E. Executive Order 13132

This action would not have a substantial direct effect on States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132, entitled *Federalism* (64 FR 43255, August 10, 1999).

F. Executive Order 13175

This proposed rule would not have Tribal implications because it is not expected to have substantial direct effects on Indian Tribes. This proposed rule would not significantly or uniquely affect the communities of Indian Tribal governments, nor would it involve or impose any requirements that affect Indian Tribes. Accordingly, the requirements of Executive Order 13175, entitled *Consultation and Coordination with Indian Tribal Governments* (65 FR 67249, November 9, 2000), do not apply to this proposed rule.

G. Executive Order 13045

This action is not subject to Executive Order 13045, entitled *Protection of Children from Environmental Health Risks and Safety Risks* (62 FR 19885, April 23, 1997), because this is not an economically significant regulatory action as defined by Executive Order 12866, and this action does not address environmental health or safety risks disproportionately affecting children.

H. Executive Order 13211

This proposed rule is not subject to Executive Order 13211, entitled *Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use* (66 FR 28355, May 22, 2001), because this action is not expected to affect energy supply, distribution, or use and because this action is not a significant regulatory action under Executive Order 12866.

I. National Technology Transfer and Advancement Act

In addition, since this action does not involve any technical standards, section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104–113, section 12(d) (15 U.S.C. 272 note), does not apply to this action.

J. Executive Order 12898

This action does not entail special considerations of environmental justice related issues as delineated by Executive Order 12898, entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629, February 16, 1994).

List of Subjects in 40 CFR Part 721

Environmental protection, Chemicals, Hazardous substances, Reporting and recordkeeping requirements.

Dated: October 26, 2009.

Wendy C. Hamnett,

Acting Director, Office of Pollution Prevention and Toxics.

Therefore, it is proposed that 40 CFR part 721 be amended as follows:

PART 721—[AMENDED]

1. The authority citation for part 721 would continue to read as follows:

Authority: 15 U.S.C. 2604, 2607, and 2625(c).

2. By adding new § 721.10155 to subpart E to read as follows:

§ 721.10155 Multi-walled carbon nanotubes (generic).

(a) *Chemical substance and significant new uses subject to reporting.* (1) The chemical substance identified generically as multi-walled carbon nanotubes (PMN P–08–177) is subject to reporting under this section for the significant new uses described in paragraph (a)(2) of this section.

(2) The significant new uses are:

(i) *Protection in the workplace.* Requirements as specified in § 721.63 (a)(1), (a)(2)(i), (a)(2)(ii), (a)(3), (a)(4), (a)(5) (National Institute for Occupational Safety and Health (NIOSH)-approved air-purifying, tight-fitting full-face respirator equipped with N100 filters), (a)(6)(i), and (c).

(ii) *Industrial, commercial, and consumer activities.* Requirements as specified in § 721.80 (k) and (q).

(iii) *Release to water.* Requirements as specified in § 721.90 (a)(1), (b)(1), and (c)(1).

(b) *Specific requirements.* The provisions of subpart A of this part apply to this section except as modified by this paragraph.

(1) *Recordkeeping.* Recordkeeping requirements as specified in § 721.125 (a), (b), (c), (d), (e), (i), and (k) are applicable to manufacturers, importers, and processors of this substance.

(2) *Limitations or revocation of certain notification requirements.* The provisions of § 721.185 apply to this section.

(3) *Determining whether a specific use is subject to this section.* The provisions of § 721.1725(b)(1) apply to this section.

3. By adding new § 721.10156 to subpart E to read as follows:

§ 721.10156 Single-walled carbon nanotubes (generic).

(a) *Chemical substance and significant new uses subject to reporting.* (1) The chemical substance identified generically as single-walled carbon nanotubes (PMN P–08–328) is subject to reporting under this section for the significant new uses described in paragraph (a)(2) of this section.

(2) The significant new uses are:

(i) *Protection in the workplace.* Requirements as specified in § 721.63 (a)(1), (a)(2)(i), (a)(2)(ii), (a)(3), (a)(4), (a)(5) (National Institute for Occupational Safety and Health (NIOSH)-approved air-purifying, tight-fitting full-face respirator equipped with N100 filters), (a)(6)(i), and (c).

(ii) *Industrial, commercial, and consumer activities.* Requirements as specified in § 721.80 (k) and (q).

(iii) *Release to water.* Requirements as specified in § 721.90 (a)(1), (b)(1), and (c)(1).

(b) *Specific requirements.* The provisions of subpart A of this part apply to this section except as modified by this paragraph.

(1) *Recordkeeping.* Recordkeeping requirements as specified in § 721.125 (a), (b), (c), (d), (e), (i), and (k) are applicable to manufacturers, importers, and processors of this substance.

(2) *Limitations or revocation of certain notification requirements.* The provisions of § 721.185 apply to this section.

(3) *Determining whether a specific use is subject to this section.* The provisions of § 721.1725(b)(1) apply to this section.

[FR Doc. E9–26818 Filed 11–5–09; 8:45 am]

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Parts 223 and 224

[Docket No. 0812291651–91321–02]

RIN 0648–XM05

Endangered and Threatened Wildlife and Plants; Endangered Species Act Listing Determination for Atlantic Wolffish

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notification of a listing determination and availability of a status review document.

SUMMARY: After we, NMFS, received a petition to list Atlantic wolffish

(*Anarhichas lupus*) as threatened or endangered under the Endangered Species Act (ESA), we established a biological review team (BRT) to conduct a status review. We (NMFS) have reviewed the BRT's status review report and other available scientific and commercial information and have determined that listing Atlantic wolffish as threatened or endangered under the ESA is not warranted at this time. We also announce the availability of the status review document.

DATES: This finding is effective on November 6, 2009.

ADDRESSES: The Atlantic wolffish status review report and list of references are available by submitting a request to the Assistant Regional Administrator, Protected Resources Division, Northeast Region, NMFS, 55 Great Republic Way, Gloucester, MA 01930. The status review report and other reference materials regarding this determination can also be obtained via the Internet at: *http://www.nero.noaa.gov/prot__res/CandidateSpeciesProgram/eas.htm*.

FOR FURTHER INFORMATION CONTACT: Kim Damon-Randall, NMFS Northeast Regional Office, (978) 282–8485; or Marta Nammack, NMFS, Office of Protected Resources (301) 713–1401.

SUPPLEMENTARY INFORMATION:

Background

On October 1, 2008, we received a petition from the Conservation Law Foundation, Dr. Erica Fuller, and Dr. Les Watling (hereafter, the Petitioners), requesting that we list the U.S. distinct population segment (DPS) of Atlantic wolffish, consisting of one or more subpopulations in U.S. waters, or the entire species of Atlantic wolffish as endangered or threatened under the ESA and designate critical habitat for the species. The petition contains information about the species, including the taxonomy; historic and current distribution; physical and biological characteristics of its habitat and ecosystem relationships; population status and trends; and factors contributing to the species' decline. The Petitioners also included information regarding possible DPSs of Atlantic wolffish. The petition addresses the five factors identified in section 4(a)(1) of the ESA as they pertain to Atlantic wolffish: (A) current or threatened habitat destruction or modification or curtailment of habitat or range; (B) overutilization for commercial purposes; (C) disease or predation; (D) inadequacy of existing regulatory mechanisms; and (E) other natural or man-made factors affecting the species' continued existence.

On January 5, 2009, we determined that the petitioned action may be warranted and published a positive 90–day finding in the **Federal Register** (74 FR 249). Following our positive 90–day finding, we convened an Atlantic wolffish BRT to review the status of the species.

