DRAFT – FOR REVIEW PURPOSES ONLY

REPORT OF THE WORKGROUP ON OCEAN RECREATIONAL AND CULTURAL SERVICES

November 21, 2008

Note from the Chair: All members of this workgroup are deserving of high praise for the cooperative, diligent, and good-natured manner in which they participated in our several meetings and even-more-frequent side deliberations. I wish to extend them my sincere appreciation for a job well done. DD

CONTENTS

ATTACHMENTS

SECTION ONE: WORKGROUP MEMBERSHIP

Dennis Ducsik, Ph.D. [workgroup chair]
Public Trust Policies Coordinator
Office of Coastal Zone Management

Nathanael Lloyd [workgroup GIS liaison]
GIS Director
Department of Conservation and Recreation

Victor T. Mastone
Director and Chief Archaeologist
Board of Underwater Archaeological Resources

Jessica A. Rowcroft
Preservation Planner
Department of Conservation & Recreation

Anthony Stella, P.E.
Office of Fishing and Boating Access
Department of Fish and Game

Thomas Mahlstedt
Archaeologist
Department of Conservation & Recreation

Edward L. Bell
Senior Archaeologist
Massachusetts Historical Commission

Professor Robert Ryan
Department of Landscape Architecture and Regional Planning
University of Massachusetts, Amherst

George Agganis
Captain, Special Operations
EOEEA Office of Law Enforcement (Environmental Police)

Arne Carr
American Underwater Search and Survey
Cataumet, MA

Leona Roach
Executive Director (through 10/31/08)
Massachusetts Marine Trades Association

SECTION TWO: INTRODUCTION

A. Our Mission and First Steps Completed

What is the role of the ocean in contemporary human experience? Certainly it remains, as always in the past, an efficient highway for commerce and a productive source of food, and most of the nation's population is still amassed within coastal counties. Even so, a small and ever-diminishing percent of that population actually works the sea. We now flock to the water's edge mostly for playful purposes, to engage in boating, beachgoing, seascape viewing, and a plethora of other active and passive recreational pursuits that are unique to the coastal out-of-doors. So intense is this present-day communion with the ocean that coastal tourism/recreation has become the largest sector of the modern marine economy, even surpassing traditional but still-vital industries like fishing and shipping.[1]

Nor can one ignore the broader social benefits accruing from the cultural services the ocean provides, which may seem less tangible than their economic value but are no less real and meaningful to the everyday lives of ordinary people. For one thing, the ocean presents limitless opportunity for the appreciation of nature and the unraveling of its mysteries through scientific study, an intellectual quality shared with the public through the ubiquitous displays, ecology tours, and other educational amenities found at coastal access sites. The same holds true for historic resources, with the ocean and adjacent shorelands being the repository of myriad artifacts and stories that edify us and connect us emotionally to the days when nearly everyone depended somehow on the water, and when so many of our ancestors went down to the sea in ships. The "heritage value" of the maritime setting is particularly significant to the Commonwealth's indigenous Native American peoples and to many ethnic immigrant groups, to whom ocean resources are not only still important economically but also linked inextricably with ongoing maintenance of traditions in language, folklore, religion, and material culture. In short, in Massachusetts our ocean is inseparable from our identity as a society.

Mindful of the importance of accounting for this human dimension in the course of ocean planning, the Workgroup on Ocean Recreational and Cultural Services has unanimously embraced a core mission: *to develop, to the extent possible using available and reasonably obtainable data, a spatial profile of the Ocean Planning Area (OPA) as a social resource that physically and visually supports public use and enjoyment of the coastal zone and sustains its cultural heritage.* The initial objectives of the ORC Workgroup, to which this report is directed, have been to (a) locate and characterize datasets of potential utility in the pursuit of the ORC mission throughout the planning process; and (b) to identify and demonstrate, in a very preliminary way, the most desirable future planning analyses that would employ both existing and improved datasets.

[1] The most recent documentation of economic activity attributable to coastal tourism and recreation is UMass Donahue Institute, An Assessment of the Coastal and Marine Economies of Massachusetts, prepared for the Massachusetts CZM Office (June 29, 2006).

We have focused this initial effort on the geography of three types of recreational and/or cultural use that occurs either within the OPA itself, or on adjacent shorelines but in a manner that is functionally connected to the OPA. These are:

- the locus of historic/archaeological features (both onshore and underwater) of known or potential preservation interest for their cultural value, including areas vital to maintaining the living traditions of ethnic groups;
- the locus of vessel-based recreation activities, including both onshore facilities (marinas/yachtclubs, boat ramps, moorings, excursion docks, etc.) as well as on-water spatial patterns of activity; and
- the locus of waterfront properties in government/NGO ownership, which provide the general public with varied sensory experiences of which scenic ocean viewing is typically a major component.

For each subtopic the report begins, in Section Three, with a commentary on the availability and suitability of available data with possible relevance to ocean planning, both internal and external to the Massachusetts Ocean Resources Information System (MORIS) and MassGIS. Each commentary is accompanied by an Attachment describing "metadata" for the individual datasets we reviewed, consisting (generally) of an overview together with brief discussions of the production, attributes, and maintenance of the dataset. Finally, the commentary notes data limitations that may have important implications for subsequent planning, and which may warrant consideration of corrective action via funding of new data development projects.

In Section Four the workgroup turns its attention to data analysis, resulting in the preparation of maps of the OPA that display "ranked polygons" for two of the subtopics under consideration (offshore historic resources and vessel-based recreation). The third subtopic of land-based public viewing does not lend itself to such analysis at present, although the workgroup is of the opinion that effective incorporation of this issue into the offshore GIS framework is achievable in the future with a modicum of additional methodological development and associated data collection. In that regard we outline a specific plan of work for a pilot project that we recommend be carried out by professionals in the field of seascape assessment, at the first opportunity that funding allows and as appropriate to the overall ocean planning schedule.

Section Five identifies key statutory, regulatory, or policy considerations that in some respect impart an "elevated status" to the recreational or cultural service in question, and Section Six contains a description of map products.

B. Our Challenge and Next Steps Contemplated

Based on our experience to date, the workgroup feels obliged to point out that ocean planners face special challenges with regard to assessing recreational and cultural issues using spatial data and analysis. The simple fact is, very little of the data we have

found for this sector is tied spatially to the OPA itself; rather, it is mostly land-based and provides at best a crude indication of the relative "levels of service" that various segments of the watersheet presently offer. For example, vessel-based recreation activity in offshore waters is highly mobile and its spatial distribution cannot be reliably derived from information about the capacity of onshore boating infrastructure; nor is it possible even to infer from any land-based dataset the overall volume of "traffic" that crosses the boundary into the OPA. Unlike what's commonly done for automobiles on land, no one to our knowledge has ever systematically counted boats on the water or computed "vessel-miles-per-year".

The same holds true (and even more so) in the case of public enjoyment of ocean scenery. While direct physical use of our oceans for recreation, transportation, and fishing purposes can be tracked somewhat and assessed with both quantifiable and inferential data, determining how people experience the ocean visually – and a quantification of what they value most about that experience – is not so straightforward and has not yet been undertaken in Massachusetts. By the same token, the locus of sites from which public viewing takes place is very well documented, but determining the relative contributions of various portions of the ocean to the scenic benefits provided from such vantage points is not only data-starved, but takes one into somewhat uncharted methodological waters.

The point here is not that recreational and cultural issues are beyond the reach of systematic inquiry. Rather, our workgroup feels strongly that the existence of special planning problems gives rise to a need for creative thinking about special solution techniques. We hope this report will help lay the groundwork for a concerted effort along those lines.

SECTION THREE: ASSESSMENT OF DATA RESOURCES

A. Ocean-related Cultural Resources

A comprehensive review is not necessary to establish the local, regional, and national importance of the considerable maritime legacy of New England. The extensive maritime historical literature clearly demonstrates the intensity, interest, and importance of this legacy to Massachusetts. Even today, millions of tourists visit Massachusetts every year to learn about our maritime heritage as well as experience the ocean from which it springs.

1. Historic Resources at the Shoreline

There are a number of historic resources that have been identified on or adjacent to the coastline of Massachusetts, whose history and development are tied directly to their coastal location. Through even the most casual observations, one can easily observe symbols of the region's maritime heritage in the form of ship captain's, fishermen's and merchant's homes, customs houses, lighthouses and fortifications, wharves, boat yards and marine railroads. Many of these historic structures are included in the Inventory of Historic Assets of the Commonwealth (see Attachment A), and some have been listed in the National Register of Historic Places, recognizing their cultural significance and their contributions to local, regional, and national history. The overall importance of these coastal historic resources depends not only on their maritime connections, but also on important views and settings that are significant character defining features. Apart from the sites listed in these datasets, there may exist additional equally important historic resources that have not yet been identified and/or evaluated under the National Register designation process.

Maritime cultural resources also include famous ships of a wide variety of types, from the *Constitution* to the *Ernestina* to the *USS Massachusetts*, and the historic lightships. These historic vessels serve as tangible connections to the ocean and how it has supported Massachusetts, and many of the best known have been designated National Register properties or National Historic Landmarks. A datalayer of historic vessel mooring locations would be useful for the purposes of this planning effort. The cost and time to create such a layer would likely be minimal. However, the overall utility and importance of this data when compared to other needs probably places it in the second tier of data needs.

Impacts to shore based historic resources can occur directly or indirectly from development activity: physically, visually, audibly, or atmospherically. As noted in the regulations summary provided in Section Five, new development projects with state or federal involvement are reviewed in consultation with the Massachusetts Historical Commission (MHC) and with other consulting parties. MHC is currently digitizing the Inventory of Historic and Archaeological Assets of the Commonwealth as funding and staffing allows. As the ocean planning effort unfolds, MHC should be contacted to

discuss the status of their GIS data and its potential utility to this effort. Getting improved data back into MassGIS from MHC would be useful for this project. However, because the data are nearly all terrestrial in nature and their connection to the watersheet is contextual, these are probably second tier data needs.

2. Underwater Archaeological Resources

The land-based components of our maritime heritage readily testify as symbols to the importance of maritime activities in our society. These terrestrial resources directly reflect the seaward nature of this heritage and we must assume a similar intensity in maritime material culture will be found in the submerged reaches of this region.

There are a number of known and potential archaeological resources we can anticipate encountering beneath the ocean waters of Massachusetts. Generally, these fall into two broad classes of archaeological "features" and "deposits" found on, embedded in, or under the submerged bottom lands:

- Ancient Native American sites and materials resulting from human activities on intact remnant submerged landscapes that were formerly above water, and evidence of artifacts and watercraft from Native American use of the ocean following submergence.
- Historical resources such as abandoned properties, aircraft, artifacts, disposal areas, treasure trove, and watercraft (shipwrecks), and materials resulting from human activities of historical importance.

