Habitat Hotline Atlantic

Issues of Concern for Atlantic Marine Fish Habitat

July 2000, Volume VII, Number 2

ASMFC Finalizes Guidelines for Evaluating Fishing Gear Impacts to Submerged Aquatic Vegetation

By

C. Dianne Stephan[1], Robin Peuser[2], and Mark Fonseca, Ph.D[3]

[1]National Marine Fisheries Service, National Oceanic and Atmospheric Administration (NOAA); [2]Atlantic States Marine Fisheries Commission; and [3]National Ocean Service, NOAA

Submerged aquatic vegetation (SAV) provides important habitat for critical life history stages of many fish species. Of the 24 species managed by the Atlantic States Marine Fisheries Commission (ASMFC or Commission), over half of them derive benefits from association with SAV (Laney 1997), such as shelter, increased availability of prey or food items, and spawning substrate. In order to provide for the conservation of this important habitat, the Commission adopted a Policy in 1997 with the goal of preserving SAV, and ultimately achieving a net gain in SAV habitat along the Atlantic coast.

Many natural and human-induced forces can adversely impact SAV. For example, one of the most serious threats to SAV is reduction in water clarity, which can result from excess nutrient inputs to estuarine waters. In its SAV policy, the Commission recognizes that most of the agencies that represent Commission member states do not have authority to regulate habitat protection; rather the focus of Commission member agencies is fisheries management. The policy is designed to overcome this limitation by encouraging collaboration between state habitat and fisheries management agencies in order to further protection of SAV. However, there is one particular category of human-induced impact to SAV for which the Commission does have regulatory jurisdiction – impacts from fishing gears. In a number of states, adverse impacts to SAV from fishing gear have been serious enough to result in regulatory intervention.

In order to address these impacts on a coastwide basis, the Commission's SAV policy directs the Commission to develop technical guidelines and standards to objectively determine fishing gear impacts to SAV, and to develop standard mitigation strategies. The report, *Evaluating Fishing Gear Impacts to Submerged Aquatic Vegetation and Determining Mitigation Strategies*, includes the required information, and was approved by the ASMFC Policy Board in February 2000.

One of the first steps in evaluating fishing gear impacts to SAV is to establish baseline data on what SAV species are present and where. Next, information is needed on the types of impacts caused by various fishing gear, and how these impacts affect individual SAV species. With this information, the potential impact from fishing gear currently in use to identified SAV can be evaluated. Managers can use this information to make decisions on how to avoid or minimize fishing gear impacts by considering different mitigation actions, such as time/area closures and gear prohibitions and modifications. The remainder of this article presents information from the ASMFC report. The Commission is currently seeking public input on report implementation.

SAV Distribution and Characteristics

Submerged Aquatic Vegetation (SAV) are "rooted, vascular, flowering plants that, except for some flowering structures, live and grow below the water surface." This includes six species of marine seagrasses, as well as 20-30 species of freshwater /brackish species found in tidal freshwater and low salinity areas of all Atlantic coast states, with the exception of Georgia and South Carolina, where tidal amplitude and turbidity combine to inhibit their growth. Based on this definition, algae are not considered SAV.

The initial step of determining exactly what constitutes

(continued on page 2)

(continued from page 1)

SAV in terms of spatial and temporal distribution — in other words, determining the boundaries of SAV-habitat — is critical. Distribution is usually identified in terms of beds rather than individual plants and is described as either continuous or patchy cover. Patchy areas have been found to provide similar ecological functions as continuous cover SAV-habitat, and evidence suggests that an unvegetated area approximating at least twice the amount of vegetated area is needed to maintain patchy vegetated areas of marine SAV. Mapping is an important component in determining SAV distribution and one that needs to be updated on a regular basis because the distribution of SAV changes over time and location. SAV mapping is incomplete for the states of NH, RI, NY, and NC. Mapping was completed prior to 1990 in NJ.

Consideration of specific life history and ecological characteristics for each SAV species is important because certain characteristics may influence SAV susceptibility to damage or loss from fishing gear impacts. The importance of these features varies among species and geographic location. The characteristics of concern include light requirements, asexual reproductive structures (also called growing tips or meristems), sexual reproductive structures (flowers and seeds), and ability to recover from disturbance or injury. An additional factor that can affect SAV susceptibility to physical damage is the substrate type in which the SAV are found.

