Oncorhynchus keta — Chum Salmon

by Susan McDougall

I pulled my beach-walking rubber boots over my lined rain pants, zipped up a theoretically rainproof jacket, and topped off the outfit with a wool hat and cotton gloves. I was ready. Nearby, my companion waited, anticipating her first visit to Jimmycomelately Creek. Our trainer accompanied us, as net and bucket in hand we began a short walk to a fish trap, installed in the stream the previous week.

I listened for sounds of life within the gurgling waters but heard none as we stopped near the trap beneath the bridge. We carefully followed instructions for opening the heavy wood cover which, when lifted, would reveal the slow water and the dark bodies of salmon within. Our purpose was to quickly net them, determine their sex, count, and release back to the creek.

The trap was empty. True, it was the first week of the survey, but nevertheless disappointment replaced anticipation. We talked about procedure, looked downstream, and began the task of replacing the stout lid.

And then we saw it. A two-foot, heavy-bodied Chum Salmon, fitted out in its beautiful spawning colors, accelerated into the trap, tail flexing rapidly from side-to-side, its movement palpable. The salmon was coming home to spawn, and to die.

I felt like I had stepped into another world, a watery planet where creatures with strange forms and unquestioned purpose dictated the terms of life and death, perhaps both beneath the surface and above as well.

The rest of the world receded as we lifted the surprisingly heavy salmon, a wonderfully foreign creature. Yet a few million years into its evolutionary path, this shiny creature had entered uncertain waters, for it was dependent on humans for survival. Ensuring the continuance of this vulnerable being was why we three humans were at the water's edge.

A few weeks later my partner and I were rewarded with the presence of many fish in the trap. They didn't like us much, or maybe they simply wanted to be on their way, up the stream. But for me, the sensation of leaving one world and entering another never diminished. As we approached the stream each week, I listened for the sounds of their restless bodies and anticipated an encounter with the incredible Chum once again.

Oncorhynchus keta — Chum Salmon

Of the five salmon species in the Salish Sea, the Chum Salmon is the second largest, with only the mighty Chinook (*Oncorhynchus tshawytscha*) exceeding it in length and weight. The genus name *Oncorhynchus* refers to the hooked upper jaw that the male develops as it returns from its ocean residency to the stream or river where it was born. Weighing in at a maximum of 33 pounds and a length of 40 inches (102 cm) from the tip of the nose to the end of the tail, the Chum more typically ranges from 9.9-15 pounds and 22 inches (58 cm). It is fusiform in shape with an upper jaw that extends beyond the mouth. The species is said to be most easily distinguished by the blackish mouth cavity. In its sea-run form the Chum resembles other salmon species, with a dark metallic-blue back and silvery sides. However, compared to others, the Chum Salmon is almost spotless, with only a few faint black markings occasionally visible on its back.

Chum Salmon – *Oncorhynchus keta*

During breeding season, when the adult Chum begin their long journey from the sea to freshwater, the fish is transformed so brilliantly that it is hardly recognizable as that blue-black, silvery fish of a former life. Now the adults take on a blackish-olive hue, with reddish-pink and gray vertical bars on the sides, rather like irregular tiger stripes. A kaleidoscope of color, the Chum is unique. At this time as well, the male develops the hooked jaws and elongated curved teeth typical of salmon species. He is quite fusiform in shape, hefty and dense, while the female shows a more rounded belly, revealing the precious eggs she carries.

Also known as the Dog Salmon, the name apparently refers to the utilization of the Chum as dog meat, as it was never considered the tastiest of salmon. Although it was important as a subsistence fish, the negative comments are plentiful with the flesh described as “coarse,” and “inferior” (particularly canned fish). Thus, it is not surprising that the Chum fishery remained small, at least until the overfishing of other salmon redirected attention to this large species. While the eggs had always been desirable as caviar, new names besides “Chum” and “Dog” could promote a market for this beautiful if tasteless fish. One of the best is “Silverbrite” although it is not exactly clear what inspired this appealing name; perhaps it was the blue-and-silver color of the saltwater fish.

