

COMPATIBILITY DETERMINATION

Use: Karluk Lake Nutrient Modification

Refuge Name: Kodiak National Wildlife Refuge (Refuge)

Establishing and Acquisition Authorities

Original authority was Executive Order 8857 (1941); modified by Public Land Order 1634 (1958), Alaska Native Claims Settlement Act (ANCSA: 1971), and Alaska National Interest Lands Conservation Act (ANILCA 1980)

Refuge Purposes

Kodiak Refuge was specifically established in 1941 (Executive Order 8857) "... for the purpose of protecting the natural feeding and breeding ranges of the brown bear and other wildlife" Forty years later ANILCA Section 303 (5)(b) added the following purposes:

- i. to conserve fish and wildlife populations (and) habitats in their natural diversity including, but not limited to, Kodiak brown bears, salmonids, sea otters, sea lions and other marine mammals and migratory birds;
- ii. to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- iii. to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
- iv. to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

National Wildlife Refuge System Mission

The mission of the National Wildlife Refuge System (NWRS) is to administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act of 1966, as amended [16 U.S.C.668dd-668ee]).

Description of Use

In 2012 Kodiak Regional Aquaculture Association (KRAA) requested a permit to apply fertilizer (aqueous nitrogen and phosphorus) to Karluk Lake, including the Thumb and O'Malley Basins.

Detail of KRAA's proposal is described in the Karluk Lake Nutrient Enrichment Final Environmental Assessment (EA) and ANILCA Section 810 Evaluation which the Service released in October 2015. In the Finding of No Significant Impact (FONSI) signed on January 20, 2016, the decision was made to continue the current management of the fishery and not allow fertilization of Karluk Lake. Therefore, no compatibility determination (CD) was completed at that time.

In brief, from 2008 to 2011, the early-run sockeye salmon stock failed to meet ADF&G spawning escapement goals for the Karluk Lake. KRAA asserts that "Karluk Lake is currently in a state of reduced productivity" and "it is unlikely that the system will return to previous, naturally high levels of productivity without intervention". KRAA linked lower adult sockeye salmon abundance from 2008 to 2011 to reduced lake nutrient concentrations (KRAA 2012) and proposed that active intervention, through nutrient modification, would increase plankton productivity and could increase salmon productivity.

To remedy this situation KRAA proposed to apply liquid fertilizer to the lake's surface over a 5-year period in an effort to increase plankton productivity and address the poor feeding conditions in Karluk Lake. The proposed fertilization program would be nine years total: five years of fertilizer application, as needed, along with two years each of pre- and post-treatment monitoring of the lake. Further, KRAA also intended to "provide for higher and sustainable escapement of adult sockeye salmon into Karluk Lake", which would "benefit subsistence, sport and commercial harvesters" (KRAA 2012). The fishery has since rebounded without the application of fertilizer and populations are expected to vary in the future, consistent with observed population dynamics in wild salmon stocks.

The project seeks to maintain an annual mean phosphorus load of 90% of "permissible" levels and nutrient targets. KRAA would work with the Alaska Department of Fish and Game (ADF&G) and the U.S. Fish and Wildlife Service (Service) each spring, prior to the May–August growing season, to develop nutrient concentration and application plans. Upon initiation of aerial application of fertilizer, KRAA would use in-season monitoring data to maintain appropriate nitrogen and phosphorus ratios throughout the growing period. Should the targeted nutrient level be achieved at any time during the proposed project, fertilizer solution application would stop. Monitoring would continue, and if nutrient concentrations were to fall back below desired levels, adaptive application would resume. A fixed-wing aircraft equipped with a sprayer bar would take on the fertilizer solution at the airport and fly to the project area. Nutrients would then be sprayed over the lake surface within a prescribed area that includes the lake's Main, Thumb, and O'Malley Basins. Physical, chemical, and biological parameters for the lake would be monitored to evaluate project effectiveness.

The Service was directed to complete a CD on this proposed use in the Federal Appropriation Bill of 2017, Report 114-281.

Anticipated Impacts of the Use

The proposed action to modify nutrient levels in Karluk Lake and associated basins by adding fertilizer would have the following anticipated impacts:

Aquatic Resources - The proposed action would increase the amounts of phosphorus and nitrogen in Karluk Lake and KRAA expects this to increase phytoplankton which in turn would increase zooplankton numbers and body size of sockeye salmon smolt. However, Service staff evaluated previous fertilization efforts and found there is a lack of studies and evidence to support this claim. Schmidt and others (1998) documented a trend of increased phytoplankton with increased phosphorus, and decreased phytoplankton with increased zooplankton. Carcass availability (i.e., carcass deposition via escapement) was the significant factor (when considered along with fertilization) in loading phosphorus into the Karluk system and the retention of phosphorus into the following spring. In that study, fertilization was not similarly credited with any similar benefit. Based on this information it is not clear that there is a link between fertilization and the quantity of fry or that there is a link between fertilization and the production or size of smolts.