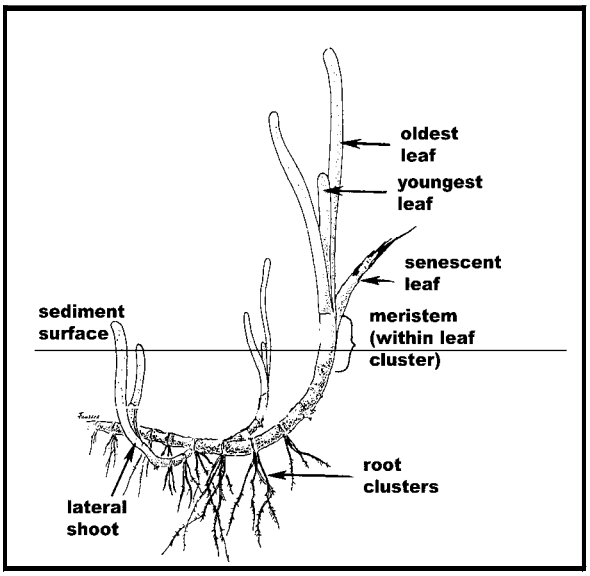

Figure 1. *Major features of eelgrass Zostera marina (adapted from Thayer et al. 1984).*

Light Requirements

Light availability is often a factor limiting SAV distribution. SAV have high incident light (subsurface light reaching the sediment) requirements which vary among species. Marine SAV require a minimum of 20% incident light (Kenworthy and Haunert 1991). Brackish water species require approximately 13% incident light (Batiuk *et al*. in press). Turbidity and excess nutrients contribute to conditions of lower incident light levels.

Asexual Reproductive Structures

SAV have specialized tissues that are capable of growth, called "meristems" (Figure 1). Meristems are seasonally active, and are responsible for plant growth and asexual reproduction. Most meristems of marine SAV are located underground. Meristems are vulnerable areas because damage to them can seriously compromise the plant's ability to grow and reproduce asexually for an entire growing season, or even result in death.

Sexual Reproductive structures

SAV reproduce sexually through flower and seed production. Injury to reproductive structures of plants that rely solely on sexual reproduction (e.g. *Halophila decipiens,* annual forms of *Zostera marina)* is a more serious impact than for plants that relay on both sexual and asexual reproduction. Flowers of brackish water species usually occur at the leaf/stem junction (axil). In marine species, flowers are generally produced at the tips of stems, often rising above the leaf portion of the plant and reaching to the water's surface to facilitate pollination. Thus, flowers can be exposed to impacts that the non-flowering parts of the plant are not. Also, disturbance of the sediment, particularly during winter months, may disrupt SAV seed banks with potentially serious impacts on the subsequent growing season. Factors characterizing the vulnerability of SAV sexual reproduction to gear impacts include seasonality, flower location and hardiness, seed setting, and seed germination.

Substrate Type

Sediment or bottom type can influence SAV vulnerability to fishing activities and/or ability to recover from injury, as demonstrated in Fonseca *et al.* 1984, which investigated impacts to SAV from bay scallop dredging. In general, more damage from dredging occurred to SAV located in soft bottom sediment (mud) than hard bottom sediment (sand).

Recovery from Disturbance or Injury

SAV species exhibit a wide range in ability to recover from injury. Type of meristem and sexual reproductive structures are of primary concern, as injury to these structures may effect the plant's ability to replace damaged tissues or lost plants. For species that rely on seed set and successful germination, beds tend to recover more rapidly (1-2 growing seasons). For species that rely on vegetative encroachment, bed recovery can take many years (Fonseca *et al*. 1998). Recovery ability is also influenced by the magnitude or extent of the injury, the location and amount of any stored energy reserves in the SAV plant, seed or tuber set prior to disturbance, and local environmental hydrodynamics.

Impacts from Fishing Gear

Injuries that could result from fishing gear are categorized as physical disturbance to plants or increases in turbidity. Physical disturbances are of greatest concern, and are classified as leaf shearing, seed or flower shearing, uprooting, below ground impacts, or burial. Below ground impacts are identified as the disturbance of greatest concern since serious damage to

(continued on page 3)

(continued from page 2)

roots, rhizomes and meristems can result.

Sources of impact are identified as attributable directly to fishing gears, or as the result of fishery related shoreside activities or aquaculture. Gears or fishing practices that could cause below-ground impacts were identified as clam kicking, hydraulic clam dredging, bay scallop dredging (toothless, on soft bottom), bay scallop/oyster/mussel/etc. dredges (toothed), hand or vessel operated rakes or tongs, and trawls (depending upon size and bottom type).

