

LUDWIGIA PRESENTATION W/ BRENDA GREWELL

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Ludwigia Invasions – Implications for Management & Restoration

- *Ludwigia* will establish in a wide range of different habitats
 - Riverine, wetlands, rice fields, oxbow lakes, managed seasonal wetlands, floodplain wetlands, canals, etc.
 - Broad ecological tolerance & phenotypic plasticity
- Morphological plasticity makes identification difficult
 - You need to look further than your own backyard
 - Ploidy numbers are important to ID w/ chromosome squashes
 - $2n=16$ diploid (moderate to manage)
 - $2n=48$ hexaploid (challenging to manage)
 - $2n=80$ decaploid (very difficult)
- Pacific West states – 5 species known
 - *Ludwigia peploides* is relatively rare in Oregon
- *L. hexapetala* phenology
 - Creeping & floating alternate lvs.
 - Stems, sepals and capsules are all hairy
 - Bractlets are lanceolate
 - Roots at stem nodes
 - Woody rhizomes
 - Sepals are persistent after petals drop
 - Viable seeds embedded in woody fruit inner wall
 - Reproduction is mainly asexual
 - Petals 5-6, 2-3 cm long
 - Young leaf rosettes are made up of rounded lvs.
 - 3 types of roots
 - Trimorphic roots – foam-like roots for transporting oxygen to immersed nodes
- *L. peploides ssp. peploides* – OR, WA, CA
 - Always glabrous (smooth, no hairs)
 - Found in Benton county on the Willamette River; eradicated in King Co. WA
- *L. peploides ssp. motevidensis* – OR, CA
 - Hairy stems and sepals
 - Leaf apex mucronate (tip ending abruptly in a sharp point)
 - Only in Portland in OR

- *Ludwigia decurrens* – Butte Co. CA
 - Winged stem
 - Glabrous, up to 7ft. tall
 - Erect annual to short-lived perennial
 - Stem branching from decurrent leaf bases
 - Brought in to CA from Arkansas on equipment
- *Ludwigia palustris* - Native, found throughout OR
 - No petals & striped sepals, flwrs in lf. axils
- *Ludwigia repens* – not in OR
- *Ludwigia grandiflora* – Southern CA, not in OR

Ludwigia sp.

- Origin: South America – Brazil, Argentina, Paraguay, & Uruguay.
- *Ludwigia* is spread through hydorchory, shoot fragments, seed capsules and other means
- There are lots of natural enemies for *Ludwigia* in its natural habitat. There is potential for bio-control use in the states.
- *Ludwigia* was brought to the U.S. via plant trade as an ornamental. Some other vectors include water gardens, constructed wetlands, aquatic dumping, boats and birds.
- The earliest population of *L. hexapetala* on the PNW coast was recorded in Corvallis, OR in 1949
- *Ludwigia* can grow in many different flow regimes, and can be dry for part of the year.
- *Ludwigia* can be detrimental to fish since it uses up dissolved oxygen while decomposing, therefore reducing the oxygen available to fish. There are probably other impacts that are not confirmed at this time.
 - Outcompetes and reduces native plants

Russian River, CA Case Study

- The Russian River population exploded over a few years. The Willamette has potential to become this way; there are plenty of colonizable habitats.
- West Lateral Canal on the Russian River
 - Year 1 – Rake, Dewater, Spray Glyphosate
 - Year 2 – Spot spray
 - Tried 5 slightly different treatments
 - Results showed that spot spraying made all the difference
 - Rake with spray and spot spray works best
 - Disking works best in managed seasonal wetlands if it is done early (spring) when or before flowering

We should consider doing some immersed plant survey work on the Willamette, to see what else is there. We can treat other aquatic invasives concurrently.

Colusa NWR, CA – Glenn Colusa Irrigation District Case Study

- Seasonally flooded wetland, with lots of *Ludwigia*. Wanted to minimize chemical control
- Used sheep to control *Ludwigia*, followed by disking with a rake attachment.
- Saw good control
- 34 plant taxa emerged after treatments
 - Plan for long term management due to seed bank recruitment; expect secondary invaders!

