Northwest **Power** and **Conservation** Council

October 2, 2018

MEMORANDUM

TO: **Council Members**

FROM: **Laura Robinson**

SUBJECT: **Presentation on Invasive Northern Pike and Lessons from the Pend Oreille**

BACKGROUND:

Presenter: Joe Maroney, Director of Fisheries and Water Resources, Kalispel Tribe of Indians

Summary: Joe Maroney is the Director of Fisheries and Water Resources in the Natural Resources Department at the Kalispel Tribe of Indians, as well as a member of the Washington Invasive Species Council and the Invasive Species Advisory Council Federal-Tribal Task Team.

The Kalispel Tribe of Indians and Washington Department of Fish and Wildlife began collaborative work in 2012 to catch and remove Northern Pike from the Pend Oreille River, which has been successful in suppressing the population to a low level. Joe's presentation to the Council in October will describe the success of that program and some lessons learned.

Relevance: The 2014 Fish and Wildlife Program identified as one of the seven emerging priorities the need to, "preserve program effectiveness by supporting expanded management of predators… and aggressively addressing non-native and invasive species."

In the 2014 Program's Predator Management Strategy, the Council calls for the, "federal action agencies should [to] work cooperatively with

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Steve Crow
Executive Director

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NOAA Fisheries, U.S. Fish and Wildlife Service, states, tribes, and the Council to develop and implement systemwide strategies to manage and reduce non-native fish species that compete and feed on native fish (both anadromous and resident species) in the basin."

Workplan: Predation Presentations in preparation for the Program amendments

Background: Northern Pike (*Esox lucius*) is a highly invasive, predatory fish species that when introduced to freshwater lakes and rivers quickly takes its place at the top of the food chain. Pike eat anything that will fit into their mouth, including salmon, steelhead, bats and even ducks. The environmental and economic resources of Washington State are under imminent threat by the continued spread of invasive Northern Pike in Washington waters.

There are numerous examples of catastrophic impacts of Northern Pike throughout the western United States, including Alaska, Colorado, and California. One example occurred in the early 2000s, when illegal introduction of Northern Pike to Alexander Creek, Alaska led to a collapse of one of the most productive Chinook salmon fisheries in Cook Inlet.

Within the Columbia River Basin, Northern Pike were illegally introduced in Montana in the 1950s. Over the last several decades, downstream spread and additional illegal introductions led to the species spreading to Idaho, British Columbia, and Washington State. Northern Pike were detected in the Pend Oreille River in 2004 and have subsequently spread downstream to Lake Roosevelt. Further downstream expansion of Northern Pike will directly impact salmon, steelhead and native resident fish and pose significant risks to tribal fisheries, commercial and sport fisheries, and ESA species recovery including salmonids and orca which rely on Columbia River fisheries.

Northern Pike are classified as a prohibited aquatic animal species by the Washington State Fish and Wildlife Commission. Northern Pike may not be possessed, imported, purchased, sold, propagated, transported, or released into state waters. The Western Governors' Association identified Northern Pike as a top threat to the west in 2018, as did the Upper Columbia United Tribes, Washington Invasive Species Council and Pacific NorthWest Economic Region in 2017.

More Info: This presentation is part of a series of presentations to the Council in preparation for the Program amendments. At the September Council meeting, Dan Roby presented to the Council on the long-term avian predation study funded by BPA and the Corps to investigate the impact of avian predators on the survival of juveniles salmonids in the lower Columbia River. The slides for that presentation can be found here. At the October Council meeting there are two predation presentations in addition to this one: the Mid-Columbia Public Utility Districts will be presenting on their predator control efforts, and staff will discuss with the full Council a

committee recommendation to pursue a science and economics review of predation in the Basin.

Additional information and links:

- Northwest Power and Conservation Council: *The Pike Problem*
  - nwcouncil.org/fish-and-wildlife/topics/pike-problem
- TVW: *TVW @ Large: Aquatic Invasive Predator - Northern Pike*
  - tvw.org/watch/?eventID=2018061081
- King 5 News: *Invasive bat-eating fish threatens Washington salmon future*
  - king5.com/article/tech/science/environment/invasive-bat-eating-fish-threatens-washington-salmon-future/281-547805673

