Rhode Island Economic Monitoring Collaborative
FY07 Economic Monitoring Report

Delivered to the
Rhode Island Bays, Rivers and Watersheds Coordination Team

April 2007

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EXECUTIVE SUMMARY

This report summarizes the findings and recommendations of the Rhode Island Economic Monitoring Collaborative's inaugural report to the Rhode Island Bays, Rivers and Watersheds Coordination Team. This report presents a scorecard approach to monitoring, with 28 indicators of the status of Rhode Island's "water cluster" industries, which includes:

Water-dependent sector: depends on the water or its close proximity for its economic viability, such as marinas, water transportation, boat dealers, and commercial fishing.

Water-related sector: Water is a contributing component of the value-added but the industry can exist without it. The industry may also be tied to the water through historical legacy but over time its dependence on it has lessened. Examples include defense, tourism, and marine trades support industries.

Watershed sector: This sector includes employers that rely on large quantities of fresh water in their operations (e.g. bio-manufacturing). The Collaborative defined this sector as industries that use twice the median amount of water per employee.

Economic Impact

Rhode Island's water cluster accounts for approximately 37,000 jobs and roughly $1.8 billion in wages. This represents 8 percent of the state's employment and 10 percent of total wages paid in the state. Defense is the dominant industry in Rhode Island's water cluster, representing 34 percent of the total employment and 46 percent in wages for the water cluster.

Rhode Island's *water-dependent sector* experienced a rate of change that was 2.6 times greater than this sector nationally between 2001 and 2005. Ship and boat building represents the largest employer in this sector with just under 3,700 in employment and $158 million in wages. Water transport experienced the most employment in this time period (80%) moving from 107 to 193 in employment.

The state's *watershed sector* firms represented 26 percent of the state's manufacturing base in 2005. Chemical manufacturing, including bio-manufacturing, represented 30 percent of the employment in this sector and is the only industry in this group that saw growth since 2001.

Water and Waterfront Capacity and Conflict

The capacity of our waters and waterfront to accommodate a diversity of uses is a critical issue for Rhode Island as high-end housing can crowd out other users. Some communities in Rhode Island have their highest value uses clustered along the coast, others have accommodated a mix of coastal uses including active maritime uses, and others have turned their back on post-industrial waterfronts. This report calls for an investment in a better information system to track land and water use in order to better identify what capacity exists for different uses and where conflicts may arise.

In parallel to the development of that system, we need to deepen our understanding of those industries that are most reliant on our water resources and are currently facing escalating land costs and user conflicts. These industries include marine trades such as boat building. The fate of these industries and other potential growth areas, such as

short sea shipping, aquaculture and energy require that we have a fine-grained understanding of their dynamics so that we can act strategically to protect them. This will be a major focus of the economic monitoring effort in 2008.

Repositioning RI's Tourism Industry

Tourism is a significant component of the state's water cluster[1]. Some tourism advocates emphasize the jobs generated by tourism, but we need to consider other indicators to measure the economic benefits of tourism. Tourism makes possible key water and waterfront amenities for residents that could not be supported by the local market alone but also puts strains on infrastructure and natural resources.

Done right, tourism supports the cultural life of the community, interprets history, advocates good community design, and makes the places we live more enjoyable and meaningful to tourists and residents alike. This approach is gaining interest and support, as efforts to promote "geo-tourism" in the state and region demonstrate[2]. The Collaborative intends to work with tourism entities in the state to study tourism in this new way.

Monitoring Public Expenditures

This report takes a snapshot of public expenditures for FY05 to FY07, examining non-personnel investments made in water quality and/or quantity, public access and economic development to support the water cluster. During this three-year period, there was almost $400 million in investment on the part of federal, state and local government, over 70 percent of which went to improvements in water quality or supply. This three-year aggregate investment number does not capture the complete life-cycle and spill-over effects of these multi-year projects.

Linking Economic and Environmental Monitoring

Although the efforts of the Economic and Environmental Monitoring Collaboratives will provide important information in this first year of monitoring, there is currently no crosswalk between the two. If we are to better understand the relationships between environmental quality and the uses of our water and waterfront (e.g. effects of improved water quality on coastal land use mix and value), we need to begin to think through indicators that will tie these issues together more closely. As we begin to integrate the two, we will be able to answer questions such as whether more intensive uses are necessarily incompatible with higher water quality. The Collaborative will work to develop better indicators of connections between the economic and environmental trends.

Setting Benchmarks and Goals

This report provides baseline measures that we can use to track the health of our water cluster. The value of this effort will increase with time as new data in future years is added to this baseline data to reveal key trends in the use of our bays, rivers and watersheds. These trend lines will be more useful if we have something to compare

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[1] The Rhode Island Department of Labor and Training estimates that the state's total annual employment in its leisure, hospitality and tourism industry cluster is 55,102. The summer increase associated with coastal tourism represented 2,852 jobs and $51 million in wages. The sectors included in this latter estimate are food, accommodations and recreation (estimated for coastal communities when possible). The Collaborative chose to examine tourism in this way as the majority of the tourism impact occurs in the summer months along the coast.

[2] Geo-tourism is defined as tourism that supports the geographical character of a place—its environment, culture, heritage, aesthetics, and the well-being of its citizens.

them against. We now need to set benchmarks for each of the measures, such as the U.S. average or one or more comparison states. Likewise, if something is worth measuring *and within the control of the state to affect*, it is also worth setting a goal for what we want the metric to be, over some reasonable timeframe. Monitoring will be most effective when the Coordination Team sets goals for these metrics and holds itself accountable for achieving them. Although this report presents data using a scorecard approach, this will truly be a Scorecard when we have goals to measure against.

INTRODUCTION

The Rhode Island General Assembly created the RI Bays, Rivers and Watersheds Coordination Team (the Coordination Team) to protect Narragansett Bay and its watersheds as well as to promote sustainable economic development for businesses that rely on these resources. The General Assembly called for several standing committees, including the Economic Monitoring Collaborative (the Collaborative)[3] to aid the Coordination Team in achieving its mission, by guiding the development of a Systems-Level Plan (SLP) and by supporting the projects that the Coordination Team undertakes.

According to the enabling legislation (RIGL 46-31), the purpose of the Collaborative is to develop and implement an economic monitoring strategy to inform the "promotion of sustainable economic development of the water cluster" and "provide the necessary information to adapt the (systems-level) plan in response to changing conditions." For the past two years, the Collaborative has been developing this strategy[4].

The purpose of this inaugural monitoring report is to provide a baseline from which to track changes in the water cluster and identify areas for more intensive study in proceeding years of monitoring. It also highlights issues for future planning consideration. The Collaborative intends this report to be used by policy makers and interested parties as a source of information for shaping bay and watershed policy. It is the Collaborative's intent to update the metrics developed for the baseline on a regular interval (every two to three years) and complement this tracking in the intervening years with more focused research into key industries, critical issues and/or specific geographies as are identified through the baseline monitoring.

This effort is unique from previous monitoring work in that it attempts to measure not only the size of water cluster industries but also find indicators that highlight key capacity and conflict issues in our waters and along our waterfront. The Collaborative spent much of its time developing this approach and the indicators presented are the first pass at capturing these multiple dimensions. These indicators will be refined over time as new data becomes available and as the Coordination Team sets goals through the development of the SLP.

RHODE ISLAND'S WATER CLUSTER

Economic activities in our bays, rivers and watersheds take place across a spectrum of reliance upon these water resources[5]. In aggregate, economic activities tied to the water accounted for approximately 37,000 direct jobs (8% of RI's employment) and $1.8 billion in wages (10% of the state's total) before economic multipliers are taken

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[3] See Appendix A for list of Collaborative Members.

[4] See Appendix B for detailed timeline of Collaborative activities.

[5] The legislation defined the water cluster as "economically interconnected grouping of businesses, institutions, and people relying directly or indirectly on the bays, rivers, and watersheds including, but not limited to, the following sectors: (i) recreation, tourism, and public events; (ii) fisheries and aquaculture; (iii) boat and ship building; (iv) boating-related businesses; (v) transportation; (vi) military; (vii) research; and (viii) technology development and education." Through a series of meetings and workshops, the Collaborative refined the definition to include the three subsectors described in this report.

into account.[6] The Collaborative classified these activities within three broad areas based on their relationship to water resources:

Water-dependent sector. This sector depends on the water or its close proximity for its economic viability. It consists of the following subsectors: marinas; water transportation and related activities including sightseeing; boat dealers; fish/seafood wholesalers; ship & boatbuilding; seafood product preparation; fishing and aquaculture; water & sewer construction; and water & sewer systems management. This sector generates approximately 6,500 direct jobs and approximately $279 million in employee wages. It is growing 2.6 times faster than the sector is on a national basis.

Water-related sector. Water is a contributing component of the value-added (direct use or aesthetics) but the industry can exist without it. The industry may also be tied to the water through historical legacy but over time its dependence on it has lessened. It consists of several subsectors: Navy and supporting contractors; the state's coastal tourism business; real estate and real estate development; education, advocacy and regulatory activities, and marine trades support industries. This sector generates approximately 16,000 jobs and payrolls in excess of $918 million. The defense industry is the primary driver of this sector, representing 12,400 jobs and $842 million in wages. The second largest component is coastal tourism associated with the summer season with 2,852 jobs and $51 million in wages. Comparisons to national or regional sectors are difficult within this sector because of the lack of comparable data for other states.

Watershed sector: While all human activities require a supply of fresh water, this sector is defined by industries that rely on large volumes of fresh water for production– two or more times the median water usage per employee in RI[7]. This sector generates approximately 14,500 jobs and approximately $636 million in direct wages. This sector is dominated by manufacturing firms; intensive water use manufacturing represents approximately 26 percent of the state's manufacturing employment and 28 percent of the manufacturing wage base. The largest and fastest growing component is companies with chemical and/or biological processing capabilities. The state's focus on developing the biotechnology sector could substantially increase this area of the economy.

THE SCORECARD APPROACH

In addition to examining wages and employment, the Collaborative considered several different models of monitoring and reporting on the status of the economic health of the water cluster. Three models were considered, each of which has its advantages and disadvantages. They are:

- *Fact Book*: The Fact Book approach is modeled after the highly successful *Kids Count Fact Book*. *Kids Count* tracks 60 indicators across five dimensions of child well-being. The advantage to this approach is that it brings together a comprehensive volume of facts and can be used as a reference by many audiences. It includes descriptive

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[6] The Collaborative did not make estimates using multipliers due to concern over the applicability of national multipliers for Rhode Island. Appendix C illustrates which industries were considered part of the water cluster.