The BRT completed the status review in July 2009. As part of the full evaluation of the status of Atlantic wolffish under the ESA, we requested that four individuals review the status review report and provide written summaries of their comments to ensure that the content of the document is factually supported and based on the best available data and the methodology and conclusions are scientifically valid. Prior to finalizing the status review report, the BRT considered and incorporated, as appropriate, the peer reviewers' comments. The final status review report was submitted to NMFS on September 30, 2009.

The Northeast Fisheries Science Center (NEFSC) has also submitted to NMFS a quantitative analysis using the Statistical Catch At Length (SCALE) model, which is a modeling program presently implemented by NMFS. In this model, projections of stock status are generally used to determine acceptable biological catch limits that would either maintain status quo conditions for stocks or increase the probability of rebuilding depleted stocks. This model can also be used to address the concern of a stock falling below some threshold that might threaten persistence. In particular, the stochastic projection model can be used to evaluate changes in population trajectories based on alterations in rates of future fishing mortality and life-history parameters.

In collaboration with the Northeast Regional Office of NMFS, the NEFSC convened a meeting in Woods Hole to address the merits of applying such fisheries assessment models to address extinction risk in Atlantic wolffish. Two outside experts, Drs. Jean-Jacques Maguire and Grant Thompson, were invited to participate in the review and provide independent comments. The Workshop participants at this meeting met to provide additional information for our listing determination.

Range

Atlantic wolffish can be found in northern latitudes of the eastern and western North Atlantic Ocean. In the Eastern North Atlantic, they range from eastern Greenland to Iceland, along northern Europe and the Scandinavian coast extending north and west to the Barents and White Seas and to the south in northern France and Ireland. In the Western North Atlantic, they are found from Davis Straits off western Greenland, along Newfoundland and Labrador coasts to Grand Bank and southward through the Canadian Maritime Provinces to Cape Cod, United States. Atlantic wolffish are found infrequently from southern New England to New Jersey (Collete and Klein-MacPhee, 2002). NEFSC's Bottom Trawl surveys have only encountered one fish southwest of Martha's Vineyard, Massachusetts, since 1963.

Habitat

Temperature ranges where Atlantic wolffish occur deviate slightly with geographic region. Historically, in the Gulf of Maine (GOM), wolffish have been associated with temperatures ranging from 0° - 11.1° C (Collete and Klein-MacPhee, 2002). Bottom temperatures collected from NEFSC bottom trawl surveys where wolffish were encountered ranged from 0.0 to 10.0° C in spring and from 0 to 14.3° C in fall. In Newfoundland, water temperatures where wolffish were found ranged from -1.9 to 11.0° C, in Norway from -1.3 to 11.0° C, and in Iceland and Northern Europe from -1.3 to 10.2° C (Collete and Klein-MacPhee, 2002; Falk-Petersen and Hansen, 1991; Jonsson, 1982). Laboratory studies indicate wolffish can survive a wide span of temperatures ranging from -1.7 to 17.0° C and that feeding is negatively correlated with the higher temperature extremes (Hagen and Mann, 1992; King *et al.*, 1989).

In the spring, adult wolffish in U.S. waters are primarily associated with depths between 27 and 173 m, while juveniles prefer a more narrow range of depths (70–184 m) in the spring (Nelson and Ross, 1992). Depth preferences are similar for juveniles and adults in the fall. According to summer trawl survey data, Atlantic wolffish (juveniles and adults) on the Scotian Shelf prefer a depth range of 73–126 m (Scott, 1982a). No data were available from the Gulf of St. Lawrence.

In the spring, wolffish in U.S. waters are primarily associated with bottom temperatures below 5.3° C (adults) and 6° C (juveniles) (Keith and Nitschke, 2008). Temperature preferences are similar for adult (<9.7° C) and juveniles (<9.6° C) in the fall (Keith and Nitschke, 2008). Summer trawl survey data from the Scotian Shelf indicate that Atlantic wolffish prefer a bottom temperature range of 3 - 6° C (Scott, 1982a). No data were available from the Gulf of St. Lawrence.

There is very little information available on salinity as it relates to

wolffish presence. Kulka *et al.* (2004) summarized observations made by divers at various shallow-water locations on the east and west coasts of Newfoundland and reported that wolffish were not observed in major estuarine haloclines, but in deeper environments, indicating that the species may not be tolerant of low salinity.

Substrate associations for adult Atlantic wolffish are well documented during the time of year that they use nearshore rocky habitats for reproduction. Based on the depth distribution information from the NEFSC trawl surveys in the GOM region, the adults move into slightly shallower water in the spring (mean depth 82.5 m versus 105 m in the fall) where they have been observed with and without egg masses inhabiting shelters in deep boulder reefs in depths between 50 and 100 meters. Similar observations of adults inhabiting shelters in shallow (<30 m), rocky habitats prior to and after spawning have been made in the Gulf of St. Lawrence and Newfoundland. Few, if any, adult wolffish have been observed in other habitats in any of these surveys. There is clearly a strong preference for nearshore, rocky spawning habitat and for bottom temperatures <10° C. Rocky, nearshore habitats are plentiful in the GOM and appear to provide critical spawning habitat for Atlantic wolffish.

However, juvenile wolffish are found in a much wider variety of bottom habitats than adults. Also, once the adults have finished guarding the eggs and resume feeding, they move into deeper water where researchers have collected them over a variety of bottom types (including sand and gravel, but not mud). In fact, the collection of ''aggregations'' of Atlantic wolffish eggs in bottom trawls fishing in 130 meters of water on LeHave Bank (Scotian Shelf) in March 1966 (Powles, 1967; Templeman, 1986) indicates that spawning is not restricted to nearshore habitats, and may not be restricted to rocky habitats. Attempts to relate catches of Atlantic wolffish in bottom trawl surveys to substrate types are of limited value and somewhat contradictory (bottom substrates are characterized using a variety of sampling techniques, ranging from acoustic surveys of large areas of the seafloor to point samples of finer sediments for grain size analysis. They are also classified using different categorization schemes and descriptive terminology. To add to the problem, there are a number of ways to spatially interpolate discrete sampling data to create substrate ''polygons'' in a GIS format, all of which are subject to problems that complicate the interpretation of the resulting ''maps.''), but they do indicate that the juveniles do not have strong habitat preferences, and that adults are more widely distributed over a variety of bottom types once they leave their nearshore, rocky spawning habitats.

Consideration as a Species Under the ESA

According to Section 3 of the ESA, the term ''species'' includes ''any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife that interbreeds when mature.'' Congress included the term ''distinct population segment'' in the 1978 amendments to the ESA. On February 7, 1996, the U.S. Fish and Wildlife Service and NMFS adopted a policy to clarify their interpretation of the phrase ''distinct population segment'' for the purpose of listing, delisting, and reclassifying species (61 FR 4721). The policy described two criteria a population segment must meet in order to be considered a DPS (61 FR 4721):

1. It must be discrete in relation to the remainder of the species to which it belongs; and

2. It must be significant to the species to which it belongs.

Determining if a population is discrete requires either one of the following conditions:

1. It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation; or

2. It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the ESA.

If a population is deemed discrete, then the population segment is evaluated in terms of significance, which may include, but is not limited to, the following:

1. Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon.

2. Evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon.

3. Evidence that the DPS represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or

4. Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

If a population segment is deemed discrete and significant, then it qualifies as a DPS.

