State of Rhode Island and Providence Plantations

COASTAL RESOURCES MANAGEMENT COUNCIL
Oliver Stedman Government Center
4808 Tower Hill Road
Wakefield, RI 02879
(401) 783-3370

Michael M. Tikoian
Chairman

Grover J. Fugate
Executive Director

November 10, 2010

Mr. J. Michael Saul
Deputy Director
The Rhode Island Economic Development Corporation
315 Iron Horse Way
Providence, RI 02908

Dear Director Saul:

On behalf of the Rhode Island Coastal Resources Management Council's Ocean SAMP subcommittee, I respectfully submit the eight period (April 1st to June 30th) narrative and financial Ocean SAMP progress.

The Ocean SAMP has made significant progress in the areas of research and public engagement. We have continued to work effectively and efficiently with the assigned budget, and our strong team continues to carry out SAMP activities.

Thank you for reviewing the attached progress report. My contact information is listed on the cover page of the document.

Sincerely,

Grover J Fugate

Grover Fugate
Executive Director, Rhode Island Coastal Resources Management Council
On behalf of the CRMC Ocean SAMP Subcommittee

RHODE ISLAND RENEWABLE ENERGY DEVELOPMENT FUND SPECIAL AREA MANAGEMENT PLAN

Eighth Period Narrative and Financial Report (April 1, 2010 to June 30, 2010)

Submitted to:

The Rhode Island Economic Development Corporation (RIEDC), 315 Iron Horse Way, Suite 01, Providence, RI 02908, Attn: J. Michael Saul

Narrative and Financial Report:

Eighth period April 1, 2010 to June 30, 2010. Narrative and Financial Report for the Rhode Island Renewable Energy Development Fund/Ocean Special Area Management Plan

Submitted by:

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Senior Advisors:

Dennis Nixon, URI Graduate School of Oceanography (GSO)
Malcolm Spaulding, URI Department of Ocean Engineering

Institutional Representative:

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Ocean SAMP Eighth Period Narrative & Financial Report (Apr. 1 to June 30, 2010)

The Rhode Island Coastal Resources Management Council's Ocean Special Area Management Plan (Ocean SAMP) continued to make significant progress during this time period. The following is a summary of progress during this time period, based on the Goals specified in the work plan:

Goal 1: Assemble background information on the project boundary's natural features, human activities and policy and procedures to assist in the understanding of this Ocean SAMP region.

During this time period, all researchers submitted draft technical reports, which will become Ocean SAMP appendices. For descriptions of the individual research activities, please see the attached document (Kingsley report/Attachment 1) or go to the Ocean SAMP web site at http://seagrant.gso.uri.edu/oceansamp/ to review all technical reports. Aside from the peer review process, which will be completed this fall, all research funded by EDC is completed.

Goal 2: Identify best practices and strategies for overcoming obstacles in planning, policy, and implementation of marine renewable energy that can be transferred to the Ocean SAMP initiative based on a comparative assessment of lessons learned from other initiatives in the United States and worldwide. Evaluate what works and what does not work in the Ocean SAMP initiative so that this model effort can be used as a case study for future efforts.

During this time period, the Ocean SAMP outreach team, with leadership from our European colleagues, completed the review and summary of the current global state of knowledge about the effects of offshore wind farms on fish and fisheries of different gear types and marine mammals. The purpose of the task was to incorporate what Europe has learned concerning the effects of offshore wind farms on fish and fisheries and marine mammals for different gear types. This document is on line. Contents were incorporated into the Renewable Energy and Other Offshore Develop Ocean SAMP chapter.

Goal 3. Engage a well informed and well represented constituency that understands the Ocean SAMP issues and is involved in the creation of the Ocean SAMP.

