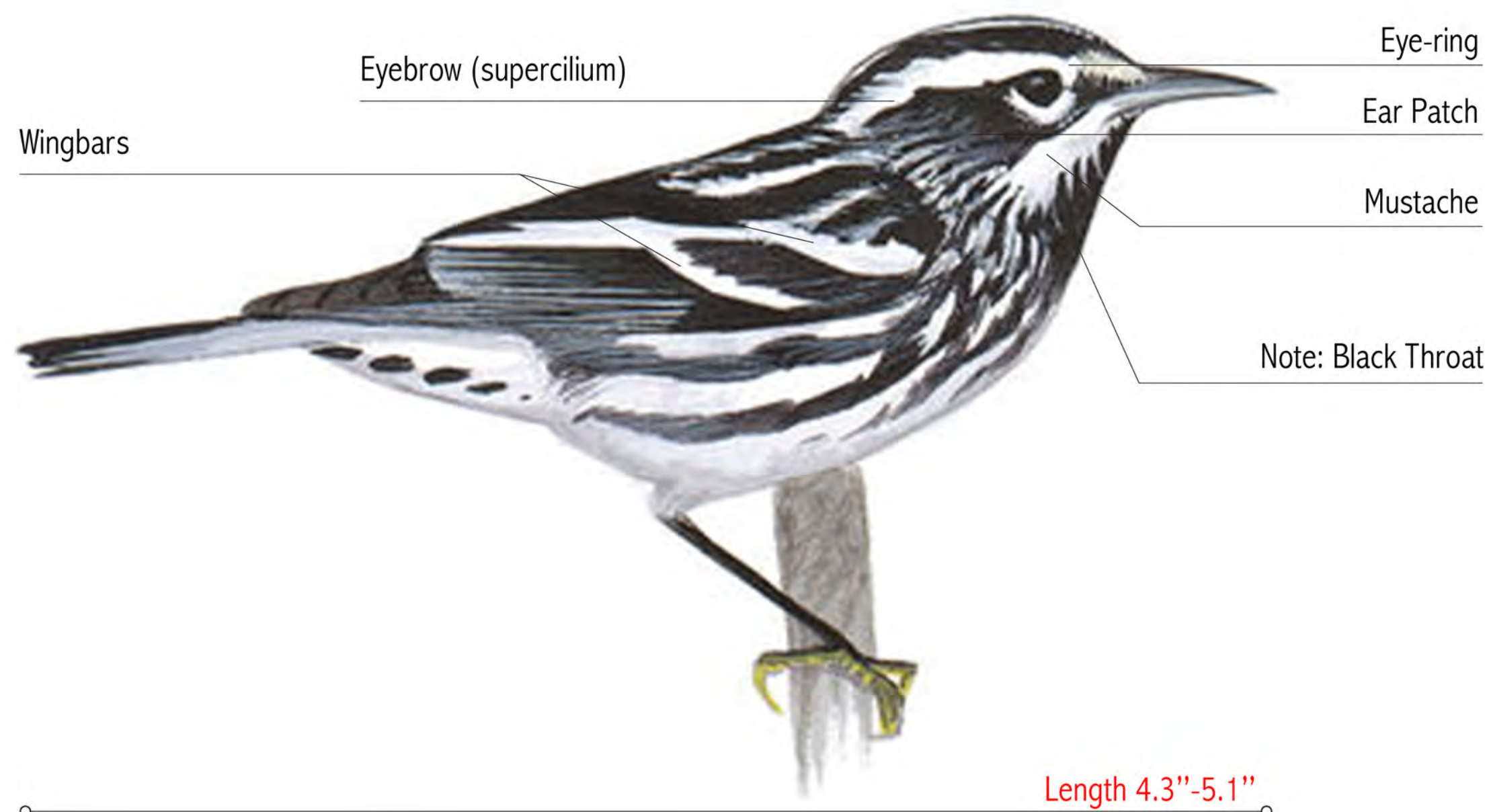


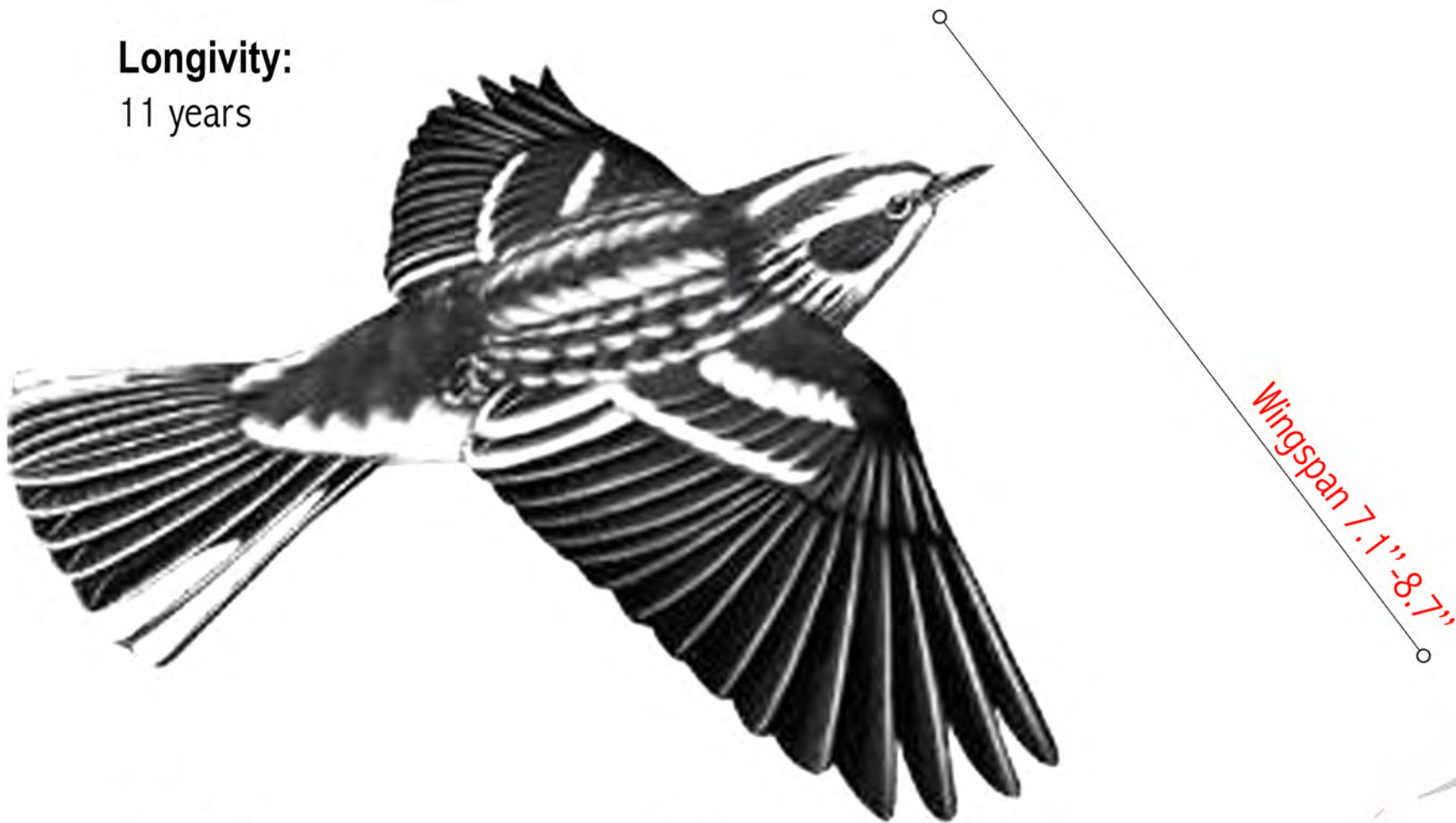
# BLACK-AND-WHITE WARBLER

*Mniotilta varia*