Discreteness

As described earlier in this document, Atlantic wolffish occur over a large range in the North Atlantic Ocean. With such a large range, Atlantic wolffish have been reported to spawn at different times of the year in different geographical regions. This may have contributed to the segmentation of Atlantic wolffish by contributing to regional reproductive isolation. Researchers have also speculated that reproductive isolation has played a role in the genetic structuring of other species such as capelin (Dodson *et al.*, 2007) and bluemouth (Aboim *et al.*, 2005), another demersal fish. Investigators have suggested that varying ocean depths and the large geographic distances spanned by ocean basins may represent hydrographic barriers to effective migrations of demersal species (McCusker *et al.*, unpublished; Knutsen *et al.*, unpublished; Shaw *et al.*, 1999). Physical and behavioral barriers to dispersal, along with the heterogeneity of spawning habitats and/or gyral retention of larvae, may inhibit gene flow and drive population differentiation at both large and local geographical scales (Imsland *et al.*, 2008; O'Leary *et al.*, 2007).

In the GOM, there is an indication of a seasonal migration. Adult wolffish travel from shallow to deep waters in autumn and then from deep to shallow waters in spring (Nelson and Ross, 1992). These migrations have been related to reproduction and are size dependent (Nelson and Ross, 1992). Tagging data have shown that wolffish migrations are usually short with occasionally longer ones (Jonsson, 1982; Templeman, 1984; Riget and Messtorff, 1988). Researchers reported the majority of recaptured wolffish migrated only 15 nautical miles (nm)(28 km); however, a small percentage of tagged fish migrated distances in excess of 100 nm (185 km).

It has been suggested that currents in the Atlantic Ocean form retention zones for different life stages of many fish species that may lead to population discontinuity (Rosques *et al.*, 2002; Sinclair and Ilse, 1985). Researchers suggest that the northwest and northeast-central Atlantic groups of capelin have been isolated by the Labrador Current, which has influenced the phylogeographic pattern of the

species (Dodson *et al.*, 2007). The North Atlantic current and the European continental shelf could also function as barriers for eastern populations in several marine species (Roques *et al.*, 2002). Modeling of blue whiting larvae revealed that the retention of tracers was influenced by currents along the shelf edge in Europe and in the Rockall Trough (Bartsch and Coombs, 1997).

Isolation and recolonization driven by glacial events have also been suggested to influence genetic population differentiation (Nesbo *et al.*, 2000; O'Leary *et al.*, 2007). Dodson *et al.* (2007) reported that the four genetic groups observed within capelin populations evolved through several glacial and climatic oscillations. Glaciation may also have strongly influenced other marine species in the North Atlantic/Mediterranean (Abiom *et al.*, 2005). These events may have affected food chains in deep sea environments, preventing pelagic larval dispersal (Aboim *et al.*, 2005) and, hence, inhibiting gene flow.

Molecular tools have been used to differentiate species of wolffish (Johnstone *et al.* 2007; McCusker *et al.*, 2008) and assess the population genetic structure of specific species of wolffish throughout their range (Imsland *et al.*, 2008). McCusker and colleagues (unpublished) have recently researched genetic variation in Atlantic wolffish, Anarhichas lupus, across the North Atlantic using 14 microsatellite loci. Their results indicate that there are four genetically distinct populations of Atlantic wolffish. These four populations are referred to as: (1) North Atlantic, (2) Eastern Grand Banks, (3) Rockall Bank, and (4) Western Atlantic Canada. Comparable phylogeographical regions have been observed for a related species, *Anarhicas minor*, the spotted wolffish. Population genetic structure of this species revealed similar patterns between the western Atlantic, middle and eastern Atlantic, and Barents Sea populations (Imsland *et al.*, 2008). Phylogeographical partitioning in these regions was also observed for Atlantic mackerel (*Scomber scombrus*) (Nesbo *et al.*, 2000), deepwater red fish (*Sebastes mentella*), and the blackbelly rosefish (*Helicolenus dactylopterus*) (Aboim, 2005).

As noted, the genetic information that is available for wolffish from Canada and Europe indicates that there are four Atlantic wolffish populations which are significantly different from one another. Fish from Western Atlantic Canada are genetically distinct from all other areas within Canada and in Europe (McCusker, unpublished data). Atlantic wolffish from Western Atlantic Canada are geographically the closest population to Atlantic wolffish residing in the United States. While genetic information is not available for U.S. fish, because of the geographic proximity, lack of barriers, the ability to migrate hundreds of kilometers, and spatial overlap of U.S. fish with the Western Atlantic Canada population, we conclude it is probable that they are closely related. Although it is possible that U.S. samples are genetically distinct from western Atlantic Canadian samples, we have no reason to believe they are. If the two populations are different, it would likely be due to genetic drift related to small population size, rather than to historically significant isolation of this region from the rest of the range. Thus, based on the available genetic data and the other information presented above, the BRT concluded that the Atlantic wolffish from Western Atlantic Canada/United States are discrete from other Atlantic wolffish populations. We concur with the BRT's conclusion.

Significance

If a population is deemed discrete, then the population segment is evaluated in terms of significance. As noted earlier, McCusker and colleagues have assessed the genetic composition of Atlantic wolffish samples from Canada using 14 microsatellite loci and documented that there are four genetically distinct populations. Although some significant differences occurred within groups, the four main groups they identified were characterized by consistent significant differences from each of the other main groups ($p<0.003$). An analysis of molecular variance (AMOVA) supported the four main group configuration (compared to two or three main groups), indicating that this configuration had the highest among-group variation and lowest within-group variation (McCusker *et al.*, unpublished data).

The mitochondrial DNA (mtDNA) was also assessed to detect any genetic variation across the range of Atlantic wolffish in order to determine phylogeographic structure. Phylogeographic analyses supported the single refuge hypothesis during the last glaciation, with the most likely location of the refuge being in the eastern Atlantic. Therefore, post-glacial colonization of the range of wolffish most likely occurred from the eastern Atlantic to the western Atlantic. This resulted in the significant genetic differences observed between Atlantic wolffish populations.

Western Atlantic Canadian samples, in particular, were characterized by low diversity, possibly suggesting relatively recent (<20,000 years ago) colonization of this part of the range (McCusker *et al.*, unpublished data). Other studies performed on mtDNA have implicated Pleistocene glaciations as a major contributing factor to phylogeographic patterns within and among closely related species (Avise *et al.*,1998; Dodson *et al.*, 2007).

The North Atlantic, Eastern Grand Banks, and Rockall Bank (White Sea) populations constitute both the northernmost and easternmost reproducing populations of Atlantic wolffish, while fish from the Western Atlantic Canada/United States represent the southernmost reproducing population. Genetic research detected greater genetic diversity in the North Atlantic and Eastern Atlantic populations when heterozygosity and allelic richness were plotted and compared to Western Atlantic Canada samples. Loss of any one of these four populations would result in significant gaps in the range of this taxon and decreased genetic diversity; thus, all four genetically distinct populations are significant to the taxon as a whole.

Based on the available information, the BRT concluded that Atlantic wolffish observed in Western Atlantic Canada and the United States form one DPS. The DPS consists of the following oceanic areas: (1) Canada's Scotian Shelf; (2) southern Gulf of St. Lawrence; (3) northern Gulf of St. Lawrence; (4) southern Newfoundland; and (5) United States. We agree with the BRT's DPS delineation and refer to this DPS as the Western Atlantic Canada/U.S. DPS of Atlantic wolffish. The available information also indicates that there are three additional DPSs spanning the remainder of the range of Atlantic wolffish outside of the United States and Western Atlantic Canada. Information on these remaining DPSs indicates that these populations are either stable or increasing. The information presented in the remainder of this finding, therefore, pertains to the status of the Western Atlantic Canada/U.S. DPS.

