

Estuarine Sensitive Taxa Guild

Amphipod Crustaceans

Ampelisca abdita
Neohaustorius schmitzi
Parahaustorius longimerus
Protohaustorius wigleyi
Rhepoxynius hudsoni

Isopod Crustaceans

Cyathura sp.

Bivalve Mollusks

Tellina sp. (Tellin clam)

Polychaete Worms

Aphelochaeta sp.
Caulleriella sp.
Mediomastus sp.
Monticellina sp.
Streblospio benedicti
Tharyx acutus
Tubificoides sp.
Tubificoides wasselli

Contributor (2014): Stacie Crowe (SCDNR)

DESCRIPTION

The members of the Estuarine Sensitive Taxa Guild are benthic macrofauna commonly found in South Carolina estuaries that have been identified as pollution sensitive by a benthic index of biological integrity for assessing habitat quality in estuaries of the southeastern USA (Van Dolah et al. 1999). Benthic macrofauna serve as ecologically important components of the food web by consuming detritus, plankton, and smaller organisms living in the sediments and in turn serve as prey for finfish, shrimp, and crabs. Benthic macrofauna are also relatively sedentary, and many species are sensitive to changing environmental conditions. As a result, these organisms are important biological indicators of water and sediment quality and are valuable to monitoring programs that assess overall coastal and estuarine health (Hyland et al. 1999; Van Dolah et al. 1999).

Taxonomy and Basic Description

Amphipods are in the taxonomic order Amphipoda of malacostracan crustaceans which have no carapace and generally laterally compressed bodies. Amphipods in the family Ampeliscidae are distributed worldwide. Ampeliscid amphipods are often the dominant amphipod group in fine



Estuarine Habitat in South Carolina. Photo courtesy of SCDNR.

sediment areas where they live in infaunal tubes that they construct from ‘amphipod silk’ and sediment (Barnard 1960, 1969). *Ampelisca* species have four eyes, each with a thickened lens (Ruppert and Fox 1988). Members of the Ampeliscidae can be difficult to distinguish from one another. The common species in South Carolina estuaries, *Ampelisca abdita*, is characterized by subtle differences from other species in its epimeral plates and uropods.

Neohaustorius schmitzi, *Parahaustorius longimerus* and *Protohaustorius wigleyi* are burrowing amphipods of the family Haustoriidae. Haustorids are characterized by their white, barrel-shaped body and the lack of a true rostrum and dactyls on pereopods 3-7.

The amphipod family Phoxocephalidae is a strictly marine group of abundant, free-living benthic amphipods that primarily inhabit soft substrates as burrowers. *Rhepoxinius hudsoni* is a common phoxocephalid amphipod in Southeastern US estuaries, differentiated from a similar species, *R. epistomus*, by a spine and the setal patterns of the uropods and epimera (Barnard and Barnard 1982).

Cyathura sp. are members of the crustacean order Isopoda that are small (1 in. or 2.5 cm) and often confused with amphipods. Unlike amphipods, isopods are dorsoventrally flattened (depressed) and have no carapace. *Cyathura* species commonly found in South Carolina, namely *C. polita* and *C. burbancki*, are distinguished by whether or not the sixth pleonal segment is fused to the telson.

Species of the genus *Tellina* are members of the bivalve family Tellinidae. Tellin clams are small (usually < 1 inch), laterally compressed, and usually have a slight twist at the posterior end (Abbot 1974). Color can vary from iridescent white to pale pastels.

Aphelochaeta, *Caulleriella*, *Monticellina* and *Tharyx* are all genera belonging to the polychaete family Cirratulidae. Members of this family are cylindrical, elongate (up to 25 cm), and characterized by cone or wedge-shaped heads that have no antennae. Cirratulid bodies are generally cylindrical, tapering at both ends, and are characterized by a large number of long, simple, thread-like hairs along the body. Some of the “hairs” occur as clusters of tentacles on the head and are grooved to facilitate deposit-feeding.

Species of the genus *Mediomastus* are members of the polychaete family Capitellidae. Capitellid worms are red or purple in color with thread-like, flexible bodies that grow up to 4 in. (10 cm) in length. They are characterized by their conical shaped head and reduced appendages.

Streblospio benedicti is a member of the tube-dwelling polychaete family, Spionidae. Spionids, or palp worms, are characterized by their small heads and two long grooved palps used for deposit or suspension feeding. Spionids are mostly small (<15 cm), but large species do exist.

