

WHAT'S IN THE RIVER? Columbia River Nonindigenous Species Surveys

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Columbia River Aquatic Nonindigenous Species Surveys

- Identified in the National Invasive Species Act of 1996 (NISA)
- Developed and led collaboratively by researchers at Portland State University,
- LCRANS implemented in Fall 2001
- MCRANS Fall 2005

Survey Areas

- Lower River:
 - Mouth to Bonneville
 - Incl. tidal portion of Willamette
- Middle River:
 - Bonneville to Priest Rapids
 - Lower Snake



Objectives

Characterization non-native species in the Columbia River provides a baseline for:

- Calculating the rates and types of species introductions to the river,
- Evaluating the efficacy of ballast water regulations,
- Contributing new information to ongoing regional ANS studies



Project Structure

- Literature Reviews
- Field Surveys
- Final Reports
- Research Recommendations



Results

- At least 82 nonnative species in the lower Columbia River
 - 54 nonnative species collected by survey
 - 27 others reported in the literature and validated by local and regional experts
- At least 51 nonnative species in the middle Columbia River
- In total at least 96 nonnative species in the Columbia River Basin



Nonindigenous Species

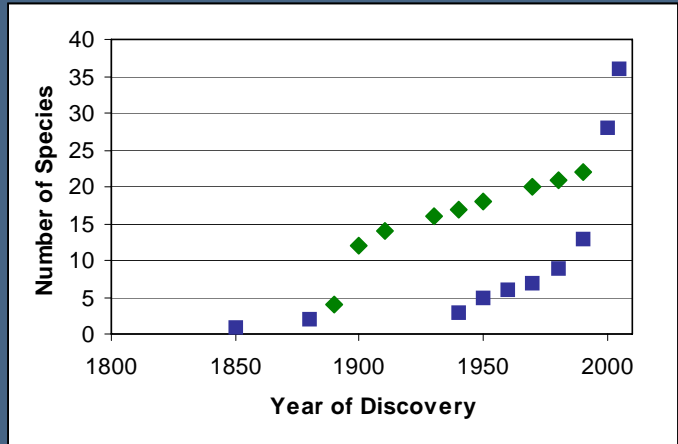
The majority of these species are fish, aquatic plants and crustaceans.



Rates of Invasion

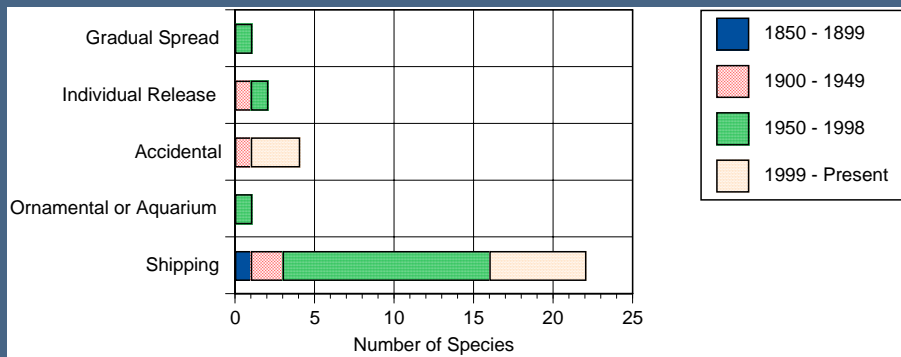
- A new introduced species was discovered in the lower Columbia about every five years between 1880 and 1970
- A new invertebrate species was discovered about every five months since 1995.
- In contrast, the rate of fish introductions peaked in the 1950s with a decline in intentional fish introductions by both individuals and fish and game agencies.

Species Accumulation



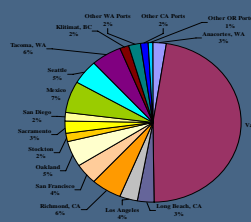
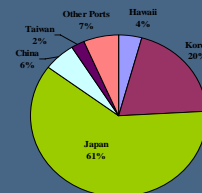
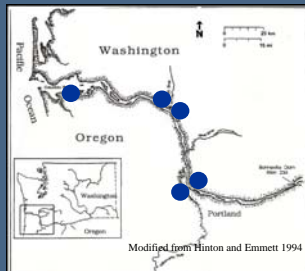
green = fishes blue= invertebrates

