

Figure 140. Percent change in limited access scallop fishing effort by rotation management area in 2005 - 2007 with access to Georges Bank closed areas, relative to the average effort distribution during 1998-2000.....	8-334
Figure 141 - Percent change in limited access scallop fishing effort by rotation management area for the long-term without access to Georges Bank closed areas, relative to the average effort distribution during 1998-2000. ...	8-334
Figure 142. Comparison of average net revenues per vessel vs. controlled access DAS tradeoff with a trip possession limit equivalent to 1,500 lb./day. The maximum percent of the aggregate TAC that can be landed assuming that limited access vessels take all available trips and land the scallop possession limit.....	8-378
Figure 143: Rotational area management options and variability of landings .....	8-394
Figure 144 – Comparison of variability in landings for the fixed duration rotational management with landings under status quo (3.5 inch rings) and no-rotation alternative with 4-inch rings.....	8-394
Figure 145. Landings with Access to Georges Bank Closed Areas with Rotational, Reservoir Options and Comparison with Status Quo Landings with No Access.....	8-396
Figure 146 – Impacts of Rotational and non-rotational options on ex-vessel prices: No Access to Georges Bank Closed Areas .....	8-401
Figure 147. Impacts of Rotational and non-rotational options on fleet revenues: No Access to Georges Bank Closed Areas .....	8-401
Figure 148. Impact on prices with access to Georges Bank closed areas .....	8-403
Figure 149 – Impacts on revenues with access to Georges Bank closed areas.....	8-404
Figure 150. Fishing activity (days per location) by small and large vessels. The red color scheme represents small vessels and the blue represents large vessels, with darker colors implying increased effort. Source: 2001 logbooks.....	8-460
Figure 151. Proportion of scallop landings by season by plan type, 1997-2001. Source: logbooks. ....	8-483
Figure 152. Proportion of scallop landings by season by port or state of landing, 1997-2001. Source: logbooks. ....	8-484

## **1.4 List of Maps**

Map 1. Closed areas, groundfish exemption areas, and state exemption line (3-mile limit in ME, NH, and MA) governing scallop fishing. ....	3-11
Map 2. Map of estimated scallop productivity by rotation management area, distributed by average recruitment by ten-minute square in the 1982 – 2000 scallop survey. Darker shades (green) represent higher productivity levels. The polygons encircle areas of high productivity.....	5-22
Map 3. Basemap for area rotation with adaptively managed boundaries, showing potential minimum size and example configurations of closures (hatched) to protect concentrations of small scallops. Other closures may also occur at any time subject to the above invariable rules. ....	5-23
Map 4. Mid-Atlantic rotation area management closure for 2004-2007, shown as being hatched. This area is shown in relationship to the distribution of small scallops in the 2002 R/V Albatross survey and the identified seed beds in the 2003 SMAST video survey. Also shown are the distribution of kept scallop catch rates and discard proportions from 2003 sea sampling data on observed scallop trips. Fixed boundary rotation management areas used to analyze and evaluate the effects of area rotation are shown in blue and the Hudson Canyon Area controlled access area is shown in dark green. ....	5-26
Map 5. Controlled access areas (shaded polygons) for the 2004 fishing year. The target fishing mortality rate will be 0.40 for all areas. The existing groundfish closed areas and a grid of ten-minute squares are shown for comparison. ....	5-29

