6-1-1990

Animals of Intertidal Sand and Mudflats, a Glance

Kirk J. Havens
Virginia Institute of Marine Science

Virginia Institute of Marine Science, Wetlands Program

Wetlands Program

June 1990 No. 90-1

Technical Report

College of William and Mary
Virginia Institute of Marine Science
School of Marine Science
Wetlands Program
Gloucester Point, Virginia 23062

Dr. Carl Hershner, Program Director

Commonwealth's Declared Policy:

"to preserve the wetlands and to prevent their despoliation and destruction. . ."

Partial funding provided by the Office of Coastal Resources Management, NOAA

Printed on recycled paper

Animals of the Intertidal Sand and Mud Flats

(a glance)

Kirk J. Havens

In 1982, recognizing the value of intertidal sand and mud flats, the Virginia General Assembly amended the Wetlands Act of 1972 to include these nonvegetated wetlands and incorporated them into the Commonwealth's Declared Policy "to preserve the wetlands and to prevent their despoliation and destruction and to accommodate necessary economic development in a manner consistent with wetlands preservation." The Commonwealth's Wetlands Guidelines classify intertidal sand and mud flats as Group Two wetlands types that warrant a high order of protection.

While a casual observer might dismiss intertidal sand and mud flat areas as unimportant and lifeless, a close examination will reveal a myriad of creatures and activities on and just below the sediment surface. As many as 300 different species of invertebrates can be found burrowing or scurrying about the mud and sand grains.

In an area roughly the size of an average desk top, there can be as many as 8,300 animals.

These animals range from microscopic organisms to worms almost four feet long. Some tunnel through the sediments ingesting mud and stripping the grains of attached organic matter, while others build burrows from which they venture to capture prey or filter out microscopic plants called plankton. Still others wander over the surface feeding on algae or burrow deep within the substrate searching for prey.

As they retreat into their burrows, the animals themselves may remain hidden, however signs of their presence are evident everywhere to one who knows what to look for. Burrow holes and mounds of fecal pellets are easily observed as the tide recedes and faint tracks across the surface can be seen by those unafraid to get their hands and knees muddy.

The Lugworm, *Arenicola cristata*, lives deep below the surface and feeds by ingesting muds and digesting any organic matter found among the grains. The lugworm tills marine soils much like an earthworm tills garden soils. A telltale sign of the lugworm is a hole surrounded by a soft coil of sand and, a short distance off, a funnel-shaped depression.

(continued)