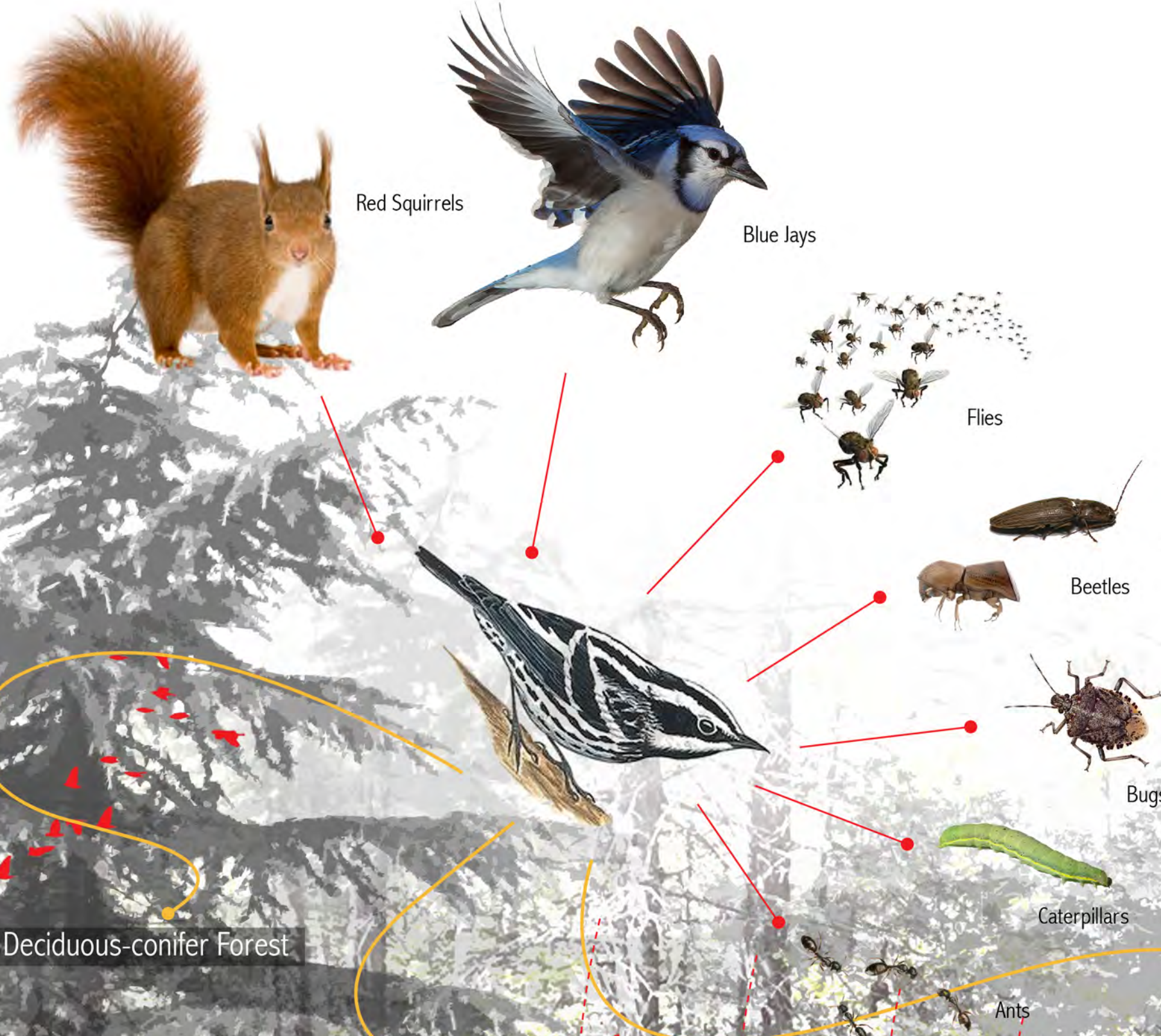
**Biometrics:**  
Length  
4.3–5.1 in  
Wingspan  
7.1–8.7 in  
Weight  
0.3–0.5 oz