Abundance and Status of the Western Atlantic Canada/U.S. DPS

The status of wolffish in the Gulf of Saint Lawrence and Scotian Shelf was summarized in a Canadian Department of Fisheries and Oceans (DFO) science stock status report (DFO, 2000). According to the report, which summarizes data from summer (Northern Gulf of St. Lawrence, 1990–2000, and Scotian Shelf, 1970–2000) and fall (Southern Gulf of St. Lawrence, 1970–2000) research surveys, wolffish

are distributed throughout the Scotian Shelf, with numbers decreasing in the late 1990s in the mid-shelf and increasing in the northern shelf. Mean number per tow was 0.5 in 1970, peaked in 1989 to 1.5, and remained above the 1970–2000 average throughout the Scotian Shelf since then; mean weight per tow, however, was near record lows from 1990 to 2000 (ranging from 0.4 to 1.1 kg). Atlantic wolffish were distributed throughout the Northern Gulf of Saint Lawrence, with the primary concentration off the west coast of Newfoundland. Mean number per tow increased from 0.2 in 1990 to 0.6 in 2000 in this area, and weight per tow increased in this area from 0.10 kg in 1990 to 0.18 kg in 2000. In the Southern Gulf of Saint Lawrence, wolffish were distributed along the slope of the Laurentian Channel. Mean number and mean weight per tow in this area increased from 0.01 and 0.15 kg, respectively, to above average after 1987 (as high as 0.20 and 0.26 kg per tow, respectively), but declined to low levels in the 1990s (0.02 and 0.03 kg, respectively, in 1999).

Length frequency data (1970 2000) from the Scotian Shelf indicate that the increased abundance since 1986 was based on small fish, with the mature fish (≥55cm) survey abundance index near record lows. The number of immature fish in the Southern Gulf of St. Lawrence also increased, but mature fish were also more prevalent, contributing to the increased abundance after 1987; however, the number of mature fish declined to low levels in the late 1990s. Mature fish have seldom been caught in the Northern Gulf of St. Lawrence. Resource survey trends in parts of the Canadian portion of the DPS show improved recruitment at low biomass levels and stable or even increasing trends of abundance.

The area occupied index (percent occurrence of wolffish in survey tows) on the Scotian Shelf declined during the 1980s and remained low during the 1990s. In the Southern Gulf of Saint Lawrence the index increased in the early 1980s and remained at slightly higher values since then. An area occupied index was not produced for the Northern Gulf of Saint Lawrence.

In the United States, Atlantic wolffish are at relatively low biomass, with various model estimates ranging between 475 and 998 mt of spawning stock biomass in 2007, according to findings presented at the NEFSC Data Poor Assessment Working Group meeting. Current abundance levels (estimated by SCALE model for 2007) are also low, ranging from 89,000 384,000 adult fish for SCALE model runs 1 and 2. The SCALE model was applied to data from 1968–2007. The SCALE model estimates for 1970 abundance using the same assumptions range from 557,000 to 1,222,000, with the estimate peaking in 1982 (379,152 to 1,909,600) before declining to 2007 levels. While estimated population numbers from U.S. waters are low, they are not believed to have reached levels where they are at risk of extinction now or in the foreseeable future.

SCALE Model Projections

Stock assessment models focus on estimation, and often use a wider range and longer time series of data than most standard models used in biological conservation. This distinction can be attributed to the underlying problem species under consideration for threatened or endangered status often have limited data. Therefore, we asked the NEFSC's Northeast Data Poor Stocks Working Group to assess the status of Atlantic wolffish, and the Working Group used the SCALE model mentioned above to do this. The SCALE model was used to assess only the U.S. portion of the Western Atlantic Canada/U.S. DPS because of: (1) inconsistencies between U.S. and Canadian fishery independent surveys; (2) differences in how commercial catch is reported in the two countries; and (3) the fact that, in Canada, Atlantic wolffish landings are grouped with other species of wolffishes, rather than separated by species. Despite the limited amount of data available, wolffish have been monitored by NEFSC bottom surveys for over 40 years, and a wide range of size frequency data is available from commercial landings and discard monitoring. While it is not possible to develop age-based measures of abundance, it is possible to use the existing length-based data in the SCALE model to develop projections of population trends in the future.

Workshop participants agreed that quantitative stock projections were an appropriate basis for evaluating the risk of extinction. The Working Group could not agree on generating a unique measure of extinction risk for the U.S. portion of the Western Atlantic Canada/U.S. DPS of Atlantic wolffish, but agreed to use previous values associated with relevant literature (e.g., Musick *et al.*, 2000; the Atlantic White Marlin Status Review, 2007). The literature suggests a carrying capacity (K) threshold value of 0.05 be associated with a species considered vulnerable or at possible risk of becoming threatened or endangered (Musick *et al.*, 2000). Workshop participants assumed that a population size below 0.05K, where K is 2 times biomass at maximum sustainable yield (BMSY), was a useful proxy for the extinction threshold for the U.S. portion of the Western Atlantic/United States DPS of Atlantic wolffish. Different values of fishing mortality (F) were also examined: a status quo F of 0.158, a near three-fold increase in F to 0.5, and an order of magnitude increase in F to 1.16. Results suggest that a value of F of 1.16 would cause the population to fall below 0.05K. However, the near order of magnitude increase in F above the current best estimate seems highly unlikely. Maintaining F at its recent level and progressively reducing average recruitment revealed that recruitment would have to drop below 1/5 of its current level to induce the population to decline to the assumed extinction threshold value of 0.05K. Hence, Workshop participants concluded that the risk of the population falling below 0.05K was very low. They further commented that the range of projection scenarios evaluated was sufficient to bound the risk. Finally, they noted that none of the scenarios considered the effects of habitat loss or possible unforeseen catastrophic events, but acknowledged that there is no explicit way of assessing this other than through some hypothesis about changes in productivity. Sufficient data were not available to perform a productivity analysis.

Significant Portion of its Range and Foreseeable Future

The ESA defines an ''endangered species'' as ''any species which is in danger of extinction throughout all or a significant portion of its range,'' while a ''threatened species'' is defined as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' The phrase ''throughout all or a significant portion of its range'' is neither defined nor explained in the ESA, and a final policy on how to interpret this language has not been developed by NMFS.

According to the NEFSC, Massachusetts, Maine/New Hampshire, and Cooperative Industry Based surveys, the general distribution of Atlantic wolffish in the United States is limited to the GOM, Georges Bank (GB), and the Great South Channel (GSC). Wolffish are scattered throughout these regions, but within the range of the Western Atlantic Canada/U.S. DPS, major concentrations appear in Jeffreys Ledge, Cashes Ledge, Stellwagen Bank, and Platts Bank. In western Canadian waters associated with the DPS, Atlantic wolffish are distributed from southern Newfoundland to Nova Scotia. Major

concentrations of Atlantic wolffish have been observed in the Bay of Fundy through the Scotian Shelf; the Southern Gulf of St. Lawrence; the Northern Gulf of St. Lawrence; and west and south coasts of Newfoundland.

We concur with the BRT's assessment that major concentrations of wolffish reside within the U.S. portion of the GOM and the western Atlantic waters of Canada during certain times of the year, but these concentrations do not represent significant portions of the range of the Western Atlantic Canada/U.S. DPS of Atlantic wolffish. These aggregations are in response to the habitat specificity associated with the species' spawning behavior. After this brief reproductive assemblage, wolffish once again become habitat generalists in order to maintain their solitary lifestyle. With the drifting pelagic larval stage of wolffish and the ability of adults to migrate, Atlantic wolffish have been observed throughout the range of Western Atlantic Canada/U.S. DPS; thus, the entire geographic range of the DPS is important, and threats assessed in any one spawning area of the entire range do not reflect the threats that the DPS faces throughout its range.

