

Mapping Conservation Priorities for Freshwater Ecosystems in Y2Y

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Freshwater Conservation Challenges

- Freshwater biota include a higher proportion of declining and endangered taxa than terrestrial biota
- Threats include changes in water quality and flow due to land and water use, fragmentation and loss of connectivity due to dams and other barriers, and introduction and proliferation of nonnative species

Freshwater Conservation Challenges, cont.

- Watersheds and floodplains are intimately linked with the surface waters they surround
- Aquatic conservation depends on maintaining or restoring the integrity of land-water linkages

“Protect the best, restore the rest”

Doppelt et al. 1993

Entering the Watershed

**How do we know
where The Best is?**

Threatened species: Bull trout, *Confluentus salvelinus*



Photo:UBC

Invading species: northern pike,
Esox lucius

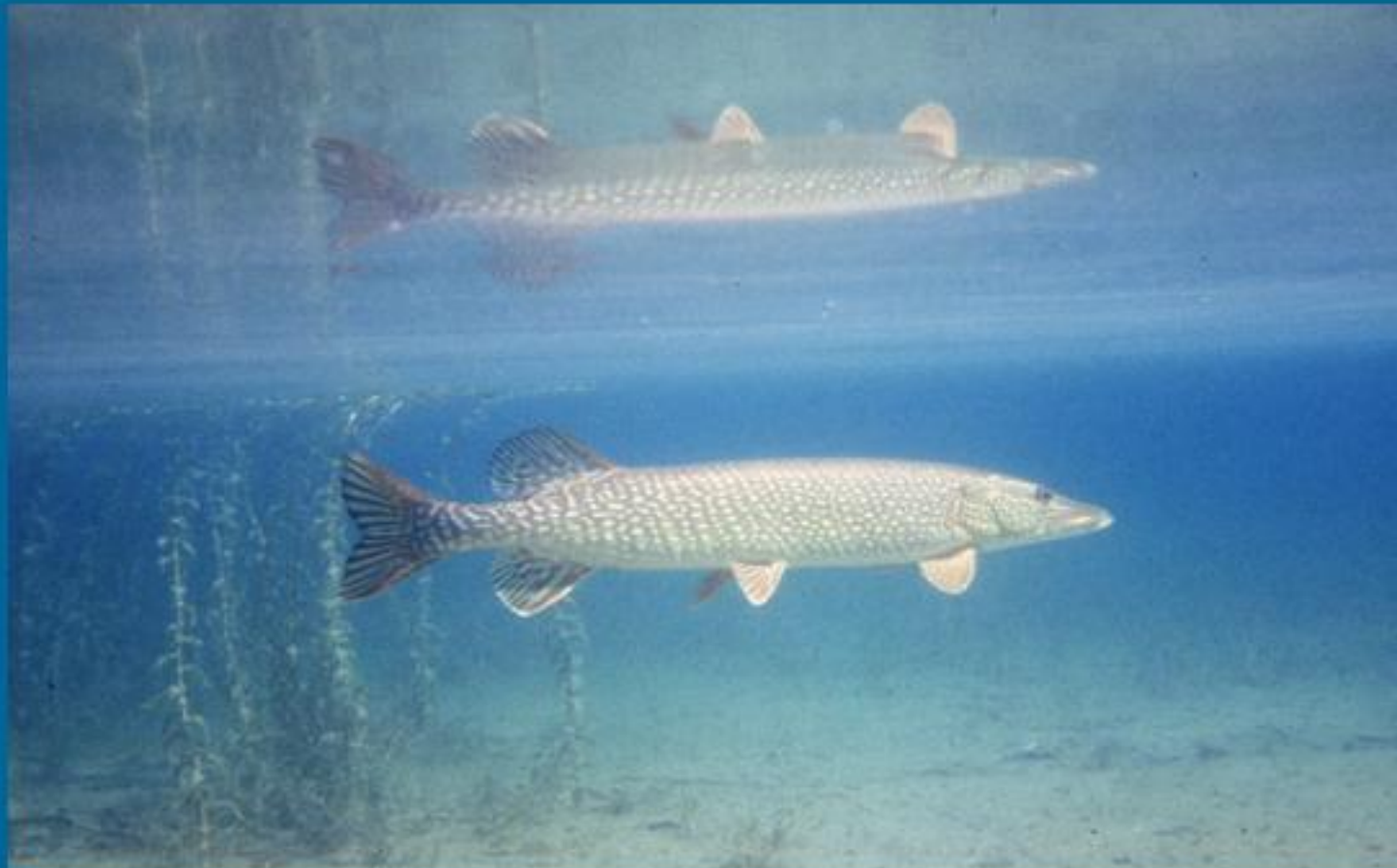


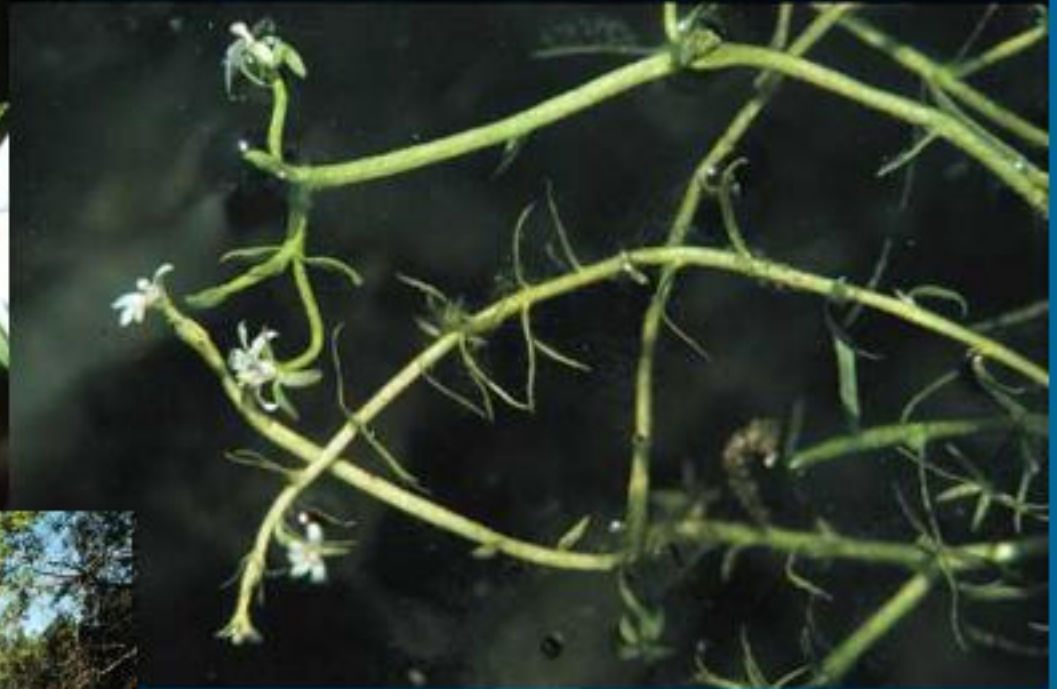
Photo: UBC

Species of concern: tailed frog,
Ascaphus truei



Photos: C. Frissell, PRC, W. Flaxington, BDL Project

Threatened species: Water howellia, *Howellis aquatilis*



Photos: ID F&G

