

## ***USFWS Q&A for the Karluk Lake Enrichment Preliminary Environmental Assessment***

### **1. What is the purpose of this Environmental Assessment?**

The Environmental Assessment (EA) evaluates the environmental and management consequences as well as the effects on subsistence uses of the Kodiak Regional Aquaculture Association's (KRAA) proposed nutrient enrichment in Karluk Lake. The preliminary EA contains four alternatives: Alternative A: No Action; Alternative B: Proposed Action - KRAA proposal to apply an aqueous solution of phosphorus and nitrogen to the surface of Karluk Lake over the period of five years to increase lake productivity; Alternative C: the stocking of fry in Karluk Lake over the same five year time period; Alternative D: a combination of stocking and fertilization.

### **2. Why conduct an Environmental Assessment?**

The KRAA has applied for a special use permit from the Kodiak National Wildlife Refuge in order to conduct their proposed action, which is within the boundaries of the Refuge. Under the National Environmental Policy Act, the Refuge must assess the potential impacts of the proposed action and alternatives on the human and natural environment. The resulting preliminary EA informs the decision whether to permit the activity in accordance with federal laws and management policy.

### **3. What is the purpose of this proposal?**

Karluk Lake is the largest lake in the Kodiak Archipelago and its watershed supports all five species of Pacific Salmon. Karluk Lake has historically been the largest producer of sockeye salmon on Kodiak Island. Concerns surfaced after 2008 when the early run of Karluk Lake sockeye failed to meet the Alaska Department of Fish and Game's minimum escapement goals for several years. In 2012, KRAA submitted an application to the Refuge for a special use permit to fertilize Karluk Lake to increase primary productivity in the lake. The project hopes to thereby increase smolt size, survival, and ultimately adult sockeye salmon harvest.

### **4. What do we know about Karluk sockeye escapement?**

We don't have any return records before 1921, when the first weir was installed on the Karluk River to count returning salmon. Using nitrogen isotopes from lake sediment samples, researchers have reconstructed an estimate of historical salmon escapement into Karluk Lake over the past 2000 years, showing large cycles between 300,000 and 1.3 million sockeye before commercial fishing began in the late 1800s. Total returns vary over time due to many environmental factors, including lake, river and marine habitat, as well as human factors such as harvest. Weir data shows a peak in escapement in the 1920s, with subsequent escapement fluctuating between 200,000 and around 1.5 million fish.

### **5. What do we think caused the decreased run during 2008-2011?**

The Alaska Department of Fish and Game (ADF&G) attributes the decreased runs to over-escapement between 1985-2007, which resulted in large numbers of juveniles that overgrazed and reduced the food available for future runs. Since 2012 the sockeye salmon returns to Karluk Lake have trended upwards, exceeding the minimum escapement goal; in 2014, returns exceeded the maximum escapement goal.

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**6. What area would the proposed project affect?**

The KRAA proposal would apply fertilizer to the surface water of all of the main Karluk Lake basin, as well as Thumb and O'Malley Lake Basins. Stocking fry would occur in Upper Thumb River and Lake. All five species of Pacific salmon depend on different areas within the Karluk watershed and may be affected; therefore the project area is defined as the entire Karluk River drainage.

**7. What is the project duration?**

The project period includes two years of pre-project monitoring, two years of post-project monitoring, and five years of enhancement activity.

**8. What is the estimated cost?**

The cost to Kodiak Regional Aquaculture Association is estimated at \$250,000 annually to fertilize the lake. The cost for stocking fry is estimated at \$250,000-\$300,000 annually. The combination of fertilization and stocking is approximately \$500,000-\$550,000.

**9. What is the importance of Karluk Lake for sockeye salmon?**

Unlike other species of Pacific salmon, sockeye salmon take advantage of lakes for spawning their eggs and rearing juvenile salmon. Once they hatch, juvenile sockeye generally stay in Karluk Lake for 2-3 years, and a variety of factors determine their growth, including environmental conditions, food, and space availability. Juvenile sockeye salmon in Karluk Lake feed mostly on small animals (zooplankton) in the lake, such as copepods.

**10. What is the history of fertilization and stocking at Karluk Lake?**

The ADF&G stocked Karluk Lake with sockeye salmon fry from 1978-86 and fertilized the lake from 1986-90. There have been no other enhancement projects since 1990.