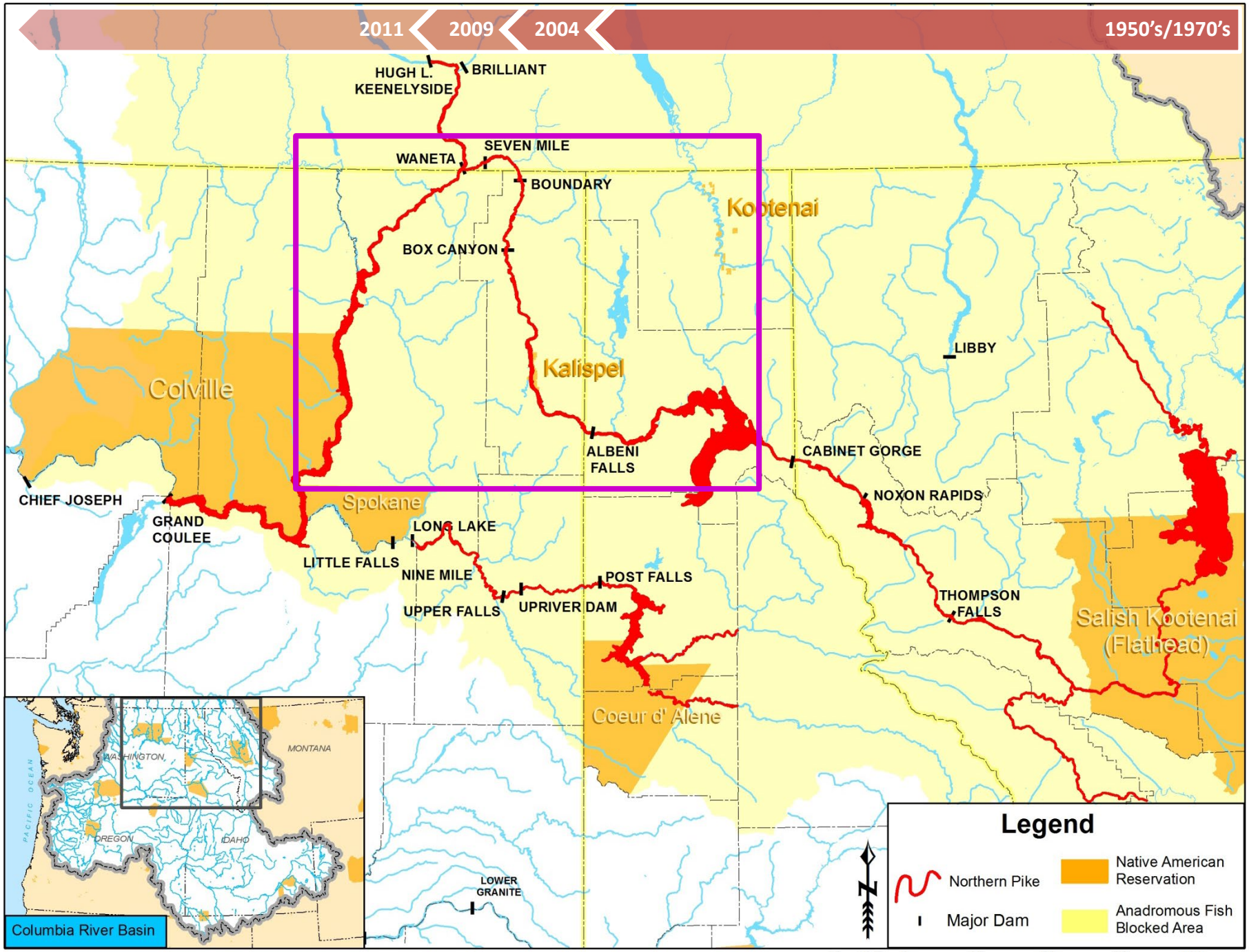
Lesson from the Pend Oreille
We can do this

Northwest Power and Conservation Council

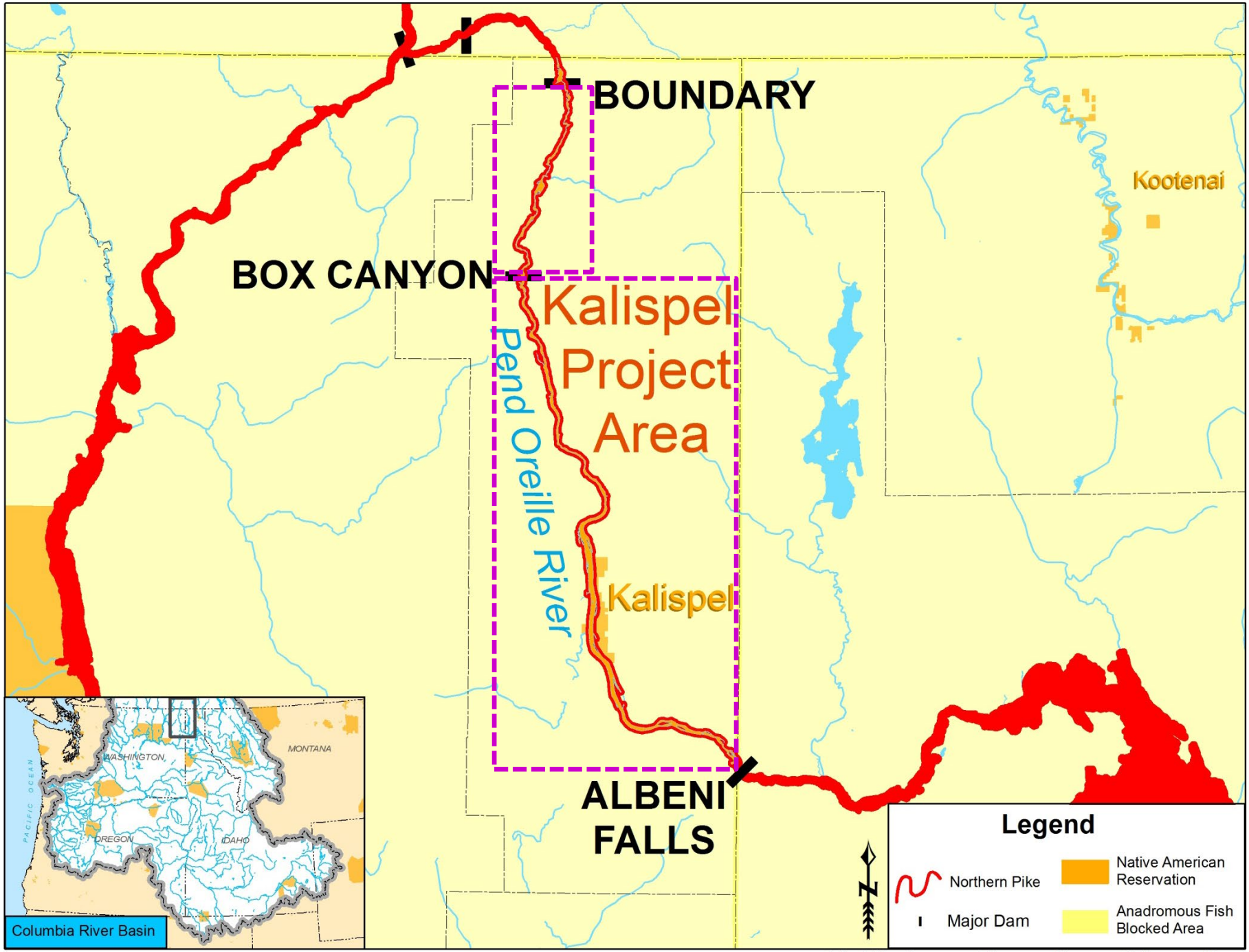
Joe Maroney
Director of Fisheries & Water Resources
Kalispel Natural Resource Department