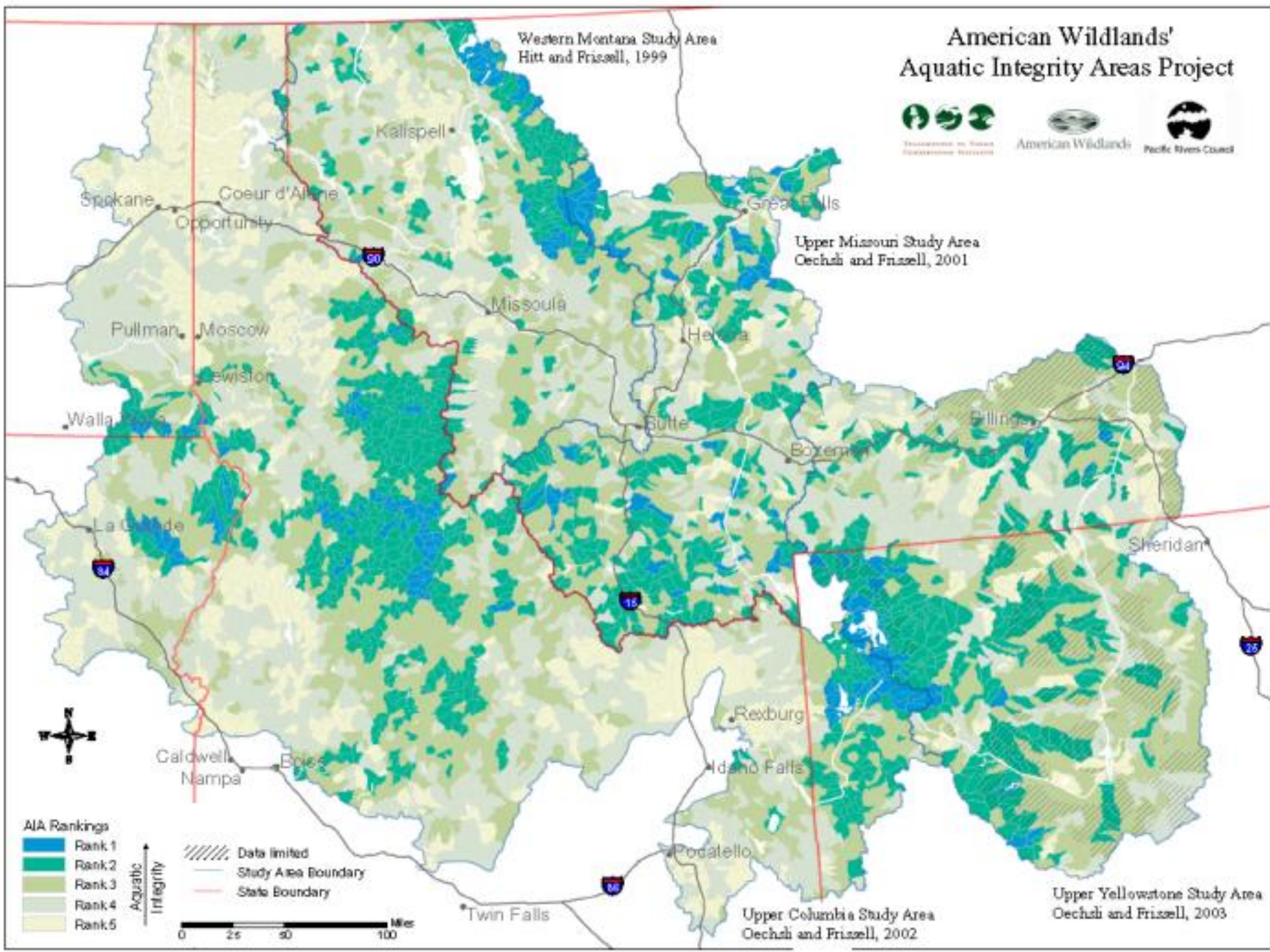
Aquatic Integrity Area mapping

- Chris Frissell, Lauren Oechsli
- Y2Y Science Program
- Assessment and Mapping of 6th code subwatersheds, ca, 20,000 acres, spanning headwaters to valley floor
- Relative rank of all areas across study area in terms of ecological conditions and aquatic biointegrity

Aquatic Integrity Area Model

- Watershed condition: Percent roadless area
- Aquatic Biointegrity: Fish species, no. of native species v. no. nonnative, evidence of genetic purity
- Fish stocking: No. stocking events (MT only)
- Other taxa: Natural Heritage plant and animal occurrences

