Invasive Northern Pike History, Impacts and Control in Upper Cook Inlet

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Sport Fish Division, Invasive Species Program Staff

RC 4 Tab 15

Northern Pike Proposals

Proposal 213: Allow anglers to use 5 lines while fishing for northern pike through the ice in Stephan Lake, Shirley Lake, Amber Lake, Parker Lake, Ladyslipper Lake, Whitsol Lake, Shell Lake, Chuitbuna Lake and the Threemile Creek drainage.

Proposal 214: Prohi horage Bowl and Knik River drainages

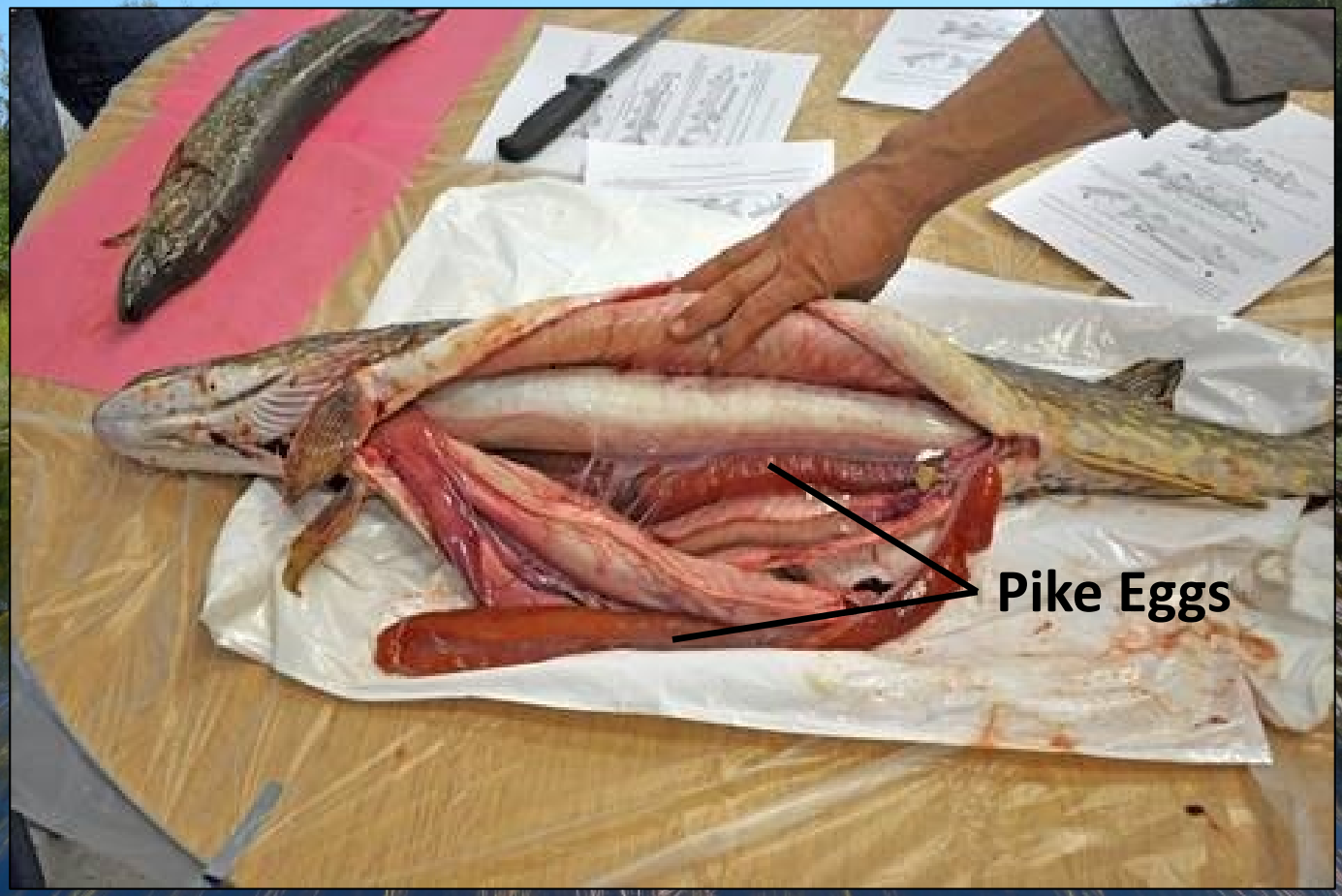
Proposal 233: Allow eemile Lake outlet. Currently a all fishing, and so is all of Threemile Cre

Proposal 239: Estab e Mat-Su Valley in all pike lakes OR suspected lakes. No limits and ALL fish must be kept.

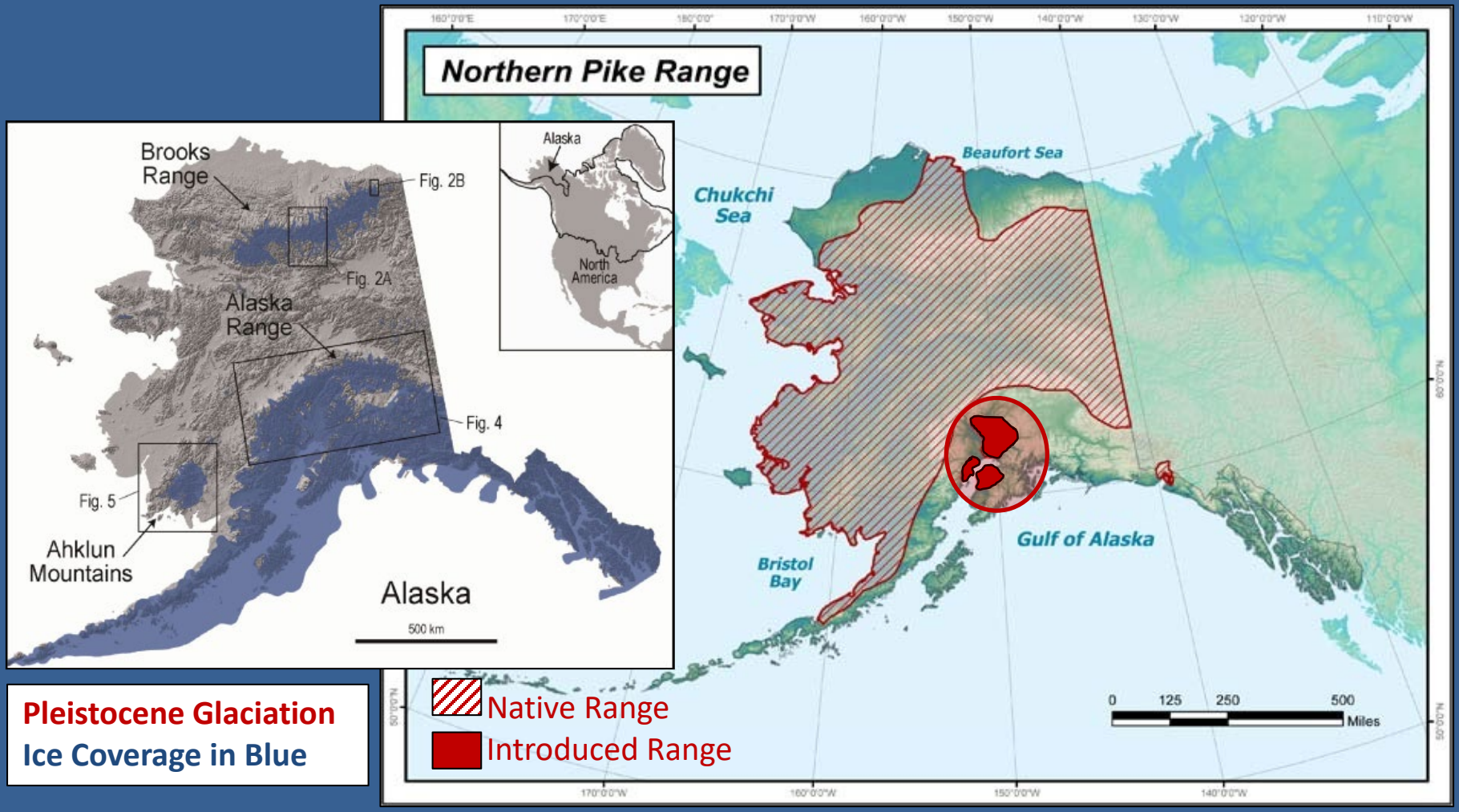
Proposal 240: Establish a personal use gillnet pike fishery in the Susitna River drainage.

Presentation Topics:

- Northern Pike Biology
- Pike Impacts to Fisheries
- Pike Control Efforts
- BOF Request


Pike Eggs

Northern Pike Range in Alaska



Pleistocene Glaciation
Ice Coverage in Blue

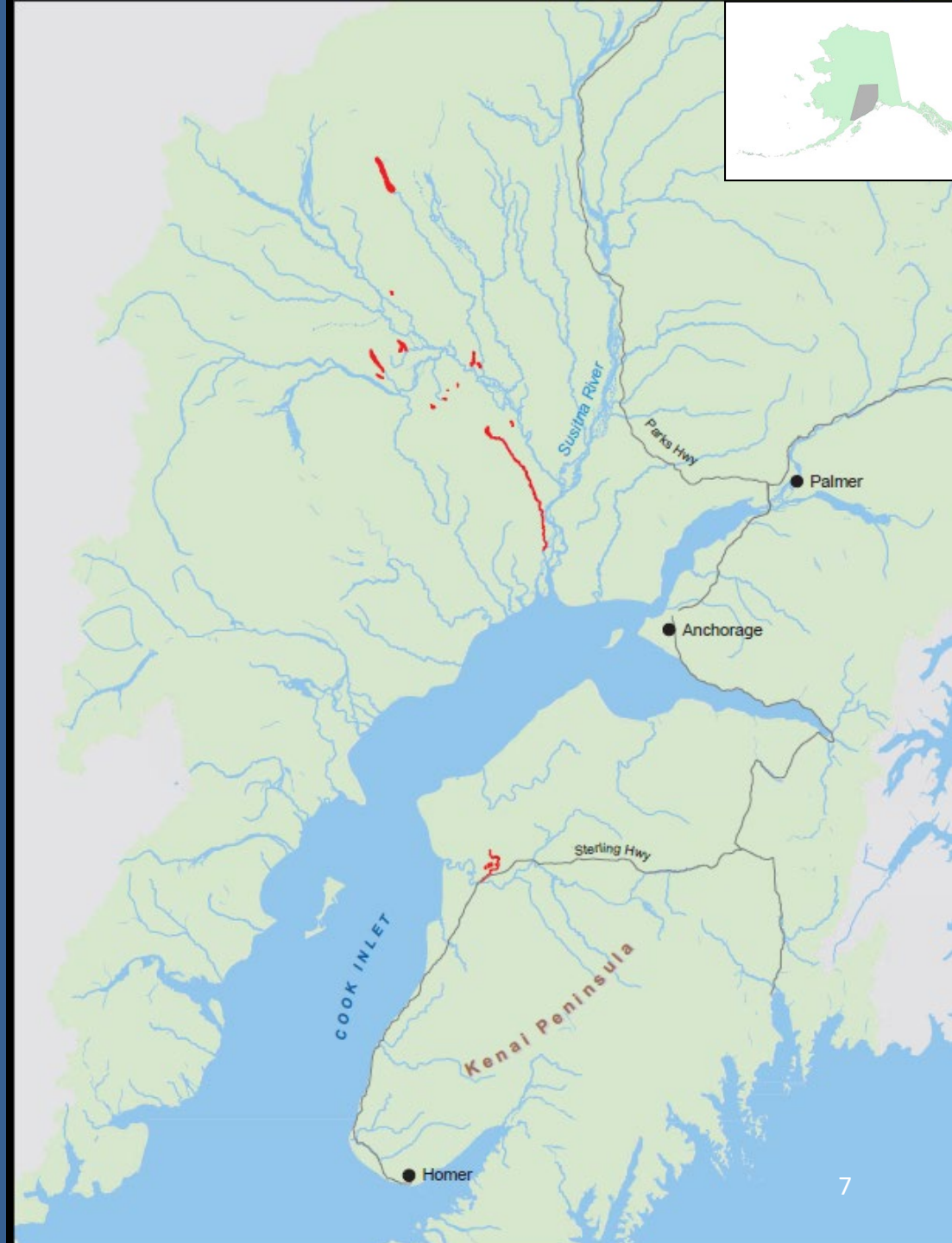
Glacial ice and the Alaska Range were geologic barriers to natural pike establishment in Southcentral Alaska.

