

Other Protected Species in the Northeast Fisheries Science Center Area: ESA Endangered (**E**), Threatened (**T**) Candidate (**C**), or Species-of-Concern (**SOC**), or Petitioned (**P**)

For **diadromous fish**, the Atlantic Salmon Research and Conservation Task is able to provide some additional data streams and management support due to overlaps in habitat use, impacts of hydropower, and encounter rates in estuary and coastal telemetry programs. In addition, the Population Dynamics Branch and Oceanography Branch provide ad hoc stock assessment and climate change analysis support of management needs.

Shortnose (E) and Atlantic Sturgeons (T&E). Shortnose Sturgeon (*Acipenser brevirostrum*) has been listed as endangered throughout its range since 1967 and is managed under a 1998 recovery plan. Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) has been listed as endangered in four of its five DPSs since 2012; Atlantic Sturgeon in the Gulf of Maine DPS was listed as threatened (USOFR 2012). The Atlantic States Marine Fisheries Commission manages Atlantic Sturgeon through Amendment 1 to the Interstate Fishery Management Plan for Atlantic Sturgeon and subsequent addenda I-III. In support of Atlantic Sturgeon management and science, NEFSC members serve on the ASMFC Technical Committee and Stock Assessment Committee. While the NEFSC has no directed research on Sturgeon species, NEFSC has participated in and funded University of Maine acoustic tagging and overwintering studies in the Penobscot River. These studies, designed to find Atlantic Sturgeon, discovered the presence of Shortnose Sturgeon in the river system as well (Fernandes et al 2010). Sturgeon bycatch data are collected as part of the NOAA Fisheries observer and ASMFC programs (NMFS and ASMFC 2013).

River Herring (SOC) (and American Shad). Shad and river herring are managed under Amendment 2 to the Interstate Management Plan for Shad and River Herring (ASMFC 2015). Alewife (*Alosa pseudoharengus*) and Blueback Herring (*Alosa aestivalis*) were identified as “Species of Concern” in 2006 due to drastic declines throughout much of their range. In 2011, the Secretary of the Department of Commerce was petitioned to list river herring as threatened under the ESA. In response, NMFS agreed to consider the listing and issued a request for comments (USOFR 2011a). After a comprehensive review of the status of river herring, listing the species as threatened or endangered was determined to be unwarranted (USOFR 2013). Therefore, river herring remain Species of Concern; NOAA Fisheries is currently providing funding to ASMFC to work with partners on a coastwide effort to conserve river herring and identify and fill data gaps. These efforts led to the formation of a Technical Expert Working Group (TEWG) with expert members representing the entire range of river herring, from Florida to Canada (GARFO 2015a). NEFSC contributed to the Status Review Team that considered the listing and continues to support river herring conservation and management efforts by

participation in the ASMFC Shad and River Herring Technical Committee, the Susquehanna River Anadromous Fish Restoration Cooperative, the TEWG, and TEWG subgroups.

For additional **other fish**, Northeast Fishery Science Center is able to provide limited support for **commercial species with recent ESA engagement** through the Population Dynamics Branch, Oceanography Branch, and Apex Predator Programs to provide ad hoc stock assessment and climate change analysis support of management needs.

Cusk (C&SOC). Cusk (*Brosme brosme*) is part of the multispecies complex in the Gulf of Maine region; however, the stock is not federally managed. In 2004, Cusk became a NOAA Species of Concern. In 2007, NOAA Fisheries initiated a status review due, in part, to declines in commercial landings from 1,700 metric tons in the 1960s to about 100 mt in recent years, continued declines in survey trends, and a five-inch decrease in average length (NOAA Fisheries-Office of Protected Species 2013, USOFR 2007). The status review included an NEFSC led collaborative assessment of the threat of climate change to Cusk (Hare et al. 2012). Currently, Cusk remains a Species of Concern in the Gulf of Maine and is an ESA Candidate species throughout its range. GARFO proposed and funded a 2011 workshop on proactive conservation planning for northwest Atlantic Cusk which was coordinated by the Gulf of Maine Research Institute (GMRI) and produced a list of seven prioritized actions to improve information on Cusk and to mitigate the impact of incidental catch of Cusk (GMRI and NOAA 2012). Workshop participants included NEFSC scientists from the Population Dynamics and Oceanography Branches and the Observer Program.

