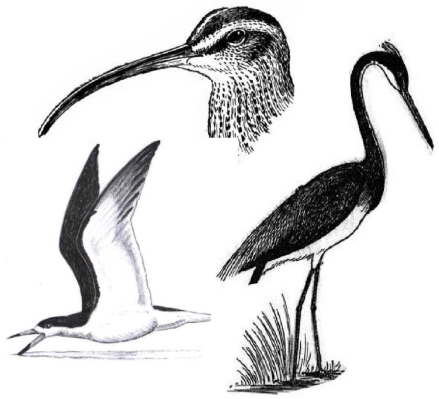
Applied concepts in estuary science:

Adaptations: Birds of the Estuary

*Note to the teacher: This concept summary is intended for students in **4th-8th** grade and is focused on science objectives related to adaptations.*



An *adaptation* is the adjustment of an organism's form, physiology, or behavior to maximize its survival and ability to reproduce successfully. Because the habitats within estuary ecosystems are diverse, so are the adaptations of the organisms living in the estuary.

Dealing with saltwater

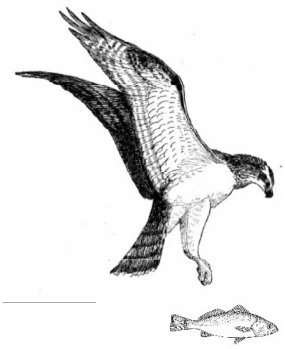
Estuary ecosystems are influenced by the input of salt water through ocean inlets. Because of this, several animals that feed in this system have adaptations that allow them to tolerate brackish water and saltwater. Biologists classify organisms that have adapted to changes in salinity as either *osmoregulators* or *osmoconformers*.

Birds are *osmoregulators*, defined as the ability to maintain internal salt concentrations at a constant value by discharging salt through special glands located just above the eyes. Many bird species are capable of eliminating fluids equal to 15% or more of their body weight each day, a human equivalent of several gallons of salt water. Salt glands are what allow many seabirds to maintain themselves on diets of marine prey and seawater, far from any source of freshwater.

As with most life functions, it is more difficult to handle environmental stresses during the first stages of life. This means that some of the young estuarine birds may not be able to handle the salty food caught in the estuary. To deal with this, adult birds have developed several strategies to lessen the salt-stress for their young chicks. When feeding their young, some estuarine birds have been observed to mainly feed on low-salt crustaceans like crayfish and avoid other high-salt organisms like bivalves. Regurgitation also helps as it produces pre-digested food with lower salt concentrations. Several other birds have been known to take the catch from the estuary and dunk it in fresh water before returning to the nest.

Feeding Strategies

The diverse environment of an estuary provides several feeding options and requires an assortment of feeding strategies. The bills, legs, feet, and feathers of estuarine birds all play a role in the bird's ability to catch and ingest food. Below are brief descriptions of several estuarine birds highlighting their adaptations for feeding.

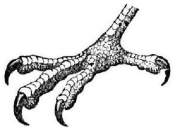


Ospreys *(Pandion haliaetus)*

The brown body, white chest and dark mask through the eyes of the Osprey make identifying this raptor easy. Ospreys can be seen in the upper reaches of many estuaries hovering over the water looking for their next meal then plunging swiftly feet-first into the water as they grapple their prey with their talons.

Features and Adaptations

The feathers of an osprey are a great example of nature s' c"ounter-camouflage ."They have a white underside (like the sky above) and a dark topside (like the water and land below). The bill of an osprey is strong and thick. This gives the bird the power to tear apart the boney flesh of its prey.



Osprey talons are sharp and strong. Because of their talons, ospreys are able to pull the unsuspecting fish out of the water and carry them back to the nest.

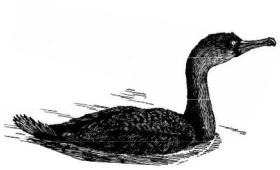
Great Blue Herons *(Ardea herodius)*

These majestic birds inhabit many of the estuaries around the world. They can be seen standing motionless in the shallow waters waiting to strike a fish, crab, or other shallow-water prey.

At around four feet in height and a wingspan of close to six feet this is the largest member of the heron family in North America. The head of a great blue is white with a black stripe along the sides of the top. The neck is grey with black streaks down the center front.

Features and Adaptations

The long neck and slender bill of these birds enables them to quickly pierce through the water surface and clasp on to an otherwise difficult catch. Their long legs benefit their ability to walk silently through the shallow waters of the estuary.

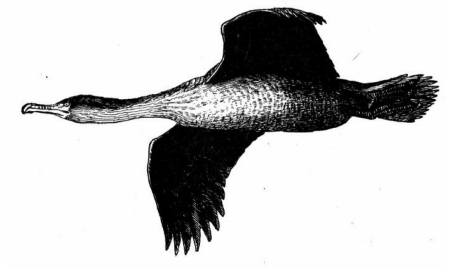


Cormorants *(Phalacrocorax spp.)*

Cormorants are fish-eating waterbirds inhabiting many of the estuaries in the Americas. They can be easily identified by their long bill with a downturned hook at the end.

