Steller's Eider Reintroduction Project
2016 Work Plan

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INTRODUCTION

Document Purpose

The purpose of this document is to describe work that will occur in 2016 on the Steller's eider reintroduction project, and provide background information on need for the project and work to date, field procedures, and other information. We anticipate that subsequent annual work plans will be different based on what we learn each year, consistent with our adaptive management framework.

Background and Objectives

In 1997, the Alaska-breeding population of Steller's eiders was listed as threatened under the Endangered Species Act (ESA) in large part because of the species' apparent extirpation from the YKD (USFWS 2002). Steller's eiders were once considered common breeders on the Yukon-Kuskokwim Delta's (YKD's) central coast (now part of Yukon Delta National Wildlife Refuge [NWR]; Kertell 1991). However, by the mid-1970s, Steller's eiders were rare on the YKD, and only one nest has been found since 2005 despite significant and consistent monitoring and research. Steller's eiders disappeared from the YKD concurrently with the decline of spectacled eiders, also listed under the ESA, and similar reasons may have contributed to declines of both species. These include increased predation and harvest on eiders as geese populations were declining, and contaminant exposure due to ingestion of spent lead shot (Flint et al. 1997, Grand et al. 1998). The entire species was not listed under the ESA by the U.S. Fish and Wildlife Service (USFWS) throughout its range (i.e., including Steller's eiders that breed in Russia) because 1992 counts estimated at least 138,000 wintering Steller's eiders in southwest Alaska, and it was unclear whether the global population was declining. Recovery criteria – benchmarks or metrics that the listed populations must meet before being removed from the Endangered Species list – were developed by the Steller's Eider Recovery Team (SERT), and include viable breeding sub-populations on the YKD and Arctic Coastal Plain (ACP) (i.e., both populations have < 10% probability of extinction in 100 years and are stable or increasing; USFWS 2002). While significant progress has been made in reducing threats, the USFWS in Region 7 (Alaska) considers recovery of Alaska-breeding Steller's eiders a high conservation priority because of the small size of the ACP subpopulation (<1000) and concern for the persistence of the YKD subpopulation. In particular, the YKD subpopulation is essentially extirpated and therefore unlikely to meet recovery goals without re-establishing a breeding population.

Since 2002, the SERT and USFWS have considered the need, feasibility, benefits, and costs of implementing Steller's eider reintroduction in Alaska to help meet recovery goals under the ESA. Similar programs have augmented or rebuilt wild populations with captive-bred or translocated birds. The Alaska SeaLife Center (ASLC) has developed an Alaska-origin captive flock of Steller's eiders, with extensive genetics and disease management procedures. This flock now has sufficient reproduction to support placing offspring back into the wild. We considered both augmentation of the ACP breeding population on the North Slope near Barrow, AK and reintroduction to the YKD. Because we are in the initial, experimental phase of the project, we are focusing current efforts on reintroduction to the YKD.

The ASLC, a non-profit research and education facility in Seward, Alaska, has played an integral role in project development (Hollmén et al. 2014). The eider research and conservation program at ASLC,

partially funded by the USFWS, was initiated in 2001 to support recovery of the threatened Steller's and spectacled eiders and to develop infrastructure and expertise to breed and maintain unique captive flocks. Since 2001, ASLC staff has developed husbandry, disease, genetics, and propagation management procedures for a captive flock of Alaska-origin Steller's eiders. The flock consists of Steller's eiders hatched from eggs collected from nests at Barrow, their captive-bred offspring, and wild captured adults. In 2006, ASLC staff began the feasibility analysis, which was completed in 2012. In 2007, the program was the first in North America to successfully breed Steller's eiders in captivity. There is no other captive flock of Steller's Eiders in the world, and maintenance of the genetic diversity of Alaska-origin Steller's Eiders in a controlled environment is another benefit of this project. In December 2012, the SERT recommended the USFWS explore reintroduction as a way to meet recovery goals, which we continue to do. In collaboration with stakeholders and as part of an adaptive management planning process, we identified these objectives for the Steller's eider reintroduction project:

- Re-establish Steller's eiders on the YKD while minimizing disease and genetic risks to other wildlife;
- Minimize effects to the local subsistence way-of-life;
- Maximize community benefits;
- Maximize broader conservation benefits;
- Minimize cost; and,
- Emphasize learning.

