

A Regional Approach to Predicting and Managing Aquatic Invasive Species Pathways

An Initiative of West Coast Sea Grant Programs

The West Coast features some of the most diverse habitats in the nation and areas especially vulnerable to the ecological and economic threats of invasive species. From Canada to Mexico, non-native species continue to invade aquatic habitats. Once established, infestations are often permanent and may spread throughout the region. Effective management of aquatic invasive species (AIS) requires strong regional coordination and collaboration. Sea Grant is undertaking a Regional Evaluative Approach (REAP) to predict the risks of AIS introduction and spread and to develop and test AIS education and management strategies.

Pathways: AIS spread in a variety of ways depending upon species, environment and method of introduction (pathway). Our project examines three primary pathways for invasions: classroom use of organisms, (the **schools** pathway); outdoor **recreation**, and **water conveyance systems**, (e.g., aqueducts). We will apply an innovative model developed by Oregon Sea Grant (see fig. 1) to evaluate pathway pressures and habitat suitability for predicting the relative vulnerability of our region to AIS, and estimate economic and ecological costs of specific AIS for each pathway:

- rusty crayfish for the **schools** pathway,
- New Zealand mudsnail and the tunicate *Didemnum vexillum* for the **recreation** pathway, and
- quagga and zebra mussels for the **water systems** pathway.

Management Strategies: As the model is adapted for different species, we will evaluate management strategies across the three West Coast states.

Schools obtain organisms, often non-native invasive species, from biological supply houses and pet stores for classroom education. To address this pathway, we will:

- Collaborate with formal and informal educators to develop and evaluate teacher trainings, classroom resources, and AIS awareness and prevention messages
- Develop activities and tools to address the roles of science curricula, biological supply houses and aquaria/pet suppliers
- Evaluate a regulatory approach to eliminate prohibited species in schools and replace them with native or non-invasive species
- Engage all partners in communicating the “do not release” message.

Recreation such as boating, fishing and hiking may unintentionally transport AIS to new water bodies on boat hulls, equipment, shoes or in compartments containing water. To address this pathway, we will:

- Develop audience-appropriate content to communicate findings for western regional AIS panel partners to use within their agencies and with their stakeholders
- Join the national “clean, drain, dry” campaign to engage ports, marinas and sporting groups



A 4th grade student at Franklin Elementary (Corvallis, Oregon) studies a rusty crayfish. The rusty crayfish, an invasive species, was ordered from a biological supply house to be used as part of a popular science curriculum.



The invasive red swamp crayfish (pictured above) is also used in classrooms as part of popular science curricula.

Right: Quagga mussels colonizing vegetation in a California reservoir are exposed after a water draw down. Photo by Carrie Culver.

Inset: Quagga mussel. Photo by Jeff Adams, WSG.



Right: The fast growing colonial tunicate *Didemnum vexillum* recently discovered in Coos Bay, Oregon.



Colonial tunicate *Didemnum vexillum* overgrowing a submerged tire in less than one growing season. Our project models the risk of invasion and the economics associated with species that are spread through similar pathways (e.g. recreation).



- Encourage these groups to communicate the “do not release” message
- Communicate with informal educators and offer education tool kits to those associated with recreational boating, fishing and hiking.

Water systems can carry quagga and zebra mussels as they transport water for use in homes, businesses and agriculture. To address this pathway, we will:

- Gather and synthesize information about AIS eradication/control strategies
- Develop information sheets describing eradication/control measures for quagga and zebra mussels in lakes, reservoirs and irrigation systems
- Conduct a workshop to prepare managers for implementing eradication/control strategies in small water bodies and irrigation systems.

Outcomes: This regional team approach spans programs and jurisdictions; incorporates the economic, ecological and cultural costs of invasions; and develops tools and educational strategies for AIS prevention and control. Using the model as a guide, we will work with stakeholders to evaluate, adapt and improve methods for addressing AIS associated with schools, recreational activities and aqueducts. The outcomes will be to reduce the risk of and impacts from AIS invasions resulting from these pathways by promoting early detection and response strategies that improve AIS management and achieve long-term, regional benefits.

For more information, contact Tania Siemens, Oregon Sea Grant Extension, tania.siemens@oregonstate.edu, 541.914.0701.



New Zealand Mudsnails. Photo credit, USGS.

Predicting potential risk of invasions in the Pacific NW from New Zealand Mudsnails (shaded colors -higher risk is associated with darker shading) compared to known infestations (circles) of mudsnails.

Figure 1. New Zealand mudsnails distribution.