Problem began in the 1950's

1950s – 1960s

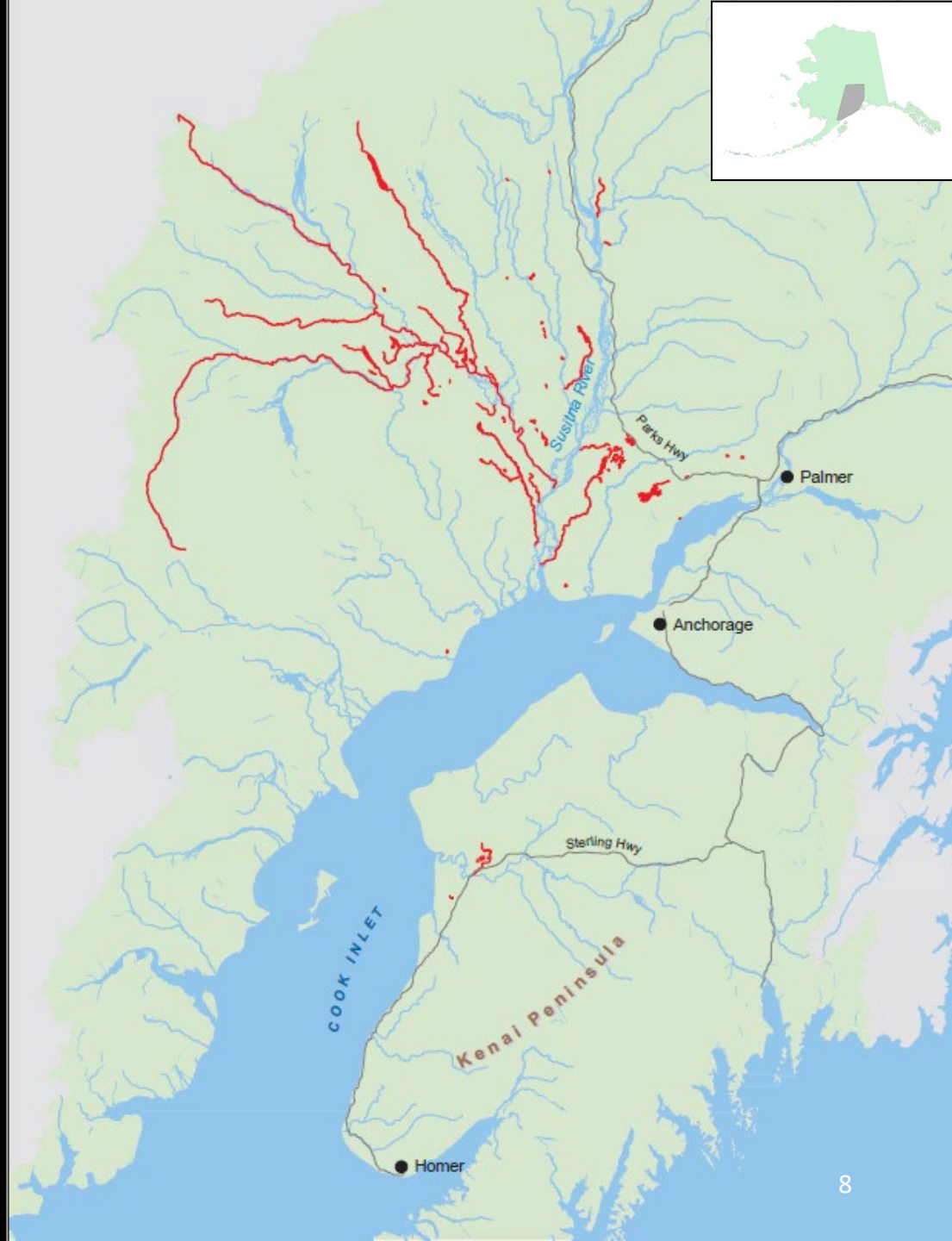
Northern Pike Dispersal in Southcentral Alaska

1970s



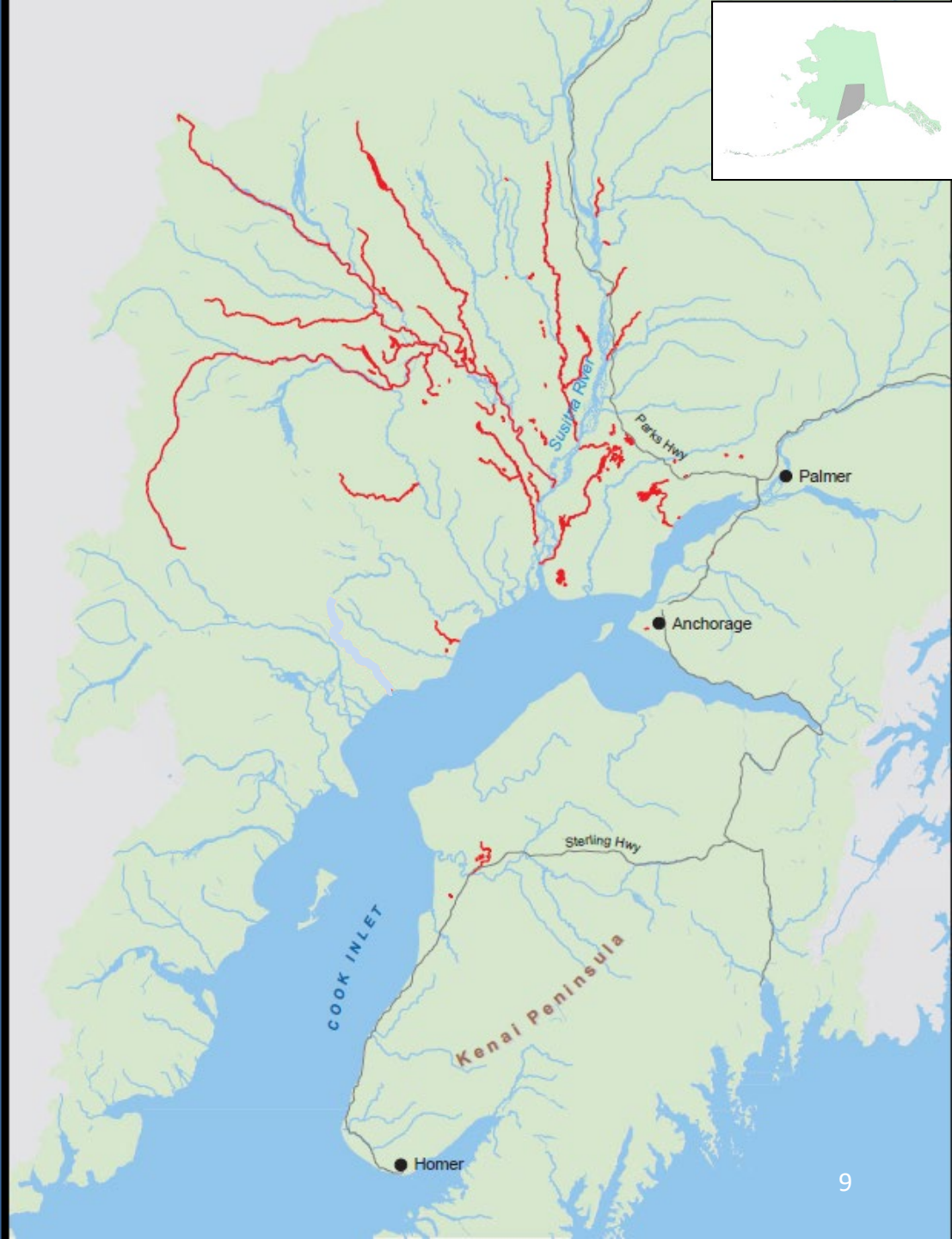
Northern Pike Dispersal in Southcentral Alaska

1980s



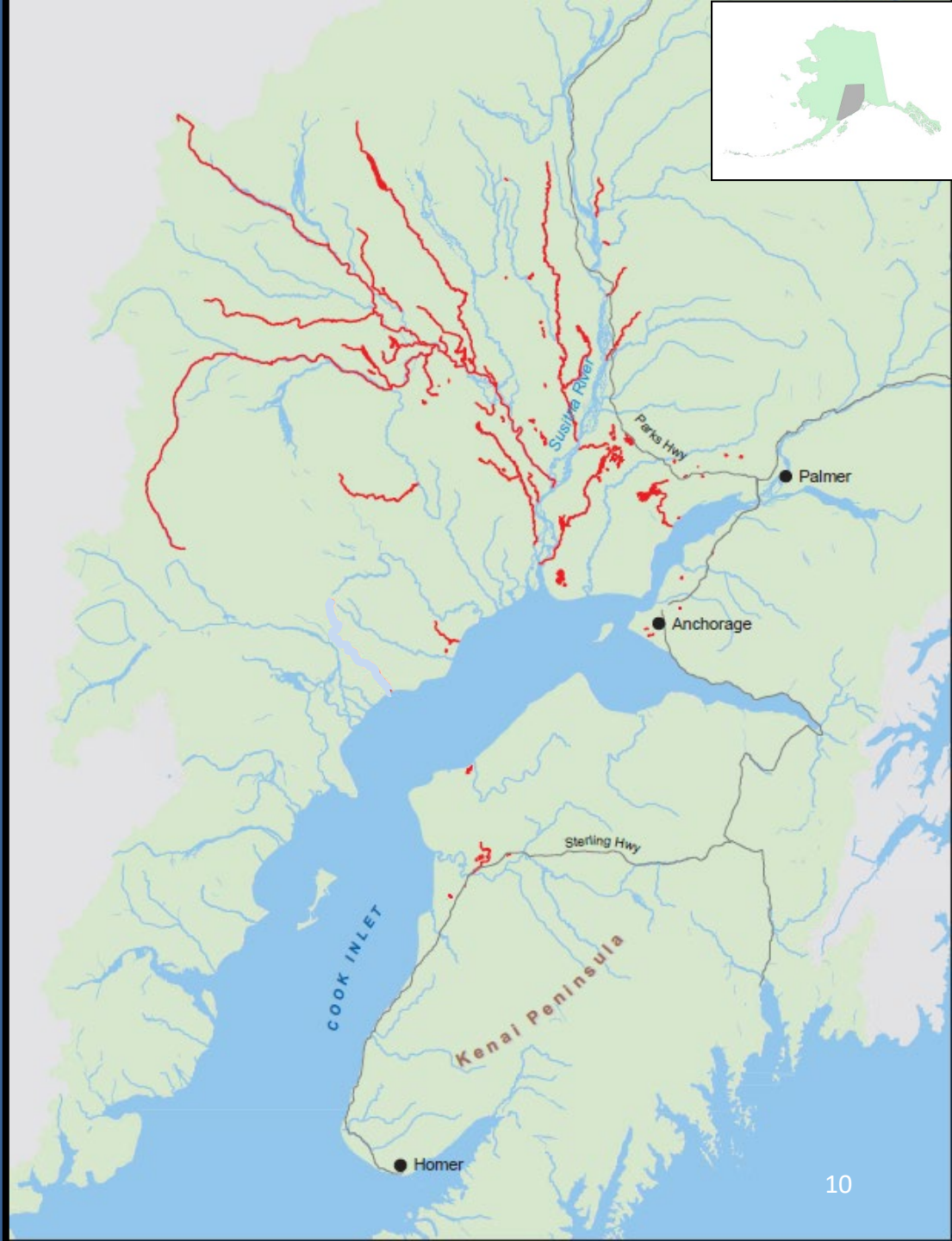
Northern Pike Dispersal in Southcentral Alaska

