Chapter 18: Invasive and Non-native Species in the Lower Coos Watershed

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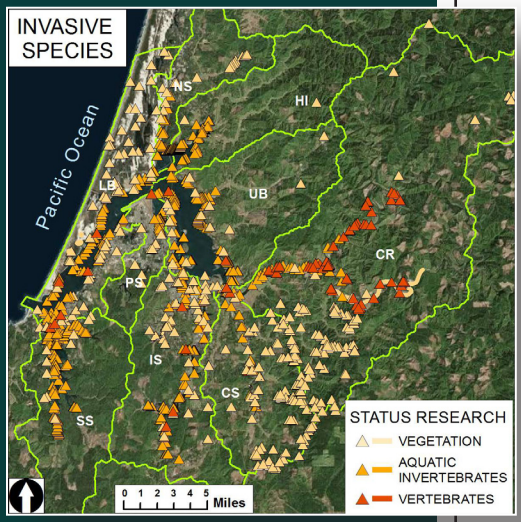
***Vegetation**: The lower Coos watershed supports many invasive plants such as European beachgrass which has significantly altered the Lower Bay subsystem.*

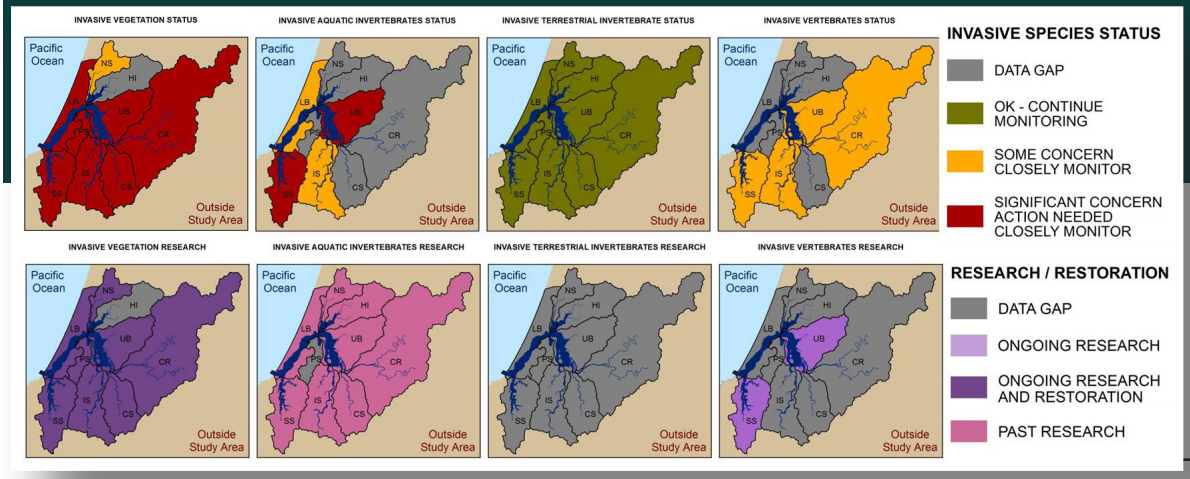
***Vertebrates**: Evidence indicates the local presence of large populations of invasive nutria, and small declining populations of non-native American shad and striped bass.*

***Terrestrial Invertebrates**: No invasive terrestrial invertebrate populations are currently established in the project area, though local forests are at risk of invasion.*

***Aquatic Invertebrates**: Over 60 non-native aquatic invertebrates species occur in the Coos estuary; additional invasions are likely. Despite the potential for significant ecological and economic effects, little is known about the status of most of these species.*



Subsystems: CR- Coos River CS- Catching Slough
HI- Haynes Inlet IS- Isthmus Slough LB- Lower Bay
NS- North Slough PS- Pony Slough SS- South Slough
UB- Upper Bay



Chapter 17: Invasive and Non-native species in the Coos estuary and the Lower Coos Watershed

This section includes the following data summaries: ***Vegetation, Aquatic Invertebrates, Terrestrial Invertebrates, and Vertebrates****— which describe invasive and other non-native species in the Coos estuary and lower Coos watershed.*

Non-Native and Invasive Vegetation: This data summary provides profiles of 58 invasive or non-native plant species that are either already established in, or are imminent threats to the project area. The narrative is separated into three sections – invasive or non-native plants that are: 1) Predicted threats – invasive vegetation not yet found in the project area but will be in the future; 2) Partially contained threats – invasive vegetation currently found only in isolated populations within the project area; and 3) Established threats – invasive vegetation found across much or all of the project area.

Local distribution of each species is discussed where information is available. Sources include invasive species response plans, which often include targeted monitoring efforts (e.g., Howard et al. 2007; ODF 2014a and 2014b) and statewide species profiling efforts (ODA 2014). Information from scientific publications (e.g., Posey 1988 and Hacker et al. 2012) and Online spatial databases (e.g., USDA 2015a) were also referenced. The vast majority of early non-native vegetation species detections have come from local biologists noticing unusual plants (e.g. information personally communicated by A. Brickner 2015).

A Background section summarizes the information available describing the local or regional environmental and economic effects of each non-native or invasive vegetation species.

Non-Native and Invasive Aquatic Invertebrates: This data summary includes information for 62 species of non-native aquatic invertebrates and algae that have become established in the lower Coos watershed (project area), as well as 12 high risk aquatic non-native species not currently locally established but considered imminent threats. Information sources are mainly comprehensive invasion histories compiled for several US West Coast locations, including Coos Bay (Carlton 1979, Cohen and Carlton 1995, Wonham and Carlton 2005). Species distribution information within the Coos estuary comes from fouling community surveys (Hewitt 1993, de Rivera et al. 2005) and species-specific studies (e.g. Berman and Carlton 1991, Jordan 1989).