Re-establishing Steller's eiders on the YKD is only likely to be accomplished over decades, and we have much to learn regarding feasibility, uncertainties, and success of different methods. We are currently in the experimental phase of the project, focusing on learning whether small numbers of released birds survive and return to the YKD. The results of 2016 will be considered and applied to determining the next steps in the project, including if it will continue, under an adaptive management learning process. This document describes the biological and regulatory background and methods for the first experimental releases of Steller's eiders to the YKD in 2016.

Risk Factors and Uncertainties

In 2009, the SERT classified the biological uncertainties and potential negative consequences of reintroduction (Hollmén et al. 2012). "Level 1 Uncertainties" were *critical risk factors* that, if left unmitigated, had the potential to cause serious negative consequences to remaining natural populations or the environment. These included disease introduction and loss of genetic diversity in the captive (source) population. Both were evaluated through formal risk assessments (described below) and procedures have been developed to mitigate these risks. "Level 2 Uncertainties" were those that could reduce the success of reintroduction efforts, including insufficient amelioration of threats that caused original population declines (such as predation, harvest, and contaminants), suitable habitat availability, or life history characteristics (fidelity to reintroduction area, ability to migrate, and predator avoidance strategies). Because we are using an adaptive management framework, reintroduction activities will be designed to reduce these uncertainties and gain greater understanding of factors affecting success.

Disease Risk

The SERT identified the risk of introducing disease into wild populations as a *critical risk factor*: If the risk was not minimized then release to the wild should not occur, as diseases could reduce survival and reproduction of captive and released birds, and affect other wild waterfowl populations. This is a significant concern in the dense waterfowl nesting habitats on the YKD. Although USFWS recognizes that the risk can never be completely eliminated, planning and management actions have and will continue to minimize the probability of transmitting disease from the captive flock to the wild.

Staff at ASLC conducted a risk analysis to identify and characterize risk factors, and developed a detailed disease management plan to maintain the health of captive and wild populations by screening for, preventing, and treating disease in the captive population. Risk analysis steps included identification, ranking, and evaluation of potential consequences and likelihood of transmission of known and potential diseases in Alaskan waterfowl. Potential disease threats were identified through testing of the captive flock, field surveys, diseases of potential concern in the species' range, recommended guidelines for animal translocations (Leighton 2002), and consultation with disease prevention experts. Disease risks were ranked based on experimental evidence of pathogenicity (the ability of an organism to cause disease), known avian pathogenicity, and evidence of exposure in captive or wild populations, using information from published literature and expert opinions. The results of the risk analysis did not identify significant disease transmission risks from the captive Steller's eider flock to wild waterfowl, primarily because no disease organisms, other than ubiquitous normal flora or low-pathogenicity bacteria found in almost all wild waterfowl, have been detected in the captive flock. Thus, the overall risk is currently considered low.

Disease management procedures for the captive flock include biosecurity practices to minimize exposure of the captive flock to pathogens, such as cleaning of equipment and clothing; health monitoring and disease screening of the captive population for a large number of pathogens (Nichols et al. 2016); behavioral observations; and treatment and response plans should diseases be detected. Specific screening and management plans for transport, release, and monitoring of birds that produce eggs to be released to the wild, and those eggs are completed; we will continue to monitor the health status of the breeding flock, and will screen all eggs prior to transport. Our decision process using the results of this screening (Table 1) will keep the risk of disease transmission extremely low. We will maintain disease risk at this low level throughout the project with regular monitoring, adaptive protocols, and clear and considered decision processes, similar to that outlined in Table 1.

Table 1. Decision process incorporating USFWS management responses to disease screening results for potential Steller's eider experimental releases in 2016. Screening will be conducted on source flock hens and eggs.

If screening results show:	Then:
Normal flora and fauna…	Proceed with release.
Novel bacteria…	Cull eggs that showed positive results from flock, rescreen samples in contact with positive sample and proceed with release if a) no change in flock health status observed, and b) there are no positive results from rescreen.
Mildly pathogenic bacteria…	Rescreen eggs until bacteria are not present and proceed with release if no change in flock health status observed. If change in flock health status observed, rescreen flock until flock health status recovers and no positive screens are detected.
Any virus or high-pathogenicity bacteria…	Do not release.

