



# Frequently Asked Questions

Island Unit Estuary Restoration Project, March 2021

The Washington Department of Fish and Wildlife (WDFW) is moving forward with a project at the [Skagit Wildlife Area Island Unit](#) to restore critical estuary habitat for struggling salmon populations. Historically, the site was a tidally influenced estuary that provided rearing habitat for juvenile Chinook salmon.

In response to questions and comments received during the alternatives analysis process, the project team developed answers to the following frequently asked questions.

If you have further questions, please contact Jenny Baker at 360-855-8325 or [jenny.baker@dfw.wa.gov](mailto:jenny.baker@dfw.wa.gov).

## **1. Projects that have been completed don't look like they're working – they just look like shallow, muddy places that are too hot for fish to survive and are invaded by cattails. What information do you have to show that they're actually working?**

Monitoring results from several projects indicate that as soon as areas are restored, juvenile Chinook occupy all the habitats they provide, including ponded marshplain (shallow, sometimes muddy habitats), distributary channels, and blind tidal channels. Juvenile Chinook are found on restored sites at similar densities as they are found in native estuary habitats. They use restored areas with a variety of water temperatures, possibly using the variation in temperature to feed and grow more quickly. Excerpts from individual restoration site monitoring reports are included below.

### Results from Deepwater Slough

- “Results from each year (2001-2003) showed juvenile Chinook salmon were present in distributary and blind channel habitat at both treatment and reference sites. The results demonstrate that juvenile Chinook salmon colonized the restored habitat within the project area in the first year after construction. In fact, higher densities of juvenile Chinook salmon were often found in the treatment areas than in the reference areas.”
- “the new habitat created by the Deepwater Slough restoration project is being used by juvenile Chinook salmon at similar levels to other habitat found within the Skagit estuary.”

### Results from Wiley Slough

- “three to four years after dike setback restoration was completed, juvenile Chinook are benefiting from the restored habitat due to both impoundments and channels currently present within the dike setback areas of the Wiley Slough Restoration Project.”
- “juvenile Chinook salmon are using the restored areas of both Wiley and Teal Slough lobes (west and east of spur dike, respectively) at seasonal density levels consistent with other long-term monitoring sites within the Skagit River estuary.”
- “Juvenile Chinook salmon may be keying in on the slightly warmer and saltier water in the Wiley lobe for growth advantages (e.g., more efficient conversion of food to fish body weight; better quality –higher calorie– or more abundant prey). Statistically significant positive relationships were detected between



water temperature and salinity and juvenile Chinook density. These observations are consistent with the idea that fish may have a metabolic advantage by occupying the Wiley lobe compared to the Teal lobe.”

### Results from Fisher Slough

- “mean fork length of juvenile Chinook rearing in Fisher Slough increased substantially during the spring and summer months, when temperatures were energetically more favorable for growth“
- “Increased mean fork length observed in juvenile Chinook salmon rearing in Fisher Slough associated with the dike setback was likely not only a result of the increase in magnitude in seasonal water surface temperature but more importantly due to the increased spatial variability in water surface temperature associated with the dike setback.”

### Results from Fir Island Farm

- “Over the four years of beach seine sampling, we caught over 80,000 fish comprised of 21 different species.”
- “Analysis of seasonal density of juvenile Chinook salmon at Fir Island Farms compared to long term monitored reference sites in the Skagit tidal delta suggests that the restored habitat of Fir Island Farms is utilized by juvenile Chinook consistent with levels of other areas within the Skagit tidal delta.”

The Chinook carrying capacity, or number of juvenile Chinook a site can hold, has been estimated for project sites that have been or could be restored since the Skagit Chinook Recovery Plan was written in 2005. No single restoration project can meet the Skagit estuary restoration goals for Chinook recovery (2,700 acres or 1.35M smolts; more on this below). However, each project contributes to the goal. Current habitats at Fir Island Farm provide a carrying capacity of approximately 64,000 smolts and Wiley Slough has a carrying capacity of approximately 367,000 smolts. Carrying capacity for each site could change as available habitats are altered by erosion, sedimentation, or sea level rise.