Tubificoides wasselli and other *Tubificoides* species are worms in the class Oligochaeta. Oligochaete worms are distinguished from polychaete worms by their lack of parapodia and a



The polychaete worm, *Streblospio benedicti*. Photo courtesy of Southeastern Regional Taxonomic Center (SERTC).

reduced prostomium (head) which lacks appendages. Marine oligochaetes resemble earthworms in appearance although they are much smaller (~1in. or 2.5 cm) (Ruppert and Fox 1988).

Status

None of the species in this guild are officially recognized as threatened or endangered, but all are part of the benthic macrofaunal community in Southeastern US estuarine habitats. The benthic macrofaunal community serves as an important source of food for juvenile finfish, such as spot (*Leiostomus xanthurus*) and weakfish (*Cynosion regalis*), and are also used as an early indicator of degraded habitats.

POPULATION SIZE AND DISTRIBUTION

The ampeliscid amphipod, *A. abdita*, is found in fine or silty sand in the protected waters of estuaries and bays from central Maine to the Indian River Lagoon system in Florida (Bousfield 1973; LeCroy 2000). Population size estimates are difficult to establish due to spatial and seasonal variation; however, the South Carolina Estuarine and Coastal Assessment Program (SCECAP) has recorded abundances as high as 25,000 individuals per m² in estuarine areas (Bergquist et al. 2009, 2011; Van Dolah et al. 2002a, 2004, 2006, 2013).

Haustorid amphipods are very abundant along the intertidal gradient of the US East Coast (Bliss et al. 1983). The haustorid amphipods in this guild range from Saco Bay, ME through Cape Canaveral, FL (Bousfield 1973; Grant and Lazo-Wasem 1982). Although the distribution of this group is well documented, population size can vary considerably by location and season and would be difficult to quantify.

The phoxocephalid amphipod, *R. hudsoni*, is found burrowed in sandy areas from Maine to South Carolina at depths from 4 to 161 m. Abundances recorded from the SCECAP program range from 22-9,150 individuals per m² (Bergquist et al. 2009, 2011; Van Dolah et al. 2002a, 2004, 2006, 2013).

Isopods in the genus *Cyathura* range from Maine to Florida in the Eastern US. Abundances recorded from the SCECAP program range from 22-1,089 individuals per m² (Bergquist et al. 2009, 2011; Van Dolah et al. 2002a, 2004, 2006, 2013).

Members of the Tellinidae family, especially the genus *Tellina*, are very common on the South Carolina coast (Ruppert and Fox 1988). Due to the numerous species within this genus, population size is difficult to estimate. Most of the species commonly found in the Southeastern US range from the Mid-Atlantic (Virginia/North Carolina) to Florida (Abbott 1974).

Cirratulids in the genera *Aphelocheata*, *Caulleriella*, *Monticellina* and *Tharyx* are found worldwide, and most species range from the Gulf of Maine through Florida on the East Coast of the US. Little has been reported on population estimates of cirratulids; however, a benthic invertebrate survey in New York reported *T. acutus* abundances of 80 individuals per m² (USACE 2004).

Mediomastus sp. are very abundant on the East Coast of the US. Identifications to species level in the genus *Mediomastus* are often difficult due to the collection of incomplete worms, but there are several species that occur in high abundances on the US Atlantic Coast.

The spionid polychaete, *Streblospio benedicti* occurs along the Atlantic US coast from Maine south to Florida. Studies on *S. benedicti* abundance on the East Coast have reported the species to be among the most abundant and characteristic taxa occurring in Gulf of Maine mud flats (Larsen and Dogget 1991) and among four taxa dominating North Carolina saltmarsh macrofauna (Cammen 1979). In South Carolina, *S. benedicti* is one of the most abundant invertebrates found in estuarine samples with abundances ranging from 25 to ~14,000 individuals per m² (Bergquist et al. 2009, 2011; Van Dolah et al. 2002a, 2004, 2006, 2013).

Members of the family Tubificidae (*T. wasselli*, *Tubificoides* sp.) found in the Southeastern US appear to be specific to the zoogeographic region from Cape Hatteras to Florida (Baker 1984). SCECAP abundances from 1999-2010 range from 22 to 14,589 individuals per m² (Bergquist et al. 2009, 2011; Van Dolah et al. 2002a, 2004, 2006, 2013).