Genetics Management

The SERT identified the risk of loss of genetic variation in the wild population through loss of genetic variation in the captive flock as another *critical risk factor*. We evaluated potential effects to the extant population's natural genetic diversity from reintroduction, and developed captive management strategies to prevent inbreeding and outbreeding depression and optimize the likelihood of successful reintroduction.

Ideally, to prevent a reduction in genetic variation and ensure the presence of locally adapted genes, the source population for reintroduction would originate from the desired release area, e.g., genetic material from the YKD population could be compared to the captive population (Jamieson and Lacy 2012). Lacking YKD breeders, however, the captive flock was grown from eggs collected from the ACP breeding population near Barrow (the only known Alaska breeding population). We characterized genetic diversity in these source individuals compared to all known wild populations (Alaska, Pacific-Russia, and Atlantic-Russia) with microsatellite loci and cytochrome b mitochondrial DNA sequences (Pearce et al. 2005). Additional markers are in development to monitor genetic diversity of loci under balancing selection, such as the loci of the major histocompatibility complex (MHC). Results to date indicate that the current captive population is genetically comparable with the Alaska-breeding

population on the ACP (A. Riddle, T. Hollmén, J. Pearce and S. Talbot; unpublished data). Haplotypes from the two genetic samples available from YKD nesting females were previously identified in individuals from Barrow (A. Riddle and T. Hollmén, unpublished data), although this sample size is obviously very small.

The genetic management plan for the captive population includes pedigree and genetic analyses to conserve genetic diversity. The ASLC uses MateRx software (National Zoological Park and Lincoln Park Zoo), recommended by the Association of Zoos and Aquariums, to select optimum breeding pairs and maintain genetic pedigrees. This program aims to preserve heterozygosity and allelic diversity through equalization of founder equivalents and identification of genetically important individuals in a pedigree. Pedigree analyses are supported by genetic fingerprinting of parent flock and putative pairings, and genetic monitoring of offspring, using the same methods described above for initial characterization of genetic diversity.

We're concerned about maximizing genetic diversity in the captive (source) population because through generations, genetic and behavioral changes may occur that affect fitness and adaptability of captive-bred individuals upon release (Earnhardt 1999). We are using several approaches to minimize these effects, including minimizing the number of generations in captivity, minimizing selection that favors captive conditions, and monitoring physiological fitness and behavioral traits of captive-bred offspring. For example, digestive efficiency and resistance to disease may be affected by captive adaptation, so we offer natural food items and monitor the capacity of captive-bred offspring to digest these items, and parent or foster parent rearing is used as often as possible to enhance the development of foraging and predator avoidance behaviors in ducklings.

In summary, the current captive population originated from the Barrow area, and contains genetic diversity similar to that of wild Steller's eiders. We use state-of-the-art tools, including pedigree analyses, genetic monitoring, and fitness and behavioral monitoring, to ensure that captive and reintroduced flocks maintain maximum genetic diversity and minimize inbreeding effects.

Methodological Uncertainties

Level 2 Uncertainties, which include causes of original population declines; suitable habitat availability; predation, harvest, disease exposure, or contaminants threats to reintroduced birds; and life history characteristics such as fidelity to reintroduction area, ability to migrate, and predator avoidance strategies, can affect the success of reintroduction efforts. We've conducted field observations, experiments, workshops, and modeling to inform site selection, evaluate field husbandry methods, sample for contaminants, and determine the effects of salinization of coastal ponds on young waterfowl (Hollmén 2015). Any experimental releases, including those during 2016, will be designed to address additional Level 2 Uncertainties.

Timeline

The background in this document and citations describe progress in the reintroduction project up to now; additional details can be found in Hollmén (2015). Over the next five years, in the context of

adaptive management, we've developed decision points and task that will help in determining if and how the reintroduction project should continue, including:

January – May, 2016: Continue communications and outreach and logistical and field project planning, complete regulatory requirements.

May – August 2016: Experimental release on the YKD, using captive-produced eggs under surrogate hens.

