Invasive and Non-native Vertebrates in the Lower Coos Watershed

CLW DATA SOURCE

Summary

- *Monitoring of striped bass and American shad in the Coos estuary have largely been suspended since populations of both non-native fishes has sharply declined since their height in the 1940s and 1950's.*
- *Invasive nutria cause substantial economic and ecological harm to coastal communities. All indications suggest populations are strong in the project area.*

Striped bass

Nutria

Evaluation

Available evidence suggests that sizable populations of striped bass and American shad no longer occur in the Coos estuary.

Evaluation

More data are needed to fully evaluate local nutria status. But available evidence suggests local populations are strong.

! DATA GAP

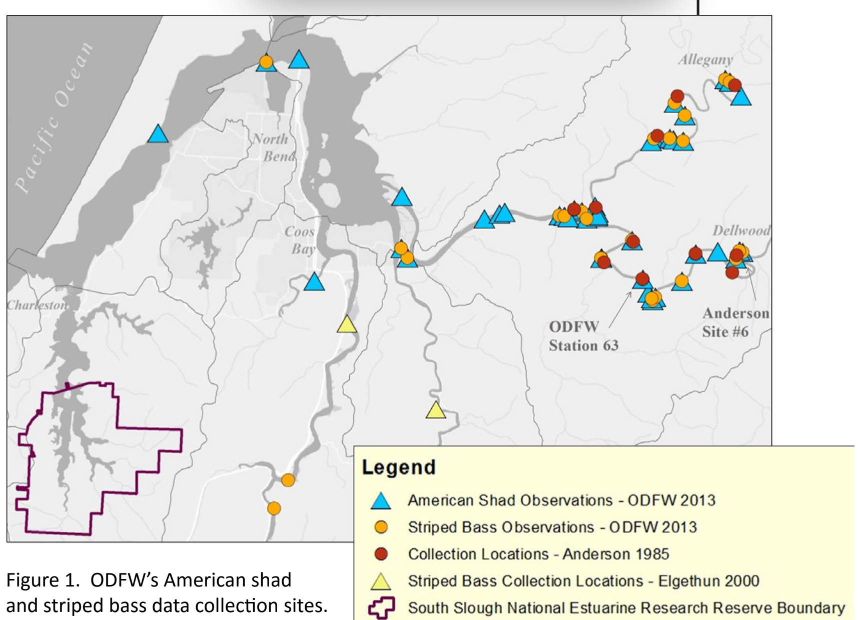

Figure 1. ODFW's American shad and striped bass data collection sites. Figure shows fewer sites than were actually sampled since not all ODFW sites included lat/long information.

What's Happening?

This data summary describes available information regarding the three most economically and ecologically important non-native vertebrate species found in the project area: two fish species, American shad (*Alosa sapidissima*) and striped bass (*Morone saxatilis*), and one large rodent, nutria (Myocastor coypus).

<u>American shad</u>
<u>*Alosa sapidissima*</u>
The Coos basin once supported major yearly runs of American shad each spring; large enough to support a commercial fishery in southwestern Oregon (Rothman 1968). Shad populations have now dwindled to the point that the run does not occur every year. Starting in the late 1950's, a large bacterial outbreak began infecting American shad populations during the spawning season in southern Oregon coastal streams (including the Coos watershed), causing large adult shad population losses (Rothman 1968). Rothman suggests this was the beginning of the sharp decline in American shad populations along the southern Oregon coast. A very small recreational fishery (several anglers/year) still exists for shad in the Coos watershed (G. Vonderohe, pers. com. 2015).

By contrast, in the Columbia River, American shad still represent the largest anadromous spawning run, outnumbering all native salmon (wild and hatchery combined), with spawning adults estimated at 4-8 million in recent years (Hasselman et. al. 2012b).

For nearly 30 years (1965-present), the Oregon Department of Fish and Wildlife (ODFW) conducted long-term fish monitoring, initially targeting both juvenile American shad and striped bass. Emphasis on those species ended in 2006 as their populations declined; monitoring efforts were re-focused to Chinook salmon populations. However, incidental catch data on the two non-native fishes are still recorded when caught. Due to the shift in focus, it should be noted that seining efforts were not identical in all years (e.g., sites were missed at different years).