[7] Based on US Army Corp of Engineers Institute for Water Resources Municipal and Industrial Needs (IWR-MAIN). Industry median IWRMAIN Coefficient for RI is 71. Industries that nationally have IWRMAIN coefficients above 142 were included. Appendix D shows the water usage intensity of industries based on IWR-MAIN coefficients. These coefficients provide an estimate of water usage per employee per day.

data as well as indicators of change. A disadvantage is the scale of the effort required. It is comprehensive rather than focused on distilling key indicators. It does not explicitly analyze conflicts and trade-offs among the different dimensions.

- *Index*: An index is a basket of indicators weighted by importance and then combined into a single number. This approach has significant advantage in its simplicity of communication – a single number. However, this simplicity of communication lacks the ability to transmit the complexity of the Bay economy. Moreover it requires decisions on which factors to use and their relative weights - decisions for which we have limited basis at this point in the evolution of our monitoring strategy.

- *Scorecard:* The Scorecard is based on a balanced scorecard model that incorporates different perspectives and can explicitly look at potential conflicts and trade-offs. This approach is leaner than the fact book. It requires choices to be made about which indicators are the most important, but does not require that we weight them as in the index approach.

The Collaborative chose to use a scorecard model based on its ability to incorporate different perspectives and generate insights into various components of the water cluster. The Bays, Rivers and Watershed Scorecard is organized into the following dimensions:

Economic: The results of economic and recreational activity	**Activity:** Economic and recreational actions
Capacity: The ability to conduct economic and recreational activity	**Conflict:** Economic, recreational and regulatory activities that may conflict with each other

This year's Scorecard presents the rationale and baseline measurement of twenty-eight indicators, which the Collaborative will track moving forward. These measures were chosen from fifty-seven potential indicators identified by the Collaborative based on the following series of principles:[8]

1) **Collectible**: The Collaborative must be able to collect and/or reasonably estimate the measure when complete data is not available.
2) **Relevant**: The measure must have relevance to the purpose for which it is being collected.
3) **Indicative**: The measure must be indicative of the overall performance of the industry, on a leading or lagging indicator basis.
4) **Balanced**: Together, the measures must offer a multi-dimensional view of the performance of industry.

Each measure presented challenges with respect to these principles. For instance, the geographic measures were not easily collectible, but the effort to develop these measures is critically important to the issues the Collaborative is attempting to monitor. We present geographic measures that were collectible within the project timeframe and discuss recommendations for extending these measures.

[8] See Appendix E for a list of all measures considered.

THE BAYS, RIVERS AND WATERSHEDS SCORECARD

SCORECARD SNAPSHOT

Economic Measures

Water Cluster Employment & Wages	37,000 jobs & $1.8 billion in wages
Navy Employment & Wages	7,382 jobs & $523 million in wages
Water Dependent Industries Rate of Change Index (2001-2005)	2.26
Seasonal Effect of Summer Community Food & Beverage Sales	$104 million
Commercial Fish Landings Value	$91 million
Cargo Tonnage	12.7 million
Change in Registered Recreational Boats (2001-2005)	6%
Coastal Land Value as % of Total Land Value	36%
Coastal Median Home Price to State Median Home Price	3.85
Public Expenditures to Support Water Cluster (fed, state, local)	$398 million

Activity Measures

Registered Events	30
Commerical Vessel Transit	674
Coastal Residential Sales as % of Total Home Sales	13%
Recreation Participation Rate	24
Boating Usage Days (Recreational only)	16.53 - 38.93
Coastal Land Use	see narrative

Capacity Measures

Permitted Slips & Moorings	14,000
Registered Boats	43,961
Transient Slips	4,250
Industrial Piers	27
Public Access Corridors	261
Future Potential Land Use	see narrative

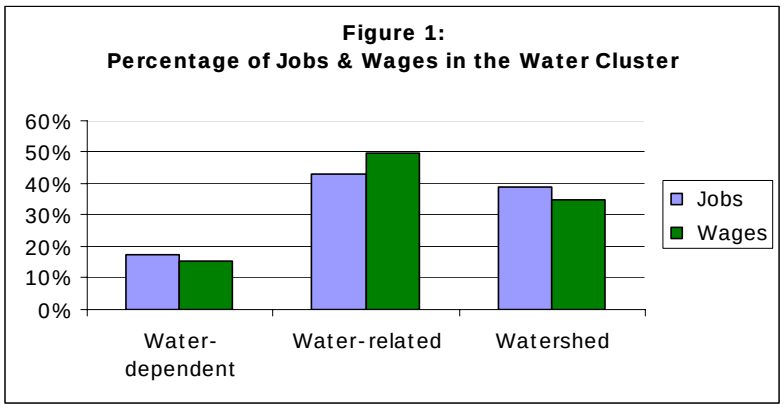
Conflict Measures

Registered Boats to Slips & Moorings	3.12
Residential Coastal Land Value to Industrial Coastal Land Value	3.12
Boating Density (recreational only)	2.16
Recreational Boats to Cargo Transit	79
Vessel Calls to Industrial Piers	10.3
Seasonal Housing as % of Total Housing	5%
Water Classifications Compared to Land Use	see narrative

Economic Indicators

Water Cluster Employment and Wages: ***37,000 jobs and $1.8 billion in wages***
Sources: Employment and wage data are from the Bureau of Labor Statistics QCEW and RIEDC Defense Economic Impact Study. Water use coefficients used to define the watershed cluster are from the US Army Corp of Engineers Institute for Water Resources Municipal and Industrial Needs.

Water cluster employment and wages provides an indication of the overall health of the sectors of the economy tied to our bays, rivers and watersheds including water-related, water-dependent, and watershed sectors. Figure 1 illustrates the percentage of jobs and wages in the three sectors of the water cluster in 2005.



Navy Employment and Wages: ***7,382 jobs and $523 million in wages***
Source: Naval Undersea Warfare Center, Office of Public Affairs, 2005.

The Navy's employment and wages provide an indication of the health of the overall defense sector. It represents 60 percent of employment and wages in the state's defense industry.

Water Dependent Industries Rate of Change Index: ***2.26***
Source: Bureau of Labor Statistics QCEW (2001-2005); calculations by Ninigret Partners.

Looking at rate of change is one way to see how fast our industries are growing. Rhode Island's most water dependent sectors grew more than twice the rate of their peers nationally. The index is created by dividing the rate of change in RI employment (9%) for the 12 water-dependent industries versus the rate of change for those same twelve industries nationally (4%). Water transport, fishing and sewer/water construction were some of the industries that grew at faster than the national rate of growth in this time period.

Seasonal Effect of Summer Community Food & Beverage Sales: ***$104 million***
Source: RI State Budget Office, 2005.

Food and beverage sales are good indicators of overall tourism activity capturing all forms of visitors including users of private summer homes. As the summer months are the primary tourist season, this measure allows us to consider the seasonal effect of this activity. This measure captures the incremental increase in sales between the summer months and non-summer months in Rhode Island's coastal cities and towns.

Commercial Fish Landings Value: ***$91 million***
Source: Fisheries of the United States, NMFS Fisheries Statistics Division, 2005.

Landings value provides an indication of the economic health of the fishery and downstream industries. In 2005, this $91 million included over 97 million pounds of fish. This represents a $15.4 million increase in dollar value and a 12.7 million decrease in pounds since 2004.

Cargo Tonnage: ***12.7 million tons***
Source: U.S. Army Corps of Engineers, Waterborne Commerce Statistics Center, 2005.

Cargo tonnage provides an indication of vessel activity within the Bay and the health of industries dependent on water-based transportation. This total includes cargo trips into Fall River.

Change in Registered Recreational Boats: ***6%***
Source: National Marine Manufacturers (NMMA) Statistical Digest, 2001-2005.

Registered recreational boats provide one component of recreational activity. The number of recreational boats registered in Rhode Island increased from 41,224 to 43,656 from 2001 to 2005, representing a 6 percent increase. By comparison, registrations in the US as a whole increased 1 percent in the same timeframe.

Coastal Land Value as a Percentage of Total Land Value: ***36% of value***
Source: Municipal GIS parcel data and tax assessor records, compiled and provided by Providence Plan, 2004 or 2005 records. Calculations by RI Economic Policy Council.

This measure is the assessed value of lands within a ¼ mile from the shore as a percentage of the total assessed land value in the coastal communities. Because of data availability, this measure includes data from nine of Rhode Island's coastal municipalities: Charlestown, Cranston, East Providence, Narragansett, North Kingstown, Providence, South Kingstown, Warren, and Warwick[9]. For the communities included, coastal lands represented 21 percent of the total acreage. Examining the communities separately also provides interesting information. For instance, Charlestown's coastal lands represent approximately 18 percent of its acreage and account for 64 percent of assessed value whereas East Providence's coastal lands represent 22 percent of its acreage and only 20 percent of its assessed value.

Coastal Median Home Price to State Median Home Price: 3.85
Source: RI Realtors Multiple Listing Service, 2006; Multiple Listing Service (Ninigret Partners manual count).

This indicator compares sales prices for coastal homes (defined as having an oceanfront or salt water view) to the state median home price. It provides an indication of the overall performance of the coastal housing market which drives a significant amount of the property values in some coastal communities.

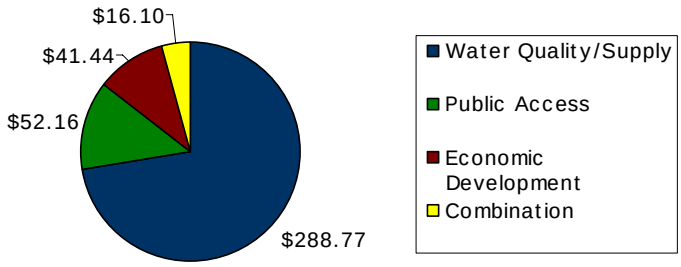
Public Expenditures to Support Water Cluster Infrastructure: $398 million
Source: Coastal Resources Management Council, Department of Environmental Management, Department of Transportation, Narragansett Bay Commission, Division of

[9] See Appendix F for a table of the coastal communities for which data is currently available.

Statewide Planning, Quonset Development Corporation, and Water Resources Board (staff compilation), FY2005-2007.

