

Flowering Rush

An Invasive Aquatic Macrophyte Infesting the Columbia River Basin

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Peter Rice University of Montana



Pacific Northwest Distribution

Montana Distribution

Flathead Lake: 1964
Listed as noxious in Montana,
Idaho, Washington, and
Oregon

Clark Fork River
Noxon Reservoir
Lake Pend O'reille
Yakima River

Snake River
Silver Lake Washington

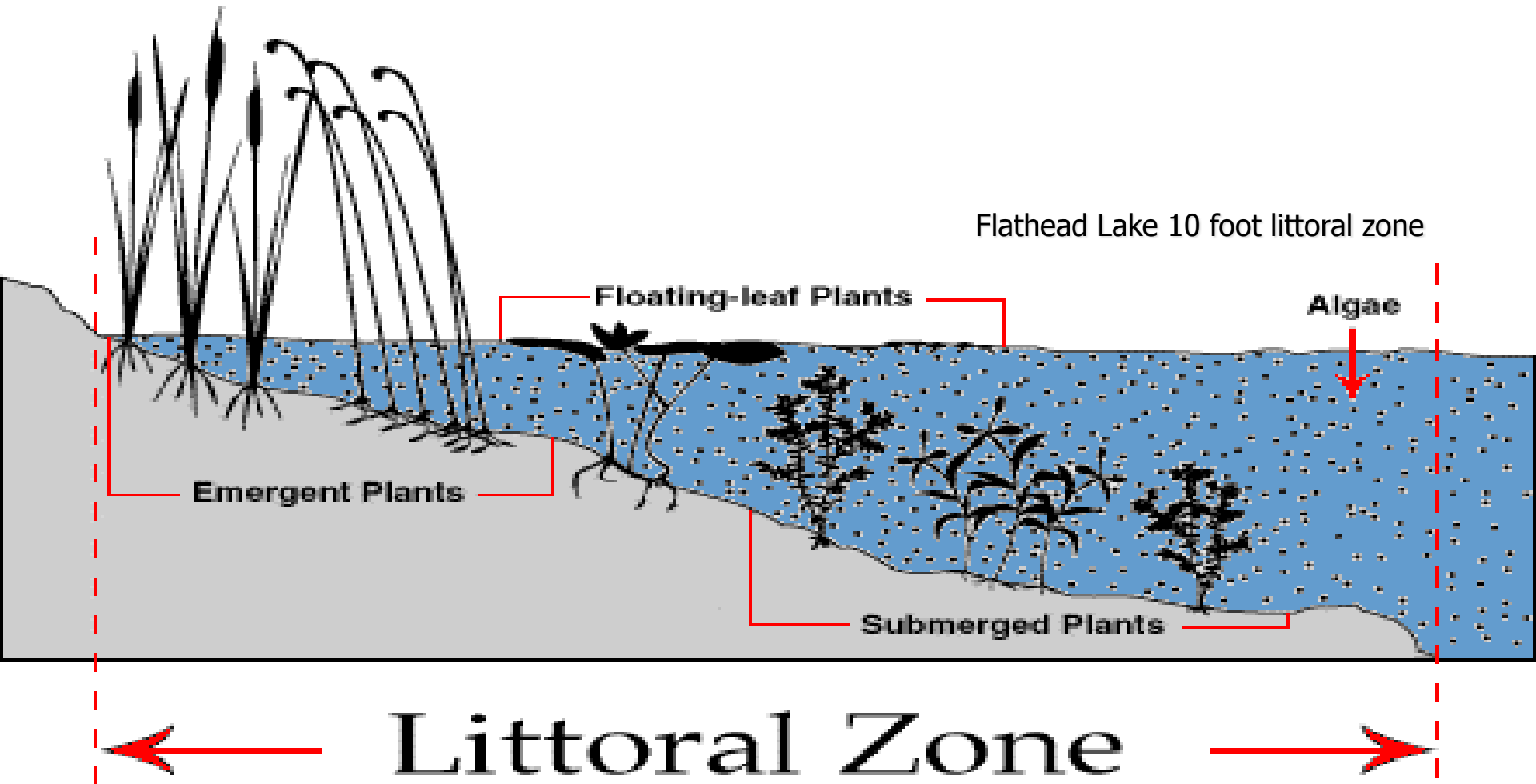


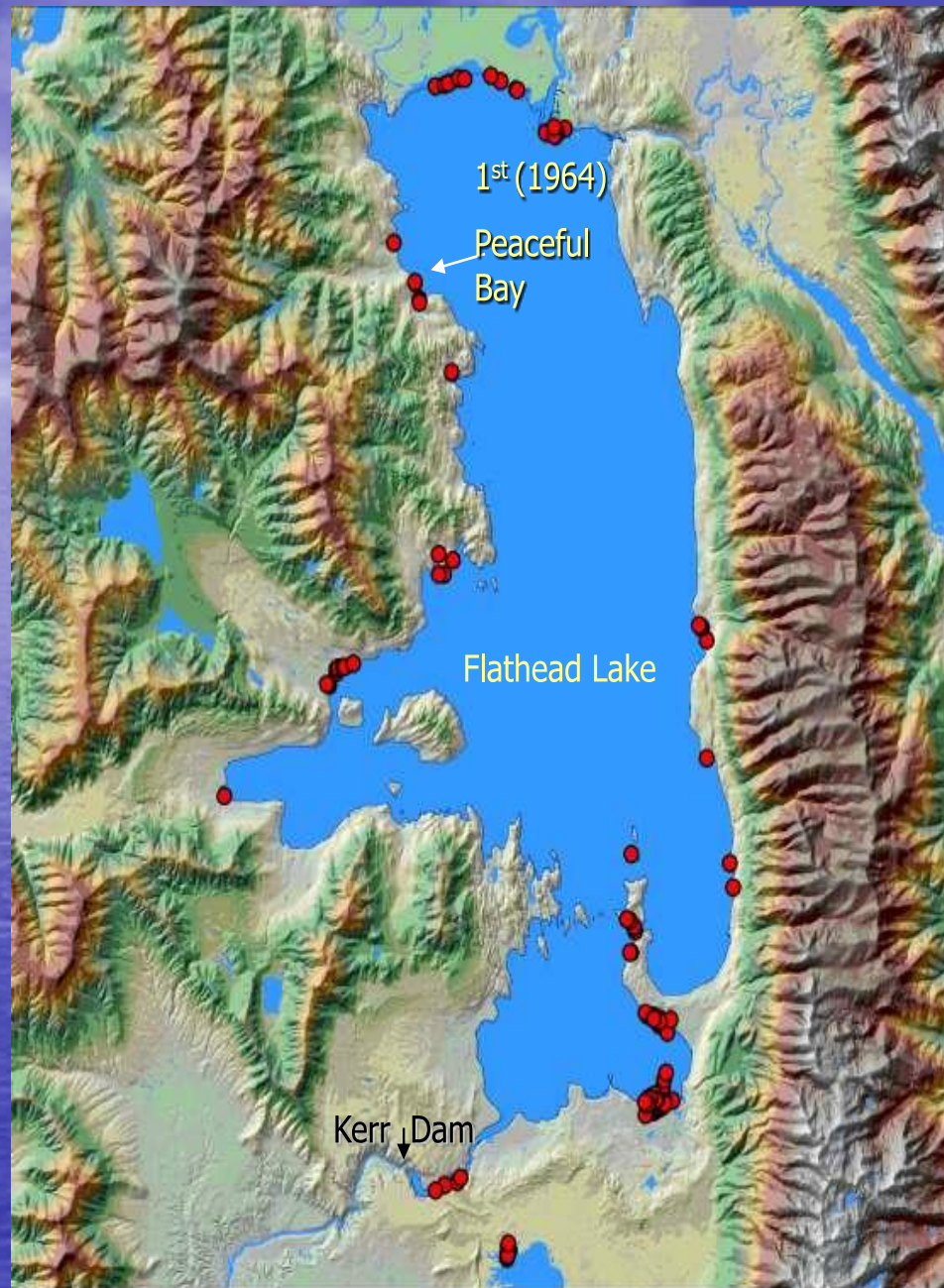
Environmental Impacts

- Form dense monocultures, excludes native aquatics
- Interferes with open water recreation
- Overtakes riparian backwater areas
- Clogs marinas, boat launches
- Habitat for swimmers itch host
- Interferes with irrigation water deliveries
- Provides habitat for invasive pike, perch, and bass, and has food web implications for lake trout, bull trout, and cutthroat
- Sedimentation, water temperatures, nutrient cycling

- ◆ Fully Submerged Form
- ◆ Emergent Form
- ◆ Shoreline Form

Literature: Rush found to 13 ft, In Flathead Lake found to 18 ft





1st (1964)

Peaceful Bay

Flathead Lake

Kerr Dam

● Flowering Rush Observed



Data and Map Produced By:
MTNHP Spatial Analysis Lab
Salish Kootenai College
University of Montana