During this time period, the Ocean SAMP outreach team carried out the following approved activities:

<u>Engaging stakeholders in the chapter development and review processes</u>: During the reporting period, we continued to meet with stakeholders and interest groups to collect input regarding stakeholders' experiential and technical information for several draft chapters (Climate Change/Future Uses/Renewable Energy/Cultural and Historical Resources). We also conducted three formal monthly stakeholder meetings on these topics during the reporting period. A meeting was also held in June to review the Draft Stakeholder Meeting report by committee

moderator Ken Payne. The document is available at http://seagrant.gso.uri.edu/oceansamp/pdf/stakeholder/sh_stakeholder_report.pdf. We ensured that for each stakeholder meeting, stakeholders and the public had access to the draft chapters and were provided opportunities for submitting written comments about the draft material. Summary notes for all meetings are on line at the Ocean SAMP web site.

Goal 4: Develop a SAMP for Rhode Island's Coastal waters that serves as a tool to encourage regulatory and management coordination and consistency among Rhode Island state agencies (CRMC, OER, DEM), federal agencies (U.S. Department of Energy, ACOE, MMS, and the U.S. Federal Energy Regulatory Commission), neighboring states (MA, CT, NY) and other public entities, developers, and environmentalists within this project area.

Integrate research results into SAMP policy and management decisions: The purpose of the task is to integrate new research results into Ocean SAMP policies and procedures, including the siting of offshore renewable energy.

The project team moved forward on: 1) Engaging researchers and resource users in collaborative dialogues (working sessions) to discuss research results and how they should influence policy and future management decisions, especially concerning the siting of offshore renewable energy; and 2) Developing and/or revising Ocean SAMP policies and/or regulatory standards based on research findings and recommendations. The results will be reflected in a suite of deliverables which includes:1) A series of working sessions with researchers, resource users, and policy makers; 2) Final policies and/or regulatory standards based on research findings and recommendations; and 3) an Interim report due on June 1, 2010.

Ocean SAMP team completed the information public review step (Step 3) and then proceeded to Step 4. The CRMC Ocean SAMP subcommittee reviewed and approved the following chapters to proceed to the 30 day public comment period: Ecology; Global Climate Change; Cultural and Historic; Fisheries Resources and Uses; Other Future Uses; and Existing Statutes, Policies and Regulations.

