

# Appendix 4 - Data Used in Plan Development

The following table lists the data used in development of the draft Massachusetts Ocean Management Plan. It includes the datalayer name used in MORIS, the Massachusetts Ocean Resource Information System (available at [www.mass.gov/czm/mapping/index.htm](http://www.mass.gov/czm/mapping/index.htm)), the original source of the data (labeled “originator”), and a brief description of the data. More detailed information about specific datalayers can be found in the layer’s metadata record, which can be viewed in MORIS by clicking on the ‘Layer Info’ tab.

Datalayer Name	Originator	Description
Active Disposal Sites	Massachusetts Office of Coastal Zone Management (CZM) and National Oceanic and Atmospheric Administration (NOAA)	These data were created by combining the Cape Cod Bay disposal site created by CZM and active disposal sites (Cape Cod Canal and Cleveland Ledge) selected from the dumping grounds data layer extracted from NOAA's Electronic Navigational Charts(ENC) Direct to GIS web portal.
Anchorage Areas	Massachusetts Office of Geographic and Environmental Information (MassGIS)/CZM and NOAA	This layer was created by combining an anchorage berth dataset digitized from NOAA nautical charts by MassGIS/CZM and selected anchorage areas extracted from NOAA's ENC Direct to GIS web portal.
Automatic Identification System (AIS)	Stellwagen Bank National Marine Sanctuary (raw data)	This dataset documents the density of vessel tracks during 2008 in the Massachusetts ocean planning area for commercial vessels greater than 299 tons. CZM digitized polygons from this dataset to represent areas where greater than 50 vessels were recorded over the duration of the year 2008 in a 250 meter grid cell.
Bathymetry	CZM	These data represent a mosaic of bathymetric datasets of waters off the coast of Massachusetts derived from the most current and accurate sources, including U.S. Geological Survey (USGS) Open File Reports, NOAA Estuarine Bathymetry, and the NOAA Coastal Relief Model. Contour lines for display and analysis were derived from these data.
Bay Scallop	Massachusetts Division of Marine Fisheries (DMF)	DMF identified a subset of bay scallop polygons from their "Shellfish Suitability Areas - November 2008" data layer to represent the highest quality habitat with the densest populations of bay scallops.
Boat Registrations	Massachusetts Environmental Police	These GIS data represent the number of active registrations of Massachusetts vessels in 2006 by vessel storage town and size class: Class I – less than 16 feet; Class II – 16 to 26 feet; Class III – 27 to 40 feet; and Class IV – more than 40 feet. The registration data exclude commercial fishing vessels and personal watercrafts (e.g., jet skis).
Boating Access Sites	Massachusetts Department of Fish and Game (DFG)	The "Office of Fishing and Boating Access Sites - April 2009" data layer shows public locations where boats may be launched. The principal source for this layer was the <i>Public Access to the Waters of Massachusetts</i> , published by the DFG Office of Fishing and Boating Access. Additional sites were digitized from USGS topographic quadrangles.

Datalayer Name	Originator	Description
Cable Areas	NOAA	Cable areas in Massachusetts were extracted from NOAA's ENC Direct to GIS web portal.
Cables	CZM	To create this layer, the CZM datasets, "Harwich Port to Nantucket Harbor electric supply cable (National Grid Nantucket Cable No. 1), Nantucket Sound, Massachusetts, 2005" and "Hyannis to Nantucket Harbor electric supply cable (National Grid Nantucket Cable No. 2), Nantucket Sound, Massachusetts, 2005," were combined with cables CZM digitized from NOAA nautical charts.
Channeled Whelk	DMF	This layer was derived from the DMF Resource Assessment Trawl Surveys from 1978-2007. To create this layer, the survey data were analyzed to create a spatial distribution of abundance of channeled whelk, which was then reclassified into top 25%, middle 50%, and bottom 25%. CZM extracted "high" areas (top 25%) for use in display and analysis.
Colonial Nesting Waterbirds	Massachusetts Division of Fisheries and Wildlife (DFW)	These sites represent areas where more than 100 pairs of colonial nesting waterbirds have been observed during surveys. Observed species may include Common Terns, Least Terns, Roseate Terns, Arctic Terns, Leach's Storm-petrels, Double-crested Cormorants, Herring Gulls, Great Black-backed Gulls, Laughing Gulls, Black Skimmers, Great Egrets, Snowy Egrets, Cattle Egrets, Little Blue Herons, Black-crowned Night Herons, and Glossy Ibis. Sites delineated solely for tern species were excluded since other data captured tern colonies. The sites were buffered 0.3 nautical miles.
Commercial Fisheries Activity	DMF	These data represent areas important to Massachusetts commercial fisheries in terms of fishing effort and landings value. These data were derived from DMF fishermen catch reports, Standard Atlantic Fisheries Information System dealer transaction reports, and National Marine Fisheries Service vessel trip reports. The fishing effort and landings value from all sources were combined and reclassified into top 25%, middle 50%, and bottom 25%. In some instances, CZM extracted "high" and "medium" areas for use in display and analysis.
Eelgrass	Massachusetts Department of Environmental Protection (DEP) Wetlands Conservancy Program (WCP)	The "DEP Eelgrass - February 2006" layer was compiled from data collected in 1995 and 2001. The layer represents eelgrass ( <i>Zostera marina</i> ), which is the most common seagrass present on the Massachusetts coastline, and widgeon grass ( <i>Ruppia maritima</i> ), which is present in areas of lower salinity along the Cape Cod and Buzzards Bay coast.
EVI	Executive Office of Energy and Environmental Affairs (EEA)	These data represent an Ecological Valuation Index (EVI) that illustrates the sum of scores for individual species or geophysical habitats indicating their perceived ecological importance.
EVI (binned by guild)	EEA	These data represent an EVI that illustrates the sum of scores for individual species or geophysical habitats that indicate their perceived ecological importance. The data were normalized by species "guild" or taxonomic group to reduce the effect of inequities in the number of species per guild.
Ferry Routes	Executive Office of Transportation, Office of Transportation Planning (EOT-OTP)	This layer is the EOT-OTP dataset, "Ferry Routes" (updated December 2008).