The Chum Salmon is a widely ranging species at home in the North Pacific, with populations inhabiting the cold waters as far east as the Lena River in Siberia, south to Japan and Korea, and across the Pacific to Alaska’s northern Beaufort Sea, east to the Mackinzie River, and south along the British Columbia coastline to warmer locations in central California. In Washington state, the Chum breeds in

many rivers of the Salish Sea, including those of the Strait of Juan de Fuca, and the lower Columbia River. Small numbers are present in northern California.

Evolution and Life History

The origins of the salmon family (the Salmonidae) are dated to an event in which the genome doubled, a process known as "autotetraploidy." This outcome of the process results in an organism with four sets of chromosomes rather than the typical two. Research indicates than this evolutionary alteration occurred in the salmonids at least 60 to 100 million years ago. It is believed that tetraploidy may provide some evolutionary advantages, such as a mechanism for rapid evolution with the presence of another "normal" gene: it may also provide some protection against inbreeding. The doubling has persisted to the present, with the Salmonidae believed to have arisen no later than 50.8 million years ago. Three subfamilies were created in this event, with the "true" salmon of the Strait (the *Oncorhynchus*) a member of the most numerous — the Salmoninae.

Research indicates that approximately 20 million years ago the *Oncorhynchus* split from the *Salmo*, a genus well-represented by Old World species, with the Atlantic Salmon (*Salmo salar*) as the solitary species in North America. With separation, divergence began, and by 6 million years ago, the anadromous salmon (the *Oncorhynchus*) of the Pacific Northwest had evolved into their acknowledged six species — Chum, Pink, Chinook, Sockeye, Coho, and the Steelhead. Dating to 6-8 million years ago, the oldest known fossil relative of the five is *Oncorhynchus ketaopsis,* a species that may have been a repeat spawner.

There are three spawning runs of Chum Salmon in the Salish Sea, a "summer-run," a population which begins its spawning in late August or early September and ends in mid-October, a "fall run" and the less common "winter-run" which occurs from December through January.

Most Chum Salmon spawn in the lower reaches of their natal rivers and streams. Large and heavy, the Chum lacks the jumping prowess of other salmon, such as the Coho, but possesses a powerfully strong body that can "muscle" its way over gravel covered by only a couple of inches of water. And some do travel far from their saltwater home; such is the case in the Yukon River, where spawning can take place as far as 1,678 miles (2,700 km) from the river mouth.

With a maximum lifespan of seven years for female Chum, most maturing fish remain in the saltwater for 3-5 years where they consume a variety of invertebrates and fish as well. In turn, they are preyed upon by other fish such as Pacific halibut, sharks, and lampreys: seabirds, whales, and seals also find them tasty. At sea they are known to forage in waters as deep as 1,312 feet (400 m) but are most often present in shallow water.

Like other salmon of the Strait, Chum Salmon inhabit cold water, although they do exhibit a relatively large temperature tolerance: during migrations temperatures as low as 32° F (0° C) with a maximum of 70° F (21.1° C) are sometimes encountered and endured. However, Chum typically spawn at temperatures from 44.6 —55 ° F (7°–12.8°C), with optimal conditions at around 45° F (7.2° C); young salmon are known to die at 53.6° F (12° C).

Upon reaching suitable spawning sites, female Chum Salmon dig a redd (nest) in clean gravels, scooping a depression and depositing as many as 3,500 eggs. They often lay more than once but also show a tendency for aggressiveness towards other fish: such disagreements may result in failure to

spawn. Following fertilization by an attendant male the female covers the eggs. Their bodies totally spent, both sexes die after spawning, most often within a day.

After 1.5-6 months of incubation, fry emerge from the gravels and migrate directly downstream. They do not feed in freshwater, but will remain near the shoreline, often in brackish waters, taking cover in eel grass or kelp. On their journey from spawning grounds to the shore, Chum fry may encounter and compete with other newly hatched fish: in particular, Pink Salmon (*Oncorhynchus gorbuscha*) — the species to which Chum Salmon is most closely related — also exhibit a similar lifestyle, with the newly emerged young immediately moving downstream.

Feeding on zooplankton, Chum fry remain in shallow waters until July or August. At this time, the small fish began their perilous journey to the sea. Most will not survive, but for those that do, within a few years they will turn landward and return to their natal stream.