October 9, 2018: Wenatchee, WA

Kalispel
natural resources



Source: Washington State Department of Fish and Wildlife



Source: Washington State Department of Fish and Wildlife

Kalispel Tribe and Washington Dept. of Fish & Wildlife Thinking

Pike are a problem, not an opportunity

Management goals:

- Minimize impact to native species
- Reduce spread of pike to other waters, including the Columbia River
- Reduce numbers of pike in Box Canyon Reservoir

Ecology of Freshwater Fish 2006: 15: 482–487
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ECOLOGY OF
FRESHWATER FISH

Extinction of a weakly armoured threespine stickleback (*Gasterosteus aculeatus*) population in Prator Lake, Alaska

Patankar R, von Hippel FA, Bell MA. Extinction of a weakly armoured threespine stickleback (*Gasterosteus aculeatus*) population in Prator Lake, Alaska.
Ecology of Freshwater Fish 2006: 15: 482–487. © 2006 The
Journal compilation © 2006 Blackwell Munksgaard

R. Patankar[1], F. A. von Hippel[2], M. A. Bell[3]

Abstract – Threespine stickleback (*Gasterosteus aculeatus*) sa
Prator Lake in southcentral Alaska consist of the relatively rar
weakly armoured individuals with few lateral plates and no pe
Prator Lake has been sampled for threespine stickleback since 1
northern pike (*Esox lucius*) were first observed in this lake in
appearance of pike corresponds with a dramatic decrease in sti

Biol Invasions (2011) 13:2103–2114
DOI 10.1007/s10530-011-0029-4

ORIGINAL PAPER

Invasive pike establishment in Cook Inlet Basin lakes, Alaska: diet, native fish abundance and lake environment

Stormy Haught · Frank A. von Hippel

ished online: 4 June 2011

tro- to exist outside of the pike inhabited littoral zone.
tral These findings indicate the importance of diverse
gh- habitat types and certain chemical and physical
of characteristics to the outcome of invasion by fish
ted predators

Chapter 14

The Northern Pike, A Prized Native but Disastrous Invasive

Kristine Dunker[*1], Adam Sepulveda[2], Robert Massengill[3] and David Rutz[4]*

14.1 NORTHERN PIKE AS AN INVASIVE SPECIES

As the chapters in this book describe, the northern pike *Esox lucius* Linneaus, 1758 is a fascinating fish that plays an important ecological role in structuring aquatic communities (chapter 8), has the capacity to aid lake restoration efforts (chapter 11), and contributes substantially to local economies, both as a highly-sought after sport fish (chapter 12) and as a commercial fishing resource (chapter 13). However, despite the magnificent attributes of this fish, there is another

Ecology of Freshwater Fish 2013

Introduced northern pike prec
in southcentral alaska

Adam J. Sepulveda[1], David S. Rutz[2], Sam S. Ivey[2], Kristine J. Dunker
[1]US Geological Survey, Northern Rocky Mountain Science Center, 2327 University Way,Suite
[2]Alaska Department of Fish & Game, Division of Sport Fish, Palmer, AK 99645, USA
[3]Alaska Department of Fish & Game, Division of Sport Fish, Anchorage, AK 99518, USA

Accepted for publication November 27, 2012

Abstract – Northern pike (*Esox lucius*) are opportunistic predators th
preferred prey have declined. This trophic adaptability allows invasive pike to have negative effects on aquatic food webs. In Southcentral Alaska, invasive pike are a substantial concern because they have spread to important spawning and rearing habitat for salmonids and are hypothesised to be responsible for recent salmonid declines. We described the relative importance of salmonids and other prey species to pike diets in the Deshka River and Alexander Creek in Southcentral Alaska. Salmonids were once abundant in both rivers, but they are now rare in Alexander Creek. In the Deshka River, we found that juvenile Chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*O. kisutch*) dominated pike diets and that small pike consumed more of these salmonids than large pike. In Alexander Creek, pike diets reflected the distribution of spawning salmonids, which decrease with distance upstream. Although salmonids dominated pike diets in the lowest reach of the stream, Arctic lamprey (*Lampetra camtschatica*) and slimy sculpin (*Cottus cognatus*) dominated pike diets in the middle and upper reaches. In both rivers, pike density did not influence diet and pike consumed smaller prey items than predicted by their gape-width. Our data suggest that (1) juvenile salmonids are a dominant prey item for pike, (2) small pike are the primary consumers of juvenile salmonids and (3) pike consume other native fish species when juvenile salmonids are less abundant. Implications of this trophic adaptability are that invasive pike can continue to increase while driving multiple species to low abundance.