The data available in each of these temporal resource categories is discussed separately below.

Ancient Native American Resources

Beginning around 18,000 years ago, broad areas of the Continental Shelf were exposed as dry land with fresh water features. Currently accepted archaeological theory places human exploitation of these environs that are now under Massachusetts state waters starting around 13,000 years ago to coincide with actual dated terrestrial archaeological sites in New England. Sea level at that time was approximately 50 meters (roughly 150 feet) below today's sea level in some places, although this figure cannot be applied uniformly throughout the OPA. The glacial retreat and the submergence process was non-synchronous, complex, and variable.

A true reconstruction of the paleo-landscape would be necessary in order to accomplish the task of reliably modeling probable ancient Native American site occurrence within the OPA. That effort would require reviewing geological and paleobotanical data to identify buried preserved paleosols/landscapes that escaped dynamic and erosive submergence processes. Examination of the present seabed surface, such as available through fine bathymetric data, cannot serve as a surrogate for detailed

information from soil cores on the subsurface geomorphology and accounting for hydrologic processes of erosion and deposition. Given the vast extent of data needs, such analysis is beyond the reasonable reach of areawide planning and must be accomplished for specific projects proposed within the OPA on a case-by-case basis. The only thing to be said with confidence is that almost the entire OPA is considered to be *potentially* sensitive for ancient period Native American resources, with the exception of previously and extensively impacted areas (deeply dredged shipping channels, major gas pipelines, and the Foul Area).

Historic Resources

It has been reasonably estimated that over 3,000 shipwrecks are located within Massachusetts waters. Many of these vessels were lost before 1900. Given Massachusetts' maritime heritage and its leadership in maritime activities, there is good probability that many of these shipwrecks are historically important and worthy of preservation.

There currently exists no comprehensive list of all shipwrecks or other cultural resources (e.g., aircraft). The Massachusetts Board of Underwater Archaeological Resources (BUAR) compiles and maintains "Site Files" that serve as a catalog of shipwrecks in or near Massachusetts's waters. Site files or records are compiled from primary and secondary literature sources and maintained by BUAR as an Excel® database. Under state law, BUAR site files are not a public record and access to these files is restricted. BUAR files need to be enhanced and expanded into a geo-referenced database. As a result, these files are currently external to MORIS and MassGIS (see Attachment A).

The BUAR dataset contains records for over 3,000 potential shipwreck sites in or near Massachusetts coastal waters. Data entries include vessel name, type, year of loss, location, possible cargo and other information, including the source of individual records. Much of the shipwreck location data is not point specific. Rather, it is given locale or nearest point of land. BUAR, as well as other sources, captures mainly vessel losses derived from primary and secondary literature. Not all sites are necessarily historic period vessels. Further, precision of location is not always reliable. Not all locations have latitude and longitude, but rather are given as locale or nearest landfall. Many locations have not been field verified.

NOAA's Automated Wreck and Obstruction Information System (AWOIS), also described in Attachment A, is a catalog of wrecks and obstructions in U.S. waters. This dataset is by no means a comprehensive list of shipwrecks or other cultural resources; it aims only to catalog potential navigational hazards. For this reason, AWOIS will "never completely address every known or reported wreck" (NOS, 2006). Furthermore, not all locations have been verified, and some of the location data is conditional as "position approximate" or "accuracy of 1-5 miles". The dataset captures mainly 20th century vessel losses and not necessarily historic period vessels. Finally, it is limited to only sites

on or above the sea floor, thus excluding buried sites. Accordingly, AWOIS cannot be used as a surrogate database for historic vessel loss.

Data needs and limitations can be partially addressed by the creation of a geo-referenced inventory of identified and potential submerged cultural resources, with improved reliability on location and resource attributes, and preliminary assessment of site importance. This effort could start with the compilation of identified submerged cultural resources (mainly shipwrecks) with limited quality control on location and resource attributes and no assessments of importance. The next step would be to expand the geodatabase to include potential shipwrecks and other submerged cultural resources (those sites for which some historic documentation exists but have not yet been located). BUAR's site files partially address these steps. At the same time, existing data sets, such as CZM's habitat mapping project, might undergo additional analysis to provide location data for man-made bottom anomalies. While this does not provide any assessment of these potential resources, it could provide quantitative data to enhance and refine boundaries of anticipated site frequency tiers. Otherwise, given the vast extent of data needs, the search for historic shipwreck resources can only be accomplished on the same case-by-case basis that is most appropriate for identifying potential ancient Native American sites.

3. Offshore Ethnic Resources

The ORC Workgroup has contacted the Massachusetts Commission on Indian Affairs as well as the Tribal Historic Preservation Officers of the Mashpee Wampanoag Tribe and the Wampanoag Tribe of Gay Head (Aquinnah). We provided them with copies of the OPA study area map and sought information about areas of potential interest. In the short timeframe governing preparation of this workgroup report it has not been possible to assemble any specific locational information, but we did obtain some telling commentary on the overall cultural importance of the ocean to indigenous Native American groups. In particular:

- the Mashpee Wampanoag Tribal Historic Preservation Officer commented that the Wampanoag Nation is known as "people of the first light", and consider the ocean to be fundamental to their history and cultural identity; and
- the Massachusetts Commission on Indian Affairs commented that the OPA has been navigated by many Native American nations for millenniums, and that evidence of Native American activity could be found within the OPA.

Both expressed their interest in directly participating in the Ocean Management Initiative and have an expectation of being consulted by the EEA ocean planning team.

Many cohesive, immigrant ethnic groups also have important maritime cultural traditions. Many cohesive immigrant groups who have settled in coastal areas of Massachusetts have important maritime cultural traditions, and these ongoing "folkways" may be closely linked to the OPA beyond its economic aspects. (personal communication

with folklorist Millie Rahn, October 12, 2008). It appears these ethnic groups are located predominantly in and around Cape Ann, Boston, New Bedford, and Cape Cod and the Islands, but are present throughout the state. Some of these groups come from fishing and shipbuilding cultures, and have skills, knowledge, and experience in maritime practices and material culture, and are inventive in adapting their traditions and material culture to changing circumstances, and may also evidence traditions linked to the OPA in language, folklore, religion, and so forth.

Because of the special nature of the ethnological information known only to these groups, it is recommended for undertakings proposed in the OPA that an ethnographer would review relevant, previous research, and consult in a culturally respectful manner with groups who have a culturally significant relationship to the OPA, on a case by case basis. Some relevant cultural information may come from public comment. Systematic investigation by an ethnographer would be required to characterize and document significant maritime cultural traditions of specific ethnic groups.[2] Consultation with regional experts and review of available datasets known to them would be productive.

4. Summary Assessment of Data Needs

Suitably geo-referenced data on historical and archaeological resources (both onshore and offshore) is not extant and cannot be made available by the end of 2008, nor does it appear necessary for immediate planning purposes. Accordingly, the workgroup does not recommend that any funding resources be devoted to baseline data development/analysis in this category at this time. However, the completion of a spatial database of known and potential historical and archaeological resources both coastal and submerged, together with historic vessel mooring locations, would be a significant benefit for longer-term OPA planning purposes. Further, the ocean planning team should continue to be aware of ethnologically important qualities of the OPA, and take into account any effects of anticipated or potential new development on important cultural traditions.

[2] Experienced folklorists and ethnographers Millie Rahn and Laura Orleans have identified relevant scholars and selected research and data gathering efforts that may be relevant to ocean planning (via personal communication with Edward L. Bell, October 12, November 5 and 6, 2008). Experts in folklore, ethnography, and marine social sciences identified by Orleans include State Folklorist Maggie Holtzberg at the Massachusetts Cultural Council; Patricia Pinto daSilva at the Kennedy School of Government; and Madeleine Hall-Arber at the MIT Center for Marine Social Sciences. For examples of ongoing research, see Voices from the Fisheries Project (www.voices.nmfs.noaa.gov); Keepers of Tradition: Art and Folk Heritage in Massachusetts—Life and Work by the Sea (www.massfolkarts.org/by_the_sea.asp); Patricia Pinto daSilva and Madeline Hall-Arber, Introduction: Weathering the Storms: Vulnerability and Resilience in the Northeast Fishing Industry. *Human Ecology* 15(2):141-142, and other articles in that volume (2008); Laura Orleans *Faces of Whaling Oral History Project (2000),* National Park Service Ethnography Program, Northeast Region (http://www.nps.gov/archive/nebe/research/faces.pdf).

B. Vessel-based Recreation

Vessel-based recreation is the second topic of key importance to the mission of this workgroup, recognizing that resolution of actual and prospective conflicts among multiple waterway uses is a topic of growing management concern around the country[3]. According to the Massachusetts Marine Trades Association (MMTA), up to 195,000 state residents enjoy boating on a typical summer weekend and another 27,000 are employees of marine trade businesses, which make a substantial contribution to the overall state economy[4]. MMTA estimates further that the marine industry payroll in Massachusetts exceeds half-a-billion dollars per year-- with nearly $50 million in taxes paid annually to state government -- and that $1.7 billion in combined annual spending is attributable to the state recreational boating industry[5].

Despite the robust economic value of vessel-based recreation, there is very little in the way of spatial planning data available for this sector. What does exist falls into three distinct categories: onshore infrastructure for boating, offshore infrastructure for diving, and on-water patterns of vessel recreation in the aggregate. Each is discussed briefly below and more fully in Attachment B.

1. Onshore Infrastructure for Recreational Boating

Boat Ramps

These data were obtained from the Public Access Board via MassGIS and were subsequently ranked for intensity by Tony Stella of Office of Fishing and Boating Access. Data were used to show areas of concentrated boat launches in conjunction with Mooring Fields and Marinas. The table created by Mr. Stella does not live inside MORIS. The table will be joined to the existing MassGIS data for inclusion in MORIS.

Marinas, 2007

Obtained from MORIS, these data were used to show areas of concentrated boat launches in conjunction with Mooring Fields and Boat Ramps. The data shows the connections between the anchoring of boats and from were they will be sailing. The

[3] An outstanding primer on multiple use waterway issues and conflicts and site-appropriate ways of coming to terms with them is *A Guide for Multiple Use Waterway Management* (2d. ed., 2004), produced by the National Water Safety Congress and available at www.watersafetycongress.org.

