The document below is an excerpt from what will be the Island Unit Alternatives Analysis Report. This REVIEW DRAFT is provided to the Island Unit Advisory Group in preparation for upcoming discussions in late October and early November. The Draft Island Unit Alternatives Analysis Report will be publicly available in mid-November 2020.

4. Criteria

This effort was a high-level analysis using landscape-scale assessment tools and existing data. Criteria were intended to capture the primary considerations WDFW used to compare alternatives.

Not all criteria have quantifiable metrics associated with them. This is due to a lack of data for a given topic or because the topic is value-based and therefore difficult to quantify. In these cases best professional judgement of WDFW staff was used after collecting input from the stakeholder advisory committee. All criteria are qualitative unless otherwise noted.

A note about tribal treaty rights: WDFW jointly manages fisheries resources and collaborates with tribes to recover depleted fisheries resources including the habitats on which they depend. Although this is not included as a criterion below, this is an overarching principle that guides our work. Tribal treaty rights are explained at https://nwifc.org/about-us/fisheries-management/ as follows:

> *"The tribes in Western Washington fish commercially, and for subsistence and ceremonial purposes. They fish for all species of salmon and steelhead in marine and freshwater areas of Puget Sound and the Washington coast.*
>
> *US v. Washington (the "Boldt Decision") in 1974 reaffirmed tribes as co-managers, along with the State of Washington, of fisheries resources. Co-management means that the tribes and the State of Washington, through the Washington Department of Fish and Wildlife (WDFW), are jointly responsible for managing fisheries and hatchery programs, and that they collaborate in regional efforts to recover depleted fisheries resources.*

4.1 Management, Regulatory & Policy Considerations

4.1.1 WDFW Policies

Declaration of purpose—Department lands: WAC 220-500-010
https://apps.leg.wa.gov/wac/default.aspx?cite=220-500-010

"The primary purpose of department lands is the preservation, protection, perpetuation and management of fish and wildlife and their habitats. Public use of department lands may include fishing, hunting, fish and wildlife appreciation, and other outdoor recreational opportunities when compatible with healthy and diverse fish and wildlife populations."

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This language implies that conservation of fish and wildlife and their habitats is the priority purposes of WDFW lands.

Policy 5003: Managing the 21st Century Salmon and Steelhead Initiative
https://wdfw.wa.gov/sites/default/files/about/advisory/hcicag/documents/implementation_guidance/pol-5003.pdf
https://wdfw.wa.gov/publications/00036

Relevant sections: *"WDFW lands provide opportunities for salmon recovery; WDFW lands have historically been purchased and managed for big game, waterfowl, fish and upland birds. Management of these lands has not always addressed the needs of salmon and steelhead. WDFW must develop and implement management plans for WDFW lands with additional emphasis on habitat needs for salmon and steelhead."*

This language implies that salmon and steelhead habitat needs are a component of land management decisions on WDFW lands.

Policy 5004: Department's Conservation Initiative and Guiding Principles
https://wdfw.wa.gov/sites/default/files/about/advisory/hcicag/documents/implementation_guidance/pol-5004.pdf

Relevant sections: *"We practice conservation by managing, protecting, and restoring ecosystems for the long term benefit of people, and for fish wildlife, and their habitat; We work across disciplines to solve problems; We integrate ecological, social, economic, and institutional perspectives; We embrace new knowledge and apply best science; and we collaborate with our co-managers and conservation and community partners."*

This language implies that we work collaboratively, using best available science from across a range of disciplines and interests to accomplish our work.

Policy 5211: Protecting and Restoring Wetlands
Relevant sections: "*WDFW will accomplish long-term gain of properly functioning wetlands where both ecologically and financially feasible on WDFW-owned or WDFW-controlled properties; WDFW will promote the restoration of original hydrology, elevations and native plant communities"*

This language puts a clear focus on providing functional wetlands that rely on natural processes. We will consider the geomorphic setting and ability of a given alternative to support and sustain habitats over the long-term. Information from the **geomorphic assessment and water surface elevation tech memo** will be used to evaluate alternatives relative to this criterion.

Washington State Wildlife Area Goals 1 – 3
https://wdfw.wa.gov/sites/default/files/publications/01810/wdfw01810.pdf

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Goal 1: "*restore and protect the integrity of priority ecological systems and sites*"
Goal 2: "*sustain individual species through habitat and population management actions where consistent with site purpose and funding*"
Goal 3: "*provide fishing, hunting and wildlife related recreational opportunities where consistent with goals 1 and 2*"

This language mirrors the purpose of state lands with the additional caveat that actions must be consistent with site purpose and funding. Site purpose for the Island Unit is being determined now through this alternatives analysis process, and will be based on past obligations and current needs as reflected in the full range of criteria presented in this document.

4.1.2 Obligations and Agreements

Acquisition Funding Obligations

The Pittman-Robertson Act, also known as the Federal Aid in Wildlife Restoration Act, was approved by Congress in 1937. The purpose of the Act is to provide funding for restoration of wild birds and mammals and to acquire, develop, and manage their habitats. Funds are derived from an 11% federal excise tax on sporting arms, ammunition, and archery equipment, and a 10% tax on handguns. These funds are collected from the manufacturers by the Department of the Treasury and are apportioned each year to the states by the Department of the Interior on the basis of formulas that consider the total area of the state and the number of licensed hunters in the state. WDFW purchased portions of the Island Unit with federal Pittman-Robertson funds in 1951 (P-R Project Agreement W-45-L). Specifically, the acquired land was intended "for the propagation of game and as a public hunting area." The remaining parcels on the Island Unit were acquired in the early 1950's using state wildlife funds, generated from the sale of fishing and hunting licenses. State wildlife funds have no identified management agreement as a part of the acquisition process.

While P-R funds were used to acquire portions of the Island Unit, WDFW cannot currently use P-R funds to complete some of the activities required to manage enhanced forage on the Island Unit as USFWS does not permit the use of these funds for activities that have the potential to injure or take an endangered species. P-R funds cannot be used for activites such as chemical treatments for crop production or weed control. Although agricultural activities may not have a direct impact on ESA-listed salmon, steelhead and bull trout, federal funds cannot be used without a Habitat Conservation Plan approving the specific agricultural activities.

As part of the alternatives analysis, we will generate documents including a waterfowl and shorebird tech memo described in section 4.2.3 and will evaluate site and landscape scale hunting access as described in section 4.3.4. Information in these sections is intended to inform the WDFW and USFWS determination of compatibility of the selected alternative with PR funding. If the preferred alternative includes restoration, WDFW and USFWS will make this determination in the subsequent phase of project planning.

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Alternatives Analysis Funding Obligations

The alternatives analysis must be consistent with contractual obligations associated with the Salmon Recovery Funding Board grant (RCO agreement #17-1159P), which is funding the alternatives analysis. It must be consistent with the grant scope, which includes considering 3-4 alternatives that range from no restoration to full restoration.

House Bill 1418

Bill: http://lawfilesext.leg.wa.gov/biennium/2003-04/Pdf/Bills/House%20Passed%20Legislature/1418-S2.PL.pdf?q=20200915082107

Plan:
https://wdfw.wa.gov/sites/default/files/about/advisory/iuag/smith_et_al_2005_tide_gate_salmon_recovery_analysis_skagit.pdf

House Bill 1418 was passed by the state legislature during the 2003 Regular Session. This bill is also known as the Tidegates and Intertidal Salmon Habitat in the Skagit Basin bill. House Bill 1418 was passed specifically to exempt tidegates and drainage infrastructure from fish passage requirements. The legislation provides that if a limiting factors analysis finds that there is insufficent intertidal habitat for salmon recovery, WDFW and the County may jointly initiate a salmon intertidal habitat restoration planning process. This bill specifies that the planning process result in a "long-term plan for intertidal salmon habitat enhancement to meet the goals of salmon recovery and protection of agricultural lands" and that the plan "shall consider all other means to achieve salmon recovery without converting farmland" and finally that the "proposal shall include methods to increase fish passage and otherwise enhance intertidal habitat on public lands…". The task force established by this house bill developed a plan that identified Wiley Slough, Leque Island, Milltown Island, and Deepwater Slough Phase 2 (Island Unit) as Tier 1 areas for future restoration.

