

# MEMORANDUM

State of Alaska  
Department of Fish and Game  
Division of Sport Fish

TO: Glenn Haight, Executive Director  
Board of Fisheries, Juneau

DATE: March 16, 2015

PHONE NO: (907) 465-6095

FROM: Thomas D Vanla, Regional Supervisor  
Division of Sport Fish, Region II

SUBJECT: Description of the Otter Lake  
Northern Pike Eradication Project

**Synopsis:** The northern pike is an invasive species in Southcentral Alaska, and its establishment in Southcentral waterbodies has resulted in the loss of salmon, trout, and stocked waters fisheries. In Anchorage, illegally-introduced northern pike have been eradicated from Cheney Lake and Sand Lake, but they are still known to occur in other Anchorage area waters such as Lower Fire Lake in Eagle River and Otter Lake on Joint Base Elmendorf-Richardson (JBER). Otter Lake drains into Otter Creek, which outflows through a weir, and continues north into Eagle River Flats, Eagle River, and ultimately the Knik Arm of Cook Inlet. Historically, Otter Lake supported anadromous runs of coho and sockeye salmon. In the 1960s, extensive beaver damming in Otter Creek impeded anadromy to Otter Lake, and in 1966, Alaska Department of Fish and Game (ADF&G) began stocking rainbow trout in the lake to supplement recreational fishing opportunities. In 2001, illegally-stocked northern pike were discovered in the lake. They quickly decimated the stocked rainbow trout, and in 2006, ADF&G discontinued stocking the lake to avoid wasting hatchery fish on northern pike predation. Currently threespine sticklebacks and stunted northern pike are the only fish remaining in Otter Lake.

The Department of Defense (DOD) is currently implementing a large fish passage restoration project on JBER. They intend to restore anadromy to Otter Lake by removing the beaver dam impediments in Otter Creek, removing a perched culvert and replacing the outlet weir with one that allows fish passage. However, with invasive northern pike present in Otter Lake, an unintentional consequence of this effort could be the dispersal of northern pike out of Otter Lake and into the Eagle River Flats. To prevent this, DOD has partnered with ADF&G to eradicate northern pike from Otter Lake and Otter Creek using rotenone, a common fisheries management tool for the removal of invasive fish. DOD has acquired the permits for this project, and they have contracted ADF&G to conduct the rotenone treatment.

**Goal:** Eradicate the northern pike population from Otter Lake and Otter Creek upstream of an impassible beaver dam to prevent this invasive species from spreading once fish passage is restored to the system.

**Permitting Processes:** In Alaska, there are extensive permitting processes involving public input for any northern pike eradication projects involving rotenone. The details are presented below for the Otter Lake Pike Eradication Project. DOD staff have taken the lead on all permitting and

public interaction on this project. Because Otter Lake is located on a military base and does not have any residential development around it, a public scoping process preceding permitting was not, in this case, conducted.

*APDES Permit.* The Alaska Pollutant Discharge Elimination System permit (an EPA section 402 Clean Water Act permit administered by the State of Alaska Department of Environmental Conservation (ADEC) was acquired for the Otter Lake Northern Pike Eradication Project on June 11, 2013. This permit involves preparing a detailed permit application and filing a "Notice of Intent (NOI)" with the ADEC.

*NEPA.* The majority of funding for this project comes from a federal source. Therefore, this project must comply with the National Environmental Policy Act (NEPA). This includes the development and subsequent federal review of an Environmental Assessment. JBER completed the Environmental Assessment in the spring of 2013, submitted it to the National Marine Fisheries Service (NMFS) and the United States Air Force (USAF), and posted it online on March 31, 2013 for public review at <http://www.jber.af.mil/environmental/index.asp>. Physical copies of the environmental assessment were also made available at the following Anchorage-area libraries: Z.J. Loussac Public Library, Mountain View Branch Library, Muldoon Branch Library, Chugiak-Eagle River Branch Library, and the JBER-Richardson Library. The NEPA process also requires a 30-day public comment period. This comment period ran from April 1 – April 30, 2013. No public comments were received during the comment period. After reviewing the environmental assessment and receiving no notification of opposition, a "Finding of No Significant Impact (FONSI) document was issued and signed by NEPA representatives from NMFS and the USAF on July 3, 2013 concluding the NEPA process.

*ADEC Pesticide Use Permit.* The ADEC Pesticide Use Permit is an extensive permitting process that usually takes 6 months to 1 year to complete. It includes a detailed permit application that documents the project area, ensures the pesticide is registered for use in Alaska, identifies how much product will be applied, methods of delivery, timing of treatment, names of certified applicators and other details. The permit also includes a 30-day public comment period, and the applicant must supply an affidavit proving that public notice of the comment period has been published in a local newspaper on two consecutive days. Public notices ran in the Alaska Dispatch on December 18 – 19, 2014, and the public comment period ran from December 20<sup>th</sup> – January 18<sup>th</sup>. No public comments were received during the public comment period. Weighing JBER's permit application packet and the lack of public opposition, ADEC issued the Pesticide Use Permit on January 29, 2015. There is a mandatory 40-day window in which the permitted agency may not proceed with their project following the issuance of the permit. (This is to allow the public an opportunity to contest the ADEC's decision. The 40-day window ended March 9th, and this permitting process is now complete.