The BRT considered various methodologies for defining the foreseeable future for Atlantic wolffish. It is appropriate to interpret ''foreseeable future'' in the statutory context as the timeframe over which identified threats are likely to impact the biological status of the species. The appropriate period of time corresponding to the foreseeable future depends on the particular kinds of threats, the life history characteristics, and the specific habitat requirements for the species under consideration. The aspects of the Atlantic wolffish life history that make the species vulnerable are slow growth rate, relatively late age of maturity, low fecundity, and the fact that the species is relatively long lived (maximum age 22 years). The BRT considered the fact that some threats are localized events and/or long term. This would include such threats as localized habitat degradation, incidental catch, overutilization, contamination, direct impacts on boulder reef habitats, and the possible rise in surface temperature and its potential effect on larval survival.

The BRT also considered the information that is available regarding the causes of the significant decline of wolffish that occurred during an approximately 20–year time period. The best scientific and commercial data available indicate that Atlantic wolffish have a mean generation time of 5 to 6 years. As further support for the 20–year timeframe for the foreseeable future, the BRT also used the 3–generation forecast period used by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and International Union for the Conservation of Nature (IUCN). After considering all relevant threats, life history characteristics, and population declines, the BRT concluded that the foreseeable future for the species is 20 years. We concur with this time period for the foreseeable future.

Qualitative Threats Assessment

As discussed in the section above, there are several threats to Atlantic wolffish that the BRT considered. Qualitative threats assessments are often performed to help evaluate the significance of the threats to the species and their impact on the persistence of the species. There are no standard methods or protocols employed to estimate the risk to the long-term persistence of species. Consequently, the BRT adopted a qualitative ranking system that is adapted from similar types of qualitative analyses for ESA listing used on the West Coast (e.g., Pacific salmon, Pacific herring, Pacific hake, rockfish) and for other species assessed on the East Coast (e.g., Atlantic and shortnose sturgeon).

In the qualitative threats assessment, the BRT identified the following five demographic variables which individually and collectively are considered to be strong indicators of potential risk to the long-term persistence of the species: abundance, population age/size structure, population growth rate/productivity, spatial structure/connectivity, and genetic diversity. The BRT discussed what is known about each of these criteria and also any uncertainties associated with each criterion. Following this discussion, the BRT ranked each criterion for its effect on the long-term persistence of wolffish. The following rankings and the associated definitions were used: very low risk = highly unlikely that this criterion alone or in combination with other criteria contributes significantly to risk to the long-term persistence of the species; low risk = unlikely that this criterion contributes significantly to risk to the long-term persistence of the species by itself, but some concern that it may in combination with other factors; moderate risk = this criterion contributes significantly to risk to the long-term persistence of the species, but does not in itself constitute a risk to the persistence of the species in the near future; high risk = this criterion contributes significantly to risk to the long-term persistence of the species and is likely to contribute to the short-term risk to the persistence of the species in the foreseeable future; very high risk = this criterion by itself indicates a danger to the persistence of the species in the near future.

The BRT ranked all of the criteria low, meaning that it is unlikely that the particular criterion contributes significantly to risk of the long-term persistence of the species by itself, but there is some concern that it may in combination with other factors. The following is a summary of the discussion regarding the available information for each criterion as well as any associated uncertainties and the final ranking.

Abundance

For the abundance criterion, the BRT noted that commercial fishing effort is not likely to increase significantly in the foreseeable future and that, if Amendment 16 to the Northeast Multispecies Fishery Management Plan (FMP) is implemented as proposed (e.g., includes the ban on possession of wolffish), commercial fishing will have less of an effect on abundance in the near future. The NEFMC will determine in December 2009 if Amendment 16's ban on possession of wolffish will be implemented and become effective in May 2010.

There are indications that wolffish may be increasing in some areas in Canada, which is a positive sign in relation to abundance of the DPS. Also, the data from Canada indicate an increase in the number of small wolffish, which suggests that the DPS is capable of producing recruits even at low biomass. Consequently, the BRT determined it is unlikely that the long-term persistence of the species is at risk due to abundance.

Population Size/Age Structure

The BRT discussed population size/age structure for the DPS. They noted that there has been a period of low recruitment for the past 2 to 3 years, and it is not known if this will persist, but the population has experienced similar trends in the past with both high and low adult biomass estimates. As stated above, the SCALE model scenarios indicate that recruitment would have to drop below 1/5 of its current level to induce the population to decline to the assumed extinction threshold. The NEFSC trawl survey data indicate that the size structure of the DPS has been consistent over time and that large fish are still being caught in the survey. The risk from changes to this size structure was determined by the BRT to be low.

The BRT concluded that it is unlikely that the long-term persistence of the wolffish is at risk due to changes in population size/age structure.

Growth Rate/Productivity

During the discussion regarding the population growth rate/productivity criterion, the BRT noted that a large decline in Atlantic wolffish occurred from the mid 1980s through mid 1990s (see Abundance and Status, above). However, since then, the population biomass appears to have stabilized at the lowest levels of the time series. Atlantic wolffish are a K selected species (e.g., a species which invests more in producing fewer offspring which have a relatively high probability of surviving to adulthood). Consequently, while they do not produce a large number of offspring, the survival of the early life stages may be higher than other species. Additionally, there is evidence from Canada that good year class production can be achieved even at low biomass, as mentioned above. The BRT concluded that it is unlikely that the long-term persistence of the wolffish is at risk due to changes in population growth rate/productivity within the DPS.

Spatial Structure/Connectivity

The BRT determined that populations do not appear to be spatially segregated, and there are no apparent barriers between wolffish within the DPS to prevent mixing. The larval pelagic stage most likely increases potential for connectivity within the DPS. Also, while it appears that most wolffish do not migrate long distances, limited tagging data are available, indicating that they are capable of long distance migrations. Thus, the risk from impacts to spatial structure/connectivity to the DPS is low. The BRT concluded that it is unlikely that the long-term persistence of the wolffish is at risk due to changes to spatial structure/connectivity.

Genetic Diversity

Atlantic wolffish is a widely dispersed species. In the areas throughout the range of the taxon from which genetic samples have been taken and analyzed, there are four genetically discrete populations. There were no significant genetic differences observed between areas within Western Atlantic Canada, leading to the conclusion that they are capable of mixing and that there are no barriers within this range which may lead to significant genetic differentiation. Genetic information is lacking for fish from the United States; however, given there are no significant barriers to mixing between the U.S. and the Western Atlantic Canada populations and that fish have been observed along the border between Canada and the United States, it is probable they are genetically similar. Given the broad range of the DPS and the lack of barriers to mixing within it, the risk from decreased genetic diversity is low.

The BRT has considered abundance, population age/size structure, population growth rate/productivity, spatial structure/connectivity, and genetic diversity and has concluded that potential changes in the five demographic variables are unlikely to pose a risk to the long-term persistence of the Western Atlantic Canada/U.S. DPS of wolffish. We concur with the BRT that each of the demographic criteria described above represent low risk to the DPS now and in the foreseeable future.

Summary of the Factors Affecting the Western Atlantic Canada/U.S. DPS

As described above, section 4(a)(1) of the ESA and NMFS implementing regulations (50 CFR 424) state that we must determine whether a species is endangered or threatened because of any one or a combination of the following factors: (A) current or threatened habitat destruction or modification or curtailment of habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) inadequacy of existing regulatory mechanisms; and (E) other natural or man-made factors affecting the species' continued existence. This section briefly summarizes the findings regarding these factors. More details can be found in the status review report.