Migratory Bird Management

Migratory birds are cooperatively managed between state, federal and international entities. All migratory birds (a total of 1,093 species) are protected under the Migratory Bird Treaty Act (1918), and associated treaties between the United States with Canada, Mexico, Japan and Russia. It is acknowledged in these agreements that wetland habitats during different seasons (breeding, wintering and migration) are needed to achieve and to maintain long-term conservation of population levels, distributions, and patterns of migration for the protection of migratory birds 'for their nutritional, social, cultural, spiritual, ecological, economic, and aesthetic values'. It is under this framework that state law and regulations must consider proposed actions and activities to be consistent with agreed upon protections.

Coordination among partners related to the Migratory Bird Treaty Act (1918) and four international treaties, include:

- Flyway Councils that serve as the interface between state, federal and international entities for all regulatory decisions. The four flyway councils facilitate state, federal, and international

coordination of migratory bird conservation and management, including development of conservation plans to serve as guiding documents.

- The four international migratory bird plans, the North American Waterfowl Management Plan, the United States Shorebird Conservation Plan, the North American Waterbird Conservation Plan, and the Partners In Flight Conservation Plans serve as the guiding principles to align MBTA, the treaties and the North American Wetland Conservation Act.
- The North American Wetland Conservation Act (1989) encourages partnerships among public agencies and other interests to: 1) protect, enhance, restore, and manage an appropriate distribution and diversity of wetland ecosystems and habitats associated fish and wildlife in North America; 2) maintain current or improved distributions of wetlands associated migratory bird populations; and 3) sustain an abundance of waterfowl and other wetland associated migratory birds.
- Migratory Bird Joint Ventures, in coordination with the flyway council's state agencies, are cooperative, regional partnerships that work to conserve habitat for the benefit of birds, other wildlife, and people addressing the bird habitat conservation issues found within their geographic area. Each joint venture has a Strategic Plan that outlines habitat acreage goals to fulfill objectives and agreements of the four migratory bird plans. The south fork delta of the Skagit River falls within the High Priority areas identified in all four migratory bird plans (see USFWS mapping tool: https://fws.maps.arcgis.com/apps/MapSeries/index.html?appid=632303c8dd8547e19b2b3198fac45078

Skagit Tidegate Fish Initiative Implementation Agreement

https://wdfw.wa.gov/sites/default/files/about/advisory/iuag/tfi_ia_final_4_21_10.pdf

The Skagit Tidegate Fish Initiative (TFI) is a signed agreement between WDFW, Western Washington Agricultural Association, National Oceanic and Atmospheric Administration's National Marine Fisheries Service, US Fish and Wildlife Service and commissioners from each of the twelve Skagit Diking, Drainage and Irrigation Districts that manage tidegates. The TFI includes 1) an implementation agreement to achieve functional estuary restoration by linking estuary restoration with long term drainage maintenance needs through a system of credits and debits, and 2) a biological opinion from the National Marine Fisheries Service. The implementation agreement was developed by staff from the signatories as well as the US Army Corps of Engineers, Washington State Department of Ecology, and the Governor's Office. The implementing agreement is based on the Skagit Chinook Recovery Plan, House Bill 1418, and the need to maintain and replace tidegates. The agreement is a "collaborative effort by the participating parties to support estuarine restoration projects within the Restoration Area that are consistent with and provide a direct contribution to achieving the goals and objectives of the Skagit Chinook Recovery Plan" and that the agreement "will provide a system of checks and balances to assure that mutually supportive actions will occur in a timely and cooperative manner throughout the 25-year duration of this Agreement." Island Unit/Deepwater 2 is identified as a potential project that contributes to the goals outlined in the agreement.

4.1.3 Future Cost and Funding

Funding availability for implementation; relative cost of construction

The total cost and likelihood of funding for construction will be considered. Cost estimates will include all design, permitting, mitigation and construction costs. Infrastructure design will reflect climate change predictions such as sea level rise, and take site limitations (such as power not being available) into account. Implementation cost is a quantitative metric and prediction of funding availability is a qualitative metric.

Funding availability for O&M; relative cost of O&M

The total annualized cost and likelihood of funding for operation and maintenance will be considered. Cost estimates will include operation and maintenance of dikes, tidegates, blinds and other infrastructure; farming and moist soils management; and control of weeds and other undesirable species. Major repairs to dikes and tidegates will not be included. O&M costs are a quantitative metric and prediction of funding availability is a qualitative metric.

4.2 Fish and Wildlife Needs

4.2.1 ESA-Listed Chinook and Orca Recovery

Endangered Species Act - Background

Congress passed the Endangered Species Act (ESA) on December 28, 1973, recognizing that the natural heritage of the United States was of "aesthetic, ecological, educational, recreational, and scientific value to our Nation and its people." It was understood that, without protection, many of our nation's living resources would become extinct.

The listing of a species as endangered makes it illegal to "take" (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to do these things) that species. Similar prohibitions usually extend to threatened species. Federal agencies may be allowed limited take of species through interagency consultations with NOAA Fisheries or USFWS. Non-federal individuals, agencies, or organizations may have limited take through special permits with conservation plans. WDFW's ability to manage both recreational and commercial fisheries is directly impacted by the ESA listing of Chinook salmon and Southern Resident Killer Whales. There are individual criteria for ESA-listed Chinook and Southern Resident Killer Whales below. Other species of ESA-listed fish are captured below under Food fish and game fish in section 4.2.2.

ESA-Listed Puget Sound Chinook salmon

Puget Sound Chinook were listed as Threatened under ESA in 1999. In response to Chinook salmon being listed under the Federal Endangered Species Act, WDFW co-authored the Skagit Chinook Recovery Plan (SCRP) with the Skagit River System Cooperative, which represents the Swinomish Indian Tribal Community and Sauk-Suiattle Indian Tribe. The SCRP identifies estuary habitat as a limiting factor for Chinook recovery and places estuary habitat in the highest priority category for restoration. The plan also identifies Deepwater Slough Phase 2 (Island Unit) as a high priority project.

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The Skagit Chinook Recovery Plan goal for the estuary is to provide space for an additional 1.35 million smolts, which is a gain of approximately 2,700 acres of estuary. Large sites that support extensive channel area and are located close to migration pathways provide the greatest value toward Skagit Chinook recovery. Deepwater 2/Island Unit is identified as a potential estuary restoration site in the Skagit Chinook Recovery Plan.

- Plan: https://wdfw.wa.gov/sites/default/files/about/advisory/iuag/skagit-chinook-recovery-plan.pdf
- Estuary appendix: https://wdfw.wa.gov/sites/default/files/about/advisory/iuag/skagitchinookrecoveryplanappendix-d-estuary.pdf
- Updated smolt numbers: see Appendix D (pgs. 633-787) in https://wdfw.wa.gov/publications/02123

Alternatives will be assessed based on their alignment with recommendations in the Skagit Chinook Recovery Plan, and their ability to provide habitat for rearing juvenile Chinook. Quantifiable metrics that will be included are:

- Predicted acres of estuary (project footprint)
- Predicted acres of channel habitat (allometric model)
- Smolt carrying capacity (Skagit Chinook carrying capacity model)

Information from the **tidal channel and chinook salmon tech memo** is part of what will be used to evaluate alternatives relative to this criterion.