Atlantic Wolffish (SOC). Wolffish (*Anarhichas lupus*) was petitioned for listing in 2008 (Conservation Law Foundation 2008) which resulted in a call for information and status review (Atlantic Wolffish Biological Review Team 2009). Center staff participated on the Biological Review Team. Wolffish was the most recent stock to be added to the NEFSC multispecies plan and was first assessed in 2008 at the Northeast Data Poor Stocks Workshop (Northeast Data Poor Stocks Working Group 2009) with a 2010 update (Northeast Fisheries Science Center 2012). Based on information in the Biological Review Team report and the NEFSC assessment, the final decisions on the listing was negative, but Wolffish remain Species of Concern.

Dusky Sharks (SOC). Dusky Sharks (*Carcharhinus obscurus*) were petitioned for listing as Threatened or Endangered under the ESA in 2013. NMFS initiated a status review (McCandess et al. 2014), the team including NEFSC scientist, but found the listing unwarranted. Moderate threats to the NWA DPS consisted mainly of exploitation as US bycatch and Mexican landings; biological vulnerability was considered the only high risk.

Porbeagle Sharks (SOC, CITES). The Porbeagle Shark (*Lamna nasus*) is a SOC in the Atlantic region from Newfoundland to New Jersey and is protected under CITES throughout its range. The species was petitioned for listing in 2010 but NMFS findings were negative (USOFR 2010). Porebeagle sharks were assessed by ICES/ICCAT (2009) and NMFS/HMS (2009) in response to the petitions. While they had been considered overfished with depleted biomass, the 2009 stock assessments indicated that biomass was increasing and overfishing was no longer occurring.

Thorny Skate (SOC). The stock assessment for the skate complex, which includes Thorny Skate (*Amblyraja radiata*), a SOC, is conducted by staff of the Population Dynamics Branch (NEFC 1988, 1991; NEFSC 2000, 2007; Sosebee 2005). Data from the NEFSC spring and autumn surveys are used to assess the status of each species. Thorny Skate biomass in the survey is at or near the lowest value in the time series (1963-2013). The stock complex is currently managed as two separate fisheries, a bait fishery and a wing fishery. The wing fishery at one time landed Thorny Skate, but possession has been prohibited since 2003, when the skate FMP was put into place. The most recent formal stock assessment took place in 2008 (Northeast Data Poor Stocks Working Group 2009), but updates occur annually and the information is sent to the NEFMC and GARFO. Although Thorny Skates were petitioned for listing in 2011 (Animal Welfare Institute 2011), along with Barndoor Skate (*Dipturus laevis*), Winter Skate (*Leucoraja ocellata*), and Smooth Skate (*Malacoraja senta*), all findings were negative (USOFR 2011b) and Barndoor Skate has been removed as a SOC (Cavanaugh and Damon-Randall 2009).

OTHER Species of Concern

Atlantic Halibut (SOC). Atlantic Halibut (*Hippoglossus hippoglossus*), a Species of Concern, are assessed regularly by the NEFSC as part of the GARM process (Col and Legault 2009, Northeast Fisheries Science Center 2012). Indications of low biomass in NEFSC survey data and an overall population decline since the 1960s with no signs of recovery (Brodziak 2002) were rationale for inclusion on the list of Species of Concern. NEFSC members have also participated in several research publications detailing Atlantic Halibut ecology (Sigourney et al. 2006; Fogarty and Murawski 1998; Link et al. 2002).

Rainbow Smelt (SOC). Another anadromous Species of Concern in the Greater Atlantic Region that the NEFSC financially supports is the Rainbow Smelt (*Osmerus mordax*; NOAA 2007). Since 2006, state agencies in Maine, New Hampshire, and Massachusetts have worked in collaboration to document the status and develop conservation strategies for Rainbow Smelt (Enterline et al. 2012a). A major contribution of this NOAA-funded collaborative work was the

development of standardized procedures for indexing the abundance of spawning Rainbow Smelt (Enterline et al. 2012b).

