

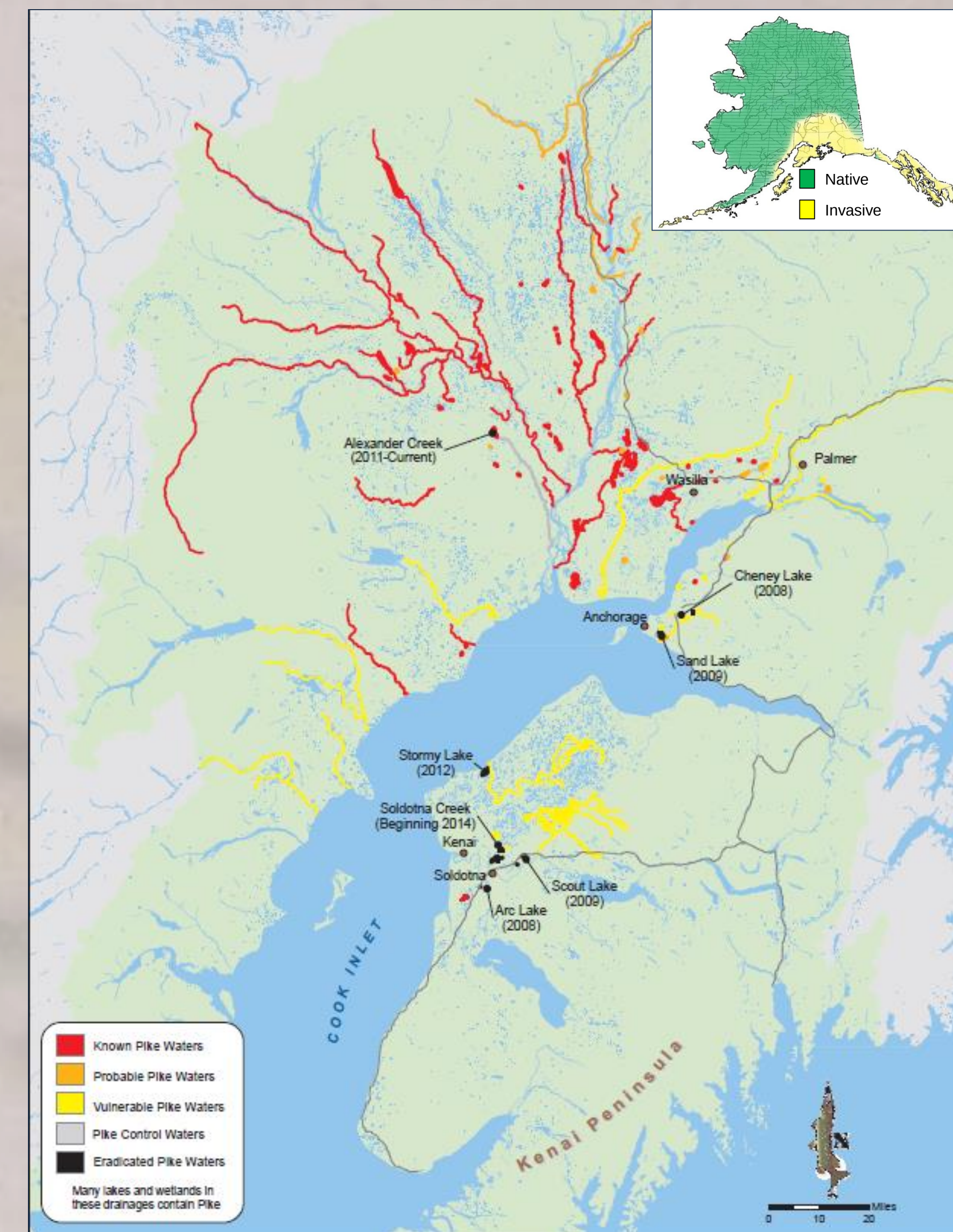


Control and Eradication of Invasive Northern Pike (*Esox lucius*) in Southcentral Alaska

Alaska Department of Fish and Game Northern Pike Control Committee

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Northern Pike in Southcentral Alaska



Northern pike are native to most of Alaska but do not naturally occur south and east of the Alaska Mountain Range. Their distribution in Southcentral Alaska is the result of illegal introductions over the last five decades and their subsequent dispersal in open systems.