The Coordination Team's enabling legislation called on the Collaborative to specifically examine "public expenditures for infrastructure to support the water cluster".[10] In fiscal years 2005 through 2007, public expenditures were $398 million (includes federal, state and local monies). These expenditures fall into the following categories: water quality and availability improvements, recreational opportunities/access, and/or other economic development activities to support the water cluster. Over 70 percent of funds were spent on either water quality or supply projects, including projects relating to fresh and saltwater resources.

Figure 2: Government Expenditures by Purpose
(FY05-07, millions)



Activity Indicators

Registered Marine Events: 30 events
Source: US Coast Guard Providence Marine Safety Office, 2005.

This is a measure of all events that involve the use of the Bay for activities that may have an impact on navigation. These 30 events include multi-day events; together they took place over a total of 71 days. This indicator is limited to those events that are required to register with the US Coast Guard.

Commercial Vessel Transit (Cruise & Freighter): 674
Source: US Department of Transportation Maritime Administration (MARAD), 2005; Newport Visitors & Convention Bureau, 2006; Amercruise Cruise Schedule, 2006.

Vessel transits provide an indication of bay activity related to commercial waterborne transit. Cruise and freighter transit represented 18 and 82 percent of this total respectively.

Coastal Residential Sales as a Percentage of Total Home Sales: 13%
Source: RI Realtors Multiple Listing Service, 2006, Multiple Listing Service (manual count by Ninigret Partners).

This measure provides a picture of market activity for coastal real estate, an indication of the continued interest in coastal living in RI which may be a measure of the perceived

[10] In order to help define the scope of this element, the Collaborative engaged the Coordination Team's Ad Hoc Group; this Group played an instrumental role in both setting the parameters for the data to consider as well as collecting it. Appendix G illustrates projects included.

health of the Bay and coastal areas. It represents the number of sales (vs. the value of those sales).

Recreation Participation Rate: 24

Source: RI Department of Environmental Management State Comprehensive Outdoor Recreation Plan/LeisureVision, 2002.

This index provides an indication of the use of the salt and freshwater resources which may be an indication of the perceived environmental health of them. This index uses survey data from the State Comprehensive Outdoor Recreation Plan, which was distributed statewide in August through October of 2002. This rate was calculated by adding all the water-based recreational participation rates together, and dividing the sum by the number of activities to generate an average participation rate. Of the individual activities, visiting beaches was the number one activity with 64 percent of respondents indicating that they had done so in the past 12 months (from the survey date).

Boating Usage of Recreational Vessels - 16.53 - 38.93 days

Source: US Coast Guard Marine Safety Survey, 2003.

Boating usage provides an indication of the use of the Bay which may be an indication of the perceived environmental health of the Bay. Recreational boat usage varies based on the type of recreational vessel. The average usage by type is: sail only (16.54 days), open motor (28.07 days), cabin motor (28.45 days) and sail/motor (38.93 days). In the future, the Collaborative would like to add commercial boat days.

Coastal Land Use

Source: Municipal GIS parcel data and tax assessor records, compiled and provided by Providence Plan, 2004 or 2005 records. Calculations by RI Economic Policy Council.

Table 1 profiles land use within a ¼ mile of the coast in the nine communities previously mentioned. Land use in this context is analyzed by examining tax records linked to parcel data. This baseline will allow us to calculate changes in coastal land use over time. Appendix H speaks to some of the issues to be considered as we move forward with tracking this measure.

Table 1: Coastal Land Use	
Residential	34.56%
Commercial / Mixed Use	7.43%
Industrial	1.62%
Farm/Forest/Open Space	7.24%
Government/Institution	32.90%
Vacant	9.80%
Unknown/Other	6.45%

Capacity Indicators

Permitted Slips and Moorings: 14,000

Source: Ninigret Partner analysis of Coastal Resources Management Council (CRMC) permits & proprietary data, 2005.

This measure counts the current permitted slips and moorings, including the 25 percent additional slip capacity provided by right once a permit is granted.

Registered Boats: 43,961
Source: National Marine Manufacturers (NMMA) Statistical Digest, 2005, fisheries of the United States, National Marine Fisheries Service, Fisheries Statistics Division, 2006.

This measure provides an indication of the potential usage of the Bay by recreational boaters and commercial fishing vessels. The total number of registered boats includes 305 commercial fishing vessels and 43,656 recreational boats.

Transient Slips: 4,250
Source: Ninigret Partners proprietary data, 2005

Provides an indication of the amount of boat traffic that might be generated due to transient boating activity. This is an estimate prepared by Ninigret Partners.

Industrial Piers: 27
Source: Marine Pilots Guide, 2006

The number of industrial piers provides an indication of capacity for marine industrial activity on the Bay. A more refined capacity measure would examine capacity of each pier.

Public Access Corridors: 40 salt water boats ramps, 221 public rights of way
Source: CRMC, Public Rights of Way Listing, 2006.

The number of public access corridors is the number of locations where the Bay and coastline may be accessed legally by the general public. The BayScape study underway at the University of Rhode Island will complement this measure by providing additional information on how people are using our water and waterfronts.[11]

Future Potential Land Use

This indicator, although not easy to calculate yet, will be useful in estimating potential future land uses based on zoning. Although this data is available for some communities in GIS form, it has yet to be reclassified in a way that would allow for a statewide examination of coastal lands.

Conflict Indicators

Registered Boats to Slips & Moorings: 3.12
Source: NMMA Statistical Digest, Ninigret Partner analysis of CRMC permits & proprietary data, 2005.

In 2005, the number of registered boats was more than three times the number of slips and moorings. This measure provides an indication of the supply and demand situation for marina-related functions and subsequent potential development demand on the Bay and coast.

[11] The BayScape Project is being conducted by Drs. Robert Thompson and Tracey Dalton at the University of Rhode Island – Marine Affairs Department. This project was featured in the 2006 41 Degrees North publication of RI Sea Grant (Volume 3, Number 2).

Residential Coastal Value to Industrial Coastal Value: 3.12
Source: Municipal GIS parcel data and tax assessor records, compiled and provided by Providence Plan, 2004 or 2005 records. Calculations by RI Economic Policy Council.

This comparison provides an indication of the potential conversion risk of industrial land to residential development based on differentials in assessed property values. Of the nine communities for which data is available, only five have industrial lands within ¼ mile of the coast. Of those five, Providence had the greatest difference with a ratio of 7.12 and Warren had the smallest difference with a ratio of 1.37.

Boating Density (bay acres per recreational boat): 2.16
Source: Ninigret Partners calculation based on NMMA Statistical Digest, 2005 and estimated bay acreage.

This measure divides the bay acres (94,080 acres) by the number of registered recreational boats (43,656). A more refined version of this would incorporate only navigable waters, include coastal water area in addition to the bay and take into account the difference in boat types which have different area footprints.

Registered Recreational Boats to Cargo Transit: 79
Source: NMMA Statistical Digest, 2005, MARAD - Lloyds Vessel transit data, 2005

This measure speaks to the potential conflict between recreational boaters and cargo vessels. It is important to point out that this number could increase or decrease because of changes in both the numerator and/or denominator (recreational boats and cargo transits respectively). This ratio is down from 119 in 2002, largely due to an increase in cargo trips from 356 in 2002 to 556 in 2005.

Vessel Calls to Industrial Piers: 10.3
Source: MARAD - Lloyds Vessel transit data, 2005, Marine Pilots Guide, 2006

This measure provides an indication of the potential back up in the Bay by commercial vessels. A more refined version of this would look at vessel days at pier compared to available pier days. However, data for this type of information is not easily obtainable.

Seasonal Housing as a Percentage of Total Housing: 5%
Source: Loan Performance, 2006

This measure provides an indication of the amount of seasonal resident activity in Rhode Island, potential pressures on the housing market and other related community planning implications. This data source reflects mortgage data for loans indicated as second homes.

Water Classifications Compared to Land Use

This element would illustrate potential inconsistencies between water classifications (CRMC and DEM defined) and existing and potential future land uses (in this case as defined by assessed use). Appendix H describes a methodology for this analysis and discusses current data limitations and issues. As these limitations are addressed, the Collaborative hopes to incorporate this indicator into the Scorecard.

FUTURE MONITORING RECOMMENDATIONS

The Collaborative's first year of baseline monitoring revealed several areas in which we need to focus our research in FY08. Those areas are:

Understanding Our Marine Trades: A perennial problem in monitoring employment and earnings in the marine trades is that it is a cross-sector cluster of firms. Readily available employment data can be used to measure a few obviously marine industries like boat building, but many activities in the marine trades, like canvas sail making, get classified within sectors that are not dominated by marine trades, for example textiles. For this reason, most estimates of employment and wages in the marine trades are incomplete.

Understanding the connections of marine trades to the larger economy and the changing conditions facing the industry are more important than placing an exact number on the size of the cluster. The presence of marine trades is significantly impacted by land and water use decisions and we need to think through the trade-offs of changing uses on and near our waters.

Over the next two years, the Rhode Island Marine Trades Association (RIMTA) will be conducting an analysis of some of these issues. The Collaborative plans to work with RIMTA and identify ways in which the Collaborative could complement this study in FY08.

Repositioning RI's Tourism Industry: Tourism is a significant component of the state's water cluster[12]. Some tourism advocates emphasize the jobs generated by tourism, but we need to consider other indicators to measure the economic benefits of tourism. Tourism makes possible key water and waterfront amenities for residents that could not be supported by the local market alone but also puts strains on infrastructure and natural resources.

Done right, tourism supports the cultural life of the community, interprets history, advocates good community design, and makes the places we live more enjoyable and meaningful to tourists and residents alike. This approach is gaining interest and support, as efforts to promote "geo-tourism" in the state and region demonstrate[13]. The Collaborative intends to work with tourism entities in the state to study tourism in this new way.

Tracking Land Use Change: Land use along Rhode Island's waterfronts is changing. Post-industrial properties are being converted to residential and mixed-use developments, and modest seasonal residences are being transformed into larger homes. The cumulative impacts of such changes can affect a region's marine industries, public water access and recreation, and natural resources.

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[12] The Rhode Island Department of Labor and Training estimates that the state's total annual employment in its leisure, hospitality and tourism industry cluster is 55,102. The summer increase associated with coastal tourism represented 2,852 jobs and $51 million in wages. The sectors included in this latter estimate are food, accommodations and recreation (estimated for coastal communities when possible). The Collaborative chose to examine tourism in this way as the majority of the tourism impact occurs in the summer months along the coast.

[13] Geo-tourism is defined as tourism that supports the geographical character of a place—its environment, culture, heritage, aesthetics, and the well-being of its citizens.