Known Infestations

Flathead Lake

Partial Survey

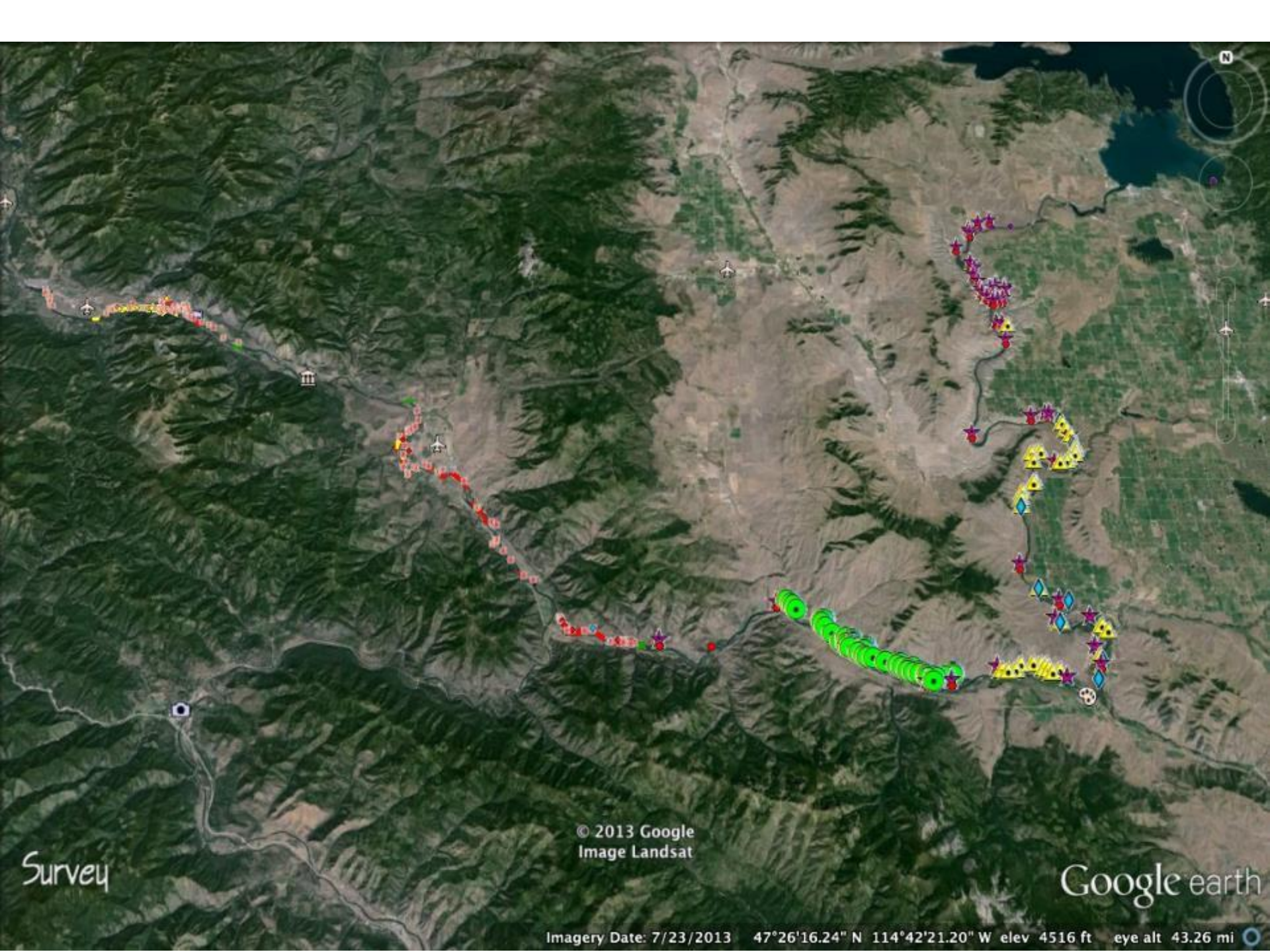
Data Through

10/13/2008

Initial Spatial Modeling Predictions

Marcus Reddish

| | Size Acres | Infested Acres | Max Acres | % of Lake |
|--------------------|-----------------------|---------------------------|----------------------|------------------|
| 0-10" Littoral | 5,823 | > 1000 | 4,364 | 3.5% |
| 10-20' Littoral | 8,375 | > 1000 | 6,546 | 5.3% |
| | 14,558 | > 2,000 | 10,910 | 8.8% |



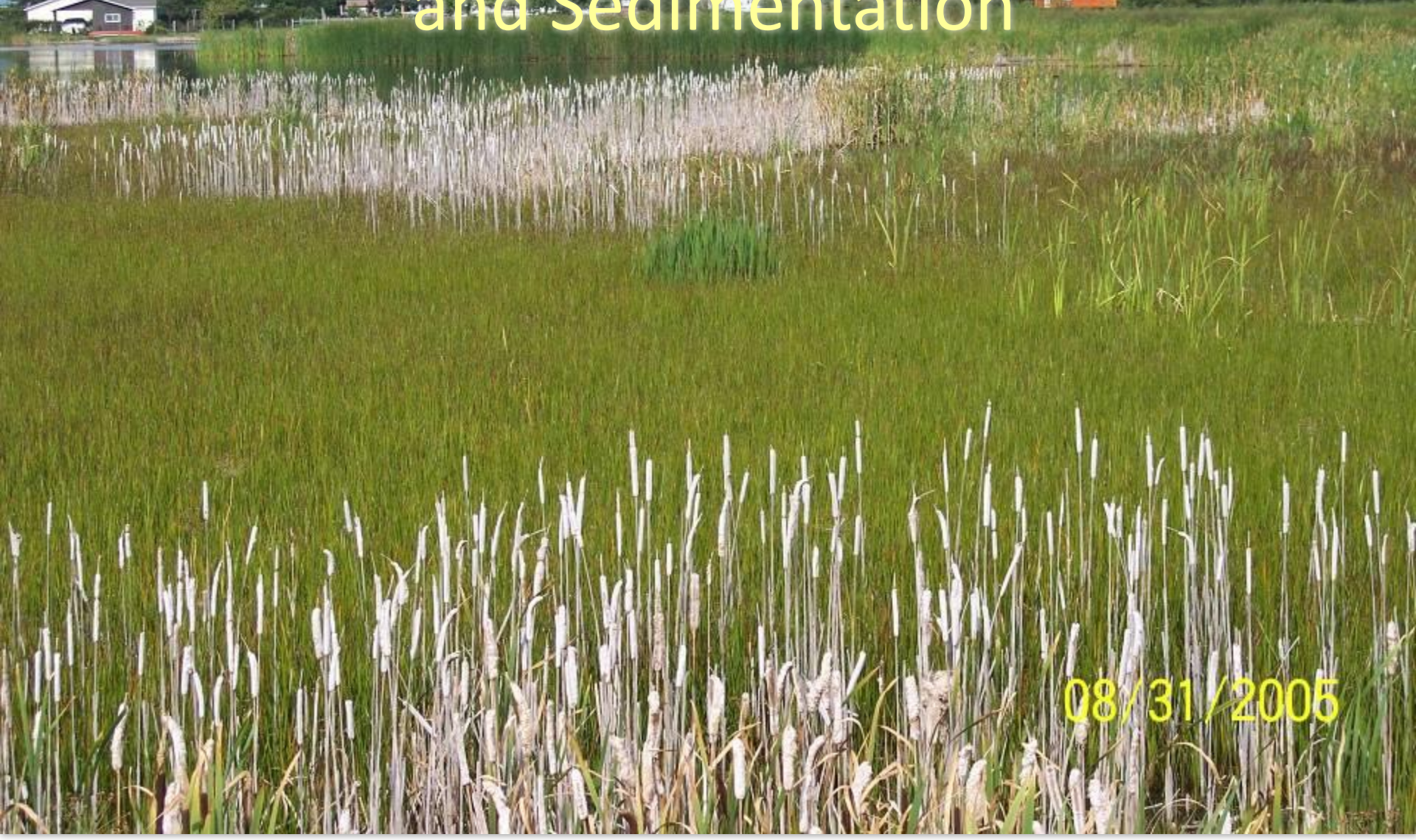
Survey

© 2013 Google
Image Landsat

Google earth

Imagery Date: 7/23/2013 47°26'16.24" N 114°42'21.20" W elev 4516 ft eye alt 43.26 mi

Invasive of Wetlands & Shoreline (Displacing Native Plants) and Sedimentation



08/31/2005





07/26/2008

Flathead Valley Pablo Reservoir Irrigation Canal





Swimmer' s Itch (*schistosome cercarial dermatitis*)