ESA-Listed Southern Resident Killer Whale (orca)

Southern Resident Killer Whales (SRKW) have been listed as Endangered since 2005 and a recovery plan was completed in 2008 (https://repository.library.noaa.gov/view/noaa/15975). While other populations of killer whales feed primarily on harbor seals or sharks, the primary prey species of SRKW is Chinook salmon. Several factors have been determined to be contributing to the decline of SRKW including prey availability, chemical contaminants, oil spills, vessel interactions and vessel sound. The Orca Task Force identified Chinook production as a core strategy for SRKW recovery. As the largest producer of Puget Sound Chinook, the Skagit River is considered especially important for the production of wild Chinook. NOAA and WDFW found fall Chinook from the Skagit River to be among the top priority stocks for SRKW (https://www.fisheries.noaa.gov/west-coast/endangered-species-conservation/southern-resident-killer-whale-priority-chinook-salmon). Recovery of fall Chinook in the Skagit is limited by the lack of estuary habitat and would benefit from estuary restoration. A

4.2.2 Food fish and Game fish*

Estuary restoration is generally driven by the need to protect or recover a species listed under the Endangered Species Act (ESA) and in the Skagit Delta estuary restoration is focused on ESA listed Chinook. ESA listed bull trout and steelhead are also found in Skagit estuary habitats along with many fish species that are not ESA listed. Pink, chum, and coho salmon, coastal cutthroat trout, and sturgeon are among the food fish and game fish species found occupying estuary habitats in addition to ESA listed Chinook, steelhead, and bull trout.

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Skagit estuary research methods have been specifically designed to capture and address questions about Chinook. Because of the limited scope of the research relatively little has been learned about the roles and estuary life histories of other food fish and game fish species. However researchers have gleaned new information that has shed additional light on food fish and gamefish use of the estuary. Below is a summary of our current understanding.

Bull trout were listed as threatened throughout Washington in November 1999. Research done on bull trout has shown a complex life history with individuals observed hundreds of miles from their natal streams entering estuarine and freshwater habitats to forage. The Skagit estuary provides high value foraging for juvenile bull trout originating from the Skagit as well as adult bull trout from the Skagit and other Puget Sound stocks.

Puget Sound Steelhead were listed as threatened under the ESA in 2007. The understanding of how steelhead use the estuary is limited and until recently they were not thought to use the estuary beyond passing through it as smolts migrating to the ocean and returning as adults to spawn. Recent estuary research using new trapping methods has found parr stage juvenile steelhead in estuary habitats. Parr stage steelhead in Puget Sound steelhead populations are known to be rearing fish as opposed to actively migrating.

Coastal cutthroat trout (searun and resident forms) are a popular fishery, but not much is known about the abundance and life history of the species in the Skagit. We do know that estuary habitats are used by both juvenile and adult coastal cutthroat.

Coho are found in freshwater tidal estuary habitats of the Skagit Riverwhere juvenile coho rear for an extended period prior to outmigrating as smolts. Chum and pink salmon are known to occupy Skagit estuary habitats for about a week during the seaward migration and research from other river systems has suggested they may occupy estuary habitats for up to three weeks.

There is much to be learned about estuary habitat use by fish species other than Chinook. Despite what is not known about use by other food fish and game fish species, all species share the fact that while present in estuaries, regardless of how briefly, they benefit from access to these habitats.

**What are Food fish and Game fish? Food fish include salmon, sturgeon, halibut, bottomfish (such as rockfish and lingcod), forage fish (such as anchovy, herring and sardine), common carp, shad, tuna, mackerel, and others. Game fish include bass, burbot, catfish, crappie, grayling, perch, northern pike, tiger musky, suckers, sunfish, trout (including steelhead), landlocked salmon (such as chinook and coho salmon, and kokanee in designated waters listed in the Sport Fishing Pamphlet), walleye, whitefish and others.*

4.2.3 Shorebird and Waterfowl Conservation

Migratory birds travel vast distances, and their habitats and populations are managed and monitored at multiple scales. For waterfowl, continental habitat needs are agreed to by the U.S., Canada and Mexico under the Pacific Flyway Council. Management and population objectives are developed and described

in the North American Waterfowl Management Plan, and then broken down into regional and smaller planning areas. Washington State is part of the Pacific Coast Joint Venture which is broken down into sub-basin planning areas; the Skagit is in the North Puget Sound Lowlands sub-basin. Breeding population surveys, harvest data and local waterfowl flights all inform population status and management actions for waterfowl.

The U.S. Shorebird Management Plan was completed by the US Fish and Wildlife Service in 2000. The goal of this plan is to ensure that adequate quantity and quality of *shorebird* habitat is maintained at the local level and to maintain or restore *shorebird* populations at the continental and hemispheric levels. The Greater Skagit Delta is designated as a site of Regional Importance under the Western Hemisphere Shorebird Reserve Network.

Wintering waterfowl and shorebirds use the Greater Skagit Delta (Samish, Padilla, Skagit and Port Susan Bays), including the Island Unit, for resting and feeding. The effect of restoring estuary habitat on waterfowl and shorebirds is not well-documented or understood. The limited studies and data that are available related to the value of managed upland vs. tidal estuarine habitats for waterfowl and shorebird conservation in the Greater Skagit Delta will be described in a **waterfowl and shorebird tech memo.**

For this criterion we will consider the importance of the Island Unit and how it is managed to waterfowl and shorebirds that winter in the Greater Skagit Delta. Information from the **waterfowl and shorebird tech memo** will be used to qualitatively evaluate alternatives relative to this criterion.

4.3 Community Interests

4.3.1 Agriculture

Both House Bill 1418 and the Tidegate Fish Initiative are key considerations for the agricultural community. Links and descriptions of these agreements are included above. HB1418 required that a plan be developed to recover Chinook salmon with the least impact to private commercial farmland. The TFI identifies Deepwater Slough Phase 2 as a project that would generate credits and therefore provides a benefit to the agricultural community and their need to maintain drainage infrastructure.

In addition to HB1418 and TFI, which provide benefits to agricultural interests, the Skagit Hydrodynamic Modeling (HDM) Project also highlighted the importance of certain projects to agriculture for a variety of reasons. This study is another key consideration for the agricultural community related to Island Unit. https://wdfw.wa.gov/publications/02123

Acknowledging that not all restoration projects hold the same value in terms of Chinook recovery or other community values, the HDM project sought to prioritize potential projects using a quantitative, multiple-interest framework and applying the best available science. Agricultural, flood risk and Chinook recovery interests were included in the assessment. The project evaluated 23 projects for their relative benefits and negative impacts to farm, fish and flood interests. Based on the results, the Island Unit project is in the highest priority group of projects.

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4.3.2 Passive Recreation

It is important to note that this site is not used by many passive recreational users due to access being by boat only. Because passive recreational use is limited, the specific users and their preferences are relatively unknown. We assume some enjoy wildlife viewing and bird watching; others enjoy walking, photography or kayaking. We assume that some value ease of access by boat and then on foot as described above in the waterfowl hunting section, while others may prefer native estuarine habitats where dynamic processes shape landforms and conditions change frequently. A variety of habitats, species and experiences are likely valued by limited numbers of passive recreational users on and around the site.

For these reasons, passive recreational use will be considered, but a detailed analysis of this topic related to the alternatives won't be completed.

4.3.3 Recreational Fishing

The primary consideration for recreational fishing is whether proposed actions support the recovery and health of fishable populations. The ESA listing of Puget Sound Chinook salmon, in particular, has constrained fishing seasons internationally, nationally, and within Washington coastal and Puget Sound waters, and river systems. There are six identified unique Chinook populations in the Skagit system and all of those have specific limits on how much harvest from each population or summed populations is allowable. When fishery managers model fisheries, harvest levels for each and every Chinook population from the Skagit and all Washington Chinook populations are estimated to make sure no population is over fished. If a stock falls into critical status, it gets even more protection which often leads to severe curtailment of opportunities because all fisheries are managed to minimize impacts to the critical stock. Actions that support the recovery of Chinook, including restoring estuary habitat for juvenile rearing, can preserve and increase fishing opportunities in the Skagit River, Puget Sound, and beyond.
Ease of access on the site is not included in this criterion since recreational fishing is primarily boat-based or from marine shorelines in Puget Sound and not from riverine or estuarine shorelines at the site.