August 2016: Incorporate learning into adaptive management.

December 2016: Final evaluation of whether to conduct additional experimental release in 2017.

Late 2017: Incorporate learning into final decision of whether to proceed with full reintroduction project.

2018-2020: Continue Steller's eider reintroduction project with annual releases and monitoring.

Annually: Evaluate success and determine if project should continue.

OUTREACH AND COMMUNICATION

Outreach, the process of sharing and receiving information from partners and stakeholders, is a central part of Steller's eider reintroduction. We are using formal - within the Government-to-Government consultation framework - and many informal methods to share and receive information with local community members from YKD central coast villages and Tribal governments. We also communicate with the State of Alaska, other Federal agencies, conservation organizations and other non-government organizations, and within the USFWS. We strive to listen and respond to stakeholder needs and concerns in a timely manner.

To date, we've conducted community meetings, village visits, and meetings with the Tribal governments in Hooper Bay, Chevak, and Newtok (communities near potential reintroduction sites); shared written communication with Tribal governments throughout the State of Alaska; and presented to the Alaska Migratory Bird Co-Management Council (AMBCC) and the Association of Village Council Presidents Waterfowl Conservation Committee (AVCP-WCC). We also continue to answer questions received through phone calls or emails. Our NEPA process included 2014 scoping meetings in Bethel, Anchorage, Hooper Bay, Chevak, and Newtok, at which many invaluable comments were received (in addition to written comments received during the public comment period), and the NEPA process will be completed by March 31, 2016. A website (http://www.fws.gov/alaska/fisheries/endangered/species/stellers_eider_reintroduction.htm) and Facebook page ("Steller's Eider Y-K Delta Reintroduction Project") have been established to provide more information, including contact information for key staff who can answer questions.

Frequent village visits are probably the single most effective way for USFWS staff and partners to share information, and work together to address any concerns of local communities. In the spring of 2014, we traveled to Chevak, Hooper Bay, and Bethel for NEPA Environmental Assessment scoping meetings. We met with the Tribal governments in all villages and provided a presentation for the local residents, received invaluable feedback, and responded to questions. We hired two students and a chaperone from Chevak who traveled to Barrow in June to work on the Steller's eider breeding biology project so that members of the community could experience working with FWS biologists on Steller's eiders. We traveled to villages again in the fall and have presented at AMBCC and other appropriate venues.

In spring 2015, we continued to engage with the local residents by traveling to the villages of Hooper Bay, Chevak, and Newtok to meet with Tribal governments and provide updated presentations on the project. In August 2015, the students and chaperones traveled to the Alaska SeaLife Center where they learned about eider research and captive breeding and presented their findings at the USFWS Regional Office in Anchorage. We also worked closely with and hired Chevak residents to help with logistical aspects of our field work.

In 2016 we will visit Hooper Bay, Chevak, Newtok, and Bethel for communication and outreach purposes; prepare a press release and fact sheet along with the Final EA, and prepare information bulletins before and after field work for distribution in YKD communities and to other interested parties.

We'll support an Alaska Native Science and Engineering Program (ANSEP) student at the YKD National Wildlife Refuge. Additionally, Refuge Information Technicians (RITs) from the Yukon Delta NWR will conduct and assist with village visits, including translation.

METHODS

Captive Flock Management

The ASLC currently maintains a flock of 65 Steller's eiders (29 females and 36 males). Of these, 22 birds are of known Barrow origin, nine birds are of unknown origin, and 34 birds have been bred at the ASLC. The ASLC has established specialized biosecure facilities to maintain and care for eiders throughout the annual cycle, as well as captive propagation techniques (Hollmén 2015). For example, eiders are held in outdoor enclosures at ambient conditions, which convert into breeding units in summer. Indoor ASLC laboratories include hatching and early rearing areas, and housing for birds in need of intensive monitoring and care. Outdoor and indoor enclosures are plumbed with salt and fresh water lines to accommodate needs throughout the seasonal changes. Specialized dry and wet laboratory spaces are available at the ASLC to collect and process samples for diagnostic and research purposes. Currently the captive flock of Alaska-origin eiders can produce 200-250 eggs in a breeding season. The first successful Steller's eider breeding at the ALSC in 2007 was also the first in North America.