A Background section summarizes what little information is available describing the local or regional environmental, economic and public health effects associated with non-native or invasive aquatic invertebrates.

Non-Native and Invasive Terrestrial Invertebrates: Information about invasive terrestrial vertebrates comes primarily from Online publications by the United States Department of Agriculture (2003a, 2003b, 2006, 2008, n.d.a, n.d.b), Oregon State University (2011), Purdue University (Sadof 2009), and United States Forest Service (n.d.). Estimates of the extent of damage caused by invasive insects come from peer-reviewed scientific literature (Kovacs et al. 2010; Nowak et al. 2001). These sources are supplemented by personal communication with invasive species specialists working in Oregon (e.g., Williams pers. comm. 2015).

Non-Native and Invasive Vertebrates: This data summary summarizes available information for American shad, striped bass and nutria – three ecologically or economically significant species. For each species, we describe what's known about their current status and distribution, any available population trends, and information on their effects on native species. Other issues associated with each species is also discussed (e.g., bacterial infections of American shad, unprecedented levels of hermaphroditism in striped bass) .

Pathogens: While numerous invasive pathogens (e.g., fungi or viruses) exist, they were not covered in this chapter due to time constraints. Several serious plant pathogens of concern to the project area have been covered in the "Terrestrial Vegetation in the Lower Coos Watershed" within the Vegetation Chapter. These include the Port Orford cedar root rot pathogen (*Phytophthora lateralis*), and the fungus that causes Swiss needle cast disease (*Phaeocryptopus gaeumannii*).

Data Gaps and Limitations

Non-Native and Invasive Vegetation: A general lack of comprehensive spatial information on non-native and invasive vegetation species impose limitations on our data summary. There are two main reasons for the limitations: 1) Few comprehensive surveys or monitoring programs exist that identify locations of non-native and invasive plants in the project area; and 2) Many spatial data that do exist come from anecdotal, often chance observations, which can introduce skewed impressions of species distributions.

Even though other spatial data exist, to simplify this data summary only maps with the most comprehensive monitoring information (e.g. gorse and purple loosestrife) or those with location information of early invaders (e.g., Spanish heath and old man's beard) were included.

Non-Native and Invasive Aquatic Invertebrates: Only a few systematic surveys of invasive aquatic invertebrate species have been undertaken in the project area (e.g. Laferriere et al. 2010, Davidson 2006 and 2008), therefore there are large data gaps in our understanding of their distribution in the Coos estuary. Likewise, knowledge of environmental and economic effects of many aquatic species is lacking.

Non-Native and Invasive Terrestrial Invertebrates: The available information about the threat of non-native and invasive insect introductions to the project area is based on projections from academic and government agency scientists, and local experts. However, since recent technological advances have resulted in the accelerated movement of goods and people across the globe, the spread of invasive insects has become increasingly difficult to monitor and predict (Hulme 2009). While these expert opinions represent the best available information, it's possible that unforeseen events (e.g., previously unaccounted for vectors of transport) could lead to the introduction of non-native and invasive species not currently anticipated by the experts. In some cases, species that pose the highest risks have appeared intermittently in Oregon (e.g., gypsy moths). Early detection rapid response programs have eliminated these threats before they have become established locally. However, if isolated populations have gone undetected, it's possible that additional, yet to be discovered threats may currently exist within or in proximity to the project area.

Non-Native and Invasive Vertebrates: Striped bass and American shad data come from long-term Oregon Department of Fish and Wildlife (ODFW) monitoring efforts whose priorities shifted over time (ODFW 2009 and 2013). ODFW initially sampled (starting in 1965) all fishes in the Coos system, but shifted its focus to American shad and striped bass beginning in the late 1970's. As American shad and striped bass populations declined, ODFW's long-term monitoring focus shifted in 2006 to Chinook salmon. American shad and striped bass (along with other fishes) are still identified and counted during Chinook sampling. But American shad and striped bass population and distribution data should only be considered comprehensive between the late 1970's and 2006.

There are additional limitations to the American shad and striped bass data in the sampling methods used. Seining methods have remained standard over the years, but fish identification varies by staff abilities. In addition, the seining effort was not identical in all years (some sites were missed— especially after the sampling focus shifted to Chinook) and during some years sampling was skipped altogether. Finally, seining methods may have inadvertently introduced bias into the sampling since seining is not effective at capturing all fish (e.g., larger more mobile fish species).

Finally, descriptions of the health of American shad and striped bass rely on older information from the primary literature (e.g., Carlton 1989), and some theses (e.g., Anderson 1985).

Nutria data are limited as no standard protocols have been adopted to assess nutria distribution or abundance in Oregon. Sheffers and Sytsma (2007) used district ODFW wildlife biologists' best estimates to create a relative nutria density distribution map for Oregon (Figure 2 in the data summary). Although these scientists have an intimate knowledge of the watersheds in which they work, they

were not always able to estimate relative nutria densities, leaving a large number of sub-watersheds unrepresented. Since these were judgment calls based on best professional knowledge, conclusions based on this map should be used with caution.

Comprehensive nutria density and distribution data are lacking for the project area and for Oregon in general, despite anecdotal evidence suggesting the local presence of relatively large sustaining populations and structural damage to local marsh habitats and human infrastructure.

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