Northern pike prefer shallow slow-moving water with abundant aquatic vegetation. Many Southcentral Alaska waters are vulnerable to northern pike establishment, and northern pike are currently found in over 120 water bodies in the region.



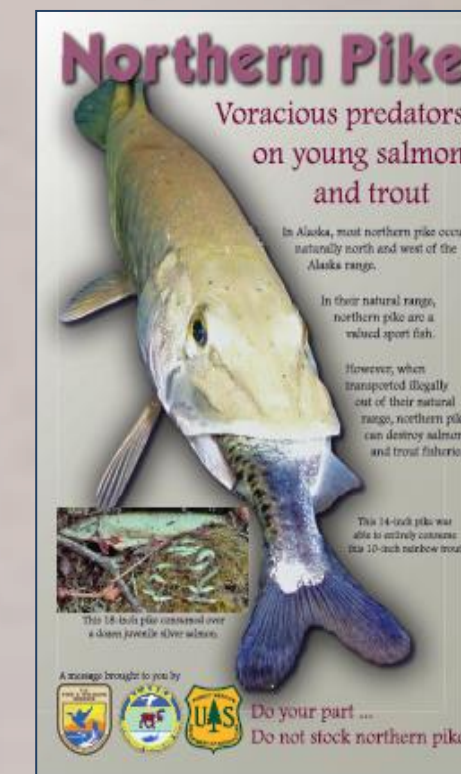
Northern pike are apex predators in aquatic environments. They hide in vegetation and quickly dart out after prey. Northern pike and rearing salmonids (i.e. coho salmon, Chinook salmon, and rainbow trout) occupy the same habitat making these species vulnerable to pike predation and contributing to fishery declines.

Project Funding Provided By:



Prevention

Outreach and Education



To prevent further northern pike establishment, ADF&G is getting the message out that northern pike are an invasive species in Southcentral Alaska and that illegal stocking has negative consequences. Outreach methods include public presentations, brochures, websites, PSAs, kiosks, and fishing DVDs.

Statutes and Regulations



The Alaska Legislature has strengthened the penalty for illegal stocking of non-native aquatic organisms to a class A misdemeanor, and the Alaska Board of Fisheries has liberalized sport harvest of northern pike by eliminating bag limits, allowing multiple harvest methods, and making it illegal to return them alive to certain waters.

Invasive Northern Pike Management Plan

In 2007, ADF&G finalized a management plan to guide ADF&G's actions on invasive northern pike.

Plan objectives:

- Increase public awareness on invasive northern pike
- Prevent future northern pike introductions
- Conduct public processes to support management actions
- Implement northern pike control and eradication projects
- Restore native fish populations that have been impacted
- Restore fisheries that have been lost

The plan includes a thorough discussion of management alternatives for northern pike control and eradication.

The plan can be reviewed at:

http://www.adfg.alaska.gov/static/species/nonnative/invasive/pike/pdfs/invasive_pike_management_plan.pdf

Strategic Planning

As an extension of the Invasive Northern Pike Management Plan, ADF&G began a strategic planning process to prioritize northern pike control and eradication projects. A team of ADF&G biologists developed a scoring matrix to be used as a tool for prioritizing project concepts. The scoring matrix includes over 60 questions pertaining to the following topics: threats to fisheries, habitat significance, watershed characterization, cultural significance, economic impacts, and feasibility.