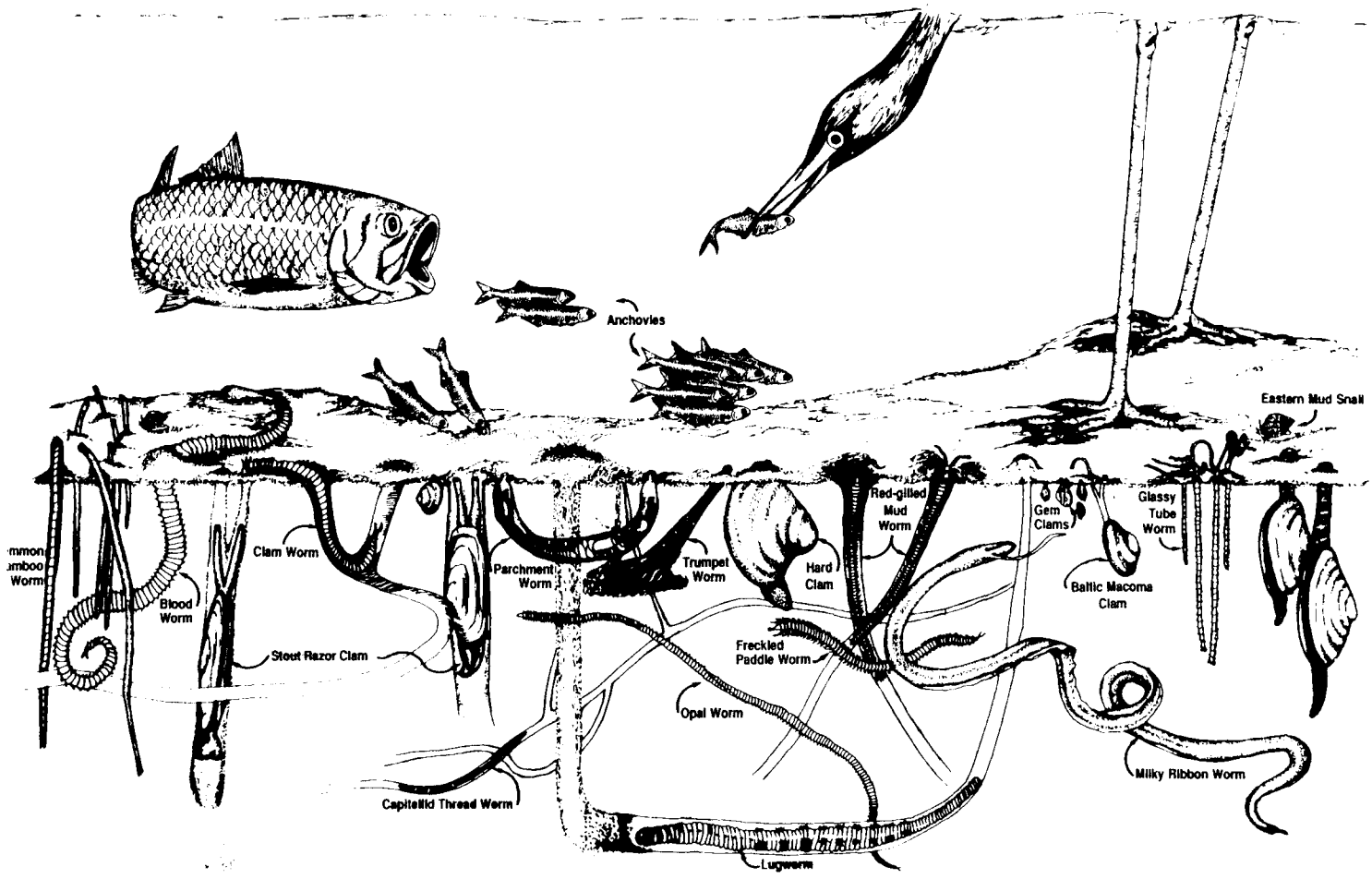
The Parchment Worm, *Chaetopterus variopedatus*, grows to about 10 inches and lives in a U-shaped tube, usually with a couple of small crabs as permanent tube guests. The parchment worm feeds by pumping water through it's tube and trapping plankton and other suspended organic matter on a net of mucus. It is strangely bioluminescent which is somewhat surprising for an animal that is blind and lives buried in the bottom. Yet, when the tube opening is disturbed, a blue luminous cloud of mucus is released and the worm retreats to the opposite end of its tube. This is possibly a mechanism to avoid being eaten by startling a potential predator.

The Milky Ribbon Worm, *Cerebratulus lacteus*, is a white to yellow-pink worm that reaches lengths of about three to four feet, though some specimens have been reported to reach 20 feet. The milky ribbon worm roams the flats in search of prey, generally clams and polychaetes. Upon locating a clam, the ribbon worm will attack the clam's foot to prevent the bivalve from retreating into it's burrow. It burrows by generating waves along its body and swims by flattening its body and writhing like an eel. During the spring and summer breeding season, the milky ribbon worm turns a dark-reddish color.

The Clamworm, *Nereis succinea*, is one of the most abundant worms in the Chesapeake Bay. It grows to about six inches, but is generally much smaller. The anterior of the clamworm is brown and a slightly different shape from the reddish posterior. There is also a blood streak down the middle of the back. The clamworm is an aggressive predator that will also feed on dead fish and algae.

These are just a sample of some of the worms found in the sand and mud flats. There are many, many more with diverse feeding behaviors such as the Common Bamboo Worm, Trumpet Worm, Freckled Paddle Worm, Barred-gilled Mud Worm, Red-gilled Mud Worm, Opal Worm, Bloodworm, Capitellid Thread Worm, Fringed-gilled Mud Worm, Glassy Tube Worm, Red-lined Worm, Chevron Worm, Plumed Worm, Ornate Worm and all are an important source of food for other marine organisms, especially bottom feeding fishes.