**Longevity:**  
11 years

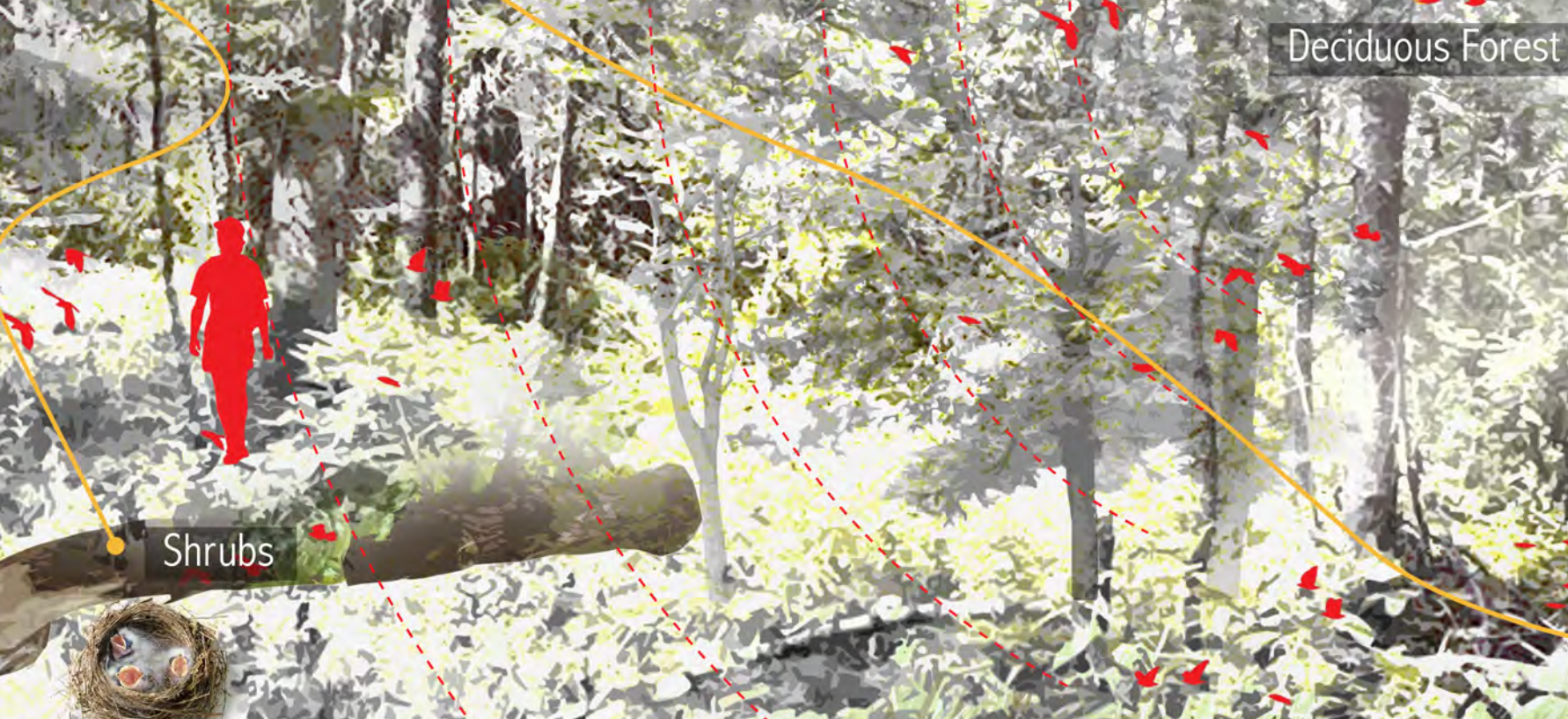


**Predators:**  
As a ground nesting species, black-and-white warblers are probably vulnerable to many different predators, especially during the breeding season.

**Diet:**  
B&W Warbler primarily eats insects such as caterpillars, flies, bugs, beetles, and also spiders, larvae and insect's egg. It is the only North American wood-warbler that regularly forages on bark.



**Nesting:**  
Black-and-white warblers breed in deciduous and mixed deciduous-conifer forests. They prefer forests with large trees and an understory of smaller trees and shrubs. In winter, black-and-white warblers can be found in a variety of forest types, as well as woodland borders, gardens, and coffee plantations.



## Description:

B&W Warbler is entirely black and white in all plumages, except for a creamy wash on the face and flanks of many females. It has a white median crown stripe bordered by black on the head. Also a white supercilium separated by a broad black lateral crown-stripe. It has black-spotted undertail coverts.

B&W Warbler has an elongated hind toe and claws. This adaptation allows it to move securely on the surface of the bark. It has shortened tarsi, and a long thin bill with a slightly curved culmen, adapted for probing deeply into bark crevices.

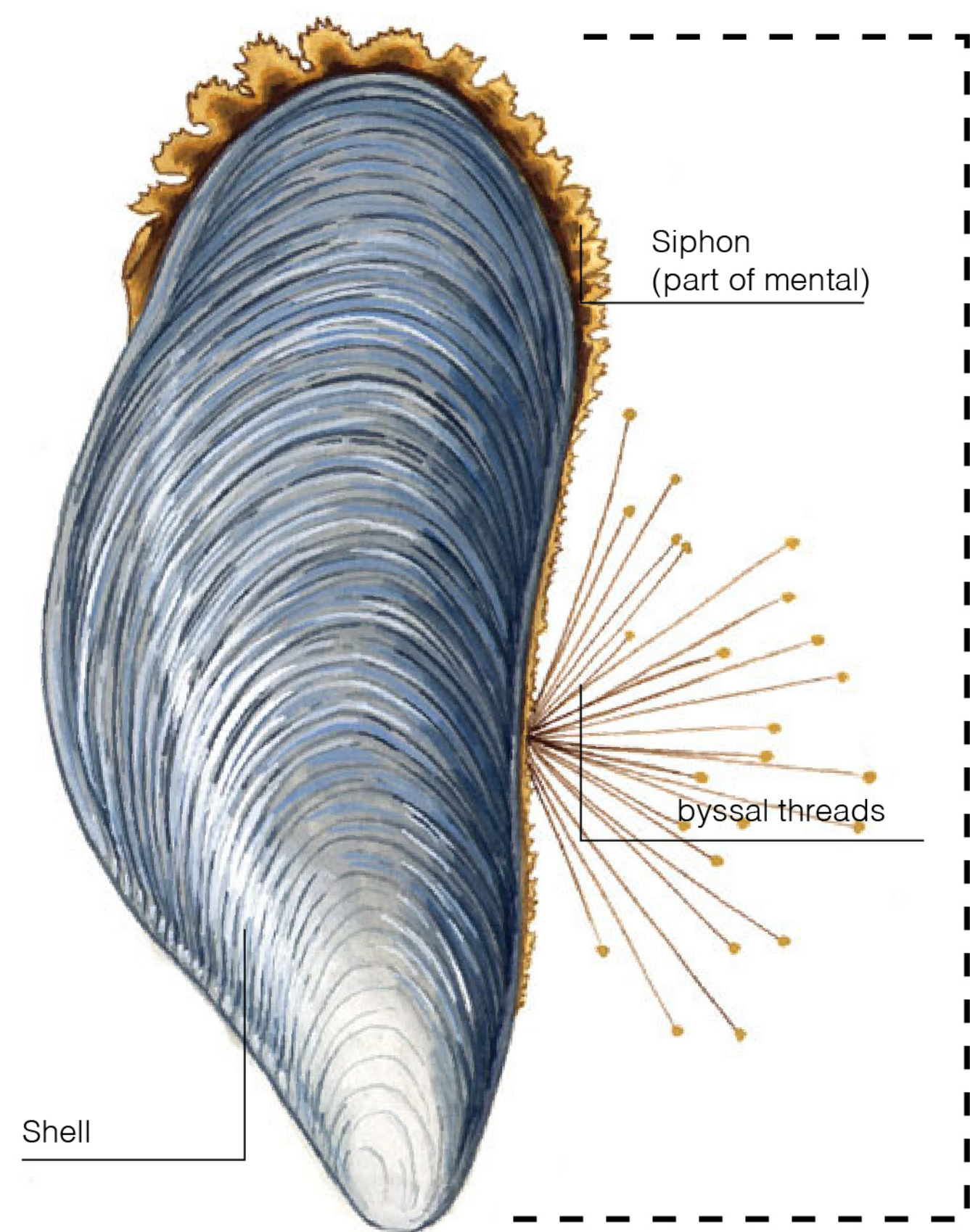
In breeding plumage, male has black throat and cheeks. In winter, it has white chin. Female and immature have pale cheeks. Female has diffused streaks on buffy flanks. Buffy wash particularly bright on immature.





