Learning “British Columbia’s Top Aquatic Plant Invaders” to Protect Investments in Natural Resources and the Restoration (Webinar May 30, 2014 1:00-2:00pm)

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Agenda for today:

- Invasive species pathways and case studies

- Species Overviews:
  - Spartina spp.
  - Japanese wireweed
  - Eurasian milfoil
  - Parrot Feather milfoil
  - Himalayan balsam
  - Giant hogweed
  - Purple Loosetrife
  - Yellow flag iris

- Questions – next webinar on aquatic invasive species

- THANKS!
What are Invasive Species?

“Species that are non-native to the ecosystem and whose introduction causes or is likely to cause economic or environmental harm or harm to human health” (The National Invasive Species Council, 2006, pg.1).

"those harmful alien species whose introduction or spread threatens the environment, the economy, or society, including human health” (Canadian National Strategy 2004)

Kudzu (Pueraria lobata)
Invasion Pathways – How did they get here?

- Transportation
- Horticulture
- Agriculture
- Aquaculture
- Aquariums & Water Gardens
- Restoration and monitoring
- Recreational or Commercial Watercraft
- Bait
- Fish Stocking
- Live Seafood
- Schools
More than 40% of listed species are declining due to non-native species.

"On a global basis...the two great destroyers of biodiversity are, first habitat destruction and, second, invasion by exotic species"

- E.O. Wilson
Case Study: Are Invasive Species the Cause or Indicator of Degraded Riparian and Stream Systems?
Devil’s Lake, Central Oregon Coast

- Ecologically sensitive run of Coho Salmon
  - Intensive development
- Former Primary treated sewage discharge
  - Leaking septic systems
  - High boating recreation use
- Watershed health issues
Consequences of introducing Asian Grass Carp to Control Aquatic Weeds in Devils Lake, Lincoln City, OR
Asian grass carp consumed macrophytes (Large aquatic plants).

Water quality problems (high nutrients) still persist.

Resulting in toxic cyanobacteria blooms
THE SOLUTION? Invest in Prevention and Early Detection to prevent future large scale invasions and keep costs DOWN!
An Urgent Situation! Your work is important!

- Aquatic invasive species have the potential to completely change British Columbia’s native landscape by out competing native species and altering the habitat on which native species depend.

- Nearly 2/3’rds of streams in the Pacific Northwest are relatively are free of invasive species – the least invaded states in the west!

- Your efforts can lead to early detection and rapid response to nip an infestation from spreading.
By looking for and reporting aquatic invasive species while in the field this summer, you can help prevent species like zebra mussels from ever harming Oregon’s environment.
Zebra/Quagga Mussels are arguably the 

#1 Invasive Species Threat to the Columbia River Basin in the West: Ecologically, Economically

http://nas.er.usgs.gov/taxgroup/mollusks/zebramussel/maps/zebraquaggamapanimati_on.gif
Known Distribution on the West Coast

Comox Harbor, BC
Fanny Bay, BC
Boundary Bay, BC
Puget Sound, WA
Gray’s Harbor, WA
Willapa Bay, WA
Siuslaw River, OR
Coos Bay, OR
Humboldt Bay, CA
San Francisco Bay, CA
British Columbia

- Three species known in BC
  - *S. anglica*
  - *S. densiflora*
  - *S. patens*

- Formed BC Spartina Working Group
  - eradication efforts in Vancouver area
  - expanded monitoring on east coast of Vancouver Island

- BC *Spartina* Response Plan 2010
- Committed to 2018 eradication goal stated in Pacific Coast Collaborative
S. *Densiflora* forms in clumps. S. *Anglica* often solitary in coarse clumps.
Spartina alterniflora native to the eastern USA (smooth cord grass) occupied over 90% of Willapa Bay, WA mid-90's.
Ecological Impacts

- Conversion of open mud-flats to monotypic meadows of *Spartina*
- Displaces native plants in high marsh
- Increased sediment accumulation
- Reduction of available wildlife habitat
- Shift from algal-based food-web to detrital
- Altered hydrology - increased channel velocity
- Increased risk of flooding upstream
Spartina Impacts on Shorebirds