Trematode Parasite

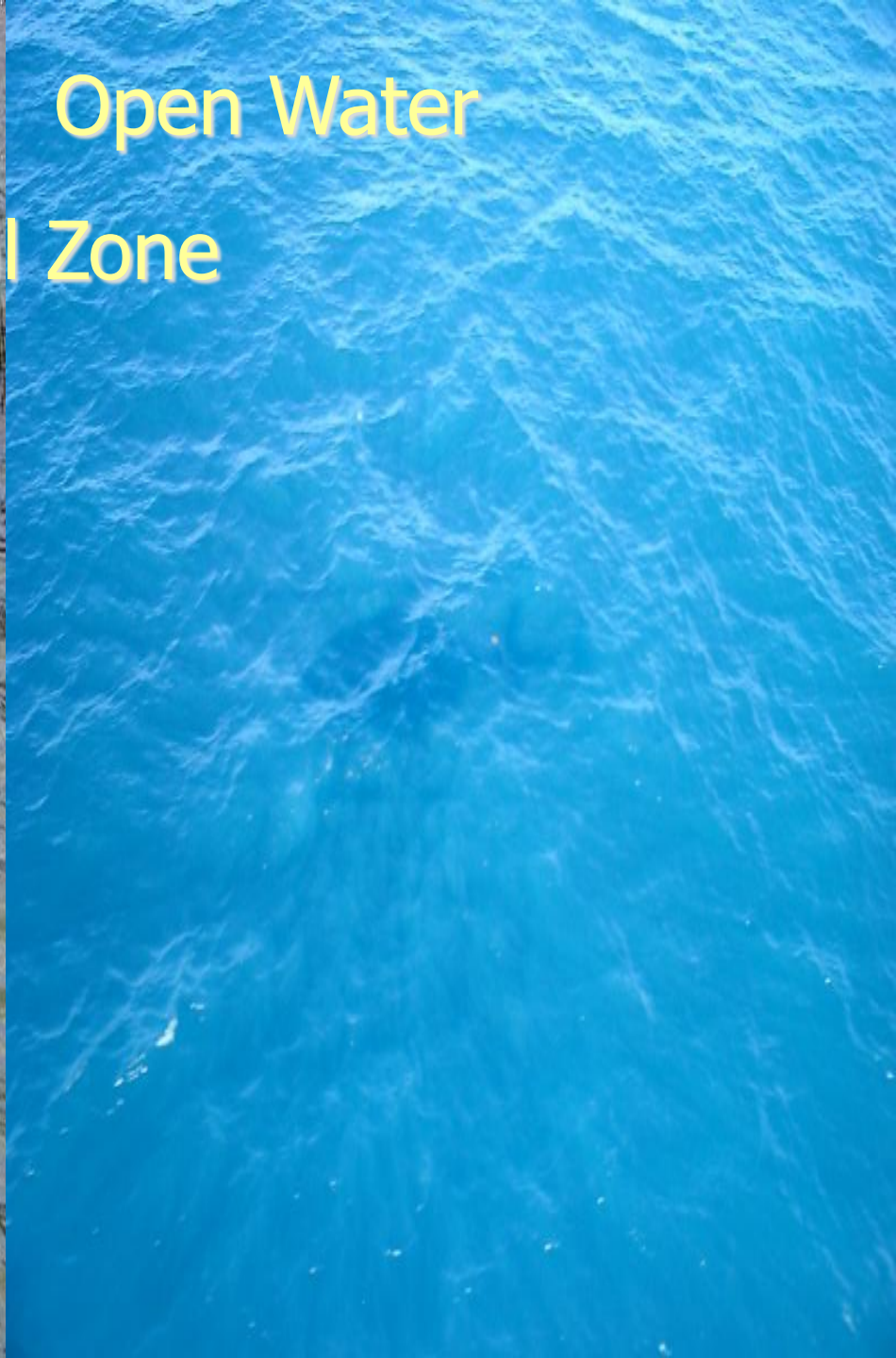
(*Trichobilharzia ocellata*)

Great Pond Snail (*Lymnaea stagnalis*)

Ducharme Fishing Access Flathead Lake



Vegetated vs. Open Water
Littoral Zone





Native Salmonids Are Open Water Species

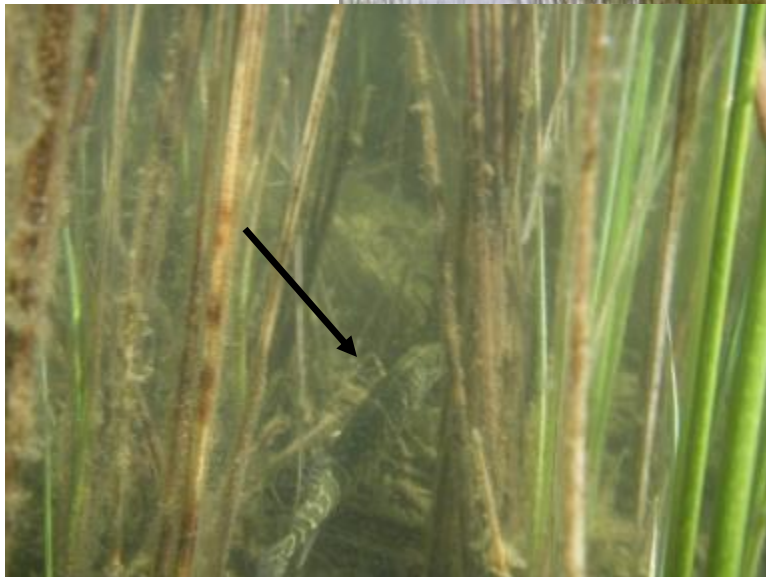


**These Introduced Piscivorous Fish
Are Adapted to Vegetated Habitats**



(Dibble et al 1997)

Northern Pike Predation of Salmonids



Lake Trout Expand as Perch Prey Base Habitat Increases Magnifying Incidental Predation on Native Salmonids?