4.3.4 Waterfowl Hunting

There are both site-scale and landscape-scale considerations when it comes to assessing waterfowl hunting opportunity.

At a site scale, considerations that will be taken into account when assessing this category are the type and variability of forage that is grown to attract waterfowl throughout the season and the number of hunting parties the site can support at any given time based on the layout of the site. Another consideration at the site scale is ease of access, which includes boat access to the site and ease of walking on the site. In terms of boat access, the primary consideration is the number and location of boat landings for a variety of watercraft (kayaks, trailered boats, etc.). Ease of walking includes the character of the walking surface (mostly mowed dikes, managed fields and ditches with predictable water levels vs. evolving channels, vegetated marsh and logs with changing water levels), which influences the predictability of walking conditions. Each of these site scale metrics will be assessed qualitatively by WDFW staff with input from the advisory group.

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On a landscape scale, the availability of similar huntable forage types and acreages throughout the Skagit delta and broader North Puget Sound region is a consideration within the waterfowl hunting criteria. WDFW will complete an inventory of all lands managed through its Wildlife Areas and Private Lands Access Program within Region 4 and specifically in the Skagit delta, and will compare acreage numbers between the year 2000 (prior to salmon recovery projects) and 2016. The habitat type categories are: enhanced forage, managed forage, non-forested upland, intertidal, and riparian (tree/brush). This method is proposed because it is an easily measured and objective way to assess how WDFW's contribution to habitats that support hunting opportunities have changed on a landscape scale. Additionally, existing data will be compiled to evaluate the amount of hunt days statewide, county-wide and at the site scale to give a rough characterization of how the Island Unit and Skagit County relate to Objective 104 in the July 2015-June 2021 WDFW Game Management Plan, which statewide is to "Maintain hunter numbers between 35,000-45,000 and recreational use days between 300,000-500,000, consistent with population objectives."

4.4 Climate Change Resilience

Long-term resilience to climate change effects such as sea level rise and changing weather patterns and river hydrology will be considered. While sea level rise predictions for a 50-year time horizon will be incorporated into how construction costs are developed, this criterion will consider whether each alternative is resilient to the anticipated effects of climate change over a longer time frame and the robustness provided by each alternative given that there is uncertainty in how factors affecting the Island Unit will change. The ability for habitats to migrate and the potential for flood risk reduction will be part of this criterion. Information from the g**eomorphic assessment and water surface elevation tech memo** will be used to assess this criterion.

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5. Analysis of Conceptual Design Alternatives

Alternatives were rated for each criterion using the summary rating system in Table 1. Ratings were determined as relative to current conditions. Some criteria did not "fit" the rating system. In those cases the rating systems are explained in individual criterion sections below. As noted above in the introduction to section 4, some criteria are assessed based on quantitative information and data, and some criteria are assessed based on qualitative information and best professional judgement of WDFW staff.

Table 1. System used to rate alternatives relative to each criterion.

Substantial positive change	+ +
Positive change	+
Some positive effects, some negative effects	+/-
Comparable to existing conditions	√
Negative change	-
Substantial negative change	- -

The summary ratings for each alternative and each criterion are provided in Table 2 and explained in the text below. **Ratings provide a summary only and not a complete understanding of all implications of a particular alternative relative to a criterion.** The detailed implications are described in the the text following the summary table. Also, please note that a negative change (-) or substantial negative change (--) does not mean that the alternative provides no remaining value or benefit for the criterion in question.

Lastly, the table is intended to capture the primary issues (criteria) that affect a decision regarding future management of the Island Unit. The ratings in the table will not be summed to provide a "total rating" per alternative, or to rank the alternatives from highest to lowest.

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Table 2. Summary ratings for each alternative relative to each criterion.

	criteria																								
	WDFW policies					Agreements & obligations					Costs and funding			Fish and wildlife needs							Community interests				Resi-lience
NOTE: the ratings in this table are a summary only; for a complete understanding of the ramifications of each alternative to a criterion, please read the entirety of section 5.	purpose of dept lands	policy 5003: salmon & steelhead initiative	policy 5004: conservation initiative	policy 5211: protecting & restoring wetlands	state wildlife area goals	Acquisition funding obligations	Alt analysis funding obligations	House Bill 1418	Migratory bird management	Skagit tidegate fish initiative	cost and likelihood of implementation funding	likelihood of O&M funding	relative cost of O&M	ESA-listed Chinook	ESA-listed orca/SRKW	Food fish & game fish	shorebirds - site scale	shorebirds - GSD scale	waterfowl - site scale	waterfowl - GSD scale	Agriculture	Passive Recreation	Recreational fishing	Waterfowl hunting	Climate change resilience
Alt 1: No Restoration	+/-	-	+/-	-	+/-	yes	yes	-	+/-	-	not likely	un-certain	√	-	-	-	√	√	+	√	-	√	-	+	-
Alt 2: Partial Restoration (east island)	+/-	+	+/-	+	+/-	TBD	yes	+	+/-	+	un-known	un-certain	√	+	+	+	+	+	+/-	√	+	+/-	+	-	+
Alt 3: Partial restoration (levee setback)	+/-	+	+/-	+	+/-	TBD	yes	+	+/-	+	un-known	un-certain	√	+	+	+	+	+	+/-	√	+	+/-	+	-	+/-
Alt 4: Full restoration	+/-	++	+/-	++	+/-	TBD	yes	++	+/-	++	un-known	un-certain	√	++	++	+	++	++	--	-	++	+/-	++	--	++

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5.1 Management, Regulatory & Policy Considerations

5.1.1 WDFW Policies

Declaration of purpose—Department lands: WAC 232-13-020

Conservation of fish and wildlife and their habitats are the priority purposes of WDFW lands. Hunting and fishing and other recreational opportunities are allowed when compatible with the primary uses. Each alternative will conserve habitats for a different suite of species. All alternatives will provide hunting, fishing and other recreational opportunities. For this reason all alternatives received a "+/-"

Policy 5003: Managing the 21st Century Salmon and Steelhead Initiative

Alternatives differ in their ability to contribute to salmon and steelhead habitat needs, which are a component of land management decisions on WDFW lands.

- Alt 1 does not provide any habitat for salmon and steelhead. Although Alternative 1 does not decrease the habitat value for salmon compared to the baseline condition, by rebuilding infrastructure to restrict salmon access it would commit WDFW to continuing the current management for a longer period of time than current infrastructure supports. For these reasons Alternative 1 received a "-"
- Alt 2 provides 170 acres of additional habitat for salmon and steelhead so it received a "+"
- Alt 3 provides 110 acres of additional habitat for salmon and steelhead so it received a "+"
- Alt 4 provides 270 acres of additional habitat for salmon and steelhead so it received a "++"

Policy 5004: Department's Conservation Initiative and Guiding Principles

All alternatives involve working collaboratively and using best available science from across a range of disciplines and interests to accomplish our work. For this reason all alternatives received a "+/-"

Policy 5211: Protecting and Restoring Wetlands

Alternatives differ in their ability to provide functional wetlands that rely on natural processes and are appropriate for the geomorphic setting where the site is located. Additional information related to this criterion can be found in the Geomorphic Assessment Tech Memo

- Alternative 1 provides important freshwater wetlands that have been lost from the landscape. Providing them at this location, however, is not consistent with the natural processes or geomorphic setting of the site. Current site infrastructure and management specifically excludes original hydrology, processes that shape elevation and native plant communities. In this location, tidal and riverine processes allowing the flow of sediment, nutrients, organisms and wood are the natural processes that shape functional wetlands appropriate to the site. Alternative 1 would continue to exclude original hydrology, processes that shape elevation and native plant communities. For these reasons, Alternative 1 received a "-".
- Alternative 2 provides 170 acres of additional area subject to natural processes appropriate for the site location. For this reason, Alternative 2 received a "+". Additionally, with restoration of

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the entire east island, more natural hydrology is possible for the lower south fork Skagit. In essence, the "plug" in the lower river caused by Island Unit levees is reduced.