# Blue Mussel and Surf scoter

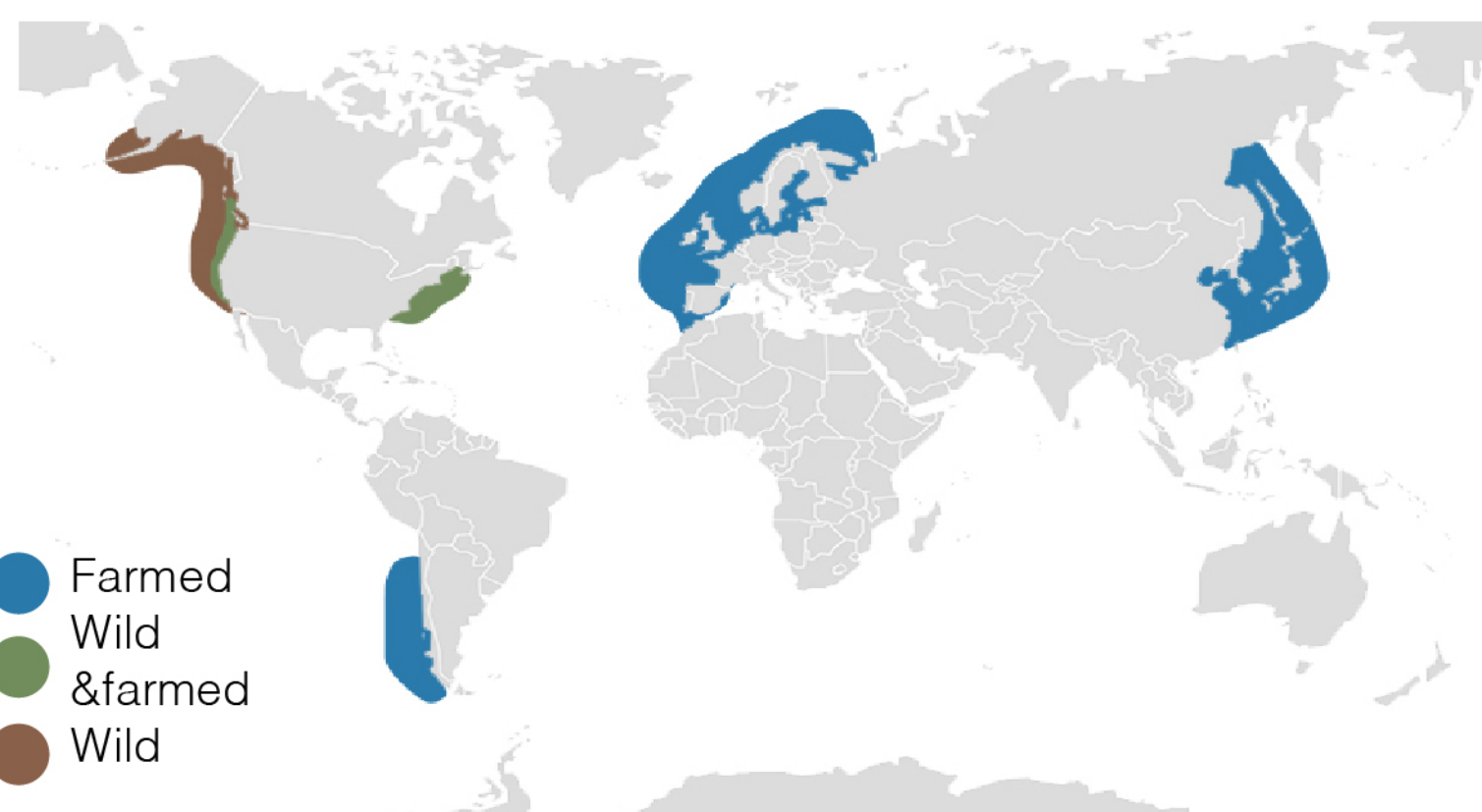
## Species research and structure design



2-5in

### Blue Mussel:

Blue mussel is a key stone of the marsh land biosystem. It has a strong adaptive ability to live in the estuary environment. Once it caught the hard surface of the intertidal zone, it will stay there for years. Blue mussel is not only a kind of food to attract sea birds, but also it can act as a filter to clean the polluted water along the edge.



### Habitat:

Blue mussels are boreo-temperate invertebrates that live in intertidal areas attached to rocks and other hard substrates by strong (and somewhat elastic) thread-like structures called byssal threads, secreted by byssal glands located in the foot of the mussel.



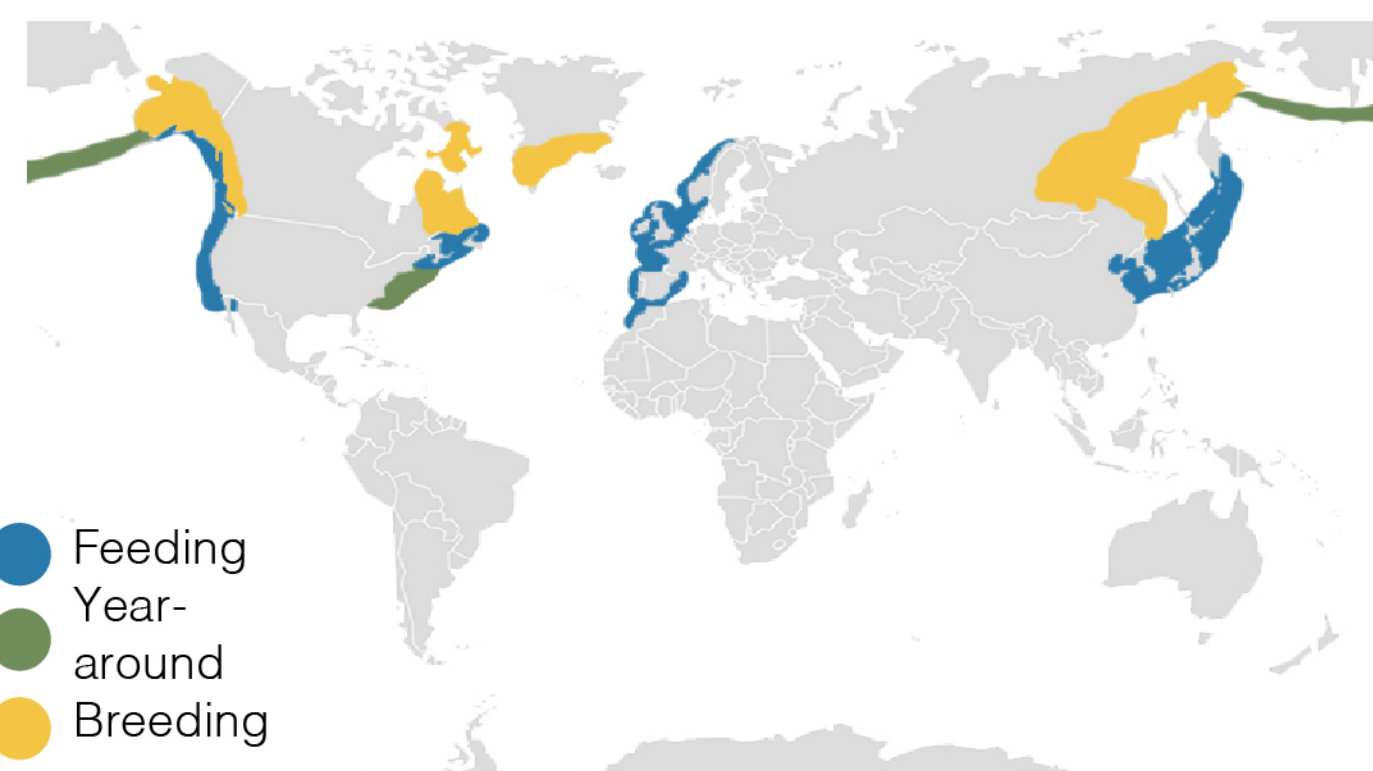
### Water condition:

Temperature: 15–20 °C  
Salinities: between 15 and 35 ppt and 20 at 35 ppt at 20 °C (68 °F) ±10ppt, Although larvae from the high salinity populations can settle in estuaries, they die within a few months after settlement  
pH level: 7.5 to 9.3

### Surf Scoter:

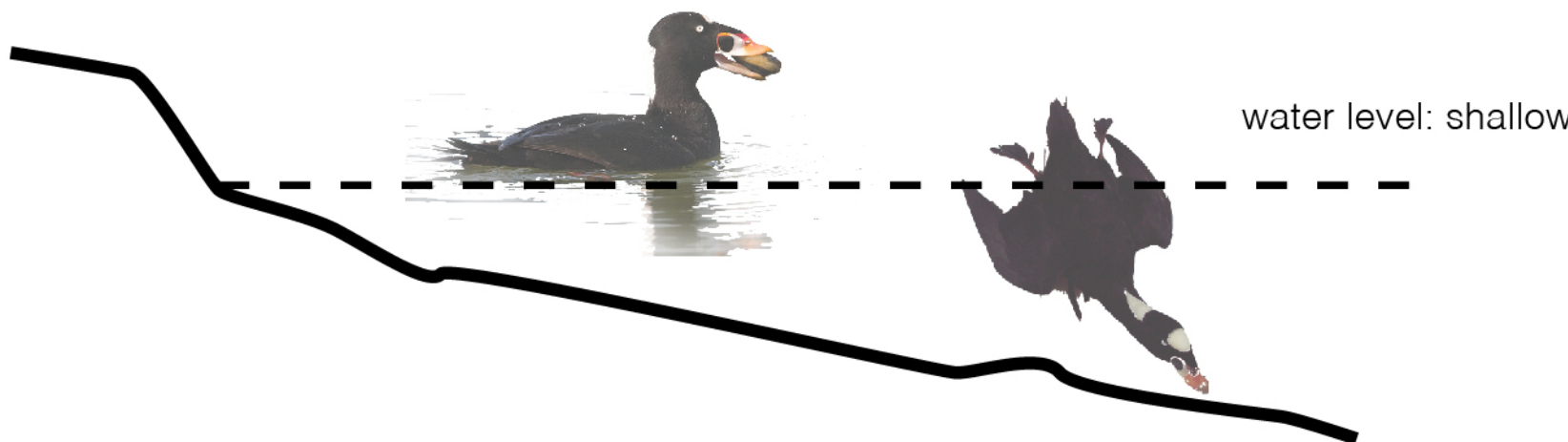
The surf scoter (*Melanitta perspicillata*) is a large sea duck, which breeds in Canada and Alaska. It is placed in the subgenus *Melanitta*, along with the velvet and white-winged scoters, distinct from the subgenus *Oidemia*, black and common scoters.

It winters farther south in temperate zones, on the coasts of the northern United States.



Breeds on shallow lakes in boreal forest and tundra. Winters in shallow marine coastal waters, usually over pebble and sand bottom.

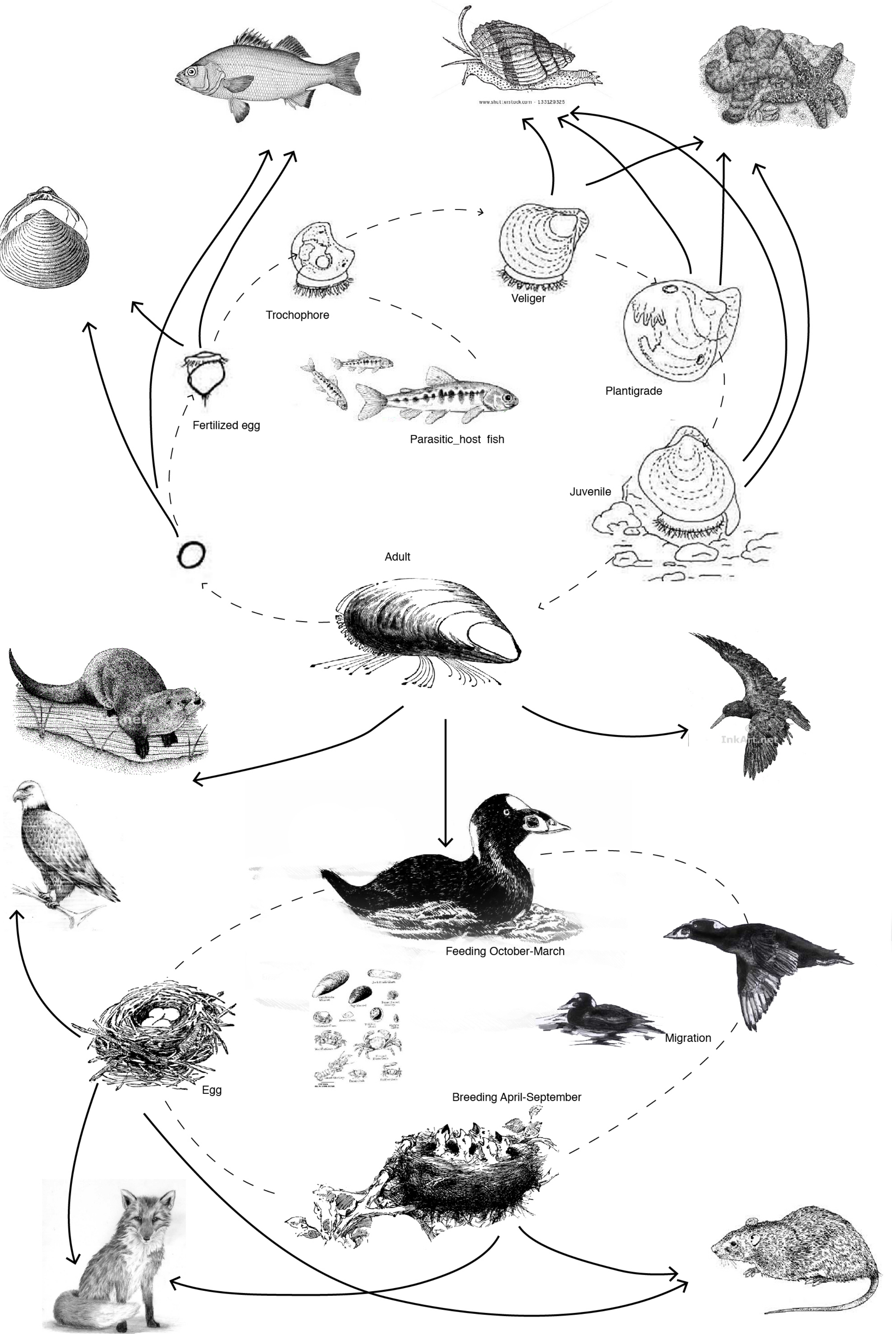
Name comes from their swimming habits. Always they can be found just beyond or in breaking waves. Dives for prey on or near bottom.