The Eastern Mud Snail, *Ilyanassa obsoleta*, is a common forager over mud flats and can sometimes be found in aggregations of



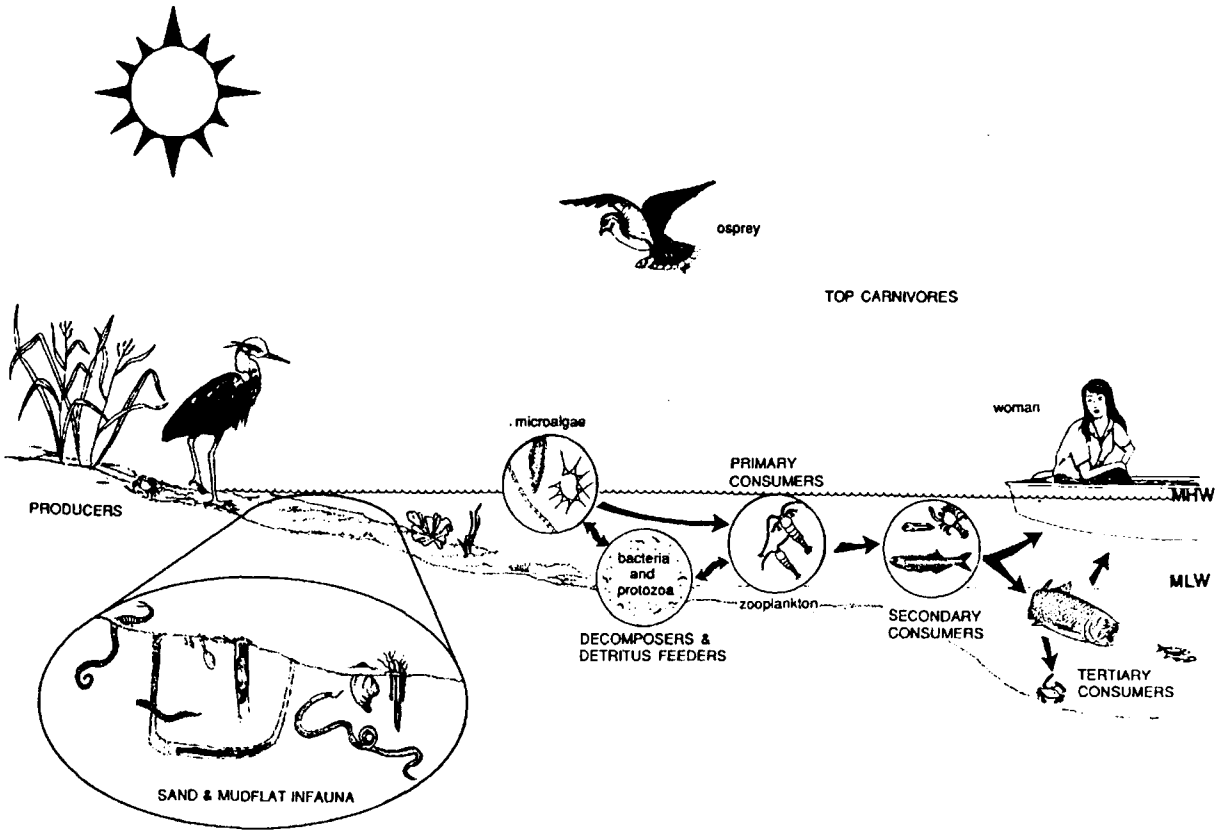
thousands of individuals. These snails feed primarily on algae on the sediment surface but will also feed on dead crabs, clams, or fish. As the snail travels across the mud surface, it leaves a mucus trail that other mud snails recognize and follow. However, if an individual is injured, a substance is released that causes other snails to quickly (for a snail) evacuate the area. An interesting aside is that the Eastern Mud Snail is the intermediate host of the parasite *Austrobilharzia variglandis* which, in the adult stage, is a blood fluke of shorebirds. The parasite's larvae are released into the water from the snails where they penetrate the skin of birds, enter the blood, and mature. The larvae will also penetrate the skin of swimming humans but, since they cannot enter the blood, will remain only briefly in the skin and result in an irritation we know fondly as "swimmers itch".

A number of clams inhabit the flats, from the tiny 1/8 inch Gem Clam, *Gemma gemma*, to the 10 inch Common Jackknife Clam, *Ensis directus*. These bivalves can be found literally packed side by side under the sediment surface. They feed by extending a pair of siphons above the bottom surface muds. One siphon draws in water from which plankton and detrital food is obtained along with dissolved oxygen. The other siphon expels waste. These bivalves serve to filter the water as they constantly pump water in and out. It has been estimated that prior to the 1870's there were so many bivalves in the bay that the entire water volume of the Chesapeake Bay was filtered through them every three to six days. Today, due to the significant reduction in bivalve populations (especially oysters), the water volume turnover estimate is every three hundred and twenty five days.