- Alternative 3 provides 110 acres of additional area subject to natural processes appropriate for the site location. For this reason, Alternative 3 also received "+". Note that the natural hydrology is not restored at a reach level to the same degree it would be with Alternative 2 because more of a "plug" would remain with Alternative 3.
- Alternative 4 provides 270 acres of additional area subject to natural processes appropriate for the site location and maximizes the functional wetland appropriate for this location. Additionally Alternative 4 removes all barriers (levees) to natural hydrology in the lower south fork at the Island Unit. For these reasons, Alternative 4 received a "++"

Washington State Wildlife Area Goals 1-3

Similar to the purpose of state lands, wildlife area goals focus on restoring and protecting the integrity of priority ecological systems and sites, and sustaining species through management actions. All alternatives will restore, protect and manage priority ecological systems for some species and preclude ecological systems for other. For these reasons all alternatives received a "+/-"

5.1.2 Obligations and agreements

Acquisition funding obligations

Pittman-Robertson funds are the only funds used for acquisition of the Island Unit that have specific obligations. In this case the property was purchased with P-R funds "for the propagation of game and as a public hunting area." The system developed for ratring alternatives relative to a particular topic/criterion compares relative benefit or impact of a proposed action with existing conditions. In this case, we are asking whether a particular action is compatible with funding obligations. Because Alternative 1 is comparable to current conditions, there is certainty that it is compatible with P-R obligations so it was given a "yes". Alternatives 2-4 would provide habitat for game species and be open for public hunting, and so appear to be consistent with P-R obligations. However, because these scenarios would involve changes to each of these elements, additional discussion with USFWS will be needed in the subsequent project planning phase if one of these alternatives is selected. Due to the need for this additional discussion, Alternatives 2-4 were given "to be determined." Although there is uncertainty in this element at this phase of the project, there is certainty that WDFW must confirm compliance with this criterion in the next project phase if a restoration alternative is selected.

Alternatives analysis funding obligations

SRFB funds for this project require considering 3-4 alternatives that range from no restoration to full restoration. Alternatives that are being considered as part of the analysis meet this requirement. Similar to the P-R rating discussion, we are asking whether a particular action is compatible with funding obligations. For this reason, all alternatives were given a "yes."

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House Bill 1418

Estuary restoration on public lands in support of Chinook recovery is a key feature of HB 1418, and the subsequent report identified Deepwater 2 (Island Unit) as a Tier 1 priority for restoration. It is the only Tier 1 project that has not been restored.

- Alternative 1 does not restore estuary on public lands and does not restore any portion of a Tier 1 project. Because new infrastructure has a longer life-span than current infrastructure, we assume the opportunity for restoration is not possible for many years. For these reasons Alternative 1 received a "-".
- Alternative 2 provides 170 acres of additional estuary habitat on public lands within a Tier 1 project footprint. For this reason Alternative 2 received a "+". Because new infrastructure has a longer life-span, we assume the opportunity for additional restoration would not be possible for many years.
- Alternative 3 provides 110 acres of additional estuary habitat on public lands within a Tier 1 project footprint. For this reason Alternative 3 received "+". Because new infrastructure has a longer life-span, we assume the opportunity for additional restoration would not be possible for many years.
- Alternative 4 provides 270 acres of additional estuary habitat on public lands and maximizes restoration within a Tier 1 project footprint. For these reasons Alternative 4 received "++".

Migratory Bird Management

Changes to wetland habitats have implications for migratory birds that are managed under the migratory bird treaty act and subsequent treaties and plans. Because specific site-management requirements are not outlined in the agreements that come from the Migratory Bird Treaty Act, site management decisions are not vetted with the state and federal agencies involved. It is unknown how the proposed changes would be viewed by various state and international partners. Elsewhere in this document we evaluated shorebird and waterfowl needs, two of the classes of migratory birds. In general waterfowl are thought to benefit from enhanced and managed waterfowl and shorebirds are thought to benefit from estuarine habitat.

- Alternative 1 continues management similar to existing conditions except that replacing infrastructure improves conditions for management activities associated with enhanced and managed waterfowl forage and at the same time precludes restoration of estuarine habitats important for shorebirds for a longer period of time. For these reasons, Alternative 1 received a "+/-"
- Alternative 2 changes management of a portion of the site to native estuarine wetlands. Because waterfowl and shorebirds have different habitats needs, Alternative 2 received a "+/-"
- Alternative 3 changes management of a portion of the site to native estuarine wetlands. Because waterfowl and shorebirds have different habitats needs, Alternative 3 received a "+/-"
- Alternative 4 changes management of the site to native estuarine wetlands. Because waterfowl and shorebirds have different habitats needs, Alternative 4 received a "+/-"

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Skagit Tidegate Fish Initiative Implementation Agreement

The Tidegate Fish Initiative Implementation Agreement ("TFI") balances the needs of districts that manage and maintain tidegates with progress toward estuary restoration goals for Chinook recovery. Estuary restoration benefits both salmon recovery and those that rely on drainage. Through the TFI agreement, estuary restoration results in credits that can be used when tidegate maintenance or repairs are needed.

- Alternative 1 does not restore estuary and generate credits. Because new infrastructure has a longer design life than current infrastructure, we assume the opportunity for restoration and credits is not likely for many years. For these reasons Alternative 1 received a "-"
- Alternative 2 provides 170 acres of additional estuary habitat and generates approximately 170 credits. Although Alternative 2 does not maximize the number of acres restored and credits generated, it is still a significant gain. For these reasons Alternative 2 received a "+".
- Alternative 3 provides 110 acres of additional estuary habitat and generates approximately 110 credits. Although Alternative 3 does not maximize the number of acres restored and credits generated, it is still a significant gain. For these reasons Alternative 3 received a "+".
- Alternative 4 provides 270 acres of additional estuary habitat and generates approximately 270 credits. For these reasons Alternative 4 received a "++"

5.1.3 Future Costs and Funding

Likelihood of Funding/Cost of Implementation

The likelihood of funding and cost of implementation have been combined into a single criterion.

The "opinion of probable construction costs" was developed by WDFW's Region 4 Habitat Engineer (Opinion of Probable Construction Cost). Because alternatives are conceptual at this stage, construction costs are provided as a general basis for comparison only, and are considered in combination with the likelihood that funding could be obtained for a particular alternative. Estimated costs were derived from actual costs from similar nearby projects and adjusted for inflation to the year 2020. Cost estimates include design, permitting, construction, construction inspection and oversight, mitigation and contingencies. For partial and full alternatives, natural estuarine hydrology may be restored by removing less than 100% of the dike length. For this reason a range of costs is provided that represents removal of 50-100% of the dike length.

Funding for any of the alternatives will be done through competitive processes and will target funding sources that focus on the type of management that a particular alternative supports. Funding for alternatives that have ecosystem benefits such as estuary restoration, natural processes restoration and restoration of habitats for ESA-listed species is available. Numerous state and federal grant programs fund actions that have ecosystem benefits. These funding sources prioritize actions that maximize restored acreages, fully restore natural process, are cost-effective, provide climate resilience and are supported in local and regional plans such as the Skagit Chinook Recovery Plan, Puget Sound

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Action Agenda and assessments associated with the Puget Sound Nearshore Ecosystem Restoration Program, among others. Estuary restoration on WDFW-owned land has ranked very well and been funded in the past. Funding for the "no restoration" alternative is uncertain. Based on past experience, obtaining funding through WDFW's capital budget process for infrastructure replacement in support of current site management at Island Unit is not likely. Other funding sources that could be used to replace infrastructure and allow for current management to continue are sources such as Duck Stamp and WWRP State Lands Development funds. However, these sources generally provide a much smaller amount of funding relative to salmon and ecosystem funding sources, and increasingly value actions that provide long term sustainability. Similar to the funding obligations rating discussion above, this is not a benefit or impact relative to existing conditions. Instead we are using a system of relative likelihood, ranging from very likely to very unlikely.