Fishing

Chum Salmon may not be considered a desirable main course by most humans, but this does not mean that their soft, unappetizing flesh historically escaped notice by recreational and commercial fishers alike. In the earlier years of the fishery, Chum Salmon were often in the "incidental take" category. As an example of this significant impact, in 1974 a new commercial fishery for Coho Salmon began in Hood Canal. Although targeted towards that popular species, as the nets were slung aboard, the Chum, along with other unwanted species, was discarded. In the early years the number could be very high.

Directed harvest for Chum in the canal began in 1976-1977, peaking in 1987: inevitably, the population was in steep decline, and in 1993 the fishery was nearly nonexistent. However, even with declining numbers, harvesting continued at high rates. Within a few years, commercial Hood Canal Chum fishing would effectively cease, and by 1992 the population was considered critical. Where previously found throughout Hood Canal, nearly half of the canal's streams no longer had summer-run Chum Salmon.

Thus, when petitions for listing the summer-run Hood Canal Chum Salmon were first introduced, an Evolutionary Significant Unit (ESU) that includes the Strait of Juan de Fuca west to the Dungeness River, the number in the canal was approximately three percent of its former abundance. Fishing rates had peaked at 90% in 1987, although this did not imply there were many fish to be caught. While the average harvest rate was 57% from 1974 through 1991, today it is much reduced. Surprisingly, fishing is permitted for threatened ESUs.

Fisheries were also active in the Strait and the San Juan Islands, the latter averaging 1,600 adults from 1990-1991. The decline in Chum numbers in the Strait began approximately 10 years later than in Hood Canal, with the number lowest in 1989: it is estimated that the run size that year was 425 fish. Some rebound occurred in the early 1990s when hatchery-bred salmon augmented the run and harvesting was more restricted. Commercial fishing in Discovery Bay and Sequim Bay ended in 1976. However, harvesting, primarily of fall-run spawning fish, in the Strait has continued.

Today, millions of Chum Salmon are caught annually on the outer coast in both Washington and British Columbia: these fish are of mixed origin, having traveled from freshwater spawning locations throughout the Salish Sea.

Chum Salmon numbers, both hatchery and natural-origin fish, tend to vary widely, often on a year-to-year basis. Both the summer-run Hood Canal threatened ESU and the fall-run Chum are subject to

such fluctuations. It is this sensitivity to environmental conditions, of which our understanding is limited, that continues to make the species challenging to managers.

In the port of Seattle, Chum Salmon is one of the top ten seafood exports. The flesh is most often canned or smoked. The fishery is considered a "good seafood choice with sustainable harvest." Unfortunately, the Hood Canal summer-run Chum can contribute little to such a reassuring assessment.

Listing

Intensive Chum fishing certainly played a role in the free fall of the Hood Canal summer run, but many other factors contributed as well. Natural occurrences, such as landslides or floods, can certainly create stress on fish populations, but these are usually events from which recovery is typically possible within a few years. Unfortunately, the most deleterious causes of decline can be attributed to human activities. With the Olympic Mountain range on the west, hills on the east, and a long sinuous form, Hood Canal is a beautiful place and understandably desirable for personal development and resource exploitation. Much of the shoreline, particularly on the west side, is populated, and thus has been altered in many ways. Unintended impacts such as pollution are inevitable without controls, and modifications of streams and rivers, including dike building and other channelization, as well as logging, farming, application of herbicides and pesticides, removal of woody debris, and other practices all contribute to habitat degradation for Chum Salmon.

While the Strait is a much larger body of water than Hood Canal and gives the impression of being less subject to change by human impacts, alterations to rivers and streams from similar human activities have significantly altered both fresh and saltwater bodies. Chum Salmon have been on the decline for years in the Strait, and when a listing of the Hood Canal summer-run Chum as "endangered" was sought, it would include the fish of the eastern Strait.

The list of societal-induced changes that have altered and reduced the Hood Canal Chum summer-run is sadly very long and is an indictment of human impacts on all salmon species and other fish as well. Local impacts include poaching, marine mammal increase and predation, eutrophication, loss of protective fry cover such as eelgrass beds, and interactions with hatchery fish all contribute to depression of Chum numbers.

Such human activities exacerbate environmental factors: these include but are not limited to fluctuations in ocean conditions, climate change, and localized natural events, such as floods and landslides.

