Estuary Species Profiles

Find a species by region:

Great Lakes

Black Crowned Night Heron (Nycticorax nycticorax)

Habitat – common in wetlands across North America, including saltmarshes, freshwater marshes, streams, rivers, lakes, ponds, lagoons, tidal mudflats, canals, reservoirs, and wet agricultural fields. They require aquatic habitat for their breeding range. In Ohio, this species is listed as threatened and is only able to breed on the Lake Erie Islands. They are currently being out competed for nesting areas by Double Crested Cormorants.

Adaptations – These largely nocturnal herons tend to hide in thick vegetation during the day. At night, they often give a distinctive, deep quawk call that reveals their presence. They are colonial nesters. The male chooses the nest site, and then turns to wooing a mate with displays that involve bowing and raising the long plume on his head. Both the male and the female incubate the eggs and brood the chicks greeting each other with calls and raised feathers when switching over duties.

Trophic level – These herons are secondary consumers, though they are generalists with their diet feeding on fish, leeches, earthworms, and aquatic and terrestrial insects. Rather than stabbing their prey, they grasp it in their bills. They generally feed at night, avoiding competition with other herons that use the same habitat.

Water quality tolerance – Loss of good habitat is thought to be an issue for these herons in Ohio, specifically breeding habitat. They require wetlands and islands for breeding.

Reserves present: Wells (ME), Great Bay (NH), Waquoit Bay (MA), Narragansett (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay-MD (MD), Chesapeake Bay-VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), GTM (FL), Rookery Bay (FL), Apalachicola (FL), Grand Bay (MS), Weeks Bay (AL), Mission Aransas (TX), Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR), Old Woman Creek (OH), Lake Superior (WI)

Sources

All About Birds

Black-Crowned Night-Heron

American Beaver (Castor canadensis)

Habitat – Beavers are found throughout North America with the exception of the California and Nevada deserts and parts of Utah and Arizona. They live in ponds, lakes, rivers, marshes, streams, and adjacent wetland areas. They are now present in every county in Ohio, where they had once been completely extirpated in the mid-1800's.

Life History – American Beaver is the largest rodent in North America, and the saying busy as a beaver quite accurate. These intelligent rodents are one of the few animals that can modify their habitat as they build watertight dams of sticks woven with reeds, branches and saplings, which are caulked with mud. They also create canals throughout their territory because they know it is easier to float a tree than to drag it across land. They build dome-like lodges that rise 6.5 feet or more and can reach widths of 39 feet. A lodge can have one or more underwater entrances and living quarter are located in the top of the lodge above the water line.

American Indians hunted beaver for meat and for their pelts. They began to trade pelts to Europeans, and the Europeans wanted fur more than any other resource. The beavers' thick, water repellent pelt was prized in Europe and America, especially for making tall, beaver felt hats. Beavers also have strong musk glands that produce castoreum that is used in making perfumes. They were so heavily trapped, that their numbers fell steadily between 1750 and 1800. They were extirpated from Ohio in 1830. It took over 100 years before evidence of beaver in Ohio was seen again. Their numbers have risen under protected status to the point where protection is not needed, and a regulated trapping season was established.

Adaptations – beavers form strong family bonds. They are social animals, and each group is up of one breeding pair, the year's kits and the surviving offspring from the previous year called yearlings. In the winter these family groups live together in their lodge and share food from the common stored food supply. Their family life is exceptionally stable and is based on a hierarchy in which adults dominate yearlings and yearlings dominate kits. They also allow other non-threatening species to share their lodge during the winter like muskrats and other small rodents. In Old Woman Creek, our beaver lodge is the center of town for activity. We have photographic evidence of almost every type of animal at the lodge; Bald Eagle, Coyote, Deer, Mink, Otter, Great Blue Heron, Raccoon, Mallard, and other Water Fowl.

Trophic Level – Beavers are herbivores, though their main food source, trees, makes up a large portion of the habitat. They love Willows and Cottonwoods especially, but we can see evidence of them taste testing all kinds of trees. The kits start out with greenery, move to sticks and then to the big trees.

Water Quality Tolerance – Beavers can increase the water quality of an area by adding extra filters, i.e. their dams. The dams reduce sediments downstream, slow the pace of

water which in turn increases stream life and decreases flooding. They do require water deep enough to provide a zone of unfrozen water below winter ice.

Fun Fact – Beavers use their tail as support when standing, a rudder when swimming and a warning device for other beavers when slapped on the water. Fat also is stored in the tail to provide a beaver with energy during winter.

Reserves present: Hudson River (NY), Old Woman Creek (OH), Lake Superior (WI)

Sources

Beaver Castor canadensis

American Beaver

American Tail Beaver

Caribbean

Nassau Grouper (Epinephelus striatus)

1

Habitat -Found from inshore to about 330 feet (100 m) depth. Adults are generally found near shallow high-relief coral reefs and rocky bottoms. They are often found near caves or large overhangs. Juveniles (1 to 6 inches or 2.5 to 15 cm long) have been found in and around coral clumps covered with macroalgae (Laurencia spp.). Juvenile Nassau groupers also live in seagrass beds or mangrove habitats.

Adaptation - Aside from the spawning season, Nassau grouper are solitary, diurnal fish. Nassau groupers are frequent visitors to wrasse fish cleaning stations. At these stations, cleaner wrasse fish pick off parasites and dead tissues from the grouper's gills and body. Nassau grouper are ambush suction foragers. They lie and wait for prey, and then engulf the organism whole in a current of water by opening their mouth and quickly expanding their gill covers.

Trophic level - The Nassau grouper is a top-level predator. Their diet is mostly fishes and crabs with specific species of prey, depending on how large the Nassau grouper is.

Life History - Unlike most groupers, Nassau groupers have separate male and female sexes. However, protogynous hermaphroditism (female to male sex change which is

common in other grouper species) has not been disproved. Nassau grouper are known to assemble in very large numbers (a few dozen to 100,000 individuals) at temporary, site-specific areas each year to spawn. This spawning period is presumably cued by temperature and moon (new) phase. They spawn into open water and the larvae float in the plankton, until ready to settle in estuary or nearshore habitats.They can live up to 29 years, and reach a maximum size of about 39 inches (100 cm) and 55 pounds (25 kg).

Tolerances:

- Water Temperature: species occurs in water 23 °C or greater, spawning occurs in temps from 24 to 27 °C
- Turbidity: generally, occur in clear water but captive specimens tolerant of poor water quality and turbidity
- Salinity: > 30 ppt in natural habitat, but one captive individual known to tolerate low salinity
- Dissolved Oxygen: high in natural habitat

Reserves present: Guano Tolomato Matanzas (FL), Jobos Bay (PR), and Rookery Bay (FL)

Sources and Credits

Gulf of Mexico

Spotted Seatrout (*Cynoscion nebulosus*)

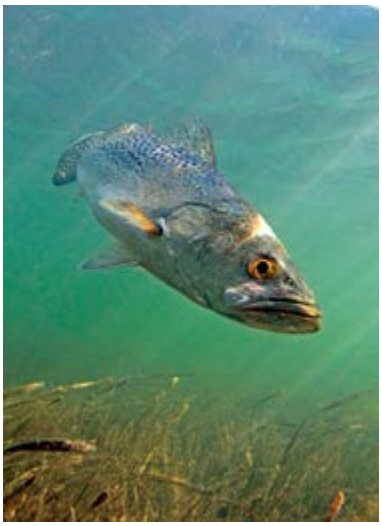


Photo credit: UTMSI. Photographer: *Evan D'Alessandro*

Habitat- Coastal waters in the western Atlantic from New York to southern Florida and southern Gulf of Mexico. Spotted Seatrout prefer shallow brackish to marine waters, such as bay and estuarine habitats with seagrass beds, sandy bottoms, oyster reefs, and jetties. They can be found in deeper bay or nearshore Gulf waters for part of the year as well, typically when water temperatures cool or salinity dramatically decreases in the shallow estuary waters.

Adaptation- Spotted Seatrout have distinct black spots on their back, fins and tail. These spots, along with their dark grey or green back and silvery-white belly make them hard to see in shallow bay or estuarine habitats. Spotted Seatrout are members of the croaker or drum family, and they make vocalizations as part of their courtship rituals and spawning.