- The opinion of probable construction cost for Alternative 1 is $6.5M. Alternative 1 actions support management that does not meet ecosystem or salmon funding sources' priorities, and so would not be funded by salmon and ecosystem sources. It is also very unlikely to be funded through non-salmon and ecosystem funding sources due to the low dollar amounts of funding provided through these sources relative to the cost and also due to questions about long-term sustainability. For these reasons, funding for Alternative 1 is considered "very unlikely."
- The opinion of probable construction cost for Alternative 2 is $8.2-10.4M. Alternative 2 is the lower-cost partial restoration alternative and provides 170 acres of estuary. The cost of removing infrastructure on the east portion of the site is relatively low compared with setback levees and tidegates on both islands. In addition, Alternatives 2 provides greater process restoration and climate resilience and is, therefore, likely to be funded by salmon recovery and ecosystem restoration sources. However, funding to upgrade infrastructure on the west island in support of enhanced winter waterfowl forage production is not consistent with ecosystem and salmon recovery funding priorities and is more costly than non-salmon sources can provide. For these reasons, funding for Alternative 2 is considered "unknown."
- The opinion of probable construction cost for Alternative 3 is $9.9-11.7M. Alternative 3 is the higher-cost partial restoration alternative and provides fewer (110) acres of restored estuary, less process restoration and less climate resilience than Alternative 2 or 4. In addition, the cost of building a setback levees on both the east and west islands increases the cost-benefit ratio compared to Alternative 2 from a salmon recovery and ecosystem restoration perspective. Funding for setback dikes as part of restoring the southern portions of each island could be covered by salmon and ecosystem restoration sources, but the likelihood of funding for other site upgrades through these sources is unknown. Funding these site upgrades is more costly than non-salmon sources can provide. For these reasons, funding for Alternative 3 is considered "unknown."
- The opinion of probable construction cost for Alternative 4 is $9.3-13.0M. Alternative 4 provides full process restoration, maximizes the restored acres, provides the greatest climate resilience and has the lowest cost-benefit ratio from a salmon recovery and ecosystem restoration perspective because infrastructure is removed and not upgraded. All of these factors mean Alternative 4 is well-aligned with ecosystem restoration and salmon

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recovery funding priorities. For these reasons, funding for Alternative 4 is considered "very likely."

Likelihood of funding for O&M

Current operation and maintenance funding for the Island Unit comes through the wildlife program budgeting process. It is a combination of funding from Wildlife General Fund and program-generated income, and a very small amount of Pittman-Robertson Act funds for select activities. O&M funding levels through the Wildlife General Fund and Pittman-Robertson Act are difficult to predict in any given biennium. Funding for O&M activities such as cattail control have historically been funded with competitive grants. Funds for O&M activities associated with any of the alternatives comes with some degree of uncertainty as it relates to the source and amount of funds. For this reason, all alternatives received a rating of "uncertain."

Relative cost of O&M

Cost estimates were developed by WDFW Wildlife Area and Weed Crew staff (O&M costs). Operation and maintenance funding costs include applicable current site management costs and/or the cost of future estuary management actions such as weed control, depending on the alternative. Cost estimates include labor, materials and equipment for the following categories: administration, ferrying/prep/miscellaneous, field prep/planting/spraying, dike and field mowing/maintenance, equipment maintenance, drainage/water control, blind construction/ maintenance, noxious weed survey and noxious weed control.

Current management relies on arrangements that allow WDFW to manage the site for less cost than fair market value for similar services. These arrangements include the lease of a barge for $1/year and a dedicated and skilled volunteer labor force that contributes well over 100 hours per year (136 hours in 2019). These arrangements may or may not continue into the foreseeable future. Management costs in the year 2019 were $41,382, which includes $7,670 in volunteer labor.

For future O&M cost-estimating purposes, a range of costs is provided for each alternative. For each alternative we provide a range of costs that considers the following:

1. Because the certainty of the current barge and volunteer labor arrangements into the future is unknown, costs for alternatives that include current management on all or a portion of the site are also unknown. We developed a range of costs where the low end of the range assumes current arrangements continue and the high end assumes WDFW would have to pay more for barging and equipment. We did not include fair market rates in the high end of the range for services currently provided by volunteers.
2. Because the amount of weed establishment in restored areas is uncertain, the amount of weed control that might be needed is also uncertain. As such, the O&M costs for alternatives that include partial or full restoration include a range where the low end of the range includes weed survey only and no weed control and the higher end of the range includes survey and control of weeds on all restored acres.

The ranges and ratings for each alternative are provided below.

- Annual O&M costs for Alternative 1 are estimated to be $41,382 to $54,836. This is similar to the amount that is currently spent on O&M at the site so Alternative 1 received a "√"
- Annual O&M costs for Alternative 2 are estimated to be $25,890 to $58,860. This is similar to the amount that is currently spent on O&M at the site so Alternative 1 received a "√"Annual O&M costs for Alternative 3 are estimated to be $35,643 to $60,459. This is similar to the amount that is currently spent on O&M at the site so Alternative 1 received a "√"
- Annual O&M costs for Alternative 4 are estimated to be $7,862 to $52,600. This is similar to the amount that is currently spent on O&M at the site so Alternative 1 received a "√"

5.2 Fish and Wildlife Needs

5.2.2 ESA-listed Chinook and Orca Recovery

ESA-listed Puget Sound Chinook salmon

Recommendations from the Skagit Chinook Recovery Plan include increased estuary habitat (area and smolt carrying capacity). Quantitative metrics used to compare the alternatives are predicted acres of estuary, predicted acres of channel habitat and predicted smolt carrying capacity. Channel acres and smolt carrying capacity numbers are taken from the Tidal Channel and Chinook Salmon Tech Memo.

- Alternative 1 would provide no gain in estuary acres, channel acres or smolt carrying capacity. Because infrastructure would be updated, we assume no restoration is likely for some period of time. For these reasons, Alternative 1 received a "-"
- Alternative 2 would provide 170 acres of estuary, 6.79 acres of channel and room for 45,776 (predicted range = 37,371 - 53,692) additional smolts. For these reasons, Alternative 2 received a "+"
- Alternative 3 would provide 110 acres of estuary, 4.47 acres of channel and room for 29,135 (predicted range = 26,116 - 32,309) additional smolts. For these reasons, Alternative 3 received a "+"
- Alternative 4 would provide 270 acres of estuary, 10.31 acres of channel and room for 72,820 (predicted range = 59,377 - 86,035) additional smolts. It would also maximize outcomes for Chinook on the site. For these reasons, Alternative 4 received a "++"

ESA-listed Southern Resident Killer Whale (orca)

This criterion considers estuary restoration to increase the availability of the orca's primary prey (Chinook), and the importance of Skagit Chinook, in particular, for orca. The rationale for rating alternatives using the orca criterion mirrors the rationale and rating for the Puget Sound Chinook salmon criterion above. Although the relationship between increases in estuary and benefits to orca is not direct, ratings took into consideration that prey availability is a key strategy for orca recovery and Skagit Chinook's particular importance amongst Chinook stocks for orca.

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- Alternative 1 would provide no gain in estuary acres, channel acres or smolt carrying capacity. Because infrastructure would be updated, we assume no restoration is likely for some period of time. For these reasons, Alternative 1 received a "-"
- Alternative 2 would provide 170 acres of estuary, 6.79 acres of channel and room for 45,776 (predicted range = 37,371 - 53,692) additional smolts. For these reasons, Alternative 2 received a "+"
- Alternative 3 would provide 110 acres of estuary, 4.47 acres of channel and room for 29,135 (predicted range = 26,116 - 32,309) additional smolts. For these reasons, Alternative 3 received a "+"
- Alternative 4 would provide 270 acres of estuary, 10.31 acres of channel and room for 72,820 (predicted range = 59,377 - 86,035) additional smolts. It would also maximize outcomes for Chinook on the site. For these reasons, Alternative 4 received a "++"

5.2.1 Food fish and Game fish

Since all species described in this criterion spend time in estuaries, we assume they derive some benefit from access to these habitats.