In terms of vegetation, the establishment of native plant communities has been different at each restoration site. Invasive vegetation can colonize restoration sites due to their disturbed nature. Cattail expansion is occurring throughout the Skagit delta, and cattail has become established on some restoration sites. It is a priority to control cattail when funding is available to allow for the development of more diverse native plant communities because in general, monocultures of any plant don’t provide high-quality habitat. At the Fir Island Farm Reserve, WDFW has located and treated individual plants and the site is free of cattail so far. On other sites like Deepwater Slough, cattail has become established and control measures have made some progress when funds are available.

There are other restoration sites where specific restoration actions (more channels, more breaches) may be preventing or limiting the amount of invasive vegetation that establishes, and restoration scientists are studying that now. At the same time, we don’t fully understand the impact of cattail on juvenile salmon and the food they eat in the estuary. Research around this question is a priority for local scientists, and funding is currently being sought to better understand conditions that enable cattail to become established in estuaries and the impact of cattail on fish and other organisms.

For additional information, please read our handout on [The value of estuary habitat restoration for Skagit Chinook salmon recovery.](#)



## **2. Why aren't we seeing increases in returning adult Chinook salmon from completed estuary restoration projects?**

Restoration projects are considered successful when juvenile Chinook are using restored areas at levels similar to native estuary. It's important to remember that even if we had more returning adults, rearing habitat is limiting the population. The Skagit has enough spawning habitat for returning adults but does not have the space in the estuary for juvenile Chinook to grow and better survive to adulthood.

When considering why increases in returning adult Chinook have not been observed yet, several points are relevant:

- The scale of recent estuary habitat gains (336 acres) compared to historic estuary habitat losses (20,670 acres) is very small so the effect on the population is also expected to be very small.
- Chinook salmon have a complex life cycle making it difficult to isolate the effect of habitat availability during one portion of their lives. That said, if you look at run reconstruction, which adds up all the fish that were harvested in marine and freshwater areas as well as returning spawners that came from a particular brood year (spawning year), the Skagit has been doing better than most places in Puget Sound as far as overall abundance while facing the same issue of reduced ocean survival that is faced by all Chinook stocks.
- Chinook salmon live for 3-5 years before they reproduce, so it will take time for the benefits of restoration to accumulate across generations before we see increases in returning adult Chinook.

## **3. With millions of dollars already spent on salmon habitat restoration and hundreds of acres restored back to estuary, why are we not seeing more fishing opportunities?**

Salmon populations are affected by numerous factors, including habitat conditions, ocean conditions, fishing (both direct harvest and as by-catch), predation, competition, and dam operations. Estuary habitats are important rearing areas as juvenile salmon feed and grow before heading out into Puget Sound. We know from monitoring restoration project sites that juvenile Chinook salmon are using restored areas at densities like surrounding marshes and we are starting to see better survival of Chinook salmon smolts due to increases in estuary habitat. However, impacts they experience during other stages of their life mean that the increased survival at a young age does not yet translate directly into detectable gains in adult Chinook returning to the river to spawn.

Fishing opportunities in Puget Sound are affected by the condition of all stocks that could potentially be impacted by a fishery. The listing of Puget Sound Chinook salmon under the federal Endangered Species Act (ESA) in the late 1990s curtailed fishing opportunities as protections for these stocks went into place. The Skagit River system on average produces more than half of the wild Chinook that return to Puget Sound. Fishing for wild Chinook in Puget Sound will continue to be constrained due to limiting Chinook stocks from neighboring river systems.

There has not been a recreational fishery targeting wild Chinook in the Skagit River since 2009, but a future fishery does appear to be within reach with gains in adult returns. When the escapement forecasts substantially exceed 14,500 Chinook, which it has come close to doing in the last five years, sport fisheries for these stocks



become an option in the Skagit River. We know that smolts with access to estuary habitat have a greater chance of surviving to adulthood and contributing to escapement forecasts.