Amphipods are very small (5-8 mm) shrimplike crustaceans found throughout the bay. There are as many as 5,500 species of amphipods, however the two most common in the Chesapeake Bay's intertidal sand and mud flats are the Saltmarsh Flea, *Orchestia grillus*, and the Spine-backed Scud, *Gammarus mucronatus*. Amphipods graze algae from the bottom sediments and are a favorite food of many fish.

The Fiddler Crab, *Uca* sp., is easily recognized by the one large claw of the male. Fiddlers dig burrows along the upper reaches of the intertidal flats and emerge at low tide to feed on detritus and microalgae. As the tide rises, the fiddler retreats to its burrow and plugs it, sealing itself inside. Interestly, while the fiddler emerges from its burrow at low tide, it is not the absence of water that triggers its emergence from the burrow. Researchers have shown that the fiddler's biorhythm is tied to the lunar cycle and not the presence or absence of water over its burrow. If fiddlers are taken inland far from water, they still become active when low tide normally would have occurred.

The Blue Crab, *Callinectes sapidus*, is a frequent visitor to the intertidal flats. As the tide



rises, the blue crab will venture into the shallows to scavenge for food. Juvenile blue crabs will move into the shallow water of the sand and mud flats to escape predation. Blue crabs, as with all crustaceans, must shed their shell in order to grow. Immediately after shedding and before the blue crab's new shell has hardened, the animal is very vulnerable to predation. One avenue of protection that the blue crab utilizes is to move into shallow water to shed in an attempt to escape large predatory fish. What looks like numerous small dead blue crabs littering the waters edge, are actually the discarded exoskeletons of crabs that have recently shed their shells.

Some of the fish that forage in the intertidal area when the tide is high are juvenile Striped Bass, *Morone saxatilis*, juvenile Spot, *Leiostomus xanthurus*, juvenile White Perch, *Morone americana*, juvenile Menhaden, *Brevoortia tyrannus*, Anchovies, *Anchoa mitchilli*, Silversides, *Menidia* sp., Killifishes, *Fundulus* sp., American Eel, *Anguilla rostrata*, and many others. These fish forage in the shallows feeding on worms, amphipods, clams, and snails.

While fish are moving in from the water to forage in the intertidal flats, birds are scouting them from the air. The Great Blue Heron, *Ardea herodias*, can be seen standing in the shallows patiently waiting to capture a meal. The great blue heron will feed on just about anything it can swallow including fish, insects, frogs, crabs, snakes, turtles, mice and rats. The Northern Shoveler, *Anas clypeata*, uses its spoon-like bill to sift through the mud for worms and other small aquatic animals. The Oyster Catcher, *Hoematopus palliatus palliatus*, pries open oyster shells with its beak but will also eat shrimp, mussels, crabs and barnacles. The Clapper Rail, *Rallus longirostris*, moves in and out of the marsh vegetation to snatch fiddler crabs from the intertidal flats and will also feed on insects, small fish, and clamworms.

Upon close examination of the sand and mud surface another forager of the intertidal flats can be recognized. The Raccoon, *Procyon lotor*, is a frequent visitor who leaves distinctive footprints. The raccoon generally forages at night in search of anything it can find that is even slightly edible. In its evening raids to the flats, the raccoon may come across another predator cruising the shallows for fish, the Northern Water Snake, *Nerodia sipedon*.

All the animals in the intertidal flats form important strands in the food web. The smaller invertebrates feed on the primary producers, detritus, bacteria and microalgae, and in turn are fed upon by the larger animals. In this way the energy produced by the primary producers is transported out of the sand and mud flats to the upland via mammals, birds, snakes, etc., or out to the deeper waters via crustaceans and fish.

It is well worth the effort to scoop up and sift through a handful of mud or sand. The numerous different types of animals that inhabit this seemingly lifeless, constantly wet, land is overwhelming. The adventurous person who straps on a knapsack, grabs a field guide, struggles into hip boots and boldly strides forth into the mud flat will be amply rewarded with new and interesting discoveries (one of which is to have a friend along to give you a hand out of the mud.)

Suggested Reading

Lippson, Robert. 1984. *Life in the Chesapeake Bay.* The John Hopkins University Press, Baltimore and London.

Niering, William A. 1988. *The Audubon Society Nature Guide - Wetlands.* Alfred A. Knopf, Inc., New York, New York.

Teal, John and Mildred. 1969. *Life and Death of the Salt Marsh.* Ballantine Books, Inc., New York, New York.

Wetlands Program *Technical Report*

College of William and Mary
Virginia Institute of Marine Science
School of Marine Science
Gloucester Point, Virginia 23062