**11. What was the effect of the previous fertilization on Lake productivity?**

Applying fertilizer generally results in an increase in microscopic plant material (phytoplankton). In Karluk Lake, primary productivity (measured by chlorophyll a), increased during fertilization but returned to pre-fertilization levels following enrichment.

**12. What about when the lake was stocked?**

Stocking added between 1-8.5 million juveniles annually to the Karluk system, but no data were collected to evaluate the impact of the added stock on the resulting adult runs.

**13. Didn't salmon returns increase after enhancement?**

Karluk runs have historically been cyclical. There was insufficient monitoring data collected to determine past enhancement project effects on sockeye returns. Total Karluk sockeye returns began to rise in 1982, peaked in 1991, and have continued to fluctuate with another peak in 2003. We can use current research on productivity and returns to better understand the context of this system. Researchers in 1998 concluded that salmon carcass deposition was the most important driver of lake productivity for the increased return that began in 1982, prior to the fertilization project. In addition, the cyclical variation in salmon returns in the

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Karluk was similar to other non-enriched systems between 1981 and 1997.

### **14. What are the potential effects of sockeye stocking on other salmon stocks?**

The Karluk watershed supports a diverse population of fish species. Increasing adult sockeye returns through stocking could change the proportion of adults harvested, cause overharvest of wild sockeye stocks that have lower egg to fry survival, and result in a long-term decline of wild stocks, reducing genetic diversity. In addition, an enhanced sockeye return could increase incidental catch of other Pacific salmon species, including Karluk River Chinook, which are currently listed as a “stock of management concern.”

### **15. What is the importance of the Salmon Portfolio Effect and genetic variety?**

Protecting the genetic variety of sockeye salmon stocks in the Karluk watershed provides for a fishery that is more resilient to changes in the environment and a more reliable long-term future food source for people and wildlife. The “Salmon Portfolio Effect” describes the recent analysis of over 50 years of data from Bristol Bay’s many different genetic stocks of sockeye salmon, comparing the overall resilience of the system to a financial best practice of diversified portfolio investments. In general, greater biological diversity tends to result in ecosystems with long-term resilience and requires less intensive management. Bristol Bay salmon returns demonstrate the benefits of a healthy portfolio by improving run stability and decreasing the frequency of fishing closures.

### **16. What guides Kodiak Refuge management policy?**

Like most Alaskans, we value healthy, wild salmon and salmon habitat, and recognize how important they are to the surrounding communities and to other critical wildlife in the area. Our key legislation is the 1997 Refuge Improvement Act, which requires that we maintain the biological integrity, diversity, and environmental health of the National Wildlife Refuge System. Under ANILCA, we have also developed a Comprehensive Conservation Plan (2008 updated), that sets an overall direction and provides goals and management guidelines for Kodiak Refuge.

### **17. Does the Fish and Wildlife Service have a preferred alternative at this time?**

No. The Service is in the process of evaluating the proposal through the environmental assessment process and will make a decision once the EA is final.

### **18. What are the expected effects of these alternatives?**

Table 10 in Section 4 of the EA summarizes the anticipated effects of the alternatives. Please look at this table for details, which range from no impact to moderate impact. Under the preliminary assessment, no significant impacts are expected from any of the alternatives.

### **19. What are the decisions to be made at the end of the review period?**

The outcome of the preliminary EA process is a decision document signed by the appropriate responsible official (RO) for the Service. In the document, the RO will determine the following:

- Whether any of the anticipated impacts from the considered alternatives are likely to be significant;

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- Whether the analysis contained in this EA is adequate for the purposes of reaching an informed decision regarding KRAA's proposal;
- Whether to approve the Proposed Action or deny KRAA's request for a permit
- Whether the Proposed Action and other action alternatives conform with the purposes of Kodiak Refuge and mission of the NWRS; and
- Appropriate terms and conditions as necessary if the project is approved.

### **21. How can I participate in this process?**

This preliminary EA provides an opportunity for public comment. The comment period will be open for 60 days following the release of the preliminary EA. Please submit comments by email to [fw7\\_kodiak\\_planning@fws.gov](mailto:fw7_kodiak_planning@fws.gov) or by mail to Pete Wikoff, U.S. Fish and Wildlife Service, 1101 E. Tudor Road, Anchorage, Alaska 99503. We also invite you to attend on Open House at the Kodiak NWR Visitor Center on January 13 from 4 to 8 p.m.

### **22. What does the Service want to know?**

We value your input! We want to know if there is any additional information or are there other alternatives we should consider in the preliminary EA?