According to the ODFW database (2013), American shad were found throughout the estuary, most often and in the highest numbers at Station 63 on the South Fork Coos River (Figure 1). They were most recently captured in 2008 at the same station. The age class most frequently captured was juveniles, often in exceedingly high numbers (500 – 1,000 in one seine was not uncommon, with a high of 2,500 juvenile shad caught in a single seine). Some (generally two or less per seine) intermediates and adults were also caught.

A related ODFW study (2009) monitored American shad and striped bass over-wintering populations in Catching and Isthmus Sloughs from 1979 to 1998. Researchers set overnight gillnets in late spring (April-June) at four sites in Catching and five sites in Isthmus Sloughs. Small numbers (<10) of shad were found each year.

Other American shad population information:

- Carlton (1989) listed shad as "abundant" in the South Slough National Estuarine Research Reserve (SSNERR)(Figure 1). Although no targeted studies have reassessed the SSNERR population since that report, it's likely the populations in South Slough have declined like the rest of the Coos estuary. This is supported by preliminary findings from a fish assemblage study of the South Slough estuary. Between July 2015 and June 2016 only 15 American shad have been caught.
- An older study by Anderson (1985) found that American shad larvae outnumbered striped bass larvae 10 to one, and that American shad juveniles outnumbered those of striped bass 335 to one in 1983, and 585 to one the following year in the Coos River (Figure 1).

American shad were intentionally introduced from their native US east coast habitats to the Pacific coast habitats in 1871 when 10,000 fry were released into the Sacramento River, CA (Hasselman 2012b). Subsequent introductions to the Sacramento River occurred over the next 10 years, totaling 574,000 fry (Hasselman 2012b).

Five years after their initial introduction to the Sacramento River, shad were being found in the Columbia River, (Hasselman 2012b). Numbers soon increased when nearly 1 million shad fry were transplanted to the Columbia River basin in the mid 1880's (Hasselman 2012b). By the late 1800's, shad were found throughout Oregon estuaries.

Background

***Non-native species** – also called "alien" species, this is a species that has been introduced (either intentionally or accidentally) to a location outside its native range.*

***Invasive species** – a non-native species that aggressively outcompetes native species or causes significant economic loss.*

Source: Clinton 1999

Like salmon, American shad are anadromous. They spend a year in the estuary as juveniles and adults spend 3-6 years in the ocean before returning to their natal stream to spawn (Pearcy and Fisher 2011). In the Coos estuary, adults return to spawn in May and June, and juveniles use the rivers and estuary as nursery habitat (August-November) before returning to the ocean (Monaco and Emmett 1990).
As a zooplankton-consuming species with a similar diet to Chinook salmon, American shad compete with native species for food and space (Hasselman 2012a). Large numbers of shad on the Columbia River have created migratory delays for native fish due to shad's dense accumulation at the base of hydroelectric dam fish ladders (Hasselman 2012a). In addition, shad are parasitic hosts that can inadvertently increase population densities and ranges of parasites that also infect native fish species (Hasselman 2012a). For example,

Hasselman (2012a) describes how a parasitic nematode was historically restricted to marine waters where its native herring host lived, until shad caused an ecological expansion of the parasite into freshwater systems.

On the other hand, American shad, can also alleviate avian and mammalian predation on native fish, including salmon, by virtue of the attractiveness of their population densities to predators (Hasselman 2012a).

Striped bass
Morone saxatilis
In 1914, some 35 years after striped bass were intentionally released in the San Francisco estuary as a commercial fish species imported from the US east coast, the first striped bass were caught in the Coos estuary. By the mid-1920's striped bass populations were robust enough to support a commercially fishery here (Parks 1978, Waldman et al. 1998). By 1945, adult striped bass populations peaked at an estimated 69,000 individuals in southwestern Oregon (Parks 1978, Waldman et al. 1998).

Since then, striped bass populations have declined drastically; fewer than 1,000 adults were counted during monitoring in the 1990's (Waldman et al. 1998).

According to Moyle (2002), San Francisco continues to maintain the highest striped bass breeding population on the west coast. In southwestern Oregon, striped bass populations are the greatest in the Umpqua and Coquille river estuaries (based on angler effort and catch data)(G. Vonderohe, pers. com. 2015).

Although they are considered an anadromous fish on the west coast, striped bass spend much of their life in the estuary. Striped bass are also opportunistic and voracious predators, feeding on juvenile salmon and other small native fish (e.g., anchovies) and invertebrates (e.g., bay shrimp)(Moyle 2002).