1990s



Northern Pike Dispersal in Southcentral Alaska

2000s

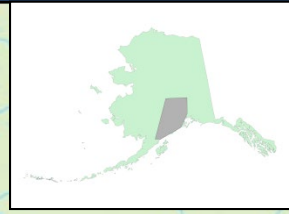


TODAY

Decades later, it became clear pike were a significant problem

Damage to the Susitna had already been done

> 120 water bodies with invasive pike



Palmer

Anchorage

Sterling Hwy

COOK INLET

Kenai Peninsula

Homer

Known Pike Waters

Many lakes and wetlands in these drainages contain Pike

N

0 10 20 Miles

Ecological Impacts

- Prevalent pike habitat
- Heavy predation on juvenile salmon and trout
  - Extirpated in some lakes
- Evidence that pike target salmon

Pike→

~~Salmonids~~→ Sticklebacks/ ~~Sculpins~~, etc.→ Invertebrates →

Pike Population Stunts

Invasive Species

Image credit: US Fish and Wildlife Service

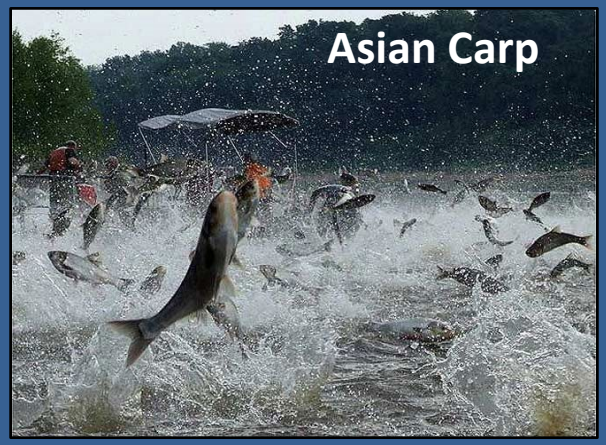


Image credit: Columbus Dispatch

Invasive Species: a species that has been introduced to an environment where it is non-native, or alien, and whose introduction causes environmental or economic damage or harm to human health.
Source: IUCN 2015

Ability to decimate salmon/native fish populations in shallow weedy waters qualifies pike as an invasive species in Southcentral.

Pike are Predators in their Native Range

Photo Credit: Jason Ching

Minto Flats State Game Refuge
Photo Credit: Paul Young

Western Alaska (Native Range):

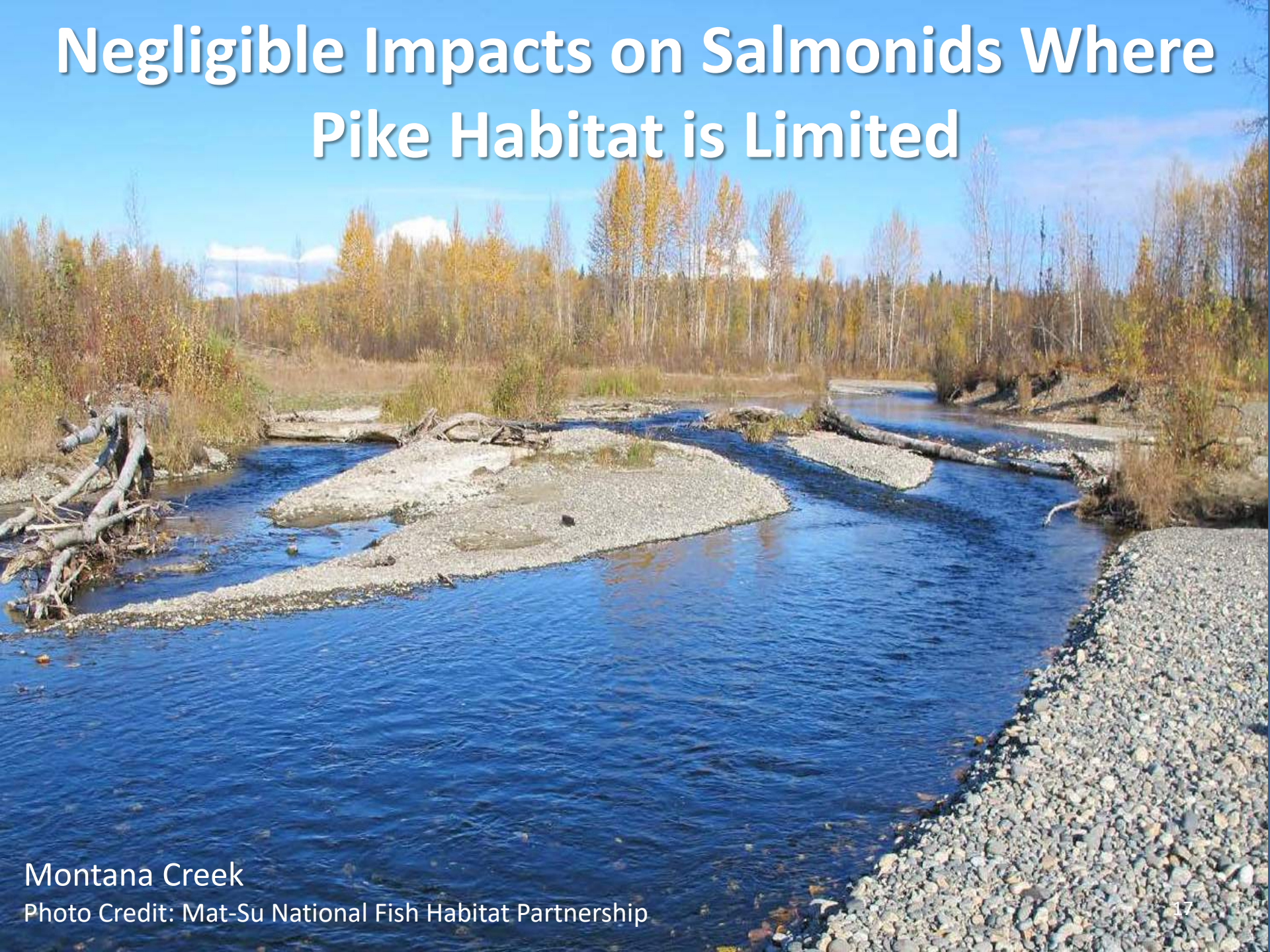
- Huge drainages with complex habitats that provide refuge from pike predation

Wood Tick-chick State Park
Photo Credit: Michael Melford

Habitat is a Key Factor for Pike Impacts

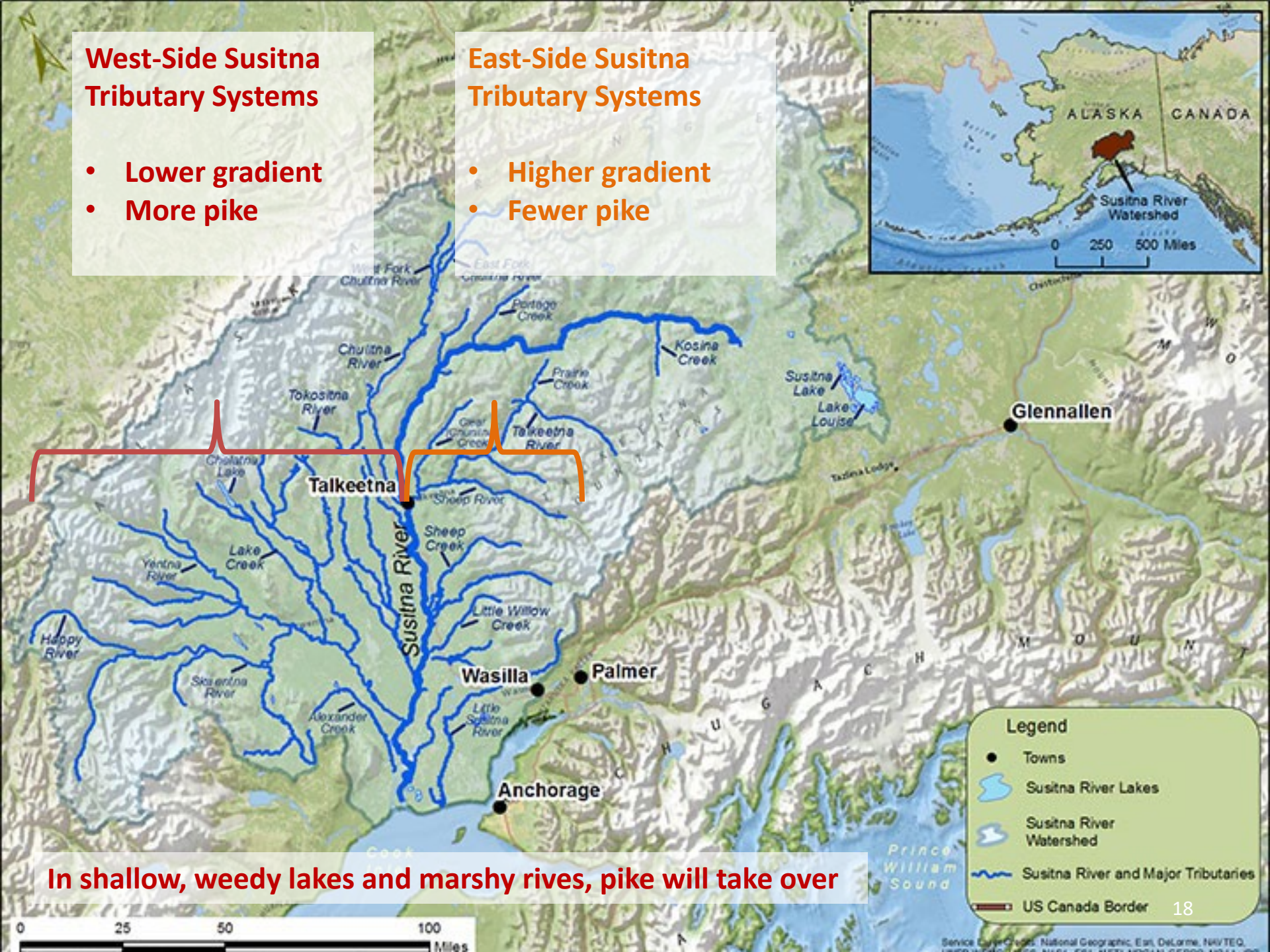
- In Southcentral, juvenile salmonids rear in these same habitats.
- Impacts are greatest when there is high habitat overlap with pike.
- Habitat variability mitigates predation risk.