Subsistence Resources and Uses - No change in resource abundance and availability is expected as any increase in sockeye salmon runs would be harvested principally by commercial fishermen. There would be no change in competition for subsistence resources, or physical, legal access to subsistence use areas.

Public Review and Comment

On December 4, 2014, after reviewing the best available science, the Service released the Karluk Lake Nutrient Enrichment Draft EA for a 60-day public review and comment period, with a request

for any additional information, corrections, or alternatives that should be considered in the final EA. We notified the public through informational postcards, a Notice of Availability in local newspapers, posting on the Kodiak Refuge website, and an open house in Kodiak on January 13, 2015. In addition to discussions during the open house, we received 39 written comments. Both individuals and organizations submitted comments. Concerns included the nature of the proposed action, the potential social, and economic effects of reduced fish numbers; the status of Karluk sockeye salmon and need for the project; overall lake productivity and past modification efforts; sockeye management by ADF&G; concern about the resources at risk in the Karluk basin; and concern over whether the proposed action was compatible with Refuge purposes. Where appropriate, changes were incorporated into the final document and a FONSI was signed.

The EA can be found at:

https://www.fws.gov/uploadedFiles/Region_7/NWRS/Zone_2/Kodiak/PDF/Karluk%20Lake%20EA%20Final.pdf

The FONSI can be found at:

https://www.fws.gov/uploadedFiles/Region_7/NWRS/Zone_2/Kodiak/PDF/Karluk-FONSI-Notice-of-decision-Final.pdf

This CD will be made available for public comment starting on April 20th, 2018 for 28 days (April 24th update: comment period extended from 14 days upon request). Electronic copies can be found on the Refuge's website at

https://www.fws.gov/refuge/Kodiak/what_we_do/resource_management/planning.html. This CD is also being advertised via flyers posted in the following communities: Kodiak City and Kodiak Villages; and through the Kodiak Daily Mirror. Printed copies will be available for review at the Refuge Office, the Refuge Visitor Center, and the Kodiak Public Library. Comments are being specifically solicited from the Alaska Department of Fish and Game and Alaska Native Tribes and Corporations.

Proposed Determination

Use is Not Compatible
 Use is Compatible with the Following Stipulations

Justification

Karluk Lake falls within an area managed to allow habitats to change and function through natural processes and maintain the natural environment with very little evidence of human-caused change. The Service believes that salmon stocks can be appropriately managed through annual targeting of spawning escapement, primarily through the management framework developed at the State level. Under the Refuge's 2008 Comprehensive Conservation Plan, the Service would consider restoration of a salmon stock once a fishery became listed as any one of the three Stock of Concern designations as described under the Policy for the Management of Sustainable Salmon Fisheries (SSFP; 5 AAC 39.222, effective 2000, amended 2001). The SSFP directs ADF&G to provide the Alaska Board of Fisheries with reports on status of salmon stocks and assists them with determining Stocks of Concern designations.

The ADF&G believes smaller run sizes were the result of a number of factors, including over-escapement between 1985 and 2007, which resulted in large numbers of juveniles that overgrazed and reduced the number of zooplankton available to subsequent broods (Foster 2014). The current sockeye run in the Karluk Lake drainage is within historic levels and the Service expects that Karluk stocks will continue to fluctuate under current management, due to the inherent complexity of the system. Rogers and others (2012) concluded that for fishery management, "models that assume time invariant parameters (e.g., for carrying capacity or intrinsic productivity) are

unrealistic representations of the biology in the systems.” It is an unrealistic expectation, therefore, to completely stabilize stocks by removing the highs and lows of fluctuating total returns. If carrying capacity and productivity are variable, working within that variability is the best way to maintain the component stocks to accomplish Refuge purposes, to meet the requirements of Refuge trust species, and provide for human harvest.

To allow this proposal and not continue the current management of the Karluk fishery would materially interfere with and detract from the Refuge’s primary purpose to conserve fish and wildlife populations and habitats in their natural diversity.

When a conservation concern occurs, the Refuge Manager will evaluate and determine the least intrusive measure necessary to achieve success. Where fishery resources have been severely adversely affected, the Refuge will work with the State of Alaska, local tribes, and other partners to restore habitats and populations to conditions consistent with Refuge purposes. Restoration emphasis will focus on strategies that are the least intrusive to the ecosystem and that do not compromise the viability or genetic characteristics of the depleted population. This may include regulatory adjustments and/or evaluations of escapement goals.