The data sets and tools for analyzing geographic changes are evolving. Rhode Island's ability to manage economic and environmental change could be greatly enhanced by investing in a statewide system for monitoring land use change, an effort in which RI Statewide Planning is taking the lead along with other key partners.

Statewide analysis of land use changes has relied on photo-interpretation of land use patterns (the most recently interpreted data is from 1995). Although this work has provided us with a broad scale sense of the pace of major new land development, it cannot give us the more precise information we need to understand changes in the mix of land use, particularly in areas that have previously been developed (much of our coast). Further, it also misses the piecemeal fragmentation of our more rural areas, which could have significant impacts on water quality and habitat. The potential exists to connect parcel-based GIS maps with other actively maintained municipal databases including tax assessment data. Combining all of these data that exists on separate and not always compatible municipal systems will give use much more immediate information about how the landscape is changing. The Collaborative intends to support the development of a statewide, parcel-based GIS so that we can combine it with other forms of land use data to track changes in a manner that will more clearly illustrate trends and inform policy decisions.

Setting the Context for Public Expenditures: The Coordination Team's enabling legislation called on the Collaborative to specifically examine "public expenditures for infrastructure to support the water cluster". In its first year of monitoring, the Collaborative learned this is a complex task. The expenditures included in this report are capital expenditures and selected non-personnel operating expenses for state fiscal years 2005, 2006 and 2007 that could be considered to fall into the following categories: water quality and availability improvements, recreational opportunities/access, and/or other economic development activities to support the water cluster. Although this definition appears to be straightforward, the process of collecting the data revealed important issues for consideration in future years of monitoring:

- Need for More Context: Although limiting data collection to recent years allowed this element to be manageable in its scope, it does not provide a full picture of a project's full cost or how the funds allocated compared to funds requested. Further, it does not speak to anticipated future costs including required maintenance.
- Difficulty of Isolating Federal, State and Local Expenditures: It is difficult to isolate state expenditures from related federal and local matches. Further, it is difficult to collect data at the municipal level unless it has a relevant state match from which to identify it.
- Potential Use of the Data: This type of data collection may be more useful when examining a specific program or project, which would allow the Collaborative to further define the types of expenditures to include and the time span to consider. The use of the aggregate numbers presented in this report misses important detail, which is necessary to appropriately frame future policy and funding decisions.

Linking Economic and Environmental Monitoring: Although efforts to collect economic and environmental data have provided important information in this first year of monitoring, there is currently no crosswalk between the two. If we are to better understand the relationships between environmental quality and the uses of our water and waterfront (e.g. effects of improved water quality on coastal land use mix and value), we need to begin to think through indicators that will tie these issues together more closely. As we begin to integrate the two, we will be able to answer questions such as whether more intensive uses are necessarily incompatible with higher water quality.

Setting Benchmarks & Goals
Measures alone are not enough to guide policy and investment. Future monitoring will focus on identifying appropriate benchmarks for indicators when appropriate so that we can see how we are doing compared to others. In addition, if these measures reflect an area where state policy has an effect, it is essential that we set a goal for it. The Collaborative will work with the Coordination Team to set appropriate benchmarks and goals that will be reflected in the next indicators report.

FUTURE PLANNING CONSIDERATIONS

Whether we look at use of the bay by vessels, development of coastal land, or use of freshwater resources, we see and expansion of direct use by residents relative to use by industry. Although our bay and rivers are not primarily industrial, manufacturing and logistics play important roles in generating jobs, providing a more diverse economy, and creating a more interesting waterfront. As we think through policies that will affect these industries, specifically those pertaining to the use of coastal lands and water, we need to ask ourselves what effect those policies have on these industries. In many cases, logistics and maritime industries cannot exist without the water. Further, we need to consider the following issues that impact the Bay:

Short Sea Shipping (S3): Short sea shipping (S3) is the movement of goods (largely transported in containers) on barges or next generation high speed coastal freighters/ferries. The principle objective of this is to reduce truck traffic on congested highways. The Boston, New York, DC corridor is often cited as an attractive traffic corridor in which to deploy S3 technology given the roadway congestion, close proximity of cities, and major shipping centers. The growth of S3 could have substantial implications on the Bay and coast line.

Narragansett Bay, particularly Providence, could serve as the de facto terminal for Boston based on a superior logistics profile in terms of distance and time savings versus traversing the Cape Cod Canal to reach facilities in Boston. A study prepared by the National Ports and Waterways Institute for the Short Sea Cooperative Program identified Providence as a preferred location for Boston[14].

Although the permitting of a major container port in Narragansett Bay proved problematic, the location and operation of a S3 terminal would face significantly fewer barriers and potentially generate more vessel calls.

Growth of Aquaculture: In 2005, RI's aquaculture industry consisted of 25 farms representing 85 acres under cultivation. Farm gate value of aquaculture totaled $744,000. Since 2001, acres under cultivation nearly tripled from 30 acres to 85 acres. At the present pace, within a decade aquaculture could represent more than 200 acres.

All of RI's present aquaculture industry is based on cultivation of shellfish. There are no saltwater finfish farms in the area. However, with the anticipated growth in demand for fish products, declining wild fish stocks, and a large downstream seafood processing industry in New England, at some point in the future a saltwater finfish application may be forthcoming.

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[14] The Public Benefits of the Short Sea Intermodal Shipping System – November 2004

The Bay & Energy Resources: Despite the historic presence of energy infrastructure on Rhode Island's coast, shifting technologies create controversy, as the Cape Wind project and the proposed LNG terminals in Fall River and Providence demonstrate. Both projects provoked political backlash and debate about potential economic dislocation for industries tied to marine navigation and recreation.

However, movement of fossil fuel energy products by water is a cost effective way to move these products. Inherent in this is the need to locate energy facilities (storage, distribution, or conversion operations such as power plants) on or near the water and develop the required piers, berths, offloading facilities. It may also require more dredging than otherwise required to maintain shipping channels. Numerous environmental, navigation, and economic tradeoffs must be considered.

Additionally the Bay and coastline can serve as a source of renewable energy. Wind power has obvious potential in Rhode Island. However, based on wind maps of the area, the coastline and Bay itself represent the best sources for steady winds required to operate wind power at maximum efficiency. Generating energy from tide changes and wave action is still a relatively new technology. Technology using these sources exists and is deployed in a few places around the world. Additionally, technology is being tested to capture the energy generated on breakwaters and related structures. Deployment of these technologies has implications on fish migrations, recreational uses of the Bay, certain forms of commercial fishing and navigation. However, they could also be an important source of renewable energy.

Managing potable water: Managing the supply and delivery of freshwater is an important issue facing Rhode Island. While industrial and agricultural use of water are declining, summertime use of freshwater by homes has grown to the point that some important sources of supply are near capacity, and some, like the Hunt River, are over used, with observable impacts on stream flow and ecology. Rhode Island is living on borrowed time with a significant portion of its water supply infrastructure beyond its 75 year projected service life. We are facing $800 million in infrastructure maintenance and other costs over the next 20 years. Investments also need to be made in system interconnections and the development of adequate reserve supply to increase system reliability. Tapping known supplies, for example with new well fields in the Big River, will allow pressure to be taken off stressed basins, like the Hunt, through interconnections. The direct impact on Narragansett Bay of increased withdrawal and use of surface or groundwater anywhere in the watershed is a reduction in freshwater input to Narragansett Bay.

The water supply system is one side of the management challenge, demand is the other. Creating a professional statewide capability to manage demand offers a cost-effective means of assuring system reliability over time and meeting dynamic water needs. The General Assembly and executive branch agencies are actively working to create more adaptive supply and demand management. Rhode Island is a relatively water rich state, and with the right management structure, water availability will continue to be a competitive advantage. Rhode Island has relatively inexpensive water and can continue to accommodate the water needs of industry, albeit with some requirements for efficiency and conservation.

Desalinization offers an opportunity to obtain clean water without intercepting stream or groundwater flow, but at the cost of increasing energy dependence. Desalinization costs have dropped from approximately $1,000 per foot acre of water to about $650 per foot acre and are continuing to decline. This is compared to approximately $200 per foot acre

for freshwater. The Tampa Bay region recently opened a facility that will provide 10 percent of the region's potable water supply or 25 million gallons of water a day at a project cost of $110 million.

Desalinization in an estuary, such as Tampa Bay or Narragansett Bay, raises a number of concerns including increased salinity, disposal of the brine, and the potential for reduced oxygen levels in the water. Proponents, however, argue that the technology has been used in open salt water using alternative energy with minimal if any environmental impact.

CONCLUSION

This monitoring framework presented in this report is part of a much larger body of work to improve the management of our water resources. It provides a baseline for a set of measures that we can track over time to understand how uses of our water and waterfronts are changing. In many cases, the baseline data alone provide limited information, but the value of this effort will multiply with time as future years of data are compared to this baseline to reveal key trends in the use of our bays, rivers and watersheds.

The public policy challenges of managing the cumulative impacts of land use changes are driving the creation of new monitoring methods. We expect significant expansion of the geographical datasets that will be available to look at the interactions of economic and environmental change in the future. The geographic indicators developed for this report were the most time-intensive to develop, but have some of the greatest potential to reveal new insights. Collaborative plans to work with its partners on further development of these indicators.

The Collaborative will continue to work with the Coordination Team to refine its monitoring approach in order to provide timely and useful information to decision makers. This work is critical to the economic and environmental health of our bays, rivers and watersheds.