Invasion Mechanisms

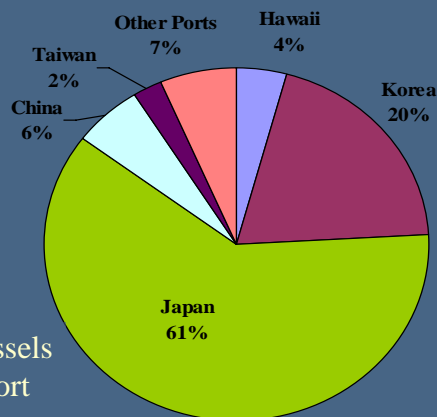


[Data shown only for the nonnative invertebrates]

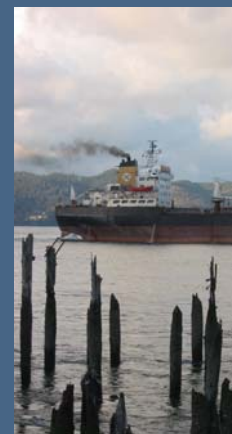
Shipping and Ballast Water in the Lower Columbia River



Ballast Water Sources

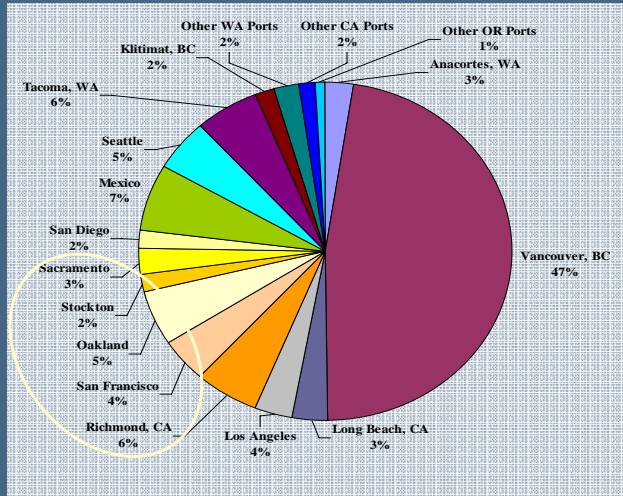


~ 90% of vessels have a last port of call in Asia

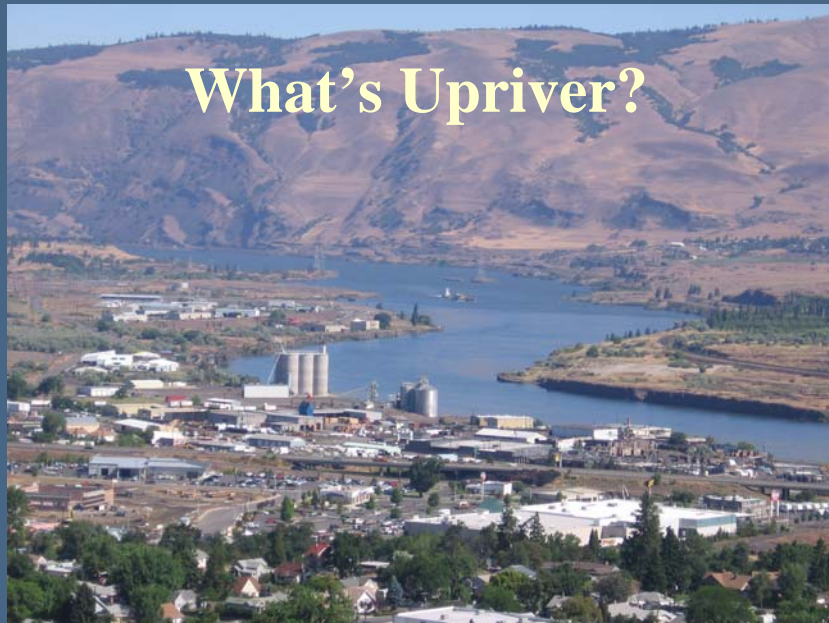


Ballast Water Sources

~20% last port of call was San Francisco Bay



What's Upriver?