Although human contributions to species' decline may be unintentional, consequences teach that hindsight is a hard lesson, but one that should not be ignored. Thus, the impact of alterations such as river channelization, sometimes done illegally, may not have been predicted, but the reality of the destruction of good spawning habitats as an outcome offers such a lesson. This was the case on the Big Quilcene River in 1993 when dikes were built, and channelization performed on nearly 1,700 feet of Chum Salmon spawning habitat.

On March 25, 1999, the National Marine Fisheries Service (NMFS), a department of the Oceanic and Atmospheric Administration (NOAA) issued a final ruling on two Chum Salmon ESUs, under the auspices of the Endangered Species Act (ESA) of 1973. These two ESUs were the Hood Canal summer-run Chum Salmon and the Columbia River Chum. They were designated as "threatened." In the ruling, Discovery, Sequim, and Dungeness Bays, all geographical features of the Strait, were included in the definition of

the Hood Canal summer-run ESU. Only natural spawning Chum living below natural, impassable barriers, were considered in the listing. This specification implied that hybrids between hatchery and wild salmon that are "naturally spawned" were not part of the ESU for protective measures.

Previous conservation efforts, if present, would be considered in proposals for protective regulations and recovery plans. It is interesting to note, however, that exceptions to harvest rules implied by a listing could be made in areas with conservation plans; such populations might be considered healthy, and thus exempt from protection.

Although less restrictive in protective measures than an "endangered" status, a threatened ESU is nevertheless considered likely to become endangered if factors contributing to its decline are not addressed. For the summer-run Chum the proclamation became effective on May 24, 1999. This listing set in motion required documentation and subsequent actions that would hopefully result in recovery and delisting.

The determination was made five years after the initial petition, which was filed by the Professional Resources Organization-Salmon (PRO-Salmon). A second petition, dated April 4, 1994, was submitted on May 20, 1994, by the Save Allison Springs Citizens Committee — in this case the petition was specific to Puget Sound streams. A third was filed on May 20,1994 by Trout Unlimited, requesting listing for summer-run chum in 12 tributaries of Hood Canal. The NMFS was thus directed to consider those specific waterways, while not being restricted to them.

Within a few months following the submittals for listing, the NMFS announced that sufficient scientific evidence had been provided for the necessity of protection and status reviews would be undertaken to consider "all" populations of Chum Salmon. During review public comments were solicited and scientific evaluation was undertaken by the Biological Review Team (BRT). Again, reviews of findings were undertaken. By March of 1998, four years after petitioning, a published determination proposed the listing of the two ESUs.

Many public comments and responses are published in the Federal Register listing document. One issue concerned the original exclusion of the Dungeness River summer-run Chum from the proposed listing. In response, the inclusion of the Dungeness summer-run in the listing was made, with the NMFS citing the availability of new data on the Dungeness as a factor in the decision.

As part of the proposal review, the NMFS investigated the protective efforts being undertaken for summer-run Chum Salmon, noting that the Hood Canal/Strait of Juan de Fuca Chum Salmon Conservation Plan (HCSCP) was at the time the most comprehensive conservation plan at an ESU scale. NMFS was directed to encourage the continuation of this program. Such supported conservation measures were those programs that focused on ecosystem health being most important. Economic impacts were not applicable.

Also noted was hatchery supplementation and reintroduction efforts to the recovery of the two ESUs. This would include programs prior to listing undertaken to enhance dwindling Chum Salmon numbers in smaller Strait water courses such as Snow Creek, Salmon Creek, and Jimmycomelately Creek.

At the time of the listing, the Hood Canal summer-run Chum Salmon count was less than 1000 adult fish: in 1968 it had been 43,720.

Restoration/Conservation Part I – Before Listing

The document listing summer-run Hood Canal Chum salmon acknowledged conservation efforts already in place while also indicating the insufficiency of those measures to adequately protect the ESU. Prior to the listing, however, there were organizations committed to restoration and conservation of local Chum Salmon populations. In 1986, a small group of people committed to three basic principles — Education, Celebration, and Restoration — created Wild Olympic Salmon (WOS). From the start, WOS would include as their members people of diverse backgrounds and occupations, and activities such as festivals and artistic endeavors would play important roles, as would conservation programs. In 1988 WOS was instrumental in the creation of Fin, a 13-foot hollow, portable salmon sculpture on wheels, with a mural painted inside. Since its introduction to the public FIN has traveled as far as the nation's capital while continuing to play an important local role in education for young and old alike. FIN shows up at festivals, parades, and other public celebrations — truly an emissary for salmon awareness.

