosystem but also the cultural and historical traditions that have been suppressed.

Dam removal is likely going to continue to be an important issue in the coming years. The aging infrastructure, challenges from climate change, and shifting societal ideals around environmental issues are unlikely to go away any time soon. The increasing polarization of our politics is evident in these three case studies, and is likely to continue to have an impact in any future removal decision. By understanding how previous decisions were made and the importance of broad coalitions, it may be possible to resolve these issues more quickly, rather than the decades that each of these case studies spanned. Dam removal can be a powerful tool when it comes to restoring river ecosystems, but we must also consider the complex interconnected nature of the ecological and human realms. People often like to believe that we are separate from nature, but this is not true, we are deeply interconnected with our environment and our decisions can ripple out in unintended and unexpected ways. Understanding how we impact the world around us will allow for better environmental policy decision making and hopefully a more symbiotic relationship.

This thesis analyzed into what factors were more important in dam removal decisions, and it quickly became evident that a strong, diverse coalition dedicated to a single goal was key to pushing for changes in policy and for a definitive decision. In the interviews, it became clear that dam removal will continue to be an important issue, especially in the Western states. It is likely to remain a contentious issue, but one that will be critical both with concerns to infrastructure as well as ecological restoration. For advocates who are seeking to remove future dams, it is important to consider how the communities identify and how differing political views could make for a combative fight, as was seen in all three case studies. It is also important to realize that these complex

policies do not change easily, and advocates need to find leverage points that allow them to get involved in the process. Environmental policy is a complex realm of overlapping goals and desires, with decisions often taking decades to be reached, understanding the human side of this equation allows for better decisions to hopefully protect the environment and the people.

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