Upriver Movement

- Asian Copepod - *Pseudodiaptomus forbesi*



- Nutria – *Myocaster coypus*

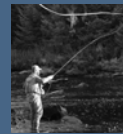


- Siberian Prawn – *Exopalaemon modestus*



Middle Columbia ANS

- ANS sources change with changing landscape
- Heavily modified habitat creates system of connected “lakes”
- Low species richness --- lower ANS diversity



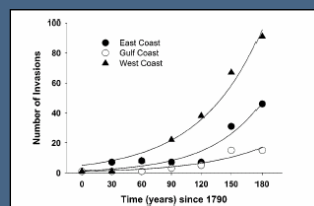
What's Next for the Columbia River Basin?



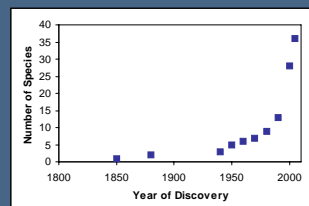
Increasing Rates of Invasion?

Global and local rates on the rise

- Continued research and monitoring may tell us what impacts ballast water management is having on the system

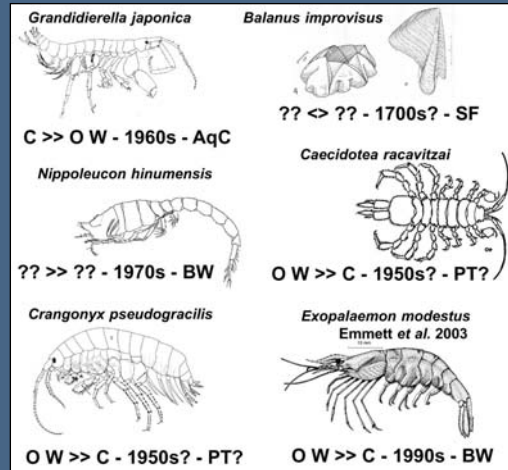


From Ruiz et al 2000



From LCRANS 2004

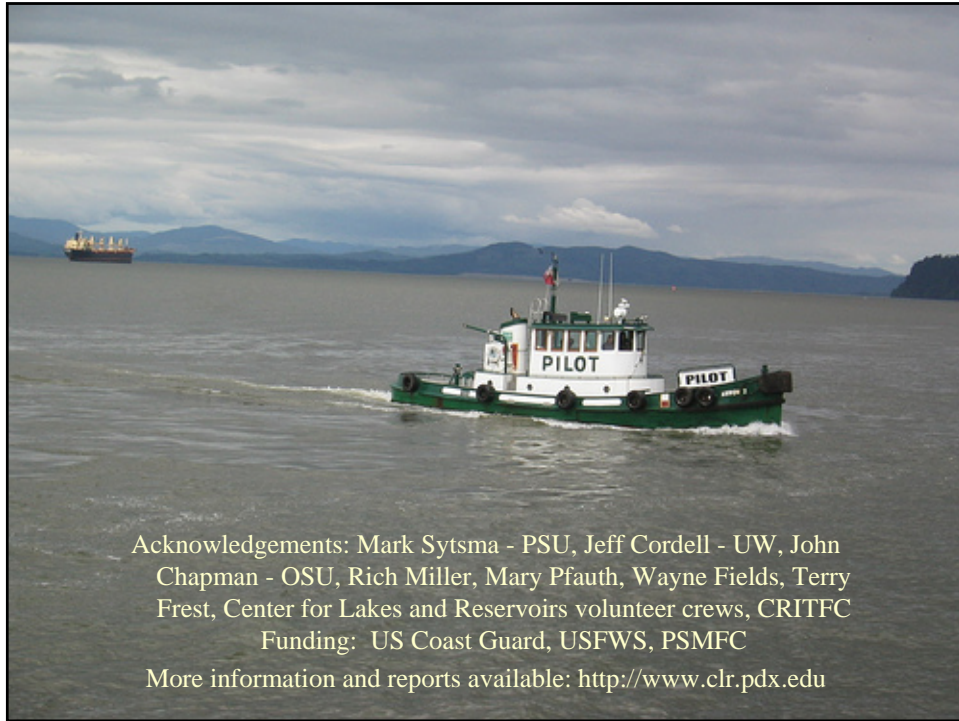
Directional Patterns of Spread?



Future Research Needs

- Risk evaluation
- Vector identification
- Invasion impacts, interactions and facilitation
- Ballast Water evaluation
- Monitoring





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More information and reports available: <http://www.clr.pdx.edu>