A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Coastal boulder reef spawning habitats used by Atlantic wolffish in western Canada and the GOM are highly vulnerable to physical damage that would result from the use of mobile, bottom-tending fishing gear (bottom trawls and scallop dredges). However, these gears are not normally used in such environments because they are severely damaged or lost if they come in contact with piled boulders. Other sandy and hard bottom pebble-cobble habitats used by juvenile and adult wolffish are less vulnerable to modification from fishing, but are exposed to fishing gear effects over a wide expanse of the continental shelf. The general effects of bottom trawls and dredges include reduction in habitat complexity, changes in benthic community composition, and reduced benthic productivity, especially in deeper-water environments that are not disturbed by bottom currents and wave action.

Fishing could reduce the survival of juvenile Atlantic wolffish by reducing the amount of shelter available (to hide from predators), but if this is the case, the effect is most likely localized and is not expected to be a significant risk to the entire DPS. In all cases, the potential adverse impacts of non-fishing human activities on boulder reef spawning habitat in coastal waters would be restricted to localized environments and are not expected to pose a significant risk to the entire DPS. Many of them could be avoided by siting project activities so that they avoid sensitive wolffish spawning habitats. Potential adverse impacts to offshore (depths >100 meters) benthic wolffish habitats from activities such as oil and gas exploration and production, mineral mining, alternative energy development, dredge spoil disposal, and pipeline and cable installation would be localized and therefore, do not pose a significant risk to the entire DPS. The previously mentioned impacts are considered local events because of the broad range of the DPS, the habitat generalist nature of the species, and the ability of all life stages to migrate within the entire range of the DPS. These characteristics would allow for the continued persistence of the species within the range of the DPS in the event of localized impacts.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Because wolffish are widely dispersed across the DPS, they are inevitably captured during recreational and commercial fishing activities. Slow growing species with low fecundity are considered more vulnerable, but Atlantic wolffish also employ valuable life history strategies, such as internal fertilization, large eggs, and nest guarding (Musick, 1999; Keats *et al.*, 1985; Pavlov and Novikov, 1993) to improve productivity and survivability.

Commercial landings from the region south of the Grand Banks are composed primarily of Atlantic wolffish. This region encompasses a large part of the western Atlantic Canada/U.S. DPS, including the Gulf of St. Lawrence, Scotian Shelf, Bay of Fundy, and the Gulf of Maine. The combined landings from these regions were approximately 1,000–1,500 mt in the 1960s, 2,000 mt from 1968–1979, peaking in 1983 at approximately 4,000 mt, dropping steadily in the 1990s to approximately

1,000 mt, and then averaging 625 mt in the early 2000s (Kulka *et al.*, 2007). The incidental catches of wolffish in southern Newfoundland during the 1995–2002 period were approximately 114 mt (Kulka *et al.*, 2007). In the United States, Atlantic wolffish have been taken primarily as incidental catch in the otter trawl fishery. Landings from this fishery increased until peaking in 1983 at 1,100 mt and then declined steadily until 2007, the latest complete year for which data are available, when landings were 63 mt.

Management action in Canada has likely benefited Atlantic wolffish, including effort controls in groundfish fisheries, which have reduced the amount of wolffish landed, and listing under Canada's Species at Risk Act (SARA) as a Species of Special Concern (Kulka *et al.*, 2007). Similarly, U.S. fishery management effort controls and permanent and seasonal area closures within the GOM for other groundfish species have reduced both fishing mortality over time and habitat disturbance in these areas, thereby, providing an indirect benefit to wolffish. Proposed action by the New England Fishery Management Council (NEFMC) under Amendment 16 to the Northeast Multispecies Fishery Management Plan (FMP), if implemented, will prohibit possession of Atlantic wolffish by May 2010 and will likely succeed in further reducing fishing mortality and improving resource health. Although Atlantic wolffish discard mortality rates are not specifically known in the GOM, a study from the yellowtail fishery in Canadian waters indicates that discard survival rates may be as high as 100 percent (Grant *et al.*, 2005).

The threats to Atlantic wolffish from recreational fishing impose a low risk to the wolffish DPS. While recreational landings of Atlantic wolffish have occurred and have become more significant in terms of overall catch in the United States, due to reduced commercial landings, they are still relatively low over the range of the entire DPS. Stewardship programs for all three wolffish species in eastern Canada have likely reduced incidental catch mortality and are building support for conservation and recovery of the resource (Pers Comm K. Blanchard, 2009). As discussed above, proposed action by the NEFMC, if implemented, will prohibit possession of Atlantic wolffish by recreational fishers in the United States as well.

Atlantic wolffish are used in various scientific research projects and for educational purposes, but neither of these poses a significant risk to the long-term persistence of this species as the numbers taken for these purposes are low.

C. Predation and Disease

Rountree (2002, in Collette and Klein-MacPhee, 2002) indicated that Atlantic wolffish have been reported in the stomachs of Greenland sharks (Barsuov, 1959), Atlantic cod (Saemundsson, 1949; Basukov, 1959), haddock (Orlova *et al.*, 1989) and gray seals (Pierce *et al.*, 1990). Spotted wolffish are believed to prey upon Atlantic wolffish eggs (Jonsson, 1982, in Collette and Klein-MacPhee, 2002). The NEFSC reports that Atlantic wolffish have been documented in the stomachs of the following species: goosefish, sea raven, longhorn sculpin, winter skate, thorny skate, cod, spiny dogfish, pollock, haddock, and red hake (pers. comm. Jason Link, NEFSC, 2009; Link and Almeida, 2000). Information on predation of Atlantic wolffish from the NEFSC's Fish Habitat Database (FHDBS), an ongoing study that began in 1973, indicates that occurrences of wolffish are limited and the quantity of wolffish in stomach contents is low; thus, predation is not likely to be having a significant effect at the population level (pers. comm. Jason Link, NEFSC, 2009). The BRT was not able to find information that demonstrates a link between gray seal population increases and Atlantic wolffish declines.

Rountree (2002, in Collette and Klein-MacPhee, 2002) reports that a sporozoan parasite has been documented to infect Atlantic wolffish muscle tissue resulting in a condition known as ''hairy catfish.'' This condition may affect the marketability of the fish (Jonsson, 1982, in Collette and Klein-MacPhee, 2002). Rountree (2002, in Collette and Klein-MacPhee, 2002) also reports that other studies have indicated that parasites have been found in Atlantic wolffish, and, most often, these parasites are associated with benthic organisms (Zubchenko, 1980, in Collette and Klein-MacPhee, 2002). One parasitic fungoid microorganism (Mycelites ossifragus) has been found to burrow into wolffish teeth, and this may play a role in the destruction of their teeth (Barsukov, 1959, in Collette and Klein-MacPhee, 2002). The BRT concludes that neither disease nor predation is significantly affecting the long-term persistence of Atlantic wolffish, and we concur with this determination.

D. Inadequacy of Existing Regulatory Mechanisms

Current regulatory mechanisms in some fisheries provide both direct and indirect protections to Atlantic wolffish within the Western Atlantic Canada/U.S. DPS. Other regulatory mechanisms such as the Coastal Zone Management Act, National Environmental Policy Act, Lacey Act, Marine Protection, Research, and Sanctuaries Act of 1972, and various state laws and regulations (discussed in more detail in the status review report) provide some indirect benefits to wolffish; however, those related to the conservation and management of fisheries most likely provide the greatest benefit.

Within Canadian waters, landings are controlled under an annual quota, and fishermen are encouraged to release Atlantic wolffish as part of the live-release program, in place since 2004, for spotted and Northern wolffish.