Negligible Impacts on Salmonids Where Pike Habitat is Limited



Montana Creek

Photo Credit: Mat-Su National Fish Habitat Partnership



In shallow, weedy lakes and marshy rives, pike will take over

Highly Impacted Waters from Pike

Susitna Drainage

Alexander Creek
Alexander Lake
Amber Lake
Bulchitna Lake
Ding Dong Lake
Fish Lakes
Hewitt Lake
Ladyslipper Lake
Lockwood Lake
Neil Lake
Parker Lake
Shell Lake
Stephen Lake
Sucker Lake
Trail Lake
Trapper Lake
Vern Lake
Whiskey Lake
Whisol Lake
Whitsoe Lake

Knik Arm

Anderson Lake
Ardaw Lake
Arrowhead Lake
Big Noluck Lake
Charr Lake
Chicken Lake
Cow Lake
Echo Ponds
Figure 8 Lake
Flathorn Lake
Frazer Lake
Goose Creek
Jacknife Lake
James Lake
Kings Lake
Little Noluck Lake
Lynx Lake
Milo Lake
Owl Lake
Phoebe Lake
Redshirt Lake
Shirley Lake
South Rolly Lake
Stephan Lake
Tanaina Lake

Kenai Peninsula

*Arc Lake
*CC Lake
*Crystal Lake
*Derks Lake
*East Mackey Lake
*Fred's Lake
*Hope Lake
*Leisure Lake
*Leisure Pond
*Ranchero Lake
*Scout Lake
*Sevena Lake
*Stormy Lake
*Union Lake
*West Mackey Lake

Anchorage Area

*Cheney Lake
Lower Fire Lake
*Otter Lake
*Sand Lake

West Cook Inlet

Chuitbuna Lake
Roller Coaster Lake
Lower Lilly Pad Lake
Threemile Lake
West Threemile Lake
Upper Lilly Pad Lake

* Lakes that have been restored

Are Pike the Reason for Salmon Declines?

Prey availability

Deforestation

Pollution

Flooding

Pike Predation

Over-Harvest

Urbanization

Beaver Dams

Climate

Culverts

Habitat Degrada

Run-off

Development

Pathogens

Offshore Bycat

n Condition

Cook Inlet Aquaculture Association

Tyonek Tribal Conservation District

USGS science for a changing world

University of Alaska

U.S. Fish & Wildlife Service

Kenai Watershed Forum

Addressing the Pike Problem

OUTREACH **RESEARCH** **SUPPRESSION** **ERADICATION**

Sport Fish Division **Commercial Fisheries Division**

Invasive Species Pr

Region II Invasi

Focus: Benefit Chinook **Keye**

Eradication **Suppression** **Resea** **ion** **Research**

PREVENTION

FISHERY RESTORATION

Collaborators

Cook Inlet Aquaculture Association
Suppression
Outreach
Research

Tyonek Tribal Conservation District
Suppression
Outreach
Research

USGS science for a changing world
Research

University of Alaska
Research

U.S. Fish & Wildlife Service
Research
Outreach

Kenai Watershed Forum
Research
Outreach

Addressing the Pike Problem

Mission: To protect, maintain, and improve the fish, game, and aquatic plant resources of the state for the benefit of Alaskans, consistent with the sustained yield principle

Strategic Plan: Minimize impacts of invasive species on fish stocks and habitats (*Plan Objective*)

Protecting native fish from invasive pike is our responsibility

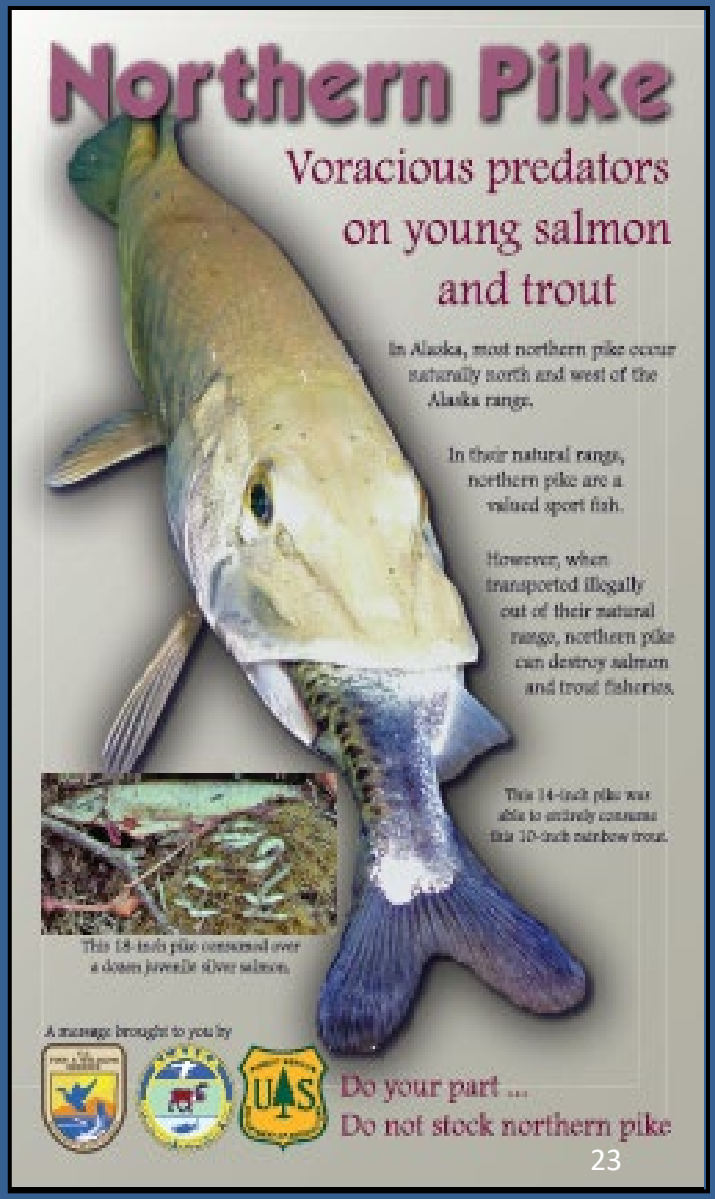
Guiding Plans: 1) Alaska Aquatic Nuisance Species Mgmt. Plan
2) Mgmt. Plan for Invasive Northern Pike in Alaska

Management Plans → Prioritization → Funding

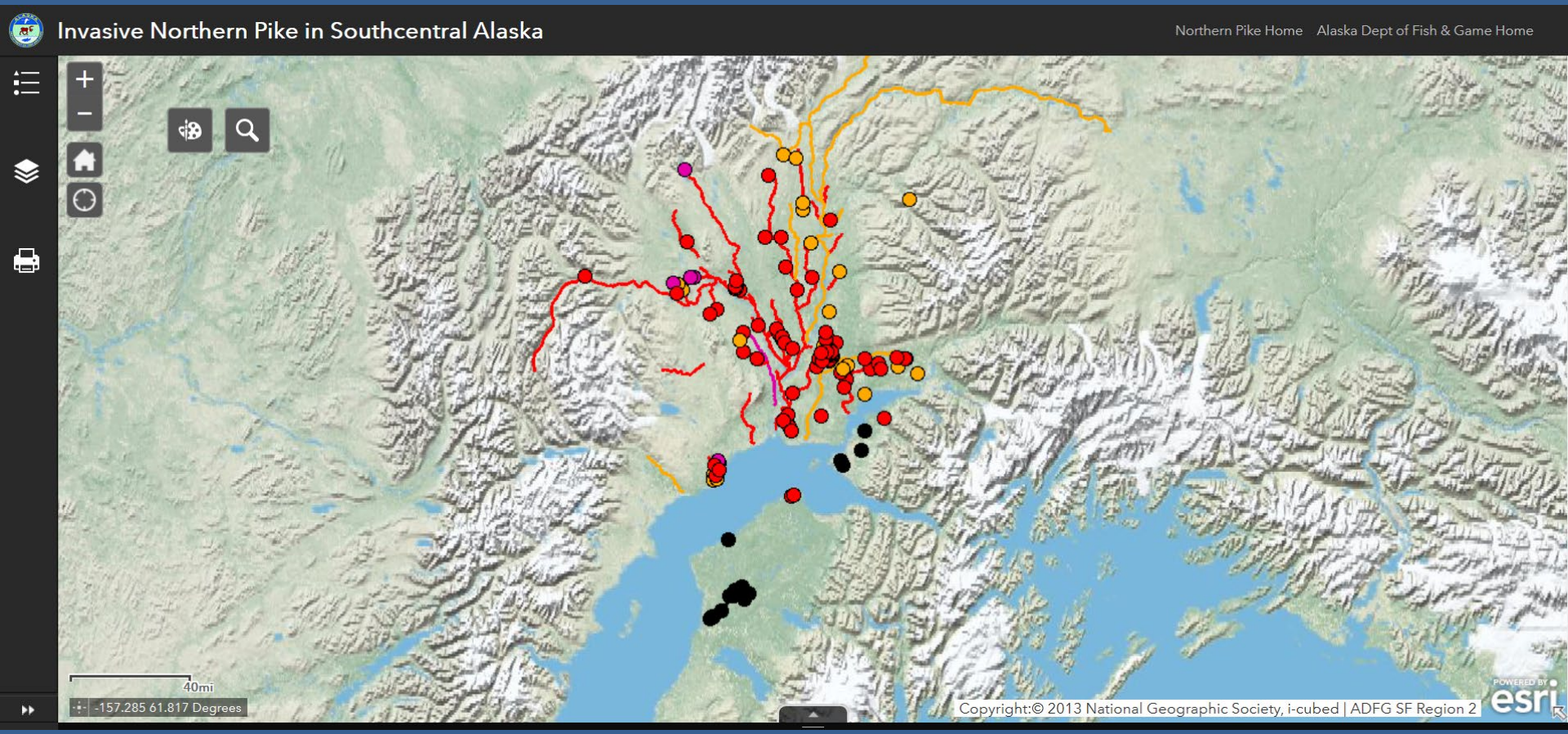
Most projects are funded through competitive Federal grants (i.e. AK Sustainable Salmon Fund)

Outreach

- Increase awareness that pike are invasive in Southcentral
- Moving live pike is illegal (Class A Misdemeanor)
- Anglers can help by harvesting pike
- Report new populations 1-877-INVASIV or http://www.adfg.alaska.gov/index.cfm?adfg=invasivespeciesreporter.main



Interactive Pike Mapper



ADFG Website → Species → Invasive → Northern Pike → Problem Areas → Interactive Map of Invasive Northern Pike in Southcentral Alaska

Research

Pike Impacts

- Diet patterns
- Bioenergetics modeling
- Habitat vulnerability modeling

Movement Patterns

- Telemetry studies
- Population genetics
- Otolith microchemistry

Increasing Early Detection Capabilities

- eDNA

Preventing Spread of Pike

- Barriers to pike movement

New Control Techniques

- Angler-assisted programs
- Genetics tools

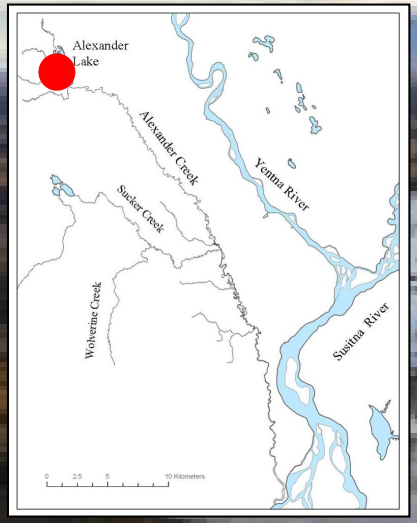
Existing Control Techniques

- Rotenone persistence
- Species diversity pre/post rotenone
- Suppression success (via mark-recap)