APPENDICES

APPENDIX A: RI Economic Monitoring Collaborative Membership

Christopher Bergstrom, RI Economic Policy Council
Austin Becker, RI Sea Grant/URI Coastal Resources Center**
Christopher Brown, RI Commerical Fisherman's Association*
Barry Costa-Pierce, RI Sea Grant College Program*
David DePetrillo, RI Tourism**
Michael Doherty, RI Economic Development Corporation**
Andrew Dzykewicz, Chief Advisor to the Governor on Energy
John Gates, URI – Dept. of Environmental and Resource Economics
Geoff Grout, Quonset Development Corporation
Michael Keyworth, Brewer Cove Haven Marina
Elizabeth Kordowski, Rhode Island Lobstermen's Assocation**
Kenneth Kubic, RI Marine Trades Association
Beth Laney, General Dynamics – Electric Boat Corporation**
Michael Marchetti, Point Judith Fisherman's Memorial Foundation
Michael McGiveney, RI Shellfisherman's Association
E. Howard McVay, Jr., Northeast Pilots Association
Stephen Medeiros, RI Saltwater Anglers Association
Richard Nadolink, Newport Engineering & Science Company
Marisa Paul, Raytheon Intergrated Defense Systems**
Mark Pearson, Pearson Composites (former President)*
Brad Read, Sail Newport*
Tom Rich, New England Boatworks**
Eric Reid, Deep Sea Fish of RI
Gary Schuler, Senesco Marine (former CEO)*
Michael Slein, Raytheon Intergrated Defense Systems*
Curt Spalding, Save the Bay
Bruce Vild, RI Division of Planning**

*Notes former member of Collaborative
**Notes new member of Collaborative as of January 2007

Other Acknowledgements: In addition to past and present Collaborative members, numerous organizations and individuals provided assistance throughout the development of this report including members of the Coordination Team Ad Hoc Group and sector specific workshop participants. Also, the following individuals made significant contributions in the collection and/or analysis of data: Jim Lucht, Eben Dowell, Evan Matthews, Tiffany Smythe, and Kevin Park.

APPENDIX B: Collaborative Timeline of Activities

Fall 2004
• First meeting of members named in legislation to discuss first steps. • First ad hoc group meeting: presentations by Kenneth Payne and Charles Colgan on two recent comprehensive research efforts on documenting RI's marine economy sponsored by the RI Senate Policy Office and the RI House Policy Office respectively. • Preparation of annotated bibliography on recent sector-specific research on marine industries in RI.
Winter 2004-2005
• Capability Mapping Workshops: ad hoc group went through four ½-day sessions to develop a deeper understanding of state's water cluster and identify catalytic projects to enhance the cluster. This work informed the current monitoring proposal. • First Report to General Assembly: submitted January 31, 2005. • Governor Donald Carcieri nominates Economic Monitoring Collaborative membership. • First Economic Monitoring Collaborative meeting: members refined the water cluster definition and determined that sector specific meetings are necessary to develop a monitoring strategy.
Spring 2005
• Sector Meetings: sector specific meetings were held in which Collaborative members and other industry experts discussed measures to include in monitoring strategy.
Summer 2005
• Report drafted to summarize findings from sector meetings and previous research in preparation of the monitoring strategy.
Fall 2005
• Economic Monitoring Collaborative meeting: economic monitoring strategy discussed and approved for submission to the Coordination Team. • Coordination Team accepted monitoring strategy for consideration in FY07 monitoring/budget proposal.
Spring 2006
• Worked with Coordination Team to secure FY07 funding.
Summer 2006
• Met to update FY07 monitoring plan to match allocated funds, to review RFP for consultant based work. • Issued RFP for consultant based monitoring work.
Fall 2006
• Selected consultant. • Funds received to begin work (October 30, 2007). • Held series of meeting with consultant to determine report approach and Scorecard measures. • Prepared and presented FY08 monitoring proposal.
Winter 2006 – 07
• Worked with Coordination Team Ad Hoc Team to collect public expenditures data. • Worked with Providence Plan to collect land use data. • Continued to work with consultant to refine Scorecard and prepare report.
Spring 2007
• Issued draft monitoring report to Coordination Team (March 2007). • Collected feedback on draft. • Issued final report (April 2007).

APPENDIX C: Water Cluster Industries (employment)

Water Dependent	Employment
Aquaculture	
Fishing	98
Water Sewer Construction	411
Seafood Product Preparation	265
Ship & Boat Building	3,673
Fish Seafood Wholesalers	183
Boat Dealers	371
Water Transport	193
Scenic Sightseeing Water	191
Support Activities for Water Transport	181
Water & Sewer Systems Management	384
Marinas	562
Total	6,512

Source: US Bureau of Labor Statistics (ES-202), 2005

Water Related	
Navy	7,382
Defense Contractor	5,036
Food	1,711
Real Estate and Res Construction	403
Education, Advocacy, Regulatory	247
Recreation & Accomodations	1,141
Total	15,920

Source: Ninigret Partners Calculations, multiple sources, 2005. This reflects an esimate of the water-related portion of these industries. The food, recreation and Accomodations represent an estimate of summer months and when possible only coastal communities.

Watershed	
Petro Refining	52
Paper	1,363
Food	2,835
Textile Mills	3,590
Chemical	4,281
Stone Clay	654
Primary Metal	1,616
Leather	181
Total	14,572

Source: US Bureau of Labor Statistics (ES-202), 2005. These industries have been identifed based on their water use coefficients (see Appendix D).

Total Water Cluster **37,004**

APPENDIX D: Water Use Coefficients

Industry	IWRMAIN	Employment	Usage*
Petro Refining	**1045**	**52**	**54,340**
Paper	**863**	**1,363**	**1,176,269**
Food	**469**	**2,835**	**1,329,615**
Textile Mills	**315**	**3,590**	**1,130,850**
Chemical	**289**	**4,281**	**1,237,209**
Stone Clay	**202**	**654**	**132,108**
Primary Metal	**178**	**1,616**	**287,648**
Leather	**148**	**181**	**26,788**
Rubber	119	2,923	347,837
Services	106	224,323	23,778,238
Fab Metal	95	7,669	728,555
Wood, Lumber	78	723	56,394
Electrical Equip	71	6,949	493,379
FIRE	71	32,646	2,317,866
Pub Admin	71	62,758	4,455,818
Instruments	66		-
Transportation	63	3,820	240,660
Machinery	58	2,326	134,908
Wholesale Trade	58	16,656	966,048
Retail Trade	58	52,506	3,045,348
Trans/Uts/Comm	51	10,426	531,726
Printing	42	2,153	90,426
Jewelry/misc	36	10,435	375,660
Construction	35	21,724	760,340
Furniture	30	1,919	57,570
Finished Apparel	13	218	2,834

* Water use is estimated from national industry specific water use coefficients (gallons per employee per day).
U.S. Army Corps of Engineers, Institute for Water Resources Municipal and Industrial Needs (IRWMAIN), U.S. Bureau of Labor Statistics (QCEW), 2005.

APPENDIX E: All Indicators Considered (by Scorecard dimension)

ECONOMIC MEASURES

- Food & Beverage tax
- Hotel tax
- Boat sales
- Commercial Fish landings
- NUWC/Navy Employment & wages
- Navy contracts
- "Seasonal" home sales (purchased information)
- Marine related research funding
- Coastal land value
- Government expenditures
- "Coastal" tourism employment & wages
- Marine trades employment & wages
- Defense (navy) employment & wages
- Visitor segment spending (summer resident, day trip, boater, etc.)
- Coastal median / state median home price
- Marine employment shift-share
- Water intensive industry employment as a percentage of total statewide employment
- Boating accessories
- Boater expenditures
- Average wage versus National wage (water industries ES 202)
- Change in local "water ES 202" employment / change national "water ES 202" employment

ACTIVITY MEASURES

- Registered events
- Vessel calls
- Beach admissions
- "Seasonal" home sales (purchased information)
- Hotel occupancy rates (purchased information)
- Large recreational vessel cruising permits
- Aquaculture leases
- Building permits
- Yacht counts
- Sailing & Fishing event participation
- Recreational participation rates
- Tourist levels
- Summer resident levels
- Boating density
- Transient slip activity
- Use of boat ramps
- Boating usage (days & hours)
- Land Use Conversion / Absorption rate
- Boating density (boats in water in key areas)
- Marine employment shift-share
- Coastal residential units
- Pump out boat count
- Boating incidents

CONFLICT MEASURES

- Slips & Moorings / Registered Boats

- Transient slips / total slips
- Residential coastal acre value versus industrial coastal acre value
- Water sheet zoning
- Water sheet zoning allowance to land use zoning allowance
- Cargo transits to registered boats
- “Seasonal housing” / total housing
- Water quality designation / land use zoning allowance

CAPACITY MEASURES

- Slips / Moorings
- Transient slips
- Registered boats
- Coastal land use / zoning
- Slips & Moorings / Registered Boats
- Transient slips / total slips
- Water sheet zoning
- Charter/cruising/party boats
- Industrial piers / vessel calls
- Public access corridors

APPENDIX F: Coastal Community Assessed Land Values

	MUNICIPAL TOTAL			COASTAL TOTAL			PERCENTAGE COASTAL		
	# PARCELS	ACRES	LAND VALUE	# PARCELS	ACRES	LAND VALUE	# PARCELS	ACRES	LAND VALUE
Charlestown	6,258	24045	$1,775,871,200	2,368	4225	$1,129,625,900	38%	18%	64%
Cranston	32,825	24,286	$1,592,501,800	1,156	277	$112,763,200	4%	1%	7%
East Providence	14,598	4,564	$1,063,676,900	2,803	1,025	$214,012,800	19%	22%	20%
North Kingstown	11,335	22,638	$1,461,741,275	3,210	7,854	$875,852,395	28%	35%	60%
Narragansett	11,107	8736	$1,842,654,100	6,257	5761	$1,383,076,300	56%	66%	75%
Providence	43,079	8,988	$4,468,257,421	1,790	1,159	$786,430,340	4%	13%	18%
South Kingstown	11,853	34,732	$2,018,389,699	3,122	5,026	$746,497,563	26%	14%	37%
Warren	5,931	1,147	$419,472,300	3,187	599	$247,056,000	54%	52%	59%
Warwick	41,093	17,034	$3,071,041,520	11,013	4,473	$857,559,300	27%	26%	28%
Total	**178,079**	**146,171**	**17,713,606,215**	**34,906**	**30,398**	**6,352,873,798**	**20%**	**21%**	**36%**

Notes:
In all but two towns, calculations were based on 2004 or 2005 data from municipal GIS parcel data and tax assessor records, compiled and provided by Providence Plan. For Charlestown and Narragansett, acreage had to be inputted from town polygon files from RIGIS.