Impacts that result in loss of SAV-habitat are considered to be "impacts of significant concern" based on the goals of the Commission's SAV policy. Below-ground impacts clearly cross the threshold of impact of significant concern. In addition, many above ground impacts will result in death for the marine species *Halophila* (paddlegrass, stargrass, or Johnson's seagrass). Determination of impact significance for above-ground impacts to other species is extremely difficult to impossible with the data currently available.

Mitigating Impacts

Mitigation strategies are identified as avoidance, minimization, restoration and creation. Only the first two strategies are considered viable for now because of the difficulty in developing effective restoration efforts for SAV. Year round closures to all gear and gear prohibitions are identified as options for avoiding impacts to SAV. Options for impact minimization include partial area closures and gear format restrictions or modifications. The report identifies current gear regulations for each state that may result in reduction of impacts to SAV-habitat.

Figure 2 is a decision tree that graphically depicts guidance for applying mitigation strategies. Impacts of significant concern have been shown to result unequivocally from below-ground impacts to most SAV species, and above-ground disturbance for *Halophila* spp. Below-ground impacts should be avoided at most costs, and the "Avoidance" mitigation strategy should be applied. Disturbance to sexual reproduction is the impact of next greatest concern. Impacts that interfere with flowering or seed setting may affect the amount of SAV present in the upcoming year. In most cases, partial area closures should be used to offset any seasonal impacts of concern. More risk-averse actions, such as full area closures, may also be used.

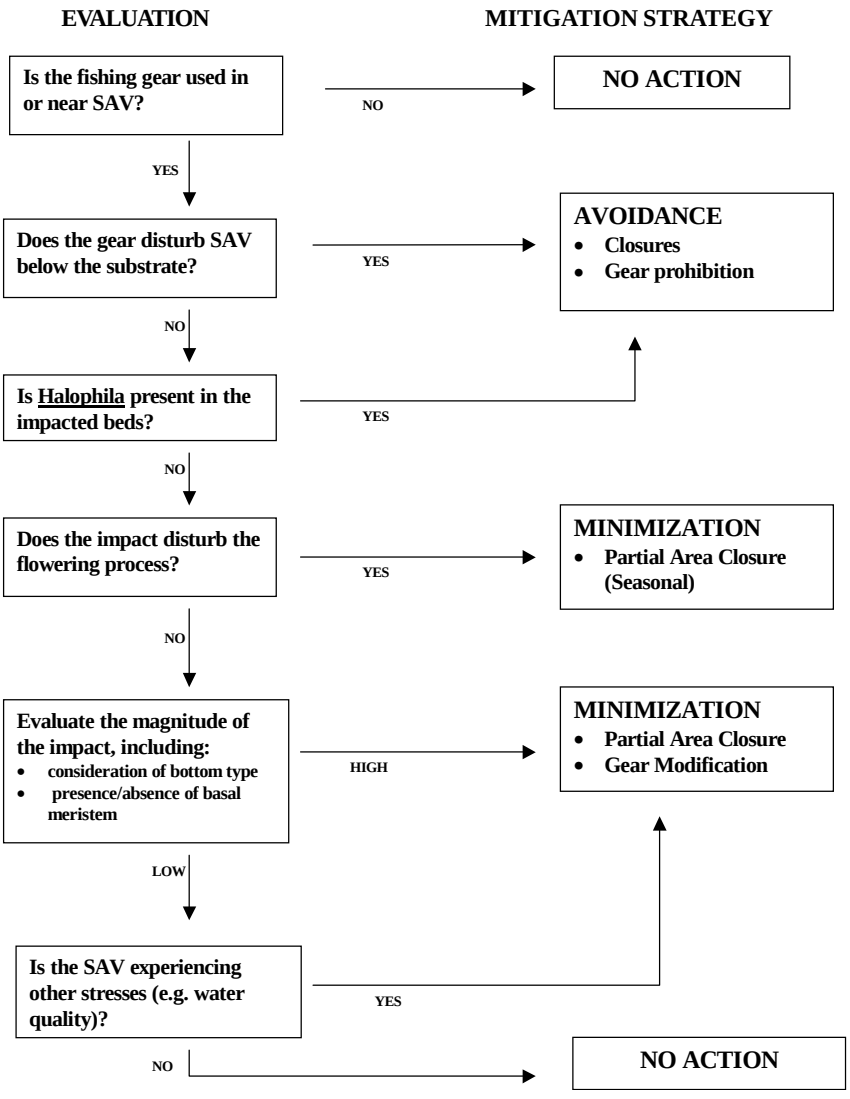

Figure 2. *Decision tree for identifying appropriate mitigation strategies for fishing gear impacts to SAV.*