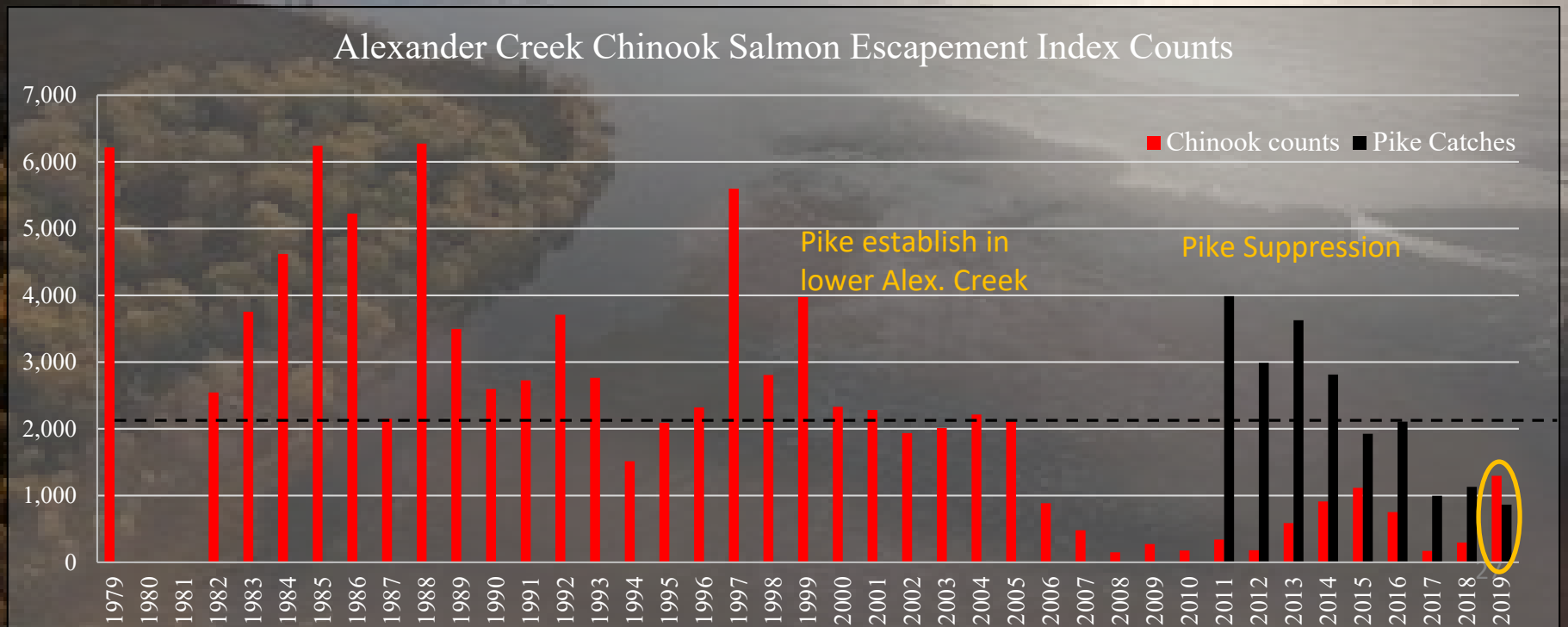
Pike Suppression

- Reduce abundance
- Used when eradication is not feasible

Alexander Creek Pike Suppression

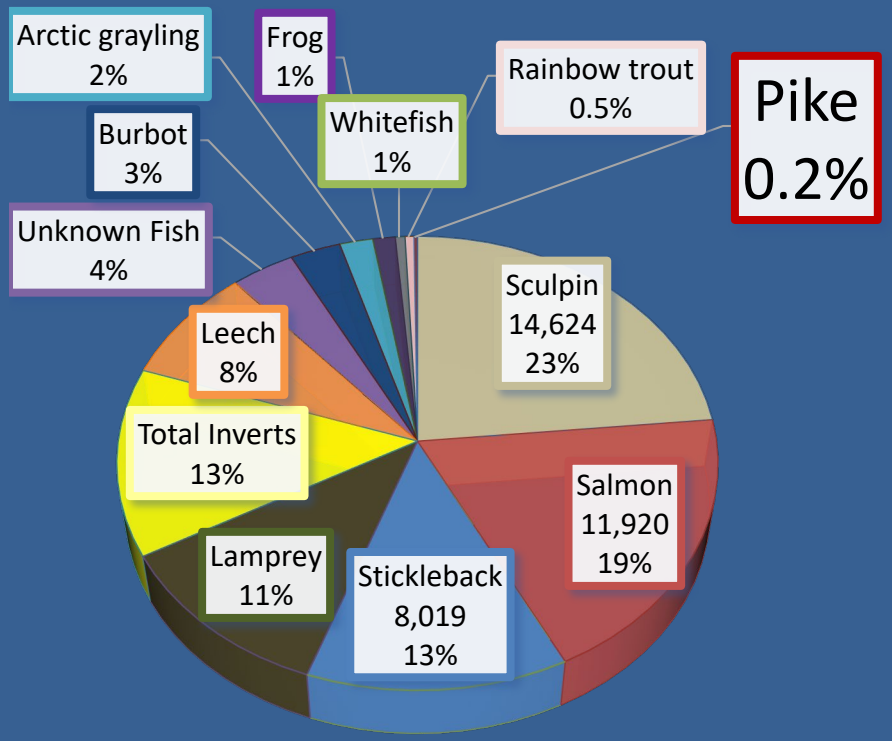


- Popular king salmon fishery collapsed after pike expansion to lower Alexander Creek
- Multimillion-dollar salmon fishery was lost
- Chinook stock of concern (BOF 2008)
- Pike suppression to increase salmon survival
- Positive signs of salmon recovery

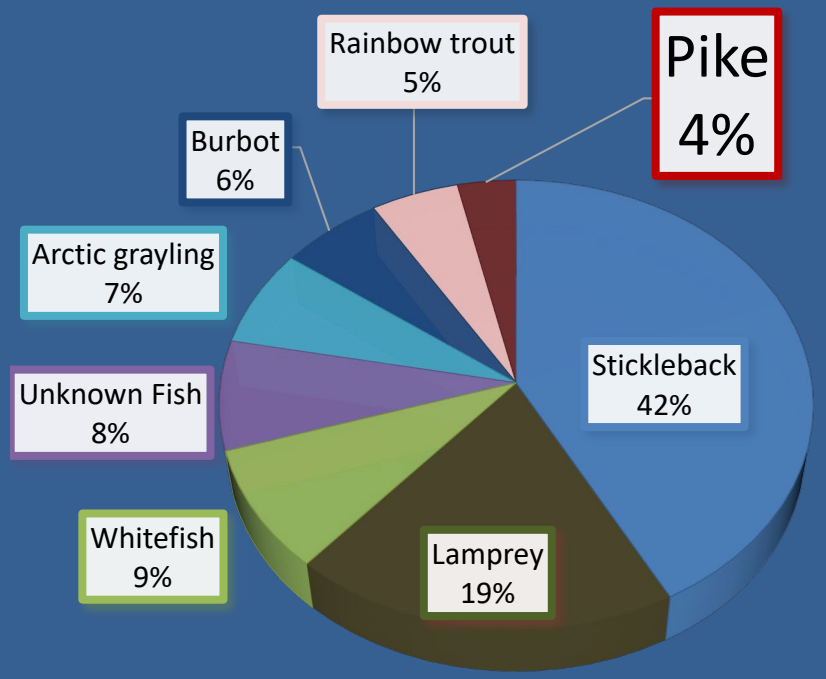


Stomach Composition from Alexander Creek Northern Pike

All Pike (4-42”)

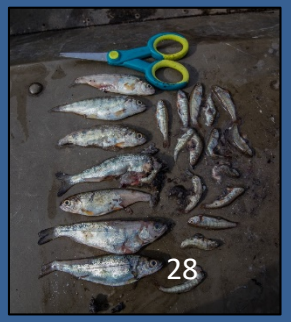


100 Largest Pike (29-42”)



13,754 northern pike from Alexander Creek 2011-2019.
Excludes fish with empty or missing stomachs (i.e. otter predation)

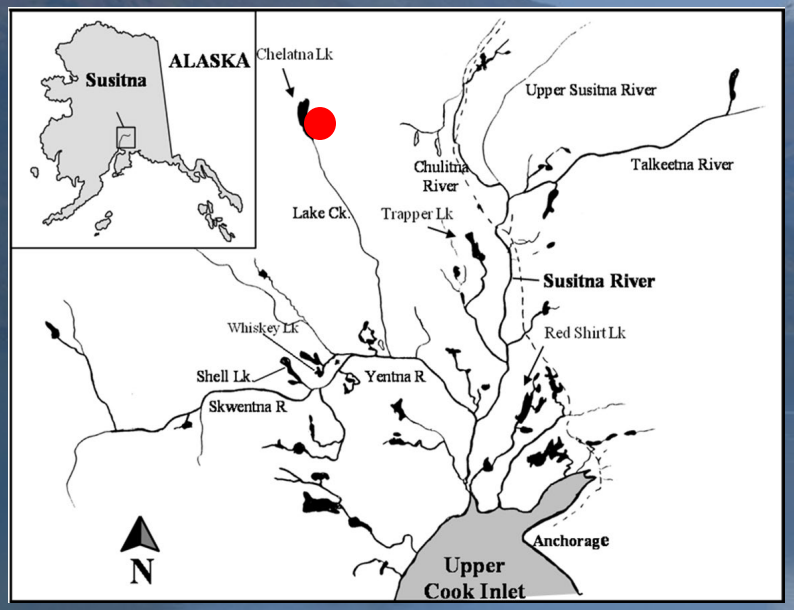
Pike prey is a minor component of overall pike diets.



Susitna River Lakes Pike Suppression

Cook Inlet Aquaculture Association

Chelatna Lake



- Susitna River sockeye - Stock of Yield Concern (BOF 2008)
- Removal of pike at Chelatna Lake outlet during smolt outmigration (2010-2012 and 2017-2019)
- Pike catches have decreased over time
- Increased sockeye survival estimated