Choosing an Experimental Release Site

During 2014-2015, the ASLC led work on release site selection and habitat assessment, with assistance from the USFWS. Discussions about habitat suitability and the effect of climate change on YKD habitats occurred at several SERT meetings, and at a 2009 expert workshop. Areas within the vegetated intertidal zone of the central YKD from the Askinuk Mountains to northern Nelson Island, which encompasses the majority of Steller's eider nest observations, were included in the analysis. Candidate sites were ranked on logistical feasibility and ecological factors by people who live and work on the YKD based on accessibility, infrastructure feasibility, land ownership, potential disturbance to released Steller's eiders birds, potential for lead shot contamination, and favorable habitat characteristics. The Kashunuk River area and Kigigak Island ranked highest, so in 2014 and 2015, both sites were evaluated for habitat suitability (vegetation type, water chemistry, and invertebrate - food - availability) (Hollmén 2015). We also sampled waterfowl hens and ducklings to evaluate exposure to contaminants and pathogens at these sites; these data are being analyzed. Nevertheless, based on potential for lead exposure at Kashunuk (Franson et al. 1998), historical observation of Steller's eider nests (USFWS unpubl. data), the presence of an established field camp at Kigigak, and density of nesting waterfowl that can serve as surrogate hens, we will conduct an experimental release of Steller's eider eggs at Kigigak Island in 2016.

Choosing a Release Method

The SERT developed an extensive list of possible release methods, narrowed by logistical (e.g., available propagation techniques, staff requirements, cost) and biological constraints, such as the birds ability to migrate to molting and wintering areas and return to the YKD to breed, evade predators, and forage. For example, near Barrow, fledglings remained with marked females until dispersal from the breeding area (Safine 2013). Fidelity to natal, molting, and wintering sites may be developed through imprinting on specific habitat types or breeding areas during the first year of life. Thus, fostering appropriate behaviors through parental guidance, and imprinting on key locations, were both considered important factors when developing release methods.

Because we do not know the degree to which Steller's eiders learn these behaviors on their own, we considered methods that ranged from releasing ducklings on the YKD (hard release), releasing ducklings after rearing in a protected area on the YKD (soft release), rearing ducklings on the YKD and transporting them to an appropriate molting area (assisted migration), and bonding ducklings to a wild hen and releasing them together on the YKD (foster hen), and augmenting nests of surrogate waterfowl species with Steller's eider eggs produced at the ASLC.

In addition to the degree to which they promote natural behaviors, the financial cost of each method varies. For the 2016 experimental release we are seeking to balance the potential for success with fiscal concerns while maximizing learning objectives which would improve future releases under the project. Therefore, we have selected to use surrogate hens for the 2016 pilot release.

In the summer of 2015, we artificially incubated, hatched, and reared northern pintail (NOPI) young (from wild nests) in a field facility on the Kashunuk River (details provided in Hollmén 2015). All eggs successfully hatched and reared, and we know of one duckling that successfully migrated to California. However the effort was logistically challenging and financially expensive, and the captive-reared ducklings appeared to struggle and failed to develop natural behaviors which they would normally learn from their mothers (e.g., foraging, predator avoidance, seeking shelter). Additionally, the hatchability of Steller's eider eggs using solely artificial incubation has been low, and partial incubation by a Steller's eider or surrogate hen increases hatching success. Therefore, for 2016 we intend to use surrogate hens to incubate eggs and rear Steller's eider ducklings. Because partially developed eggs are more fragile than undeveloped eggs, the surrogate hen will incubate eggs in the field rather than at the ASLC where the eggs are produced. Therefore, to maximize the number of successfully hatched eggs, providing a mother for the chicks, and to minimize costs, the 2016 release method will be eggs, produced by captive flock hens and incubated under surrogate wild hens.

Fieldwork

The 2016 study site is Kigigak Island (60°51' N, 164°58' W), roughly 110 miles west of Bethel. The island (32.5 km^2) is bounded by the Bering Sea and Ninglick River and is part of the Yukon Delta National Wildlife Refuge. Sloughs and small ponds dominate the landscape and are surrounded by grasses, sedges and tundra vegetation. The area is highly influenced by daily tides and floods frequently during spring snowmelt and seasonal storms.