HABITAT AND NATURAL COMMUNITY REQUIREMENTS

Members of the estuarine sensitive taxa guild are benthic macrofauna that live in estuarine habitats in South Carolina's Coastal Zone. The sheltered waters of estuaries provide habitat for many organisms that are specially adapted for life in a range of salinities. The macrofauna in this guild are found in the many types of habitats in and around estuaries, including shallow open waters, salt marshes, swamps, sandy beaches, mud and sand flats, rocky shores, and oyster reefs.

Ampeliscid amphipods are infaunal organisms that live in protected sand flats. They prefer muddy or sandy bottoms where they build lined tubes embedded with sediment grains. The tubes project above the surface of the sediment where the amphipods use water currents or their appendages for filter feeding.

Haustorid amphipods are free-swimming amphipods which are adapted for burrowing in sandy or silty substrate. They prefer a variety of intertidal areas including exposed and protected beaches, inlet entrances, and estuaries with fine sand or mud. They can be found from mean low water to a depth of 50 m, in salinities from 6 ppt to fully marine, depending on the species (Bousfield 1973).

Phoxocephalids, such as *R. hudsoni*, are free-living benthic amphipods that primarily inhabit soft substrates as burrowers. They are omnivorous, detritivores, and opportunistic predators found in all oceans and at all depths.

Cyathura species of isopods burrow in mud and muddy sand and have a high tolerance for changes in physical factors such as salinity that occur commonly in shallow water estuarine habitats (Schultz 1969).

Tellinid clams are mud or sand dwellers with a worldwide distribution. The tellinids are active infaunal burrowers in soft sediments, usually in the silty sand of protected beaches (Ruppert and Fox 1988). Unlike other bivalves, tellinids are deposit feeders who burrow horizontally through the sediment to seek fresh deposits of particulate organic material.

Capitellid worms, such as *Mediomastus* sp., are sedentary deposit feeders that often occur in mud or muddy sand on the lower shore to sub-littoral zone. They may be found under pebbles or small stones, with the burrows at or near the surface of the sediment where they feed on deposited organic material (Ruppert and Fox 1988).

Members of the polychaete family Cirratulidae (*Aphelochaeta* sp., *Caulleriella* sp., *Montecellina* sp., *Tharyx acutus*) are sluggish-type worms that inhabit medium to fine sand or muddy sediments. Cirratulids mostly burrow in soft sediments, but some live in rock crevices. They can be found buried just below the surface of the sediment with only their feeding appendages exposed.

Streblospio benedicti prefers soft sediments in which it can form a mucoid tube just below the sediment-water interface that allows it to deposit feed. *Streblospio benedicti* is relatively tolerant of elevated levels of sediment organics (Reish 1979), a trait that contributes to its success as an opportunistic species.

Tubificoides wasselli and other *Tubificoides* species are common in estuarine habitats in South Carolina, especially those habitats with a high organic content (Ruppert and Fox 1988).

CHALLENGES

South Carolina's Coastal Zone includes a variety of sensitive habitats that serve as critical nursery grounds for most of the State's commercial and recreational fisheries resources. Rapid population growth and development along South Carolina's coastline threaten the vitality of our state's natural marine resources. In addition to their natural beauty and ecosystem functions, these resources support recreational and commercial fishing industries worth hundreds of millions of dollars and tourism that brings billions of dollars to the State annually. As with most coastal states, population growth in the coastal counties has been rapidly increasing in recent years, a trend that is expected to continue. The ongoing urbanization of our coast, combined with increased recreational utilization of our coastal waters, will result in an escalating potential for serious impacts on South Carolina's estuarine and coastal habitats.

CONSERVATION ACCOMPLISHMENTS

In South Carolina, the SCECAP program was established in 1999 to begin evaluating the overall health of the State's estuarine habitats. SCECAP represents an expansion of ongoing monitoring programs being conducted by both state and federal agencies and ranks among the first in the country to apply a comprehensive, ecosystem-based assessment approach for evaluating coastal habitat condition.