Such a representative as FIN would play an important role in public awareness, but in 1987 the reality of the concerns she would in part represent became very real at Chimacum Creek, a local salmon-bearing stream that emptied into Port Townsend Bay, which joins the Strait a few miles to the north. Chimacum Creek had supported a Chum Salmon run in the past; now the spawning fish no longer returned to the creek.

Two primary causes of the extirpation of the Chum Salmon in Chimacum Creek were implicated — a significant flood in 1987 destroyed a culvert at the mouth of the creek and washed out a logging road upstream near Irondale. Sediment from this event effectively eliminated the Chum Salmon run in the lower reaches of the creek. The salmon were gone. Any celebration for the yearly return would be put on hold; the question was what, if anything, could be done to reverse this combination of natural and human- related causes.

The loss of the Chum in Chimacum Creek would not only result in WOS involvement in an unprecedented restoration effort but also contribute to the formation of the Jefferson Land Trust (JLT), a conservation organization that by 1989 would implement a commitment to conservation by altering land use, whether through easements or purchase.

Both WOS and JLT as well as other organizations such as the Washington Department of Fish and Wildlife (WDFW) became involved with a restoration project for Chimacum Creek. Since the run was extirpated, the closest available Chum Salmon cohort that might be used to reintroduce this species to the creek was the population at Salmon Creek, another altered stream that emptied into Discovery Bay.

In response to WOS efforts to restore the Chimacum Creek run, a supplementation program was begun at Salmon Creek in 1992. A small Chum population, also impacted by habitat alterations to the point of being considered at high risk for extinction during 1989-1991, would serve as broodstock for the reintroduction of Chum Salmon to Chimacum Creek as well as the augmentation of the runs in the local Discovery Bay creeks.

In 1992, a few returning adults were trapped near the mouth of Salmon Creek and held for spawning. Following egg collection, the eggs and milt were transferred to Dungeness Hatchery for fertilization and incubation. Otoliths (ear bones) were marked, and eggs were transferred to incubators at a hatchery on Houck Creek, where the hatched fry were fed for two weeks, then transferred to Discovery Bay at the mouth of Salmon Creek. At a specified weight, the fry were released into Discovery Bay. By 2001, the fry were being directly released into freshwater. Among other factors, data was collected on survivability and rate of return. In 2002, the combined total of natural origin and

supplementation adults was approximately 2,700; nearly 1,000 were natural-origin. A similar program was begun at Chimacum Creek, with incubation at a hatchery on Naylors Creek, a tributary of Chimacum. Fry were released into Port Townsend Bay near the mouth of the creek. During 1999, fry were also raised at Chimacum Creek Hatchery and reared in both saltwater and freshwater sites.

A similar restoration program was also begun at Jimmycomelately Creek, a small stream that empties into Sequim Bay. This program began in 1999. It did not rely on Salmon Creek stock but rather involved the trapping of returning adults to the creek. Hurd Creek Hatchery, on the Dungeness River, was the site for fertilization and incubation, with eggs transferred to a tributary of Jimmycomelately where they were hatched. The fry were released into the creek near its mouth.

Thus, when the summer-run Hood Canal salmon were listed in March 1999, programs were in place on two creeks and beginning at a third. Within a few years, the supplementation program could be discontinued, as returns to the creeks steadily increased to viable numbers.

In the end, both programs were successful, with 864 summer-run Chum counted in Chimacum Creek in 2002, marking the first spawning event since the 1980s. Meanwhile, at Salmon Creek nearly 1,500 Chum were counted.

The success of these carefully managed and documented hatching programs could be measured in numbers and continuing returns. Chum Salmon were back in creeks that had been their home for thousands of years. It was cause for celebration, particularly for the commitment of individuals and groups whose unselfish goal was to restore and protect.