Our main research objective for 2016 is to determine whether it's feasible to use common and abundant ducks that nest on the YKD to hatch and raise Steller's eider ducklings from eggs produced by the captive flock at the ASLC. This "surrogate hen" approach was selected because ASLC staff found Steller's eider eggs have much greater hatching success when at least partially incubated by a hen, rather than entirely in an artificial incubator. Also, Steller's eider ducklings may be more apt to learn proper foraging and survival behaviors when raised by a wild hen. Factors considered when choosing surrogate species included nesting abundance and density, tolerance to nest manipulation, incubation behavior, brood rearing strategy and duration, clutch size, non-breeding distribution, and the number of Steller's eider eggs that could reasonably be placed in each surrogate nest. No single species was found to be a

perfect match to Steller's eider breeding behavior or non-breeding distribution so three species that proved to be a reasonable compromise were chosen based on responses to a query of YKD waterfowl experts. These are Pacific common eider (*Somateria mollissima v-nigrum*), northern pintail (*Anas acuta*) and greater scaup (*Aythya marila*). While we won't actively search for long-tailed duck (*Clangula hyemalis*) nests, we intend to use any found opportunistically for clutch replacement in the event that we fail to find a suitable number of nests of the three primary surrogate species.
Surrogate duck species nests will be searched for and their clutches replaced with Steller's eider eggs produced from the captive flock at the ASLC. Based on past production of the captive flock at ASLC, we anticipate substituting approximately 200 Steller's eider eggs into surrogate nests during mid-incubation. The number of Steller's eider eggs per surrogate nest will not exceed 6-8 for common eider, 5-6 for northern pintail, and 9-10 for greater scaup. Eggs will be distributed as evenly as possible amongst the three primary surrogate species and surrogate clutch sizes will not be enlarged by more than two eggs over the hen's original clutch size.

Two or three days prior to hatch, surrogate hens will be marked with an external VHF radio transmitter so hens and their Steller's eider broods can be tracked to determine fledging success. Hens will be trapped using either a mist net (primary method) or bow net. Capturing late in incubation should greatly reduce the risk of nest abandonment due to disturbance. Mist net capture is done by lowering a horizontally-stretched mist net, held by two persons, over the nest while the hen is incubating (similar to the method described in Bacon and Evrard 1990). After lowering the net, the two persons kneel on either end of the net and slowly crawl toward the nest. In most cases, the hen stays tight on the nest until the net can be lowered over her. Alternatively, hens may be captured on the nest using a bow net (Sayler 1962). Bow nets are string-activated nest traps constructed of netting on two semi-circular aluminum pole frames joined by a spring in the center. The net is set on a nest while a female is absent. The researcher then leads a string that is attached to the trigger out from the trap about 80m and then leaves the area to allow the female to return to the nest. After approximately two hours, researchers return to the site, confirm that the hen is in a safe position, pull the trigger string, and remove the female from the net.

Radio transmitters (Advanced Telemetry Systems model A4420 or A4430) will be affixed to captured surrogate females using the prong-and-glue method. This is similar to the prong-and-suture method (Mauser and Jarvis 1991, Rotella et al. 1993) where the suture is replaced with cyanoacrylate tissue adhesive (e.g., Vetbond). This method allows for short term tracking, involves a minimal amount of manipulation of each bird, allows the transmitter to be shed by the bird over time, and does not require surgery, recovery time, or a veterinarian. This anchor technique is used to attach small transmitters to the back of adult birds and is commonly used on waterfowl. One advantage of the prong-and-glue method is that it does not encumber the wings, body or neck of the bird as harness-mounted devices may, and the weight can be minimized compared to harness attachments. According to the manufacturer, some prong-and-glue transmitters are shed in 50 to < 150 days, with most lost when the bird undergoes its next molt. The 8-9 g transmitters range from 0.85 to 1.24% of the surrogate hens average late-incubation body weight, depending on the species.