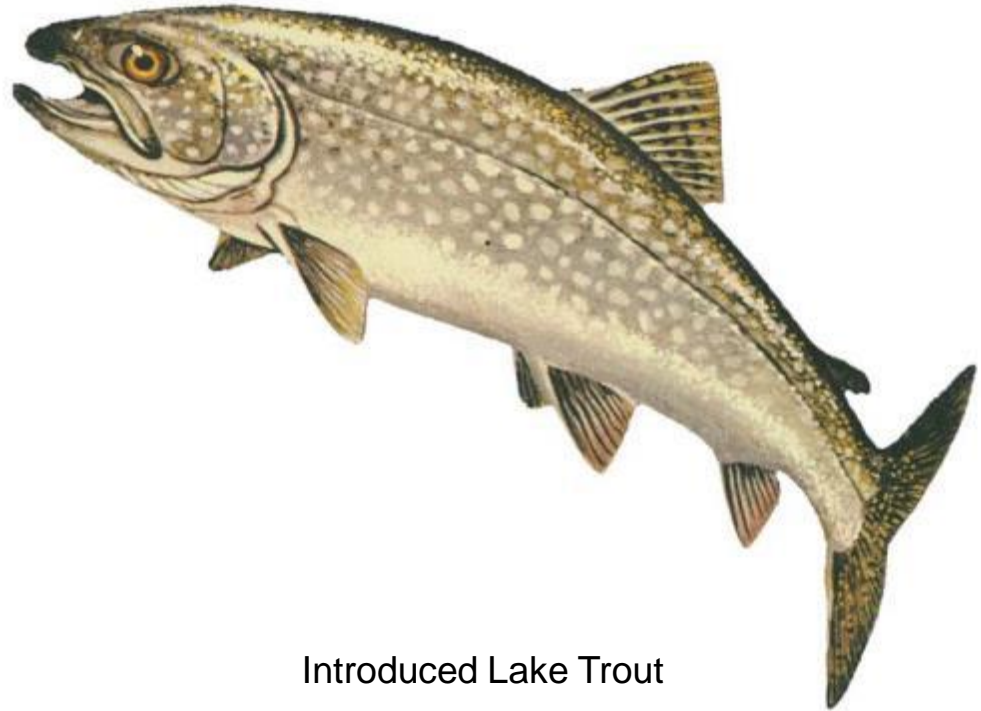
Native Bull Trout



Native Cutthroat



Introduced Lake Trout

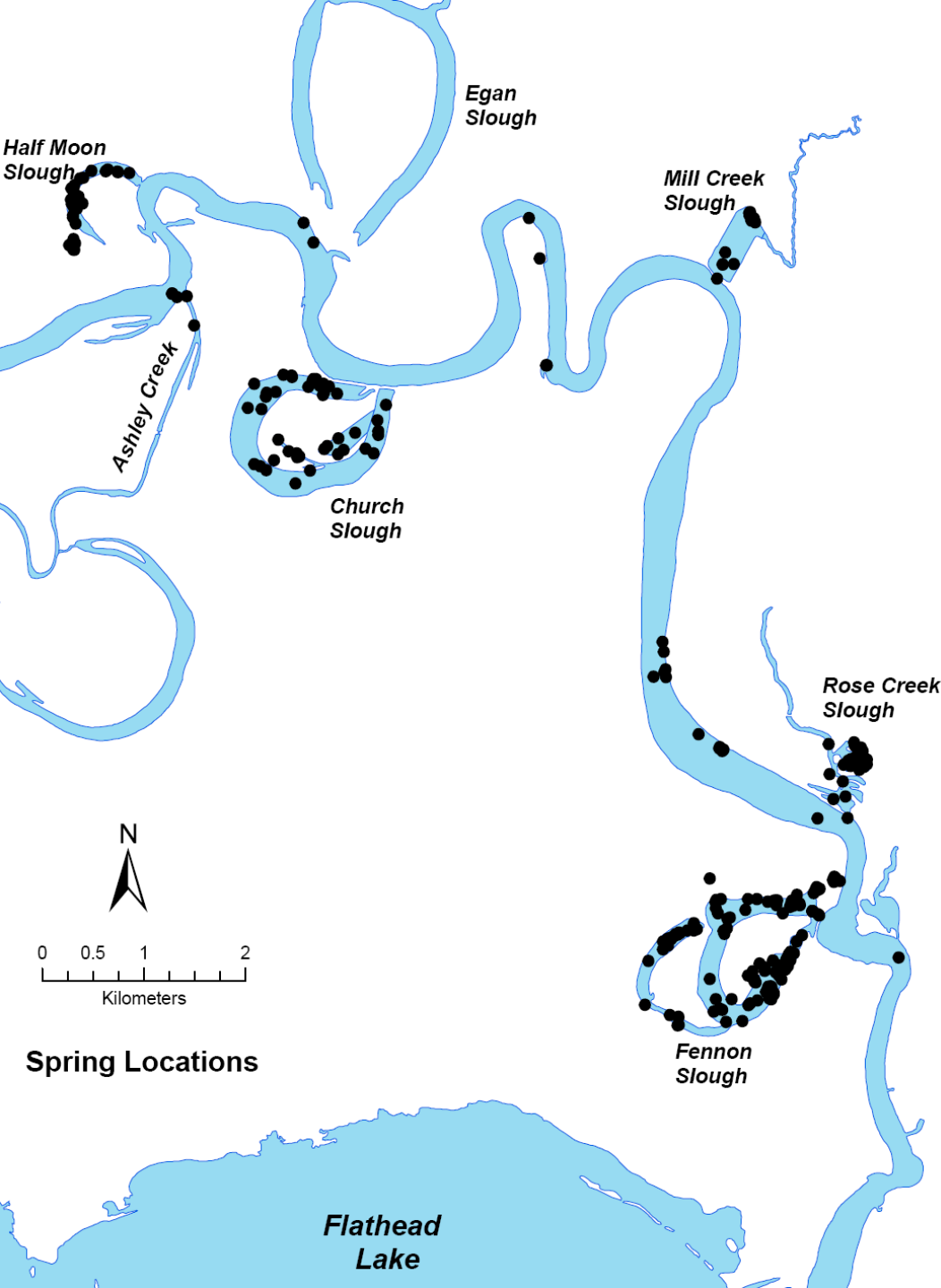


Introduced Yellow Perch



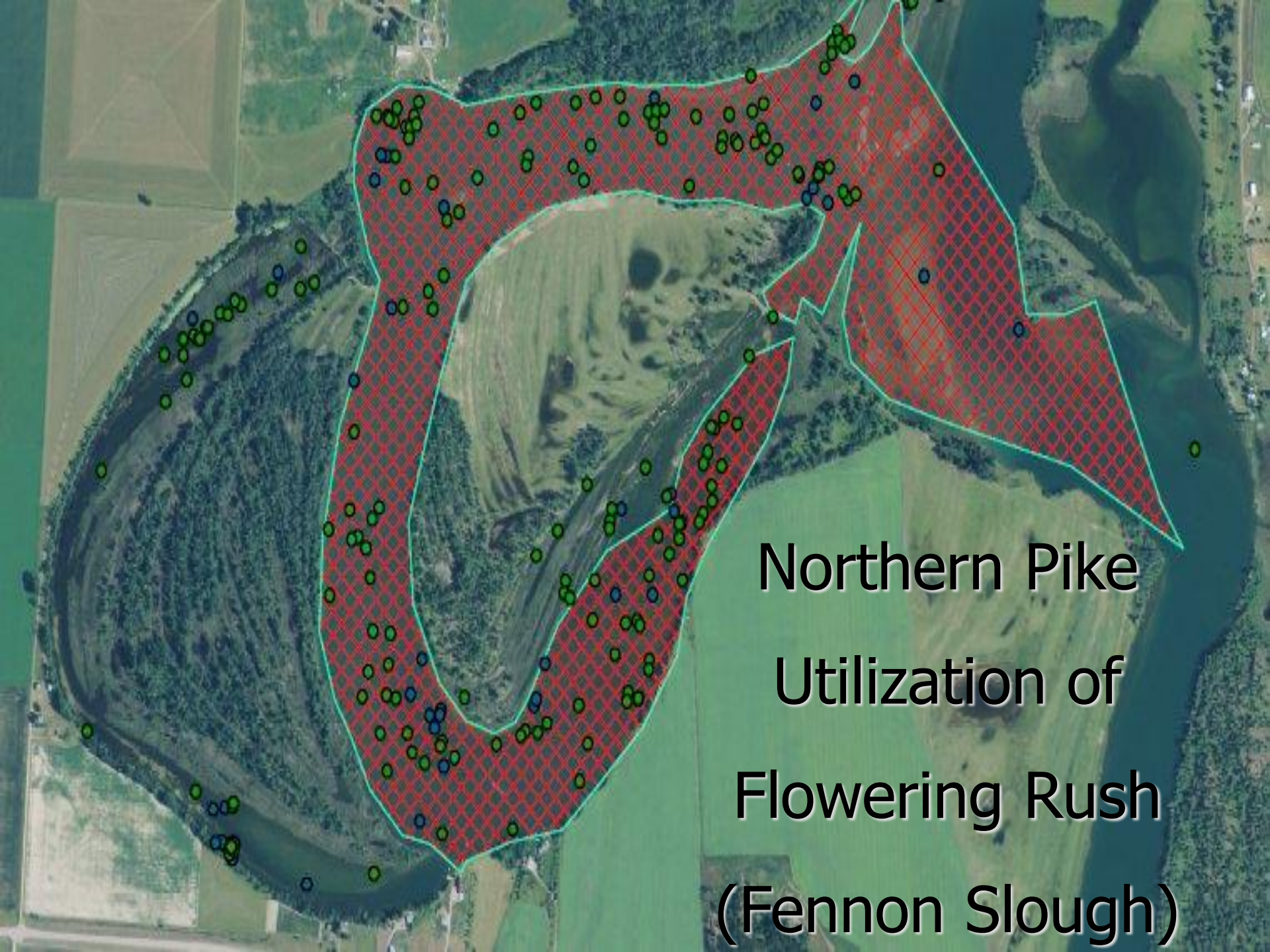
Eggs on





Montana Fish, Wildlife & Parks

Radio Tag Study of Northern Pike Distribution in the Upper Flathead River



Northern Pike
Utilization of
Flowering Rush
(Fennon Slough)

Northern Pike Bioenergetics Study (Upper Flathead River)

Prey items

| <u>Season</u> | <u>WCT*</u> | <u>BULL**</u> |
|---------------|---------------|---------------|
| Winter | 686 | 380 |
| Spring | 2,015 | 2,922 |
| Summer | 9,428 | 0 |
| Fall | 1,250 | 156 |
| Totals | 13,379 | 3,457 |