#### **4. Why don't we just stop all fishing for a year or two? Wouldn't that help recover salmon without doing all this habitat restoration?**

Fishing in Puget Sound and each river including the Skagit River is carefully managed by WDFW and tribes (co-managers) under the authorization and supervision of the National Oceanic and Atmospheric Administration (NOAA) fisheries as required by law. Puget Sound Chinook are federally listed under the ESA and fisheries for Chinook are the most scrutinized throughout Washington. While it may seem counterintuitive for NOAA to allow any harvest of an ESA-listed species within its jurisdiction (waters of the United States, NOAA has no control over harvest in Canadian Waters except through negotiated terms in the Pacific Salmon Treaty), NOAA's position on harvest in fisheries is that carefully administered harvest will not impede Chinook recovery, and simply restricting harvest will not lead to recovery of Puget Sound Chinook.

#### **5. Why don't we increase hatchery production instead of doing habitat restoration to recover ESA-listed Chinook and other salmonid populations and increase fishing opportunities?**

In general, most hatchery programs have one of two major goals: to increase fishing and harvest opportunities to a variety of constituents, and/or to promote the conservation of natural populations. Sometimes hatcheries use parents from the wild to get more juveniles with wild (natural origin) genes so they can help rebuild the population. Hatchery production also provides ecosystem services such as food for southern resident killer whales and transport of nutrients from marine waters to rivers and streams. Although hatchery programs may seem extremely advantageous, they must be managed properly to reduce risks.

##### **Fishery-related risks**

A major concern of hatchery programs is that they intensify fisheries that incidentally impact naturally reproducing fish, including ESA-listed species. Most Chinook salmon sport fisheries in marine waters of Washington are mixed-stock fisheries, which means hatchery fish are in the same area at the same time as naturally reproduced fish that may come from many different stocks, some of which may be severely depressed. To provide opportunity to catch abundant hatchery fish without incidentally harvesting natural origin fish, only hatchery fish, which have had their adipose fins removed, can be kept by anglers (called a mark-selective fishery).

However, in mark-selective fisheries, naturally reproduced fish are incidentally (and unavoidably) caught and released as bycatch and a proportion of all released bycatch will die because of the encounter. So, when hatchery fish abundance is high and fishing effort is high, the number of naturally reproduced fish caught increases as well. This can set up a situation where lots of hatchery fish are in the system and there's no way to harvest them without doing harm to naturally reproduced (natural origin) stocks. If lots of hatchery fish are not harvested and end up on the spawning grounds (strays), other problems are created (addressed below). In addition, not all mixed-stock fisheries are mark-selective so harvest may directly impact both hatchery and naturally produced fish. Like above, high abundance of hatchery fish can lead to increased harvest and further suppression of naturally reproduced fish.

### **Ecological risks**

There are also ecological risks associated with increasing hatchery production for the sake of harvest opportunities. Generally speaking, salmon hatcheries artificially spawn and rear fish in a controlled environment relative to the natural environment allowing hatcheries to increase survival, size, and condition from egg to smolt life stages. Once released, hatchery smolts of ideal size and condition could outcompete naturally reproduced fish for forage in rearing habitats like estuaries. Emerging research suggests that at certain times, hatchery fish do occupy estuary habitats, which can result in the estuary filling up to capacity and the potential for native origin fish to be displaced. A large number of hatchery smolts could also attract and increase predation, subsequently increasing predation on naturally reproduced juveniles.

### **Genetic risks**

Hatchery programs could also pose genetic risks to ESA-listed populations. If not managed properly, loss of genetic diversity can occur. As a result, fish can become less able to survive the many challenges they face during their lives, potentially having negative effects on the population. If hatchery-raised fish are used to produce additional generations of hatchery-raised fish, and hatchery offspring excessively stray and spawn with natural origin fish on the spawning grounds, the genetic pool on the spawning grounds is reduced.

### **Managing risks**

WDFW works closely with federal agencies and our tribal co-managers to manage hatchery populations to reduce potential fishery-related, ecological, and genetic risks. Several hatchery reform measures have been implemented to reduce these risks, including managing hatchery program size, adjusting release strategies, and monitoring and tracking gene flow to reduce the impacts on naturally-reproducing fish. In producing adult salmon for a variety of stakeholders, hatchery programs use hatchery reform management strategies to work collaboratively with habitat restoration activities towards the goal of providing adequate forage and increased smolt survival in estuaries.