In addition, there are several minor permits from ADF&G and Alaska Department of Natural Resources that are either complete or will be completed well in advance of the rotenone treatment.

**Rotenone Treatment:** The project area for this rotenone treatment encompasses Otter Lake and its littoral marshes and a 1/3-mile section of Otter Creek down to the impassible beaver dam that has been in place since the 1960s. This is a large perched structure that completely prohibits fish passage between Otter Creek and Eagle River. The entire project area is located on JBER north of

Anchorage, AK. Otter Lake is fed by springs and is adjacent to a large wetland complex. Otter Lake and the littoral marshes included in the treatment area cover 141.3 surface acres (57.18 ha) and has a volume of 870 acre-feet. The lake has a maximum depth of 26 feet and a mean depth of 6.6 feet. Otter Creek from Otter Lake to the beaver dam is 1,925 feet in length and 10 feet wide at its widest point and has an outflow range between 3.33 and 5.45 cfs.

Liquid rotenone (CFT Legumine™) will be applied to Otter Lake in late September 2015. The rotenone treatment in Otter Lake is relatively small-scale compared with recent treatments ADF&G has completed. It will likely take less than 8 hours to complete the treatment. Motor boats, an airboat, and backpack sprayers will be used to deliver the rotenone to Otter Lake and the surrounding wetlands. Where water is more than 15 feet deep, the rotenone mixture will be applied to lower depths using a point source delivery system. In shallower waters, boats will be equipped with gas-powered pumping systems that will premix site water with the pesticide and then discharge the mixture below the water surface near the propeller wash of the boat. Small pockets of water along the edge of the lake and creek will be sprayed using backpack sprayers, and an airboat with a pumping system will be used to access submerged connected wetlands that are too shallow to access with motorboats.

Drip stations will dispense liquid rotenone into the creek for 8 continuous hours at a constant rate and will be monitored to insure the proper flow rate. Sentinel fish in cages will be used to determine if neutralization downstream of the treatment area in Otter Creek is necessary. If so, potassium permanganate (KMNO<sub>4</sub>) will be delivered via drip stations into the creek downstream of the beaver dam.

Following the rotenone treatment, treated waters will be monitored with water tests to determine when the rotenone has completely broken down. ADF&G will also assist JBER staff with project evaluation to ensure that northern pike have been eradicated. Once that is determined, JBER staff will proceed with their fish passage restoration work in Otter Creek.

**Other AK Projects:** Rotenone has been successfully used for northern pike eradication on several other occasions. In 2008, Cheney Lake in Anchorage and Arc Lake in Soldotna were treated. That winter, ADF&G used rotenone in a series of ponds in Yakutat with illegally-introduced northern pike. In 2009, ADF&G eradicated northern pike populations in Sand Lake in Anchorage and Scout Lake in Sterling. In 2012, ADF&G completed a large treatment of Stormy Lake in Nikiski to remove northern pike and prevent their spread to the nearby Swanson River. This project included an open-water treatment of an outlet stream to the Swanson River. In 2014, ADF&G treated Area 1 of Soldotna Creek which included four lakes and stream connections to Soldotna Creek.

For all rotenone treatments, substantial pre-treatment field assessments are conducted to describe the water quality and biological inventory of each water body to be treated. Biological inventories include identifying all fish species and dominant invertebrate and plankton species present. Post-treatments, ADF&G has documented sufficient recolonization of invertebrates and plankton to support reintroduction of native fish.