Key words: Alaska; diet; *Esox lucius*; Northern pike; prey-specific abundance; salmon; Susitna River

ECOLOGY OF
FRESHWATER FISH

e consumption of
al Alaska

Patrick A. Shields[3], Kristine J. Dunker[4]
ersity Way, Suite 2, Bozeman, MT 59715, USA
5, USA
AK 99669, USA
9518, USA

Abstract – The impacts of introduced northern pike (*Esox lucius*) on salmonid populations have attracted much attention because salmonids are popular subsistence, sport and commercial fish. Concern over the predatory effects of introduced pike on salmonids is especially high in Southcentral Alaska, where pike were illegally introduced to the Susitna River basin in the 1950s. We used pike abundance, growth, and diet estimates and bioenergetics models to characterise the realised and potential consumptive impacts that introduced pike (age 2 and older) have on salmonids in Alexander Creek, a tributary to the Susitna River. We found that juvenile salmonids were the dominant prey item in pike diets and that pike could consume up to 1.10 metric tons (realised consumption) and 1.66 metric tons (potential consumption) of juvenile salmonids in a summer. Age 3–4 pike had the highest per capita consumption of juvenile salmonids, and age 2 and age 3–4 pike had the highest overall consumption of juvenile salmonid biomass. Using historical data on Chinook salmon and pike potential consumption of juvenile salmonids, we found that pike consumption of juvenile salmonids may lead to collapsed salmon stocks in Alexander Creek. Taken together, our results indicate that pike consume a substantial biomass of juvenile salmonids in Alexander Creek and that coexistence of pike and salmon is unlikely without management actions to reduce or eliminate introduced pike.

Key words: Alaska; bioenergetics; consumption; *Esox lucius*; Susitna River

2011 Northern Pike Reclassification

- WDFW Fish and Wildlife Commission Vote
- Reclassification of Northern Pike from Game Fish – Prohibited Species
- Other prohibited species: Red-Bellied piranha and snakeheads.

Invasion/Action Timeline

2004 NP First Detected in Box Canyon Reservoir

2005 NP Studies/Surveys Initiated

2010 1st Annual SPIN Survey in Box Canyon Reservoir

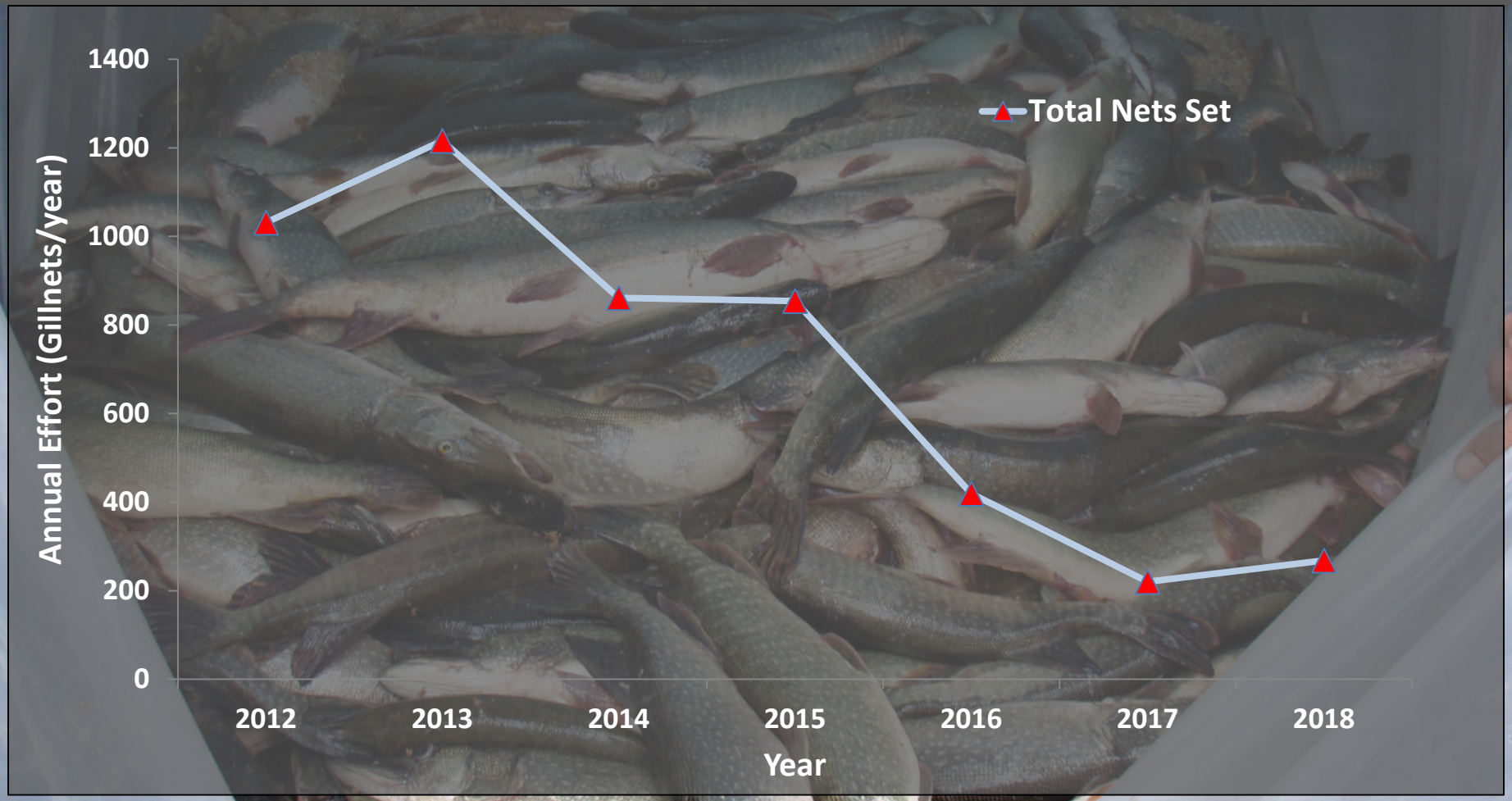
2011 Box Canyon Reservoir Suppression Pilot; Initiate Public Outreach & Regulation Changes

2012 Full Suppression Initiated Box Canyon Reservoir (2012-2018)

2016 1st Annual SPIN Survey in Boundary Reservoir; Boundary Reservoir Suppression Pilot