[4] There are approximately 156,000 boats registered in Massachusetts, for which the U.S. Coast Guard maintains a comprehensive database that is available from Captain George Agganis of the state Environmental Police and a member of the ORC Workgroup. In addition, there are potentially tens of thousands of federally documented (minimum 5 ton displacement) recreational vessels homeported but not necessarily registered in the state, the economic impacts of which are not captured in assessments derived from state registrations only.

[5] A detailed analysis of the economic impact of recreational boating for each U.S. Congressional district in the Commonwealth is available from MMTA. The assessment was prepared in 2008 by the Recreation Marine Research Center at Michigan State University, which has developed and deployed an online economic modeling tool for this purpose that can be found at www.marineeconomices.com.

concentrations of these locations give some indication as to the relative use of proximal sections of the ocean planning area.

Mooring Fields

Obtained from MORIS, these data were used to show areas of concentrated boat launches in conjunction with Boat Ramps and Marinas. The data shows the connections between the anchoring of boats and from were they will be sailing. The concentrations of these locations give some indication as to the relative use of proximal sections of the ocean planning area.

2. Offshore Infrastructure for Recreational Diving

Artificial Reefs

Obtained from MORIS, these data represent another potential dive locations, particularly by divers looking to fish for lobster.

SCUBA Diving Sites

Recreational SCUBA diving has significant roots in waters of Massachusetts. Many local clubs and at least one international dive club started here in the late 1950s during the sports infancy. The Bay State Council of Diver, an umbrella group of dive clubs, charter operators, and dive shop owners, notes that our region contains the five largest sport diving populations in the US. Recreational uses vary from natural and heritage tourism to recreational fishing (lobster and scallop) to hobby collecting to nature photography.

Data about shipwrecks, reefs, and jetties and breakwaters off the Massachusetts coast frequently visited by SCUBA divers for recreational purposes were compiled from several sources. The Massachusetts Office of Coastal Zone Management developed their GIS datalayer that shows certain popular dive sites from the Massachusetts Board of Underwater Archaeological Resources (BUAR) and web searches of popular diving locations listed by recreational and commercial groups. The datalayer is stored in ArcSDE as **MORIS.DIVE_SITES_PT** in MORIS. It is not a comprehensive list of all sites frequented by SCUBA divers, many site locations are generalized, and data are for the most part anecdotal**.** BUAR web site depicts only those 40 Exempt shipwreck sites designated explicitly for recreational use and where casual artifact collecting is allowed. The remaining data on diving sites were culled from http://www.scuba-newengland.com and http://www.bostonharbordivingcompany.com/, which seem to be the most extensive of web site visited. No attempt has been made to verify or adjust these data. The list is biased toward modern shipwreck sites which now function mainly as habitat for lobster. It may not include many natural bottom features (ledges and pinnacles) visited by divers. It under-represents the growing use of deeper bottomlands (below 120 feet) by

recreational divers. We must also consider there is some overlap with cultural heritage sites as recreational uses occur on both natural and cultural resources.

3. Spatial Patterns of On-water Activity

Recreational Boating Intensity

These data were obtained from the TerraLogic Recreational Boating data in a June 2005 report called *Characterization of Non-fishing Ocean-based Human Uses in Massachusetts*. These data were slightly modified and used to determine the ranking on the Recreation map. The modifications to the data are discussed further in the data analysis portion of this report (section 4.B). These data currently reside within MORIS but they should be deleted as they exist in their current form, because important components were omitted. This workgroup is in the process of revising the data so that it may be correctly loaded into MORIS.

The data collected by TerraLogic are not high enough in quality to support the needs of the current Ocean Management Planning efforts. When creating the data TerraLogic only held two workshops that were sparsely attended by the representative expert groups on vessel-based recreation. However, the data model and data collection methodology outlined by TerraLogic in their report are excellent and should be used as a guide to collect a better data set that is more complete and representative of the recreation activities occurring in Massachusetts waters.

Other Recreational Uses (Excluding Personal Motorized Boating Activities)

Obtained from TerraLogic Recreational Boating data and similar to the recreation boating data they are inaccurately included in MORIS. The workgroup is in the process of putting corrected data into MORIS. These data are both lines and polygons representing specific recreational uses of the watersheet. The data collected by TerraLogic are not high enough in quality to support the needs of the current Ocean Management Planning efforts. When creating the data TerraLogic only held two workshops that were sparsely attended by the representative expert groups on ocean recreation. However, the data model and data collection methodology outlined by TerraLogic in their report are excellent and should be used as a guide to collect a better data set that is more complete and representative of the recreation activities occurring in Massachusetts waters.

Outstanding Resource Waters

The potential for impacts to Outstanding Resource Waters (ORW) by activities on the watersheet lead us to include this dataset in our workgroup efforts on Vessel-based Recreation. Except in limited circumstances, no discharge of dredged or fill material may

occur in Outstanding Resource Waters (ORWs) *designated as such by DEP, in order to protect and maintain water quality in waters determined to have outstanding socio-economic, recreational, ecological, and/or aesthetic values*. [314 CMR 9.06(3)] These data are included in both MORIS and MassGIS.

Outstanding Resource Waters are listed and mapped in the DEP regulations containing Surface Water Quality Standards, at 314 CMR 4.06(3). A total of 40 ORWs have been designated in coastal and marine waters, including 22 in the Cape Cod Coastal Drainage Area, 16 in the Islands Coastal Drainage Area, and 2 in the North Shore Coastal Drainage Area. Among other areas, all waters and associated wetlands within coastal ACECs are designated as ORWs as well. See also Rojko et al., "Designated Outstanding Resource Waters of Massachusetts", MA Executive Office of Environmental Affairs and Department of Environmental Protection (April, 1995).

4. Summary Assessment of Data Needs

One of the primary data collection efforts that we feel should be made by the EEA ocean planning team is to acquire additional data on vessel-based recreation within the OPA itself, as a follow-up to the previous TerraLogic work. This is a vital component to ocean planning in the long run, since there are impacts on ocean resources associated with boating and other on-water recreation activities and, conversely, such activities can be adversely affected by other projects or activities within the Ocean Planning Area. TerraLogic, being the authors of the existing data model and experienced in the collection methodology as applied to Massachusetts waters, would be the logical candidate to perform this follow-up work in the most expeditious manner. By holding additional workshops along the entire coast, the quality and robustness of the extant data can be dramatically improved.

C. Shore-based Public Viewing

Scenic enjoyment is unquestionably an integral part of ocean-related outdoor recreation; indeed, simple viewing of the water is probably how the greatest number of people experience the ocean as a natural resource. Accordingly, the workgroup believes it is essential for the ocean planning program in the long run to assess in some reasonable manner the "viewing services" provided by state waters to the recreating public. The need to do so was highlighted in 2004 in the final report of the Governor's Ocean Management Task Force, which recommended that the state "develop and implement common methodologies and standards for the [presentation of data and] analysis of visual, cultural, and aesthetic impacts of proposed projects in state waters", to ensure such impacts are fully understood and to serve as a basis for mitigation.[6]

[6] "See Management Tools Recommendation #5", Waves of Change, Massachusetts Ocean Management Task Force Report and Recommendations, p. 12 (March, 2004).

The enduring wisdom of this recommendation is underscored by two specific realities, one political and one legal in nature. First, we are preparing an ocean plan with a mandate from the legislature largely because of the controversy surrounding the Cape Wind project, and that controversy was (and still is) largely about visual impacts. More of the same can be expected as we explore offshore siting of renewable energy facilities on a statewide basis, making it advisable to seek an objective framework for assessment of visual factors at the "reconnaissance" level typical of areawide planning. Second, the visual environment has been afforded an enhanced legal status by the state Ocean Sanctuaries Act, which directs EEA and all other state agencies to ensure that "all ocean sanctuaries shall be protected from any exploitation, development, or activity that would significantly alter or otherwise endanger the ecology *or appearance* of the ocean, the seabed, or subsoil thereof, or the Cape Cod National Seashore."[7] *[emphasis added]* Since more than three-quarters of the ocean planning area lies within the ocean sanctuaries, it follows that the content of the plan itself is subject to the legislative mandate to prevent significant alteration of ocean sanctuary appearance.

Fortunately, there is a growing body of international literature on seascape assessment, a growing community of professional practitioners in that field, and a growing number of ocean planning efforts in the US and overseas that are attempting to deal with this issue head-on. Ours is billed as the "first-in-the-nation" comprehensive ocean plan, and there is a correspondingly high expectation that it will address all major ocean planning issues to at least some degree, with a modicum of innovation as needed. However, compared to ocean-based resources and activities that can be directly observed, measured, and mapped, enjoyment of ocean scenery does not lend itself easily to data collection and analysis; indeed, it does not even take place for the most part within the ocean planning area, but from the adjacent shorelands. Understanding such "transboundary" use of the ocean as a scenic resource presents special challenges to the planning process, which can only be met in the long run by an ambitious program of new data development and analysis requiring time-consuming fieldwork.

So, where do we start? The focus of this report is on extant spatial data, and the data that seems most relevant for immediate planning purposes is that which simply identifies the locus of "vantage points" along the shoreline from which ocean viewing can occur.[8] Primarily, ocean viewing opportunities arise in three ways, including visitation to federal, state, and town beaches and other recreation or conservation properties open to the public; patronage of waterfront hotels, restaurants and other commercial facilities of public accommodation (FPAs); and ownership of private waterfront property. Of these, only the first category was considered for this report,

[7] M.G.L. c.132A, sections 14 and 18. The latter stipulates that "all…units of the executive office of environmental affairs and other affected agencies or departments of the commonwealth shall…..conduct their activities consistently with the act…."

[8] We acknowledge that scenic enjoyment is also an important part of the recreational boating experience, which features oft-spectacular views of the land from the water as well as vice versa. Such on-water viewing has been addressed in previous seascape assessments, including that recently prepared for the Boston Harbor Islands which took into account views experienced by inter-island ferry passengers (see footnote X, infra). However, consideration of this aspect of the visual environment is beyond the scope of this report.

because government and NGO lands presumably provide the most public viewing opportunities in the aggregate and, fortunately, have been the subject of reasonably thorough data development efforts. In contrast, no georeferenced information is available on the incidence of FPAs along the coast; and while private waterfront property is well catalogued by local tax assessors, it seems inappropriate to consider the ocean viewing benefits accruing to individual owners through planning on behalf of public interests.