Map 6. Controlled access areas (shaded polygons) for the 2005 fishing year. The target fishing mortality rate will be 0.48 for the Hudson Canyon Area and 0.20 for Closed Area I South. The existing groundfish closed areas and a grid of ten-minute squares are shown for comparison. For 2006 and 2007, only Closed Area II South will be open under controlled access rules and the Hudson Canyon Area will be subject to the general scallop fishing rules.....	5-30
Map 7. Candidate area rotation boundaries analyzed in the DSEIS to evaluate area rotation systems with fixed boundaries using existing resource data.....	5-63
Map 8. Example area rotation scenarios, where white areas represent closed rotation areas and blue areas represent re-opened rotation areas. All orange areas would be open to normal scallop fishing by scallop vessels with limited access and general category permits. ....	5-64
Map 9. Example area rotation scenarios, where white areas represent closed rotation areas and blue areas represent re-opened rotation areas. All orange areas would be open to normal scallop fishing by scallop vessels with limited access and general category permits. ....	5-65
Map 10. Map of estimated scallop productivity by rotation management area, distributed by average recruitment by ten-minute square in the 1982 – 2000 scallop survey. Darker shades (green) represent higher productivity levels. The polygons encircle areas of high productivity. ....	5-76
Map 11. Example basemap for area rotation with adaptively managed boundaries, showing potential size and configuration of closures (hatched) to protect concentrations of small scallops. ....	5-77
Map 12. Location of scallop fishing areas for an access option that would sometimes re-open all but habitat areas of particular concern. The areas that would potentially open for scallop fishing are shown as shaded portions of the Georges Bank groundfish closed areas.....	5-87
Map 13. Location of scallop fishing areas for an access option that would sometimes re-open portions of the groundfish closed areas that were opened to fishing in 2000. The areas that would potentially open for scallop fishing are shown as shaded portions of the Georges Bank groundfish closed areas. ....	5-88
Map 14. Areas (hatched) that would remain closed for an alternative that would re-open no part of the Georges Bank groundfish closed areas. ....	5-89
Map 15. Map and coordinates for Habitat Alternative 1. ....	5-101
Map 16. Map and Coordinates for Habitat Alternative 3a. Current Groundfish closed areas included for reference.....	5-102
Map 17. Map and Coordinates for Habitat Alternative 3b. Current Groundfish closed areas included for reference.....	5-103
Map 18. Map and Coordinates for Habitat Alternative 4. Current Groundfish closed areas included for reference.....	5-104
Map 19. Map and Coordinates for Habitat Alternative 5a. Current Groundfish closed areas included for reference.....	5-107
Map 20. Map and Coordinates for Habitat Alternative 5b. Current Groundfish closed areas included for reference.....	5-108
Map 21. Map and Coordinates for Habitat Alternative 5c. Current Groundfish closed areas included for reference.....	5-109
Map 22. Map and Coordinates for Habitat Alternative 5d. Current Groundfish closed areas included for reference.....	5-110
Map 23. Map and Coordinates for Habitat Alternative 6. Current Groundfish closed areas included for reference.....	5-111
Map 24. Map and Coordinates for Habitat Alternative 7. Current Groundfish closed areas included for reference.....	5-112
Map 25. Map and Coordinates for Habitat Alternative 8a. Current Groundfish closed areas included for reference.....	5-113
Map 26. Map and Coordinates for Habitat Alternative 8b. Current Groundfish closed areas included for reference.....	5-114

Map 27. Map and Coordinates for Habitat Alternative 9. Current Groundfish closed areas included for reference.....	5-115
Map 29. Distribution of the seven major benthic assemblages in the Gulf of Maine as determined from both soft bottom quantitative sampling and qualitative hard bottom sampling. ....	7-64
Map 30. Sedimentary provinces of eastern Georges Bank based on criteria of sea floor morphology, texture, sediment movement and bedforms, and mean tidal bottom current speed (cm/sec). <i>Relict moraines (bouldery sea floor) are enclosed by dashed lines. See Table 2.4 for descriptions of provinces. Source: Valentine and Lough (1991)</i> .....	7-69
Map 31. Schematic representation of major macrofaunal zones on the Mid-Atlantic shelf.....	7-75
Map 32. The EFH designation for Atlantic sea scallops is based upon alternative 2 (75%), based on the NMFS scallop survey (1982 - 1997), plus areas identified by the fishing industry and by NMFS as important for sea scallops. The designation also includes the mid-Atlantic juvenile sea scallop closed areas (the Hudson Canyon Closed Area and the Virginia Beach Closed Area) and those bays and estuaries identified by the NOAA ELMR program as supporting sea scallops at the "common" or "abundant" level. The other alternatives were not selected because they either include too little area (less than half of the range of this overfished species), or include areas where sea scallops occur in relatively low concentrations. The light shading represents the entire observed range of Atlantic sea scallops.....	7-86
Map 33. Scallop EFH and Bottom Sediments as modified from Poppe et al, 1986. ....	7-87
Map 34. Distribution of surficial sediments and sampling locations in the U.S. Northeast region (modified from Poppe et al. (1989) ).....	7-94
Map 35. Sub-regions of the U.S. Northeast shelf and areas on Georges Bank closed to bottom trawling since 1995. ....	7-95
Map 36. Distribution of ten minute squares (TMS) of latitude and longitude that account for high (50%), medium (75%), and low (90%) cumulative percentages of the total number of days absent from port for all bottom trawl and scallop dredge vessels from 1995-2001 vessel trip reports and overlays of 90% TMS on Northeast region sediments for each gear type. ....	7-96
Map 37. Distribution of ten minute squares (TMS) of latitude and longitude that account for high (50%), medium (75%), and low (90%) cumulative percentages of the total number of days absent from port for scallop trawl vessels and days fishing for hydraulic clam dredge vessels from 1995-2001 VTR and logbook data and overlays of 90% TMS on Northeast region sediments for these two gear types. ....	7-97
Map 38. 1998 Vessel Monitoring System Data of scallop dredge fishing activity by ten minute square... 7-98	
Map 39. 1999 Vessel Monitoring System Data of scallop dredge fishing activity by ten minute square.. 7-98	
Map 40. 2000 Vessel Monitoring System Data of scallop dredge fishing activity by ten minute square.. 7-99	
Map 41. Overlap of INTENSE scallop fishing effort in 1998-2000 with juvenile EFH designations for species with EFH that is vulnerable to bottom tending gear (Gulf of Maine region only). ....	7-189
Map 42. Overlap of INTENSE scallop effort in 1998-2000 with juvenile EFH designations for species with EFH vulnerable to bottom tending gear (Mid-Atlantic region only). ....	7-190
Map 43. U.S. Northeast shelf ecosystem.....	7-217
Map 44. Map showing distribution of surficial sediments, Gulf of Maine, Georges Bank, and the Mid-Atlantic Bight (modified from original map by Poppe <i>et al.</i> 1989). ....	7-220
Map 45. Mid-Atlantic Bight submarine morphology. Source: Stumpf and Biggs (1988).....	7-223
Map 46. Major features of the Mid-Atlantic and Southern New England continental shelf. Source: Stumpf and Biggs (1988). ....	7-224
Map 47. Bathymetry of the U.S. Atlantic continental margin. Contour interval is 200 m below 1000 m water depth and 100 m above 1000 m. Axes of principal canyons and channels are shown by solid lines (dashed where uncertain or approximate). Source: Tucholke (1987). ....	7-227