Features and Adaptations

Compared to the feathers of a duck, cormorant feathers are less able to trap air. This characteristic makes the cormorant less buoyant and therefore, they can be seen floating with most of their body under water. The benefit of this decrease in buoyancy is the ability to swim underwater for long distances and with great speed. By using their webbed feet and wings for propulsion and their tail as a rudder, cormorants swim rapidly underwater and nab their fish dinner.



Because their feathers don t dry as quickly as duck s' feathers, cormorants can be seen perched on logs and stumps, standing upright and extending their wings for drying.

Black Skimmers *(Rynchops niger)*

Skimmers can be found gliding near the water surface in the shallow of the estuary. At rest, a skimmer can easily be identified by its white face, black crown and topside, and black-tipped red bill. Interestingly, they are recognized as the only North American bird with the lower mandible longer than the upper.

Features and Adaptations

The feathers of a skimmer are a great example of nature s' c"ounter-camouflage ."They have a white underside (like the sky above) and dark topside (like the water and land below).

The lower mandible, being longer than the upper, is a unique adaptation for feeding. This unique bill, along with long, strong wings and a slender body, allows these birds to s"kim "along the surface of the water collecting insects and small fish. It is truly a sight to see!

Brown Pelicans (*Pelecanus occidentalis*)

The Brown Pelicans are some of the most prehistoric looking birds in the estuary. They can be easily identified by their chestnut and white necks, white heads with yellow crowns, brown streaked rump and tail, blackish-brown belly, grayish bill and pouch, and black legs and feet. Often times, they prop themselves at the end of piers and posts in the harbor. Brown pelicans fly with their necks folded, heads resting on their backs, using slow, powerful wingbeats.

Features and Adaptations

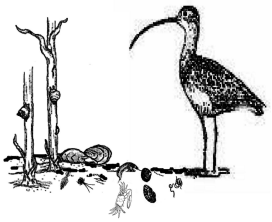
Pelicans feed mostly on fish and require up to 4 lbs per day. When feeding, Pelicans can be seen diving beak first into the water, returning to the surface with a mouthful of fish. Air sacs beneath the pelican s'skin cushion the impact and aid with buoyancy.

Whimbrils (*Numenius borealis*)

Whimbrils can be differentiated from other estuarine birds by the down-turned bill and black-and-white stripes on the head. In the winter, Whimbrils are found probing the muds of estuarine tidal flats.

Features and Adaptations

The curvature of the Whimbril s'bill makes a crab dinner a little easier to achieve. This is because the curvature of the Whimbril s' bill is practically an exact match of the curvature the fiddler crab s' burrow.

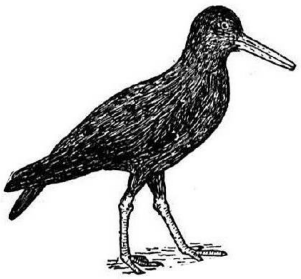


Roseate Spoonbills *(Ajaia ajaja)*

The pinkish body and spoon-shaped bill of the Roseate Spoonbill make an easy task of identifying this majestic bird. They can be found feeding in small flocks in the shallow waters of many estuaries.

Features and Adaptations

The oddly-shaped bill of the Roseates makes their feeding rituals amusing to observe. As they walk through the shallow waters, Roseates swing their slightly-opened bill from side-to-side looking for shrimp, fish, insects, snails, and some roots. Once their prey is encountered, the bird snaps the bill shut and pulls it from the water.



Oystercatchers (*Haematopus spp.))*

An oystercatcher can easily be identified by the contrasting bright reddish-orange bill and black head. The American Oystercatcher, found along the Gulf and Atlantic coasts has a white underbelly. The Black Oystercatcher (illustration) is mostly found along the rocky shores of the Pacific coast.

Features and Adaptations

The bright red bill of an oystercatcher offers more than just beauty. When feeding, the thin, bladelike tip of the bill is carefully inserted into the edge of a clam then the razor-sharp edges snip the muscles that hold the clam shut. Once the restrictive muscles are removed, the oystercatcher opens the clam and enjoys the meat.

Questions for review from:

Adaptations: Birds of the Estuary

1. An Osprey is best adapted to feeding on …
   A. buried clams and crustaceans in the tidal flats.
   B. insects and spiders on the bark of trees.
   C. fish swimming near the surface of the water.
   D. fish swimming near the bottom of deep water.

2. Cormorants are best adapted to …
   A. swimming underwater.
   B. drying off quickly.
   C. collecting large volumes of plankton in their bills.

3. Which of the following birds has a beak with the lower mandible longer than the upper?
   A. Osprey
   B. Roseate Spoonbill
   C. Oystercatcher
   D. Black Skimmer

4. Which of the following is the largest heron in North America?
   A. Green Heron
   B. Great Blue Heron
   C. Night Heron
   D. Little Blue Heron

5. A Whimbril is best adapted to feeding …
   A. by collecting plankton in large volumes of water.
   B. by pulling large fish from the water with its feet.
   C. by probing the burrows of crabs in the estuary muds.
   D. by swimming underwater.