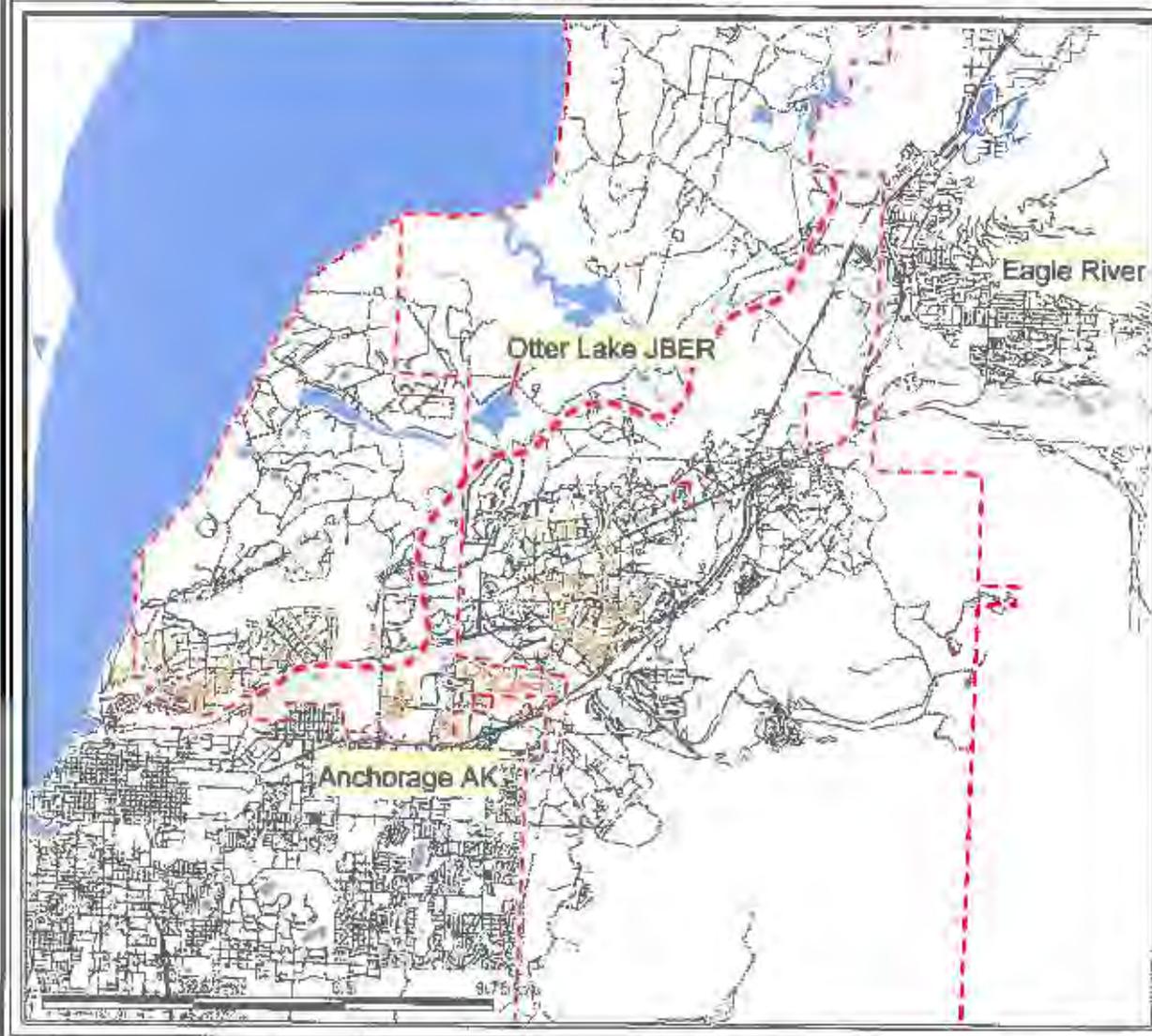
**Funding:** \$140,600 was supplied through Port of Anchorage Mitigation funds for the Otter Lake Northern Pike Eradication Project. These funds are held through a third-party NGO, Great Land Trust. ADF&G has an existing cooperative agreement with Great Land Trust to execute the treatment within the allotted funding available.

**Rotenone Description:** Rotenone is a naturally-occurring compound derived from the roots of tropical plants in the bean family. It has been used for centuries by indigenous cultures throughout the tropics to catch fish for food. Rotenone has been used as a piscicide by fish managers in the U.S. since the 1930s to remove unwanted or invasive fish. Currently, rotenone is commercially available as either a wettable-powder or as a liquid (CFT Legumin<sup>TM</sup>) and is registered by the EPA as a restricted-use pesticide for fish management. Besides draining an entire water body, chemical treatment is currently the only fisheries management tool that is capable of completely eradicating an entire fish population. Rotenone is toxic to fish, although some species are more tolerant than others. Rotenone is a mitochondrial inhibitor. As such, it inhibits a biochemical process that makes it impossible for fish to use oxygen during cellular respiration. This occurs in fish and other gill-breathing organisms because it is readily absorbed through the gills into the blood stream. Non-gill breathing animals lack this rapid absorption route into the blood stream. At concentrations used for fisheries management (~1.0 ppm of rotenone product), rotenone that is ingested or spilled onto skin is broken down by enzymes and is, therefore, not harmful to birds or mammals. There has been debate in the last decade on whether rotenone can cause Parkinson's Disease (PD). Prolonged, direct exposure reduces the level of dopamine in the brain, and in lab animals, this causes symptoms consistent with PD and other neurological conditions. However, the studies investigating this are completely unrelated to fisheries management. Neurologists studying diseases such as PD use rotenone in lab animals to mimic symptoms they are researching. In all such studies, laboratory animals are intravenously or intragastrically administered concentrated rotenone for prolonged periods (i.e. weeks) to induce these effects. These studies are not relevant to fisheries management because the concentration of rotenone used (1 ppm) when diluted into a lake are not, in any way, comparable to the exposures in the medical studies. However, recognizing that debate on the subject exists and that information available online and in the literature is complex and inconsistent for the interested public to review, ADF&G has adopted a policy of advising the closure of any water body that is treated with rotenone with signs and public notices until water tests indicate the chemical is completely degraded. No exposure equates to no human health risk for the public, and ADF&G staff are well-trained and protected with appropriate protective gear when handling the rotenone during treatments.