1. Public Access Infrastructure

As described more fully in Attachment C, the two principal datasets on public waterfront recreation sites in the Commonwealth are the Marine Beaches layer (presently in MORIS) and several layers associated with the Coastal Access Locator (available through the MassGIS On-Line Mapping Service, with incorporation into MORIS pending)[9]. The Locator dataset is by far the more complete of the two, and it can be presumed that most if not all of the generic information in Marine Beaches (apart from that specific to DPH water testing activities) is in the Locator as well. At any rate, taken together the two datasets present a near-complete profile of public recreational infrastructure along the Massachusetts shoreline, at least in physical terms. It should be noted that the data in each case was developed for specific programmatic purposes: to inform the public of water quality status, in the case of Marine Beaches, and as a "user guide" to help people find different public recreation facilities, in the case of Locator. Accordingly, the datasets do not provide information of the type more useful to coastal planners, such as the extent of public usage of the respective sites or the nature of site-specific viewing experiences.

Despite these data inadequacies, it should be noted that Massachusetts has been a pioneer in the field of land-based visual assessments in the past. The DEM Scenic Landscape Inventory effort was undertaken in 1981/82, as an effort to help identify areas of scenic interest to the Commonwealth to help guide future land protection efforts. Included in this inventory were several large areas segments of the coastline that were determined to be scenically significant due in part to the quality of the ocean views provided. The effort focused only on land areas that were larger than one square mile and contained what were determined to be consistently high scenic value based upon the presence of natural and cultural resources. The methodology that was employed has been utilized by other states also doing land-based scenic assessments, however the approach is somewhat dated and not easily replicable nor quantifiable. Although this information does exist as a datalayer on MassGIS, users are cautioned that it is now over 25 years old and did not provide any regulatory protections, therefore it is likely in many cases that the qualities which were once valued for their scenic quality may no longer be present. Nevertheless, to the extent the datalayer potentially could be useful in future assessments of seascape quality, we include a description in Attachment C.

[9] There are separate datasets on public boat ramps, as described in Attachment B. Such facilities are also included comprehensively in the Locator datatset, and generally are considered to be public viewing sites for purposes of this discussion.

2. Summary Assessment of Data Needs

Suitably georeferenced data on scenic viewing "services" provided by the waters within (and beyond) the OPA is considered essential for long-term planning purposes, but is not extant and cannot reasonably be acquired within the timeframe for preparation of the initial ocean plan. Acquiring the necessary planning information will require an ambitious program of new data development and analysis involving time-consuming fieldwork. Accordingly, for the second phase of ocean planning the workgroup recommends that substantial funding resources be devoted to this challenging task. A conceptual framework for a pilot project that will take a "first cut" at meeting the data needs is proposed in Section Four C, below.

SECTION FOUR: PRELIMINARY DATA ANALYSIS

A. Potential Site Occurrence for Underwater Historic Resources

We must document the underwater archaeological environment off our coast to ensure that historic and other cultural resources are not lost through neglect or inadvertently destroyed. Archaeological remains are often fragile and can be damaged by seemingly harmless activities. Our workgroup has attempted to create, in a preliminary way, a spatial identity for cultural heritage and related features (aka sites) for the offshore submerged bottom lands of Massachusetts. While there might be certain features that serve both a recreation and cultural heritage function (share a common "address"), these must be treated as distinct features/resources for purposes of planning.

For purposes of modeling potential early human use and occupation, we initially considered it possible to assume the probable occurrence of ancient and historical Native American site is limited to depths shallower than 50 meters (roughly 150 feet) for state waters within the OPA. However, this excluded portions eastern Massachusetts Bay and northeastern Cape Cod Bay that are considered to have been habitable dry land in ancient times, and could not account for the probability of artifacts and features (such as lost fishing gear or watercraft from ancient or early historical times) throughout the OPA. Thus, due to data limitations, the entire OPA must be provisionally characterized as being potentially sensitive for ancient and historical period Native American archaeological resources. Areas that can be excluded include deeply dredged shipping channels, the Foul Area, and significantly impacted areas (major gas pipelines) for which accurate geographic data are available.

With respect to mapping sensitivity zones for underwater historic resources of more recent vintage, the workgroup relied on expert knowledge from Vic Mastone, CZM Director of the Board of Underwater Archaeological Resources (BUAR), to identify areas likely to include concentrations of shipwrecks within the Ocean Planning Area (see Map #1 in Section Six). In developing this map, Mastone also relied on certain information in BUAR site files, such as the reported locations of known historic shipwrecks by municipality or locale, AWOIS shipwreck locations, the location of the routes for vessel traffic in the historic period, and gross scale modern ocean depth contours that corresponded with this information. This information was used to create a GIS datalayer that shows the horizontal extent for potential of historic shipwreck site occurrence in the OPA. Taking the relevant factors into account, the map displays three tiers for the potential site occurrence of historic shipwrecks:

- High - High anticipated frequency for known and/or recorded shipwrecks and heavy volume of vessel traffic during historic period.
- Medium - Moderate or low anticipated frequency of known and/or recorded shipwrecks and heavy volume of vessel traffic during historic period.
- Low - Low anticipated frequency for known and/or recorded shipwrecks and light volume of vessel traffic during historic period.

The assigned potential has some limitations. A numeric value could not be reliably assigned to these layers or sub-units derived from these layers due to location limitations in the data. No assessments were made for those areas outside MOP state waters (e.g., federal waters of Nantucket Sound). The anticipated frequency of shipwreck site occurrence cannot be correlated to the relative need or intensity for future field investigations. Again, project-specific survey work needs to occur on a case-by-case basis.

B. Relative Intensities of Offshore Recreation Activity

The ranking of recreation intensity was taken almost as defined from the Terra Logic data on Recreational Boating. Those data are accessed through the *Recreational_boating* subtype in the type domain *d_rec_boating*. Joined to the *d_rec_boating* data using the FUID field is a table from the same Geodatabase called *Metrics*. Under this table there are a series of seasonal intensity data tabulated by month. We used the month of July to represent the Summer Peak Season. Any month in the peak season could have been used from April through October since the use intensity for the peak season does not change from month to month during the season for any of the individual records. The *Trace* intensity attribute was recoded to *Low* and the overlapping intensity polygons were clipped to maximize the area in descending order. There was a small sliver of data missing in the Northern portion of the Ocean Management Planning Area. Since the sliver was entirely adjacent to areas of low intensity, the data was extended to include the sliver in the low category.

The additional data sets were included on the map to provide context and support to the rankings used by the team. Of these additional layers only the boat ramps layer was further manipulated for use on the map. Using a table provided by Workgroup member Tony Stella, a subset of coastal boat ramps was selected. This table was joined to the attribute table using the facility name, and the ramps were symbolized by their intensity of use as indicated in the table. Mr. Stella was deemed to be able to assess the level of boat ramp use intensity since he is on the Public Access Board that is the point of origin of these data.

The Ranking for the Recreation Intensity for the Workgroup on Ocean Recreational and Cultural Services was the segment for which the group had the most available data. While the data was more plentiful than the Heritage Resources or the Scenic Resources, it is still considered to be inadequate for the purposes of this project. We recommend that the data model established by the TerraLogic consulting company, in the report entitled *Characterization of Non-fishing Ocean-based Human Uses in Massachusetts, June 2005*, should continue to be utilized. However, more data needs to be collected that will do a better job of representing expert opinion on the intensity of recreational use of the watersheet in the waters off the coast of Massachusetts. To collect this data the Methods used by TerraLogic should continue to be followed. TerraLogic held workshops where experts on ocean-based human uses were invited to participate in

order to create the data. TerraLogic only had time to hold two workshops that were sparsely attended to create the existing data. By holding additional workshops the quality and robustness of the data can be dramatically improved.

The Workgroup feels that these data are particularly important to the overall strength of the plan. Because the data model and collection methods are already complete the costs of obtaining these data are likely to be reasonable, especially when considering their importance.

C. Toward a Framework for Assessing Scenic Ocean Services

Although we do not as yet know how best to analyze the ocean's "scenic services", we do know that views of water are almost always the most highly rated natural factor among various scenic qualities, coastal or otherwise. This recognition flows from a series of agency programs beginning with the DEM Scenic Landscape Inventory effort of the early 1980s and continuing with DCR's ongoing work with communities through the Heritage Landscape Inventory program. This truth is further confirmed by a review of attempts to assess scenic resources in other states and countries, as well as by the recent difficult experience surrounding the Cape Wind project. The visual impact of that offshore development has brought out emotional reactions and engaged individuals who do not normally participate in local and regional planning processes. This has been a hot-button political issue, to be sure, but we would observe that the involvement of more individuals in determining the future of our seascapes and landscapes is a positive thing, despite the challenges posed.

With the global interest in the development of wind farms in particular, other countries and coastal states in the US are starting to develop visual impact analyses based upon traditional studies of viewsheds across landscapes, adapting them to the seascape context and exploring ways to identify visual resource areas of high value. One example is the March 2001 report *Guide to Best Practice in Seascape Assessment* (Maritime Ireland/Wales INTERREG Report No. 5), which apparently serves as the basis for visual assessments of water in the UK. Subsequent studies have been carried out that apply the tools set forth in that seminal work and provide analogous models, such as *Guidance on the Assessment of the Impact of Offshore Wind Farms: Seascape and Visual Impact Report* (2005, Department of Trade and Industry, UK). In the United States, some agencies are exploring the use of GIS tools to model viewsheds and assign values to them for mapping purposes through a variety of means. Examples include *Visual Impacts and Assessments: Coastal Connecticut* (which uses 3-D modeling) and a *Bureau of Land Management Visual Resource Inventory.*[10] Closer to home, the Boston Harbor Islands have recently been the subject of a scenic analysis and assessment.[11]

---

[10] See http://www.ct.gov/dep/lib/dep/long_island_sound/living_on_the_shore/visual_impacts_and_assessments.pdf and http://www.ct.gov/dep/lib/dep/long_island_sound/living_on_the_shore/visual_impacts_and_assessments.pdf]

Our workgroup has not thoroughly studied the analytical approaches contained in the extant literature, nor considered how such approaches might be applied to Massachusetts' waters. We have, however, developed sufficient familiarity with the "state-of-the art" to observe that the primary goal of existing methodologies is only to assess seascape quality as experienced from land-side vantage points. Although such qualitative valuation is a key ingredient for visual impact analysis on any given waterfront site or area, it does not represent a direct measure of the type contemplated by the ocean planning team's ultimate goal for analysis, which is to identify "ranked polygons" within the OPA itself as an indicator of the visual significance to be attached to various ocean spaces. Accordingly, in the limited time available, the workgroup has confined its deliberations to the question of how such an analysis might be carried out, and has sketched out a promising approach that should be explored further in subsequent efforts by consultants to the ocean planning program.