## **6. There are thousands of acres of estuary in Skagit Bay already – why do we need more? What difference will a few more hundred acres make?**

Salmon habitat from the headwaters to Puget Sound have been impacted for over 150 years, resulting in habitat degradation and losses. Now, just a fraction of historic habitats is available to salmon. In the late 1990s when Chinook salmon were listed under the federal Endangered Species Act, it was estimated that only 13% of estuary habitats preferred by Chinook salmon remained in the Skagit delta. The Skagit Chinook Recovery Plan identified the estuary as a bottleneck to Chinook salmon population recovery.

Even if more spawning habitat were available, many of the young salmon coming down the river would not survive because there is not enough rearing habitat (including estuary) for them to feed, grow, and transition to saltwater. The Recovery Plan identified a need to provide space for an additional 1.35 million out-migrating smolts, which was estimated to be approximately 2,700 acres of additional estuary habitat. Several hundred acres of estuary have been restored since the plan was written.

There is still a need to restore more estuary to meet recovery plan goals and achieve a healthy and sustainable Chinook salmon population in the Skagit watershed. No single project will achieve the goals. Multiple projects will be needed to reach the recovery plan goals for the estuary.



## **7. Why isn't restoration being done on private lands? Why is all the restoration being done on public lands?**

With the remaining need for additional estuary, restoration will have to happen on public and private lands. There are several reasons that restoration has been completed and continues to be considered on public lands first. [House Bill 1418](#) required prioritizing actions for Chinook recovery that did not negatively impact commercial farmland, and specifically prioritized estuary restoration on public lands.

A [subsequent report](#) that prioritized projects categorized Deepwater II (Island Unit) as a Tier 1 project, with Tier 1 projects being the highest priority projects for implementation. It is the only Tier 1 project that has not been completed to date. Additionally, the Island Unit was identified as a priority project through the [Skagit Hydrodynamic Modeling Project](#), which assessed 22 estuary restoration project concepts throughout the delta for their ability to maximize benefits and minimize impacts to farm, fish, and flood interests.

## **8. Will waterfowl populations decline without enhanced forage at the Island Unit?**

Waterfowl congregate on the Island Unit because of current wetland management activities, which provide a high concentration of calories and water level (depth) management designed to optimize food availability for dabbling ducks. Estuary wetlands also provide forage for dabbling ducks; however our understanding of the relative value and availability of these food resources is not complete due to lack of studies and data in Puget Sound. From studies in other regions, we know the concentration, timing, and availability of these foods is different from farmed forage. It is assumed that estuaries typically provide lower density food resources with lower caloric value than enhanced forage, and those calories tend to be available during the fall and spring rather than winter. In addition, water levels fluctuate with the tides, limiting the amount of time water depths allow dabbling ducks to reach food. The mosaic of estuarine and other habitats on the landscape provides diverse food resources that dabbling ducks and other waterfowl rely on.

Food resources are available on the larger landscape of the greater Skagit Delta in the estuary, on other WDFW-managed lands, and on private farmland. There is some uncertainty related to relying on private lands to meet the forage needs of dabbling ducks for several reasons. Food on the larger landscape is utilized by dabbling ducks, as well as geese and swans. Also, changes in agricultural crop types and harvest efficiencies can impact food available to waterfowl, as forage available on commercial farmland is any left after harvest, whereas WDFW lands provide food grown solely for waterfowl. From past assessments of landscape-scale food resources, it is assumed that forage available on the Island Unit is relatively small compared to food resources available on the larger landscape. Therefore, the number of overwintering waterfowl is not expected to decline with full or partial restoration of the Island Unit. However, local concentrations of waterfowl on the Island Unit will likely change as dabbling ducks disperse across the larger landscape to seek food elsewhere.

For additional information, please read Appendix E: Waterfowl and Shorebird Technical Memorandum of the [alternatives analysis report](#).