OCEAN SAMP RI EDC FINANCIAL/PROGRESS REPORT AS OF JUNE 2010

OCEAN SAMP PROJECT FINANCIAL/PROGRESS REPORT-RHODE ISLAND ECONOMIC DEVELOPMENT CORPORATION

	June 30, 2010	SCHEDULE			FUNDING INVOICING REQUESTS				PROGRESS			BUDGET			
Activity #	OCEAN SAMP PROJECT ACTIVITY/STUDY	Budget	*Funding Source	Expected End Date	Prior SAMP Invoices to EDC/DOE	Current Invoice to EDC/*DOE	**Outstanding Encumbrances	Total Invoices	Prior Progress	Current Progress	Total Progress	Budget Completion	Projected Completion	Budget/Project Variance	Comments
	RIEDC-Ocean SAMP FUNDING														
1-S052	Policy & Outreach-McCann	$ 1,436,816	YI, YII, 2.8M	7/31/10	$ 1,212,455.53	$ 69,175.64	$ -	$ 1,281,631.17	85%	5%	90%	89%	90%	1%	
2-S053	Project Management & Coordination-DeBow	$ 132,043	YI, YII, 2.8M	7/31/10	$ 84,849.22	$ 15,498.68	$ -	$ 100,347.90	86%	4%	90%	76%	90%	14%	
3-S054	Technological Assessment-Hu	$ 67,307	YI, YII	2/1/10	$ 67,182.13	$ 122.64	$ -	$ 67,304.77	98%	2%	100%	100%	100%	0%	
4-S055	Temperature & Salinity Review/Moored Vessel Survey-Codiga	$ 327,300	YI, YII, 2.8M	7/31/10	$ 301,185.80	$ (1,152.55)	$ -	$ 300,033.25	88%	7%	95%	92%	95%	3%	*Bouy purchased and deployed.*
5-S056	Site Screening Mapping Study/GIS Training & Support-Damon	$ 293,589	YI, YII, 2.8M	7/31/10	$ 229,082.93	$ 17,350.45	$ -	$ 246,433.38	92%	3%	95%	84%	95%	11%	
6-S057	Marine Mammal Analysis-Kenney	$ 21,317	YI	10/31/09	$ 19,867.76	$ -	$ -	$ 19,867.76	100%	0%	100%	93%	100%	7%	
7-S058	Geophysical, Geological, Biological & Transporation Analysis-King	$ 915,830	YI, YII, 2.8M	7/31/10	$ 830,047.93	$ 75,078.51	$ -	$ 905,126.44	87%	0%	87%	99%	87%	-12%	*Equipment purchase.*
8-S059	Wind, Storm Occurrence & Precipitation Analysis-Merrill	$ 6,769	YI	12/31/09	$ 6,150.37	$ -	$ -	$ 6,150.37	94%	1%	95%	91%	95%	4%	
9-S060	Acoustic Noise & Electromagnetic Effects-Miller	$ 231,250	YI, YII, 2.8M	7/31/10	$ 182,080.80	$ 29,135.46	$ -	$ 211,216.26	91%	0%	91%	91%	91%	0%	
10-S061	Avian Study-Paton	$ 1,049,748	YI, YII, 2.8M	7/31/10	$ 781,795.60	$ 47,841.99	$ -	$ 829,637.59	92%	3%	95%	79%	95%	16%	
11-S062	Wind, Wave and Storm Surge Analysis-Spaulding	$ 831,397	YI, YII, 2.8M	7/31/10	$ 475,482.92	$ 219,940.50	$ -	$ 695,423.42	84%	11%	95%	84%	95%	11%	
12-S063	Ecosystems-Nixon	$ 341,632	YI, YII, 2.8M	7/31/10	$ 258,893.12	$ 37,579.16	$ -	$ 296,472.28	96%	4%	100%	87%	100%	13%	
13-S092	Meteorological, Hydrodynamic, & Wave Modeling-Grilli, S.	$ 345,000	2.8M	7/31/10	$ 194,079.40	$ 70,842.69	$ -	$ 264,922.09	80%	15%	95%	77%	95%	18%	
	*DOE-APPROPRIATION FUNDING					$ -	$ -								
14-S083	Fisheries/Mammal/Marine Recreation Impact Studies	$ 248,558	DOE	1/31/11	$ 57,122.72	$ 41,412.91	$ 18,310	$ 98,535.63	63%	3%	66%	40%	66%	26%	
15-S084	Mapping & Characterizing Fish Habitat	$ 120,000	DOE	1/31/11	$ 74,803.69	$ 9,346.28	$ -	$ 84,149.97	80%	0%	80%	70%	80%	10%	
16-S085	Spatial Distribution, Abundance & Movement Ecology of Birds	$ 100,000	DOE	1/31/11	$ 54,684.59	$ 25,166.62	$ 19,667	$ 79,851.21	92%	3%	95%	80%	95%	15%	
17-S086	Ecological Services Index (ESI) Mapping-GrilII, A.	$ 165,522	DOE	1/31/11	$ 93,212.04	$ 4,572.63	$ -	$ 97,784.67	65%	15%	80%	59%	80%	21%	
	TOTAL PROJECT FUNDING	$ 6,634,078			$ 4,922,977	$ 661,912	$ 37,976	$ 5,584,888							

FUNDING SOURCE	Amount
Year I-Ocean SAMP Funding:	$ 1,599,999
Year II- Ocean SAMP Funding	$ 1,600,001
2.8M-Additional Studies Funding	$ 2,800,000
DOE - Reed Appropriation for SAMP	$ 634,080
TOTAL	$ 6,634,080

Previously Billed	RIEDC 30-Jun	*Encumbrances*	INVOICES *Total to Date*	EDC *Payments*		EDC *Balance*
			$ -			
$ 4,643,154	$ 581,413	$ -	$ 5,224,567	$ 4,274,515.15		$ 950,051.53
			$ -			
$ 4,643,154	$ 581,413	$ -	$ 5,224,567	$ 4,274,515.15		$ 950,051.53

*DOE-APPROPRIATION FUNDING:
2/19/2010-DOE Award has been released to CRMC. DOE Accts: 14-S083-86
Outstanding ENCUMBRANCES:
Are identified project expenses with specific purposes (i.e. Subcontracts) & have not been invoiced for payment by vendor and therefore amounts are not reflected in account expenditures.