- Alternative 1 does not provide any habitat for food fish and game fish. Although Alternative 1 does not decrease the habitat value compared to the baseline condition, by rebuilding infrastructure to restrict fish access it would commit WDFW to continuing the current management for a longer period of time than current infrastructure supports. For these reasons Alternative 1 received a "-"
- Alternative 2 provides 170 acres of additional estuary habitat so it received a "+"
- Alternative 3 provides 110 acres of additional estuary habitat so it received a "+"
- Alternative 4 provides 270 acres of additional estuary habitat. While this is more habitat than in alternatives 2 and 3, the relative amount of benefit food fish and game fish experience from additional estuary habitat is unknown, so Alternative 4 also received a "+"

5.2.3 Shorebird and waterfowl conservation

Refer to the Waterfowl and Shorebird Tech Memo for information related to this section.

Shorebirds – site scale

Although shorebirds use the Island Unit under certain conditions provided by current management (wet, unvegetated soils), shorebirds are primarily tied to intertidal marshes and mudflats. Any increase in estuarine habitats at the site scale will benefit shorebirds.

- Alternative 1 would not provide any additional estuary habitat, which is similar to existing management. For this reason, Alternative 1 received a rating of "√"
- Alternative 2 would provide 170 acres of additional estuary habitat. For this reason, Alternative 2 received a rating of "+"
- Alternative 3 would provide 110 acres of additional estuary habitat. For this reason, Alternative 3 received a rating of "+"

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- Alternative 4 would provide 270 acres of additional estuary habitat. For this reason, Alternative 4 received a rating of "++"

Shorebirds – GSD scale

Shorebirds are highly mobile and routinely move within the GSD. The habitats they use are primarily estuary and adjacent farmland; many species do not venture inland as far as waterfowl to seek foraging and resting habitats. In addition, estuary habitat losses continue to occur due to coastal erosion and human impacts. Consequently, as estuary is restored and intertidal shorebird habitat increases, shorebird populations will likely also benefit at the GSD scale. As such the ratings for this criterion are the same as those for the site-scale shorebird criterion.

- Alternative 1 would not provide any additional estuary habitat, which is similar to existing management. For this reason, Alternative 1 received a rating of "√"
- Alternative 2 would provide 170 acres of additional estuary habitat. For this reason, Alternative 2 received a rating of "+"
- Alternative 3 would provide 110 acres of additional estuary habitat. For this reason, Alternative 3 received a rating of "+"
- Alternative 4 would provide 270 acres of additional estuary habitat. For this reason, Alternative 4 received a rating of "++"

Waterfowl – site scale

At the site scale, waterfowl benefit from farmed forage (enhanced/managed winter waterfowl forage) and carefully managed water levels that optimize ducks' ability to access the forage. A reduction in acres managed as they are currently managed on the Island Unit will reduce the calories available to waterfowl at the site scale and reduce waterfowl numbers that congregate on the site. It is important to note that for partial and full restoration alternatives, a change from managed and enhanced winter waterfowl forage to estuary forage is not a total loss of forage value, but a reduction in forage value. The caloric value of estuarine systems for waterfowl in the Pacific Northwest has not been quantified, but is thought to be significantly lower than enhanced and managed forage.

Managed and enhanced forage result in concentrated waterfowl use and therefore increased hunting pressure which is a source of disturbance. Current management and hunting disturbance have changed waterfowl behavior so that the majority of foraging and resting activity on site occurs during non-hunting hours (hours of darkness) from mid-October until the end of January. Conversely, estuarine habitats experience less hunting disturbance per acre because concentrations of waterfowl are lower. Hunter use and disturbance would likely be reduced in areas restored to estuary.

Because forage availability (caloric value and water levels that support foraging) are thought to be the largest drivers in waterfowl conservation at the site, those factors were the ones used to develop the summary ratings below.

- Alternative 1 maintains 270 acres as is, including 141 acres in enhanced/managed winter waterfowl forage production. With updated infrastructure that provides more reliable water

control, water level management at the site will be improved. For these reasons, Alternative 1 received a rating of "+"

- Alternative 2 maintains 100 acres as is, including 54 acres of enhanced/managed winter waterfowl forage production. Similar to Alternative 1, with updated infrastructure water level management at the site will be improved. 170 acres of the site will be restored to estuary, resulting in a loss of 87 acres of forage production. Waterfowl forage is available in the restored estuary but has lower forage plant density and caloric content. Access to food resources is only available at certain tides. For these reasons, Alternative 2 received a rating of "+/-"
- Alternative 3 maintains 160 acres as is, including 81 acres of enhanced/managed winter waterfowl forage production. Similar to Alternative 1, with updated infrastructure water level management at the site will be improved. 110 acres of the site will be restored to estuary, resulting in a loss of 60 acres of forage production. Waterfowl forage is available in the restored estuary but has lower forage plant density and caloric content. Access to food resources is only available at certain tides. For these reasons, Alternative 3 received a rating of "+/-"
- Alternative 4 does not maintain any portion of the site in enhanced/managed winter waterfowl forage production and water levels are no longer managed. Waterfowl forage is available in the restored estuary but has lower forage plant density and caloric content. Access to food resources is only available at certain tides. For these reasons, Alternative 4 received a "--"

Waterfowl – GSD scale

Waterfowl use many habitat types and food resources across the greater Skagit delta (GSD). Because the Island Unit is small relative to areas that waterfowl use within the GSD, changes in management at the Island Unit are unlikely to result in a decline in the winter waterfowl population at the GSD scale, but rather shift the number of dabbling ducks to disperse across the larger landscape. We assume at a landscape scale that any loss in forage value at the site will be made up for on the larger landscape, but WDFW does not control the management of the larger landscape, which adds uncertainty to the outcome of all alternatives.

- Under alternatives 1-3, the Island Unit will continue to contribute to production of waterfowl forage with the highest caloric content within the GSD. For these reasons, alternatives 1-3 received a rating of "√".
- Alternative 4 received a "-" because under this scenario, the Island Unit provides a reduced contribution to waterfowl forage at the landscape scale, and waterfowl would rely more heavily on the ability of surrounding lands that are not controlled by WDFW to provide forage. Note that waterfowl populations are not expected to decline at the landscape scale under this scenario.

5.3 Community values

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5.3.1 Agriculture

In addition to HB1418 and TFI (captured above), the Skagit Hydrodynamic Modeling (HDM) Project also highlighted the importance of certain projects to agriculture. The Island Unit project is in the highest priority group of projects based, in part, on maximizing benefits and minimizing negative impacts to agriculture. For these reasons restoration of the site is considered positive for agriculture.

- Alternative 1 would not provide any restoration at Island Unit and infrastructure upgrades ensure the site is not restored to estuary for the foreseeable future. For these reasons, Alternative 1 received a "-"
- Alternative 2 would provide partial restoration of the Island Unit site. For this reason, Alternative 2 received a "+"
- Alternative 3 would provide partial restoration of the Island Unit site. For this reason, Alternative 2 received a "+"
- Alternative 4 would provide full restoration of the Island Unit site, maximizing the benefits and minimizing the negative impacts of restoration on agriculture. For these reasons, Alternative 4 received a "++"

5.3.2 Passive recreation

Passive recreational users enjoy a variety of activities and experiences (e.g. birdwatching, photography, etc.) and value different habitat types. We assume that updating infrastructure maintains the status quo for recreational users, and any change provides benefits for some users and negatively impacts others. For these reasons, Alternative 1 received a "v" and all others alternatives received a "+/-"

5.3.3 Recreational fishing

Estuary habitat restoration that provides additional rearing habitat is an important action in the recovery of Puget Sound Chinook salmon. Gains in Puget Sound Chinook numbers are closely linked to increased fishing opportunities within Washington coastal and Puget Sound waters and river systems, including recreational fisheries. Increased estuary habitat also supports the health of other food fish and game fish that provide important recreational fisheries. As a result, the ratings and rationale in this criterion mirror those for the "Chinook salmon" criterion above: gains in estuary habitat (including predicted acres of estuary, predicted acres of channel habitat and predicted Chinook smolt carrying capacity) are positive; continuing to isolate areas is negative.