Crews will attempt to locate radio-marked hens and their broods beginning when the ducklings are 3 days of age and following with checks every seven days (10, 17, 24 days, etc.) until the brood fledges or cannot be found. Tracking will be conducted using a three-element hand-held Yagi antenna and a VHF receiver. Whenever possible, broods will be observed with binoculars from a distance, data will be gathered quickly and the area will be left as soon as possible in order to avoid altering hen and duckling behavior. Tracking will not occur on stormy or unusually cold days when ducklings might seek sheltered areas or spend more time being brooded.

Prior to fledging (at approximately 28-30 days of age), a small subset of Steller's eider juveniles will be fitted with radio transmitters using the prong-and-glue method described above so we can track them as they leave the YKD and determine whether they successfully arrive at molting and wintering areas. Concurrently with brood captures, we will collect blood, cloacal swabs, and feather samples for DNA and to screen for contaminants and diseases. Hens and young will be captured by driving them across mid-sized ponds into a mist net (Dau 1976, Flint et al. 2000). We will use a standard 127 mm mesh, 18 m wide mist net with one shelf (1.3 m tall) stretched between two 9' aluminum poles. This pole length will allow us to anchor the poles in deeper ponds and the net will be placed so that the bottom is even with or above the water surface and the top of the net is near the end of the poles (depending on pond depth). Guy ropes will be used to hold the poles in place and tension the net. Each brood drive will be no more than 30 minutes long. Birds will be removed immediately once caught in the net and any birds that are severely tangled will be cut free if necessary. One concern with the use of surrogate hens to rear Steller's eider ducklings is that the ducklings may follow their surrogate hen to post-breeding areas inappropriate for a Steller's eider (i.e., inland molting areas or staging and wintering areas in the conterminous United States, Canada, or Mexico). To reduce the likelihood that experimentally released juvenile Steller's eiders would stray from their normal migration corridors and end up in unsuitable areas we believe that broods need to be separated from their surrogate hen. The separation method chosen is to capture and relocate a brood to a different area of the island before release, several kilometers from the capture site, while the hen remains at the capture pond. All members of a brood will be released simultaneously to minimize any chance of brood fragmentation.

Keeping birds cool and calm after capture reduces stress. We'll keep birds out of direct sunlight in a covered kennel or a mesh bag, avoid excessive movements or loud noises, and avoid handling each bird more than necessary. Any birds that show signs of excessive handling stress will be released back to the pond immediately and monitored carefully. Use of bird bags is approved under U.S. Fish and Wildlife Service Alaska Region, Standard Operating Procedures for Use of Bird Bags, Approved 11 November, 2011. We typically place adult females in kennels as they are larger and more comfortable for adults, particularly when the female has a radio-transmitter as the antenna and external mount are not disturbed during holding. Kennels are lined with a clean cotton towel on the bottom and a dark towel is draped over the outside of the kennel to make it dark and keep the female calm, reducing the chance of injury. Ducklings are typically placed individually in mesh bags during holding. The bird kennels are too large for a single duckling, and may allow too much movement and the potential for injury during holding. The mesh bags can be closed with a drawstring, and allow good air circulation to the duckling, while minimizing the potential for injury to wings and feet.

Predator Management

Nest and/or duckling predation by mammalian and avian predators may hinder reintroduction efforts by reducing the survival of eggs and ducklings. The primary mammalian nest predators in the coastal zone of the YKD are foxes, although mink are present in some areas (B. McCaffery and J. Schmutz, pers. comm.). Avian predators include gulls and jaegers. In an effort to increase nest success and duckling survival, we will implement temporary localized predator management (lethal removal of foxes) at the release site (Kigigak Island) in 2016. The number of foxes removed will be recorded, and nest cameras and observation by biologists in the field will record nest fates (hatch, predation by avian or mammalian predators etc.). The goal of fox control in 2016 is to remove all foxes from the 8,016 acre Kigigak Island (the release site). Based on previous fox control efforts on Kigigak Island (McCaffrey and Fischer 2010) we estimate that <20 foxes will be lethally removed, and are unlikely to recolonize the island during the nesting and early brood rearing season.