The team meets to prioritize project concepts every two years. Planning efforts in 2010, 2012, and 2014 identified the following projects as priorities for ADF&G's invasive northern pike program:

1. Alexander Creek northern pike control
2. Cottonwood Creek drainage northern pike suppression
3. Soldotna Creek northern pike eradication – Phase 1
4. Soldotna Creek northern pike eradication – Phase 2
5. Stormy Lake northern pike eradication
6. Otter Lake northern pike Eradication
7. Cabin and Nancy Lake Pike Suppression
8. Kenai Peninsula northern pike eDNA study
9. Lower Fire Lake northern pike eradication
10. Alexander Creek northern pike movement study

*Currently in progress **Complete ***Currently Unfunded

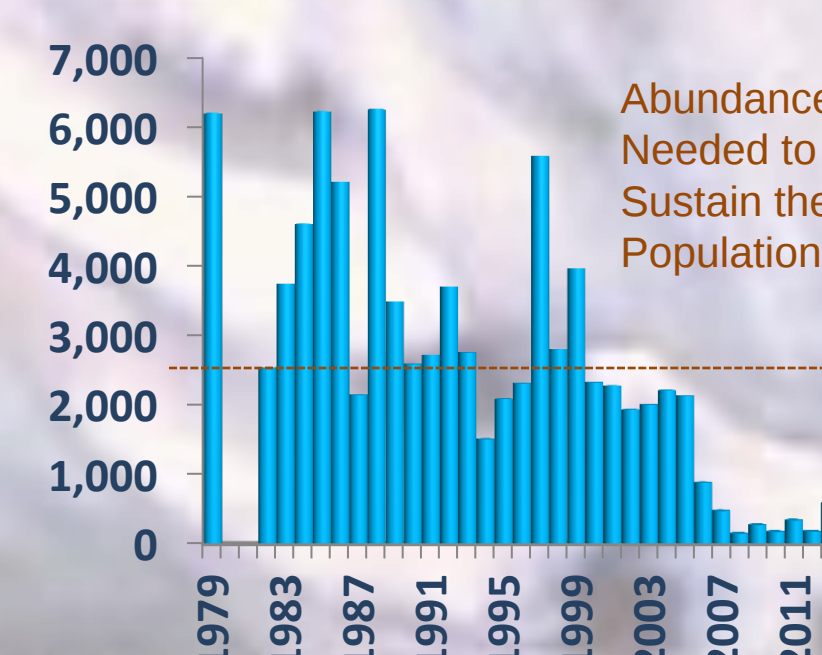
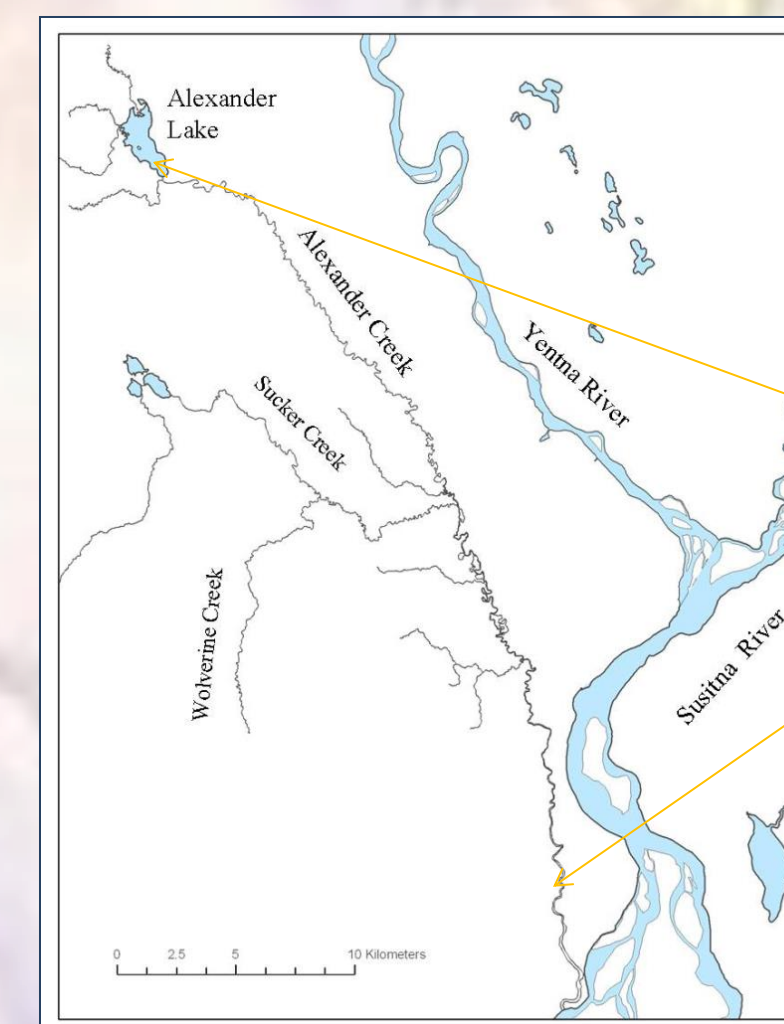
Control