The impacts which do not fit into these three categories of impacts [(1) below ground disturbance; (2) impact to *Halophila*; (3) disturbance of sexual reproduction] must be evaluated for degree of impact. Factors which should be considered in this evaluation include: (1) type of injury, (2) injury magnitude, (3) susceptibility/recoverability of the species relative to injury and magnitude, and (4) temporal extent of injury. If the degree of impact to SAV is considered to be high, then minimization strategies should be employed. If the degree of impact is low, then other environmental stresses should be taken into account when evaluating the need for mitigation. If there is little additional stress such as poor water quality, then no action is required.

Implementation

The Commission is presently in the process of deciding how to implement the report's recommendations. Implementation options have been drafted in an issue paper and the ASMFC is

(continued on page 4)

(continued from page 3)

currently seeking public input on this issue paper. The Commission's Policy Board is expected to discuss implementation options at the ASMFC's annual meeting scheduled for October 2000. To obtain a copy of the report, *Evaluating the Fishing Gear Impacts to Submerged Aquatic Vegetation and Determining Mitigation Strategies*, or to obtain a copy of the draft issue paper, *Implementing the Report, "Evaluating the Fishing Gear Impacts to Submerged Aquatic Vegetation and Determining Mitigation Strategies*," please see the Commission's web page, www.asmfc.org. The report is under "News" in the Habitat Managers Series, and the issue paper is under "Public Input." You may also contact Vanessa Jones at the ASMFC (202) 289-6400 for copies of either. Please direct all comments and questions about the project to Carrie Selberg, ASMFC Habitat Specialist at the same number.

References

Batiuk, R., P. Bergstrom, M. Kemp, E. Koch, L. Murray., C. Stevenson, R. Bartleson, V. Carter, N. Rybicki, J. Landwehr, C. Gallegos, L. Karrh, M. Naylor, D. Wilcox, K. Moore, and S. Ailstock. In Press. Chesapeake Bay submerged aquatic vegetation water quality and habitat-based requirements and restoration targets: a second technical synthesis. U.S.E.P.A. Chesapeake Bay Program.

Kenworthy, W.J. and D.E. Haunert. 1991. The Light Requirements of Seagrasses: Proceedings of a Workshop to Examine the Capability of Water Quality Criteria, Standards and monitoring Programs to Protect Seagrasses. National Oceanic and Atmospheric Administration, Tech. Memo. NMFS-SEFC-287. Beaufort, N.C. 181 p.

Fonseca, M.S., W.J. Kenworthy and G.W. Thayer. 1998. Guidelines for the Conservation and Restoration of Seagrasses in the United States and Adjacent Waters. NOAA Coastal Ocean Program Decision Analysis Series No. 12. NOAA Coastal Ocean Office, Silver Spring, MD. 222 p.

Fonseca, M.S., G.W. Thayer, A.J. Chester, and C. Foltz. 1984. Impact of Scallop Harvesting on Eelgrass (*Zostera marina*) Meadows: Implications for Management. North American Journal of Fisheries Management 4:286-293.

Laney, R.W. 1997. The Relationship of Submerged Aquatic Vegetation (SAV) Ecological Value to Species Managed by the Atlantic States Marine Fisheries Commission (ASMFC): Summary for the ASMFC SAV Subcommittee. In: Stephan, C.D. and T.E. Bigford (eds.), Atlantic Coastal Submerged Aquatic Vegetation: A Review of its Ecological Role, Anthropogenic Impacts, State Regulation and Value to Atlantic Coastal Fisheries. ASMFC Habitat Management Series No. 1. Washington, DC. pp. 11-35.

Thayer, G.W., W.J. Kenworthy, and M.S. Fonseca 1984. The ecology of eelgrass meadows of the Atlantic coast: a community profile. U.S. Fish & Wildlife Service. FWS/OBS-84/02. 147 p.