Sand Tiger Shark (SOC). Sand Tiger Sharks (*Carcharias taurus*) are ESA SOC throughout their range in the Western Atlantic and Northern Gulf of Mexico. A SEFSC status update, which included NEFSC authors, reported a decline in the species severe enough to maintain the species as SOC designation (Carlson et al. 2009). The report authors included NEFSC staff. The species is also listed on the IUCN Red List of Threatened Species (Pollard and Smith 2009).

Species Covered by other NOAA Fisheries Science Centers or Headquarters

Atlantic Bluefin Tuna (SOC). (*Thunnus thynnus*) is also a GARFO Species of Concern and has been petitioned for listing under the ESA, but findings were negative (GARFO 2015b). There are currently no NEFSC scientists assigned to Bluefin Tuna; however, in response to the April 2010 Deepwater Horizon oil spill, Southeast Fisheries Science Center scientists have been collecting larval samples, analyzing observer data, and conducting tagging studies in the Gulf of Mexico (NMFS 2015a).

Great Hammerheads (CITES). Great Hammerhead Sharks (*Sphyrna mokarran*) were petitioned for listing in 2012 and 2013. The petitions resulted in a status review throughout range (Miller et al. 2014). The NMFS status review indicated that most of the decline occurred in the 1980s and that current regulatory measures are preventing further decline; therefore, the findings for listing were negative. However, due to its exploitation for its fins, the species was included in the CITES Appendix II protection (CITES 2013).

Whale Shark (P). In 2012, a petition was submitted to list the Whale Shark (*Rhincodon typus*) as Threatened or Endangered under the ESA (WildEarth Guardians 2012). Whale Sharks received international protection in September 2014 with NOAA's final rule under the Tuna Conventions Act to prohibit setting a purse seine net on Whale Sharks (USOFR 2014a).

Scalloped Hammerhead (T, E & CITES). Scalloped Hammerhead Sharks (*Sphyrna lewini*) are ESA Endangered in Eastern Atlantic and Eastern Pacific DPSs and Threatened in the Central & Southwest Atlantic DPS and the Indo-West Pacific DPS (USOFR 2014b) as well as CITES protected throughout its range (CITES 2013). NW Atlantic and GOM DPSs were found "not warranted." In response to the petition to list, NMFS ERA Team conducted a status review in which the six DPSs were identified and evaluated (Miller et al. 2014).

The number of protected species in the Greater Atlantic Region exceeds the NEFSCs Protected Species and Population Dynamics Branches capacity to adequately dedicate sufficient resources for effective management. In many cases, contributions are limited to little more than reviewing grant proposals and reports, or being the point of contact for basic information on the species. Data-poor species require research and assessment over broad spatial and temporal scales for even a rudimentary understanding of their population dynamics. In addition, population viability analyses and risk-assessment for stocks at low abundance requires different data and approaches than traditional stock assessment. An ecosystem approach to research that includes multispecies investigations as well cooperative research with universities, partners, and other agencies may help defray costs and leverage limited resources. A cooperative approach to ecosystem level evaluations for diadromous communities has been undertaken in Maine under the stewardship of a combined GARFO, NEFSC, and Restoration Center coordination team to make more active information gathering and management of multiple important species and ecosystem processes a reality (see diadromous ecosystem brief).

REFERENCES

Animal Welfare Institute. 2011. Petition to list The Northwest Atlantic Distinct Population Segment (DPS) of the Thorny Skate (*Amblyraja radiata*) as an Endangered or Threatened Species or, alternatively, to List the United States DPS of the Thorny Skate as an Endangered Species under the U.S. Endangered Species Act. Animal Welfare Institute, Washington, DC.

Atlantic States Marine Fisheries Commission (ASMFC). March 6, 2015. Shad and river herring. <http://www.asmfc.org/species/shad-river-herring> (March 6, 2015)

Atlantic Wolffish Biological Review Team. 2009. Status Review of Atlantic wolffish (*Anarhichas lupus*). Report to National Marine Fisheries Service, Northeast Regional Office. September 30, 2009. 149 pages.

Brodziak, J. 2002. In: Assessment of 20 Northeast Groundfish Stocks through 2001 - Atlantic halibut. A report of the Groundfish Assessment Review Committee. NEFSC. Woods Hole, MA. p. 206-214.