American Wildlands' Aquatic Integrity Areas Project



Western Montana Study Area
Hitt and Friszell, 1999

Upper Missouri Study Area
Oechli and Friszell, 2001

Upper Columbia Study Area
Oechli and Friszell, 2002

Upper Yellowstone Study Area
Oechli and Friszell, 2003

- AIA Rankings**
- Rank 1
 - Rank 2
 - Rank 3
 - Rank 4
 - Rank 5

Aquatic Integrity

- Data limited
- Study Area Boundary
- State Boundary



River Integrity Area Mapping

*Than Hitt, Len Broberg, Chris Frissell, Lauren
Oechsli*

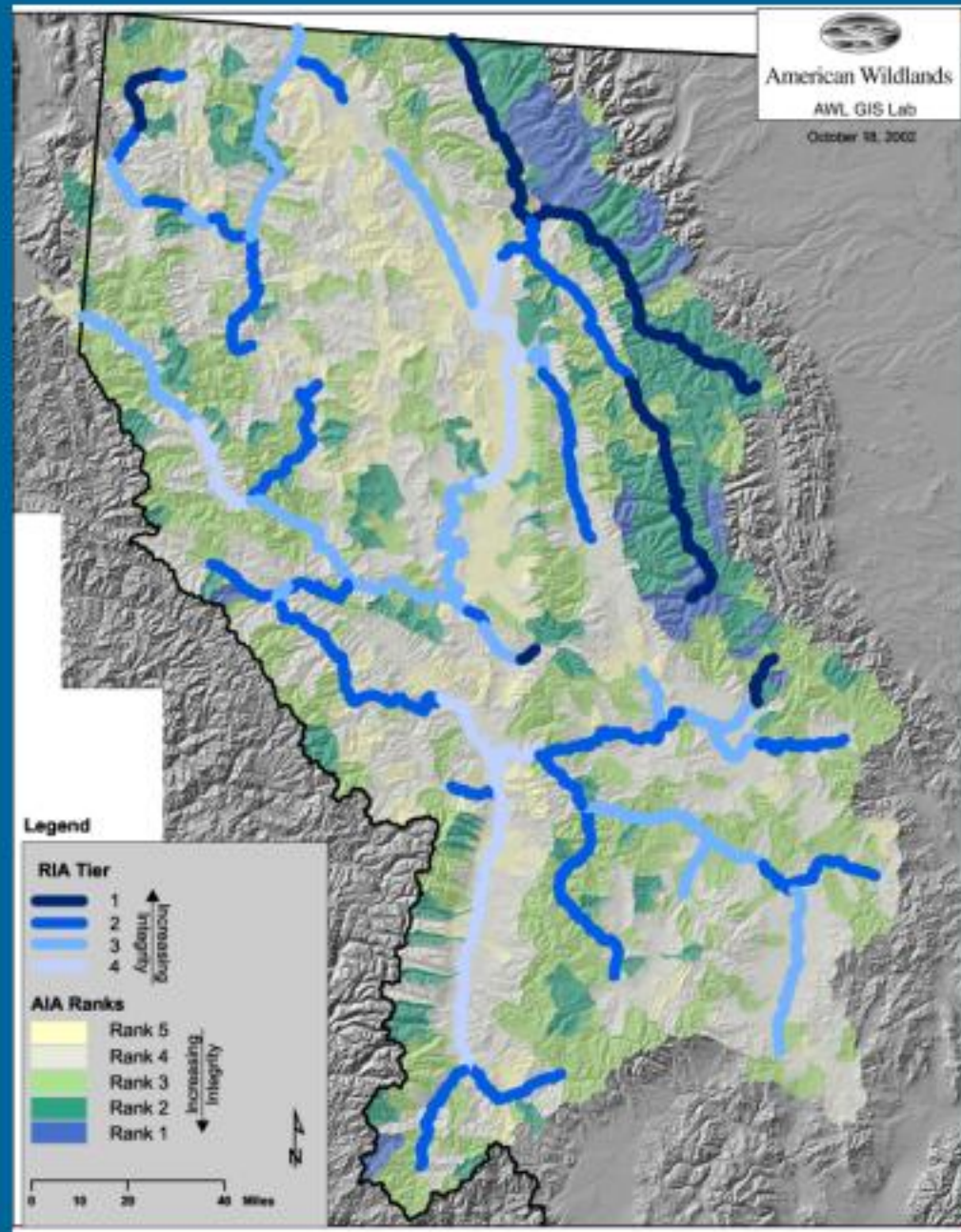
Wilburforce Y2Y Science Program

- Western Montana Pilot Study, 2002
- Upper Missouri Basin, 2003-4
- Delineation of river segments
- Compilation and relation of spatial data
- Integrity model calculation and mapping

RIA Metrics:

- Fluvial connectivity:
 - No. headwater dams, distance to nearest dam, upstream cumulative impounded area
- Fish assemblage integrity
 - No. nonnative (introduced or invading) spp
- Floodplain condition
 - 404 permits, 303d listing, road density, percent in ag in floodplain zone
- Headwater tributary condition
 - Average AIA scores, upstream area and direct link to segment

*River
Integrity
Areas,
Western
Montana*



Conclusions: Flathead River Basin

- The North, Middle, and South Forks of the Flathead R., together with the Swan R., are a network of biological strongholds of regional and national importance
- The Flathead enjoys a relatively high degree of protection for many, but not all of its most valuable watersheds and river segments
- The regional method short-shrifts the Swan Basin
Issues include spatial resolution, hydro linkage of wetlands with watershed units, ecological resilience
- Higher-resolution analysis is needed to produce a biologically robust conservation area design