Conferences

August 8-11, 2000, Albury, New South Wales (NSW). Annual Workshop and Conference. Australian Society for Fish Biology. The Workshop is scheduled for Aug. 8-9, 2000 and the conference for Aug. 11-12. Stock enhancement of marine and freshwater fisheries is the workshop theme and topics include new approaches in stock enhancement methods, measuring success of stock enhancement programs, ecological impact of stock enhancement programs and genetic impact of stock enhancement programs. The conference will focus on a range of topics, including management of ecosystems and fisheries, habitat and ecosystem processes, recruitment and larval ecology, stock assessment, and biological interactions. For more information see website at www.hydro.com.au/asfb/albury.html or contact Andrew Sanger, NSW Fisheries, 3/556 Macauley St., Albury, NSW, 2640. Ph. (02) 6021-7475, email: asanger@dragnet.com.au.

October 24-27, 2000, Vero Beach, Florida. Fourth Workshop on Salt Marsh Management & Research. The workshop is designed to update interested persons on current salt marsh management and research findings. Topics for consideration include mosquito control and natural resource implications of many aspects of salt marsh management, e.g., source reduction, salt marsh fisheries & wildlife issues, regulatory issues, land acquisition, ecosystem restoration, and mosquito control chemical use in salt-marsh environments. The meeting will include a field trip to regional salt marsh habitats. Presentation abstracts will be published. For more information see website: www.ifas.ufl.edu/~veroweb; under "news and events" or contact D. Scott Taylor, Brevard Mosquito Control District, 2870 Greenbrooke St., Valkaria, FL 32950, (321) 952-6322, email: dstaylor@digital.net.

October 24-26, 2000, New Orleans, Louisiana. Conference: Gulf of Mexico Fish and Fisheries: Bringing Together New and Recent Research. The U.S. Department of Interior's Minerals Management Service (MMS) is sponsoring this conference on outer continental shelf (OCS) development and fisheries/marine communities to bring together widely ranging research topics on fisheries biology and ecology of the Gulf of Mexico to examine the relationship between fisheries and the oil and gas industry. Planned presentations include a range of topics from ecology of platform fish assemblages, to ichthyoplankton, natural and artificial reef productivity, and pelagic fisheries, with perspectives from managers, industry, and academia. Two proceedings will be published: 1) a non-peer review publication by MMS including all manuscripts submitted by authors and 2) a peer-review publication of selected papers as a Special Symposium by the American Fisheries Society. For more information see website: http://www.beak.com/info/features/features.htm or contact David Stanley, Fisheries/Acoustic Scientist with Beak International, Ontario, Canada, at email: dstanley@beak.com or (800) 361-2325.

Environmentalists Sue NMFS To Stop Reopening Areas on Georges Bank to Scallop Dredging

On July 20, 2000, two environmental organizations, Conservation Law Foundation and American Oceans Campaign, filed suit against the National Marine Fisheries Service (NMFS) on the grounds that NMFS violated the National Environmental Policy Act (NEPA) by allowing scallop dredging in habitat deemed essential to recovering New England groundfish stocks, without first conducting an environmental impact analysis as required under NEPA. The plaintiffs plan to file a motion asking the Court to prohibit the opening of vital habitat in the Georges Bank fishing grounds to scallop dredging. The Georges Bank habitat has been closed to nearly all fishing gear, including scallop dredging, since 1994 and has been designated as essential fish habitat (EFH)—important nursery and feeding areas—for New England's valuable but depleted groundfish stocks.

Specifically, the lawsuit challenges (1) the opening to scallop dredging of three closed areas containing EFH designated habitat for recovering groundfish stocks and (2) allowing the catch of additional scallops, by increasing the amount of time scallopers are allowed to fish. One of the closed areas was opened to scalloping last summer and the other areas are scheduled to be opened to scalloping later this year.

Some New England commercial fishermen are concerned about the impacts that the scallop dredging may have on the rebuilding efforts for codfish, especially without completing an Environmental Impact Statement. Scallop dredging has been shown to disturb ocean bottom habitat.

Environmentalists are especially critical of the way NMFS chose to pursue the action through what's called a "framework adjustment" that undergoes little public scrutiny compared to the more formal process of amending a fishery management plan that specifically provides for public comment. Also of concern is the effect this action will have on current efforts to create a 'rotational area management system' as part of the New England scallop fishery management plan. Rotational area management represents a new approach e.g., areas currently open to scallop fishing would be closed on a staggered basis, then re-opened periodically to allow for the sustainable harvesting of larger scallops. However, the environmentalists claim that "NMFS, in allowing access to these closed areas without first adequately evaluating the impact on the marine environment—including habitat, groundfish and scallops—is undermining the very conditions needed to ensure that this new approach [rotational area management system] can succeed."