APPENDIX G: Public Expenditures

		State Investment			Federal Investment			Municipal Investment			Invest. Area*
Agency	**Project Name**	**FY 05**	**FY 06**	**FY 07**	**FY 05**	**FY 06**	**FY 07**	**FY 05**	**FY 06**	**FY 07**	
CRMC	"New" rights of way designations	–	–	–	$5,000	$5,000	$5,000	in-kind	in-kind	in-kind	PA
CRMC	Coastal habitat restoration activities	$250,000	$250,000	$225,000	n/a	n/a	n/a	$0	$0	$0	PA
CRMC	Allin's Cove		$34,840						$0	$0	PA
CRMC	South Coast Restoration Project		$1,043,733	$1,043,733					$0	$0	PA
CRMC	Narrow River Restoration Project			$1,843,000					$0	$0	PA
CRMC	Brushneck Cove Restoration Project			$343,000					$0	$0	PA
DEM	Sewer Interceptors	$477,894	$522,107	$0				$477,894	$522,107	$0	WQ
DEM	Governmental Water Pollution Control Facilities	$58,542	$22,050	$24,256				$19,514	$7,350	$8,085	WQ
DEM	Non-Government Grant & Revolving Loans	$19,000	$11,415	$19,585				$19,000	$11,415	$19,585	WQ
DEM	State Nonpoint Source Bond	$51,135	$35,475	$1,753				$34,090	$23,650	$1,169	WQ
DEM	Wastewater Treatment Grant - Cranston	$315,000	$1,979,569	$0				$35,000	$219,952	$0	WQ
DEM	Wastewater Treatment Grant - Warwick	$0	$0	$32,511				$0	$0	$3,612	WQ
DEM	Planning and Program Development	$2,627	$12,401	$0				$292	$1,378	$0	WQ
DEM	Pilot & Prototypical Projects	$0	$0	$1,807				$0	$0	$201	WQ
DEM	Wastewater Treatment Grants	$0	$62,500	$0				$0	$6,944	$0	WQ
DEM	Urban Runoff Abatement	$32,669	$0	$6,000				$3,630	$0	$667	WQ
DEM	Narragansett Bay and Watershed Restoration	$0	$0	$514,339				$0	$0	$514,339	WQ
DEM	Local Land Acquisition Grants	$0	$4,011,766	$5,712,474							PA
DEM	Local Bikeways & Recreational Greenways	$2,500,000	$2,500,000	$0							PA
DEM	Bay Islands Park System	$0	$0	$0			$250,000				PA
DEM	Fort Adams Restoration	$350,000	$50,000	$1,146,550							PA

DEM	State Bike Paths	$0	$5,000,000	$0							PA
DEM	Fish & Wildlife Infrastructure Improvements	$70,000	$150,000	$350,000							PA
DEM	Galilee Piers	$1,321,848	$74,089	$75,000							ED
DEM	Newport Piers	$180,000	$0	$0							ED
DEM	Jamestown Fishing Pier	$7,368	$65,181	$0							PA
DEM	Wickford Marine Facilities	$1,690	$6,200	$1,448,310			$400,000				WQ, PA
DEM	Great Swamp Management Area	$0	$0	$0							PA
DEM	Boyd's Marsh Habitat Restoration	$24,400	$0	$0			$1,977,160				WQ
DEM	Ten Mile River Habitat Restoration	$0	$0	$100,000			$380,000				WQ
DEM	Narragansett Bay Window Phase II	$0	$0	$141,945							WQ
DEM	Marine Debris Removal	$0	$0	$150,083							WQ
DEM	Pollution + Fishery Studies - Narr Bay	$87,503	$121,538	$240,000							WQ
DEM	Marina Pumpouts				$62,213	$0	$100,000				WQ
DOT	Field's Point Dock			$30,000			$120,000				PA
DOT	Ferry Facility Improvements			$140,000			$560,000				ED
DOT	King St. Improvements			$190,000			$750,000				PA
DOT	Jamestown-Verrazzano Bridge - Phase III Impr.	$443,318	$793,340	$85,853	$1,773,267	$3,173,357	$367,710				ED
DOT	Smith Castle		$14,000			$56,000					PA
DOT	Stormdrain Retrofit	$17,279	$176,120	$156,000	$69,116	$704,475	$624,000				WQ
DOT	Warren Bridge		$205,379	$1,212,248		$823,104	$4,854,885				ED
DOT	Jamestown Bridge Demolition - Bicycle Access/Trestle Span Demolition/Fishing Pier					$12,186,553	$11,354,039				PA
DOT	Replace I-195 Washington Bridge Eastbound				$2,239,697	$4,773,722	$14,975,580				ED
DOT	Dutch Island Lighthouse			$2,000			$8,000				ED/PA
DOT	East Bay Bikepath Warren Extension			$50,000			$200,000				PA
EDC	Newport Hospital wireless broadband base		60,000			60,000					ED
NBC	Total Capital Improvements **	n/a	n/a	n/a	$2,041,693	$1,165,958	$0	$80,597,578	$78,755,410	$57,610,000	WQ
NBC	Environmental Monitoring - capital outlays **	n/a	n/a	n/a	n/a	n/a	n/a	$76,473	$195,673	$154,653	WQ

Quonset Devt Corp	Demolition & Site Preparation	$1,059,057	$2,152,752	$3,601,277							ED/PA
Quonset Devt Corp	Rail		$174,007	$1,870,000							ED
Quonset Devt Corp	Roads & Utilities		$2,240,805	$3,650,000							ED/PA
Quonset Devt Corp	Waterfront		$1,113,150	$415,000							ED/PA/WC
RICWFA	Clean Water Projects	1,777,740	3,441,720	$3,167,860	$8,888,700	$7,208,600					WQ
RICWFA	Drinking Water Projects	1,600,820		$4,963,580	$5,522,829		$7,636,420				WQ
RIPTA	RIPTA Ferry (Prov.-Npt.)	240,000			960,000						ED
WRB	Stream Gages, Hydrologic Studies, Models and Data	$125,700	$406,031	$771,468	$1,152,064	$749,724	$686,122	n/a	n/a	n/a	WQ
WRB	BCWA Capital Improvements	$61,400	$152,162	$102,888							WQ
WRB	Statewide Emergency Interconnections	$185,482	$178,021	$664,609	n/a	n/a	n/a	$0	$851,197	$740,425	WQ
WRB	Big River Land Management/Protection	$92,546	$84,320	$127,435	n/a	n/a	n/a	n/a	n/a	n/a	WQ
WRB	WRBC Drinking Water Protection - Water Quality Improvements	$412,242	$1,224,688	$1,430,120	n/a	n/a	n/a	n/a	n/a	n/a	WQ
WRB	WRBC Drinking Water Protection - Watershed Protection	$812,629	$1,004,853	$670,600	n/a	n/a	n/a	n/a	n/a	n/a	WQ

*WQ = water quality/quantity, PA = public access/recreation, ED= economic development

**Please note that NBC capital expenditures listed under Municipal Investment are not funded with state monies. These capital expenditures are funded through sewer use fees paid by residents and businesses from the communities of Providence, North Providence, Johnston, Pawtucket, Central Falls, Cumberland, Lincoln, the northern portion of East Providence and small sections of Cranston and Smithfield.

Source: Compilation of agency expenditures by CT Ad Hoc Group.

APPENDIX H: Identifying Potential Inconsistencies in Land and Water Use

The Economic Monitoring Collaborative would like to develop a methodology with which to assess any conflicts and inconsistencies that may exist between coastal land use and adjacent water 'zoning' systems. As many of these datasets exist in Geographic Information Systems (GIS) – compatible format, GIS software is being used to perform these analyses.

The Data

The Collaborative could use three different datasets to perform these analyses:

1. An aggregate of town parcel data for several coastal towns, prepared for the Collaborative by Providence Plan. This dataset contains a "tax code" field that indicates the current use of the parcel (i.e. residential, commercial, institutional). This dataset is based on town tax assessor data from 2004-2005 (see Figure H1).

2. A RIGIS dataset illustrating the RI Coastal Resources Management Council's (CRMC) "Water Use Classification" system for all state marine waters (the Bay, the south coast, and the Block Island coast). This dataset was released in February 2007 and reflects changes recently made to this classification system (see Figure H2).

3. A RIGIS dataset illustrating the RI Department of Environmental Management's (DEM) "Water Quality Standards" system for all state marine waters (same as above). This dataset was released in February 2007 and reflects changes recently made to these standards (see Figure H3).

The town parcel data, based on town tax assessor data, is being used as a surrogate for town land use. This data is not yet available for all coastal towns. The parcel data used for this analysis represents Providence Plan's best efforts to acquire this data for all towns. If this dataset is to be used for this purpose moving forward, a number of issues will need to be resolved. For instance, how will we ensure that the dataset retains historical information on assessment so we can track it over time? How do we plan to codify parcels that are town or state owned so that we can better track the land uses that take place on them? Figure H4 illustrates the latter challenge, where Quonset Business Park is classified as government land rather than industrial. These are just a few of the questions that need to be addressed as we move forward.

The CRMC Water Use Classifications, described in Section 200 et seq. of the Rhode Island "Coastal Resources Management Program" ("the Red Book") were developed by the Coastal Resources Management Council in 1983 based on current uses of the adjacent lands. In a sense, the use classification system adopted 1983 coastal land uses as the standard for future coastal development. There are six water use classifications as follows:

Type I	Conservation Areas
Type II	Low-Intensity Use
Type III	High-Intensity Boating
Type IV	Multipurpose Waters
Type V	Commercial and Recreational Harbors
Type VI	Industrial Waterfronts/Commercial Navigation Channels

As described in the "Red Book," these classifications are not entirely prescriptive but, rather, are meant to guide future development in these areas. For example, a number of uses, such as the construction of recreational boating facilities, are prohibited in Type I Waters; by contrast, marinas, boatyards, and similar recreational boating facilities are simply recommended as "the highest priority uses" of Type III Waters. Nonetheless, these use classifications directly address issues of adjacent land use and so it is logical to look for inconsistencies between the two. Figure H5 displays areas of potential inconsistency, in this case areas in North Kingstown where commercial or government land are located adjacent to waters designated "Type I" (conservation areas) by the CRMC.

The DEM Water Quality Standards, described in DEM's "Water Quality Regulations" (updated July 2006), were developed in response to the Clean Water Act (1972). Unlike CRMC Water Use Classifications, DEM Water Quality Standards are performance-based, or aspirational in nature – they represent not what the water quality in a given area *is*, but rather what it *should be*. This "ideal" water quality is described in terms of the Clean Water Act's "fishable/swimmable" goal, as the types of activities that should be able to take place in a given area. Following are the water quality standards for marine waters as well as excerpts of the descriptions provided by the DEM:

- Class SA - These waters are designated for shellfish harvesting for direct human consumption, primary and secondary contact recreational activities, and fish and wildlife habitat;
- Class SB - These waters are designated for primary and secondary contact recreational activities; shellfish harvesting for controlled relay and depuration; and fish and wildlife habitat;
- Class SB1 - These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat;
- Class SC - These waters are designated for secondary contact recreational activities, and fish and wildlife habitat;*
  **no RI waters are currently designated as SC waters.*

The water quality standards are further complicated by "partial use designations" which reflect additional use restrictions that may be placed on certain areas. Partial use designation {a} indicates the presence of CSOs, and designation {b} indicates a "concentration of vessels," usually in the vicinity of a marina or mooring field.