Smith Bybee Lakes Natural Area, Portland, OR

- Treatment of *L. peploides ssp. montevidensis*
- Control using 2% triclopyr and 2% glyphosate
 - Ended up using 3% glyphosate with is too hot for this species, though would work for *L. hexapetala*
 - Triclopyr tends to burn the leaves without translocating herbicide, so is not very effective
- Study set up, but fell through

Bio-Controls for *Ludwigia*

- *Altica litigate* (*Coleoptera chrysomelidae*), water flea beetle
 - In nature, these beetles attack the plants in the late season, so they are not very effective in reducing biomass

Delevan NWR, CA, Gray Lodge Wildlife Area

- Found water flea beetle feeding on *L. hexapetala* and *L. peploides*
 - Stems only had minor damage
 - Beetle larvae feed on the leaves

Peconic River, NY

- Found *L. peploides* in 2003, and was fully established by 2006
- Eradicated *Ludwigia* through aggressive hand pulling with volunteers (438 volunteer, 2,360 hrs.); no herbicide used
- None found during 2009 Paddle to River event
- Installed dump stations for boaters to deposit biomass

Delta Ponds, Eugene, OR, Open Space Division

- Lauri Holts – *Ludwigia* Control Project

- 5 year plan, OSWB grant
- Treatment started in June 2013
- Invasion- park ponds, gravel pits and back channels
- Reconnected side channels to main stem before treating *Ludwigia*
- Eugene has the furthest upstream record on the Willamette, and is known down to Yamhill county
- Project area is 43.5 acres
- Photo plot monitoring; Experimental framework is important
- Control methods
 - Manual removal
 - Chemical control (2.75 acres of shoreline & 7.5 acres of infested habitat)
 - 2-3% of aquatic glyphosate, Agridex surfactant (crop oil), and low toxicity indicator dye
 - Foliar application with backpack sprayer and hip waders
 - Custom spray rig w/ high capacity tank; high pressure hose mounted on a reel, powered by a remote control motor