Striped bass are still a highly regarded sport fishing species in Oregon despite the commercial fishery having closed years ago.

During ODFW's long-term fish monitoring program (2013)(described above under American shad), striped bass (both hatchery and wild) were found throughout the estuary, most often and in the highest numbers at station 63 on the South Fork Coos River (Figure 1). Striped bass were most recently captured in 2000 at the same station. After 2000, no striped bass were caught, despite the same stations being sampled specifically for striped bass and shad until 2006. The age class most frequently captured was juveniles (sometimes by the hundreds), followed by intermediates and then adults.

Winter gillnetting by ODFW (also described above) found that overwintering striped bass in Catching and Isthmus Sloughs fluctuated by year and month captured. Striped bass generally represented a higher catch rate compared to American shad.

Anderson (1985) examined striped bass populations in the Coos River and estimated 912 wild striped bass in the Coos River system in 1983 and 1,003 in 1984. Anderson also found that American shad larvae outnumbered striped bass larvae 10 to one and American shad juveniles outnumbered striped bass 335 to one in 1983 and 585 to one in 1984. The majority of striped bass juveniles (hatchery and wild) were found in the South Fork Coos River – the majority of those at site #6 (Figure 1). No wild juveniles were found on the Millicoma River.

Curiously, the Coos population of striped bass has unprecedented high levels of hermaphroditism (one individual has both male and female reproductive organs), a condition that is exceedingly rare in striped bass populations in their native range. (Waldman et al. 1998). Waldman and colleagues (1998) speculate that this anomaly is likely due to a genetic bottleneck from the few founders that strayed to the Coos estuary from San Francisco Bay. This, along with subsequent declines in the Coos population caused rare genes (which expressed themselves through hermaphroditism) carried by the remaining individuals to pass on their genes to offspring, which subsequently caused the gene to spread throughout the population.

However, Elgethun and colleagues (2000) postulate that elevated levels of contaminants such as tributyltin accumulate in striped bass (a higher order predator), causing reproductive anomalies. Elgethun's team measured butyltin exposure of fish in the Coos estuary and found that striped bass caught in Catching Slough had elevated concentrations of tributyltin (110 µg/kg) and total butyltins (130 µg/kg)(Figure 1). Striped bass from Isthmus Slough were also measured and had lower concentrations the same sampling year (1992) at 40 µg/kg and 50 µg/kg respectively.

Nutria
Myocastor coypus

There is very little information currently available with which to estimate nutria status and trends in the project area. Resource managers understand from anecdotal observation and the studies described below that nutria continue to be a growing problem on Oregon's south coast. One contributing factor to nutria's spread especially in western Oregon is their preference for regions with mild winters such as the Oregon coast. According to LeBlanc (1994), summer densities in Oregon can range as high as 56 animals per acre.

The US Geological Survey's (USGS) Nonindigenous Aquatic Species program, consider nutria to be established in the following project area subsystems at least since 2007: Coos River, Isthmus Slough, Haynes Inlet, South Slough, Upper Bay, and in the Lower Bay along the North Spit (USGS 2015).

While there's currently no standard protocol used to assess nutria distribution or abundance in Oregon, Sheffels and Sytsma (2007) created a distribution map based on ODFW wildlife biologists' best estimates for nutria density at the 6th field HUC watershed scale (Figure 2). According to Sheffels and Sytsma, nutria densities in the project area subwatersheds are considered to be medium (11-100 individuals/subsystem) in North Slough, Haynes Inlet, Coos River, Catching Slough, Isthmus Slough, and South Slough subsystems and high (>100 individuals/subsystem) in Pony Slough, Upper Bay, and Lower Bay subsystems.