The goal of the approach we contemplate is to produce a first approximation of the "viewing level of service" provided by various segments of the Ocean Planning Area (OPA) to users of public or quasi-public waterfront properties along the entire Massachusetts shoreline. Although conceptually straightforward, a number of the tasks involved in this approach pose methodological and/or data acquisition issues that should be addressed in a pilot study. For that purpose, a sample of approximately 15-25% of the properties in the Coastal Access Locator database (up to a maximum of 250) should be chosen for initial study. The sample should represent a fairly even spatial distribution along the coastline, and representative lat/long points should be specified for each property (e.g. site mid-points if under ½ mile in length or every ½ mile for sites with longer frontage). The analysis itself would involve two basic steps:

- first, assign a "scenic viewing rank" (on a scale of 1-10) to each public waterfront property that is visually connected to one or more OPA grids, taking into account not only the nature of the viewing experience but also the demographics of the likely viewing public;
- second, using standard GIS analytic techniques, combine the rankings for all such properties (weighted according to the extent of visual connection to each grid) to produce a total numeric score for each grid, which in turn would serve as the basis for a High/Medium/Low ranking throughout all state waters.

Each of these primary analytic components is discussed further below.

Developing Site-Specific Scenic Viewing Ranks

This task requires application of a scenic assessment system that rates the relative scenic value of each of the viewsheds from the public waterfront sites. This system will

---

[11] Robert L. Ryan and Richard P. Taupier, Boston Harbor Islands National Park Area Scenic Analysis and Assessment: A Pilot Study, UMass (Amherst) Department of Landscape Architecture and Regional Planning (July 25, 2007).

be a professionally administered scenic quality rating system based on criteria developed from previous literature[12]. This will be accomplished as a three-stage process, beginning with viewshed categorization. Understanding the different type of ocean viewscapes is critical to creating a system that can be applied throughout the study area. For example, viewsheds that have un-obstructed panoramic views of open water with no foreground elements would be one type of viewshed. Other viewsheds should be categorized based upon similar features, such as those with near shore views, distinct landforms or visual relief such as islands, and those with distant ocean views.

The next step is to determine the relative ratings of each of the types of categories on a preliminary basis. It is expected that those views with more unique features as well as more vertical relief will receive higher scores, as was found in previous research by Ryan and Taupier (2007). These criteria for rating should be reviewed and approved by EEA ocean planning staff prior to rating. GIS will be used to allow an initial categorization of these views. These categories of viewshed will then be given a numerical rating (on a 1-10 scale for scenic value) based upon these assessment criteria. Then, the viewshed ratings would be calibrated using actual scenic ratings of sample viewshed types, obtained through surveys of site visitors as well as government officials. A sample of viewsheds (appx. 80-100) should be selected to represent the range of views within the study area. This sample would use panoramic photographs taken from the sample public access points using the landscape preference methodology developed by Kaplan and Kaplan (1989). These photos will then be rated for scenic quality by a sample of the public at local workshops, as well as on a web-based survey instrument for rating by a larger sample of the public. This step is essential to compare the scenic rating derived from GIS and the viewshed assessment systems to those considered to be of high visual quality by the general public. The visual quality data will be analyzed for mean scores and the scenes ranked according to visual quality. These scores can then be mapped with their respective viewsheds as data fields in the viewshed attribute tables.

The final stage of the process incorporates the variable of user intensity. Certain public waterfront sites are more heavily used than others. Visual impacts therefore may have higher impacts on more people in these areas. Therefore, a weighting system will be developed to acknowledge the relative impact of use. Unfortunately, up-to-date user data for publicly accessible sites is currently not available and may be difficult to obtain for most sites. In lieu of using actual visitor counts, a use-intensity value will be assigned on a 1-5 scale based upon factors such as number of parking spots, previous visitation

[12] See Bishop, I.D. and Miller, D. R. 2007. Visual assessment of off-shore wind turbines: The influence of distance, contrast, movement and social variables. Renewable Energy 32: 814-831; Kaplan, R. and Kaplan, S., 1989. *The Experience of Nature: A Psychological Perspective.* Cambridge University Press, New York. (Republished by Ulrich's, Ann Arbor, MI: 1996); Ryan, R. L. and Taupier, R.P. 2007. Boston Harbor Islands National Park Area Scenic Analysis and Assessment: A Pilot Study. University of Massachusetts, Amherst, Department of Landscape Architecture and Regional Planning. Graduate studio report; USDA Forest Service. 1995. *Landscape Aesthetics: A Handbook for Scenery Management.* Agricultural Handbook No. 701. Washington, D.C.: USDA Forest Service; and US Department of the Interior, Bureau of Land Management. 1980. *Visual Resource Management Program.* Washington, D.C.: U.S. Government Printing Office.

records, nearby population density. Professional judgment of officials who oversee these sites will also be used to determine these scales. If more detailed site visitation records are developed as part of the larger ocean planning effort, they can be used to calibrate these numbers.

Mapping the Visual Significance of the Ocean Planning Area

In parallel with the onshore scenic assessment work, a GIS field of vision study should be conducted using GIS spatial analysis tools. For each sample point, the extent of the ocean surface that is visible at eye-level would be determined to form a geo-referenced polygon called a viewshed. A viewshed is bounded horizontally on either side by the first land obstruction and extends vertically to the effective horizon for the vantage point in question (which varies with elevation, in accordance with standard distance charts). Where the view from a vantage point intersects landforms, such as islands or peninsulas, these landforms shall be considered the extent or boundary of the viewshed. Since the public generally will not be able to distinguish the planning area (starting 1500 feet offshore and extending for approximately 3 nautical miles) from either nearer or farther waters, all such waters should be included in the viewshed.

Within the basic dimensions of the viewshed, the visibility of different parts of the ocean is simply a function of how close a given area lies to the shoreline where the public recreation site is located, which can be accounted for by using a weighted distance formula. The importance of distance in affecting scenic ratings has been documented in many studies including the Bishop and Miller (2007) study of the visual impact of off-shore wind turbines. The GIS procedure underlying the "visibility analysis" is as follows:

1. Establish grid dimensions appropriate to the resolution desired for purposes of a statewide pilot project (probably 100-200 meters).

2. Determine sample of public access points for viewing the ocean.

3. Using the elevation at each of the access points (to estimate distance to the horizon) and the landforms "framing" the view on either side, create viewsheds of the areas of ocean surface that can be seen from the access points.

4. Apply a visibility score to each grid cell in each viewshed using a linear weighting scheme, where grid cells that are closer to the access point get a higher weighting than cells that are farther away.

5. Combine the grid cells for all viewsheds so that the scores of cells of overlapping viewsheds are added together to display the composite "visibility" of various segments of ocean waters (both state and federal) from public shorelands in the aggregate.

The workgroup has prepared a prototype map to illustrate the application of this procedure, using a small number of public waterfront properties along the North Shore coastline (see Section Six, Map #3).

Once the relative visibility of each OPA grid has been determined, an overall scenic value rating can be computed and mapped by combining these results with those of the scenic ranking process. Presumably this would employ a weighted multiplier formula of some kind, one that gives a higher score to grids that are more conspicuous from popular public access points or that are part of individual viewsheds that rate very high in scenic value, all other things being equal. This combinatorial process inevitably will require an element of subjective judgment, and one explicit objective of the pilot project should be to carry out a comparative evaluation of various candidate algorithms in order to determine which is most suitable for final rating purposes.

SECTION FIVE: REGULATORY SUMMARY

Within the Massachusetts Ocean Planning Area there are several statutes and implementing regulations pertaining to recreational and cultural resources that are relevant to the ocean planning effort due to their special designations and/or standards. The primary laws are summarized below.

Massachusetts Ocean Sanctuaries Act, MGL c.132A, secs. 13 through 16 and 18; 302 CMR 5.00

- Section 14 states that "all ocean sanctuaries…shall be protected from any exploitation, development, or activity that would significantly alter or otherwise endanger the ecology or appearance of the ocean, the seabed, or subsoil thereof, or the Cape Cod National Seashore."
- Section 18 states that "all departments, divisions, commissions, or units of the executive of the executive office of environmental affairs and other affected agencies or departments of the commonwealth shall issue permits or licenses for activities or conduct their activities consistently with the act, and shall not permit or conduct any activity which is contrary to the provisions of the Act."

Section 106 of the National Historic Preservation Act of 1966 (as amended); 16 USC 470f; 36 CFR 800

- Under the Section 106 review process, projects that require any federal licensing, funding or permitting are reviewed by the Lead Federal Agency, which must consult with the State Historic Preservation Office (SHPO), which is the Massachusetts Historical Commission (MHC), with Tribal Historic Preservation Officers, and with other consulting parties with an interest in the projects to take into account adverse effects to significant historic and archaeological resources.
- It is important to note that visual impacts to significant historic properties are considered in these reviews. Therefore, projects within the ocean that are in the viewshed or setting of a significant historic property or district, have the capacity to affect historic resources, when the viewshed or setting is a significant, character-defining feature of the historic property or district.
- If determined that a proposed project will have an adverse effect on an historic or archaeological resource that is listed (or determined eligible for listing) in the National Register, the Lead Federal Agency engages in consultation with all parties to avoid, minimize, or mitigate the impacts to resources.
- In 2004, the Federal Communications Commission, the Advisory Council on Historic Preservation, and the National Conference on State Historic Preservation Officers developed a nationwide programmatic agreement for review of effects on historic properties relating to the installation of cell towers, to help guide the assessment of visual and other impacts to historic and archaeological resources. A similar agreement for alternative energy projects such as wind turbines might be considered by the involved federal agencies

MHC statute/regulations – MGL c. 9, secs. 26-27C; 950 CMR 71

- The Massachusetts Historical Commission (MHC) was established to identify, evaluate, and protect important historical and archaeological assets of the Commonwealth.
- The MHC is the office of the State Historic Preservation Officer, as well as the office of the State Archaeologist.
- This law creates the MHC, the office of the State Archaeologist, and the State Register of Historic Places among other historic preservation programs. It provides for MHC review of state projects, State Archaeologist's Permits, the protection of archaeological sites on public land from unauthorized digging, and the protection of unmarked burials.
- Any projects that require funding, licenses, or permits from any state agency must be reviewed by MHC, and consultation occurs to consider prudent and feasible projects alternatives to avoid, minimize, or mitigate adverse effects to important historic and archaeological resources.

Abandoned Shipwreck Act of 1987, Pub. L. 100-298, 102 Stat. 432 (43 U.S.C. 210)

- This federal law transfers ownership of the abandoned shipwrecks to the individual states in which the shipwreck is located.
- For shipwrecks in Massachusetts's waters, the responsible agency is the Board of Underwater Archaeological Resources.
- Key provisions include guarantee of appropriate recreational access to these sites.