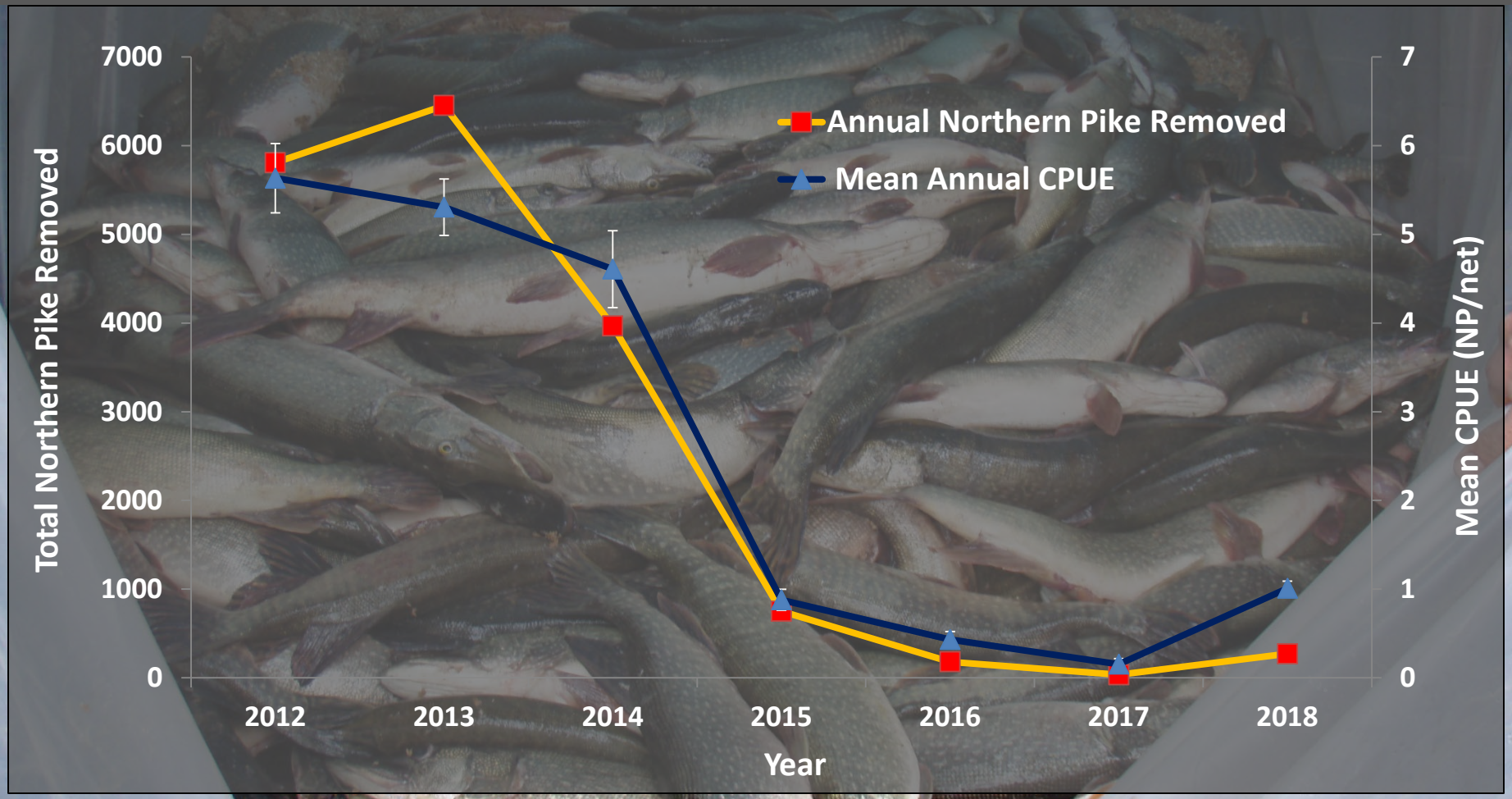
2017 Full Suppression Initiated in Boundary Reservoir (2017-2018)

Box Canyon Suppression 2012 – 2018: Effort



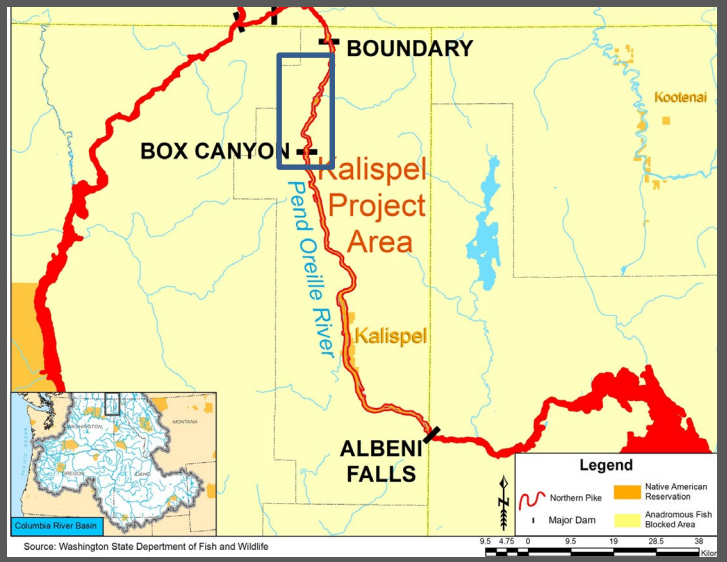
- Set nearly 5,000 gillnets equating to roughly 140 miles of continuous net
- Decline in effort due to decline in overall abundance of Northern Pike

Box Canyon Suppression 2012 – 2018: Results



- Removed nearly 17,500 Northern Pike from Box Canyon Reservoir
- 18.8 metric tons (42,000 lbs) of Northern Pike removed from Box Canyon Reservoir