In 2003, the Salmon Creek supplementation program was discontinued. At this time, the effective population size — that is, the size that participates in production of the next generation, a number much less than the total run — had increased to more than twelve times its pre-supplementation number.

Other conservation and restoration programs were also begun prior to the 1999 Chum Salmon summer-run listing; these efforts are ongoing today. In 1990, the Washington State legislature passed a law creating the Regional Fisheries Enhancement Group Program (RFEG). This program was responsible for the creation of 14 RFEGs throughout the state. The goal was salmon recovery, a process that was mandated to include diverse groups of people, such as volunteers, landowners, tribal members, and communities. Funding for these groups would come from fishing license fees as well as grants and local fundraising programs. Under this directive, the North Olympic Salmon Coalition (NOSC) was formed. This organization would merge with WOS and undertake protection and restoration programs involving all Olympic Peninsula salmon-bearing water bodies.

Since its creation in 1990, NOSC has become a leader of salmon restoration actions throughout the region. With a small paid staff and a large contingent of volunteers and concerned citizens, prior to listing NOSC had been involved with projects such as the Salmon Creek salmon supplementation program (in conjunction with WOS). NOSC also implemented revegetation projects, such as those at Chimacum Creek, and was instrumental in the Snow Creek Restoration. Beginning in April 1996, this involved lowering the streambed, planting native species to restore riparian vegetation, and installing structures for stabilization. It would benefit the summer-run Chum as well as steelhead and coho.

By 1997, NOSC was expanding its activities, with plans to implement eight new enhancement projects the following year. The organization was gaining experience, monetary support, and, importantly, a community of volunteers and locally engaged supporters. Through its early efforts, NOSC

was poised to become increasingly involved with salmon restoration after the listing of the summer-run Chum in 1999.

Restoration/Conservation Part II – After Listing

While some efforts were directed at the newly listed Chum, restoration projects on the Olympic Peninsula in the 21st century often benefit all salmon species: likewise, programs in place for other species can promote the health of Chum Salmon summer-run populations. Specific proposals by NOSC, in conjunction with other organizations such as WDFW and JLT, are numerous, and involve several approaches to restoration, such as land acquisition and conservation easements, native plantings to restore streamside vegetation, fish monitoring of juveniles and spawning adults, culvert replacements, and reconfiguration of stream channels. Educational programs to promote public awareness and inclusion of local students were also part of the approach to building healthy salmon runs; these and other endeavors are an acknowledgement of the importance of community involvement.

Time and effort, and money as well, added to the continued enhancement of many projects in place prior to 1999, and new proposals were planned, submitted as proposals, and when approved, begun with commitment to both short and long-term goals. For example, between 1999 and 2001, aided by grants, NOSC worked on more than 20 projects.

Some of the projects were small in scale and of short duration; others would be long term. One such effort involved the acquisition of property bordering the Dungeness River a few miles upriver from the mouth. The Jamestown S'Klallam Tribe took on a leadership role by using available funds to both purchase land and begin restoration of sites along the river. Alterations to the Dungeness from activities such as channeling, road construction, levees, and more had degraded the river and its floodplain, making it marginal as salmon habitat. Acquisition of four properties totaling 21.44 acres of riverine habitat was completed in 2017. This purchase included 1.03 miles of river frontage, beginning at Highway 101 (6.5 miles from the river's mouth) and extending to river mile 10.5. The goal of land management for the parcels was restoration of salmon habitat in a portion of the river that was within the migration zone for spawning salmon, included the summer-run threatened Chum Salmon as well as listed Chinook, Bull Trout, and Steelhead. Also present in the river were non-listed Coho Salmon, Pink Salmon, and Fall Chum. Thus, as with many properties acquired for restoration, enhancement projects would benefit all local salmon species.

Of the four newly acquired restoration properties, one — the Caldero property, purchased in 2017 — was considered a high priority site and subsequently proposed for restoration. Located between mileposts 9.5 and 10.5 from the river's mouth, Caldero was a much-altered 7.85-acre property with riprap along the river. The Dungeness flows rapidly in the area, and thus restoration proposals included alteration of the river itself. A side channel would be dug to provide slower flows; additionally, engineered log structures in the channel increased beneficial habitat for salmon adults and juveniles as well.