Trophic Level- Spotted Seatrout are predators, feeding upon small crustaceans and fish when young and other fish as large adults. Predators of Spotted Seatrout include alligator gar, striped bass, tarpon, and humans. Spotted Seatrout, sometimes called the speckled trout, are a popular and economically important sport fish along the Gulf Coast.

Life History- Spotted Seatrout spend time foraging in shallow bays and estuaries during spring and summer. As water temperatures decline, they may move into deeper nearshore waters and the Gulf of Mexico. Spotted Seatrout reach sexual maturity at two to three years of age, commonly live to be nine or ten years of age and can reach

a length of 39 inches. Spotted Seatrout rarely migrate far from the estuary they were spawned.

Tolerances- Spotted Seatrout are adaptable and resilient to changes in their environment yet have been susceptible to overfishing in some areas of the Gulf Coast. Both Alabama and Texas have closed commercial fishing of the Spotted Seatrout to protect the fishery.

Reserves present: Waquoit Bay (MA), Narragansett (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay-MD (MD), Chesapeake Bay-VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), GTM (FL), Rookery Bay (FL), Apalachicola (FL), Grand Bay (MS), Weeks Bay (AL), Mission Aransas (TX)

Sources

Spotted Seatrout

Coastal Fisheries Research Program

FishBase

Fish Spawning Aggregations in the Gulf of Mexico

Whooping Crane (*Grus Americana*)

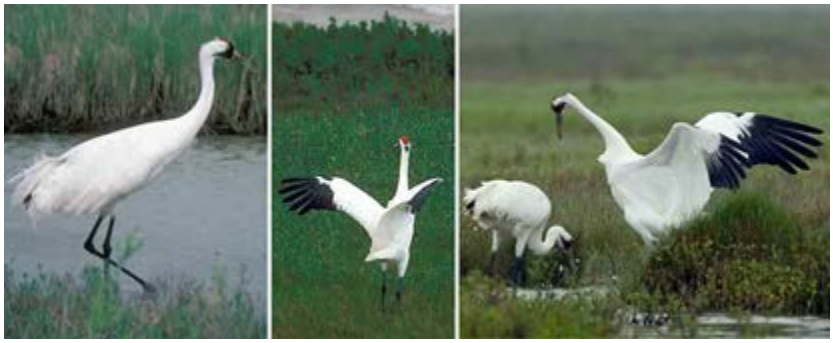


Photo: TPWD website

Habitat: Wetlands, marshes, wet prairies, and fields. Before their decline, all Whooping Cranes were believed to nest throughout the upper Midwest and northwestern Canada, and winter along the Gulf Coast of Texas. The wild migratory population summers in northwestern Canada and winters along the Texas coast and the reintroduced migratory population summers in Wisconsin and winters in the southeastern United States. A reintroduced non-migratory population resides in southern Louisiana.

Adaptation: Whooping Cranes are the tallest bird in North America. They stand approximately 5 ft (1.5m) tall and have a wingspan of 7.5 ft (2.3m.) Their long legs allow them to stand in tall estuary reeds and grasses, where they prefer to nest and forage. Their long neck and beak enable them to forage within estuary reeds, grasses and shallow waters

Trophic Level: Whooping Cranes are omnivores, eating crustaceans, small fish, insects, marsh plants, and grains.

Life History: Whooping Cranes can migrate more than 2,400 miles a year. The wild migratory flock breeds in northern Canada during the summer months and spend the winter on the Texas Coast in estuary marshes. Whooping Cranes mate for life, and can live up to 25 years in the wild. Whooping Cranes are known for their elaborate courtship displays that include leaping into the air, flapping their wings and making loud calls. Whooping Cranes are listed as an endangered species, nearly going extinct in the late 1930's. In 2018 the population in the Gulf Coast of Texas grew to just over 500 birds.

Tolerances: Loss or deterioration of critical wetland habitat, such as reduced freshwater inflow and loss of marsh grass, threaten Whooping Crane populations. Low genetic diversity is also a threat, since the population was once reduced to 15 birds in the late 1930's. Conservation efforts at the local, federal and international level have worked to protect Whooping Crane habitats and the remaining flocks.

Reserves present: Mission Aransas (TX)

Sources

National Wildlife Federation

Texas Park & Wildlife Department

International Crane Foundation

Southeastern United States

Eastern Oyster (*Crassostrea virginica*)

Habitat: Estuaries, salt marshes, mudflats, tidal bays and sounds. Oysters form intertidal reefs in the southeast that are habitat for at least 35 fish species and other animals like crabs, snails, and worms.

Adaptations: Oyster have two hinged shells. The oyster will close its shell at low tide, keeping its organs covered in saltwater when it is exposed to the air.

Trophic Level: Oysters and other bivalves are filter feeders. As they filter water over their gills, the oysters take in and eat algae, a kind of phytoplankton. The oyster spat or larvae are eaten by a wide variety of fish and invertebrates. Larger, mature oysters may be eaten by crabs, fish, starfish, worms, or birds.

Fun Fact: One oyster can filter up to 50 gallons of water a day, serving an important role as a natural water filter!

Water Quality Tolerances:

Temperature: larvae need >17.5 ºC; adults can survive -2 to 36 ºC

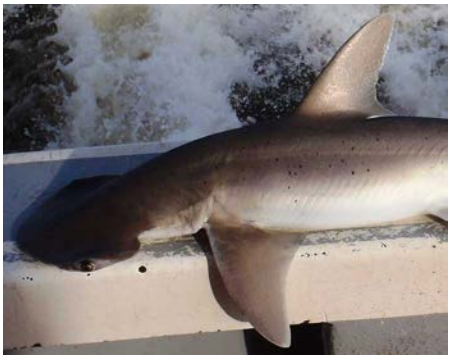
Salinity: 5 to 35 ppt

Dissolved Oxygen: >2 ppm

pH: 6.75-8.75

Reserves present: Wells, Great Bay, Waquoit Bay, Narragansett, Jacques Cousteau, Delaware, Chesapeake Bay-MD, Chesapeake Bay-VA, North Carolina, North Inlet-Winyah Bay, ACE Basin, Sapelo Island, GTM, Rookery Bay, Apalachicola, Grand Bay, Weeks Bay, Mission Aransas

Bonnethead Shark (*Sphyrna tiburo*)



Habitat: Sandy and muddy bottoms in shallow estuaries, often aggregated near oyster reefs or along sandy beach fronts.

Adaptation: Shovel-shaped head with eye on either side with their mouth on the bottom; countershaded: gray-brown dorsally and white ventrally

Trophic level: The bonnethead's primary food sources is blue crabs. Immature or smaller sharks may be prey to larger fish. In an estuary, the shark is the apex (top) predator. Some sharks, such as leopard sharks, may feed on worms, clams, and crabs. Other sharks, such as the bull shark, may hunt for other sharks, turtles, and birds, among other prey.

Life history: Relatively small shark up to 59 inches. They are placentally viviparous with a 5 month gestation period. Females move further into shallow water than males do, but scientists do not yet understand why. They live to be about 18 years old.

Tolerances:

Reserves present: Wells (ME), Great Bay (NH), Waquoit Bay (MA), Narragansett Bay (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay- MD (MD), Chesapeake Bay- VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), Guana Tolomato Matanzas (FL), Jobos Bay (PR), Rookery Bay (FL), Apalachicola (FL), Weeks Bay (AL), Grand Bay (MS), Mission-Aransas (TX)

Sources

Cartilaginous Fishes

Hammerhead Sharks Guild

Smooth Cordgrass (*Sporobolus alterniflorus*)

Habitat: Throughout the salt marshes of the Atlantic and Gulf coasts of the U.S., invasive along the Pacific

Adaptation: Spartina is the only grass with the adaptations needed to survive in the stressful low salt marsh environment: 1.Glands along the blades excrete excess salt, 2. A root-rhizome system acts as an anchor, holding the grass steady against high wave energy; as salinity decreases it shares space with other species; the stems and root mats of Spartina are highly effective at accumulating fine sediment, thus helping combat sea level rise;

Trophic level: Primary producer, decaying stalks and leaves form wrack and detritus that provides nutrients to the soil

Life history: Spartina reproduces in three ways: Seeds disperse by wind and tides, fragments of living plants break off and form new ones, rhizomes can sprout new plants

Tolerances: salinity: 0-35 ppt

Reserves present: Wells (ME), Great Bay (NH), Waquoit Bay (MA), Narragansett Bay (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay- MD (MD), Chesapeake Bay- VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), Guana Tolomato Matanzas (FL), Rookery Bay (FL), Apalachicola (FL), Weeks Bay (AL), Grand Bay (MS), Mission-Aransas (TX), Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA)

Sources

Smooth Cordgrass

Red Drum

Habitat: Red Drum is a common coastal and estuarine species found over a wide range of bottom types. Young (up to about 30 inches and 4 years of age) are found in shallow estuarine waters. Adults occur in shallow ocean areas and around the surf and jetties where they spawn in late summer. It is an important recreational gamefish. Also known as spottail bass, redfish, puppy drum, and channel bass.