### Food chain and life circle:

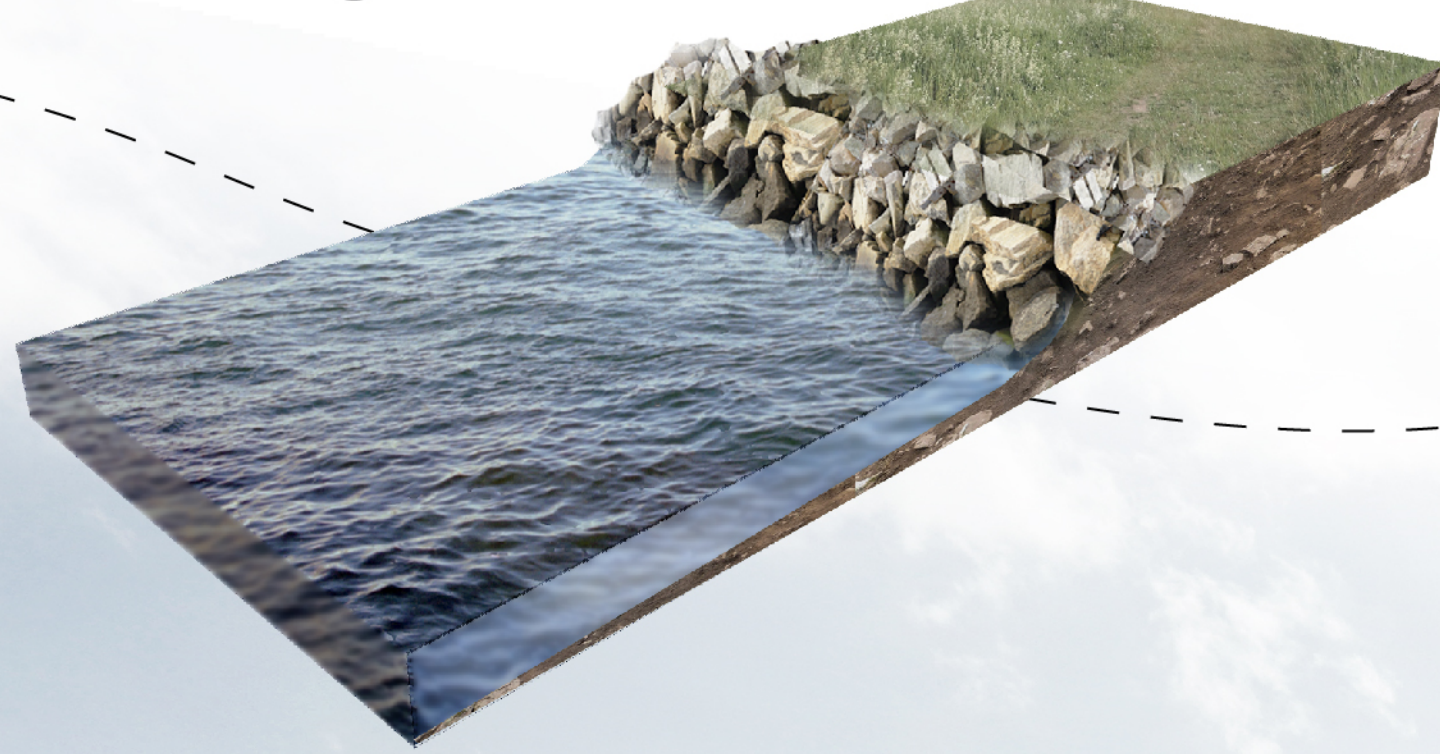
Mussels are bivalve mollusks, which means they have a hinged shell-like clams, oysters, and scallops. Blue mussels produce hundreds of thousands of eggs. Once hatched, larvae are highly mobile and drift around in the water column for 2-3 weeks before attaching to a substrate.

Surf scoter's nest is built on the ground close to the sea, lakes or rivers, in woodland or tundra. 5-9 eggs are laid. An egg may range from 55–79 g (1.9–2.8 oz) and average 43.9 mm (1.73 in) in breadth and 62.4 mm (2.46 in) in length. Occasional (and likely accidental) brood mixing between different females occurs in areas with high densities of nests. Growth is relatively rapid and the incubation period is about 28 to 30 days. The offspring will fledge independently at about 55 days.