Gillnets are the primary gear used for northern pike control projects. Projects span a variety of purposes from detecting presence of northern pike to monitoring known populations, to targeted annual control efforts. Gillnets are effective at reducing abundance of northern pike, but they are not typically used to eradicate populations.



Large-Scale Northern Pike Control

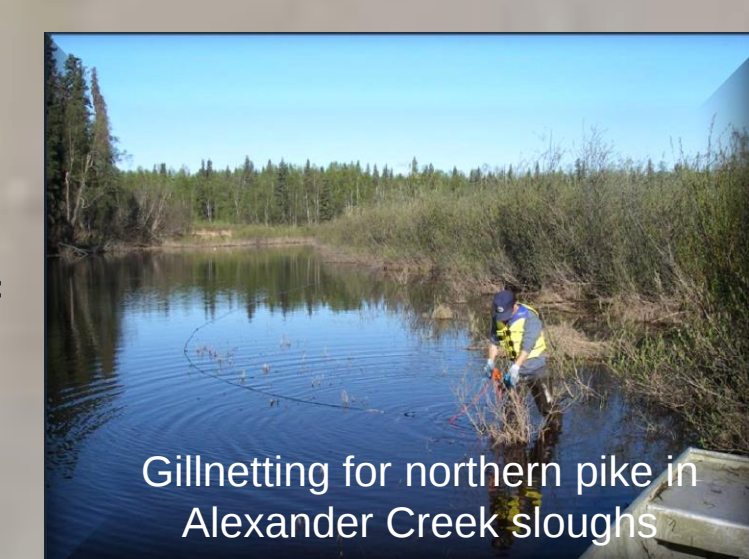
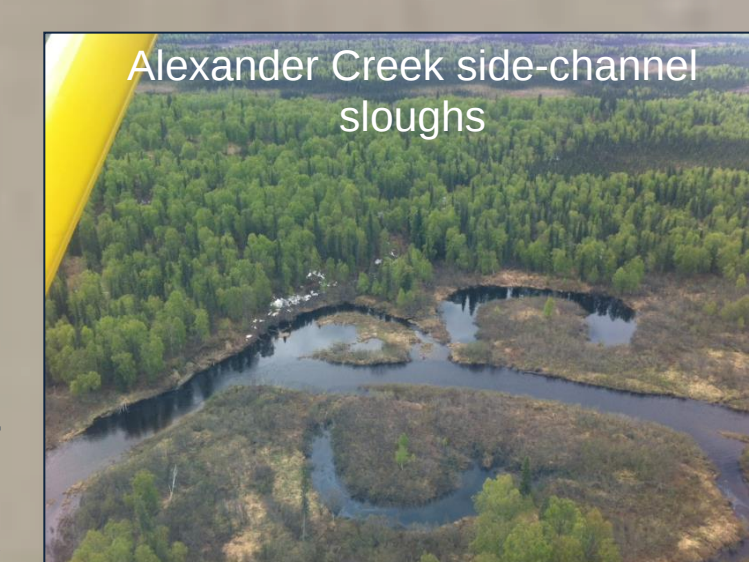
Annual northern pike removal from Alexander Creek, a tributary to the Susitna River, is ADF&G's highest priority for northern pike control.