Adaptation: Larval red drum use vertical migrations to ride high salinity tidal currents into tidal creeks and shallow salt marsh nursery habitats.

Trophic level: Predatory foragers on or near the bottom that feed on invertebrates and fishes. Larvae feed primarily on zooplankton and small invertebrates; juveniles forage inshore at marsh grass edges feeding on opossum shrimp, grass shrimp, juvenile spot, mud minnows, mud crabs, and fiddler crabs. Adults feed primarily on menhaden, spot, anchovies, blue crab, and speckled crab.

Fun Fact: Adults often feed at high tide in shallow estuary waters by “tailing” for fiddler and mud crabs and are exciting to catch on fly rods by sight casting. Scientists believe that the black spot near their tail helps fool predators into attacking the red drum's tail instead of their head, allowing the red drum to escape.

A tagged red drum originally released in 1997 near James Island, SC was recaptured in 2008 in Georgetown, SC at the Winyah jetties, then again in 2018 at the same location in Winyah Bay!

S.C. Dept. of Natural Resources

Marine Game Fish Tagging Program
217 Ft. Johnson Rd,
Charleston, SC 29422
(843) 953-9363

Fish History Report

Fish ID: **5401**

Type	Date	Old Tag	New Tag	Species	Len.	Wgt.	Angler	Capture Location
Initial tagging	02/27/1997		A033559	DRUM, RED (SPOTTAIL BASS)	35		MISCHKE, KEVIN	ELLIOT'S CUT/WAPPOO CUT, SC
Released - same tag	10/05/2008	A033559	A033559	DRUM, RED (SPOTTAIL BASS)	40	30	WOOD, WARREN	WINYAH BAY JETTIES, SC
Released - same tag	06/09/2018	A033559	A033559	DRUM, RED (SPOTTAIL BASS)	41	29	BALL, ANDY	WINYAH BAY JETTIES, SC

Since its initial tagging on 2/27/1997 this fish has been recaptured a total of 2 time(s), has had a tag for 7772 day(s), and has grown 6 inch(es) and pound(s).

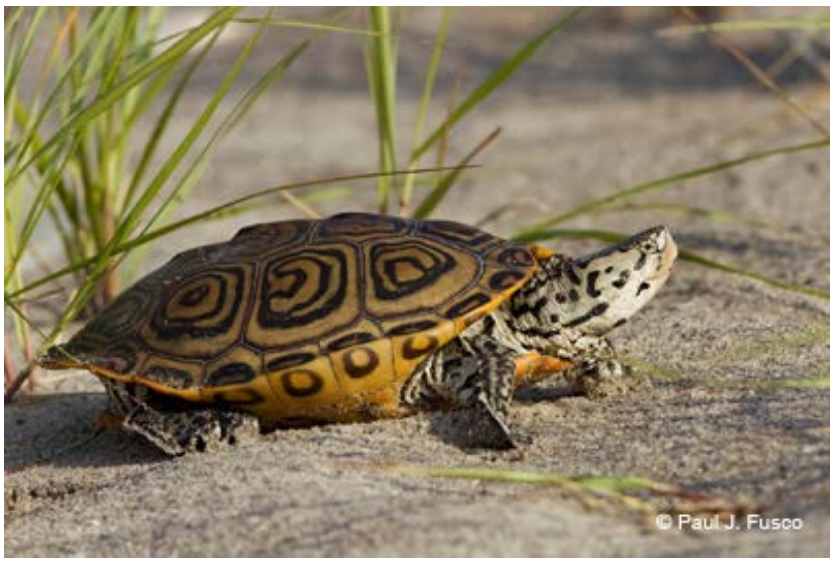
Differences in length and/or weight that appear to show a negative growth rate are the result of angler measuring technique. In some instances size is estimated while in others it is actually measured.
If there is no "Initial Tagging" under the "Type" column then we have not received the initial tag card yet. We remind our trained taggers to send in tag cards as soon as possible after the tag event. We apologize for the lack of information and will send you a follow up report once we receive this information

Life history: Adults mature by 3 – 5 years of age; approximate length at maturity: males – 28 inches, females – 33 inches; maximum age: ~38 years, but estimates as old as 60 years. Spawn during late summer and fall. Spawning aggregations occur near estuary inlets and passes along barrier island beaches. Males produce drumming sounds using muscular contractions to vibrate the swim bladder to attract females.

Tolerances: Young can tolerate low salinity water; adult salinity preference is 19-29 ppt.

Reserves present: Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay-MD (MD), Chesapeake Bay-VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), GTM (FL), Rookery Bay (FL), Apalachicola (FL), Grand Bay (MS), Weeks Bay (AL), Mission Aransas (TX)

Diamondback Terrapin (*Malaclemys terrapin*)



Habitat: Diamondback Terrapins primarily inhabit coastal marshes and tidal creeks. While diamondback terrapins can tolerate freshwater, they are believed to be the only turtle who makes a home exclusively in brackish water. Diamondbacks are very good swimmers and like to sunbathe on mudflats or sandbars throughout the day. During low tide, at night, and throughout winter the turtles may burrow in mud.

Life History: Diamondbacks mate from May-July, and their gestation period is around 60 days. Each clutch size is around 8-12 eggs, but some females may produce several clutches in a single year. The hatchlings emerge between August and October, and are completely on their own; some hatchlings, however, stay in their nest through the winter, before sourcing water in the spring. Eggs are normally buried in the sand, and most hatchlings proceed to the nearest body of water soon after emergence. Hatchlings are generally around 1.3" long, male Diamondback Terrapins are around 5.5", and females are around 9".

Adaptation: Diamondback Terrapins are mostly carnivorous, consuming snails, crabs, fish, worms, and clams for nutrients. In order to properly digest these mollusks and crustaceans, Diamondbacks have specially adapted ridges in their jaws to crush their food. Furthermore, their feet have extensive webbing to aid the turtles' semi-aquatic lifestyle.

Trophic Level: Carnivorous Diamondback Terrapins are predators to small mollusks and crustaceans. Natural predators of Diamondback Terrapins include alligators, sharks, otters, raptors, toads, fish, and crabs, depending on the size and strength of the animals.

Tolerances/Threats: Diamondback Terrapins — once so abundant in NC that they were considered a nuisance — are state and federally recognized as a species of Special Concern. This categorization is primarily a result of Diamondbacks getting caught in crab pots, but other reasons for population decline may include overharvesting, loss of habitat, road deaths, and climate change.