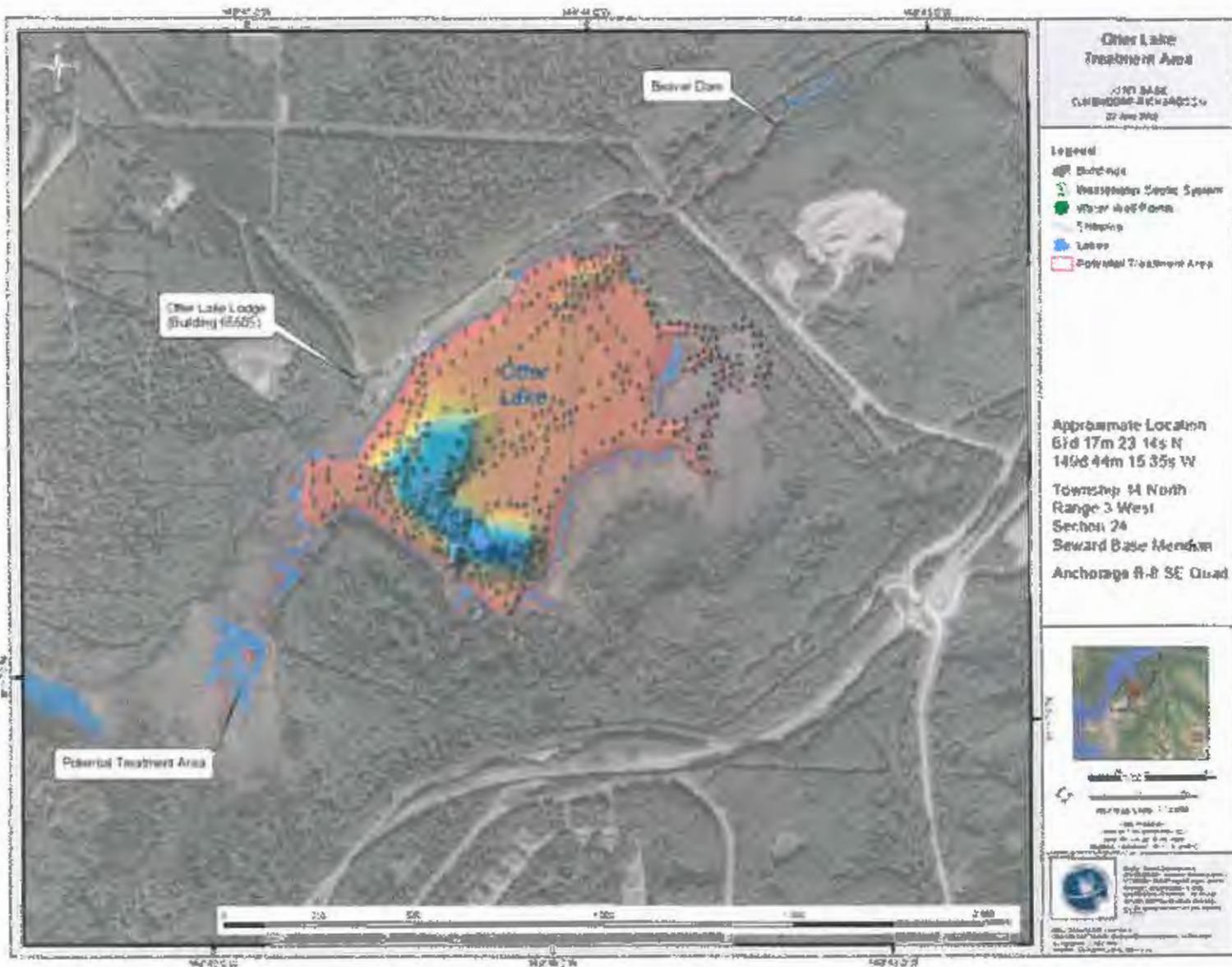
**For further questions, please contact Kristine Dunker, Research Biologist, (907)267-2889  
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Cc: Kristine Dunker

# Otter Lake Treatment



Location of Otter Lake on JBER north of Anchorage



**Otter Lake Pike Eradication Project Treatment Area**