Boundary Reservoir



- **2016:**
  - SPIN: 30 nets; 117 NP
  - PILOT: 35 nets; 111 NP
- **2017:**
  - SUPPRESSION: 146 nets; 308 NP; 2.09 NP/net
  - SPIN: 40 nets; 28 NP; 0.93 (Slough) & 0.0 (River) NP/net
  - ~ 83% reduction in one year
- **2018:**
  - SUPPRESSION: 174 nets; 121 NP; 0.69 NP/net
  - Notable reduction in total catch between 2017 and 2018

Kalispel natural resources

Program Success to Date

- Removed >18,000 NP
- Reduced (+maintained) relative abundance of NP by >98% in a 89 km long reservoir (Box Canyon)
- Reduced relative abundance in Boundary reservoir by >80%
- Demonstrated the feasibility and effectiveness of this Program in large & complex river system

Kalispel
natural resources

Consistency with the Strategies of the 2014 Fish and Wildlife Program

- **Management of predator fish**
  - Sub-strategy
    - Improve the survival of salmon and steelhead and other native focal fish species by managing and controlling predation rates.

"The federal action agencies should work cooperatively with NOAA Fisheries, U.S. Fish and Wildlife Service, states, tribes, and the Council to develop and implement systemwide strategies to manage and reduce non-native fish species that compete and feed on native fish (both anadromous and resident species) in the basin."

- **Non-native and invasive species**
  - **Sub-strategy**
    - Prevent the introduction of non-native and invasive species in the Columbia River Basin, and suppress or eradicate non-native and invasive species.

Developing and implementing strategies to suppress, reduce, or control non-native invasive fish species where they are identified as a limiting factor and are negatively impacting salmonids and native fish populations.

Can you consume Northern Pike?

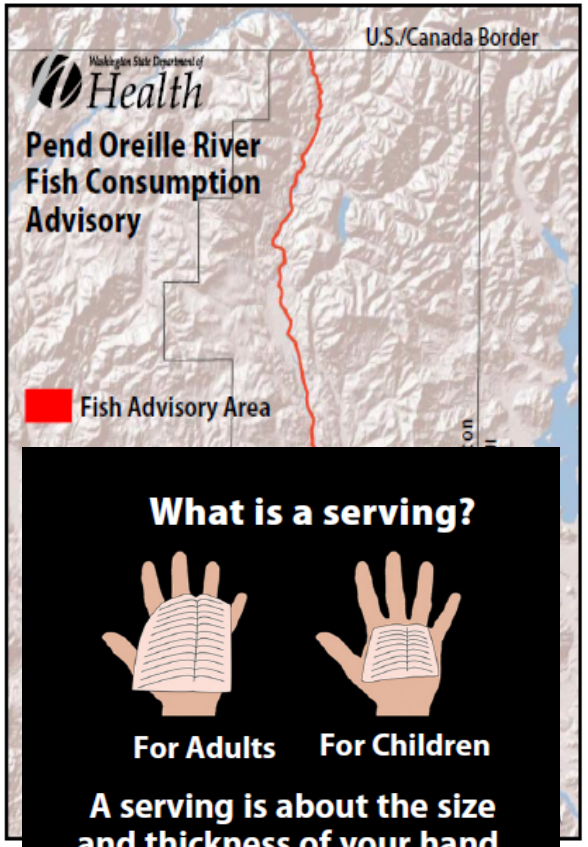
Washington State Department of Health

Fish Consumption Advisory

Pend Oreille River

Washington State Department of Health

CAUTION		Meals Per Month*
Northern Pike		Smaller than 24 inches 2 meals per month
Largemouth Bass		2 meals per month
Smallmouth Bass		2 meals per month
DO NOT EAT		
Northern Pike		Bigger than 24 inches DO NOT EAT
Northern Pikeminnow		DO NOT EAT



Washington Invasive Species Council Top Priority Species

Washington Invasive Species Council Top Priority Species

More than 700 invasive species are known to be in and around Washington State, all of which pose a threat to Washington's environment, economy, and human health. Of these known species, the Washington Invasive Species Council has selected 50 priority species for action by the council using science and professional judgment. These species represent the gravest threats to Washington's plants, animals, and businesses that depend on the rich biodiversity of our state.

Terrestrial Plants	Insects	Aquatic Animals	Aquatic Plants	Infectious Diseases	Terrestrial Animals
Butterfly Bush	Apple Maggot	Asian Carp	Brazilian Elodea	Infectious Amphibian Diseases	Feral Swine
Common Crupina	Brown Marmorated Stink Bug	Invasive Crabs	Caulerpa	Infectious Fish Diseases	Mediterranean White Snail
Garlic Mustard	Emerald Ash Borer	Invasive Frogs & Crayfish	Flowering Rush	ose Syndrome/Pd	
Invasive Knapweeds	European Chafer	Invasive Tunicates	Hydrilla		
Invasive Knotweeds	Gypsy Moths	Invasive Zooplankton	I ive M		
Kudzu	Invasive Longhorned Beetles	New Zealand Mud Snail	ather		
Leafy Spurge	Japanese Beetle	Northern Pike	Phragmites		
Poison Hemlock	Onion Leaf Miner	Northern Snakehead	Purple Loosestrife		
Puncturevine	Scarlet Lily Beetle	Nutria	Spartina		
Rush Skeletonweed	Sirex Woodwasp	Overbite Clam	Starry Stonewort		
Scotch Broom	Spotted Wing Drosophila	Quagga/Zebra Mussels			
Scotch Thistle					
Tamarisk					

Yellow Starthistle (*Centaurea solstitialis*)

Zebra Mussel (*Dreissena polymorpha*)

Feral Swine (*Sus scrofa*)

Asian Longhorned Beetle (*Anoplophora glabripennis*)