Datalayer Name	Originator	Description
Fin Whales	NOAA National Centers for Coastal Ocean Science (NCCOS)	This layer is based on cetacean sightings data from 1978-2005 acquired from two sources: (1) the North Atlantic Right Whale Consortium sightings database held at the University of Rhode Island; and (2) the Manomet Bird Observatory database, held at the NOAA Northeast Fisheries Science Center (NEFSC). The data were corrected for sightings-per-unit-effort (SPUE) to calculate probability of detection functions for individual species. In some instances, CZM extracted "core" (or highest SPUE) data for use in display and analysis.
Fisheries Resources	DMF	These data are intended to represent areas important to Massachusetts fisheries resources. This layer was derived from the DMF Resource Assessment Trawl Survey collected from 1978-2007. The survey allocates its sampling effort according to a series of 23 strata, based on five biogeographic regions and six depth zones. To create this layer, 22 species were selected for consideration, based on 2 criteria: 1) they were adequately sampled by the Resource Assessment Trawl Survey, and 2) they were considered to be an important component of commercial or recreational fisheries within the planning area. In some instances, CZM extracted "high" areas for use in display and analysis.
Footprint of Human Uses	Halpern and Kappel	Draft map prepared by Benjamin S. Halpern and Carrie V. Kappel, National Center for Ecological Analysis and Synthesis, University of California, Santa Barbara. These data show the number of co-occurring human stressors. 20 human stressor data layers were included.
Gas Pipelines	CZM	CZM acquired original engineering plans to create these data.
Hard/Complex Bottom	CZM	These data show the combination of hard bottom (classified as hard bottom from the CZM/DMF "Surficial Sediments" data) and high rugosity (classified as >1 standard deviation from the CZM "Rugosity" data).
Horseshoe Crab	DMF	This layer was derived from the DMF Resource Assessment Trawl Survey collected from 1978-2007. To create this layer, the survey data were analyzed to create a spatial distribution of abundance of horseshoe crab, which was then reclassified into top 25%, middle 50%, and bottom 25%. CZM extracted "high" areas (top 25%) for use in display and analysis.
Humpback Whales	NCCOS	This layer is based on cetacean sightings data from 1978-2005 acquired from two sources: (1) the North Atlantic Right Whale Consortium sightings database held at the University of Rhode Island; and (2) the Manomet Bird Observatory database, held at the NOAA Northeast Fisheries Science Center (NEFSC). The data were corrected for sightings-per-unit-effort (SPUE) to calculate probability of detection functions for individual species. In some instances, CZM extracted "core" (or highest SPUE) data for use in display and analysis.
Important Seal Haul-Out Areas	DFW and National Marine Fisheries Service (NMFS), Northeast Fisheries Science Center (NEFSC), Protected Species Branch (PSB)	These data were developed by combining data from DFW and NMFS/NEFSC/PSB. The largest seal haul-out areas in Massachusetts were delineated by biologists from DFW and corroborated by biologists at Mass Audubon's Wellfleet Bay Wildlife Sanctuary. The NMFS/NEFSC/PSB data are twenty point locations of major haul-out sites in southern Massachusetts that they survey during their monitoring flights. All of the data were extended 0.3 nautical miles to maintain consistency with the ocean planning mainland buffer. In some instances, CZM extracted sites with higher concentrations for use in display and analysis.
Inactive Disposal Sites	NOAA	These data were extracted from NOAA's ENC Direct to GIS web portal.
Intertidal Flats	DEP-WCP	The intertidal flats data were extracted from the "DEP Wetlands (1:12,000) - April 2007" data layer. The wetlands were interpreted from 1:12,000 scale, stereo color-infrared photography by staff at UMASS Amherst and field checked by DEP-WCP.