Witmer and Lewis (2001) describe nutria as a large semi-aquatic rodent, first introduced in Lincoln and Tillamook Counties, in the late 1930's for fur farming. Due to nutria fur farming's low economic returns, it was a short-lived industry with lasting consequences. Many failed nutria farmers released their nutria stock into the wild where they soon became naturalized. With the ability of female nutria to produce 2-3 litters per year and 4-5 offspring per litter, nutria have become

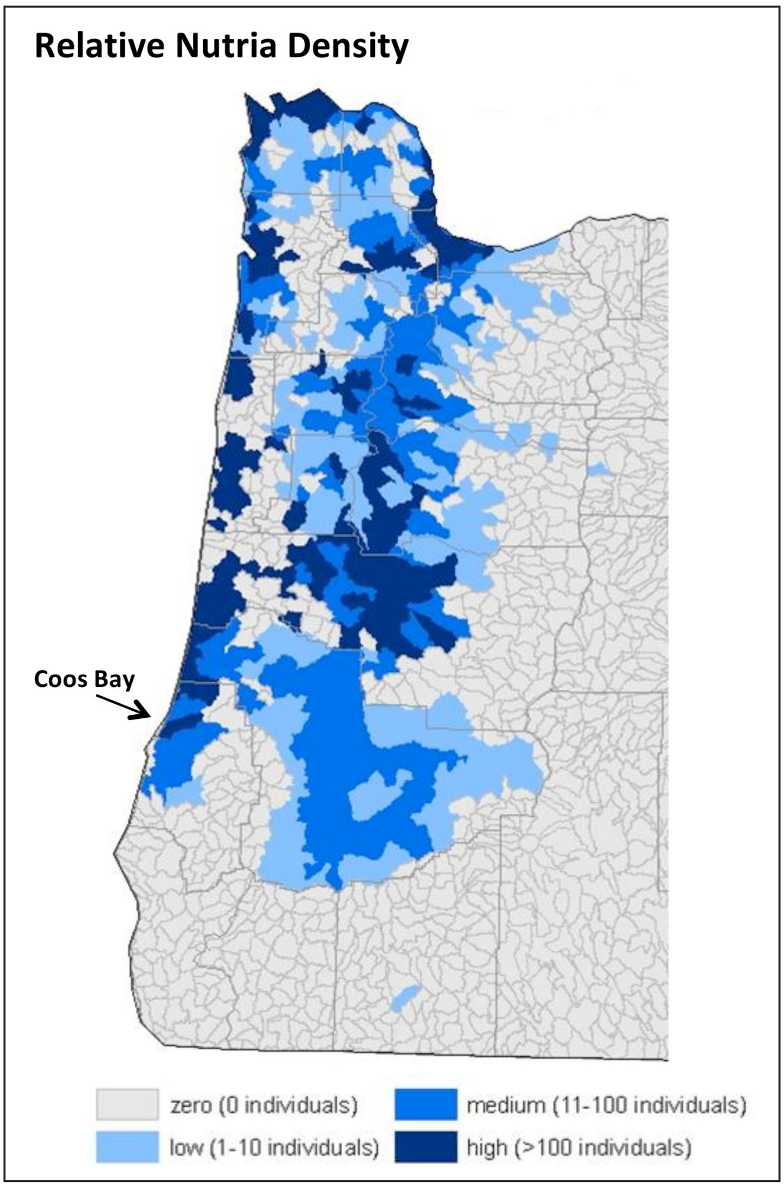

Figure 2. Estimated relative nutria densities in Oregon watersheds. Modified from: Sheffels and Sytsma 2007.

exceedingly abundant in the wild, especially in central and western Oregon (Sheffels and Sytsma 2007, Wentz 1971, citations within Sheffels 2013).

Nutria cause numerous ecological and socio-economic problems. They cause soil erosion, reduced water quality, damage to native flora, structural damage to channel banks and levees, and are carriers of diseases and parasites that can pass to humans, livestock and pets (e.g., rabies)(Witmer and Lewis 2001).

Nutria can denude vast areas of vegetation through foraging and creating grooming platforms, trails, and dens (citations within Witmer and Lewis 2001). Meyer (2006) found that nutria selectively feed on forbs (non-grass herbaceous vegetation) in coastal Oregon wetland habitats and have denuded large areas of both natural and restored tidal wetlands in South Slough (Cornu, pers. com. 2015).

Meyer also documented considerable bank erosion in areas with nutria populations compared to areas without nutria. The associated excess turbidity in adjacent waters, affecting fish species.

Perhaps most importantly to coastal economies, nutria significantly destabilize and ultimately destroy waterway structures (e.g., dikes and levees) when they burrow into banks (Sheffels and Sytsma 2007). These sometimes extensive burrows can extend up to 18' in length and 2' in diameter, and include complex interconnecting passages (Link 2004).

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