- Alternative 1 received a "-"
- Alternative 2 received a "+"
- Alternative 3 received a "+"
- Alternative 4 received a "++"

5.3.4 Waterfowl hunting

Site scale considerations: Preferences on the type and style of waterfowl hunting are very subjective and personal. However, as it relates to this alternatives analysis WDFW staff and waterfowl hunters suggested that the following factors should be considered: 1) The availability of enhanced winter waterfowl forage which attracts high concentrations of waterfowl use through the whole hunting

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season. 2) The number of hunting parties supported by the site which can include number of blinds and non-blind-based hunting opportunities. 3) Site access which includes the number of boat landing sites and predictability of walking conditions.

Note: Although factors 1-3 would be reduced or altered in alternatives that reduce the amount of acres under current management, hunting in native and restored estuary is valued and preferred by some hunters and would be allowed on any portion of the site that is restored.

Landscape scale considerations: The availability of similar huntable forage types and acreages throughout the Skagit delta and broader North Puget Sound region was also considered. The forage types considered include: enhanced forage, managed forage, non-forested upland, intertidal, and riparian (tree/brush). An inventory of WDFW-managed lands within the Skagit delta that are available for public hunting compared how habitat types within those lands have changed since 2000 (refer to the Hunted Habitats appendix). The summary finding of that inventory is that WDFW has continued to provide a diverse portfolio of waterfowl hunting land in the Skagit delta and huntable habitat acreages have increased in every category since the year 2000 except for the "enhanced waterfowl forage", which has decreased by 547 acres, and a slight decrease in "riparian/brush" and "non-forested upland" habitat, which aren't preferred by waterfowl hunters.

In addition to the considerations listed above, WDFW compiled existing data to help contextualize the contribution of the Island Unit in its current management regime with Skagit County and statewide numbers. Recent estimates from WDFW's Small Game Questionnaire indicates that total waterfowl hunter days afield is below the 300,000 statewide objective stated in the WDFW Game Management Plan (Objective 104). Skagit County ranks 2nd amount Washington counties, providing an average of 20,000 waterfowl hunter days afield. This ranks Skagit County 36th out of 3,115 counties nationally. A considerable portion of this hunting effort occurs on public lands, with 64.7% of hunters within the Pacific Flyway indicating they hunt on public land with 64.3% indicating the lack of public places is a moderate to very severe problem and 26.3% indicating it is a very severe problem (National Survey of Waterfowl Hunters: Summary Report for the Pacific Flyway (Slagle and Dietsch 2018)). WDFW has counted boat trailers parked at the two nearest boat launches to the Island Unit at Headquarters and Conway between 2016-2019 during waterfowl hunting season. These counts total 5,253 boat trailers over four hunt seasons, which averages as 1,313 boats per season. The percentage of these boats that hunt at the Island Unit as opposed to other sites nearby is uncertain, as is the number of hunters per boat. However, these numbers do indicate that a meaningful percentage of hunting effort within Skagit County occurs at the Island Unit and vicinity.

- Alternative 1 at the site scale would maintain or slightly increase the acreage in managed and enhanced waterfowl forage production (141 acres) to attract high concentrations of waterfowl, support the same number of hunting parties and provide similar access as current conditions. Updated infrastructure would provide more reliable drainage and water level management. At the landscape scale, this alternative would maintain the "enhanced waterfowl forage" category in the broader greater Skagit delta area. For these reasons Alternative 1 received a "+"

- Alternative 2 at the site scale would provide fewer acres of managed and enhanced waterfowl forage production, support fewer hunting parties and provide fewer boat landings. However, updated infrastructure on the west island would provide more reliable drainage in support of forage production and more reliable water level management in winter for hunters. At the landscape scale, this alternative would reduce the "enhanced waterfowl forage" category by 54 acres and would add 170 acres of intertidal habitat. For these reasons, Alternative 2 received a "-"
- Alternative 3 at the site scale would provide fewer acres of managed and enhanced waterfowl forage production, support fewer hunting parties and provide fewer access points. However, updated infrastructure on the northern portions of each island would provide more reliable drainage in support of forage production and more reliable water level management in winter for hunters. At the landscape scale, this alternative would reduce the "enhanced waterfowl forage" category by 81 acres and would add 110 acres of intertidal habitat. For these reasons, Alternative 3 received a "-"
- Alternative 4 at the site scale would eliminate managed and enhanced winter waterfowl forage production from the site meaning high concentrations of waterfowl would be unlikely to congregate on the site. The number of hunting parties the site could support would likely be reduced. Boat in access would not be provided at established landings. Walkability and boat access of the site would be less predictable since it would be controlled by tides and river flow/flood conditions. Wood and debris have the potential to block channels. At the landscape scale, this alternative would reduce the "enhanced waterfowl forage" category by 141 acres in the greater Skagit delta and would add 270 acres of intertidal habitat. Hunters who prefer "enhanced waterfowl forage" habitats would likely use alternative WDFW sites on the landscape, and this could lead to higher hunter pressure on existing sites. For these reasons, Alternative 4 received a "--"

5.4 Climate change resilience

There are three considerations included in the application of this criterion: the potential for habitat migration; long-term climate resilience to changing river hydrology and sea level rise; effect on flood risk in the lower south fork Skagit River. In general isolating areas behind levees does not provide space for habitats to migrate. River hydrology that is anticipated to become more "flashy" (including higher and more frequent flood flows) in combination with long-term sea level rise (SLR) predictions will put infrastructure at risk. And leaving structure in the lower south fork creates a "plug" that backs up flood waters and increases water levels in this reach of the river. Removing structures that block flow, reduces flood risk and makes the larger system more resilient to changing hydrology. For more information, refer to the Geomorphic Assessment Tech Memo.

- Alternative 1 would not provide any space for habitats to migrate because it would continue to isolate 270 acres of uplands behind levees and tidegates. Infrastructure would be at risk of damage from larger and more frequent river floods in combination with SLR. Leaving both the east and west islands surrounded by levees leaves a large plug in the lower south fork Skagit,

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which backs water up during floods and puts upstream areas at higher risk of flooding. Updated infrastructure would ensure these issues persist for a longer period of time. For these reasons, Alternative 1 received "-"

- Alternatives 2 is the more resilient of the partial restoration alternatives. Alternative 2 would leave infrastructure on site, which would be at risk from higher and more frequent flood flows and SLR, but Alternative 2 would also provide improved resilience in a couple of ways. Alternative 2 would provide 170 acres of restored estuary containing a wide range of elevations where habitats could migrate over a long timeframe, and it would remove part of the "plug" that blocks flood flows passing through the lower south fork Skagit. For these reasons, Alternative 2 received a "+"
- Alternatives 3 is the less resilient of the partial restoration alternatives. Alternative 3 would provide 110 acres where habitats could migrate but these areas are relatively similar in elevation so would not provide for migration over as long a timeframe. Infrastructure left on site would be at risk from higher and more frequent flood flows and SLR. Lastly, Alternative 3 does not remove the "plug" that blocks flood flows passing through the lower south fork Skagit; in this way it is essentially the same as Alternative 1. For these reasons, Alternative 3 received a "+/-"
- Alternative 4 would provide significantly more climate change resilience than existing conditions. This alternative would provide 270 acres of restored estuary containing a wide range of land elevations for habitat migration over a long timeframe. Alternative 4 also removes all infrastructure from the site, which removes barriers to flood flows in the south fork Skagit and eliminates the risk of damage to infrastructure on site associated with higher and more frequent flood flows and SLR. For these reasons, Alternative 4 received a "++"

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