Previously Exp.	**DOE 30-Jun		Total to Date		
$ 279,823	$ 80,498	$ 37,976	$ 360,321.48		
$ 4,922,977	$ 661,912	$ 37,976	$ 5,584,888	$ 5,622,864	TOTAL PROJECT ACTIVITY

ATTACHMENT 1:
NARRATIVE REPORT 4/1/2010 TO 6/30/2010

Milestone 2

Note: Additional resources have been received to expand the scope of some research efforts. Status of Individual Research Efforts is based on revised estimates for completion:

1: Engineering Studies in support of the Ocean SAMP

Principal Investigator: Malcolm L. Spaulding, URI Graduate School of Oceanography, Ocean Engineering

Revised Overall completion estimate: 95%

A. Wave, and storm surge characterization for RI coastal waters

1. Wind analyses completed using observations and WeatherFlow meteorological model predictions. Three papers prepared and submitted, including extensive appendices. Papers include: (1) hindcast of winds south of Block Island using the WeatherFlow model results from Oct 2009 to Feb 2010, (2) estimates of wind resources south of Block Island using a template based scaling method, and (3) a summary of wind resource assessment for the entire SAMP study area. A paper was prepared using a Weibull based strategy to analyze wind data for the SAMP study area. This paper was withdrawn since Cape Wind refused to allow release of their data for Nantucket Sound..
2. Wave and Surge Analysis - Final report completed and delivered.
3. Sight Analysis - TDI and PCCA paper published in January/February 2010 issue of Marine Technology Society Journal, Special Issue on Marine Technology for Offshore Wind Power. Summary of high resolution analysis prepared for SAMP renewable energy chapter.

B. Buoy Measurement Program

1. Buoys sensors continue in operation with data being served to SAMP investigators via Univ Maine and NERACOOS web sites. Buoys will continue in operation until September 2010 under existing funding.

C. High Resolution Screening for Block Island Waters

1. High resolution TDI and screening analysis complete for area south of Block Island. Final report prepared. Results included in SAMP Renewable Energy chapter..

2: RI Wind Farm Structures/Foundations Study – Support Structures and Foundations for Offshore Wind Turbines

Principal Investigator(s) & Staff: Sau-Lon James Hu

Overall completion estimate: 100%

1. Completed analysis of lattice (jacket) structures
2. Completed analysis on parameters: water depth, depth to bedrock
3. Completed technology type factor based on weight of structure
4. Draft report submitted June, 2010

3: RI Wind Farm Siting Study- Acoustic Noise and Electromagnetic Effects

Principal Investigator: James H. Miller, URI Graduate School of Oceanography , Ocean Engineering

Overall completion estimate: 85%

1. Data analysis of acoustic data in progress. Underwater noise analysis complete. Air acoustic data collection complete and analysis complete. Documentation in draft form.
2. Noise prediction model completed and initial results complete. Documentation in draft form.
3. Noise criteria selected based on NMFS regulations..
4. EM data collection complete in air and water sensors being tested.
5. In air measurements complete at Jamestown underwater cable landing, in water measurements to be completed.
6. EM effects on fish and other animals researched, in discussions with Andrew Gill on criteria. Documentation in progress

5: Added Engineering Studies in support of the Ocean SAMP

Principal Investigator: Stephan Grilli, URI Graduate School of Oceanography, Ocean Engineering

Overall completion estimate: 95%

1. Wind modeling and mapping S-SW and SE of Block Island
2. RAM has been used to simulate a continuous 5 month time series, which was used to force both ROMS and SWAM simuations in the SAMP area.