Bull Trout** & Cutthroats* Are
Being Significantly Depredated
by Northern Pike



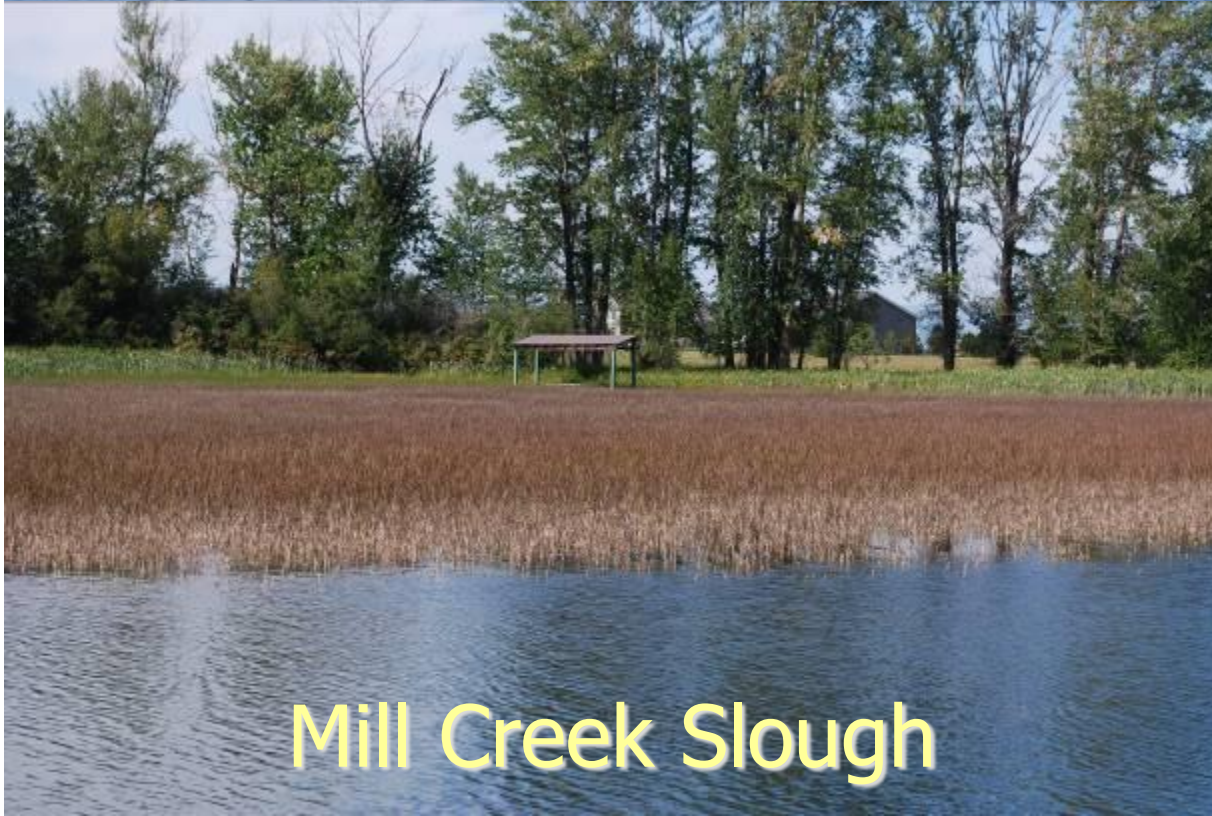
Muhlfeld et al. (2008)

**Flowering
Rush**

**Dominates
Sloughs Being
Used by
Northern Pike**



Fennon Slough



Mill Creek Slough

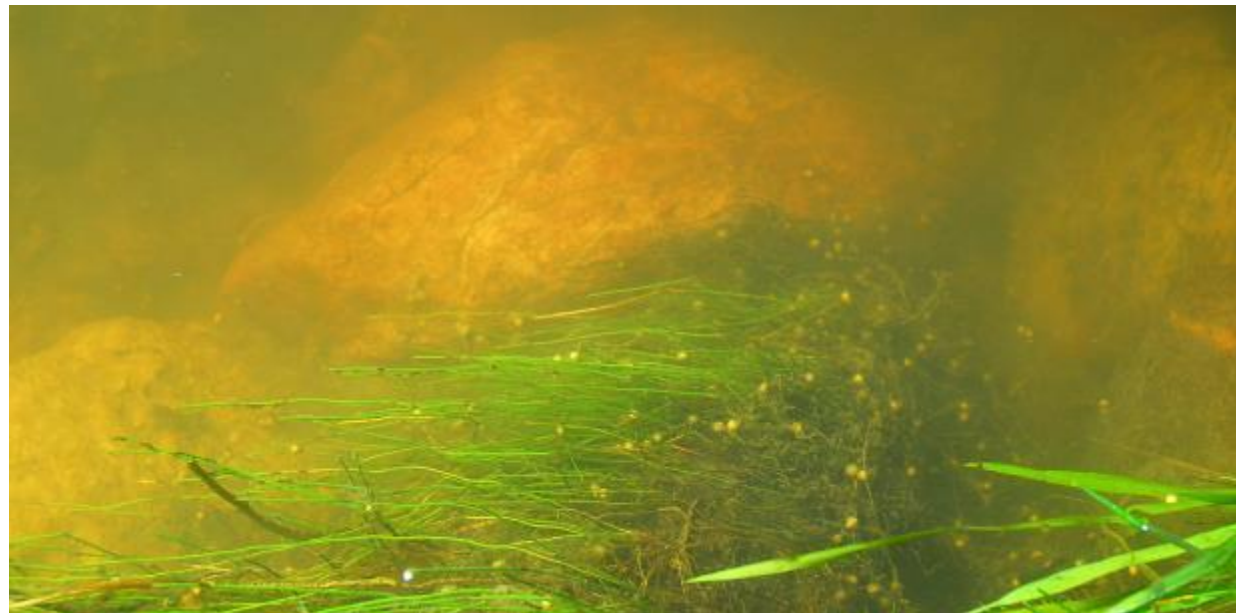
Northern Pike

Obligate

Vegetation
Spawners



- Eggs Attached
- Sac Fry Attached
- Fingerling Rearing





Flowering Rush in April
(Fennon Slough, Upper Flathead River)



A photograph of a lush green field of tall grass, likely a meadow or marsh. In the foreground, a purple funnel-shaped object is partially visible, suggesting a field sampling activity. The background shows a dense line of trees under a clear sky.

A Sampling Methods Pilot Study: Flowering Rush Habitat Facilitation of Northern Pike & Macroinvertebrate Community Changes