In the United States, Atlantic wolffish are not currently managed under a FMP. However, several management measures approved by the NEFMC under the NE Multispecies FMP with the intention of protecting habitat or controlling effort in the groundfish fishery have provided some protection to wolffish populations throughout the GOM and GB. Several year-round closure areas have been implemented that prohibit commercial fishing with gear capable of catching groundfish, though recreational fishing is still permitted in these areas. The Western GOM Closed Area, in particular, covers an area of historically high wolffish abundance. Amendment 13 to the NE Multispecies FMP established seven year-round habitat closures in the GOM/GB region that prohibit the use of mobile, bottom-tending fishing gear (NEFMC, 2003). Most of the areas overlapped the existing groundfish closed areas, but some were in new areas. A series of rolling closures were created in the GOM in part to protect spawning groundfish aggregations, but which also provide protection to wolffish during limited times of the year. Within the GOM/GB Inshore Restricted Roller Gear Area, an inshore area of the western GOM that includes areas of historically higher wolffish abundance, no part of a trawl footrope, including discs, rollers, or rockhoppers may exceed 12 inches (0.30 m) in diameter. A separate action has prohibited the harvest of groundfish using brush-sweep, also known as ''street sweeper,'' trawl gear. These two provisions limit the ability of trawl gear to be used in rocky habitat areas considered preferred habitat for wolffish. The minimum mesh size of trawl and gillnet gear used in the GOM and GB has increased a number of times over the years, improving the probable escapement of wolffish. In addition, several rounds of reductions in days at sea have been implemented since 1994

with the intention of reducing effort in the groundfish fishery. A more detailed chronology of effort controls in the NE multispecies fishery is provided in the status review report. All of these measures have provided indirect protection to wolffish populations.

Amendment 16 to the NE Multispecies FMP, as adopted by the NEFMC in June 2009, adds the Atlantic wolffish to the list of species managed under the FMP (NEFMC, 2009). As part of this inclusion, Amendment 16 identifies Essential Fish Habitat (EFH) for the species. The amendment requires establishment of management measures to address the determination that the Atlantic wolffish stock is ''overfished.'' Amendment 16 prohibits the retention of wolffish in both the commercial and recreational fisheries, and requires that any wolffish caught be released alive. If approved by the NMFS, regulations implementing this prohibition would become effective in May 2010.

The lack of regulatory mechanisms in place that directly protect Atlantic wolffish has been and is continuing to have some effect on the species, as evidenced by the decreases in abundance. The BRT concluded that the lack of direct regulatory mechanisms in the United States poses a moderate risk the species. However, if Amendment 16 is implemented successfully, this will be reduced to a low risk. We concur with the BRT's evaluation of existing regulatory mechanisms in the United States. The BRT also evaluated the regulatory mechanisms for Atlantic wolffish in Canada. Because there is a live release program for the two other species of wolffish in Canada, many Atlantic wolffish from the DPS are released alive. Thus, the BRT concluded that the risk from the inadequacy of existing international regulatory mechanisms in Canada is low. While the risk to the DPS from the inadequacy of existing regulatory mechanisms in the United States is currently moderate, this is not driving the DPS toward imminent risk of extinction or endangerment in the foreseeable future because of the wide range occupied by this species and the protections afforded indirectly in both the United States and Canada.

E. Other Natural or Manmade Factors Affecting the Continued Existence of the Species

The BRT examined other natural or manmade factors affecting the continued existence of Atlantic wolffish. Climate change models predict that bottom water temperatures could increase enough during the next 100 years to cause the loss of spawning habitat south of Cape Cod, but not in the GOM where the species is more common. Sea surface waters could warm to the point that the survival of pelagic larvae in November and December is compromised. Atlantic wolffish eggs incubate for 3 to 9 months, allowing them to hatch over several months. This incubation/hatching period can last as late as May or June. Consequently, given that incubation and hatching are spread over a relatively large time period, impacts to sea surface water temperatures during only a portion of the incubation/hatching period are not expected to pose a significant threat to the DPS.

The BRT considered the impacts to Atlantic wolffish from increased competition and/or decreased availability of prey. Evidence supports the existence of a classic predator/prey response between wolffish and green sea urchins within certain portions of its range (Keats *et al.*, 1886; Bernstein *et al.*, 1981; Hagen and Mann, 1992). The sea urchin population declined in the late 1980s because of an intense fishery and a disease outbreak in Nova Scotia. The decline in wolffish abundance in recent years can not be attributed to a reduction in the numbers of sea urchins in the GOM since other prey species are readily available, or to competition from other species of fish. The BRT also considered the impacts to Atlantic wolffish from aquaculture operations. Currently, there is an aquaculture research program in Canada. However, this program does not pose a threat to the DPS since there are no immediate plans to harvest wild brood stock.

Ranking of Stressors/Factors

The BRT identified the anthropogenic stressors and natural limiting factors that are associated with the five ESA factors (discussed in more detail in section 7 of the status review report and in the section above) and evaluated each stressor/factor in terms of its effect to the long-term persistence of the species. The same ranking system and associated definitions discussed above in the demographic risk analysis were used to rank each stressor/factor (e.g., from very low to very high).

Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Two anthropogenic stressors were associated with this factor (i.e., present or threatened destruction, modification, or curtailment of its habitat or range) loss or degradation of habitat from fishing related activities and from other anthropogenic activities (e.g., dredging, aggregate extraction, offshore energy development). The available information indicates that for most of the year, wolffish are habitat generalists occurring over many different bottom types; however, for part of the year, they have an affinity for boulder reefs which provide shelter for them and their young. Consequently, impacts to this habitat could be significant. Most of the commercial fishermen with bottom tending gear avoid boulder reef habitats in order to prevent damage to their gear. It is possible that fishing gear could be developed that is capable of fishing in boulder reef areas, which could lead to impacts to this habitat. However, the likelihood of this is uncertain. Because fishing effort is currently low in the boulder reef areas, it is unlikely that significant destruction to these habitats from fishing gear is occurring. Currently, there are several areas that are closed to bottom tending gear, and these closures may result in some habitat protection for the DPS. It is not known if these areas will continue to be closed in the future. If Amendment 16 to the Multi-species FMP is implemented as proposed, it will include EFH designations that will also provide protection to important habitats for the DPS. It is also possible that other anthropogenic activities such as dredging, aggregate extraction, and offshore energy development could have localized impacts to these boulder reef habitats. Given the wide range of the DPS, if there are impacts to habitat from fishing gear or other anthropogenic activities, they are likely to be localized and not affect a significant portion of the DPS. Thus, the BRT considered the risk to the DPS associated with these two anthropogenic factors to be low.

Overutilization for Commercial and Recreational Purposes

The BRT evaluated the risk to the DPS from overutilization for commercial and recreational purposes (Factor B). The BRT agreed that the available information for recreational harvest may not be an accurate reflection of the catch; however, the reported recreational catch does represent 20 percent of the reported commercial catch. Recreational fishermen also have the ability to fish in the boulder reef areas that commercial fishermen do not typically fish in and may encounter wolffish more frequently in these areas.

After a period of high fishing mortality rates, reported commercial utilization rates for wolffish have declined in response to regulatory measures implemented for other groundfish stocks. The BRT expects that the commercial fishing rate associated with groundfish fisheries will continue to decline, but given the potential for

changes in management measures in the future, this is uncertain. As stated previously, if Amendment 16 is approved as proposed (e.g., includes a ban on possession for commercial and recreational catch), then this would most likely reduce wolffish mortality from both commercial and recreational fishing. This ban on possession would lead to a live release program for both commercial fishers participating in the multi-species groundfish fishery and recreational fishers. The success of a live release program is unknown, but given expected high post-release survival rates for wolffish, it is expected to be good. There has been a mandatory live release program for northern and spotted wolffish in Canada since 2004, and many fishers are applying this practice to Atlantic wolffish. However, since Atlantic wolffish are a species of special concern, it is not known whether this program will continue to result in indirect benefits to the species into the future. Limited data are available regarding the amount of wolffish taken in lobster gear, but incidental catch has been reported and thus, this could represent a source of incidental catch that has not been addressed.