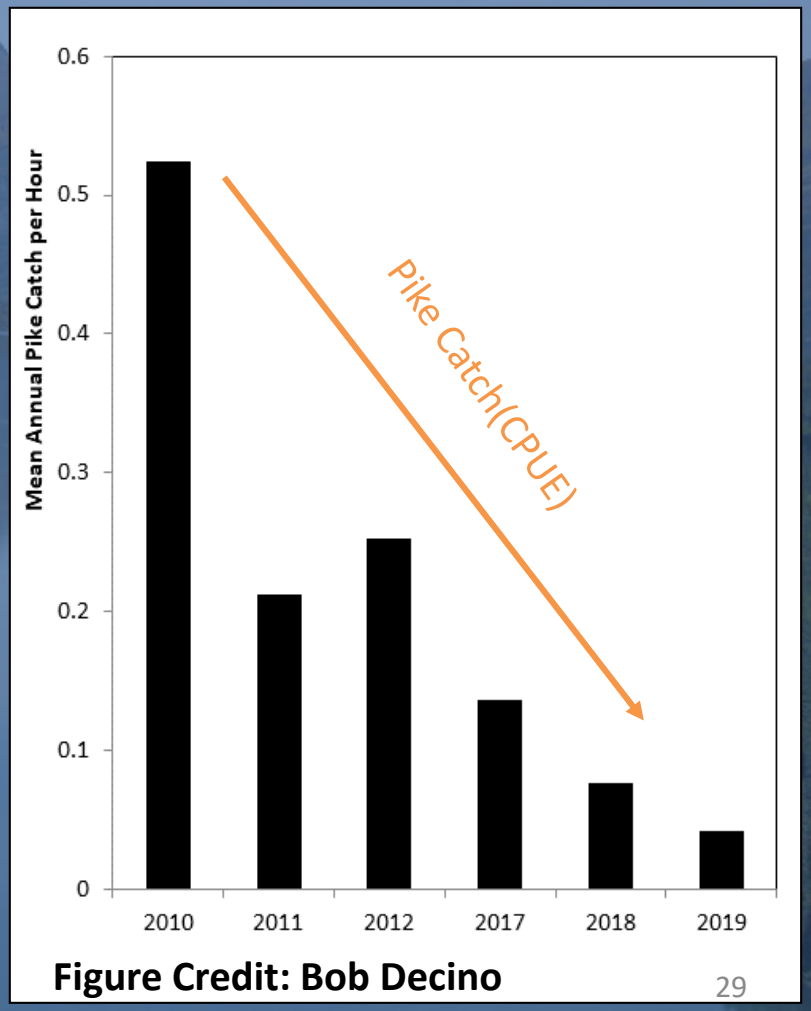
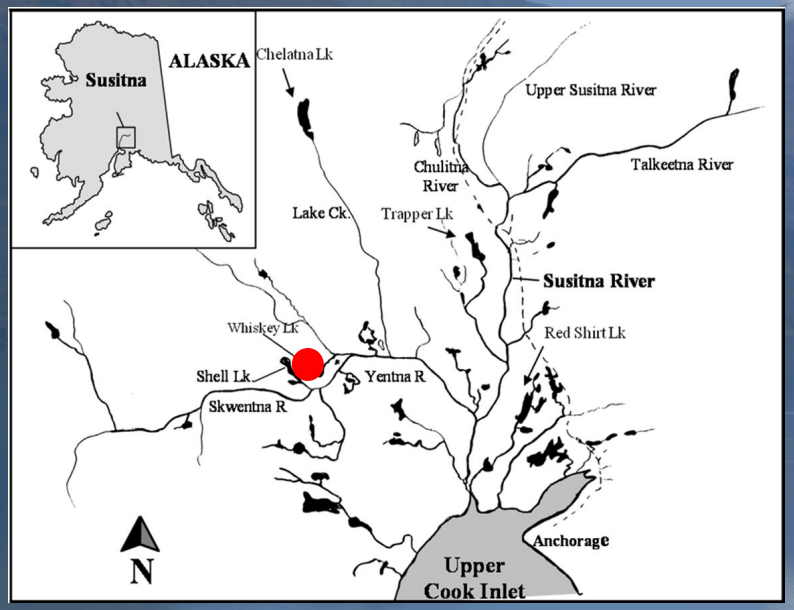


Figure Credit: Bob Decino

Susitna River Lakes Pike Suppression

Whiskey and Hewitt Lakes

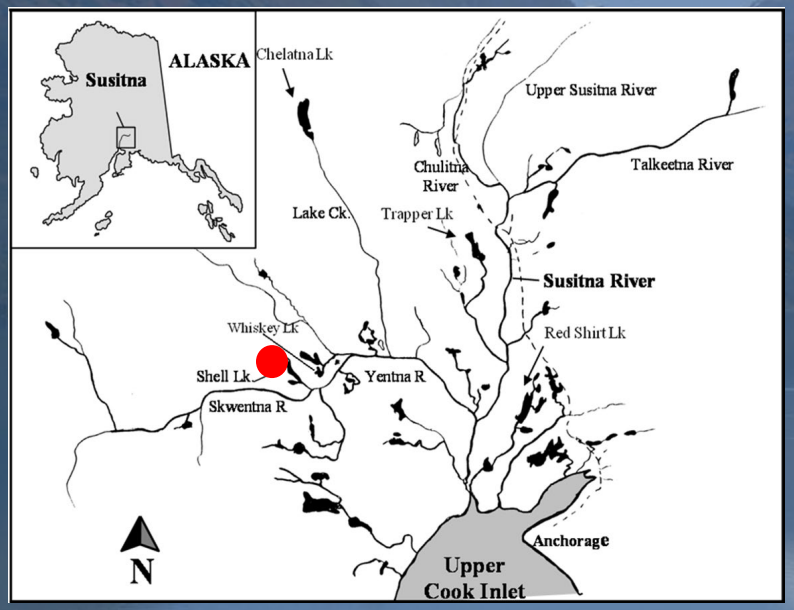


- Removal of pike in Whiskey and Hewitt Lakes and the creek outlet to the Yentna River during smolt outmigration (2013-2015 and 2018-2020)
  - Goal: reduce pike by 80%, increase juvenile sockeye abundance by 1,000,000
- Substantial decrease in sockeye abundance experienced in both lakes
- High densities of pike in the lakes and the outlet → High predation during outmigration

Susitna River Lakes Pike Suppression

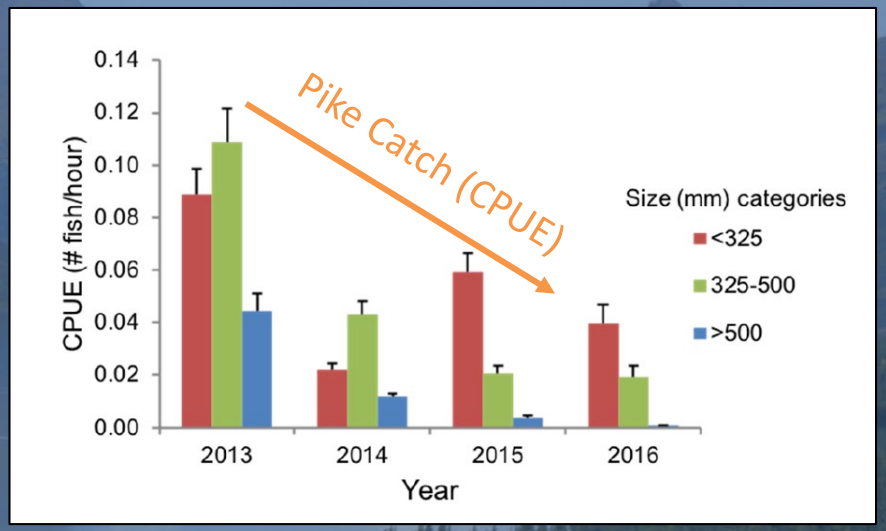
Cook Inlet Aquaculture Association

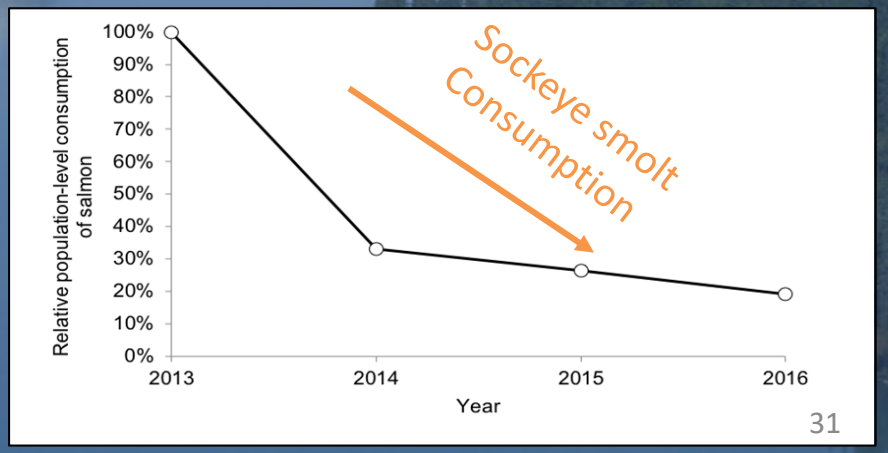
Shell Lake



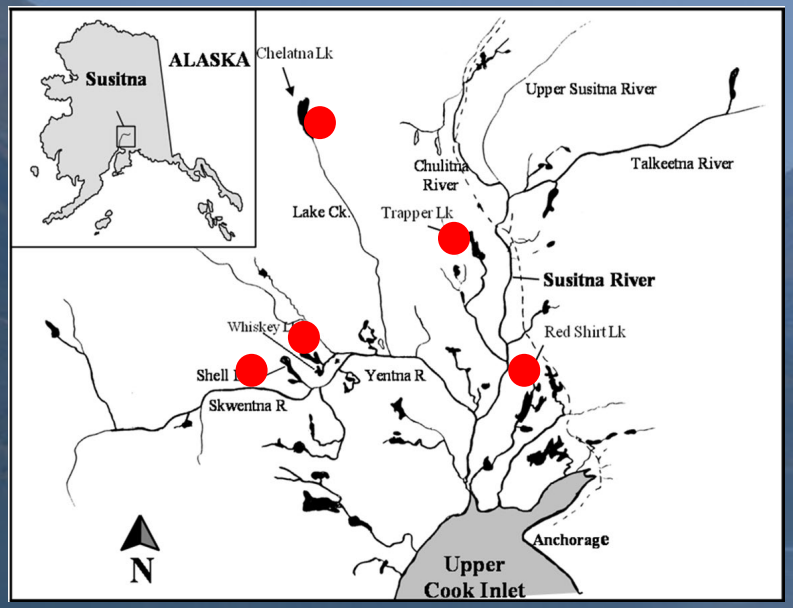
- Decrease in sockeye abundance from pike predation, disease, and beaver dams
- CIAA gillnetting pike in the lake outlet since 2013
- Pike catches decreasing over time
- Decrease in sockeye smolt consumption

Figure Credits: Andy Wiczik, CIAA





Susitna River Lakes Diet Analysis



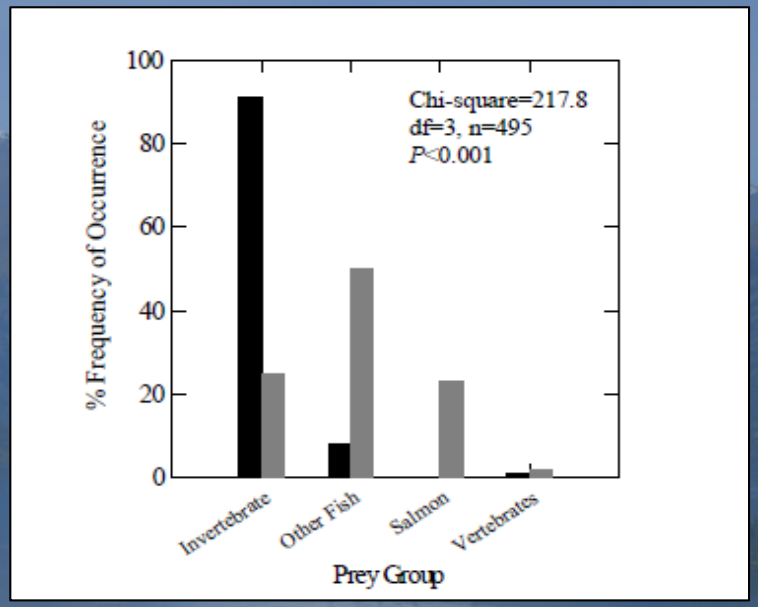
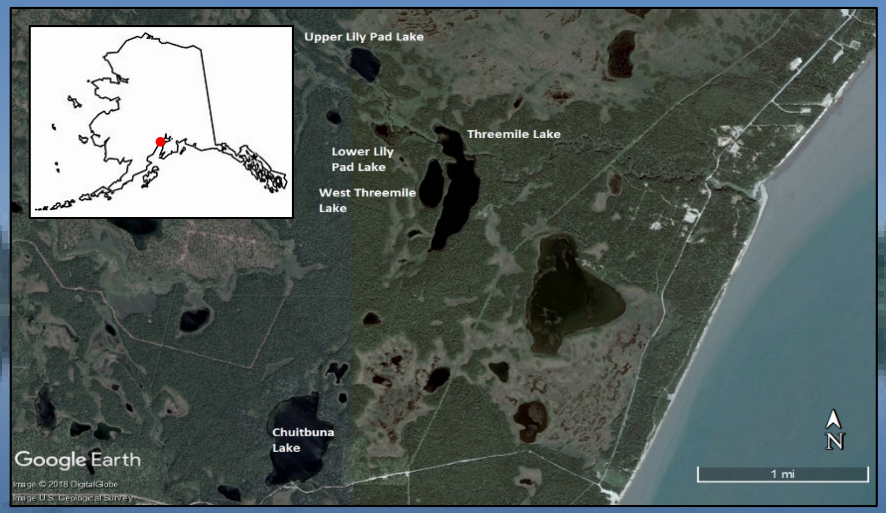