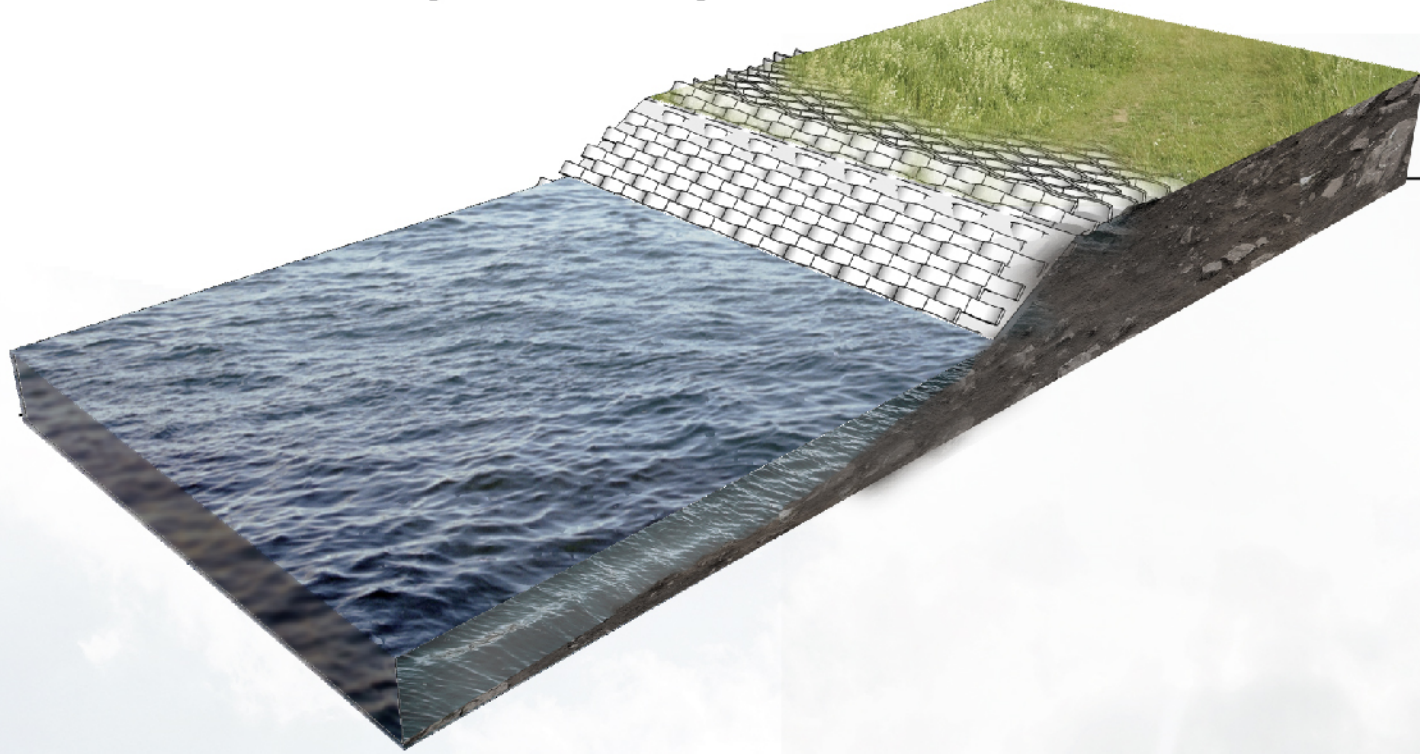


— Predator  
- - - Symbiosis

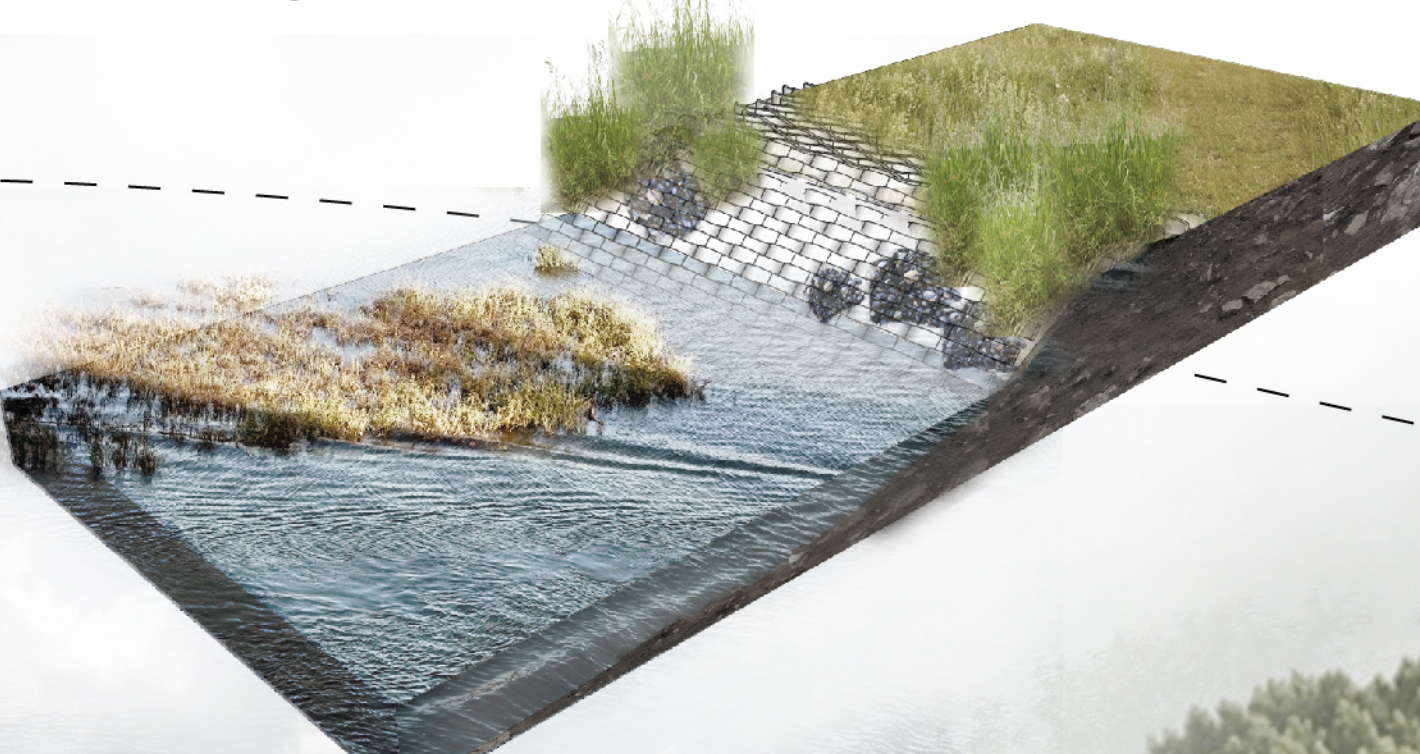
### Existing condition



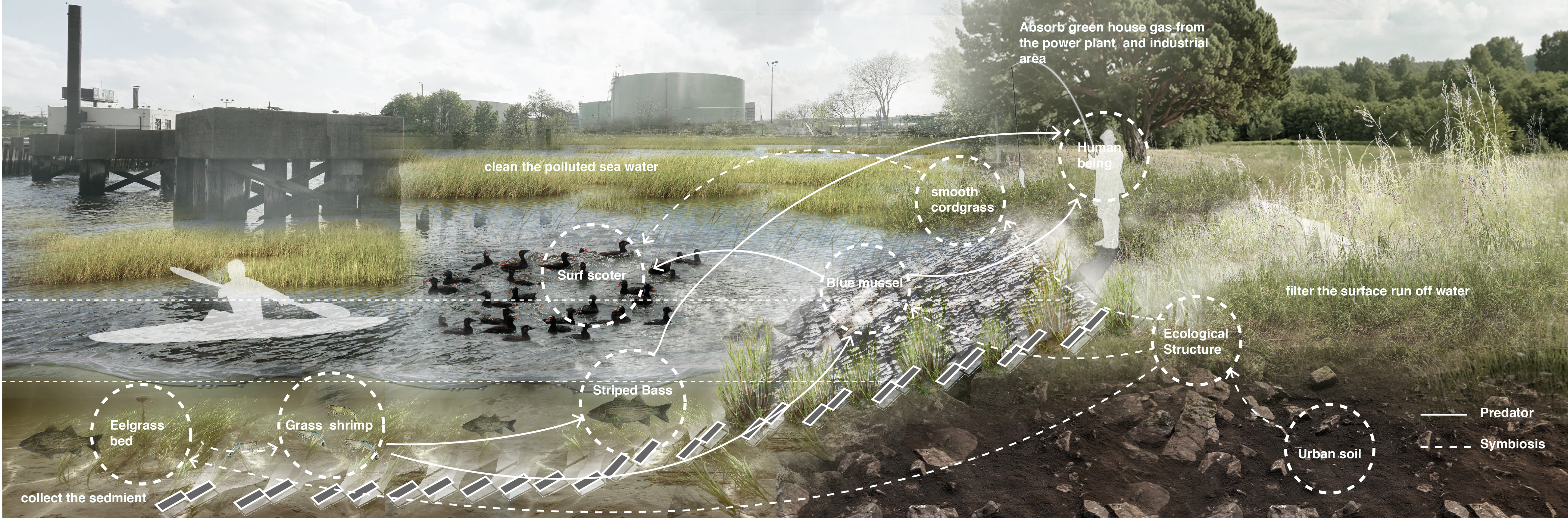
### Proposed plan



### 10 years after



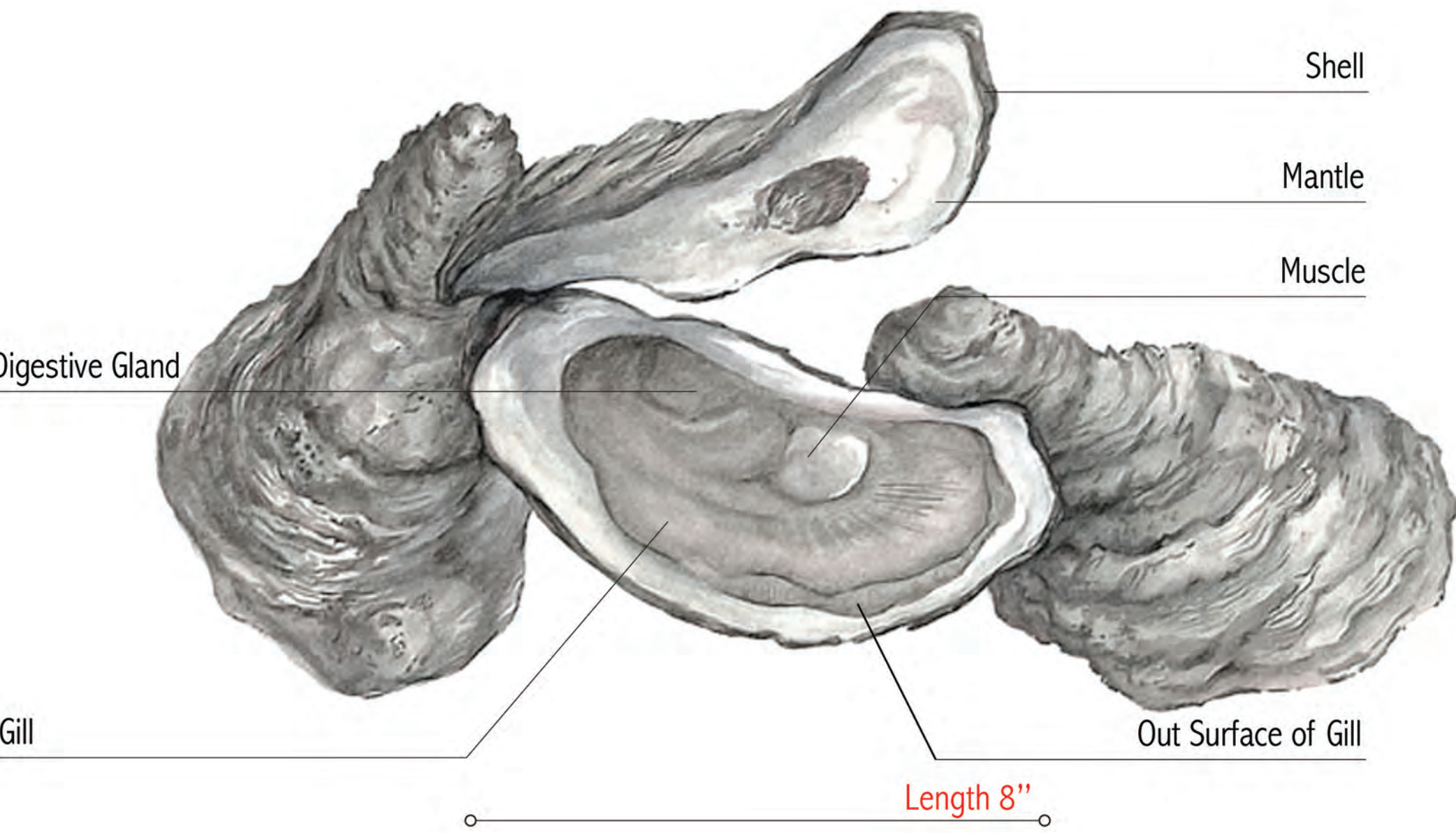
### 25 years after





# EASTERN OYSTER

*Crassostrea virginica*



**Description:**

Valve (shell) length of the eastern oyster reaches up to 8 inches. Its two shells (called "valves," hence the name bivalve) attach together at one end by a natural hinge and by a single large muscle. The pale white to gray shell is rough with ridges or bumps.

**Habitat:**

Eastern oysters are abundant in shallow saltwater bays, lagoons and estuaries, in water 8 to 25 feet deep

**Predator & Prey:**

The eastern oyster feeds on plankton and algae. It has numerous predators, including birds such as the American oystercatcher, ocean dwellers such as sea anemones, sea stars, sea nettles, some parasites, and humans.