NMFS announced the scallop area openings in mid-June saying, "by carefully selecting areas to open and adopting appropriate rules, harvest can occur without compromising rebuilding of yellowtail flounder, overfishing sea scallop stocks, increasing gear conflicts with lobster pots, or damaging important bottom habitat." One of the rules includes requiring vessels to have onboard electronic monitoring systems for frequent reporting of landings and vessel position. Results of the limited fishery allowed in Closed Area II last year included a total catch of about 6 million pounds of scallop meats with an estimated value of $36 million. In addition, some of the scallop meats were bigger than any seen on the market in recent years.

Sources: Conservation Law Foundation (CLF) and American Oceans Campaign Legal Complaint and July 20, 2000 press release (available at CLF's website: www.clf.org see under hot topics).

National Oceanic and Atmospheric Administration (NOAA) June 14, 2000 press release, "Commerce Secretary Announces More Sea Scallops Available to North Atlantic Fishermen," NOAA fisheries staff contact Teri Frady (508)-495-2239.

Flags Used to Protect Eelgrass From Boating Impacts

In the past, Connecticut's Niantic River contained abundant and healthy eelgrass beds which provided important habitat for juvenile scallops. The river also had a thriving scallop population and fishery and was called "the Scallop Estuary." But by 1988, most of the eelgrass beds were gone and the bay scallop populations had declined drastically.

In an effort to restore eelgrass beds in the Niantic River, volunteers placed flags on buoys in the river, marking the location of beds along the navigation channels. The flags, displaying the message "Protect Eelgrass Beds," remind boaters to stay within the channels and out of eelgrass beds where boat propellers can shear off leaves. Boats can also stir up sediments thereby reducing the amount of sunlight reaching the leaves.

In addition, other educational efforts were undertaken including distributing to nearby residents, maps showing the location of eelgrass beds and flyers on protecting eelgrass. Connecticut Sea Grant and the local Shellfish Commission provided support for the project. After the flags were put up and the information distributed, there was a noticeable improvement in the number of boats staying in the navigation channel and out of eelgrass beds. Unfortunately in 1998, for some yet to be determined reason, there was a large die-off of eelgrass in the river. Now it is even more important that boaters stay clear of the remaining beds, so as not to further damage the eelgrass plants and impede their recovery.

For further information, contact Nancy Balcom, Connecticut Sea Grant Associate Extension Educator, at (860) 405-9107.

Resources

The Gulf States Marine Fisheries Commission (GSMFC) has compiled an ***Annotated Bibliography of Fishing Impacts on Habitat***. The bibliography contains over 570 references, including abstracts when available, for papers dealing with fishing impacts on habitat. It includes a wide range of sources including, scientific literature, technical reports, college theses, state and federal agency reports, conference and meeting proceedings, and popular articles. The bibliography tries to narrow its focus to the physical impacts of fishing on habitat and it will be updated periodically. The bibliography can be downloaded from the GSMFC website www.gsmfc.org (under publications/habitat program) and it is now available online as a ProCite searchable database. Hard copies can be obtained by contacting Cindy Yocom at the GSMFC office (228) 875-5912.

A recent article in the journal Nature provides a review of the economic and ecological impacts of aquaculture practices around the world. ***Effect of Aquaculture on World Fish Supplies*** by Rosamond Naylor et al., includes analysis and discussion of the impacts of various aquaculture feed and production practices to the sustainability of ocean fisheries. The authors conclude that although net global aquaculture production adds to total world fish supplies, some practices result in a net loss of fish (for example, salmon and shrimp farming because they require large inputs of wild fish for food), and some practices reduce wild fish supplies through habitat modification, wild seedstock collection and other ecological impacts. The authors recommend several actions, such as reducing wild fish inputs in feed and adoption of more ecologically sound management practices, in order to accommodate future increases in aquaculture production, but not at the expense of declines in wild fish stocks. The article is available for online purchase for $7 at http://www.nature.com/nature.
Source: June 29, 2000 Nature 405, 1017-1024.

Atlantic States Marine Fisheries Commission
1444 Eye Street, N.W., 6th Floor
Washington D.C. 20005

Return Service Requested

Habitat Hotline Atlantic

Robin L. Peuser
Editor

Funded by