In 2011, ADF&G began a large-scale annual gillnetting operation in an effort to reduce invasive northern pike abundance and increase survival of salmonids rearing in Alexander Creek. Each year, field crews spend a month netting ~60 Alexander Creek side-channel sloughs during the northern pike spawning season. In 2014, ADF&G added a fall netting season. ADF&G is evaluating juvenile salmonid abundance with minnow trap surveys and stomach contents of northern pike and conducting aerial surveys of adult salmon to measure the effectiveness of the gillnetting effort. The overall goal is to restore harvestable salmon fisheries to Alexander Creek.

Preliminary Results:

- > 14,300 northern pike have been removed since 2011.
- 2014 had the greatest abundance of returning Chinook salmon in nearly a decade.
- Juvenile salmon and resident species are recolonizing reaches of the creek where they had been absent prior to control efforts beginning.



Eradication

Rotenone

Besides draining a water body, chemical treatment is the only other consistently effective method of eradicating entire populations of invasive fish. ADF&G has been using rotenone to eradicate northern pike populations since 2008.

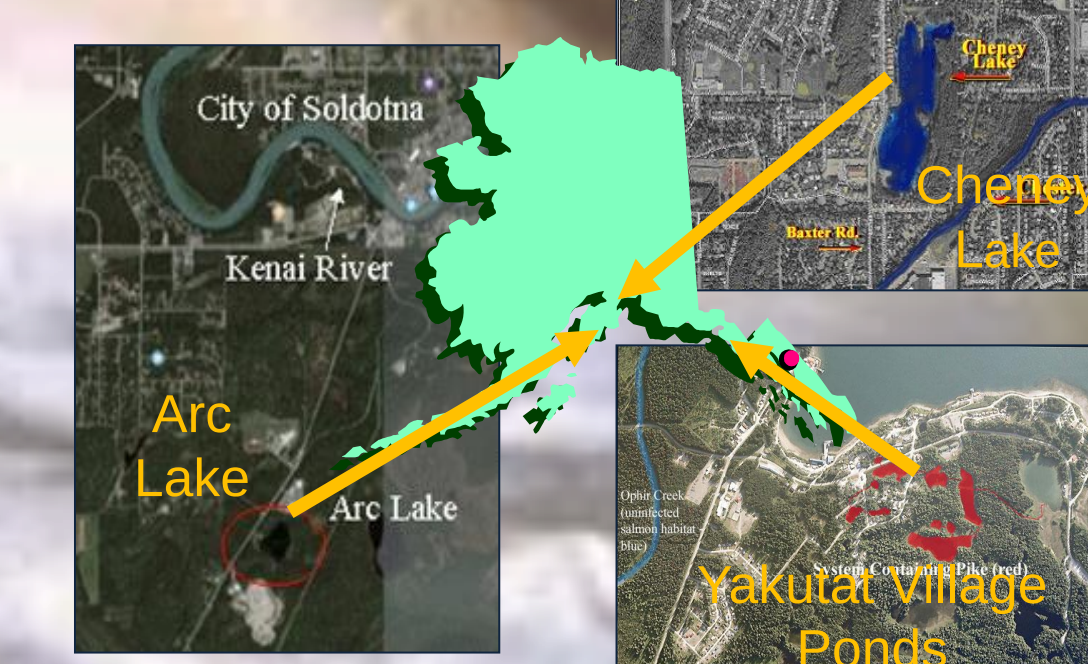
Rotenone is naturally-derived from tropical plants in the bean family. It has been manufactured and used as a piscicide in the US and elsewhere since the 1930s. Rotenone inhibits cellular respiration. It is lethal to fish because it is rapidly absorbed into the blood stream through the gills. Organisms without gills lack this rapid absorption route and are not affected by rotenone at treatment concentrations.

Rotenone Treatments

Liquid and powder formulations are used for northern pike eradication projects. Rotenone is mixed with lake water inside semi-closed pumping apparatuses and applied from motorboats. Backpack sprayers are used in densely vegetated areas, and drip stations are used in flowing waters. The concentration of rotenone needed to eradicate northern pike is very small (~5ppb or less).