The DEM dataset also includes data on "impaired waters" – waters that do not, at present, meet the designated water quality standards. "Impaired waters" are those for which Total Maximum Daily Loads (TMDLs) must be developed.

As described in DEM regulations, the Water Quality Standards do not explicitly address adjacent land use; they do not prescribe or even encourage certain types of uses adjacent to certain types of waters. Rather, they limit discharges into surface waters that may be caused by sewer systems or other such facilities. Persons developing coastal lands must apply for one or more discharge-related permits (i.e. a Water Quality Certificate or a Rhode Island Pollutant Discharge Elimination System permit).

Further, it is important to note that DEM seeks to attain these standards by managing both point sources of pollution, such as wastewater treatment facilities, which directly correlate with adjacent land use and non-point sources of pollution,

such as runoff, which is a much less straightforward problem that may not directly correlate with coastal land use. For these reasons it is not entirely clear when and how the DEM Water Quality Standards may directly conflict with adjacent land use or with the CRMC Water Use Classifications.

In this regard it is recommended that the relationships between (a) the DEM Water Quality Standards and adjacent land use, and (b) the DEM Water Quality Standards and the CRMC Water Use Classifications *not* be described as "conflict". Instead it is recommended that the "conflicts" between these two datasets be described as "potential inconsistencies" or something similar that acknowledges the important differences between the Water Quality Standards and the Water Use Classifications.

The Analysis

The Economic Monitoring Collaborative sought to answer three questions utilizing the above data:

(1) What conflicts or inconsistencies, if any, exist between land use and the CRMC Water Use Classification system?

(2) What conflicts or inconsistencies, if any, exist between land use and the DEM Water Quality Standards?

(3) What conflicts or inconsistencies, if any, exist between the CRMC Water Use Classification system and the DEM Water Quality Standards?

For questions (1) and (2), a GIS analysis of the ***adjacency*** of features can be used to identify any such conflicts or inconsistencies. Such an analysis must focus on just one or two potential inconsistencies and will result in a selection of features (in this case, parcels of land) that meet a given criteria. It is recommended that the following queries are performed for this analysis:

For question (1):

- What *industrial* parcels are adjacent to waters designated Type I (conservation areas)?
- What *residential* or *mixed-use* parcels are adjacent to waters designated Type V (commercial/recreational harbors) or VI (industrial waterfronts/commercial navigation channels)?

The result of this query will be a number of parcels, as well as a map displaying the parcels that represent this potential inconsistency.

For question (2):

- What *industrial* parcels are adjacent to waters designated SA (shellfish harvesting for direct human consumption)?
- What *industrial* parcels are adjacent to waters designated as "impaired"?

The result of this query will be a number of parcels, as well as a map displaying the parcels that represent this potential inconsistency.

For question (3), a GIS "**UNION**" analysis may help identify points of inconsistency. UNION enables the user to calculate the geometric intersection of features, and so can be used to identify overlapping areas of different classification designations and water quality standards.

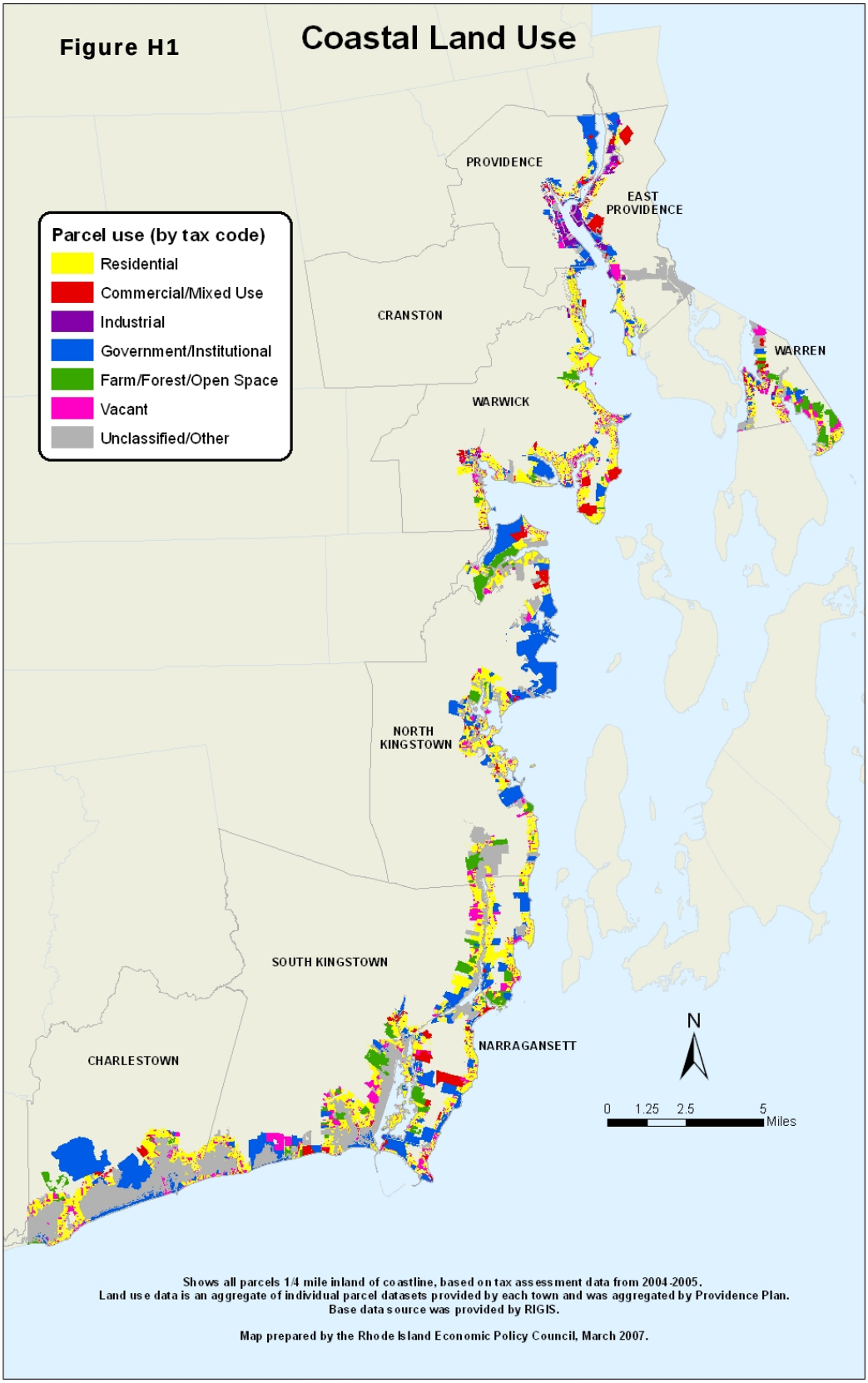
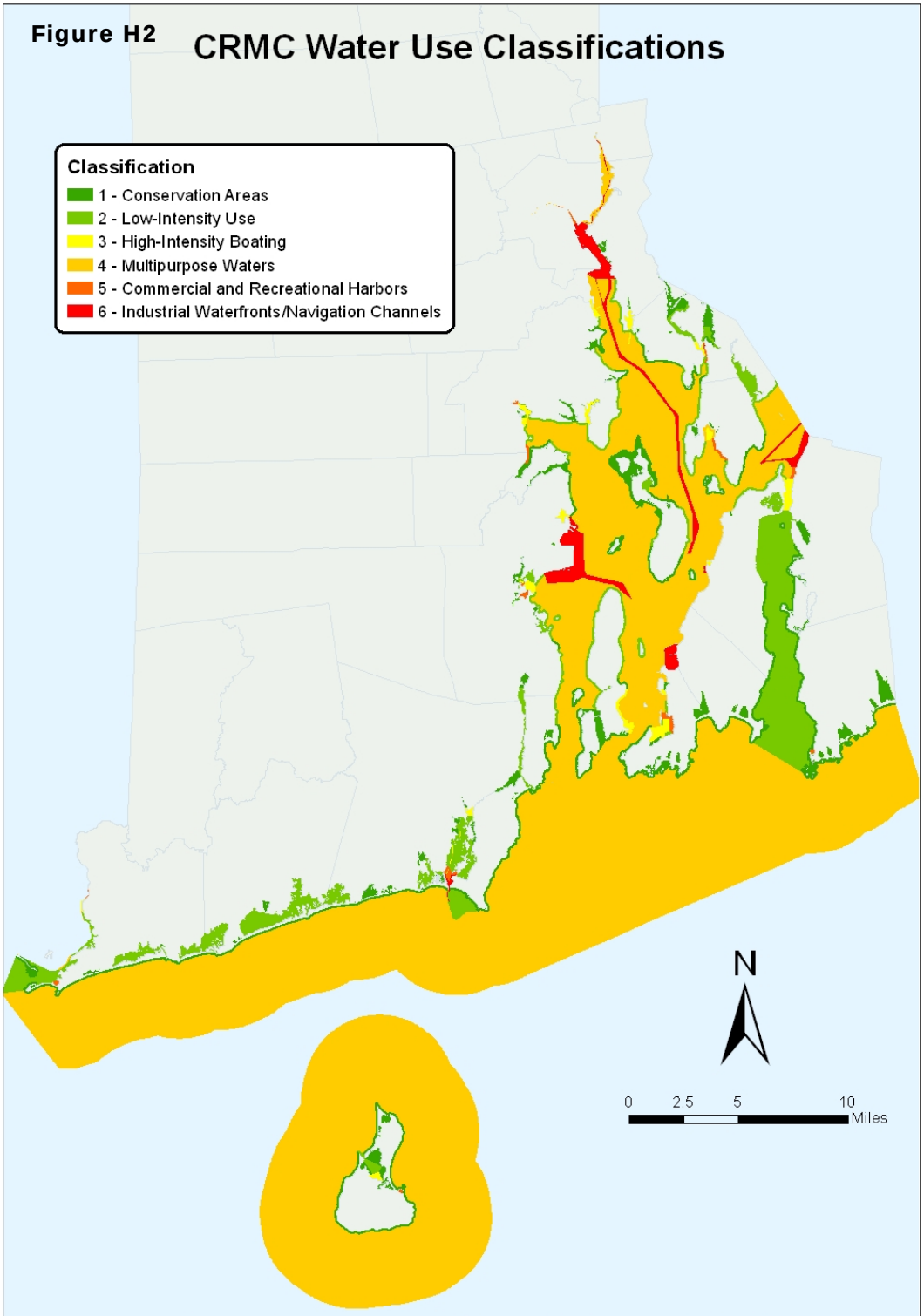


Figure H1
Coastal Land Use
Parcel use (by tax code)
Residential
Commercial/Mixed Use
Industrial
Government/Institutional
Farm/Forest/Open Space
Vacant
Unclassified/Other
PROVIDENCE
EAST PROVIDENCE
CRANSTON
WARREN
WARWICK
NORTH KINGSTOWN
SOUTH KINGSTOWN
NARRAGANSETT
CHARLESTOWN
N
0 1.25 2.5 5 Miles
Shows all parcels 1/4 mile inland of coastline, based on tax assessment data from 2004-2005.
Land use data is an aggregate of individual parcel datasets provided by each town and was aggregated by Providence Plan.
Base data source was provided by RIGIS.
Map prepared by the Rhode Island Economic Policy Council, March 2007.