3. Regional wave and current modeling and mapping
    i. The ROMS/SWAN model suite was run for a continuous 5 month time series over the SAMP area, for which hindcast wind (using RAMS) are available as well as WAVEWATCH III wave simulations at the outer boundary. Modeling results were (and are still being) compared with field data measured at 3-5 buoys in the area (ie, waves, current,...)

4. Map bathymetry and surficial sediments
    i. Bathymetric base maps were identified and implemented for setting-up the two hydrodynamic models (ROMS and SWAN) in the SAMP area. Data was identified, acquired and mapped for surficial sediment types and median grain equivalent diameter..

5. Apply WRF, ROMS and SWAN models
    i. RAMS simulations are complete and the report is finished on this part. Hidcast winds with RAMS were used to force ROMS and SWAN in coupled mode.

6. Investigate vertical 2D structure of wind over BI
    1. The analysis of 2D-WRF results is finished and the report has been completed on this part.

6: New Effort: Ecological Service Value Index ESVI for RI Ocean SAMP

Principal Investigator: Annette Grilli, URI Graduate School of Oceanography, Ocean Engineering

Overall completion estimate: 80%

A. Develop comprehensive maps of seasonal relative density, or use, for each ecological service.

    1. Mapping of ecological services: mammals, fishes, fisheries as well as geophysical variables.

B. Model relative ecological service values (ESV) for individual natural resource uses

    1. Model development. Component principal and Cluster analysis model operational.

C. Combine individual indices for each ecological service using relative weighing schemes, to develop an overall index (the ESVI)

    1. Exaustive bibliography and theoretical aspect completed. Mapping completed using the principal component/cluster method.

D. Habitat mapping

    1. Benthic habitat ; mammals distribution; fish distribution

E. Apply wildlife movement (migration and behavior) model, WildMap

    1. Preliminary Wildmap simulations under development

F. Develop human use maps of relative value

    1. Ecological regions using PC/Cluster analysis

7: Characterizing Physical Oceanography of the Rhode Island Coastal Ocean
Principal Investigator: Dan Codiga, URI Graduate School of Oceanography

Revised Overall completion estimate: 95%

1. Data for GIS layers of all relevant plots from the Part 1 report has been sent to Chris Damon. Metadata remains to be prepared.
2. Part 1 report is completed; input from the external reviewers is in hand and will require minor modifications; completing the revision remains.
3. Both Fall and Spring field deployments/recoveries complete. Analysis and interpretation substantially complete, included in early draft Part 2 report.
4. Calculations with CODAR / model output are 100% / 80% complete
5. All 4 surveys complete. Analysis/interpretation for Part 2 report substantially complete, included in early draft Part 2 report.
6. "Early draft" Part 2 report completed. Analysis/interpretation and writing for some sections remain to be completed.

8: Geospatial Data/Mapping Support for the RI Ocean SAMP
Principal Investigator: Christopher Damon, URI Natural Resource Science

Overall completion estimate: 95%

Consolidate geospatial data and metadata to support the analytical, visualization, outreach, and communication needs of the wind farm assessment process.

1. Much data has been assembled and mapped in support of the OceanSAMP chapter releases. A significant amount of data is still needed from the individual researchers for addition to the centralized SAMP database.

Assist in the development and implementation of a Phase 2 site screening process for RI coastal waters

1. Criteria for a Phase 2/Environmental Valuation Index study are still being established, along with protocols for habitat weighting. ASA is addressing the valuation modeling, while the EDC is acting as the liaison between ASA and the SAMP database.

Develop a common graphic template for mapping products emerging from the site screening process and assist in the production of cartographic products to support project analysis and communication requirements

1. Basic templates complete for both 8.5 X 11 and 11x17 maps. May be revised as project proceeds. Templates are redesigned as needed, such as with the high-resolution TDI evaluation that focused specifically on the area south of Block Island.

Collect and assemble relevant and available geospatial data (raster, vector, image, photographic, tabular) to support the site screening process for wind farm assessment.

