HABITAT HOTLINE ATLANTIC

Atlantic States Marine Fisheries Commission Winter 2007, Volume XIV, Number 1

A Sneak Peak at Shellfish Habitat

Release of ASMFC Habitat Management Series #8

On February 1, 2007, the ASMFC Interstate Fisheries Mangement Program Policy Board approved for publication, "The Importance of Habitat Created by Molluscan Shellfish to Managed Species Along the Atlantic Coast of the United States," by Dr. Loren D. Coen and Dr. Raymond E. Grizzle. This document will be #8 in the ASMFC Habitat Management Series. While the document is going through the publication process, we thought we would give you a glance at its contents. An excerpt from the introduction for the publication follows:

Source: Janessa Cobb

Along the Atlantic coast of the continental United States, shellfish habitats occur in estuaries, nearshore coastal waters, and offshore on the continental shelf (Shumway and Kraeuter 2004), and provide numerous ecological services to these systems. Both bivalve and gastropod molluscs form these types of shellfish habitats. Two hinged 'valves' or 'shells' characterize bivalve shellfish (e.g., clams, mussels, and oysters). Gastropods (or snails) are sometimes called 'univalves' because they have a single, typically coiled shell. For both bivalves and gastropods, the shell structure, which functions as an exoskeleton, is composed of a matrix of calcium carbonate and organic materials and is secreted by the underlying soft mantle tissue.

Many shellfish species are consumed by finfish or other vertebrate and invertebrate predators (e.g., mammals, birds, finfish, other molluscs). Some shellfish support major commercial and recreational fisheries, and a subset create important habitats, particularly when they occur at high densities. The habitats created by molluscs can be classified into four major types: (1) reefs (veneer of living and dead animals), (2) aggregations (living and dead), (3) shell (dead) accumulations (often called 'shell hash'), and (4) marine shellfish aquaculture. Some habitats can be grouped into either category 2 or 3, depending on the relative abundance of dead shell versus live organisms.

The eastern oyster (*Crassostrea virginica*) and blue mussels (*Mytilus* spp.) are two major examples of reef-forming shellfish that occur along the Atlantic coast (Sellers and Stanley 1984; Burrell 1986). Before mechanized harvesting techniques were used, subtidal oyster reefs in some estuaries probably extended as much as several meters above the bottom, forming complex three-

(continued on page 2)

(*continued from page 1*)

dimensional structures that provided habitat for finfish and invertebrates (Galtsoff 1964; Dame et al. 1984a, 1984b; DeAlteris 1988; Kennedy and Sanford 1999; CBP 2001; Dame and Libes 1993; Smith et al. 2003). Today, subtidal oyster reefs rarely extend more than a few decimeters above the bottom; nonetheless, they provide important habitat for economically and ecologically important species (Bahr and Lanier 1981; Sellers and Stanley 1984; Breitburg 1988, 1989, 1991, 1999; Coen et al. 1999b; Posey et al. 1999; Peterson et al. 2003). Artificially enhanced oyster grounds can create extensive acres of "planted" beds, either with cultch for spat collection or the transfer of variously aged oysters for grow out (L. Stewart, University of Connecticut, personal communication).

Other shellfish that cement together to form reef-like structures can be found in a family of gastropods known as the Vermetidae (Safriel 1975). Alternatively, the sea scallop (*Placopecten magellanicus*) is an example of a species that does not form reefs, but often occurs in aggregations of adequate density to provide habitat for other species (Langton and Robinson 1990; Stokesbury 2002).

A third type of shellfish habitat is formed by ocean quahog (*Arctica islandica*), surf clam (*Spisula solidissima*), and other abundant bivalves (e.g., *Mercenaria* spp. and *Mya arenaria*), whose shells can persist long after the inhabiting organism has perished. Sometimes abandoned shells accumulate on the seabed of the continental shelf in sufficient quantities to provide significant structure and habitat for a variety of organisms (Dumbauld et al. 1993; Auster et al. 1995; Palacios et al. 2000; Steimle and Zetlin 2000; Stoner and Titgen 2003). During a lobster research study on post-larval habitats, divers on the shoals off of northern Long Island reported concentrations of *Spisula* sp. shell accumulations (more than 20 cm in depth) along the slopes, providing habitat for juvenile lobster, crabs, and benthic fishes (Lund et al. 1973). These four types of shellfish environments combine to provide significant amounts of habitat, particularly for juveniles of many fish species.