CONSERVATION RECOMMENDATIONS

Effective habitat management requires monitoring on a periodic basis to evaluate coastal habitat condition. SCECAP's goal is to monitor the conditions of the State's estuarine habitats and provide periodic reports to both coastal managers and the general public. The program monitors a suite of water quality, sediment quality, and biological condition parameters at a large number of sites throughout the State's Coastal Zone each year, and integrates these measurements into an overall assessment of estuarine habitat condition at individual sites and statewide. The program also expands historical monitoring activities that have primarily focused on open water habitats (e.g. bays, sounds, tidal rivers) to include an assessment of environmental conditions in tidal creeks, which serve as important nursery habitats for most of the State's economically valuable species. Many of these tidal creeks are also the first point of entry for upland runoff and therefore provide an early indication of stress related to coastal development, agriculture, and industrial

activities. (Holland et al. 1997; Sanger et al. 1999a,b; Lerberg et al. 2000; Van Dolah et al. 2000).

MEASURES OF SUCCESS

The members of this guild inhabit the estuarine areas of South Carolina's extensive Coastal Zone and are thereby directly affected by increased utilization of that area. Measures of success for this guild will directly correlate with continued efforts to protect our coastal habitats from degradation.

LITERATURE CITED

- Abbott, R.T. 1974. American Seashells: The Marine Mollusca of the Atlantic and Pacific Coasts of North America, 2nd Edition. Van Nostrand Reinhold Company, New York. 663pp.
- Baker, H.R. 1984. Diversity and zoogeography of marine Tubificidae (Annelida, Oligochaeta) with notes on variation in widespread species. *Hydrobiologia* 115(1): 191-196.
- Barnard, J.L. 1960. The amphipod family Phoxocephalidae in the Eastern Pacific Ocean, with analyses of other species and notes for a revision of the family. Allan Hancock Pacific Exped., vol. 18, pp. 175-368, pls. 1-75, 1 chart
- Barnard, J.L. 1969. The Families and Genera of Marine Gammaridean Amphipoda. Smithsonian Institution Press, Washington, D.C. 529pp
- Barnard, J.L. and C.M. Barnard. 1982. The Genus *Rhepoxynius* (Crustacea: Amphipoda: Phoxocephalidae) in American Seas. Smithsonian Contributions to Zoology Number 357. Smithsonian Institution Press, Washington, D.C. 49pp
- Bergquist, D.C., R.F. VanDolah, G.H.M. Riekerk, M.V. Levisen, S.E. Crowe, L. Brock, D.I. Greenfield, D.E. Chestnut, W. McDermott, M.H. Fulton, E. Wirth, and J. Harvey. 2009. The Condition of South Carolina's Estuarine and Coastal Habitats During 2005-2006: Technical Report. Charleston, SC: South Carolina Marine Resources Division. Technical Report No. 103. 69pp.
- Bergquist, D.C., R.F. VanDolah, G.H.M. Riekerk, M.V. Levisen, S.E. Crowe, D.E. Chestnut, W. McDermott, M.H. Fulton and E. Wirth.. 2011. The Condition of South Carolina's Estuarine and Coastal Habitats During 2007-2008. Technical Report. Charleston, SC: South Carolina Marine Resources Division. Technical Report No. 106. 64pp.
- Bliss, D.E., J.H. Vernberg. and W.B. Vernberg. 1983. Biology of Crustacea, Volume 7: Behavior and Ecology. Academic Press, Inc. New York, NY. 364pp.
- Bousfield, E.L. 1973. Shallow-water Gammaridean Amphipoda of New England. Cornell University Press, Ithaca, N.Y., 312pp.
- Cammen, L.M. 1979. The macro-infauna of a North Carolina saltmarsh. *The American Midland Naturalist* 102:244-253

