Flowering Rush
An Invasive Aquatic Macrophyte
Infesting the Columbia River Basin

Virgil Dupuis Salish Kootenai College
Peter Rice University of Montana
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
## Initial Spatial Modeling Predictions

Marcus Reddish

<table>
<thead>
<tr>
<th>Size</th>
<th>Infested Acres</th>
<th>Max Acres</th>
<th>% of Lake</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-10” Littoral</td>
<td>5,823</td>
<td>&gt; 1000</td>
<td>4,364</td>
</tr>
<tr>
<td>10-20’ Littoral</td>
<td>8,375</td>
<td>&gt; 1000</td>
<td>6,546</td>
</tr>
<tr>
<td></td>
<td>14,558</td>
<td>&gt; 2,000</td>
<td>10,910</td>
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</tbody>
</table>
Invasive of Wetlands & Shoreline (Displacing Native Plants) and Sedimentation
Swimmer’s Itch (*schistosome cercarial dermatitis*)
Trematode Parasite
(*Trichobilharzia ocellata*)
Great Pond Snail (*Lymnaea stagnalis*)
Ducharme Fishing Access
Flathead Lake
Native Salmonids are open water species. These introduced piscivorous fish are adapted to vegetated habitats.
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

Gregory & Powels
Montana Fish, Wildlife & Parks
Radio Tag Study of Northern Pike Distribution in the Upper Flathead River
Northern Pike Bioenergetics Study
(Upper Flathead River)

Prey items

<table>
<thead>
<tr>
<th>Season</th>
<th>WCT*</th>
<th>BULL**</th>
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</thead>
<tbody>
<tr>
<td>Winter</td>
<td>686</td>
<td>380</td>
</tr>
<tr>
<td>Spring</td>
<td>2,015</td>
<td>2,922</td>
</tr>
<tr>
<td>Summer</td>
<td>9,428</td>
<td>0</td>
</tr>
<tr>
<td>Fall</td>
<td>1,250</td>
<td>156</td>
</tr>
<tr>
<td>Totals</td>
<td>13,379</td>
<td>3,457</td>
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</tbody>
</table>

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

Muhlfeld et al. (2008)
Fennon Slough

Flowering Rush Dominates Sloughs Being Used by Northern Pike

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 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

<table>
<thead>
<tr>
<th></th>
<th># light traps</th>
<th>Largemouth Bass</th>
<th>Yellow Perch</th>
<th>Pumpkin-seed</th>
<th>Northern Pike</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>100% BUTUMB</strong></td>
<td>44</td>
<td>77.3</td>
<td>31.8</td>
<td>6.8</td>
<td>11.4</td>
</tr>
<tr>
<td><strong>100% Native</strong></td>
<td>36</td>
<td>55.6</td>
<td>2.8</td>
<td>0</td>
<td>0</td>
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<tr>
<td><strong>Open Water</strong></td>
<td>36</td>
<td>25.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>
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
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