From: Patten, K. Shorebird, waterfowl, and birds of prey usage in Willapa Bay in response to Spartina control efforts. WSU Long Beach Extension Unit
BC Monitoring

- Focus on:
  - Fraser Delta & Roberts Bank (*S. anglica*)
  - East Coast of Vancouver Island (*S. densiflora*)
- Results:
  - *S. anglica* and *S. densiflora* populations are increasing
BC Tools for Control

Mechanical
• Removal & burial with excavator

Manual
• Covering (trials underway)
• Hand-digging
• Seed-head clipping

Chemical
• Permit process prevented use until BC Ministry of Environment granted emergency registration
• Trials began summer 2013
  • 2,000 clones sprayed
• Support from WSDA & USFWS
Japanese Wireweed (Sargassum muticum)

- A large, brown seaweed elongated lanceolate blades possessing toothed margins

- Located between the blades of the branches are small floats, called vesicles, about 2mm in diameter that allows the fronds to float upright and breakoff

- Broad tolerance to temperature, salinity and dessications

- Grows in thick patches that can reduce the ability of sunlight to penetrate the water

- Reproduces sexually and through fragments
Japanese Wireweed

- Native to the southeastern portion of Asia and Japan, where it grows in sheltered coastal habitats and estuaries.
- Introduced through Japanese Pacific oyster culture and ships.
- Sargassum muticum invaded over 3000 km of western North American coastline since its main introduction in the 1970's.
Didymosphenia geminata

Didymo, Rock Snot

Diatoms connected by a complex form of mucilagenous persistent stalks composed of starch-polysaccharides.
Didymo distribution

Confirmed presence of D. geminata in the United States and Canada. A total of 401 samples are included. Records are based on data from USGS National Water Quality Assessment (NAWQA), EPA Environmental Monitoring and Assessment (EMAP), and samples from other studies. (Map by Karl Hermann, Sarah Spaulding, and Tera Keller)
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<th>Is it Didymo?</th>
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<tr>
<td><strong>YES</strong></td>
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Origin (where it was introduced from): Under debate. Originally thought native to northern Europe and northern North America. It is assumed to be indigenous in Norway, Scotland, Ireland, Sweden, Finland, France, Spain, Switzerland and Vancouver Island (Cleve, 1894-1896; in Kilroy, 2004). It could be native, but has become aggressive due to changes in climate and water quality.
EURASIAN WATERMILFOIL

Seeds
EURASIAN WATER-MILFOIL Distribution
Myriophyllum spicatum
Eurasian watermilfoil
EURASIAN WATER-MILFOIL (Myriophyllum spicatum)

- Plant native to Europe, Asia, and northern Africa.
- Aquatic plant rooted to the bottom of the waterbed.
- Stems are underwater and long, branching off and producing many leaves near the water surface.
- The leaves are divided into thread-like leaflets, usually in pairs of more than 12 to 14, forming a feathery shape, with uppermost leaves having a squarish tip.
- This species can be distinguished from native northern watermilfoil (Myriophyllum sibiricum), whose long leaflets occur in fewer than 11 pairs and extend almost to the leaf tip, resulting in rounded uppermost leaves. In addition, northern watermilfoil tends to grow close to the bottom, while Eurasian watermilfoil grows up to the water surface.
parrot feather
Myriophyllum aquaticum

Myriophyllum aquaticum

Photo by Alison Fox
Copyright 1998 University of Florida
PARROT’S FEATHER
(Myriophyllum aquaticum)

- Originating from Southeastern United States, north to and including Virginia. Also native to South America.
- Prefers habitats with shallow, sluggish waters to 1 m deep, including swamps, ponds and ditches.
- Pathway- water gardens, fragments carried by boating and other water recreation
Myriophyllum aquaticum – Parrot Feather

- Submersed shoots have reddish orange leaves
- At water surface, plant growth changes
- Emergent leaves feather-like, are whorled and stiff, can extend above the water, branching
Himalayan Balsam (Impatiens glandulifera)