WASHINGTON STATE RECREATION AND CONSERVATION OFFICE
Washington Invasive Species Council

2017

Learn more about invasive species by visiting invasivespecies.wa.gov and wise.wa.gov

Washington Invasive Species Council Western Governors' Association Work Group Aquatic Established Species Ranked List

Aquatic Established Top Priorities

#	*Scientific Name*	*Common Name*
1	*Esox lucius*	Northern pike
2	*Carcinus maenas*	European green crab
3	*Iridoviridae* sp.	Rana virus
4	*Xenopus laevis*	African clawed frog
5	*Spartina* sp.	Invasive spartina species
6	*Hydrilla verticillata*	Hydrilla
7	*Myriophyllum* sp.	Invasive milfoil species
8	*Lythrum salicaria*	Purple loosestrife
9	*Procambarus clarkia, Orconectes virilis, Orconectes rusticus*	Invasive crayfish
10	*Myocastor coypu*	Nutria
11	*Egeria densa*	Brazilian elodea
12	*Potamopyrgus antipodarum*	New Zealand mud snail
13	*Myriophyllum aquaticum*	Parrotfeather
14	*Pseudodiaptomus forbesi, Oithona davisae*	Invasive zooplankton
15	*Phragmites australis*	Phragmites

Western Governors Association West-wide Invasive Species Risk-Assessment Survey Results: February 2018

Top-10 Established Aquatic Species

1. Eurasian Watermilfoil
2. Quagga and Zebra Mussel
3. New Zealand mudsnail
4. Asian Clam
5. Curly-leaved pondweed
6. Silver Carp
7. Northern Pike
8. Purple loosestrife
9. Hydrilla
10. Whirling disease

Aquatic survey participants: AK, AZ, CA, CO, HI, MT, ND, NE, NM, NV, OK, OR, SD, TX, UT, WA, WY

Increased Awareness of Northern Pike

Lake Roosevelt Forum 2018 conference

1:00 - 1:30	NORTHERN PIKE, AN UNWELCOME INVADER

Keynote

- Kristin Dunker and Parker Bradley, Alaska Department of Fish and Game

AGENDA

MID AND UPPER COLUMBIA INTERAGENCY NORTHERN PIKE FORUM

JULY 18 AND 19, 2018

Northern Quest Resort and Casino
100 North Hayford Road, Airway Heights, WA
Kalispel North/South Room (2nd floor)

Pacific Northwest Northern Pike Forum and Coordination Meeting Report

July 24th, 2018 1:00-4:00 pm
Meeting Room 10, Davenport Grand Hotel, Spokane, WA
Meeting report developed by Samara Group, LLC
on behalf of the Pacific NorthWest Economic Region

Introduction

Northern pike threaten the Pacific Northwest's economy and environment. Over 50 individuals
federal government agencies, regional organizations,
non-governmental organizations were in
y 24th, 2018 coordinated by the Pacific
State Invasive Species Council. The purpose of
thern pike; identify a path for continuation of a
lefine feasibility and needs for publication of a
Tribal, commercial, and recreational sport fishing
pecies, and pose as a risk to hydroelectric

nal Genetics Research Study
n Pike and Flowering Rush
orthern Pike in Alaska

ke in Lake Roosevelt
Can Do This

orking Group Northern Pike Action Items

18 items
border northern pike committee

es and needs

Pacific NorthWest Economic Region

2018 - 2019 PNWER Executive Committee*

Larry Doke, MLA
Saskatchewan
President

Rep. Mike Cuffe
Montana
Vice President

Graham Sucha, MLA
Alberta
Vice President

Rep. Gael Tarleton
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British Columbia

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Yukon

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Northwest Territories

Colin Smith
APEGBC
Private Sector Co-Chair

Dan Kirschner
Northwest Gas Assoc.
Private Sector Co-Chair

Sen. Arnie Roblan
Oregon
Imm. Past President

*Partial listing

September 10, 2018

Guy Norman
Council Member
Northwest Power & Conservation Council
851 SW 6th Ave.
Portland, OR 97204

RE: Need and Potential for Invasive Species Economic Analyses

Dear Council Member Norman,

I am writing to express support for the Northwest Power and Conservation Council's investigation into developing additional economic reviews and analyses focusing on emerging invasive species issues, such as the proliferation of northern pike within the Columbia River Basin.

The Pacific NorthWest Economic Region (PNWER) and our Invasive Species working group has worked extensively on protecting the region against the threat of invasive species. At this year's PNWER Summit in Spokane, our Invasive Species working group held a special working session on northern pike with stakeholders and experts from around the region. As a result of the meeting, the Invasive Species working group submitted an action item that was approved by the PNWER Executive Committee that PNWER send a letter to the Northwest Power and Conservation Council "regarding the need and potential for additional economic analyses of invasive species to be developed."

Protecting our region against the significant environmental and economic risk of invasive species has long been recognized by PNWER and our Executive Committee of legislators as one of the key issues for our region. Every year we advocate and inform policy makers at the state, provincial, territorial, and federal levels on the issue of invasive species.

The states and provinces of our region face numerous threats from invasive species. PNWER recognizes the damaging impact that northern pike can have on our regional ecosystem and economy, and are particularly concerned with the potential impacts to salmon in the Columbia Basin. PNWER recognizes the need for, and sees significant value added in the development of additional economic analyses to aid decision making and support of rapid response activities. We recommend that the Council investigate the potential economic impacts of invasive species on the regional economy.

Sincerely,

Matt Morrison

Matt Morrison
Chief Executive Officer

Northwest Power and Conservation Council

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Share

The Pike Problem

– John Harrison, September 2018 –

Jump to: Invasive species threatens fisheries in Washington | Slowing a runaway species | Eradication partners | Science and pike | Who pays? | An uncertain future

Invasive species threatens fisheries in Washington

Lurking, and apparently thriving, under the quiet, shallow shoreline waters of Lake Roosevelt in Northeastern Washington is an aggressive, invasive predator that has the potential to upset billions of dollars of investment to rebuild native fish populations including redband trout, kokanee, white sturgeon, burbot, and possibly salmon and steelhead.