Carlson, J.K., C.T. McCandless, E. Cortés, R.D. Grubbs, K.I. Andrews, M. A. MacNeil, and J.A. Musick. 2009. An Update on the Status of the Sand Tiger Shark, *Carcharias taurus*, in the northwest Atlantic Ocean. NOAA Technical Memorandum NMFS-SEFSC-585, 23 pages.

Cavanagh, M.F., and K. Damon-Randall. 2009. Status of the barndoor skate (*Dipturus laevis*). National Marine Fisheries Service Report, Northeast Regional Office. 77 pages.

CITES. 2013. Consideration of proposals for amendment of appendices I and II. CoP16. <http://www.cites.org/sites/default/files/eng/cop/16/prop/E-CoP16-Prop-43.pdf> March 20, 2015.

Conservation Law Foundation. 2008. Petition for a rule to list the US population of Atlantic Wolffish (*Anarhichas lupus*) as an endangered species under the Endangered Species Act. Brunswick, Maine. 124 pages.

Col, L.A. and C. L. Legault. 2009. The 2008 assessment of Atlantic halibut in the Gulf of Maine-Georges Bank Region. US Department of Commerce, Northeast Fisheries Science Center Reference Document 09-08. 39 pages.

Curtis TH, McCandless CT, Carlson JK, Skomal GB, Kohler NE, et al. (2014) Seasonal Distribution and Historic Trends in Abundance of White Sharks, *Carcharodon carcharias*, in the Western North Atlantic Ocean. PLoS ONE 9(6): e99240. doi:10.1371/journal.pone.0099240

Enterlaine, C.L., G. Wipfelhauser, J. Carloni, and B. Chase. 2012a. A multi-state collaborative to develop and implement a conservation program for three anadromous finfish species of concern in the Gulf of Maine. Final Report. NOAA Award#: NA06NMF4720249.

Enterline, C.L., B.C. Chase, J.M. Carloni, K.E. Mills. 2012b. A regional conservation plan for anadromous rainbow smelt in the U.S. Gulf of Maine. NOAA Species of Concern Grant Program Award #NA06NMF4720249A

Fernandes, S.J., G.B. Zydlewski, J.D. Zydlewski, G.S. Wipfelhauser, and M.T. Kinnison. 2010. Seasonal distribution and movements of Shortnose Sturgeon and Atlantic Sturgeon in the Penobscot River Estuary, Maine. Transactions of the American Fisheries Society 139:1436-1449.

Fogarty, M. J., and S. A. Murawski. 1998. Large-scale disturbance and the structure of marine systems: fishery impacts on Georges Bank. Ecological Applications 8(1) Supplement, pp. S6-S22.

Fuller, P., E. Maynard, J. Larson, A. Fusaro, T.H. Makled and M. Neilson. 2015. *Osmerus mordax*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL.
<http://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=796> Revision Date: 7/8/2014

Greater Atlantic Regional Fisheries Office (GARFO). 2015a. Technical Expert Working Group :: Greater Atlantic Regional Fisheries Office. March 6, 2015
<http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/index.html> (March 6, 2015).

Greater Atlantic Regional Fisheries Office (GARFO). 2015b. Proactive Conservation Program:: Greater Atlantic Regional Fisheries Office. January 27, 2015.
<http://www.greateratlantic.fisheries.noaa.gov/protected/pcp/index.html> (March 4, 2015).

Gulf of Maine Research Institute (GMRI) and NOAA Fisheries (NERO). 2012. Workshop on proactive conservation planning for Northwest Atlantic Cusk. December 7-8, 2011, Gulf of Maine Research Institute, Portland, Maine. 282 pages.

Hare, J.A., Manderson, J.P., Nye, J.A., Alexander, M.A., Auster, P.J., Borggaard, D.L., Capotondi, A.M., Damon-Randall, K.B., Heupel, E., Mateo, I., O'Brien, L., Richardson, D.E., Stock, C.A., and Biege, S.T. 2012. Cusk (*Brosme brosme*) and climate change: assessing the threat to a candidate marine fish species under the US Endangered Species Act. ICES Journal of Marine Science, 69: 1753–1768.