The four types of shellfish habitats (reefs, aggregations, shell accumulations, and cultured ground) show great variation in physical characteristics and their relationship to managed species. Although there is rich literature (published and unpublished) that demonstrates the importance of all four habitat types to ASMFC-managed species, other structure-forming organisms, such as seagrasses, have garnered much of the attention of management agencies. In part, this is due to the almost exclusive management perspective of shellfish as a food resource for humans. Recently, however, the broader ecological value of shellfish has begun to gain more universal recognition (Luckenbach et al. 1999). The result has been an ongoing expansion of the focus of shellfish research and management.

Source: Jon Fajans

Therefore, in addition to an examination of the direct relation of shellfish habitat to managed species, this document also deals with the broader ecological context of shellfish habitat, because management decisions often require that type of information. Worth noting here are recent papers generated from work supported by the National Center for Ecological Analysis and Synthesis (NCEAS at UCSB) on important nearshore habitats, which suggest that our understanding of these habitats as nursery areas is still far from complete (Beck et al. 2001, 2003).

Important Characteristics of Shellfish Habitat

Most, if not all, state and federal fisheries management agencies did not view shell bottom habitats as essential fish habitat (EFH) until the 1990s. For example, Street et al. (2005) provide an excellent discussion of 'shell bottoms', which they define as, "living or dead oysters (*Crassostrea virginica*), hard clams (*Merceneria merceneria*), and other shellfish." For the purpose of this report, the ASMFC Habitat Committee has defined 'shellfish habitat' as:

Intertidal and/or subtidal habitat generated by living molluscan shellfish and/or dead associated shell in continuous or discrete beds, including, but not limited to, bivalve habitats, such as oyster reefs and mussel beds, forming three-dimensionally complex structure in an otherwise two-dimensional environment (e.g., within soft sediment, rocky shores, or rubble).

Shellfish habitat—whether it is a living assemblage or an accumulation of dead shells—provides hard substrate for the attachment of many species that would not be present in areas consisting only, or mainly, of soft sediments. The overall ecological result is greatly enhanced biodiversity in shellfish habitat compared to surrounding areas of the seabed. For example, in his classic study on eastern oyster reefs, Wells (1961) found over 300 species of invertebrates that were largely restricted to the reef structure or other hard-bottom habitats, and thus did not typically occur in adjacent non-reef habitat.

Shellfish habitat is also characterized by a greater amount of vertical relief in comparison to the surrounding seabed. This enhanced vertical relief is of major importance, with implications for assessing habitat value for managed species and for development of management policy. For example, an oyster or mussel reef protruding only several centimeters above the bottom represents, in terms of fluid mechanics, a "roughness element." Roughness elements substantially affect water flow, which creates larger zones of turbulence, and alters hydrodynamics and material transport (Officer et al. 1982; Dame 1996; Kennedy 1996; Coen et al. 1999b; Luckenbach et al. 1999; Nelson et al. 2004). Changes in these physical processes directly influence recruitment, growth, and other biotic processes of the shellfish and other organisms (e.g., finfish) that live on the reef (Zimmerman et al. 1989; Kennedy and Sanford 1999; Breitburg 1999; Lenihan 1999; Coen et al. 1999b; Luckenbach et al. 2005). Therefore, policy development should include a consideration of the impacts of fishing and other regulated activities on structural components of shellfish habitat...

For more information, or a copy of the full publication (indicate preference of electronic or paper copy in request), please contact:

Source: Loren Coen

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ENERGY UPDATE

February 15, 2007:
FEDERAL ENERGY REGULATORY COMMISSION SEEKS COMMENTS ON PERMITTING PROCESS FOR WAVE, CURRENT, AND INSTREAM NEW TECHNOLOGIES

The Federal Energy Regulatory Commission (FERC) is seeking public comment on how to process preliminary permit applications for wave, current, and instream hydropower technologies in light of an increasing interest in these new technologies. Also, FERC is seeking comment on how it should enforce permits once they are issued.

In a Notice of Inquiry, FERC is seeking comment on the following alternatives for reviewing preliminary permit applications:

- Maintain the standard preliminary permit review process currently in use. This process involves moderate scrutiny of applications and generally does not include specific requirements for project progress reports.

- Provide stricter scrutiny of permit applications and limit the boundaries of the permits to prevent site-banking and promote competition. Additional scrutiny could include public outreach and agency consultations, development of study plans, and deadlines for filing a notice of intent to file a license application and a preliminary licensing document. This would also require that progress reports demonstrate compliance with specific milestones.

- Decline to issue preliminary permits for these new technologies altogether. Until FERC determines how it will review permit applications for these technologies, it will use the "stricter scrutiny" alternative approach, which addresses a significant number of issues raised at a technical conference FERC held on December 6, 2006, to explore the environmental, financial, and regulatory issues associated with these new hydropower technologies.