Sunken Military Craft Act of 2005, Pub. *L. 108-375, 118 Stat. 2094-2098 (10 U.S.C. 113)*

- Federal government retains right, title, and interest in all sunken military craft of the United States including but not limited to watercraft and aircraft or the associated contents of such craft.
- No person shall engage in or attempt to engage in any activity directed at a sunken military craft that disturbs, removes, or injures any sunken military craft, except through permits issued by the Secretary of Defense.
- U.S. Naval Historical Center is charged with administering this Act.

BUAR statute/regulations – MGL c. 6, § 179-180 and c. 91, § 63; 312 CMR 2.00

- The Massachusetts Board of Underwater Archaeological Resources (BUAR) was established as the state agency charged with the identification, preservation and protection of the Commonwealth's underwater archaeological resources.

- State holds title to underwater archaeological resources; affirmed by federal Abandoned Shipwreck Act.
- Underwater archaeological resources include resources such as abandoned properties, aircraft, artifacts, treasure trove, watercraft (shipwrecks), ancient and historical Native American sites, and materials resulting from human activities of historic value.
- No one may remove, displace, damage, or destroy an underwater archaeological resources except in conformity with permits issued by the BUAR.
- Any field activities, including but not limited to remote sensing, directed toward the "exploration for or collection of underwater archaeological resources associated with environmental review and public planning purposes or for scientific purposes" in Massachusetts waters require a Special Use Permit issued by BUAR.

SECTION SIX: DESCRIPTION OF MAP PRODUCTS

Three preliminary maps utilizing extant data were produced by the workgroup, as follows:

Map #1: *Underwater Archaeological Potential* This map ranks the occurrence of historic archaeological sites (i.e. shipwrecks) into categories of High, Medium and Low potential concentrations. The map is conceptual and cannot be applied to consider specific impact areas of proposed projects.


history.pdf

Map #2: *Offshore Recreation Activity* This map ranks the aggregated distribution of a variety of vessel-based recreational activities, according to areas of High, Medium and Low concentration. Additional recreation data were included on the ranking map to provide some context for the ranking decisions.


recreation.pdf

Map #3: *Ocean Visibility Pilot Study* This map displays the "combined visibility" of a segment of the OPA from a small sample of public access sites along the shoreline. It illustrates a key step in a larger process of mapping the "visual services" the ocean provides to public users of land-based public outdoor recreation sites.


ocean_viewshed.pdf

ATTACHMENT A:
DATASETS ON OCEAN-RELATED HISTORIC RESOURCES

Board of Underwater Archaeological Resources Site Files

OVERVIEW

The Massachusetts Board of Underwater Archaeological Resources (BUAR) compiles and maintains Site Files that serve as a catalog of shipwrecks in or near Massachusetts's waters. Records are compiled from primary and secondary literature and maintained by BUAR as an excel database. The data set contains records for over 3,000 potential shipwreck sites in or near Massachusetts coastal waters. Data entries include vessel name, type, location, possible cargo and other information, including the source of individual records. Under state law, BUAR site files are not a public record.

This data set can used to support the creation of a GIS datalayer that shows the horizontal extent of possible submerged historic resources, chiefly shipwrecks.

PRODUCTION

All data is produced by BUAR staff. It is compiled by BUAR staff on a continuous basis from a review of primary and secondary literature. It is maintained by BUAR as an excel database. This database currently contains over 3,000 potential shipwreck sites in Massachusetts coastal waters. Data includes vessel name (if known), vessel type and rig, location, possible cargo and other information, including the source of individual records.

Data limitations: BUAR's data is by no means a comprehensive list of all shipwrecks or other cultural resources (e.g., aircraft). It captures mainly vessel losses derived from primary and secondary literature. Not all sites are necessarily historic period vessels. Further, precision of location is not always reliable. Not all locations have latitude and longitude, but rather given as locale or nearest landfall. Many locations have not been field verified. Under state law, BUAR site files are not public record.

ATTRIBUTES

Identifiers	Vessel name or the term UNKNOWN, UNIDENTIFIED; type of propulsion, hull material, usage; vessel dimensions and tonnage
Geographic Position	Fields that represent the most accurate position available. Municipality/locale, LAT/LON, Loran; possible rating on the quality of position;
History	Cause of loss; ownership; captain/crew, homeport; last voyage; cargo
Reference	Bibliography of source materials, particularly for position data source; informants
Dive Conditions	If known
Photographic	Depictions of vessel or site in BUAR possession, if any
Comments	Observations and qualifiers by sources or recorder

Depending on the potential site, many entries have fields that contain no information.

MAINTENANCE

This excel database were created by BUAR. Entries and updates are coordinated with BUAR. For questions or concerns regarding the data please contact: BUAR Director, 251 Causeway Street, Suite 800, Boston, MA 02114-2136 PH: 617-626-1141, Fax 617-626-1240

Automated Wreck and Obstruction Information System (AWOIS)

OVERVIEW

Automated Wreck and Obstruction Information System (AWOIS) is a catalog of wrecks and obstructions which are considered navigational hazards in US waters. It is compiled and maintained by the National Ocean Service (NOS) of National Oceanic and Atmospheric Administration (NOAA). It is a readily accessible public data set for wreck and obstructions in US waters.

PRODUCTION

As part of its hydrologic survey planning process, NOS staff review these records and update information based on their investigations. All data can be accessed by MCZM staff in consultation with the BUAR staff. Its intent is to capture those wrecks, hangs, and obstructions that are potential hazards to navigation. Data includes description, location, and other information detailing the state and accuracy of individual record.

Data limitations: NOAA's AWOIS data is by no means a comprehensive list of shipwrecks or other cultural resources. Its aim is to catalog potential navigational hazards; if a site is not considered to be such a hazard, it may not be included in the catalog. It will "never completely address every known or reported wreck" (NOS, 2006). Not all locations have been verified. Some of location data is conditional as "position approximate" or "accuracy of 1-5 miles". It captures mainly 20th century vessel losses and not necessarily historic period vessels. Further, it is limited to only sites on or above the sea floor. It does not capture buried sites. It cannot be used as a surrogate database for historic vessel loss.

ATTRIBUTES

The data set can be accessed on-line through the NOS Office of Coast Survey website: http://chartmaker.ncd.noaa.gov/hsd/hsd-3.html. It contains the following attributes:

Identifier	Vessel name or the term UNKN OWN, OBSTRUCTION, and SOUNDING; Chart,; Depth
Geographic Position	Fields that represent the most accurate position available. LAT/LON is decimal degrees; rating on the quality of position; position data source
History	Memo which describes prior surveys and any descriptive information on the site
Reference	Bibliography of source materials

MAINTENANCE

AWOIS is maintained NOS Office of Coast Survey. For questions or concerns regarding this data please contact: http://ocsdata.ncd.noaa.gov/idrs/inquiry.aspx or by mail:

Office of Coast Survey
1315 East West Highway
Silver Spring, MD 20910-3282

Inventory of Historic and Archaeological Assets of the Commonwealth

OVERVIEW

The Massachusetts Historical Commission (MHC) maintains the Inventory of Historic and Archaeological Assets of the Commonwealth, which includes records of historical districts, buildings, sites, areas, structures, bridges, objects, specimens, burial grounds, streetscapes, parks, and landscapes. The Inventory consists of paper and computerized records including indices, maps, files, and reports. The Inventory of Historic Assets is available for research at the MHC during business hours. Under state law, archaeological site locational information is not a public record to protect the sites. The Inventory of Archaeological Assets is available for research at the discretion of the State Archaeologist.

PRODUCTION

These data come to the MHC from many sources, chiefly local historical commissions, local historic district commissions, and through cultural resource surveys.

Data Limitations: The Inventory does not contain a listing of all historic and archaeological resources, just those recorded with the MHC. Professional survey is required to locate, identify, and evaluate historic and archaeological resources in a study area. Furthermore, the majority of the properties in the Inventory have not been formally evaluated for their significance (i.e., their eligibility of listing in the National Register of Historic Places [36 CFR 60]), and even recorded properties may require additional survey and documentation to provide current information for evaluation.

ATTRIBUTES

N/A

MAINTENANCE

MHC continues to digitize the Inventory as part of a long-term GIS project as staffing and funding permits. For questions or concerns regarding the data please contact:

Massachusetts Historical Commission
The Massachusetts Archives Building
220 Morrissey Blvd
Boston, MA 02125
Ph: 617-727-8470, Fax: 617-727-5128

ATTACHMENT B:
DATASETS ON VESSEL-BASED RECREATION FACILITIES AND ACTIVITIES

Coastal Public Boat Launch Facilities

OVERVIEW

The Massachusetts Office of Fishing and Boating Access (FBA) manages the construction, repair, and operation of state boat ramps, canoe and car-top launch sites, and associated parking areas and approach roads. According to FBA records, there are presently 61 boat launch sites that provide access to Massachusetts coastal waters. These include: general access sites consisting of concrete boat ramps and parking for vehicles with boat trailers; fisherman access sites consisting of concrete plank ramps also containing parking for vehicles with boat trailers; cartop boat access; and canoe access. Most of these launch facilities are on property owned by the city or town, who also provide day to day management of the facility. The data provided shows only state-owned boat coastal boat launch facilities and does not include private marinas, privately owned boat ramps, or city or town-owned boat ramps.

PRODUCTION

The data lives in MassGIS at www.mass.gov/mgis/ofba.htm. All data is produced by FBA staff. It is updated on an on-going basis as new sites are developed or are incorporated into the FBA system. The data is maintained as an excel spreadsheet. The spreadsheet includes the site name, city or town, type of facility, location, management, number and type of parking spaces, and intensity of usage (high, medium, low).

ATTRIBUTES

The datalayer has a point attribute table with the following items:

Item Name	Description
PENDING	Page in book
DATE_ENTER	Date entered in *Public Access to the Waters of Massachusetts*
PAGE	Page in *Public Access to the Waters of Massachusetts*
MAINTRESP	Maintenance and management responsibility
RAMPTYPE	Launch ramp type
NOLANES	Number of lanes
NORAMPS	Number of ramps
NOPARKSP	Number of parking spaces
CONDITION	Condition of ramp
FEE	Fee required? (some records are null; data not yet complete)
STKPRMT	Sticker or permit required? (some records are null; data not yet complete)
RESTRKT	Restrictions? (some records are null; data not yet complete)
COMMENT_	Comment field
FACNAME	Facility name
TOWN_ID	Town ID

TOWN Town Name

QUADS_ID USGS Quad ID

QUAD_NAME USGS Quad name

DOUBLEQUAD USGS Double quad name

FACIL_TYPE Type of facility:

- **A** GENERAL ACCESS: Concrete boat ramp and parking for boat trailers.
- **B** FISHERMAN ACCESS: Small concrete ramp, concrete pad ramp system or gravel ramp designed for smaller boats and parking for boat trailers.
- **C** CARTOP ACCESS: Access to lakes, ponds and rivers for small boats, canoes and kayaks.
- **D** CANOE ACCESS: Access to rivers most suitable for canoes and kayaks.
- **E** SPORT FISHING PIER: Pier that provides fishing area for recreational anglers - barrier free.
- **F** SHORE FISHING AREA: Minimally improved property that provides shore fishing access.