Reserves present: Waquoit Bay (MA), Narragansett (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay-MD (MD), Chesapeake Bay-VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), GTM (FL), Rookery Bay (FL), Apalachicola (FL), Grand Bay (MS), Weeks Bay (AL), Mission Aransas (TX)

Sources

Northern Diamonback Terrapin (image by Paul J. Fusco)

Diamond Terrapin

Wildlife

Diamondback Terrapin North Carolina Wildlife Profiles

IUCN Conservation Status

Reserves

Rookery Bay Diamondback Terrapin

2019 Terrapin Tally

Great Bay Terrapin Project

Mid-Atlantic

Atlantic Horseshoe Crab (*Limulus polyphemus*)

Photo Credit: David Schrichte

Habitat:

Adaptation:

Trophic level:

Life history:

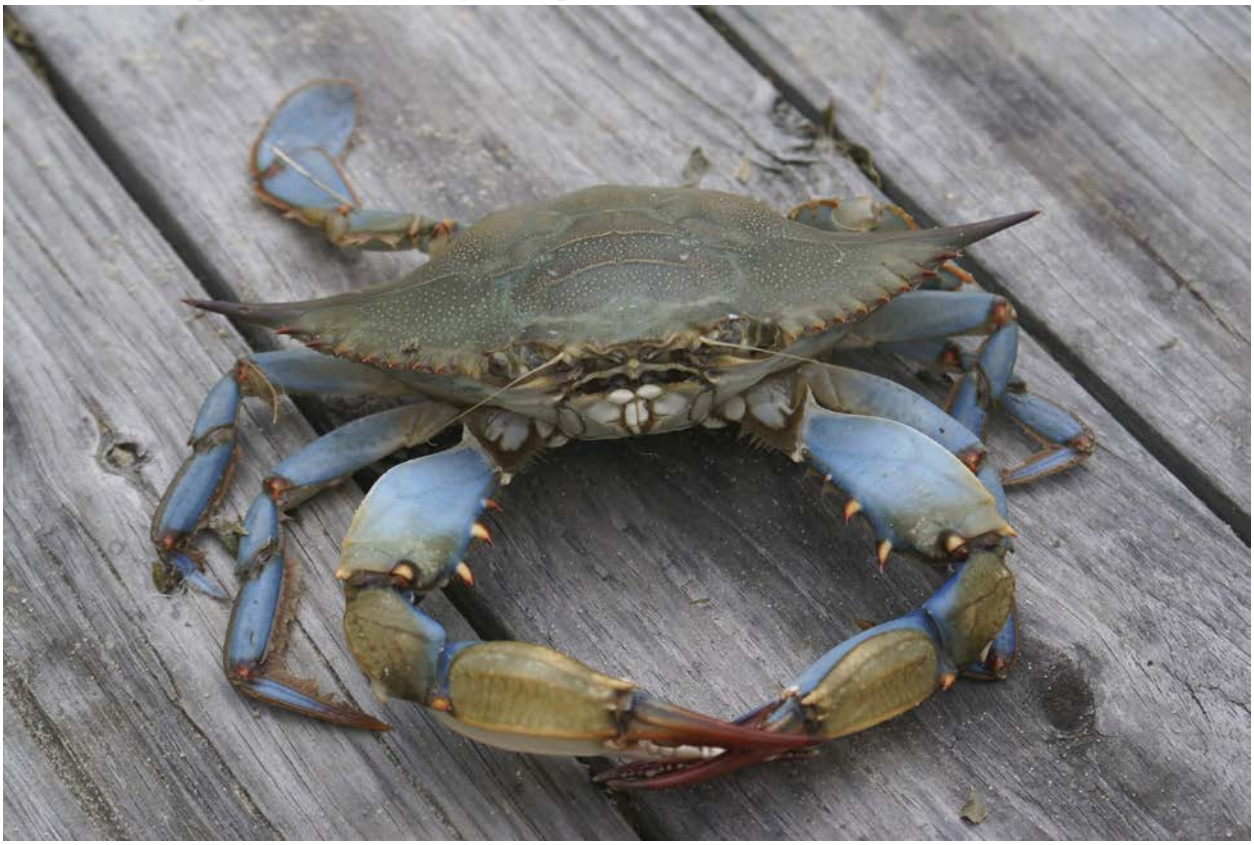
Tolerances:

Reserves present: Wells (ME), Great Bay (NH), Waquoit Bay (MA), Narragansett Bay (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay- MD (MD), Chesapeake Bay- VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), Guana Tolomato Matanzas (FL), Jobos Bay (PR)

The snowy egrets' best-known adaptation is their yellow feet, which they jiggle around underwater to attract prey. Like the whooping crane, the snowy egret's long legs and long toes help them wade through the salt marsh and walk on the mud.

• The marsh wren has excellent camouflage. Their behavior is also an adaptation that helps them avoid predators. They are very secretive and often remain hidden in dense stands of plants, so it is difficult for predators to find them.

Blue Crab (Callinectes sapidus)



Habitat: Estuaries, oceans, and seagrass beds

Adaptations: The blue crab's two back legs are paddles allowing them to swim through the water unlike most other crabs that can only walk. Blue crabs have sharp powerful claws for capturing prey and protecting themselves from

predators. That means that, if they can't fight or scare off their predator, they have the option of turning and quickly swimming away.

Trophic Level: Blue crabs are scavengers and predators. Blue crabs will go alone and eat dead animals or fish and they will even eat their own species when they are in their soft shell state. Blue crabs also eat plant material, oysters, clams, and anything that it can catch. Blue crabs are eaten by a lot of different predators like large fish, gulls, egret, herring and people.

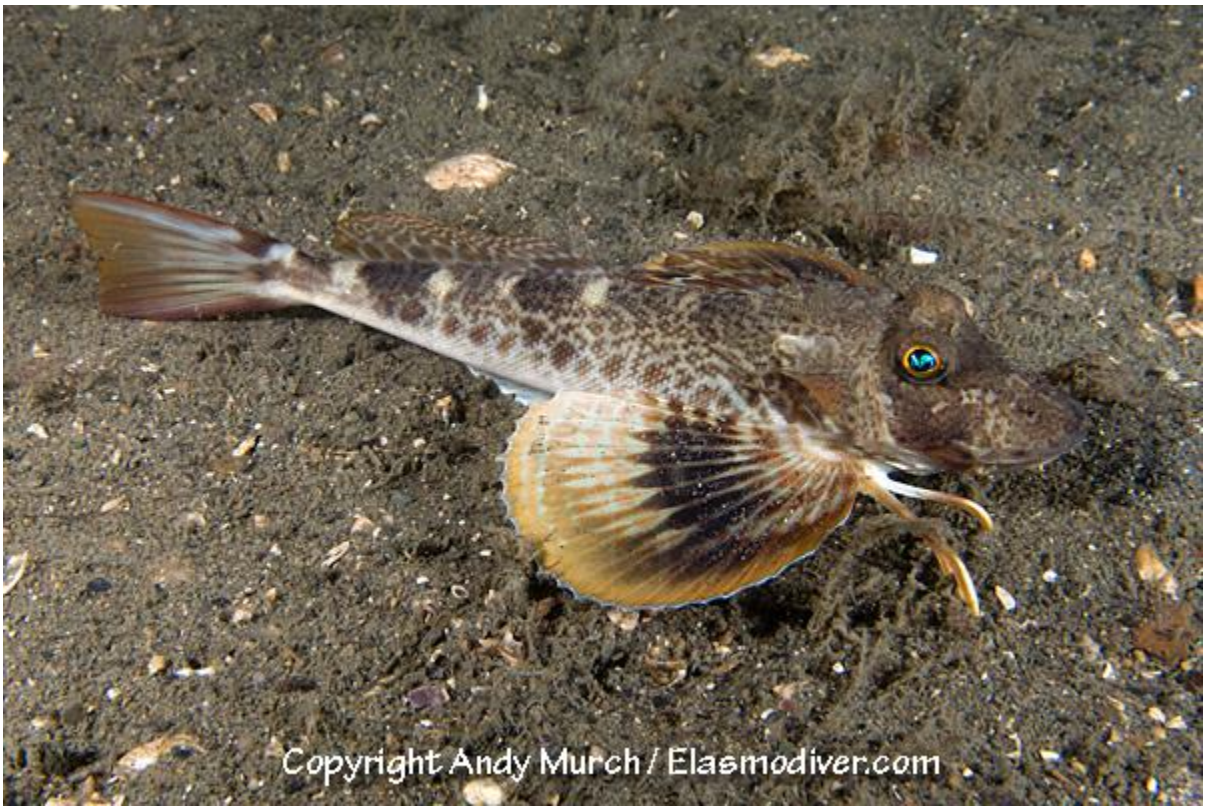
Fun Fact: The blue crabs scientific name *Callinectes sapidus* actually means beautiful swimmer!