The following legislation provides the Service specific guidance for managing refuges in Alaska. There are two statutes in particular that provide direction and authority that inform the management of Kodiak Refuge: The Alaska National Interest Lands Conservation Act (ANILCA) (16 U.S.C. 3111–3126); and the National Wildlife Refuge System (NWRS) Improvement Act (Improvement Act) 16 U.S.C. 668dd–668ee, which amended the National Wildlife Refuge System Administration Act. ANILCA takes precedence over the Improvement Act if there is a conflict between the two.

Under Section 303(5)(B) (i) of ANILCA the first purpose for Kodiak NWR is to conserve fish and wildlife populations habitats in their natural diversity including, but not limited to, Kodiak brown bears, salmonids, sea otters, sea lions and other marine mammals and migratory birds. The Congressional Record also reflects language that states “protecting and managing all fish and wildlife populations within a particular wildlife refuge system unit in the natural “mix,” not to emphasize management activities favoring one species to the detriment of another” (126 Cong. Rec. H12, 352-53).

Additionally, Section 4(a)(4)(B) of the National Wildlife Refuge Improvement Act states that “In administering the System, the Secretary shall...ensure that the biological integrity, diversity, and environmental health (BIDEH) of the System be maintained for the benefit of the present and future generations of Americans...” (16 U.S.C. 668dd(a)(4)(B). The Service’s BIDEH policy (601 FW 3) provides for the consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on refuges and associated ecosystems.

The BIDEH policy states that the Service shall “formulate refuge goals and objectives for population management by considering natural densities, social structures, and population dynamics at the refuge level” and manage populations for “natural densities and levels of variation.” The BIDEH policy also states that the “[Service] strives to manage in a holistic manner the combination of biological integrity, diversity, and environmental health. We balance all three by considering refuge purpose(s), System mission, and landscape scales.”

Conserving fish, wildlife, and habitats in their natural diversity is mandated by ANILCA and managing for biological integrity, diversity, and environmental health on Kodiak Refuge is required by the National Wildlife Refuge Improvement Act of 1997. In order to follow these mandates, the Service evaluates activities that may influence natural processes of habitat on which wildlife and fish populations depend.

A Refuge Manager will authorize fisheries restoration activities on a National Wildlife Refuge in Alaska only if:

- a) Alternatives to proposed action have been evaluated as a practical means of achieving management objectives;
- b) Proposed actions have been evaluated in compliance with the National Environmental Policy Act (42 U.S.C. 4321 et seq.);
- c) A formal refuge compatibility determination has been completed, as required by law; and
- d) The potential effects of the proposed action on subsistence uses and needs have been evaluated through an ANILCA section 810 analysis.

These management techniques must meet refuge purposes; be consistent with Federal laws and policy; and be based on sound science in response to a conservation concern. Demands for increased abundance of wildlife for commercial purposes or human harvest cannot be the sole or primary basis.

After fully considering the impacts of nutrient modification, it is my determination that, at this time, the use will materially interfere with and detract from the purposes of the Refuge and the mission of the NWRS.

Citations

Foster, M.B. 2014. *Karluk Lake Sockeye Salmon Reduced Runs Memo Compilation*. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 4K14-01. Kodiak: Alaska Department of Fish and Game.

Kodiak Regional Aquaculture Association (KRAA). 2012. *Karluk Lake Nutrient Enrichment: A Proposal by the Kodiak Regional Aquaculture Association*. Kodiak, Alaska: Kodiak Regional Aquaculture Association.

Rogers, L. A, et. al. 2013. Centennial-scale fluctuations and regional complexity characterize Pacific salmon population dynamics over the past five centuries. *Proceedings of the National Academy of Sciences*. Vol. 110, No. 5. 1750–1755.

Schmidt, D.C., S.R. Carlson, and G.B. Kyle. 1998. Influence of carcass-derived nutrients on sockeye salmon productivity of Karluk Lake, Alaska: Importance in the assessment of an escapement goal. *North American Journal of Fisheries Management* 18:743–763.

Signature Refuge Manager: _____
(Signature & Date)

Concurrence Regional Chief, NWRS, Alaska: _____
(Signature & Date)

Mandatory 10-Year Re-Evaluation Date: _____

National Environmental Protection Act (NEPA) Compliance for Refuge Use Decision

_____ Categorical Exclusion without Environmental Action Memorandum

_____ Categorical Exclusions and Environmental Action Memorandum

Environmental Assessment and Finding of No Significant Impact

Environmental Impact Statement and Record of Decision