Map 48. Visual comparison between the final “Elephant Trunk” Mid-Atlantic closed rotation area, the initial proposed closed rotation areas in the DSEIS, the controlled access Hudson Canyon Area, and the rotation management areas that were used in the biological projection analyses.....	8-146
Map 49. Distribution of small scallops in the annual scallop survey during 1999-2002 (< 65 mm; brown circles); small scallops in the 2003 SMAST survey (no specific size identified; purple circles); and in the percent of discards (green) and kept scallops (blue) in sea sampled scallop dredge trips during 2003 (commercial cull) .....	8-148
Map 50. Distribution of small scallops in the annual scallop survey during 2001-2002 (< 65 mm; orange and light blue circles; 65-80 mm light green circles); small scallops in the 2003 SMAST survey (no specific size identified; purple circles); and in the percent of discards (green) and kept scallops (blue) in sea sampled scallop dredge trips during 2003 (commercial cull) .....	8-149
Map 51. Quarterly distribution of loggerhead sea turtles (large dots) compared with 1998-2000 sea scallop limited access fishing effort (hours per nm <sup>2</sup> , gray scale or red).....	8-206
Map 52 – Boundaries of the Northwest Atlantic Analysis Area used in the habitat metric analysis .....	8-210
Map 53 – Sediment map of the Northwest Atlantic Analysis Area (NAAA) based on Poppe <i>et al.</i> data (1989) .	8-212
Map 54 – Poppe <i>et al.</i> (1989) sampling locations.....	8-212
Map 55 – Stokesbury and Harris (2002) substrate data for areas on Nantucket Shoals from Asia Rip north to Davis Bank and extending west into Closed Area I.....	8-213
Map 56. Scallop abundance (1995-2001 averaged). .....	8-240
Map 57. VTR data (1995 – 2001 total) for otter trawl gear inside the scallop closed areas. ....	8-318
Map 58. VTR data (1995-2001 total) for clam dredge gear inside the scallop closed areas.....	8-319
Map 59. VTR data (1995-2001 total) for clam dredge gear, all days fished. ....	8-320
Map 60. Distribution of scallop fishing effort in 1998. ....	8-322
Map 61. Distribution of scallop fishing effort in 1999. ....	8-323
Map 62. Distribution of scallop fishing effort in 2000. ....	8-323
Map 63. 1998-2000 VMS activity data (greatest 80% of fishing time) overlaid with sediment categories (summarized from Poppe et al. 1989).....	8-324
Map 64. Overlap of direct scallop effort in 1998-2000 with juvenile EFH designations for species with EFH vulnerable to bottom tending gear (Gulf of Maine region only).....	8-339
Map 65. Overlap of direct scallop effort in 1998-2000 with juvenile EFH designations for species with EFH vulnerable to bottom tending gear (Mid-Atlantic region only).....	8-340
Map 66. Overlap of INTENSE scallop effort in 1998-2000 with juvenile EFH designations for species with EFH vulnerable to bottom tending gear (Gulf of Maine region only). ....	8-341
Map 67. Overlap of INTENSE scallop effort in 1998-2000 with juvenile EFH designations for species with EFH vulnerable to bottom tending gear (Mid-Atlantic region only). ....	8-342
Map 68. VTR data (1995 – 2001) for otter trawl trips reported inside the RMA’s.....	8-349
Map 69. VTR data (1995 – 2001) for surf clam/ocean quahog trips reported inside the RMA’s.....	8-351
Map 70. 1998-2000 VMS activity data for RMA’s.....	8-353
Map 71. Map and Coordinates for Habitat Alternative 6. Current Groundfish closed areas included for reference.....	8-369