With water diverted year-round to the side channel, the reduced main flow would also be slowed with the addition of four log jams. Upon completion of the side channel, observers noted that salmon were soon present in that new waterway.

The physical work involved in restoring a site was not limited to the moving of rocks, the digging of channels, nor the emplacement of structures. Caldero is a broad, flat piece of land, and although not

logged commercially, the vegetation cover was limited in variety. The soil reflects a history of river incursions with much clay and hardpan, and rocks small and large dot the landscape.

Yet despite the hard substrate, this was a place where restoration could go beyond riverbanks to encompass much of the site. This was an arena in which volunteers contributed time and effort, planting native species on designated workdays, managed by NOSC.

It was not a small effort, for in time a multitude of holes would be dug, small but vigorous plants tucked in, and mulched in subsequent visits. Citizens numbering in the hundreds began digging and planting in 2022, with thousands of native trees and shrubs planted on several designated days. In the spring of 2023 alone, the goal of 12,000 plants was set, and in the early winter of 2023 alone more than 6,700 were placed in their new home.

The hope for survival of plants through all the seasons is strong amongst those involved with streamside restoration, and the unprecedented alterations to the swift Dungeness River represent a step forward in the attempt to return a much-altered river to one which benefits both salmon and other species — including humans — alike. As a large-scale project, Caldero represents a step forward in the quest to save wild salmon.

Fall-run Chum Salmon — the Elwha

The fall-run Chum Salmon in the Elwha was for the most part considered to be of natural origin although there had been a hatchery program from 1975 to 1985. Prior to dam removal, the population varied widely, with as many as 1,000 fish in 2008. Although supplementation began again following construction of the LEKT (Lower Elwha Klallam Tribe) House of Salmon located near the mouth of the river, today fisheries personnel do not consider this species to be “recovered” in the river, although spawning adults have been seen in the upper portion near the Glines Canyon dam site. In 2022, the population estimate was 390. Such a low number seems at odds with an expected increase following dam removal. But since Chum Salmon typically spawn in lower river reaches, the species would benefit directly as habitat improved.

However, the Chum fall-run was nearly decimated during the dam removal process. In 2013, the sediment released as the Glines Canyon dam was taken down had a severe impact on all species, including the Chum. That year the annual smolt count, an effort that was begun in 2006, was halted because of the sediment damage to the traps and subsequent fish mortality.

An important tool for assessing recovery in the Elwha, the smolt survey has continued to the present, providing an important tool for quantifying the recolonization of the river and its tributaries following dam removal. For the Chum Salmon, the slow return is thus documented,

Thus, at the present time the hope for Chum Salmon expansion in numbers and range rests in hatchery production, specifically at the House of Salmon hatchery. Returns to the hatchery reflect the low numbers of spawning fish in the Elwha. With fewer than ten adults, the number of eggs that can be incubated is correspondingly much less than is typical for other salmon species: in 2024, approximately 5,000 fry will be released in early spring. Of these, a small percentage will return as adults in 3-4 years.

The goal of Elwha River hatcheries is to both increase and stabilize species such as the Chum Salmon to the point that supplementation will no longer be required to maintain a viable population. Such has been the outcome in summer-run chum populations in streams east of the much-altered Elwha River. From the efforts of many, including those with the vision to restore habitat by the implementation

of what could be considered an exceptionally radical plan in the late 20th century, the removal of the Elwha's dams is a test case for restoration and conservation. It offers much-needed hope for the future.

Although 1,376 returning fish were counted, 2023 was not the best year for the Jimmycomelately Chum Salmon count. Tended seven days a week, in late October the trap would be removed for another year. Chum were seen a mile upriver, a good sign of spawning habitat expansion. And compared to the past, when numbers brushed the near-zero mark, the return of the Chum was encouraging news indeed.

Chum Salmon numbers do fluctuate widely from year to year, and so tempering optimism with caution seems a prudent approach to evaluating restoration of this threatened summer-run. Restrictions, restoration, engagement, including counting — all are necessary human activities that are directed towards the goal of preservation of what was nearly lost.

With the shortening of summer days, I will look forward to being granted entrance once again to that exotic, beautiful world of the returning salmon. The visit will be temporary, as it should be.