## 9. WDFW has committed to providing replacement lands to offset waterfowl hunting opportunity losses associated with previous restoration projects. Why haven't replacement lands been provided?

WDFW remains committed to continue providing a broad portfolio of land available for waterfowl hunting in Skagit County and throughout North Puget Sound. Appendix H: Changes in WDFW-Managed Land and Habitat Types Since 2000 in the [alternatives analysis report](#) details how habitat types and huntable acres provided by WDFW have changed over the past 20 years since estuary restoration projects began. The acreage tables in the appendix show that enhanced forage grown for waterfowl in the Skagit Wildlife Area has decreased by 547 acres in that timeframe, while most other habitat types and the overall huntable area has increased. While many species and people on WDFW-managed lands benefit from the overall growth of the wildlife area, WDFW has heard from waterfowl hunters that intertidal sites are more challenging to access and fields with enhanced forage are preferred. Because of this, WDFW has continuously sought new opportunities to improve waterfowl hunting access and enhanced forage, commonly called “replacement lands”.

WDFW initially focused on acquisition of new land as the preferred tool to offset the impact of changing access and habitat types. A few compatible properties with willing sellers were identified over the years. WDFW completed internal approval processes to pursue acquisition funds, and staff submitted grant applications for funding. Each funding application so far, however, has been unsuccessful in grant rounds that compete with other projects throughout the state and country. The main challenges to overcome for funding are:

1. Property values in the North Puget Sound region are higher on a per-acre basis than most other areas, and
2. there are fewer linkages between non-intertidal habitat and recovery of species listed in the Endangered Species Act in this region when compared to others.

In addition to funding challenges, WDFW also acknowledges prior agreements with the agriculture community, which recognize that conversion of private farmland should be focused on salmon recovery. Pursuit of acquisition for other purposes requires additional collaboration. Although acquisition of replacement land has been challenging, WDFW will continue to pursue this tool when appropriate and available.

Although acquisition of replacement land for enhanced forage has largely been unsuccessful to date, there are several other tools WDFW has used that have been more successful.

1. The [Private Lands Access Program](#) has continued to grow over the past several years and now consistently provides 1,500-2,000 acres of huntable property in the region through agreements with private landowners, some of which provide enhanced waterfowl forage.
2. WDFW has recently started exploring partnerships with other public landowners to facilitate opening new properties to waterfowl hunting. A recent example is the [300+ acre property at Smith Island](#) managed by Snohomish County.
3. WDFW has improved habitat for waterfowl and hunters on properties within the Skagit Wildlife Area. Two examples are a project on the 400+ acre [Samish Unit](#) that increases the ability to control water for farming enhanced forage, and restoring wetlands on the adjacent 100+ acre [Samish River Unit](#).
4. Several boat launches and parking lots are currently funded that are intended to improve access to existing WDFW waterfowl hunting properties.



## **10. If the area is restored, will public hunting be allowed?**

Yes, public hunting would be allowed in areas restored to estuary. As we move into the next design phase, we'll be looking for ways to improve waterfowl hunting access into the design.

## **11. The criteria used to assess alternatives seem weighted toward issues that would end up pointing to a particular outcome/preferred alternative. How were criteria developed?**

Draft criteria were developed by the cross-program project team. Internal to WDFW, Region 4 (North Puget Sound region) staff from Wildlife, Fish, and Habitat programs and the state waterfowl section manager reviewed the draft criteria and provided input. The [Island Unit Advisory Group](#) also reviewed the criteria and provided input. A number of changes were made as a result of this input, including revising/reorganizing criteria and adding new criteria. All of these groups were also asked for their input on the application of the criteria to the alternatives and whether the summary ratings and descriptions were accurate. More information on the stakeholder and public processes can be found in Section 2.4 of the report and Appendix B of the [alternatives analysis report](#).

## **12. What is the next stage of the project?**

The next stage of the process is for WDFW to secure funding to design and obtain permits for the restoration project. Construction is not likely to begin for several years. WDFW will continue to seek input from waterfowl hunters on the design of the restoration project, as well as how to increase waterfowl hunting opportunities throughout the region.