**Peter Rice University of Montana
Virgil Dupuis, Salish Kootenai College
Eric Dibble, Mississippi State University**



Trials for Sampling Methods

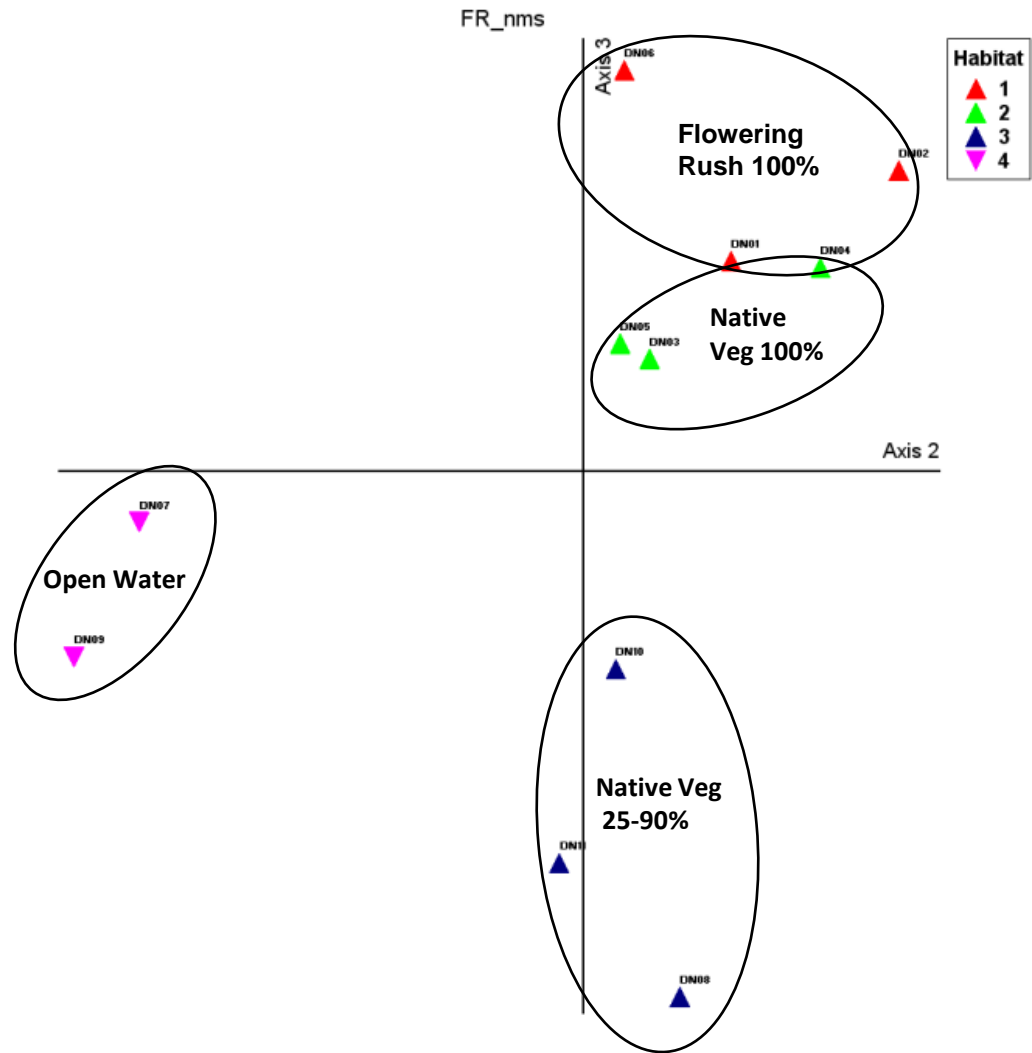


% Positive Samples Fennon Slough

2013 Light Traps

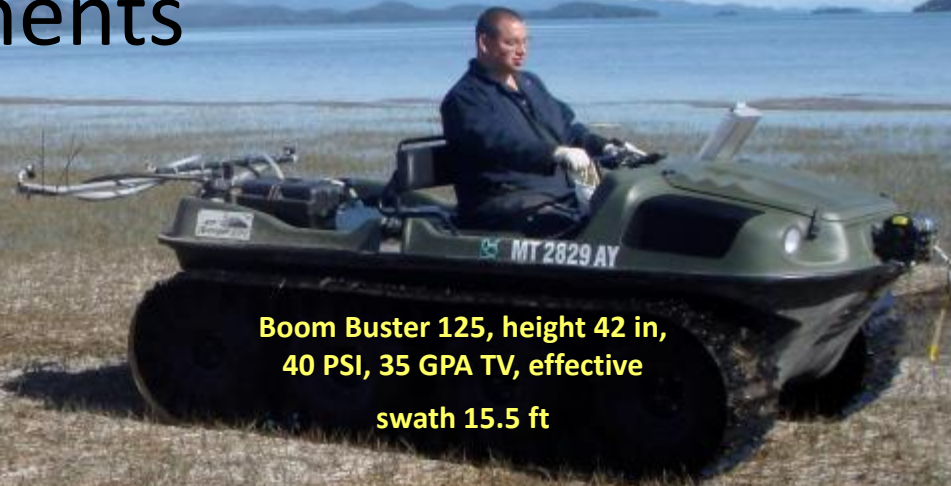
| | # light traps | Largemouth Bass | Yellow Perch | Pumpkin-seed | Northern Pike |
|--------------------|---------------|-----------------|--------------|--------------|----------------------|
| 100% BUTUMB | 44 | 77.3 | 31.8 | 6.8 | 11.4 |
| 100% Native | 36 | 55.6 | 2.8 | 0 | 0 |
| Open Water | 36 | 25.0 | 0 | 0 | 0 |

Aquatic Community NMS Relationship for 2012 Dip Net Samples



Low Pool Foliar/Exposed Sediments

Herbicide Treatments



**Boom Buster 125, height 42 in,
40 PSI, 35 GPA TV, effective
swath 15.5 ft**

5 to 7 Inch Average Leaf Length East Bay May 27, 2008

CONTROL



140 DAT WITH IMAZAPYR



Need for A System-Wide / Multi-Partner Comprehensive Scientific Assessment



- ◆ Complete Main Stem Survey
- ◆ Water Level Management & Invasion Success
- ◆ Reproductive Phenology & Rhizome/Seed Dispersal Determine Genotypes
- ◆ Higher Trophic Level Impacts, affects on native fish
- ◆ Sediment Deposition & Transport
- ◆ Control Methods
- ◆ Professional Awareness
- ◆ Strategic Plan for Columbia River Basin

Summary Points

- Flowering Rush Colonizes Previously Unvegetated Littoral Zone Creating Northern Pike, Bass, and Perch Habitat
- Juvenile and adult Northern Pike Are Associated With Flowering Rush Infestations
- Northern Pike are Significantly Depredating Native Cutthroat & Bull Trout Populations
- Fish & Macroinvertebrate Community Composition is Being Altered from The Indigenous Native State
- Flowering rush is spreading down the Columbia

Funders and Supporters

- USDA-National Institute of Food and Agriculture
- Montana Department of Agriculture
- Montana Department of Fish, Wildlife and Parks
- Montana Legislature
- Confederated Salish and Kootenai Tribes