WASHINGTON STATE RECREATION AND CONSERVATION OFFICE
Governor's Salmon Recovery Office

Salmon Recovery Funding Board (WA)

March 21, 2018 Briefing

Concerns about the Northern Pike Population above Grand Coulee Dam

Board Letters to the following:

- Governor Inslee
- Northwest Power & Conservation Council
- Washington Department of Fish & Wildlife
- Chelan County PUD
- Grant County PUD
- Douglas County PUD

https://www.tvw.org/watch/?eventID=2018031136

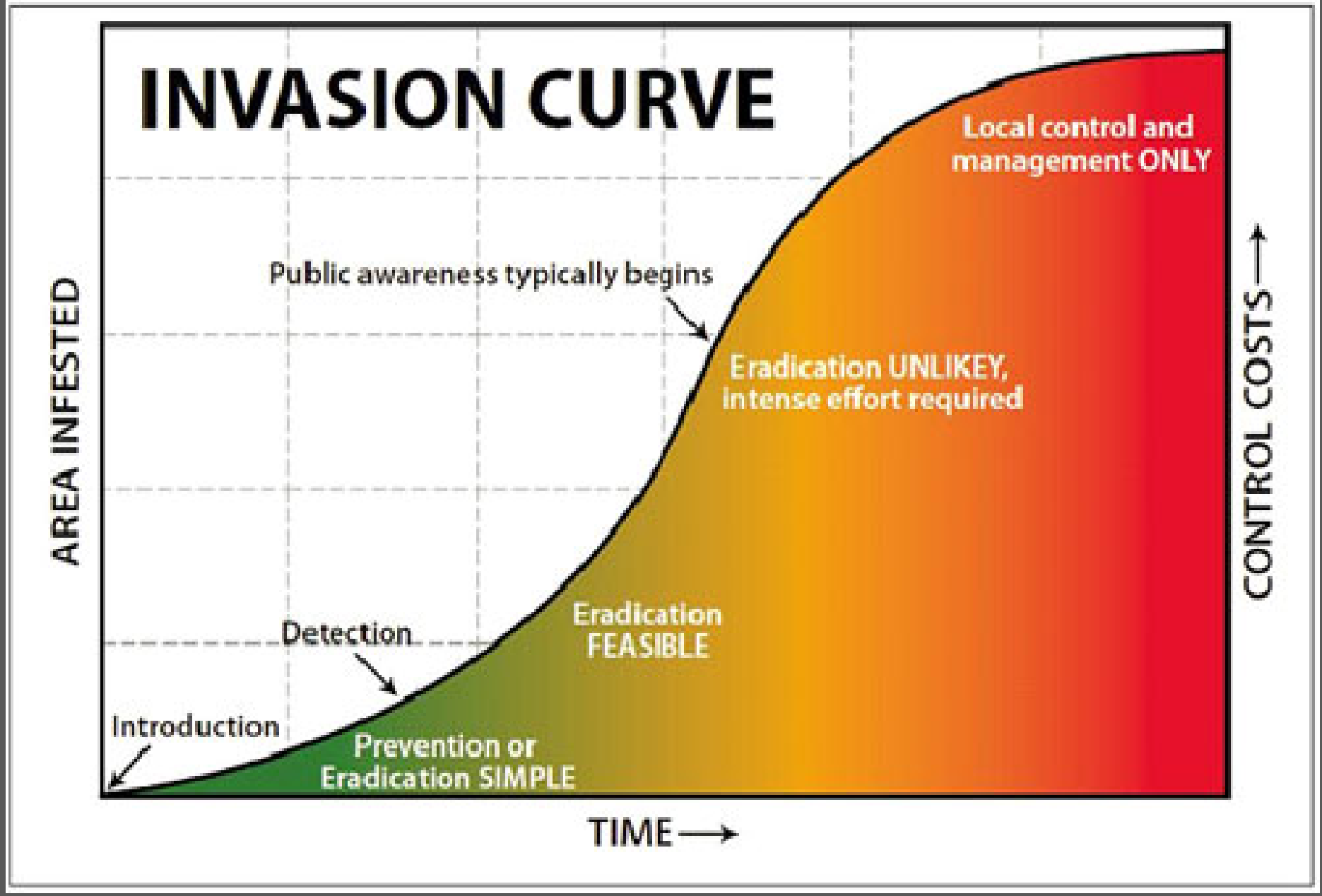
Mouth of Okanogan River

Northern pike caught in Lake Washington could have impact on juvenile salmon

Originally published January 27, 2017 at 3:21 pm | *Updated January 28, 2017 at 1:11 am*

The Seattle Times

Photo of Northern Pike caught in Lake Washington on Jan. 24 was taken by Brian Noel.


INVASION CURVE
Local control and management ONLY
Public awareness typically begins
Eradication UNLIKEY, intense effort required
Eradication FEASIBLE
Detection
Introduction
Prevention or Eradication SIMPLE
AREA INFESTED
CONTROL COSTS
TIME

Acknowledgements

- Bonneville Power Administration
- US Bureau of Indian Affairs
- Avista Corporation
- Seattle City Light
- Eastern Washington University
- Washington Department of Fish and Wildlife
- Kalispel Tribe of Indians
- Hardworking KNRD Field Crew

Thank You! Questions?

More Information:

Websites: http://wdfw.wa.gov/ais/esox_lucius/

and http://kalispeltribe.com/kalispel-natural-resources-department/

Kalispel
natural resources