1. Make data handling recommendations to researchers as they process information from their studies. Examples of this work include: coordinating with the physical oceanography group to develop a conversion/visualization strategy for their data. These data were developed using Matlab software and require a significant amount of processing prior to inclusion in the SAMP database.

Work with scientists developing screening criteria

1. This work is ongoing as project proceeds. The EDC has worked closely with PIs to generate useful interpretations of fisheries VTR and VMS data; to develop a benthic surface roughness dataset; and to test the validity of predictive modeling of surficial sediments.

Prepare cartographic products in hard-copy and digital form to support the screening process, outreach activities, development of educational materials, and project reporting

1. Documents are provided as requested to satisfy PI needs. Products have been developed for the high-resolution TDI assessment, stakeholder presentations, and SAMP fisheries, ecology and renewable energy chapters. In addition, ad hoc maps have peen supplied in support of the high-resolution mapping of the waters south of Block Island.

A web site within WWW.NARRBAY.ORG that will serve as a repository for geospatial data, metadata, analytical and cartographic products resulting from the study.

Framework exists with sections for paper maps, interactive maps, and geospatial data (http://www.narrbay.org/d_projects/oceansamp/). Pending approval by the management committee, data and maps are added for download. To date, many of the Tier1 datasets and maps have been made available to the public. A interactive mapping framework has been implemented via the website that allows users to create custom maps using SAMP data. This application will continually be improved with additional data as the project proceeds.

9: Marine Mammals and Sea Turtles Analysis
Principal Investigator: Robert D. Kenney, URI Graduate School of Oceanography

Overall completion estimate: 100%

Study Tasks:

1. The Final technical report has been reviewed and released.

10: Air quality and meteorology studies in support of ocean SAMP

Principal Investigator: John Merrill, Graduate School of Oceanography

Overall completion estimate: 95%

1. Gathered data and performed preliminary analysis.
2. Taking account of suggestions from DEM in regard to air emission impacts of construction project.

11: Wind Farm Siting Study -Regional Subsurface Geology, Surficial Sediment, Benthic Habitat Distribution, and Cultural Resources

Principal Investigator: John W. King, URI Department of Oceanography

Note: Effort extended into mapping of areas in Federal Waters.
REVISED Overall completion estimate: 80%

Objectives:

- Objective 1. Conduct coarse resolution, geophysical, geological, biological surveys and groundtruthing studies of sites. 100%
  Mapped 57.5 sq. mi. Block Island. Mapped 8.1 sq. mi. "the Dagger". Mapped 69.1 sq. mi. Rhode Island Sound. Groundtruth complete.

- Objective 2. Develop a GIS data layer of regional subsurface geology, including depth to bedrock and type of subsurface materials. 100%
  Done for Block Island and RI Sound.

- Objective 3. Develop a GIS data layer of geological habitat. 97%
  Block Island done and RI Sound nearly done.

- Objective 4. Develop a GIS layer of biological habitat using NOAA CMECS classification system. 95%
  Block Island done and RI Sound nearly done.

- Objectives 5-7: Assess the potential for submerged historic and archaeological sites within SAMP areas with first existing data and then newly acquired geophysical survey data. 100%
  Block Island done.

- Objective 8: Complete final reports and deliver to CRC. 90%
  Draft reports submitted.

Tasks: (please estimate percentage complete and describe progress)

- Objective 1. (Tasks 1-3)

1. Collect existing data from literature. 100%
   Literature collected and largely analyzed.

2. Conduct low resolution, subbottom, sidescan, and interferometric sonar surveys of study sites. 100%
   Mapped Block Island, Dagger, and Block Island Sound.

3. Conduct groundtruthing surveys, including SPI, underwater video, grab samples. 97%
   Complete near Block Island; near complete RI Sound.

- Objective 2. (Tasks 4-5)

4. Analyze and interpret subbottom sonar data. 100%
   Data analysis complete.

5. Construct a GIS data layer of subbottom geology, including depth to bedrock and type of subsurface materials. 100%
Task complete.