The BRT evaluated the risk to the DPS from both commercial and recreational overutilization (Factor B). The BRT determined that the risk from recreational fisheries is low. The BRT also determined that currently, there is a moderate risk to the DPS from commercial fisheries. However, if the ban on possession in Amendment 16 is implemented and effective, then overutilization from commercial fisheries would represent a low risk to the DPS.

Disease and Predation

The BRT evaluated the risk to the DPS from disease and predation (Factor C). According to the NEFSC, there are some predators of Atlantic wolffish, but they are limited, and the quantity of wolffish that has been observed in these predators' stomachs is small. There is uncertainty regarding potential changes in predator population abundances, and it is possible that increases in various predators could lead to higher predation rates; thereby, having a more significant impact to the DPS. The likelihood of this happening, however, is unknown. Thus, the BRT ranked the threat from predation as low. There are limited data available on diseases that affect wolffish, but there is nothing to suggest that any particular disease is impacting the DPS at this time. As such, the BRT ranked the threat from disease as very low risk.

Inadequacy of Existing Regulatory Mechanisms

Currently, there are no direct regulatory mechanisms for wolffish in the United States; however, there are regulations for other species (e.g., groundfish) which provide indirect benefits through mechanisms such as reduced fishing effort and closed areas. The lack of direct regulatory mechanisms for the DPS may change in the foreseeable future. As stated previously, if Amendment 16 is approved as proposed (e.g., includes a ban on possession for commercial and recreational catch), then this would directly reduce wolffish mortality. Thus, in evaluating the risk posed by the inadequacy of existing regulatory mechanisms (Factor D), the BRT determined that there is a moderate risk at this time.

As indicated above, there is a mandatory live release program for northern and spotted wolffish in Canada that began in 2004. This program provides some protection to Atlantic wolffish from the DPS. However, since Atlantic wolffish are a species of special concern, it is not known if this program will continue into the future.

Consequently, the BRT ranked the risk from the inadequacy of existing regulatory mechanisms outside of the United States as low. While the risk to the DPS from the inadequacy of existing regulatory mechanisms in the United States is currently moderate, this is not driving the DPS toward imminent risk of extinction or endangerment in the foreseeable future due to the wide range occupied by this species and the protections afforded indirectly in both the United States and Canada.

Other Natural or Manmade Factors

Finally, the BRT considered all other natural or manmade factors that may affect the DPS (Factor E), which included competition/prey availability, climate change impacts, ocean acidification, and aquaculture/enhancement. When evaluating the risk posed by competition, the BRT noted that there may be some competition for shelters during reproduction; however, adult wolffish have been observed in the same crevices with other species, and the available information indicates that they are capable of sharing the available space rather than competing for it. Therefore, this most likely is not a significant impact to the species. Also, wolffish consume a wide variety of prey. Thus, while declines in green urchin populations, a significant prey species for wolffish, may pose a localized risk to the DPS, it is not significant throughout the entire DPS.

Wolffish have specific thermal tolerances (e.g., they do not prefer temperatures above 10° C), so it is possible that rising water temperatures could impact the DPS. However, it is not known whether bottom temperatures in the area occupied by the DPS will increase and how this might affect the range of the species (e.g., potential for range contraction). If a spawning cue is related to temperature, changes in ocean temperatures could impact the DPS, but this is also not known. The BRT, therefore, concluded that effects from climate change are highly uncertain and there is not much known upon which to base decisions.

The impacts from potential ocean acidification are also unknown, but impacts to the DPS are not expected within the foreseeable future. Currently, there are no aquaculture operations for wolffish in the United States, but there are limited aquaculture activities for wolffish in Canada. The Canadian researchers are experimenting with hybridization with spotted wolffish; however, hybridization between these two species occurs in the wild, and therefore, impacts of hybridization on the DPS are not known. The BRT ranked the threat to the DPS from these other natural and manmade factors as very low. There are potential enhancement activities proposed by Canadian researchers in Canada using wolffish from the Canadian portion of the DPS. Again, the impacts of potential enhancement on the DPS are not known, but could raise the risk from very low to low. We concur with the BRT's ranking of threats/stressors.

We agree with the BRT's assessment that there is low risk currently associated with Factor A (the present or threatened destruction, modification, or curtailment of its habitat or range), Factor B (the overutilization for commercial, recreational, scientific, or educational purposes, and Factor C (predation and disease) as they pertain to the long-term persistence of the species. When evaluating Factor D (the inadequacy of existing regulatory mechanisms), we believe that wolffish in the United States are not afforded any direct protection and a ranking of moderate risk is appropriate at the present time. However, we do not believe that the moderate risk posed by the inadequacy of existing regulatory mechanisms in the United States is driving the species toward imminent risk of extinction or toward becoming endangered in the foreseeable future. While biomass has been reduced, the

DPS occupies a wide variety of habitats in sufficient numbers throughout a large range to persist into the foreseeable future. The DPS also receives indirect benefits from regulatory mechanisms for other groundfish species in the United States and from the live release program for wolffish in Canada. We also support a very low ranking for Factor E when considering other natural or manmade factors affecting the continued existence of the species.

Current and Future Protective Efforts

As previously mentioned, landings within Canadian waters are controlled under an annual quota, and fishers are encouraged to release Atlantic wolffish as part of the live-release program for spotted and northern wolffish, in place since 2004. Within the U.S. EEZ, wolffish have benefited from management measures designed to protect depleted groundfish stocks. If Amendment 16 to the NE Multispecies FMP is approved as adopted by the NEFMC, a live-release program for both commercial and recreational fisheries would be implemented in U.S. waters in May 2010, thereby, providing direct protections for the species. This would reduce the risk to Atlantic wolffish from both commercial and recreational fishing.

Listing Determination

As mentioned above, the ESA defines an endangered species as any species in danger of extinction throughout all or a significant portion of its range, and a threatened species as any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Section 4(b)(1) of the ESA requires that the listing determination be based solely on the best scientific and commercial data available, after conducting a review of the status of the species and after taking into account those efforts, if any, that are being made to protect such species.

As stated previously, the BRT concluded that Atlantic wolffish in Western Atlantic Canada and the United States are discrete and significant from other populations of Atlantic wolffish. We have identified a Western Atlantic Canada/U.S. DPS consisting of the populations in the following oceanic areas: (1) Canada's Scotian Shelf; (2) southern Gulf of St. Lawrence; (3) northern Gulf of St. Lawrence; (4) southern Newfoundland; and (5) United States. We have considered abundance, population age/size structure, population growth rate/productivity, spatial structure/connectivity, and genetic diversity and have concluded that these five demographic variables represent low risk to the DPS now and in the foreseeable future. We also do not believe that the DPS is at risk now or in the foreseeable future based on ranking of the anthropogenic stressors and natural limiting factors that are associated with the factors listed in section 4(a)(1) of the ESA. The NEFSC's Working Group has concluded that the chances of the population falling below the threatened/endangered threshold was very low, based on SCALE projections and scenarios. This conclusion supports the qualitative threats assessment conducted and summarized by the BRT.

After assessing the BRT's status review, the Working Group's review, and the best available scientific and commercial information for the Western Atlantic Canada/U.S. DPS, we have determined that the species does not warrant listing as threatened or endangered throughout all or a significant portion of its range. Given that the protective measures specified in Amendment 16 will not be implemented until May 2010 and the effectiveness of these measures has not been demonstrated, we have, however, concluded that Atlantic wolffish should remain on the species of concern list.

Authority: 16 U.S.C. 1531 *et seq.*

Dated: October 28, 2009.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

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