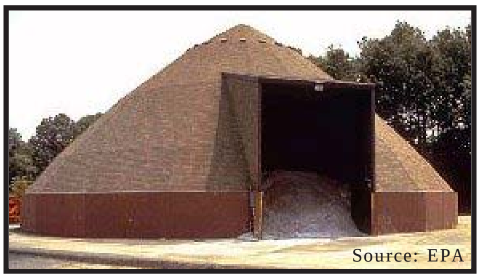
(continued from page 3)

In addition to the typical six-month progress reports to FERC by the permit holder, FERC is requiring the permittee to file, within 45 days of issuance of the order, a schedule of activities to be carried out under the permit and target dates for completion of these activities. In addition, consultations with the appropriate federal, state and local agencies as well as other interested parties must take place. If significant progress is not evident in the periodic reports to FERC, or the permit holder fails to comply with any other conditions, the permit may be canceled.

A preliminary permit preserves the right of the permit holder to have the first priority in applying for a license for the project being studied. A preliminary permit, which typically is for three years, does not authorize construction and requires the holder of the permit to file progress reports with FERC on a regular basis. The permit provides a potential license applicant three years in which to develop a formal application for a license, which is required to construct and operate a hydropower project.

Comments on the notice are due to FERC 60 days after publication in the *Federal Register.*

For more detailed information, please see http://www.ferc.gov/whats-new/comm-meet/2007/021507/H-1.pdf, or contact Celeste Miller, FERC Media Contact, at (202) 502-8680.



Source: EPA

Spotlight on a Slippery Predicament

As I look out my window at the snow swirling down, I cannot help but think... what will the road condition be for my drive home? A common thought, no doubt. I have to wonder, however, about the impact that road deicing is having on myself and the environment as a whole. All of that salt cannot be good for the water supply... right? Right.

The most common type of road deicer is rock salt, or sodium chloride (NaCl). This deicing agent is used on roads in the United States in the amount of 8 million to 12 million tons annually. NaCl is available anywhere; it is inexpensive and melts ice very effectively. Due to its wide use, road salt is often applied in areas with small buffers to surface water sources. Surface waters may be impacted to varying degrees, depending on topography, water volume, soil type, salting intensity, and climate. In addition to surface water infiltration, road salt may enter ecosystems via groundwater, air, soil, release from surface soils, and/or windborne spray. Furthermore, no natural removal mechanisms for these salts exist once they enter the environment.

Impacts of road salt on the environment include:
soil- compromised soil structure, decreased erosion control
plants- osmotic imbalance, disrupted nutrient uptake, inhibited growth, severe injury to reproduction and structure, decreased processing of pollutants
wildlife- destruction of food resources and reproduction habitats, salt toxicity, behavioral abnormalities
aquatic biota- eutrophication, decreased diversity, dominance of salt-tolerant species, impaired oxygen and nutrient cycling
humans- poor water taste, hypertension, vehicle corrosion, infrastructure damage

There are a few alternatives to road salt. One is calcium magnesium acetate (CMA), which is relatively harmless to biota, and is noncorrosive and nondestructive. However, more of the substance is needed to produce the same effect as salt; also, it is slower acting and less effective than salt below 23°F. While CMA is much more environmentally friendly than salt, it costs significantly more ($500-$700/ton, compared to $30/ton for salt). Potassium acetate (KA) has similar impacts to CMA, but is also quite costly. A third alternative that some municipalities are using is to increase the amount of sand mixed with the road salt, particularly on minor roadways. This practice, however, may cause problems with increased sediment input to waterways, and blockages in waterlines caused by the sand. As you can see, more cost-effective alternatives are needed to solve this predicament.

Citation: Wegner, W., and M. Yaggi. 2001. Environmental impacts of road salt and alternatives in the New York City watershed. Stormwater 2: 1-22.

Around the Coast: Hardbottom Habitats in the Mid-Atlantic Bight

Our fisheries depend on marine production and the interaction of all food web components that allow fish to thrive. In order for fish to thrive, they need healthy habitats; reef habitat is one of the most productive types of habitats. Seafloor stratification (e.g., hard corals, tubeworms, clay bottom riddled with holes, mats of dense grass, or meadows of sea whip) forms important complex habitat for fish and other valuable species under management in the mid-Atlantic.

According to the 2002 publication of the National Research Council, *"Effects of Trawling and Dredging on Seafloor Habitat,"* the sensitivity and vulnerability of hard-bottom reefs is greater than that of other habitats, with the exception of tubeworm colonies. Given our present knowledge on the natural sequestration (or biofiltering) of nutrients in estuaries, it seems likely that large areas of hardbottom in a mature state of growth would contribute to water quality in a similar fashion.