Water Quality Tolerances:

- Temperature: 10 to 33_0C
- Salinity: 3 to 30 ppt
- Dissolved Oxygen: >2 ppm
- pH: 6-8

Reserves present: Wells (ME), Great Bay (NH), Waquoit Bay (MA), Narragansett Bay (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay- MD (MD), Chesapeake Bay- VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), Guana Tolomato Matanzas (FL), Jobos Bay (PR), Rookery Bay (FL), Apalachicola (FL), Weeks Bay (AL), Grand Bay (MS), Mission-Aransas (TX)

Northern Sea Robin (Prionotus carolinus)



Habitat: Estuaries, Oceans, deep channels and flats.

Adaptations: The sea robin has two huge pectoral fins that help it glide along the bottom.

Trophic Level: Sea robins are predators of small bivalves, crustaceans, and worms. The sea robin has few predators, but bigger fish and crabs will eat them.

Fun Fact: All northern sea robins have bright greenish blue eyes!

Water Quality tolerances:

- Temperature: 10 to 30 degrees Celsius
- Salinity: 5 to 35 ppt
- Dissolved Oxygen: >2 ppm
- pH: 7-8.5

Reserves present: Wells (ME), Great Bay (NH), Waquoit Bay (MA), Narragansett Bay (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay- MD (MD),

Chesapeake Bay- VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA)

Northeast Atlantic

Osprey (*Pandion haliaetus*)

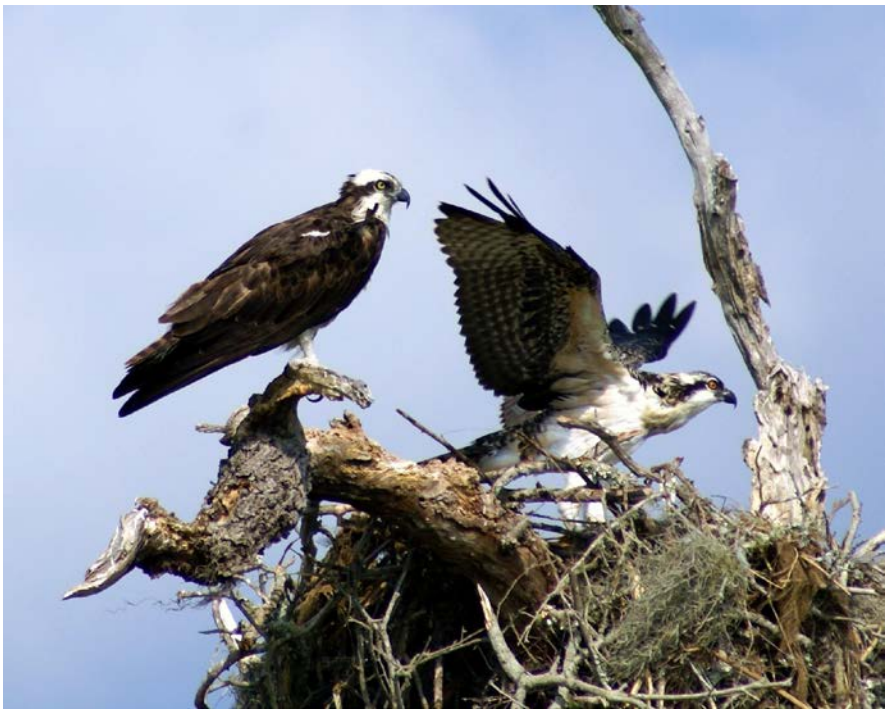


Photo credit: Donna Finley

Habitat: Found near water, either fresh or salt, where there is an abundance of fish; found nearly worldwide. Commonly seen near rivers, lakes, ponds, marshes and coastal areas. Nests are typically out in the open, either on a platform atop a pole provided by humans or a dead tree/snag.

Adaptation: Excellent at soaring and diving, tend to keep to open areas flying with stiff wingbeats in a steady motion. Talons have four toes - three in the front, one in the rear. When reaching for a fish, the outer front toe swings to the back, giving the osprey two talons both front and back, with which to grasp the fish. To help keep hold of a slippery fish, the toes are lined with spikes to provide extra grip. When the osprey plummets into the water, their nostrils shut tight, to keep water out. Because ospreys must dive into the water to capture their prey (almost exclusively fish), their feathers are coated with oil, allowing them to easily shake the water off as they fly away.

Trophic Level: Trophic level 4, a tertiary consumer. Eats almost exclusively fish and has few natural predators.

Life History: In New England, ospreys return in early spring to begin courtship displays and nest building. Males bring most of the nesting material while the female arranges them into an appropriate nest; many osprey pairs will use the same nest year after year. Females generally lay 1-4 eggs, with an incubation period of 36-42 days. Nestlings are born with downy feathers but have limited movement; in a little less than 2 months, the nestlings will fledge and leave the nest. Ospreys will migrate south in the fall months, leaving northern climates before water bodies freeze over, reducing their food supply.

Tolerances: Found nearly worldwide; must be near a body of water with an abundance of fish

Reserves Present: All

Special Note: A conservation success story; ospreys were nearly wiped out due to the use of DDT, a pesticide that entered the food chain and impacted fish. The ospreys ate the fish, thereby ingesting the pesticide through the fish. The pesticide caused ospreys to lay eggs with very thin shells that would break before the chicks could fully develop, resulting in no offspring. Approximately 90% of the breeding pairs between New York and Boston disappeared; since the banning of DDT, osprey populations have increased about 2.5% per year from 1966-2015.

North American Lobster *(Homarus americanus)*

Habitat: Estuaries, tidal bays, and sounds, and coastal waters.

Adaptations: The lobster's antennae are covered in tiny hairs that pick up chemicals from potential predators or prey, and relay them back to the lobster so that the animal can literally "smell" its surroundings. These hairs are so sensitive that the lobsters can discern between the various species of mussels that it hunts. Lobsters also have developed a pair of claws that are distinct to one another. One claw is large with tiny teeth on it that the lobster uses to grab, hold and crush its prey. The other claw is smaller with serrated edges that is used to cut.

Trophic Level: Lobsters usually hunt for food at night. It was once thought that lobsters were scavengers and ate primarily dead things. However, researchers have discovered that lobsters catch mainly fresh food (except for bait) that includes: fish, clams, mussels, crabs, sea urchins and sometimes even other lobsters! There are, however, many fish that eat baby lobsters.

Fun Fact: Lobsters can generate a buzzing sound underwater that scientists think may be used as a defense strategy. Lobster females hold their egg externally for up to 10 months while they develop, and seawater temperature plays the biggest factor in when these eggs hatch.

Physical Tolerances:

Category	Life-Stage	Threshold Value	Reference
Temperature	Eggs	<5°C winter, 10-12°C hatching	1, 2
	Larvae	10-12°C	2
	Juveniles/Adults	5-18°C, preference ~ 16°C, 20.5°C stressed	3, 4, 5, 6
Salinity	Eggs/Larvae	< 17 ppt	7
	Juveniles/Adults	< 12 ppt	8
Dissolved Oxygen	Larvae	< 1 mgO_2L^{-1}	9
	Juveniles/Adults	< 2 ppm	10
pH	Larvae	< 7.7 (Stages I – IV)	11
	Juveniles/Adults	n/a	

A summary of key biological threshold values for *H. americanus.* References: (1) Waddy and Aiken 1995; (2) MacKenzie 1988; (3) Reynolds and Casterlin 1979; (4) Crossin et al. 1998; (5) Dove et al. 2005; (6) Powers et al. 2004; (7) Charmantier et al. 2001; (8) Jury et al. 1994; (9) Ennis 1995; (10) Howell and Simpson 1994; (11) Keppel et al. 2012.

Reserves Present: Wells (ME), Great Bay (NH), Waquoit Bay (MA), Narragansett Bay (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay- MD (MD), Chesapeake Bay- VA (VA), North Carolina (NC)

American Eel (*Anguilla rostrata*)

Habitat: American eels may be found in almost any freshwater habitat that can be accessed from the ocean, although they reach their largest sizes and abundance in lakes, ponds, and larger rivers.

Adaptations: A long, slender, snake-like fish with thick, slimy skin, a small mouth, and tiny scales. The dorsal, caudal, and anal fins are fused into one continuous fin that runs the length of the eel's body and wraps around the tail. Juvenile eels may be distinguished from lampreys by the presence of pelvic fins and a true jaw. American eels are usually dark brown to olive green on the back and grayish white below. Females average 2 to 3 feet but may grow to 5 to 6 feet long. Males are generally half as big. This amazing fish goes through several metamorphisms that take it from sea water to fresh water and then back out to the salty ocean again. (That's something few fish can do.)