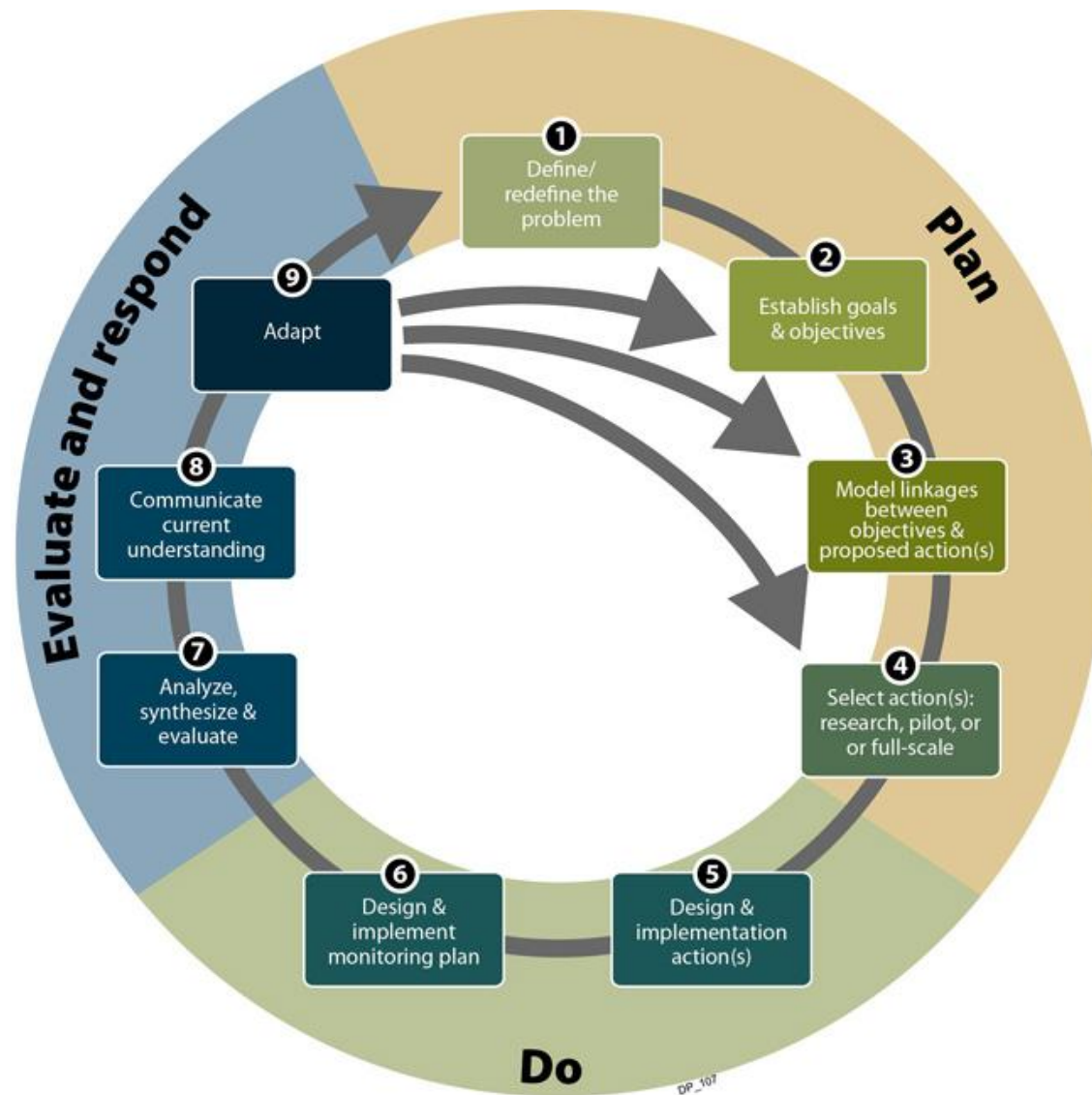
Tips for Removing *Ludwigia*

- Manually remove weeds before flowering (April-May), timing depends on area and conditions.
- Remove re-sprouts before flowering (June-July)
- Try to ensure the removal of all plant parts
- *Ludwigia* biomass increases through fall
- Lowest level of carbohydrate reserves in spring
- Effective at accumulating nutrients, so makes a rich compost
- Store plant material at a high temperature, far away from water
- Use aquatic glyphosate
- Use floating booms to trap plant fragments during mechanical and hand removal
 - Floating limno-barriers can be used to contain chemicals in water system (mostly used in lakes and ponds)
 - Sometimes local construction companies will loan these out

Mission Trails Regional Park

- 3% Aquamaster & Agridex surfactant
 - Foliar spray with gas piston pump
- Effective control

Adaptive Management Framework for Informed Weed Management Decision Making



1st Priority: Prevent weed invasions/ Educate

2nd Priority: Rapid Response to new invasions; control expanding weed patch boundaries

- When you select your site, use appropriate weed management methods, while considering the long-term goals (NOT "spray, pray, walk away")
- Comprehensive weed management planning; prevent downstream spread
 - Monitor, adjust, be persistent
- Include a site preparation/weed control component in restoration grants

Timing for *Ludwigia* treatment

- Best to treat prior to seed production, and formation of reproductive mats (spring manual, then late spring/early summer herbicide). Can spray while flowering (dropping petals), but want to catch it before the seed capsules have formed.
- Glyphosate must make direct contact with leaves; avoid silt
 - May want to spray leaves to wash them off prior to treatment

Ludwigia can survive in brackish water for 90+ days.

*When writing a grant proposal mention that prior to side channel restoration and redevelopment, *Ludwigia* should be removed since it will spread to the main channel.