An asterisk (*****) after a code indicates coastal access for all facility types.

SITEMAPSIZ Size of site map

PONDMAPNAM Filename of pond map

FISH_CODES Fishing codes:

1	Trout	**10**	Striped bass
2	Largemouth Bass	**11**	Bluefish
3	Smallmouth Bass	**12**	Bonito
4	Northern Pike	**13**	False albacore
5	Tiger muskee	**14**	Tautog
6	White perch	**15**	Fluke
7	Pickerel	**16**	Cod
8	Black crappie	**17**	Flounder
9	Walleye	**18**	Squeteague - weak fish

OFBA_ID Unique site ID assigned by the OFBA. See http://www.mass.gov/dfwele/pab/pab_facilities.htm for details.

SITEMAPNAM Name of site map

In ArcSDE the layer is named **OFBA_PT**. With the January 2008 release it replaces the Public Access Board Sites (PAB_PT) layer.

An additional table called Coastal Access Sites Priortized.xls was used to rank the boat ramps into High, Medium, and Low categories of use intensity. This table was provided by Tony Stella of the Public Access Board.

MAINTENANCE

DFG GIS program in cooperation with the Office of Fishing and Boating Access

Popular Dive Sites

OVERVIEW

The Massachusetts Office of Coastal Zone Management developed this GIS datalayer that shows popular dive sites for recreational SCUBA divers including reefs, wrecks, and 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. The list is not exhaustive and site locations are generalized and should not be used to plan dives. These data were updated by CZM on July 2, 2007.

The layer is stored in ArcSDE as **MORIS.DIVE_SITES_PT.**

PRODUCTION

All data were produced by MCZM staff, in conjunction with the BUAR for the 40 designated Exempt Sites.

Data about shipwrecks, reefs, and jetties and breakwaters off the Massachusetts coast were compiled from several sources; many without any locational error analysis. Many sites have estimated depth to the bottom or to unique underwater feature. These data are for the most part anecdotal and rounded to the nearest five foot interval. The vertical position values are directly taken from the source data and no attempt has been made to verify or adjust these data.

The list is not exhaustive and site locations are generalized and should not be used to plan dives. It is not a comprehensive list of all sites frequented by SCUBA divers. The list is biased toward shipwreck sites and may not include many natural bottom features (ledges and pinnacles) visited by divers. It under-represents the growing use of deeper bottomlands (below 120 feet) by recreational divers.

ATTRIBUTES

The layer **MORIS.DIVE_SITES_PT** contains the following attributes:

NAME	Popular name of dive site
OFFSHORE	Closest Massachusetts municipality
TYPE	Type of attraction and mode of access
STATUS	Access policy
LATITUDE	Latitude of point
LONGITUDE	Longitude of point
DEPTH	Maximum and minimum depth of feauture
WRECK DATE	If shipwreck, year of sinking
LOC SOURCE	Source of dive site information

MAINTENANCE

These spatial data were created by the Massachusetts Office of Coastal Zone Management (CZM) for the Massachusetts Executive Office of Energy and

Environmental Affairs (EOEEA). Updates are coordinated with MassGIS by CZM. For questions or concerns regarding the data please contact:

CZM Data Manager
251 Causeway Street, Suite 800
Boston, MA 02114-2136
Phone 617-626-1200, Fax 617-626-1240

Outstanding Resource Waters

OVERVIEW

This datalayer delineates those watershed areas in which some resources may be afforded Outstanding Resource Waters classification under the Massachusetts Surface Water Quality Standards of 1995. According to 314 CMR 4.00: "Certain waters shall be designated for protection under this provision in 314 CMR 4.06(3) including Public Water Supplies (314 CMR 4.06(1)(d)1.). These waters constitute an outstanding resource as determined by their outstanding socioeconomic, recreational, ecological and/or aesthetic values. The quality of these waters shall be protected and maintained." (March 1, 1995). In ArcSDE are two layers - **ORW_POLY** and **ORW_ARC**. The entire datalayer was check plotted by MA DEP and quality checked by MA DEP Wetlands Conservancy Program staff.

PRODUCTION

The original source materials for this datalayer correspond to the MassGIS drainage sub-basins and Areas of Critical Environmental Concern (ACEC) datalayers. Additional water supply watershed information was gathered from overlaying existing data onto USGS 1:25,000 quads and delineating additional watersheds.
The existing MassGIS drainage subbasin datalayers were plotted on Mylar at 1:25,000 scale with the surface water withdrawal points from the MassGIS public water supplies datalayer. The basins of the surface water supplies were identified and if necessary additional drainage basins were delineated from the intake points of public water supplies. From these basins all upstream basins were coded as contributing to a surface public water supply. These basins were compared against the Massachusetts Surface Water Quality Standards of 1995 to determine which basins were designated as containing Outstanding Resource Waters (ORW). Additional areas added included ACECs, drainage basins of protected scenic rivers, protected wetlands areas and areas that contribute to other states' surface water supplies. This information was extracted from the component datalayers and appended into a single ORW datalayer.

While the primary designation of ORWs is through the Massachusetts Surface Water Quality Standards at 314 CMR 4.00, the further definition and protection of specific resources is addressed by and through the application of regulations promulgated pursuant to the Massachusetts Clean Waters Act, the federal Clean Water Act, Massachusetts drinking water protection laws, the federal Safe Drinking Water Act, and possibly local bylaws or ordinances. This datalayer only serves to highlight areas where ORW issues should be more specifically addressed by the relevant state and federal statutes and regulations or other local legal requirements. Furthermore, the scale and source materials for this datalayer are far coarser then that at which most specifically regulated activities and resource issues should be examined. Because the watershed delineations used for this datalayer are an interpretation of contour data their spatial accuracy can be no better, and, in locations with little contour information represent considerable professional judgment. This data has not been field checked. For areas near

watershed boarders or anytime there is a question, field observation and/or site specific information should be consulted.

ATTRIBUTES

In order to differentiate between ORW areas protected because of public drinking water supplies and other areas, the field ORW was added to the **ORW_POLY** attribute table and coded as follows:

ORW	ORW Description
1	ORW contributing area of a public surface water supply
2	ORW for ACEC
3	ORW for both Water Supply and Other

The LINE_ID field in the **ORW_ARC** attribute table is codes as follows:

LINE_ID	Description
0	Sub-basin boundary
1	Major basin outline
2	State boundary
5	Surface water supply basin outline
6	ORW other outline

Mooring Fields

OVERVIEW

These GIS data show the approximate location of large mooring fields on the coast of Massachusetts. Large mooring fields are defined a contiguous cluster of ten or more moorings. Mooring fields were created by onscreen digitization of mooring fields identified on MassGIS ortho imagery (2001 and 2005) and Pictometry data. The mooring fields data were then checked and augmented by local knowledge (Massachusetts Office of Coastal Zone Management regional coordinators) in the Spring of 2007. These data are not to show exact mooring field boundaries but instead to give the user a general idea where large aggregations of boats are moored.

PRODUCTION

Some mooring fields were detectable from the MassGIS ortho photos (2001 and 2005) and Pictometry data and were captured via onscreen digitization. Most mooring fields, however, had been pulled for the season when the MassGIS ortho photos were taken. To capture these mooring fields, large poster sized 1:5000 maps were printed and distributed to MA CZM Regional Coordinators. Using local knowledge, the Regional Coordinators draw known mooring fields onto the posters for their region. The data inherent in these posters was then transferred into GIS by hand digitizing the location of the mooring fields over both the MassGIS ortho photos and the appropriate detailed NOAA nautical charts for the region in question. The resultant polygons were then corrected to ensure they overlaid water deep enough to support moored vessels and did not intersect any land, rocks, bars, or infrastructure such as docks or navigational monuments.

Marinas, 2007

OVERVIEW

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. All data are represented as points with associated attribute data. Marinas are generally defined by CZM for these data as faculties that cater to recreational yachtspersons and provide berths, moorings, maintenance and repair, hauling, storage, chandely, fuel, and/or other supplies. Marina types were subdivided into marinas, yacht clubs, boat yards, municipal facilities, and unknown. All "marinas" have tidal frontage.

PRODUCTION

Geographic feature locations were acquired from manuals, books, and public lists and geocoded using ArcView and Google Earth. Locations were subsequently micro-located visually over MassGIS color orthophotography (2001 and 2005) and additional point features with boat storage located on orthophotos. The methodology and content are consistent over entire coastal area. Marinas outside of the coastal zone were not included in this dataset.

ATTRIBUTES

The attribute CAT describes the category of marina as follows:

CAT	Description
BYD	Boatyard
MAR	Marina
YCT	Yacht Club
TWN	Municipal Facility
UNK	Unknown

Artificial Reefs

OVERVIEW

The intended use of this data is to support diverse activities including planning, management, maintenance, research and interpretation. Creation of artificial habitat can be an effective method of increasing productivity, providing additional recreational and commercial fishing opportunities, and enhancing the forage base (i.e., provide attachment substrate for blue mussels and habitat for finfish; settlement, forage, and shelter habitat for lobster; and habitat for several life-stages of winter flounder

PRODUCTION

These data were converted form Degrees, Minutes to Decimal Degrees (latitude/ longitude geographic coordinates) and entered into an Excel spreadsheet. Fields were created to provide information to the user in a GIS. The spreadsheet was saved as a dBase file (DBF) and added to the list of tables in an ArcView 3.X project. The data was then added as an Event Theme in ArcView and converted to a shapefile. The ArcToolbox Define Projection Wizard was used to define the shapefile's coordinate system--Geographic, NAD 1927. The ArcToolbox Project Wizard was used to reproject the coordinates to State Plane, Massachusetts Mainland, NAD 1983, Meters.

Recreational Boating Intensity

OVERVIEW

The intended use of these data was to categorize the level of recreational boating use intensity on Massachusetts state waters. The data have been categorized into "High", "Medium" and "Low" levels of intensity.