Adaptive Management

Uncertainty exists regarding the cause(s) of decline of the former sub-population, the current threats to recovery, population biology of Steller's eiders, future habitat changes, and efficacy of alternative release methods to achieve the objective of recovery on the YKD. Reintroduction, by definition, is conducted in an area where the species no longer exists, and the need for management and decision making in the face of these types of uncertainties is not unique to the management of Steller's eiders. However, we are explicitly addressing these uncertainties by developing an adaptive management strategy (Williams et al. 2009) that integrates learning and modeling to reduce uncertainty and make informed recurrent decisions on release methods and locations. The ASLC has developed a decision model that will support planning for annual releases, including uncertainty associated with alternative methods. Monitoring released individuals will be important to learning about the success of different methods. These decisions and the methods used to make them are outlined in the Adaptive Management Strategy that can be found at:
http://www.fws.gov/alaska/fisheries/endangered/species/stellers_eider_reintroduction.htm.

THE REGULATORY PROCESS

NEPA Compliance

It is the Service's policy to integrate, in an efficient and reasonable manner, the NEPA purposes, policies, and decision-making process into the planning and implementation of our actions (550 FW 1). The procedural requirements of NEPA include: 1) In reaching its decision, the agency shall carefully consider detailed information concerning every significant environmental impact on the human environment; and, 2) The public shall play a role in the decision-making process and the implementation of that decision, such as ensuring that monitoring and mitigation plans are executed as prescribed (550 FW 2).

Typically, reintroduction of listed species is considered a categorical exclusion, defined as a class of actions which do not individually or cumulatively have a significant effect on the human environment, under 516 DM 2:

> "B(6). The reintroduction or supplementation (e.g., stocking) of native, formerly native, or established species into suitable habitat within their historic or established range, where no or negligible environmental disturbances are anticipated."

However, prior to commencing our NEPA analysis we considered that the action could be controversial and may fall under two "extraordinary circumstances" as defined by the DOI NEPA Compliance Checklist (FWS Form 3-2185):

> "3. Has highly controversial environmental effects or involves unresolved conflicts concerning alternative uses of available resources;" or,
>
> "10. Has the possibility for a disproportionately high and adverse effect on low income or minority populations."

Thus, we determined that the action did not unequivocally fall under the categorical exclusion, and therefore developed an Environmental Assessment (EA). This process also allowed us to formally request public input both during the scoping period and during a public comment period after publication of the Draft EA. Based on the current information and analysis we do not believe the Steller's eider reintroduction project meets the definition of a major Federal action significantly affecting the quality of the human environment requiring the preparation of an Environmental Impact Statement; therefore, an Environmental Assessment (EA) and a Finding of No Significant Impact was prepared. These documents, along with responses to the public comments we received during the EA process can be found at:
http://www.fws.gov/alaska/fisheries/endangered/species/stellers_eider_reintroduction.htm.

Endangered Species Act

The capture, transport and release of wild and captive Steller's eiders during this project will require the issuance of a recovery permit to the USFWS Fairbanks Fish and Wildlife Field Office (FFWFO), the ASLC, and other programs or partners under Section 10(a)(1)(A) of the ESA.

The primary purpose of the action is to establish a viable population of Alaska-breeding Steller's eiders on the YKD; therefore, we anticipate the long-term net result of the project will be beneficial. However, in the short-term, this action may affect wild populations of listed Steller's (although we are doing this project because few to none breed on the YKD) and listed spectacled eiders through disturbance of nesting birds. Field releases and research will occur within the range of both species during the nesting season on the YKD, and within Steller's and spectacled eider designated critical habitat. We anticipate that formal consultation and issuance of a Biological Opinion on the issuance of a Section 10 permit and USFWS project funding will be necessary to comply with Section 7(a)(2) of the ESA; therefore, we anticipate the need to analyze potential effects to listed species through a formal Section 7 consultation.

Other Permits and Regulatory Processes

Other permits and regulatory processes required to continue the Project include initial and annual review of all activities involving live birds by an Institutional Animal Care and Use Committee (e.g., http://www.uaf.edu/iacuc/iacuc-info/); permits from the Alaska Dept. of Fish and Game; continued Government-to-Government consultations with affected Tribes; a review to ensure consistency with the Policy on Maintaining Biological Integrity, Diversity, and Environmental Health of the National Wildlife Refuge System; and an ANILCA section 810 determination.

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