In many regions of the U.S., indeed the world, managers are actively protecting reef-like areas. However, many managers, researchers, and fishers are unaware of the naturally occurring coral reef systems in the Mid-Atlantic Bight. Because these areas remain unknown, contributions by this productive ecology type remain unrecognized as important fish habitat. In particular, lost fisheries production due to gear damage is unquantified in any regional management plan, while the habitat loss might have played a role in the diminishment of fisheries over time. Perhaps this neglect is because science, on the whole, has missed the existence of these habitat types in the region.

However, allowing these habitats to flourish will benefit many of the species that make up the region's fisheries. Protecting or restoring certain hardbottom habitats would enhance juvenile survival rates by increasing forage supply and improving their ability to avoid predation. Furthermore, when recruitment rates increase and predation decreases, more fish become available to the fishers and other species that benefit from a thriving ecology.

Species presently under management that utilize the areas for feeding, spawning, and growth to maturity are: sea bass, tautog, lobster, loligo squid, scup, and summer flounder. Species that use these reefs for feeding are prolific and include numerous sharks, loggerhead turtle, bluefish, and bluefin tuna; while locally extinct now, both codfish and red hake were once bountiful in these regions as well.

At this time, hard-bottom reefs in the mid-Atlantic are considered rare. However, their importance to the region's bioeconomic model is directly evidenced by landings of lobster and sea bass. Of the two routinely cited scientific studies concerning the mid-Atlantic seafloor, one failed to find any hard-bottom in the region (Wigley and Theroux 1981). The other study by Stiemle and Zetlin (2000) mentions very few areas of natural substrate, but concedes that, "...more low profile hard bottom and reefs will undoubtedly become known or identified".

The potential for accelerated recovery of fish stocks dependant on live-bottom habitat, as well as benefits to multiple other areas of the marine food web, should be of great interest to the region's fishery managers. There is a short video at www.morningstarfishing.com that shows Mid-Atlantic Bight hardbottom habitats in conditions ranging from pristine to freshly trawled. There is hope that the importance of the habitats will gain recognition as more people come to realize their existence.

For more information on hardbottom habitats in the Mid-Atlantic Bight, please contact the author:

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Your organization is invited to join the Atlantic Coastal Fish Habitat Partnership (ACFHP)!!

The ACFHP is a partnership forming under the National Fish Habitat Action Plan (NFHAP). The NFHAP is a call for action to improve degraded fish habitat nationwide. Our primary interest is the protection and restoration of habitats in Atlantic coastal drainage basins. For further information on this initiative, or if you are interested in becoming a partner, please contact Jessie Thomas, ASMFC Habitat Coordinator, at (202) 289-6400, or JThomas@asmfc.org.

IN THE NEWS

ASMFC Habitat Program is Restructured

On February 1, 2007, the ASMFC Interstate Fisheies Management Program Policy Board accepted the revised ASMFC Habitat Program Five-Year Strategic and Management Plan 2007-2011. The Plan includes a newly developed mission for the program: *To work through the Commission, in cooperation with appropriate agencies and organizations, to enhance and cooperatively manage vital fish habitat for conservation, restoration, and protection, and to support the cooperative management of Commission managed species*.

The Habitat Committee will pursue 5 major goals from 2007-2011. Through the implementation of these goals and a revision of Committee membership, the Habitat Program will progress to become a recognized authority on Atlantic coastal habitat issues. The Habitat Program will provide the ASMFC Commissioners with the tools they need to be strong advocates for habitat conservation for all Atlantic coastal fish species. With Commissioner support, and the support of other partners, the Habitat Program will form the center of a strong coast-wide network of advocates for the conservation of fish habitat and dissemination of habitat information.

2006 U.S. Ocean Policy Report Card

Innovative state government initiatives, long overdue federal fisheries reform, and the designation of 140,000 square miles of protected waters were among the highlights of U.S. efforts to reform ocean policy in 2006. These advancements were undercut by the nation's failure to commit funding and make desperately needed policy reforms for the long-term preservation of our oceans, according to the Joint Ocean Commission.

The report card (available at www.jointoceancommission.org) is an assessment of the nation's collective progress in 2006 toward fulfilling the recommendations of the Joint Ocean Commission Initiative. The United States received an average grade of C- for the six subjects measured in the report card, up slightly from the D+ assigned for 2005.

State leadership and fisheries management earned grades of A- and B+, respectively. States emerged as important champions for oceans in 2006, establishing new statewide initiatives in New York and Washington as well as regional agreements to coordinate ocean management efforts on the West Coast and in the Gulf of Mexico.

Source: Joint Ocean Commission Initiative

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