Figure H2

CRMC Water Use Classifications

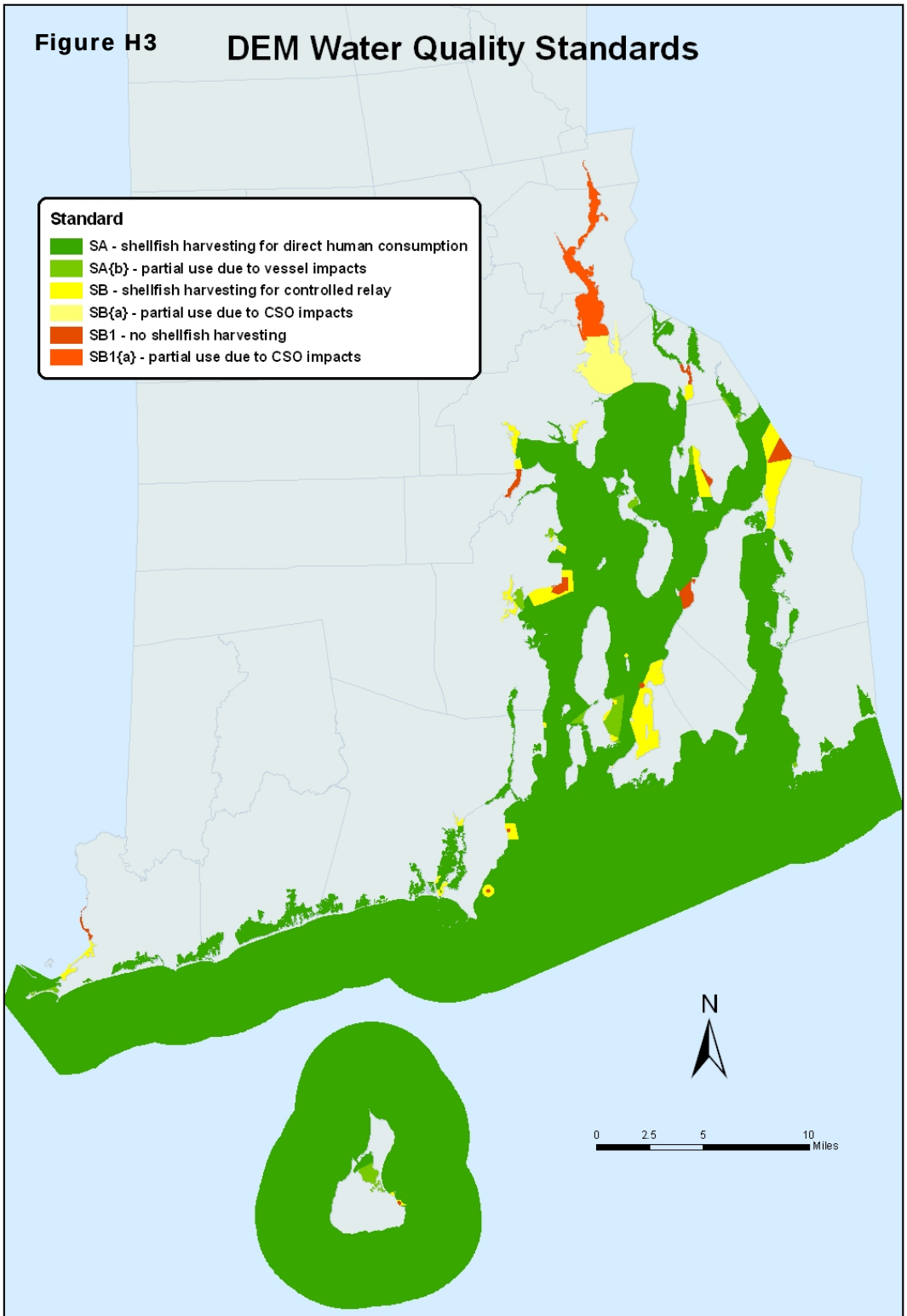


Based on updated dataset issued February 2007 from RIDEM. Base data provided by RIGIS.
For further explanation of the Water Use Classification system,
see the RI Coastal Resources Management Program, as amended ("the Red Book").

Map prepared by Rhode Island Economic Policy Council, March 2007.

Figure H3

DEM Water Quality Standards



Based on updated data issued February 2007 by the RIDEM. Base data provided by RIGIS.
For further explanation of the DEM's Water Quality Standards,
see the DEM's "Water Quality Regulations" (updated July 2006).

Map prepared by the Rhode Island Economic Policy Council, March 2007.

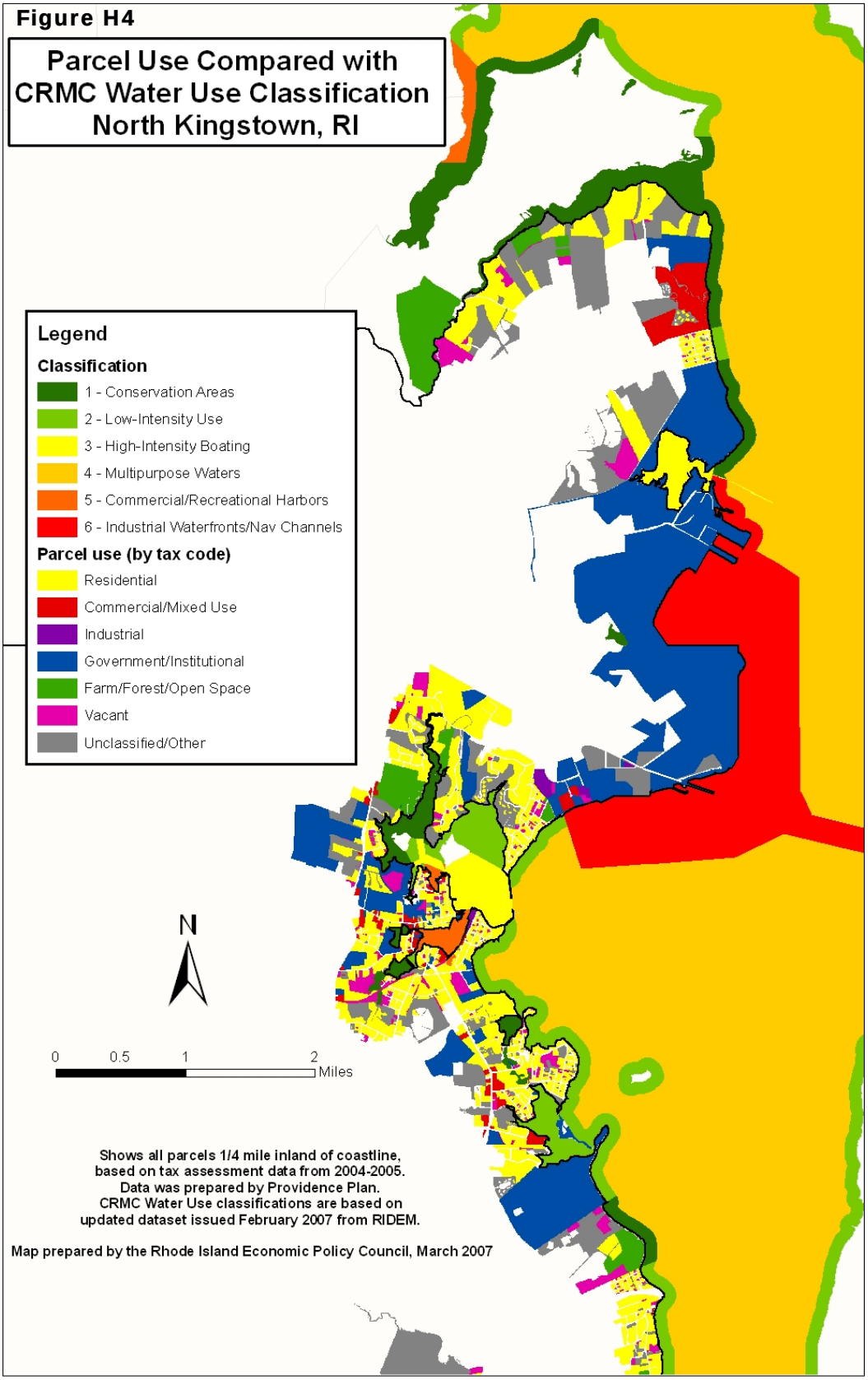


Figure H4
Parcel Use Compared with CRMC Water Use Classification North Kingstown, RI
Legend
Classification
1 - Conservation Areas
2 - Low-Intensity Use
3 - High-Intensity Boating
4 - Multipurpose Waters
5 - Commercial/Recreational Harbors
6 - Industrial Waterfronts/Nav Channels
Parcel use (by tax code)
Residential
Commercial/Mixed Use
Industrial
Government/Institutional
Farm/Forest/Open Space
Vacant
Unclassified/Other
N
0
0.5
1
2
Miles
Shows all parcels 1/4 mile inland of coastline, based on tax assessment data from 2004-2005. Data was prepared by Providence Plan. CRMC Water Use classifications are based on updated dataset issued February 2007 from RIDEM.
Map prepared by the Rhode Island Economic Policy Council, March 2007

Figure H5

An Analysis of Potential Inconsistencies Between Parcel Use and Adjacent CRMC Water Use Classification in North Kingstown, RI