Datalayer Name	Originator	Description
Knobbed Whelk	DMF	This layer was derived from the DMF Resource Assessment Trawl Survey collected from 1978-2007. To create this layer, the survey data were analyzed to create a spatial distribution of abundance of knobbed whelk, which was then reclassified into top 25%, middle 50%, and bottom 25%. CZM extracted "high" areas (top 25%) for use in display and analysis.
Leach's Storm-petrels	DFW	Leach's Storm Petrel is a state-listed Endangered species. Areas delineated are documented breeding areas. Nesting areas were buffered 0.3 nautical miles.
Lighthouses	CZM	This data layer, "Lighthouses - July 2006," shows the current locations of all extant lighthouses on the coastline of Massachusetts. While many of the lighthouses represented are active aids to navigation maintained by the U.S. Coast Guard, others are not and are maintained privately.
Lobster	DMF	This layer was derived from the DMF Resource Assessment Trawl Survey collected from 1978-2007. To create this layer, the survey data were analyzed to create a spatial distribution of abundance of lobster, which was then reclassified into top 25%, middle 50%, and bottom 25%. Per DMF's recommendation, CZM extracted "medium" areas (middle 50%) south of Cape Cod and "high" areas (top 25%) for use in display and analysis.
Long-tailed Ducks	Massachusetts Audubon Society (Mass Audubon)	Long-tailed Ducks were extracted from the Critical Avian Habitat dataset, which was compiled by Mass Audubon for the Massachusetts ocean plan. Mass Audubon ornithologists used their professional judgment and knowledge of the Bird Observer database, which is a compilation of observations by scientists and birders, to determine priority areas for Long-tailed Ducks.
Marinas	CZM	These GIS data show the locations of marinas, boatyards, yacht clubs, and yachting related facilities along the Massachusetts coast. The data were compiled from public lists, databases, and visual inspection of orthoimagery. While not fully comprehensive, these data constitute a majority of the marina-type resources available to recreational yachtspersons.
Massachusetts Aeronautics Commission (MAC) Aviation Buffers	CZM	CZM created this layer by buffering a 10,000-foot radius around the EOT-OTP "Airports" (current as of June 2006) data layer.
MMTA Recreational Fishing and Boating Survey	Massachusetts Marine Trades Association (MMTA)	This data layer represents recreational fishing and boating areas identified by MMTA in the Massachusetts ocean planning area. MMTA marked NOAA charts with boat routes, recreational fishing areas, recreational boating areas, and sail boat race areas as specified by MMTA members.
National Register of Historic Places (NRHP)	National Park Service (NPS)	This data set contains the locations and basic attributes of sites, buildings, objects, structures, and districts listed on the National Register of Historic Places (NRHP). *NOTE: Only properties LISTED prior to the date of this dataset ("beginning of 2007") are contained in this layer. Properties determined eligible, pending nomination, or pending owner objection do not appear in this dataset.
North Atlantic Right Whales	NCCOS	This layer is based on cetacean sightings data from 1978-2005 acquired from two sources: (1) the North Atlantic Right Whale Consortium sightings database held at the University of Rhode Island; and (2) the Manomet Bird Observatory database, held at the NOAA Northeast Fisheries Science Center (NEFSC). The data were corrected for sightings-per-unit-effort (SPUE) to calculate probability of detection functions for individual species. In some instances, CZM extracted "core" (or highest SPUE) data for use in display and analysis.