- Native to India and west of the Himalayas
- Balsam spread through intentional use in gardens and has spread its “rocket seeds” by shooting them into the air and up to 5m away from the plant. These seeds can disperse even farther through waterways and attached to the fur of animals
- It usually germinates in late winter to early spring and flowers from early summer to early fall. Flowers are predominately pink, white or purple and shaped much like an “English policeman's helmet”.
Himalayan Balsam (Impatiens glandulifera)

- Himalayan balsam thrives in moist soils in lowland, riparian zones
- Flower like a policemen’s helmet
- Leaves are stalked, oblong to egg-shaped and have a serrated edge.
- Seed capsules can eject seeds up to 7 m.
- Each plant can produce up to 2000 seeds
Himalayan Balsam
(Impatiens glandulifera)
Giant Hogweed *Heracleum mantegazzianum*

- Massively tall plant (5-7 m).
- Large umbrella shaped flowers.
- Wide (5-10 cm) hollow stems with red-purple blotches and single erect hair in the center.
- Large (2.5-3ft wide) deeply incised leaves
Giant hogweed (heracleum mantegazzianum)

- Originally from Eurasia and introduced as an ornamental curiosity
Giant Hogweed
*Heracleum mantegazzianum*

CAUTION! TOXIC!

*Oils in this plant cause severe skin burns!*

Wear protective clothing and gloves!!

*phyto-photodermatitis*
Giant Hogweed
*Heracleum mantegazzianum*

**WHEN TO LOOK**
- Flowers May-July

**WHERE TO LOOK**
- Along streambanks, fields, forest understory
Giant Hogweed vs. Cow Parsnip

Giant Hogweed

Cow Parsnip
Knotweeds
Knotweeds

• Tall (2-4 m) bamboo-like stems.

• Broad leaves are rounded, flat, or heart-shaped at the base, and taper to a point toward the end.

• Drooping clusters or greenish-white flowers (2.5–3 mm long).

• Found in the riparian area of ANY river or stream.
Knotweed Complex
Ecological Impacts

- Dominates riparian landscapes
- Alters food web by reducing litter input critical for stream health, fish and invertebrates
- Changes soil chemistry
- Compared to native plants, knotweed ties up higher ratio nutrients in rhizome biomass
- Prevents establishment of native riparian trees and understory
Japanese knotweed: a case study for impacts on watershed health
Knotweed aboveground mortality after broadcast herbicide application- What’s next?
Extensive underground rhizomes make knotweed hard to control
(Regrowth of knotweed 5 years later)
Knotweed can spread quickly through fragments of stems and

- In just two years knotweed had occupied twice the stream length

- Trask River Peninsula
Japanese Knotweed: Outcompeting blackberries
Purple Loosestrife (Lythrum salicaria)

- 2’-7’ tall plant, opposite leaves with spikes of magenta flowers
- Stiff square stems
- Found in wetlands
- Flowers June – August
- One plant can produce 2.5 million seeds
Purple Loosestrife
(*Lythrum salicaria*) Wetland invader

- Wetlands invaded by loosestrife can lose 50-100% of native biomass
- Introduced as ornamental and for honey production
- European Weevils and beetles introduced for biocontrol
Yellow Flag Iris traps sediments creating meadows out of streams and lakes

Currently this plant is found in BC’s southern interior, and has quickly spread throughout the Okanagan valley, lower Similkameen valley, Christina Lake and other isolated sites in the West Kootenays.
Yellow Flag Iris colonies fuse together in meadows that impair flow and watershed functions
Yellow Flag Iris

- It is the only iris with completely yellow flowers.
- Grows 0.4 – 1.5 m tall
- Stiff, sword-like leaves with thick, spongy midrib
- Leaves in a fan-like, overlapping arrangement.
- 3-sided, shiny green fruit
- Found in the riparian areas of slow moving water
Long distance dispersal via large, corky floating seeds, and reproduction via vigorous rhizomes.
Next Iwebinar: Aquatic Invasive Species

June 23, 2014

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http://oregonstate.edu/main/natural resources-leadership-academy