Trophic Level: Trophic Level 3, a secondary consumer. Eats other fish, clams, worms, frogs, crabs, insects and fish eggs.

Life History: The American eel is a catadromous species, meaning adult eels migrate from freshwater rivers throughout the Atlantic coast to their spawning grounds in the Sargasso Sea. American eel larvae drift on ocean currents back to the coast line, where they migrate up rivers as juvenile eels, known as elvers. Juvenile eels have the ability to ascend obstacles that block other fish species. They can work their way through cracks in dams and climb vertical surfaces with only a trickle of water. However, dams and other barriers have greatly reduced the distribution of eels, which were once present in nearly all freshwater habitats that could be reached from the ocean. Eels may remain in freshwater for over 20 years before migrating back to the ocean. As adult eels prepare for their journey to the Sargasso Sea, their bodies undergo a transformation into what is known as the silver eel phase. Migration usually begins during the first significant rains of midsummer and continues into late fall. Silver eels do not eat as their bodies prepare for the transition into salt water. Female eels tend to migrate greater distances than males, which usually remain in estuarine habitat until sexual maturation. Hydropower turbines are a major cause of mortality as adult eels migrate downstream.

Tolerances: American eels can tolerate fresh and salt water and can even live out of water for a short period of time.

Reserves Present/Distribution: Wells (ME), Great Bay (NH), Waquoit Bay (MA), Narragansett Bay (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay- MD (MD), Chesapeake Bay- VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), Guana Tolomato Matanzas

(FL), Jobos Bay (PR), Rookery Bay (FL), Apalachicola (FL), Weeks Bay (AL), Grand Bay (MS)

The American eel ranges from Greenland and Labrador south to northern South America and west to the Mississippi Valley. Eels will ascend any accessible coastal river. Their current distribution is limited by dams.

Saltmarsh (or Smooth) Cordgrass (Spartina alterniflora)

Soft-shell Clam

Pacific Northwest (include Alaska)

Eelgrass, Zostera marina

Photo: Padilla Bay NERR

Habitat: Eelgrass grows in sand and mud in sheltered bays and estuaries.

Adaptation: flowers underwater, releasing pollen in long, stringy secretion.

Trophic level: Primary producer

Life history: This grass spreads vegetatively by rhyzomes under the mud. Shoots produce flowers in April-June. Individual plants produce both female and male flowers, but they mature at different times, preventing self-fertilization. Pollen is bright yellow and stringy, floating on currents. Mature seeds float, and travel with currents.

Tolerances: Temperature 0-25 degrees C

Salinity: 5-32 ppt but has a high light requirement and does not tolerate turbid water. It requires at least 20% of surface light levels to thrive.

Reserves Present: Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR), Padilla Bay (WA)

Pacific Herring, *Clupea pallasii*

Juvenile Pacific herring at Osaka Aquarium. Photo: OpenCage blog (CC BY-SA 2.5).

Habitat: open ocean and coastlines. Spawns in protected bays on submerged vegetation.

Adaptation: unusual vision in low light environments. Schools can generate huge biomass of eggs - up to 6,000,000 in a square meter.

Trophic level: secondary consumers, eating primarily zooplankton such as copepods. They are an important prey species - consumed by marine birds, marine mammals, and larger fish.

Life history: Adults travel from open ocean to protected bays and estuaries to spawn on submerged vegetation such as eelgrass and kelp.

Tolerances:

Reserves Present: Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR), Padilla Bay (WA), Kachemak Bay (AK)

Dungeness Crab (Cancer magister or Metacarcinus magister)

Habitat: Sandy or muddy areas in lower estuaries and tidal bays out to 300 feet, and can even be found at depths of 1,500 feet in the open ocean. The crabs prefer cold water and exist from Aleutian Islands south to California.

Adaptations: Dungeness crabs have four walking legs and two large claws lined with small spines for gripping and tearing food. Like all crustaceans, crabs have a hard exoskeleton which is the support structure for the body. These animals have jointed legs; this means they have tendons, a special connective tissue that links muscle to bone, along their appendages that enable them to move. The crab's stalked eyes increase its field of vision. Dungeness crabs (like most crabs) also have the unique ability to survive out of water for long periods of time by keeping their gills damp. Unique structures called *articulating plates* help seal in water and slow evaporation from the gills; as long as the crab's gills remain wet, oxygen from the air will move into the water on the gills, and into the crab's bloodstream.

Trophic Level: Adult Dungeness crabs can be both scavengers and predators, feeding on a variety of creatures including small clams and other mollusks, crustaceans and fish. Early life stages of crabs are planktonic, and the zoea and megalops stages feed on a wide variety of plankton. Dungeness crabs are a food source for many estuarine and ocean animals such as seals, octopuses, salmon and many other juvenile and adult

fishes. Dungeness crabs are also a major fishery in the Pacific northwest and tens of millions of pounds are harvested by humans each year.

Life History: Dungeness crabs' mate in the spring. Females extrude and fertilize eggs in fall and carry the eggs on their undersides beneath the abdominal flap. Eggs turn from orange to dark brownish as they grow and are released into the water. They hatch in the water as zoea, a microscopic zooplankton, during the winter and move through 5 zoea stages, becoming megalopae in the spring. Megalopae are a larger zooplankton and can be seen swimming in the water along docks and shorelines in late spring/early summer when they are swept inshore by currents. During late spring the megolopae settle out on the ocean floor and become juvenile Dungeness crabs. They live for 2 years in shallow protected parts of the estuary, like eelgrass beds, marsh edges and woody debris. The crabs can molt up to 6 times in a year while they are juveniles. Crabs mature after 3 years, and will occupy habitats throughout the bay, estuary and nearshore waters. Male crabs will seek out female crabs early in the spring before they molt, and stay with them, with their legs wrapped around the female until she molts and the male crab can deposit spermatophores. Male crabs often continue to stay wrapped around the female until her shell rehardens.

Water Quality Tolerances:

- Temperature: species prefer temperatures between 3-18 °C, with larvae being much more sensitive than adults.
- Salinity: prefer salinities between 16 to 32 ppt, generally avoiding low salinities. Some lab experiments suggest they will venture outside those ranges into lower salinities to get food.
- Dissolved Oxygen: >3 ppm (NOT SURE)
- pH: >7.4 (acidosis occurs at 7.4 in lab experiments according to NMS)

Reserves Present: Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR), Padilla Bay (WA), Kachemak Bay (AK)

Northern California

Southern Sea Otter

Habitat: Estuaries, marine, bays. Males tend to travel around the coastal marine waterways, both frequent bays, harbors and estuaries. Females using salt marsh pickleweed as resting areas and nurseries.

Adaptation: The thickest fur of any animal, necessary for keeping them warm in the very cold Pacific Ocean along the northern west coast of the united states

Trophic level: Top predator in an estuary, feeding on invertebrates such as mollusk, crabs, and various worms. In the open ocean along the coast they are predated by Orcas and Great white sharks.

Life History:

Tolerances: They have a wide tolerance in regard to water quality, however, are susceptible to bacterial and viral infections carried by infected shell fish and mollusk. They can be susceptible to extreme cold.

Reserves Present: Elkhorn Slough (CA), San Francisco (CA), South Slough (OR), Padilla Bay (WA), Kachemak Bay (AK)

Topsmelt

Habitat: Primarily marine; in bays, estuaries, and the mouths of coastal streams.

Adaptation: Can survive extreme salinities up to 80 ppt

Trophic level: Prey for most larger fish

Life history: As juvenile fish age they move further into the estuary from fresh to brackish. Spawn March through October with salinity around 30 ppt and a temp. range of 13-27°C.

Tolerances: Salinities ranging from fresh to 35ppt and in temperatures ranging from 5 to 29°C.. DO 2-18 mg/l

Reserves Present: Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR), Padilla Bay (WA),

California Halibut

Habitat: Estuaries, marine, bays.