Datalayer Name	Originator	Description
Pilot Boarding Areas	CZM	Representatives from state pilot associations (Boston Harbor Pilot Association and Northeast Pilots Association) provided the center coordinate of five pilot boarding areas in the Massachusetts ocean planning area. The Boston Harbor pilot boarding area was buffered by a nautical mile radius, and the remaining four pilot boarding areas were buffered by a 0.5 nautical mile radius.
Potential Tidal Resources	CZM	ADCIRC Coastal Circulation and Storm Surge Model is a system of computer programs for solving time dependent, free surface circulation and transport problems in two and three dimensions. The model was used by Applied Science Associates to provide an estimate of the maximum tidal currents experienced in the Massachusetts ocean planning area during a tidal cycle. All areas with a current speed exceeding 2.75 knots were selected and isolated.
Precautionary Areas	NOAA	These data were extracted from NOAA's ENC Direct to GIS web portal.
Proposed New England Marine Renewable Energy Center (MREC) Test Area	CZM	CZM digitized the MREC proposed area for renewable energy research and projects from coordinates provided by MREC.
Proposed Tidal Energy Sites	CZM	CZM digitized the proposed tidal energy sites from relevant Federal Energy Regulatory Commission (FERC) preliminary permit applications.
Qualitative Commercial Fishing Information	EEA	These data on black sea bass, lobster, and winter flounder were generated through an EEA field study to collect information about commercial fisheries in Massachusetts state waters. As part of the study, commercial fisherman were interviewed and asked to identify and record areas of fisheries known to them on NOAA charts, which were subsequently digitized.
Recreational Dive Sites	CZM	This GIS data layer, updated by CZM in July 2007, shows popular dive sites for recreational SCUBA divers including reefs, wrecks, jetties and breakwaters off the coast of Massachusetts. The data were compiled from the Massachusetts Board of Underwater Archaeological Resources (BUAR) and web searches of popular diving locations listed by recreational and commercial groups.
Recreational Fishing Areas	DMF	This data layer represents the recreational fisheries identified in the Massachusetts ocean planning area from the DMF Massachusetts Ocean Planning Recreational Fishing Effort Survey. The field study was designed to collect information about recreational fisheries in four regions in Massachusetts state waters. To create this later, polygons drawn on recreational fishing maps developed by DMF were digitized.
Roseate Terns	DFW	This dataset represents documented Roseate Tern breeding, staging, and foraging areas. The breeding and staging sites were buffered 0.3 nautical miles. Within the foraging areas, DFW biologists identified critical foraging areas, which represent the most important foraging areas, critical to the use of the mapped breeding and staging areas. In some instances, CZM extracted "core" data for use in display and analysis.
Rugosity	CZM	Rugosity is a measure of terrain roughness and is indicative of the amount of habitat available for colonization by epibenthic organisms and shelter and foraging area for mobile organisms. For this dataset, CZM calculated rugosity with an algorithm developed by Sappington et al. 2005 that measures vector dispersion in three dimensions. CZM then reclassified those areas greater than one standard deviation from the mean as "high" rugosity.

Datalayer Name	Originator	Description
Sea Scallop	DMF	DMF identified a subset of sea scallop polygons from their "Shellfish Suitability Areas - November 2008" data layer to represent the highest quality habitat with the densest populations of sea scallops.
Separation Zone	NOAA	Traffic separation zones were extracted from NOAA's ENC Direct to GIS web portal.
Shipping Lanes	CZM	CZM digitized traffic lanes, shipping channels, and recommended routes from current NOAA charts.
Special Concern Terns	DFW	Areas delineated are important breeding, staging, and foraging areas for terns state-listed as species of Special Concern. These species include Common, Least, and Arctic Terns. The breeding and staging sites were buffered 0.3 nautical miles. Within the foraging areas, DFW biologists identified core foraging areas, which represent the most important foraging areas. In some instances, CZM extracted "core" data for use in display and analysis.
Submerged Wrecks	NOAA	The Automated Wreck and Obstruction Information System (AWOIS) is an automated file that contains information on wrecks, obstructions, and other significant charted features in coastal waters of the United States subject to National Ocean Service (NOS) Hydrographic Surveys. CZM removed obstructions from the dataset so that only wrecks are present.
Surficial Sediments	CZM and DMF	Sediment data from the USGS publication, <i>usSEABED: Atlantic Coast Offshore Surficial Sediment Data Release</i> (USGS Data Series 118), in the Massachusetts ocean planning area were spatially interpolated to create a surficial sediment map, resulting in the following four categories: muddy, sandy, gravelly, and hard bottom. Note that the distribution of points in the usSEABED data is not uniform, creating areas where interpolation occurs across far larger distances than others.
Tidal Current Speed >3.0 knots	CZM	ADCIRC Coastal Circulation and Storm Surge Model is a system of computer programs for solving time dependent, free surface circulation and transport problems in two and three dimensions. The model was used by Applied Science Associates to provide an estimate of the maximum tidal currents experienced in the Massachusetts ocean planning area during a tidal cycle. All areas with a current speed exceeding 3.0 knots were selected and isolated.
Vessel Monitoring System (VMS)	NMFS Northeast Regional Office	VMS data are collected by NMFS to track fishing vessel activity for law enforcement (closed areas), safety, and scientific study. This dataset documents the density of fishing vessels from September 1, 2007, to September 1, 2008, using the VMS records available for that period. CZM digitized polygons from this dataset to represent areas where greater than 25 vessels were recorded in a 250 meter grid cell over the duration of the year.
Wind Speed	MassGIS	For this dataset, MassGIS used modeled wind speed data at a height of 70m above ground that was developed by Truwind Solutions, LLC in 2002-2003.