- Grant, J. and E.A. Lazo-Wasem, 1982. Systematics and ecology of the estuarine amphipod crustacean *Lepidactylus dytiscus* Say, 1818 (Haustoriidae). *Canadian Journal of Zoology* 60(9): 2039-2045.
- Holland, A.F., D.M. Sanger, C.P. Gawle, S.B. Lerberg, M.S. Santiago, G.H.M. Riekerk, L.E. Zimmerman and G.I. Scott. 2004. Linkages between tidal creek ecosystems and the landscape and demographic attributes of their watersheds. *Journal Experimental Marine Biology & Ecology* 298:151-178.
- Hyland, J.L., R.F. Van Dolah and T.R. Snoots. 1999. Predicting stress in benthic communities of southeastern US estuaries in relation to chemical contamination of sediments. *Environmental Toxicology and Chemistry* 18(11): 2557-2564.
- Larsen, P.F. and L.F. Dogget. 1991. The macroinvertebrate fauna associated with the mud flats of the Gulf of Maine. *Journal of Coastal Research* 7(2):365-375.
- LeCroy, S. E. 2002. An Illustrated Identification Guide to the Nearshore Marine and Estuarine Amphipoda of Florida, Volume 2: Families Ampeliscidae, Amphilochidae, Ampithoidae, Aoridae, Argissida and Haustoriidae. Annual Report for DEP Contract Number WM724. 300pp
- Lerberg, S.B., A.F. Holland and D.M. Sanger. 2000. Responses of tidal creek macrobenthic communities to the effects of watershed development. *Estuaries* 23:838-853.
- Reish, D. J. 1979. Bristle worms (Annelida: Polychaeta). In: Hart, C. W., Fuller, S. L. H. (ed.) Pollution ecology of estuarine invertebrates. Academic Press, New York. p. 77-125
- Ruppert, E.E. and Fox, R. 1988. Seashore Animals of the Southeast: a guide to common shallow-water invertebrates of the southeastern Atlantic Coast. The University of South Carolina Press, Columbia, SC. 429 pp.
- Sanger, D.M., A.F. Holland, and G.I. Scott. 1999a. Tidal creek and salt marsh sediments in South Carolina coastal estuaries. I. Distribution of trace metals. *Archives of Environmental Contamination and Toxicology* 37: 445-457
- Sanger, D.M., A.F. Holland, and G.I. Scott. 1999b. Tidal creek and salt marsh sediments in South Carolina coastal estuaries. II. Distribution of organic contaminants. *Archives of Environmental Contamination and Toxicology* 37: 458-471.
- Schultz, G.A. 1969. The Marine Isopod Crustaceans. Wm. C. Brown Co Publishers, Dubuque, Iowa. 359pp.
- USACE-New York District. 2004. Benthic Invertebrate Survey: East of Shinnecock Inlet to East of Fire Island Inlet.
- Van Dolah, R.F., J.L. Hyland, A.F. Holland, J.S. Rosen, and T.R. Snoots. 1999. A benthic index of biological integrity for assessing habitat quality in estuaries of the southeastern USA. *Marine Environmental Research* 48: 269-283.
- Van Dolah, R.F., P.C. Jutte, G.H.M. Riekerk, M.V. Levisen, L.E. Zimmerman, J.D. Jones, A.J. Lewitus, D.E. Chestnut, W. McDermott, D. Bearden, G.I. Scott, M.H. Fulton. 2002a. The Condition of South Carolina's Estuarine and Coastal Habitats During 1999-2000: Technical Report. Charleston, SC: South Carolina Marine Resources Division. Technical Report No. 90. 132p.

- Van Dolah, R.F., D.E. Chestnut and G.I. Scott. 2000. A baseline assessment of environmental and biological conditions in Broad Creek and the Okatee River, Beaufort County, South Carolina. Final Report to Beaufort County Council, 281 pp.
- Van Dolah, R.F., P.C. Jutte, G.H.M. Riekerk, M.V. Levisen, S.E. Crowe, A.J. Lewitus, D.E. Chestnut, W. McDermott, D. Beardon, and M.H. Fulton. 2004. The Condition of South Carolina's Estuarine and Coastal Habitats During 2001-2002: Technical Report. Charleston, SC: South Carolina Marine Resources Division. Technical Report No. 100. 70 p.
- Van Dolah, R.F., D.C. Bergquist, G.H.M. Riekerk, M.V. Levisen, S.E. Crowe, S.B. Wilde, D.E. Chestnut, W. McDermott, M.H. Fulton, E. Wirth, and J. Harvey. 2006. The Condition of South Carolina's Estuarine and Coastal Habitats During 2003-2004: Technical Report. Charleston, SC: South Carolina Marine Resources Division. Technical Report No. 101. 70 pp.
- Van Dolah, R.F., D.M. Sanger, G.H.M. Riekerk, S.E. Crowe, M.V. Levisen, D.C. Bergquist, D.E. Chestnut, W. McDermott, M.H. Fulton and E. Wirth,. 2013. The Condition of South Carolina's Estuarine and Coastal Habitats During 2009-2010: Technical Report. Charleston, SC: South Carolina Marine Resources Division. Technical Report No. 107. 48 pp.