ICES/ICCAT. 2009. Report of the 2009. Porbeagle Stock Assessment Meeting. SCRS/2009/014-Sharks Stock

Assessment. SCI-032/2009. Copenhagen, Denmark, June 22-27, 2009.

Link, J. S., K. Bolles, and C. G. Milliken. 2002. The feeding ecology of flatfish in the Northwest Atlantic. *Journal of Northwest Atlantic Fishery Science* 30: 1-17.

Maine Sea Grant. 2015. Maine Seafood Guide. <http://www.seagrant.umaine.edu/maine-seafood-guide/cusk> (March 6, 2015).

McCandless, C.T., Conn, P., Cooper, P., Cortés, E., Laporte, S.W., and M. Nammack. 2014. Status review report: northwest Atlantic dusky shark (*Carcharhinus obscurus*). Report to National Marine Fisheries Service, Office of Protected Resources. October 2014. 72 pages.

Miller, M.H., Carlson, J., Cooper, P., Kobayashi, D., Nammack, M., and J. Wilson. 2014. Status review report: scalloped hammerhead shark (*Sphyrna lewini*). Final Report to National Marine Fisheries Service, Office of Protected Resources. March 2014. 133 pages.

Miller, M.H., Carlson, J., Hogan, L. and D. Kobayashi. 2014. Status review report: great hammerhead shark (*Sphyrna mokarran*). Final Report to National Marine Fisheries Service, Office of Protected Resources. June 2014. 116 pages.

Miller, M.H., Carlson, J., Hogan, L. and D. Kobayashi. 2014. Status review report: great hammerhead shark (*Sphyrna mokarran*). Final Report to National Marine Fisheries Service, Office of Protected Resources. June 2014. 116pp.

National Marine Fisheries Service (NMFS). 2015a. NOAA Scientists Study Effects of Oil Spill on Bluefin Tuna. http://www.nmfs.noaa.gov/stories/2011/04/21_oil_spill_effects_bluefin_tuna.html (March 13, 2015).

National Marine Fisheries Service (NMFS). 2015b. Improving International Fisheries Management: Report to Congress Pursuant to Section 403(a) of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006. February 2015. U.S. Department of Commerce. Washington, D.C. 107 pages.

National Marine Fisheries Service (NMFS) and Atlantic States Marine Fisheries Commission (ASMFC). 2013. Workshop on Sea Turtle and Atlantic Sturgeon Bycatch Reduction in Gillnet Fisheries. Jan 22-23, 2013, Ocean City, MD. 48 pages.

National Marine Fisheries Service. 1998. Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 104 pages.

Natural Resources Defense Council. 2011. Petition to List Alewife (*Alosa pseudoharengus*) and Blueback Herring (*Alosa aestivalis*) as Threatened Species and to Designate Critical Habitat. New York, New York. 107 pages.

NEFC (Northeast Fisheries Center). 1988. An evaluation of the bottom trawl survey program of the Northeast Fisheries Center. NOAA Technical Memorandum NMFS-F/NEC-52, Woods Hole, Massachusetts.

NEFC [Northeast Fisheries Science Center]. 1991. Report of the 12th Stock Assessment Workshop (12th SAW), Spring 1991. Woods Hole, MA: NOAA/NMFS/NEFC. NEFC Ref. Doc. 91-03.

NMFS/HMS. 2009. Stock Assessment and Fishery Evaluation (SAFE) Report for Atlantic Highly Migratory Species. Department of Commerce.

http://www.nmfs.noaa.gov/sfa/hms/Safe_Report/2009/HMS_SAFE_Report_2009_FINAL_FULL_DOCUMENT.pdf
March 20, 2015.

NOAA Fisheries – Office of Protected Resources. 2013. Cusk (*Brosme brosme*).
<http://www.nmfs.noaa.gov/pr/species/fish/cusk.htm> (March 6, 2015)

NOAA. 2007. Rational for Listing as a “Species of Concern.” November 13, 2007.
http://www.nmfs.noaa.gov/pr/pdfs/species/rainbowmelt_detailed.pdf (March 6, 2015).