2008



2009



2012



2014



In 2012, ADF&G treated Stormy Lake which was the most extensive treatment to date. The goal was to prevent pike from spreading to the Swanson River where they would likely thrive and decimate the Swanson's native fish populations.

Otter Lake on Joint Base Elmendorf-Richardson will be treated in 2015.

Beginning in 2014, rotenone will be applied to the Soldotna Creek Drainage to prevent northern pike from spreading to the Moose River which contributes up to 40% of the Kenai River coho salmon production.

Research

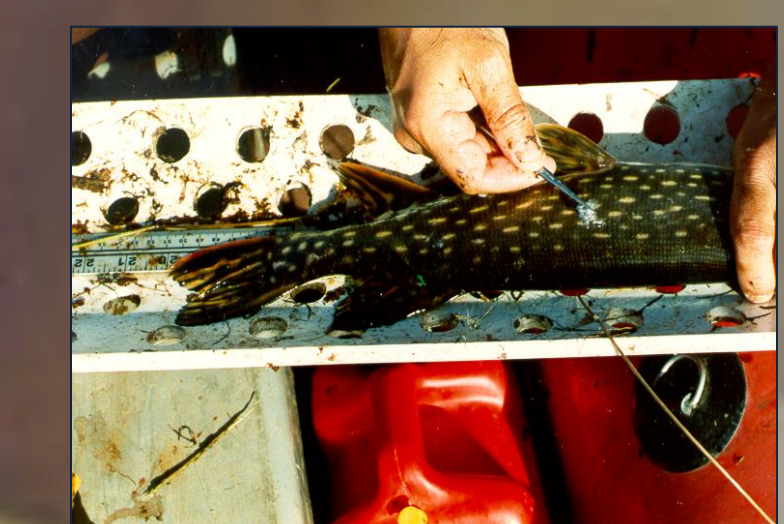
Rotenone Monitoring and Evaluation



Before rotenone treatments, ADF&G conducts habitat and species assessments and conducts bathymetric surveys in waters to be treated. Following treatment, water samples are analyzed to determine the rate of rotenone degradation, and lakes are thoroughly surveyed with gillnets to look for surviving northern pike. To date, no live northern pike in any of the treated lakes have been discovered during these evaluations.

Northern Pike eDNA Study

ADF&G is investigating the application of eDNA technology for northern pike detection. Aquatic organisms shed scales, gametes, excrement, etc. into the water, and DNA from these can potentially be detected in water samples. One of the concerns with the traditional method of surveying rotenone-treated lakes with gillnets is that it is difficult to detect species in low abundance. The sensitivity of eDNA testing is thought to be more effective for this than traditional survey methods.



Collecting samples for genetic marker development (above) and processing eDNA water samples (below)

In 2013, ADF&G and the USFWS, began a study to develop pike eDNA genetic markers, test the detectability of pike eDNA in lakes with known pike densities, test how distance from pike affects detectability, test eDNA detectability post-mortem for pike, and test pike eDNA detectability in open systems. Preliminary results suggest that live pike can be reliably detected up to 10m from the source and that eDNA remains detectable 1 week post-mortem.

Pike Movement Studies



In addition to the annual northern pike suppression in Alexander Creek, ADF&G studied the movement patterns of pike in that system using radio telemetry. 125 pike in Alexander Lake were implanted with radio transmitters in 2011. Pike movements were tracked monthly through 2013 with flight or snow machine surveys as well as with stationary receivers along the creek. The purpose of the study was to determine if there was significant movement of pike from Alexander Lake to the creek where all the suppression efforts are occurring. Of the tagged pike, only 9 of them moved out of the lake, and all of these were killed in ADF&G's gillnets downstream.

ADF&G also radio-tracked northern pike in Stormy Lake prior to treating it with rotenone to identify high use and spawning sites for pike in the lake to better direct the eradication effort there.

Background Photo by Jim Lavakras, Compliments of Anchorage Daily News