Reserves Present: Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR), Padilla Bay (WA)

Adaptation: Large flat fish

Trophic level: Both predator and prey

Tolerances: High year-round salinity, not below 10 ppt, Diurnal threshold of DO is 4 mg/l (no nocturnal data available). Sensitive to nutrients and contaminants during rainy season. Grow faster in warm water (not below 10°C)

Alkali heath, Frankenia salina

Photo by: © Br. Alfred Brousseau, Saint Mary's College

Habitat: Like the name suggests, Alkali heath lives in salty areas. It is commonly found in the higher elevation areas of tidal salt marshes, including on the upland-marsh edge. It is occasionally found outside of wetlands.

Adaptation: Being able to reproduce both from seed and root suckers is adaptation that many salt marsh plants, including Alkali heath, share. Alkali heath is also able to grow in salty soils because it can excrete salt.

Trophic Level: Alkali heath is a plant and so is at the base of the food web, however it has a lot of defenses against herbivory like small, tough leaves.

Life History: Alkali heath makes small, but 5-petaled beautiful pinkish purple flowers. The flowers bloom in late Spring or Summer and then develop into seeds in the Fall. It can also spread by root suckers and is therefore often found in clumps. Alkali heath goes dormant in the winter and is a perennial plant.

Tolerance: Alkali heath is tolerant to full salinity and some flooding.

Reserves Present: Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR),

Olympia Oyster – *Ostrea lurida*

Photo by Anna Deck, San Francisco Bay NERR

Habitat: Olympia oysters are native to the Pacific Coast, from Baja to British Columbia. They live in brackish water on rocky shores in estuaries. They are most abundant in the lower intertidal zone. Olympia oysters are the only native oyster on the West Coast of the United States.

Adaptation: Olympia oysters can seal their two shells tightly together in times of stress. With the shell sealed tightly, they can survive predation, low or high salinity, and other environmental stressors.

Trophic Level: Oysters are filter feeders, filtering phytoplankton from the water column. They are eaten by larger animals like bat rays, birds, and crabs.

Life History: Olympia oysters have an interesting life history. They are sequential hermaphrodites, which means an individual oyster switches between being male and female. They can change sex twice within a single year. Female oysters brood eggs –

sometimes over 250,000 of them- inside their protective shells. The larvae are released into the water column, where they swim as plankton for up to 2 months. The larvae then settle and attach onto rocks in the shallow water, where they spend the rest of their life.

Tolerance: Olympia oysters are tolerant to changing water quality conditions. Scientists have studied the extremes of their tolerance to understand more about where they can be restored. They learned that: (1) salinities lower than about 6ppt for 8 or more days cause death, (2) water temperatures above 37.6 C for more than an hour causes death, and pH above 7.9 for 52 days is stressful, but not deadly. (see San Francisco Bay China Camp Oyster Mystery Lesson for references)

Reserves Present: Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR), Padilla Bay (WA)

Pickleweed – Salicornia pacifica

Photo by: Gerald and Buff Corsi © California Academy of Sciences

Habitat: Pickleweed is commonly found in tidal salt marshes, brackish marshes, and salt flats in California and beyond. It is often the dominant plant in the marsh.

Adaptation: Pickleweed stores salt within its cells. It is also succulent, which conserves water.

Trophic Level: Pickleweed is a plant and therefore at the base of the food web. Salt marsh animals, including the endangered Salt Marsh Harvest Mouse, eat it.

Life History: *Salicornia virginica* is a perennial plant; it goes dormant for the winter but survives multiple years. There are other species of pickleweed that are annual; they grow from seeds each year. Pickleweed has tiny, inconspicuous flowers that are wind pollinated. The seeds are able to float and are spread by water.

Tolerance: Pickleweed is extremely salt tolerant and is often found growing in salt pans or depressions in the marsh that have become too salty for other plants.

Reserves Present: Wells (ME), Great Bay (NH), Waquoit Bay (MA), Narragansett Bay (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay- MD (MD), Chesapeake Bay- VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), Guana Tolomato Matanzas (FL), Jobos Bay (PR), Rookery Bay (FL), Apalachicola (FL), Weeks Bay (AL), Grand Bay (MS), Mission-Aransas (TX), Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR), Padilla Bay (WA), He'eia (HI)

Brown Pelican – Pelecanus occidentalis

Photo by: Lee Karney, USFWS from the NCTC Image Library

Habitat: Brown pelicans live on the coast and in estuaries throughout the United States. On the Pacific Coast, they breed on rocky offshore islands in southern California and further south.

Trophic Level: Brown pelicans eat small fish, especially those that form schools in shallow water.

Adaptations: Brown pelicans have an unusual hunting style. They fly low over the water, searching for fish. When they see a fish, they dive suddenly and steeply, careening head first into the water. They scope up gallons of water, and possibly the fish, into the expandable throat pouch attached to their bill.

Life History: Brown pelicans build nests on the ground on rocky islands offshore. They nest in large colonies. Both parents incubate the eggs and feed regurgitated fish to the young. Brown pelican populations suffered tremendous losses in the 1960s due to the

use of pesticides like DDT. After the ban of DDT, the populations have recovered well, and brown pelicans are now a common sight throughout coastal California.

Tolerance: Brown pelicans are tolerant of estuarine conditions and are primarily a coastal species.

Reserves Present: Wells (ME), Great Bay (NH), Waquoit Bay (MA), Narragansett Bay (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay- MD (MD), Chesapeake Bay- VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), Guana Tolomato Matanzas (FL), Jobos Bay (PR), Rookery Bay (FL), Apalachicola (FL), Weeks Bay (AL), Grand Bay (MS), Mission-Aransas (TX), Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR), Padilla Bay (WA)

Southern California

Alkali heath and halibut separate doc

Northern Harrier

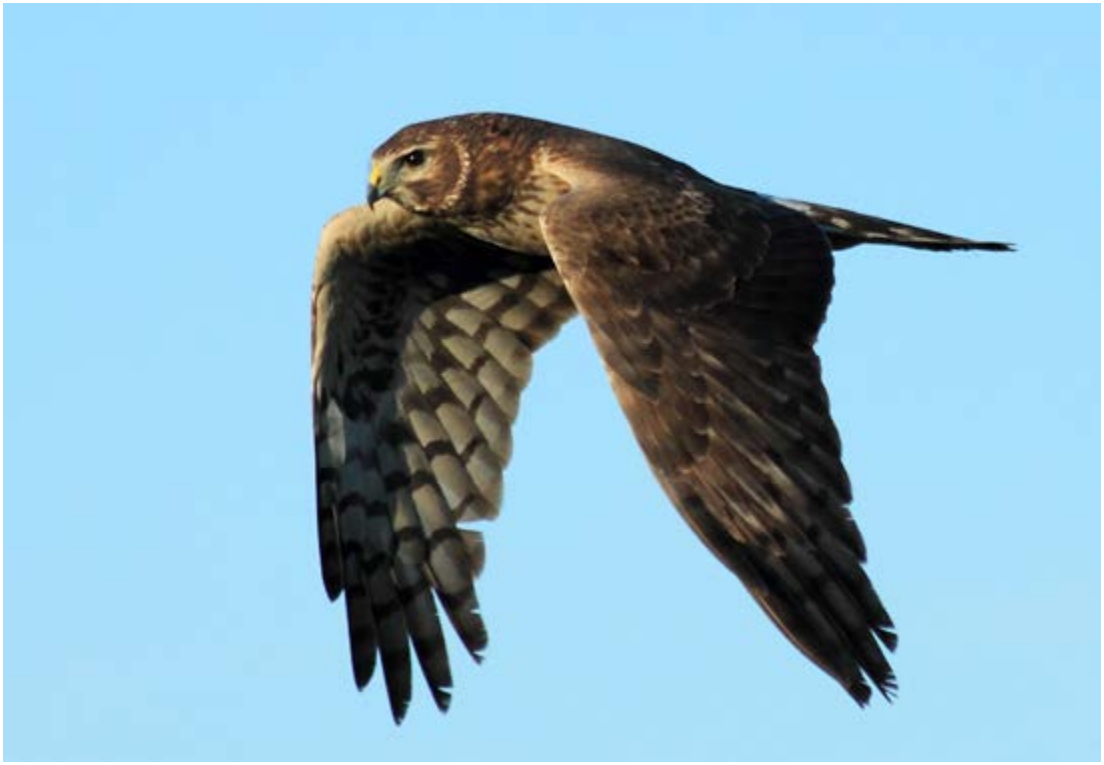


Photo courtesy Mark Ardnt

Habitat: Often found hunting low over salt marshes and open grasslands near the marsh