Northeast Data Poor Stocks Working Group. 2009. The Northeast Data Poor Stocks Working Group Report, December 8-12, 2008 Meeting. Part A. Skate species complex, deep sea red crab, Atlantic wolffish, scup, and black sea bass. US Dept Commer, Northeast Fish Sci Cent Ref Doc. 09-02; 496 pages.

NEFSC [Northeast Fisheries Science Center]. 2000. 30th Northeast Regional Stock Assessment Workshop (30th SAW) Stock Assessment Review Committee (SARC) Consensus Summary of Assessments. Woods Hole, MA: NOAA/NMFS/NEFC. NEFSC Ref. Doc. 00-03.

NEFSC [Northeast Fisheries Science Center]. 2007. 44th Northeast Regional Stock Assessment Workshop (44th SAW) 44th SAW Assessment Report. Woods Hole, MA: NOAA/NMFS/NEFC. NEFSC Ref. Doc. 07-10.

Northeast Fisheries Science Center. 2012. Assessment or Data Updates of 13 Northeast Groundfish Stocks through 2010. US Dept Commerce, Northeast Fish Sci Cent Ref Doc. 12-06; 789 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026, or online at <http://www.nefsc.noaa.gov/nefsc/publications/>

Pollard, D. & Smith, A. 2009. *Carcharias taurus*. The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 20 March 2015.

Sigourney, D. B., M. R. Ross, J. Brodziak, and J. Burnet. 2006. Length at age, sexual maturity and distribution of Atlantic halibut, *Hippoglossus hippoglossus* L., off the northeast USA. *Journal of Northwest Atlantic Fishery Science* 36: 81–90.

Sosebee, K.A. 2005. Maturity of skates in Northeast United States waters. *J. Northw. Atl. Fish. Sci.* 35: 141-153.

USOFR (U.S. Office of the Federal Register). 2007. Endangered and Threatened Species; Initiation of a Status Review under the Endangered Species Act for Cusk. *Federal Register* 72:46 (9 March 2007): 10710-10711.

USOFR (U.S. Office of the Federal Register). 2010. Listing Endangered and Threatened Wildlife and Plants; 90–Day Finding on Petitions to List the Porbeagle Shark under the Endangered Species Act. *Federal Register* 75:132 (12 July 2010): 39656-39662.

USOFR (U.S. Office of the Federal Register). 2011a. Listing Endangered and Threatened Wildlife and Plants; 90-day finding on a petition to list alewife and blueback herring as threatened under the Endangered Species Act. Federal Register 76:212 (2 November 2011): 67652-67656.

USOFR (U.S. Office of the Federal Register). 2011b. Listing Endangered and Threatened Wildlife and Plants; 90-Day Finding on Petitions To List the Thorny Skate (*Amblyraja radiata*) Under the Endangered Species Act. Federal Register 76:244 (20 December 2011): 78891-78898.

USOFR (U.S. Office of the Federal Register). 2012. Endangered and Threatened Wildlife; 90-Day Finding on a Petition To List Five Species of Sturgeon as Threatened or Endangered Under the Endangered Species Act. Federal Register 77:166 (27 August 2012): 51767- 51771.

USOFR (U.S. Office of the Federal Register). 2013. Endangered and Threatened Wildlife and Plants; Endangered Species Act Listing Determination for Alewife and Blueback Herring; Notice of a listing determination. Federal Register 78:155 (12 August 2013): 48944-48994.

USOFR (U.S. Office of the Federal Register). 2014a. International Fisheries; Pacific Tuna Fisheries; Fishing Restrictions in the Eastern Pacific Ocean, Whale Shark Conservation Measures; Final Rule. Federal Register 79:181 (18 September 2014): 56017-56019.

USOFR (U.S. Office of the Federal Register). 2014a. Endangered and Threatened Wildlife and Plants; Threatened and Endangered Status for Distinct Population Segments of Scalloped Hammerhead Sharks; Final Rule. Federal Register 79:128 (3 July 2014): 38214-38242.

WildEarth Guardians. 2012. Petition to list the Whale Shark (*Rhincodon typus*) under the Endangered Species Act. WildEarth Guardians, Denver, Colorado.