Figure Credit: Glick et al. 2016

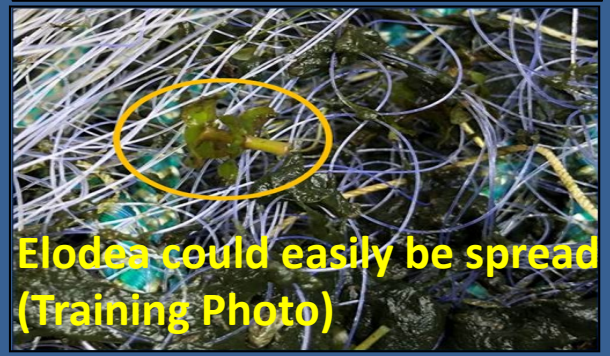
- Study to compare pike diets in lakes with sockeye present (Chelatna, Whiskey, Shell) vs. where sockeye were extirpated (Trapper and Redshirt)
- Pike diets dominated by salmon /other fish in lakes with salmon (73%) and invertebrates without salmon (91%)
- Low rates of cannibalism
  - Range 1% (salmon present) – 29% (pike and inverts only)

West Cook Inlet Pike Suppression



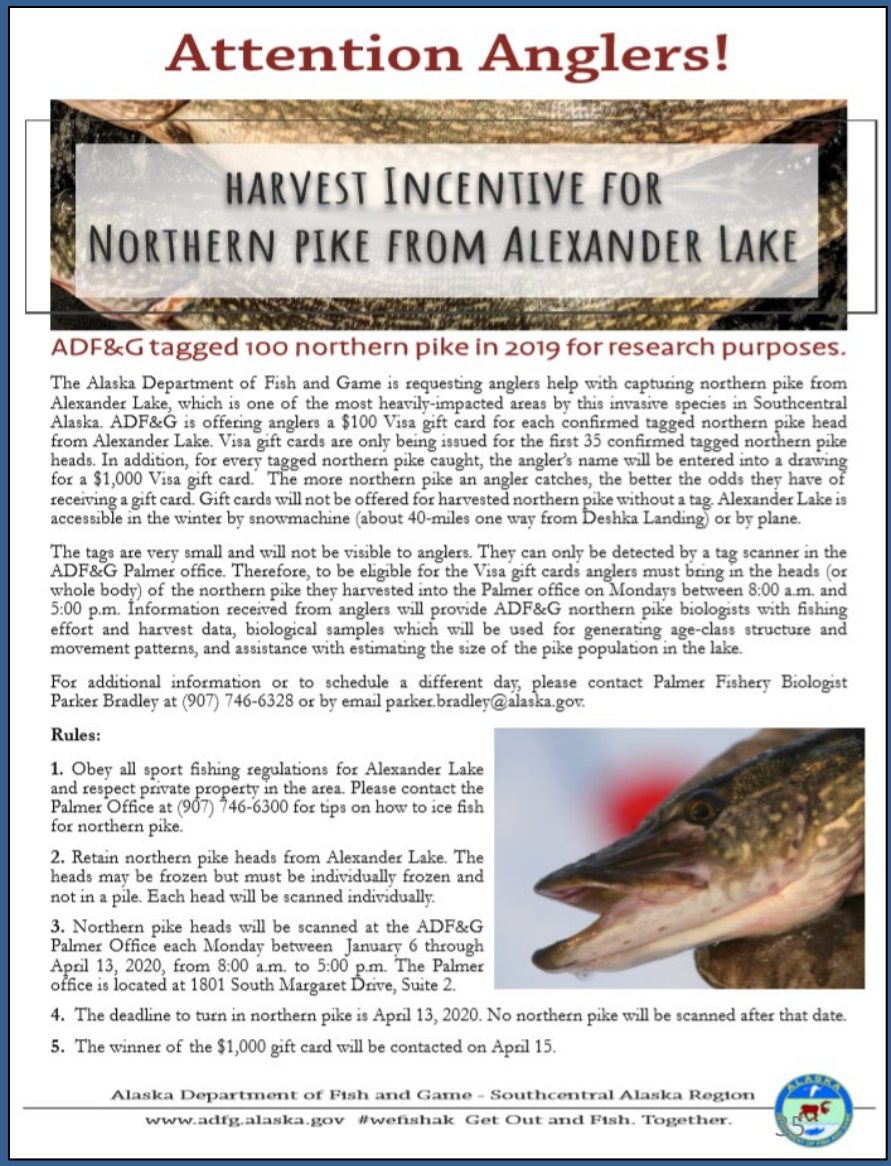
- Partnership with TTCD
- Threemile Drainage and Chuitbuna Lake
- Mark-recapture evaluations
- Annual suppression
- Diet anlaysis

Risks of Using Gillnets



Partnering With Pike Anglers

- Anglers can assist with pike suppression through harvest
- Fishing regulations for pike in Southcentral are extremely liberal
  - i.e. No Limit
- New Angler Incentive Program
  - PIT-tagged pike in Alexander Lake
  - Anglers with a tagged pike are eligible for a reward
  - Cost-effective way to collect data, increase harvest, and partner with the pike angling community
  - If successful, may be expanded to other locations



Attention Anglers!

HARVEST INCENTIVE FOR NORTHERN PIKE FROM ALEXANDER LAKE

ADF&G tagged 100 northern pike in 2019 for research purposes.

The Alaska Department of Fish and Game is requesting anglers help with capturing northern pike from Alexander Lake, which is one of the most heavily-impacted areas by this invasive species in Southcentral Alaska. ADF&G is offering anglers a $100 Visa gift card for each confirmed tagged northern pike head from Alexander Lake. Visa gift cards are only being issued for the first 35 confirmed tagged northern pike heads. In addition, for every tagged northern pike caught, the angler's name will be entered into a drawing for a $1,000 Visa gift card. The more northern pike an angler catches, the better the odds they have of receiving a gift card. Gift cards will not be offered for harvested northern pike without a tag. Alexander Lake is accessible in the winter by snowmachine (about 40-miles one way from Deshka Landing) or by plane.

The tags are very small and will not be visible to anglers. They can only be detected by a tag scanner in the ADF&G Palmer office. Therefore, to be eligible for the Visa gift cards anglers must bring in the heads (or whole body) of the northern pike they harvested into the Palmer office on Mondays between 8:00 a.m. and 5:00 p.m. Information received from anglers will provide ADF&G northern pike biologists with fishing effort and harvest data, biological samples which will be used for generating age-class structure and movement patterns, and assistance with estimating the size of the pike population in the lake.

For additional information or to schedule a different day, please contact Palmer Fishery Biologist Parker Bradley at (907) 746-6328 or by email parker.bradley@alaska.gov.

Rules:

1. Obey all sport fishing regulations for Alexander Lake and respect private property in the area. Please contact the Palmer Office at (907) 746-6300 for tips on how to ice fish for northern pike.
2. Retain northern pike heads from Alexander Lake. The heads may be frozen but must be individually frozen and not in a pile. Each head will be scanned individually.
3. Northern pike heads will be scanned at the ADF&G Palmer Office each Monday between January 6 through April 13, 2020, from 8:00 a.m. to 5:00 p.m. The Palmer office is located at 1801 South Margaret Drive, Suite 2.
4. The deadline to turn in northern pike is April 13, 2020. No northern pike will be scanned after that date.
5. The winner of the $1,000 gift card will be contacted on April 15.

Alaska Department of Fish and Game - Southcentral Alaska Region

www.adfg.alaska.gov #wefishak Get Out and Fish. Together.

Pike Eradication With Rotenone

What is Rotenone?

- Extract of tropical “bean family” plants
- Used by indigenous cultures to collect fish
- Used to manage fish in U.S. since 1930s
- Easily absorbed through gill membranes
- Kills fish by inhibiting cell respiration
- Not harmful to mammals or birds at fish management concentrations

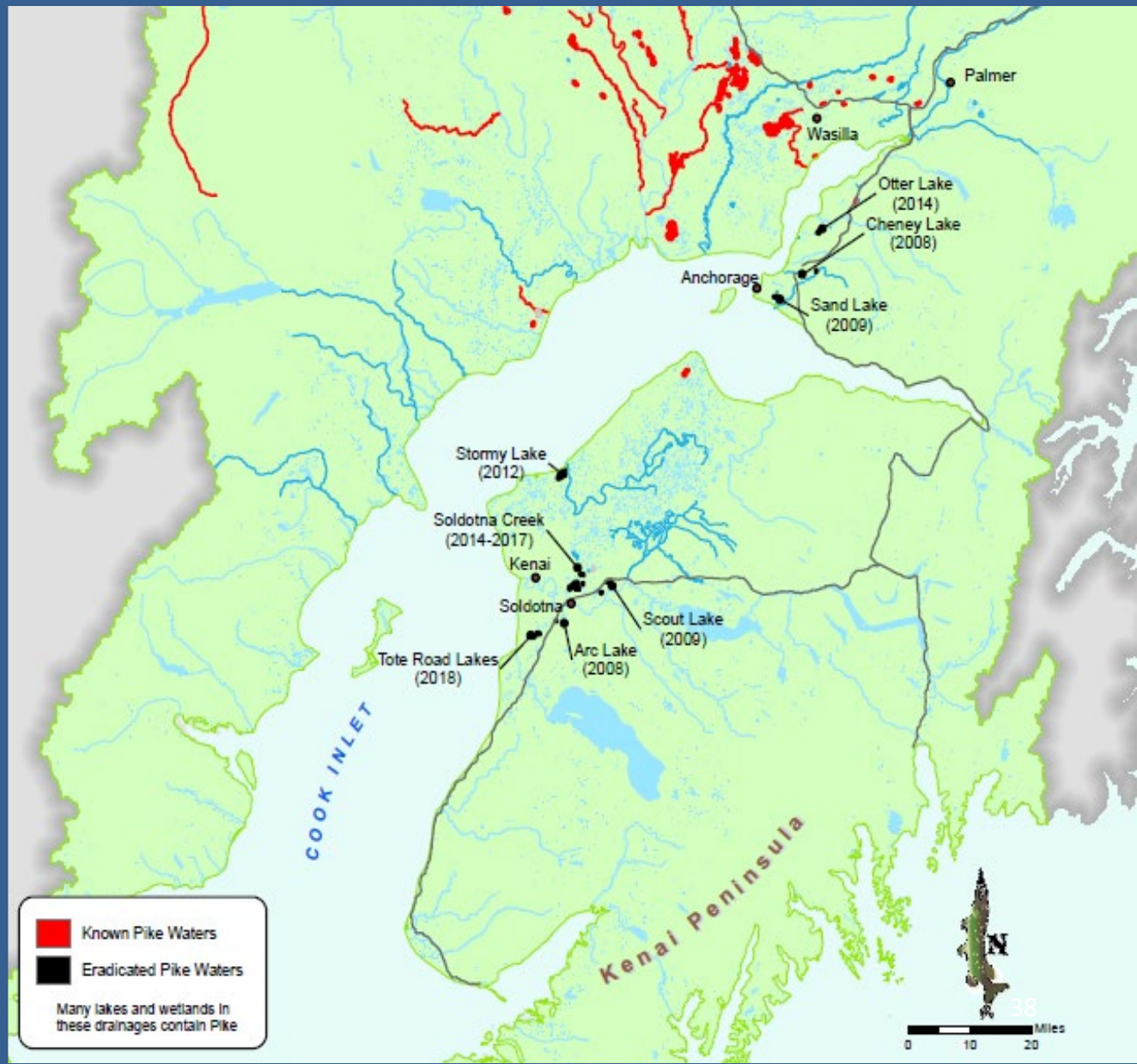
Pike Eradication Accomplishments

Eradications to Date:

Anchorage: Cheney Lake
Sand Lake
Otter Lake

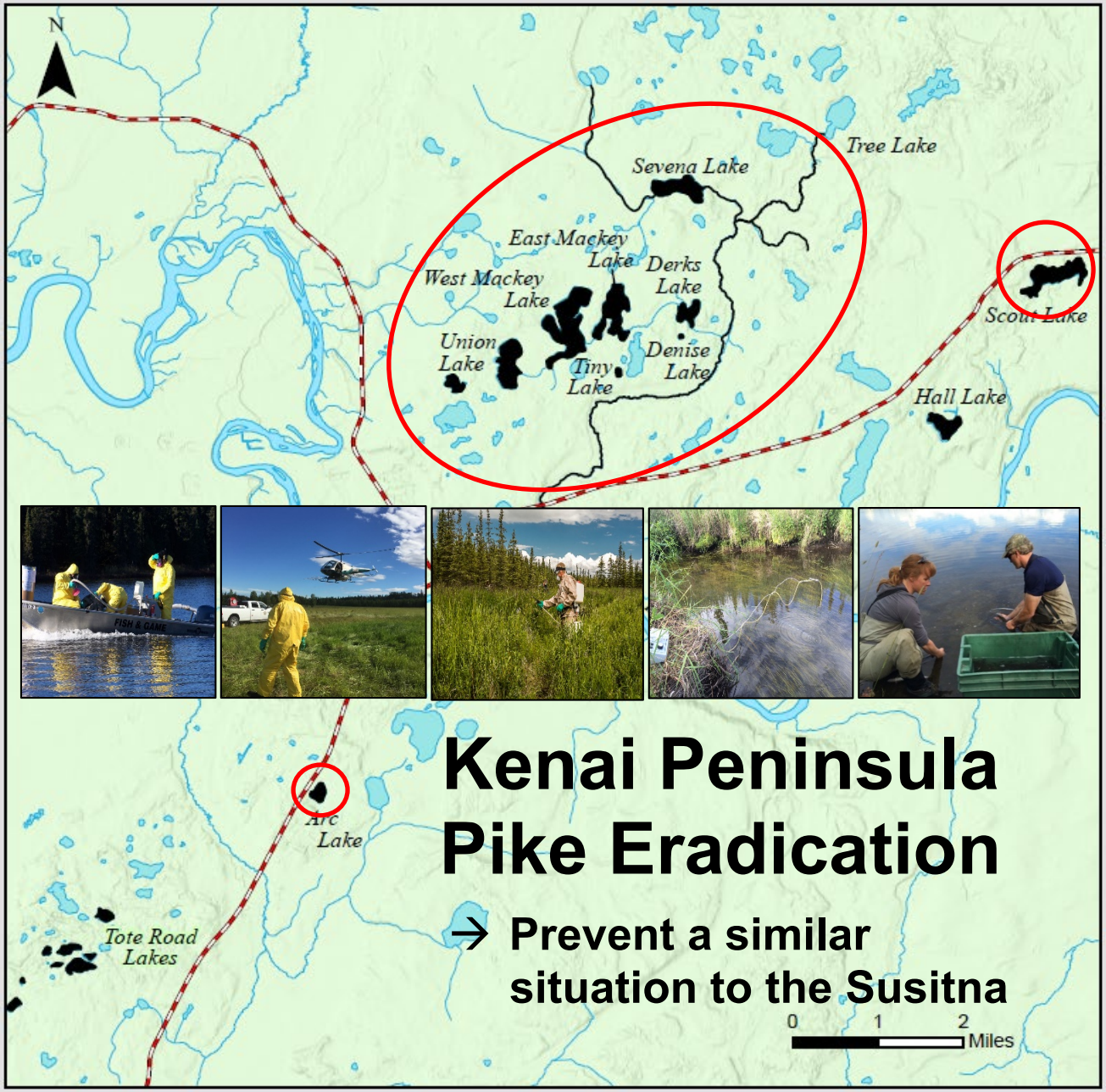
Kenai Pen.: Arc Lake
Scout Lake
Stormy Lake
Union Lake
East Mackey Lake
West Mackey Lake
Derks Lake
Sevena Lake
Soldotna Creek
Loon Lake
Tiny Lake
Hall Lake
Warfle's Lake
Tote Road Lakes

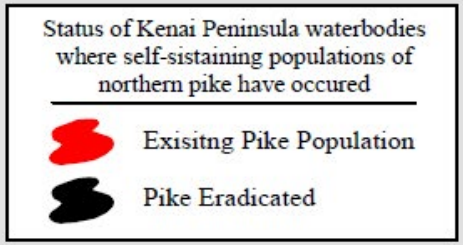
Yakutat: Village Pond System

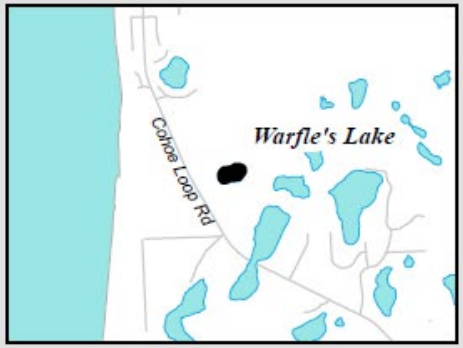


Kenai Peninsula Pike Eradication

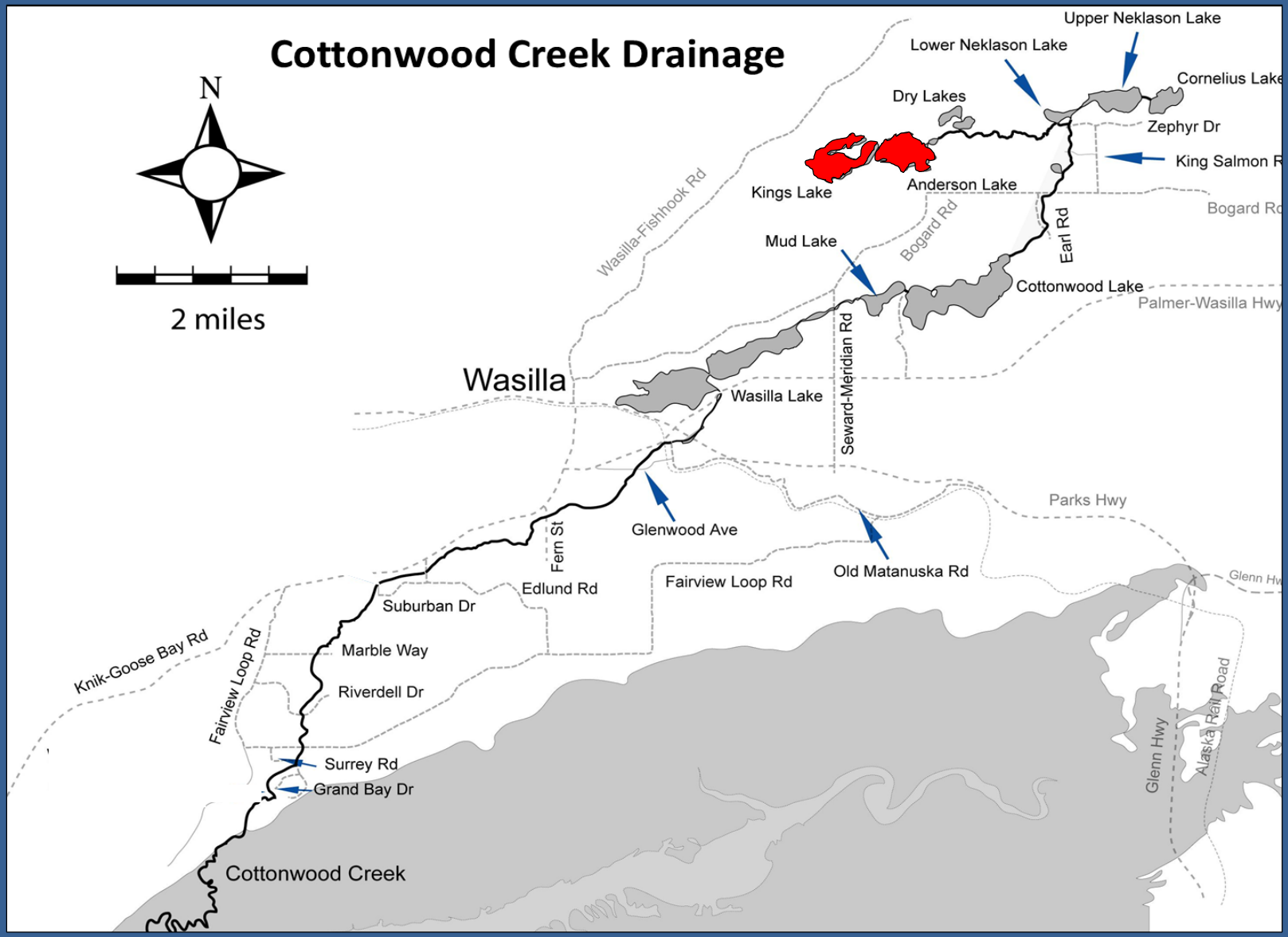
→ **Prevent a similar situation to the Susitna**







Anderson and Kings Lakes Pike Eradication



Eradication Milestone Timeline

- Pre-TX data collection(2019/2020)
- Alaska BOF approval request (February 2020)
  - Per AS 16.35.200
- Scoping/Permitting (Winter- Summer 2019/2020)
  - DEC: Pesticide Use Permit and public comment period
  - NEPA: Environmental Assessment and public comment period
  - DNR: Land Use Permit
  - ADF&G: Fish Transport Permit
- Pre-TX fish salvage (Winter/ Spring 2020)
- Rotenone application (October 2020)
- Post-TX fish cleanup/water monitoring (Oct. 20'-Oct. 21')
- Fish stocking (Summer 2021)

Request for BOF Approval

Acknowledgements:

Alaska Sustainable Salmon Fund
ADF&G Commercial Fisheries
Cook Inlet Aquaculture Association
Tyonek Tribal Conservation District
U.S. Geological Survey
University of Alaska Fairbanks
University of Alaska Anchorage
U.S. Fish and Wildlife Service
Kenai National Wildlife Refuge
Kenai Watershed Forum
Mat-Su Borough
Joint-Base Elmendorf-Richardson
Dept. of Environmental Conservation
Dept. of Natural Resources

Anderson/ Kings is the Primary Eradication Priority for Mat-Su

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