Adaptation

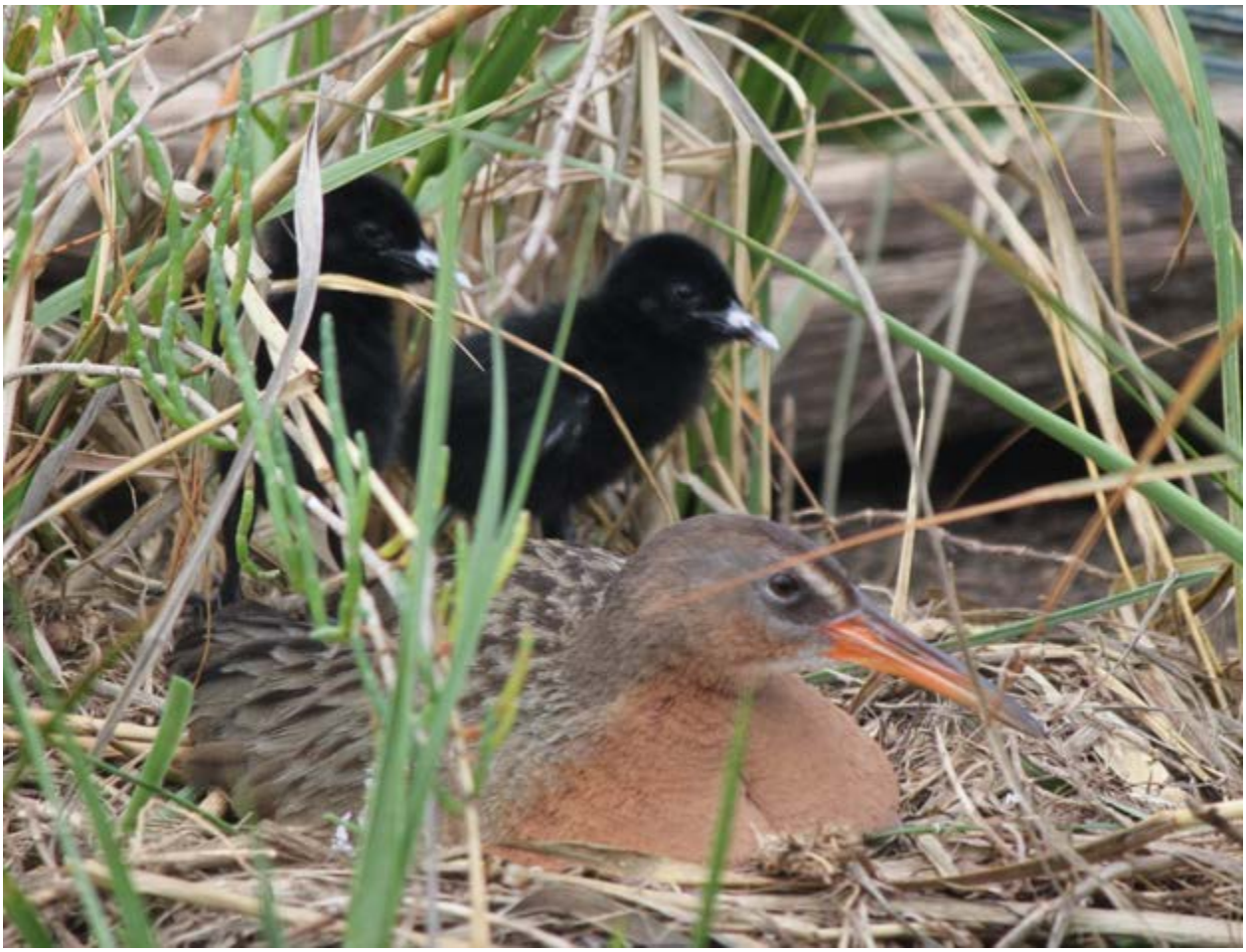
Trophic level: Eats mice, rats, and the small mamals, frogs, birds (Ridgway's Rail) , snakes, and insects. Unlike most raptors, the Nothern Harrier, with its flat owl-like face, glides low over marshes and uses its hearing to find its prey. Nest predators include coyotes, feral dogs, striped skunks, raccoons, red foxes, American Crows, Common Ravens, and Great Horned Owls.

Life History: Nest is a platform on the ground made of sticks in various plant communities – salt marshes, swamps, and grasslands. Lays 4-8 eggs , 5 th emost common. Incubation is for 21-31 days and both sexes sit on the nest and care for young.

Tolerances

Reserves Present: Lake Superior (WI), Old Woman Creek (OH), Wells (ME), Great Bay (NH), Waquoit Bay (MA), Narragansett Bay (RI), Hudson River (NY), Jacques Cousteau (NJ), Delaware (DE), Chesapeake Bay- MD (MD), Chesapeake Bay- VA (VA), North Carolina (NC), North Inlet-Winyah Bay (SC), ACE Basin (SC), Sapelo Island (GA), Guana Tolomato Matanzas (FL), Jobos Bay (PR), Rookery Bay (FL), Apalachicola (FL), Weeks Bay (AL), Grand Bay (MS), Mission-Aransas (TX), Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR), Padilla Bay (WA)

Light-footed Ridgway's Rail (Endangered) *Rallus obsoletus levipes*



[Photo courtesy Charles Gailband]

Habitat: Salt marshes with pickleweed and cord grass. Ranges from northern Baja California, MX to Ventura County California, US. Second largest population occurs at the Tijuana River NERR.

Adaptation: Weaves a nest in cord grass like an elevator that can go up and down with the tides.

Trophic level: Ridgway's Rails eat marine worms, crabs, mollusks, cord grass seeds and roots. They are eaten by Northern Harriers, Red-tailed Hawks, Great-Blue Herons, foxes, coyotes, and domestic cats.

Life history: Nests on the ground or in woven cord grass leaves. Lays 8-10 eggs and sometimes up to 14. Incubates the eggs for 21-23 days and by both parents. Chicks are born black and fledge in 50-60 days.

Tolerances

Reserves Present: Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA)

California Horn Snail (Cerithideopsis californica)

Habitat: Estuaries, salt marshes, intertidal mudflats and channel.

Adaptations: Snails have an spiral shell and an operculum (a small round "door"), which they use to protect their bodies against predators and to keep their bodies moist when they are exposed to the air.

Trophic Level: Snails feed on microscopic algae called diatoms and other microscopic organisms. Snails can be eaten by some birds, fishes and crabs. They also have a diverse group of parasites that castrate de snails without killing them.

Fun Fact: These snails are the most abundant animal in the estuaries of Southern California!

Water Quality Tolerances:

- Temperature: Adults can survive 2 to 40 ºC
- Salinity: 0 (for short periods of time) to 35 ppt
- Dissolved Oxygen: >2 ppm
- pH: 6 - 8.5

Reserves Present: Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA)

Alkali heath Frankenia salina

See photo in Northern California section

Habitat: Like the name suggests, Alkali heath lives in salty areas. It is commonly found in the higher elevation areas of tidal salt marshes, including on the upland-marsh edge. It is occasionally found outside of wetlands.

Adaptation: Being able to reproduce both from seed and root suckers is adaptation that many salt marsh plants, including Alkali heath, share. Alkali heath is also able to grow in salty soils because it can excrete salt.

Trophic Level: Alkali heath is a plant and so is at the base of the food web, however it has a lot of defenses against herbivory like small, tough leaves.

Life History: Alkali heath makes small, but 5-petaled beautiful pinkish purple flowers. The flowers bloom in late Spring or Summer and then develop into seeds in the Fall. It can also spread by root suckers and is therefore often found in clumps. Alkali heath goes dormant in the winter and is a perennial plant.

Tolerance: Alkali heath is tolerant to full salinity and some flooding.

Reserves Present: Tijuana River (CA), Elkhorn Slough (CA), San Francisco (CA), South Slough (OR),

Pacific Islands

Species Profiles (animals and plants)

Habitat

Adaptation

Trophic level

Life history

Tolerances

Reserves present