These data were created as part of a CZM funded project with the consulting company TerraLogic in June 2005. The efforts by TerraLogic created an excellent GIS database with a very robust set of attributes and interrelated tables. The creation of data to fill these tables was not as thorough. TerraLogic held two workshops with experts in water based recreation to collect the data. The methods for organizing and conducting the workshops were sound. However, more workshops would have been necessary to create a truly viable set of data.

PRODUCTION

The ranking of recreational boating intensity was taken from the intensity data contained in the Terra Logic data on Recreational Boating. Those data are accessed through the *Recreational_boating* subtype in the type domain *d_rec_boating*. Joined to the *d_rec_boating* data using the FUID field is a table from the same Geodatabase called *Metrics*. Under this table there are a series of seasonal intensity data tabulated by month. We used the month of July to represent the Summer Peak Season. Any month in the peak season could have been used from April through October since the use intensity for the peak season does not change from month to month during the season for any of the individual records. The *Trace* intensity attribute was recoded to *Low* and the overlapping intensity polygons were clipped to maximize the area in descending order. There was a small sliver of data missing in the Northern portion of the Ocean Management Planning Area. Since the sliver was entirely adjacent to areas of low intensity, the data was extended to include the sliver in the low category.

Recreational Uses (Excluding Personal Motorized Boating Activities)

OVERVIEW

The intended use of these data was to show where significant levels of nonmotorized recreation occurs in Massachusetts state waters. The data only show where experts have said these activities occur at significant levels and it does not indicate the intensity of use.

These data were created as part of a CZM funded project with the consulting company TerraLogic in June 2005. The efforts by TerraLogic created an excellent GIS database with a very robust set of attributes and interrelated tables. The creation of data to fill these tables was not as thorough. TerraLogic held two workshops with experts in water based recreation to collect the data. The methods for organizing and conducting the workshops were sound. However, more workshops would have been necessary to create a truly viable set of data.

PRODUCTION

These data are queried directly from the TerraLogic *MASS_CZM_Human_Use_GDB* geodatabase. The data are part of the boating feature data set and can be located under recreational boating and by using the *CLASS* field with the *USE_TYPE* sub category. These data are pulled from both the polygon and polyline data.

ATTACHMENT C:
DATASETS ON SHORELINE PUBLIC VIEWING SITES

Coastal Access Locator

OVERVIEW

The Coastal Public Access Sites data viewer ("Locator") covers the entire shoreline of Massachusetts, providing maps and associated information for more than one thousand coastal access sites owned by government agencies or land conservation organizations and open to the public. These places range from large, spectacular parks and conservation areas to very small sites, such as public lanes and landings common in nearly every coastal city and town. By September 2008, the Locator also will include information on a substantial number of private waterfront properties where licenses issued by the Waterways Regulation Program of DEP have required pedestrian access as a condition of development on filled tidelands. With this addition the Locator has become the most comprehensive source of data yet compiled on public access to the Massachusetts coast. The only significant information not in the Locator is that pertaining to other types of privately-owned shorelands required to provide some degree of public access (like marinas/boatyards and individual piers/docks) as well as certain undeveloped lands subject to conservation restrictions.

The Locator data is available through MassGIS and is presently being incorporated into MORIS.

PRODUCTION

Development of the Locator database relied primarily on the following EEA sources:

- The Massachusetts Geographic Information System (MassGIS) and its *Protected Open Space and Recreation Mapping Project* (see www.mass.gov/mgis/osp.htm).
- The DCR Division of Resource Conservation's *Coastal Property Inventory*, which was compiled in 1990 and includes sites owned by public agencies, private land trusts, and other nonprofit organizations.
- *Public Access to the Waters of Massachusetts*, published by DFG's Public Access Board, which includes detailed maps that identify many boat launching facilities. .

In addition, published documents from a variety of government and nonprofit sources were used to confirm and expand the database.

A great deal of time also went into checking the Locator information in order to minimize errors. Quality control is a high priority for the MassGIS staff in maintaining the open space datalayer, and the information gathered by DCR staff for the Coastal Property Inventory was obtained directly from the organizations owning the coastal land and then checked against available town records. As an additional quality control measure, CZM staff visited every site in the Locator database -- and often the local assessor's office as well -- to ensure that the information collected was as accurate as possible and that the sites could be located using the on-line maps.

Despite these extensive quality control efforts, individual ownership of all parcels has not been independently verified. CZM makes no representations or warranties with respect to the definitiveness of the private or public ownership data presented in the Locator. All issues related to questions of ownership of coastal property should be investigated at the local Registry of Deeds.

ATTRIBUTES

The Locator database provides a near-complete profile of each coastal access site. The available attribute information can be organized into the following basic categories:

- General site descriptors: name, ownership, location (town with street address/zipcode finder), latititude/longitude, site photos, summary description, frontage on waterway (in miles)
- Parking lot capacity (if any): classified as small (less than 15 spaces), medium (16-50 spaces) and large (over 50 spaces)
- Onsite recreation support facilities: visitor center, toilets, concessions, campground, playing field/playground, pier/float/boat ramp, put-in for kayak/canoe or other small (hand-carried) watercraft, picnic tables, benches, pathways and trials (with links to detailed maps and related trail information), restrictions (if any)

Also provided in map form is information on transportation access to the respective sites, including display of major highways and connector roads; the border-to-border "Coastline Drive" (comprising the nearest principle roadways generally following the shoreline); and commuter rail lines (with stations), ferry terminals, and water taxi stands.

MAINTENANCE

The Locator database is maintained jointly by CZM and the MassGIS Office. No arrangements are presently in place for periodic updates to the database.

Marine Beaches

OVERVIEW

The Massachusetts Department of Public Health (MDPH), Center for Environmental Health (CEH), Environmental Toxicology Program (ETP) has developed two marine beach data layers, an arc feature class representing the linear extents of each beach, and points marking beaches' boundaries and access, sampling, and other locations. Data were collected from 7/20/2003 to 10/20/2003 for public and semi-public beaches in Massachusetts' oceanfront communities as part of the BEACH Act, as administered by the U.S. Environmental Protection Agency. The beach points (based on GPS) are accurate to within 10 meters.

The layers are stored in ArcSDE as **MARINEBEACHES_ARC** and **MARINEBEACHES_PT**.

PRODUCTION

All data were produced by MDPH/CEH/ETP staff, in conjunction with the MDPH/Division of Community Sanitation.

Point data were collected in the field by MDPH beach inspectors using global positioning system (GPS) units. To aid in locating the points, the inspectors used as reference MassGIS black and white and color ortho images, street maps, and sandy coastline maps produced by Applied Geographics, Inc. These coastline maps had previously been mailed to local boards of health and state agencies for mark-up of appropriate beach boundary and sampling locations. Boundary points were then used to manually delineate beach extent lines in ESRI's ArcMap software.

ATTRIBUTES

The layer **MARINEBEACHES_PT** contains the following attributes:

BEACHNAME	Name of beach
TOWNNAME	Name of town in which the beach is located
BEACHTYPE	Type of beach: Public or Semi-Public (privately owned but open to the public)
EPA_ID	ID of beach assigned by US EPA
COUNTYNAME	Name of county in which the beach is located
LATITUDE	Latitude of point
LONGITUDE	Longitude of point
POINTTYPE	Type of point: Boundary, Sampling Point, Access Point, Posting Point, Pollution Source, or various combinations of these
POINTCODE	Numeric code that combines several POINTTYPE values to facilitate symbolization, with priority assigned according to the numbers (with 1 having top priority) when more than one type was included in the POINTTYPE field: 1 - Boundary 2 - Sampling 3 - Posting 4 - Access 5 - Pollution 6 - Boat Ramp

7 – Other

The layer **MARINEBEACHES_ARC** contains the following attributes:

EPA_ID	ID of beach assigned by US EPA
TYPE	Type of beach: Public or Semi-Public
LENINMILES	Length of beach lines in miles
BEACHNAME	Name of beach
TOWNNAME	Name of town in which the beach is located

MAINTENANCE

These data are evaluated for accuracy on an on-going basis as MDPH beaches staff visit marine bathing beaches in the course of their overall duties. Updates are coordinated with MassGIS by MDPH. For questions or concerns regarding the data please contact:

Massachusetts Department of Public Health
Center for Environmental Health, Environmental Toxicology Program
250 Washington St., 7th Floor
Boston, MA 02108
Phone (617) 624-5757, Fax (617) 624-5777

Scenic Landscape Inventory

OVERVIEW

The DEM Scenic Landscape Inventory (SLI) was undertaken in 1981/82, as an effort to help identify areas of scenic interest to the Commonwealth to help guide future land protection efforts. The SLI focused only on areas that were larger than one square mile and contained what was determined to be consistently high scenic value based upon the presence of natural and cultural resources. Coastal areas determined at the time to have high scenic value include much of the eastern coast of Essex County, the Boston Harbor Islands, the Westport/Dartmouth coastline, the barrier beaches enclosing Plymouth harbor, the Elizabeth Islands, the south and west casts of Martha's Vineyard, much of the northern coast of Nantucket, the Sandy Neck area in Barnstable, and much of the Outer Cape. In ArcSDE the layer is named **SCNEINV_POLY**.

PRODUCTION

Landscapes that were identified through this effort were broken down into 3 primary categories: Distinctive, Noteworthy, and Common. Distinctive and Noteworthy were mapped on USGS quads (the remainder being classified as Common, and not mapped. This datalayer was digitized by staff at The Trustees of Reservations. The information was digitized from the USGS quads contained within the final report. MassGIS processed the coverage for linework generalization and smoothing, however the lines between these two classifications were not made at the time of digitization – so there is no distinction between Distinctive and Noteworthy on the datalayer available on MassGIS.

Data limitations: This data is now 25 years old – and since the scenic landscape identification did not come with regulatory protections, it is likely in many cases that the qualities which were once valued for their scenic quality may no longer be present.

ATTRIBUTES

The attribute SCENIC is coded "Y" for all polygons designated as scenic. Six polygons coded "N" are non-scenic areas surrounded by scenic landscapes.

MAINTENANCE

This was a one time effort – the data has not been maintained since digitization. However, a follow-up datalayer is currently in development in conjunction with DCR's current work with communities under the through Heritage Landscape Inventory Program, whereby residents consistently identify landscapes with access to and/or views of the water to be of high value to the community. For questions or concerns regarding the data please contact:

Nathanael Lloyd
MA Department of Conservation & recreation
251 Causeway St, Suite 700
Boston, MA 021114 Ph: 617-626-1381, Fax: 617-626-1349