- Objective 3. (Tasks 6-8)

6. Analyze and interpret sidescan and bathymetry data; pick areas for groundtruth studies. 100%
   Task done.

7. Obtain groundtruth data (SPI, video, grab samples). 95%
   Task nearly complete.

8. Construct a GIS data layer of geologic habitat needed for floating zone tool. 95%
   Task complete; BI maps in RI Sound being refined.

- Objective 4. (Tasks 9-11)

9. Collect existing data from literature. 100%
   Task complete.

10. Analyze benthic grab samples. 100%
    Task complete.

11. Prepare a biological habitat GIS data layer needed for floating zone tool.95%
BI complete and maps being refined for RI Sound.

- Objectives 5-7. (Tasks 12-14)

12. Collect and assess existing data, and conduct ground truthing studies. 100%
Task complete.

13. Assess newly acquired geophysical data. 95%
Minor refinements needed around BI.

14. Construct a GIS layer of archaeological sites needed for floating zone tool.90%
Work nearly complete.

- Objective 8. (Task 15)

15. Final report completion and submission to CRC. 90%
Draft report submitted.

12: Spatial distribution and abundance, and flight ecology of Marine and Coastal Birds off coastal Rhode Island

Principal Investigator: Dr. Peter Paton, URI Department of Natural Resources Science

Overall completion estimate: 95%

1. During this quarter, collected data from 19 Feb to 19 Mar from N end of Block Island, 24 hrs per day, 7 days per week, completed radar data collection
2. Have three full-time biologists on staff to conduct surveys, acquired optical equipment, Initiated land-based survey points at 11 points along 4 survey routes, each point will be surveyed 6 times monthly (3 morning and 3 afternoons), collected data from 1 April to 31 July 2010
3. Conducted offshore transect surveys on 8 4X5 nm grids offshore using Francis Fleet boats - tried to conduct approx. 1 survey (2 grids) per week for this quarter. Aerial surveys were initiated in Oct 2009 that survey entire SAMP area. Conducted approx. weekly through late December - 1 survey per week during this period. Will continue boat surveys through July 2010 and aerial surveys through April 2011

4. Completed protocols for when and where radar data will be collected. Coordinated with Deepwater Wind, who also has an avain radar unit on Block Island, although that radar is focused on an area SE of Block Island.
5. Collected radar data from 1 Oct through 15 Dec 2009 at N end of island. Data were 24 hrs per day/ 7 days per week. Minimal problems with sea clutter at N end. Data collected during this time period primarily focused on quantifying movement ecology of passerines during nocturnal migration, although waterbirds were surveyed as well.
6. Assessed impact of sea clutter on radar data, assessed quality of data collected to date. Initial analysis of data collected at S end of island. Also cleaned data collected at N end collected up through Sept 2009.
7. Conducted preliminary analyses to assess altitudinal distributions of nocturnal and diurnal migrants based on radar data. From March through May, approx. 12% of nocturnal migrants were flying below 100 m, while 26% were below 200 m.
8. Sent draft reports to Ocean SAMP committee on Timelines of spatial distribution and abundances of individual avian species and groups of species (e.g., waterfowl, shorebirds) in SAMP area and Estimates of diurnal flight behavior of birds in nearshore waters at Pt. Judith
9. Developed protocols for land-based and offshore surveys. Also, developed protocols for Roseate Tern surveys to be initiated in May 2009 - sent this protocol out for peer-review.
10. Initiated analyses of land-based and offshore survey data collected to date. Presented results for Ocean SAMP at two meetings - Biologists from Mass Audubon and USFWS at Kettle Pond Visitor Center on 5 Feb 2010 and to the public at Audubon Society of Rhode Island in Bristol on 4 March 2010.
11. Completed protocols for radar data collection and data analysis. Due to sea clutter issues on SW end, field tested a parabolic dish antenna to reduce sea clutter issues - which it did not.
12. Conducted preliminary analysis of data collected at S and N end of island, have post-doc working on data analysis.

13: Ecology

Principal Investigator: Dr. Scott Nixon, URI Department of Oceanography

Overall completion estimate: 100%

Task 1: Measures of plant abundance in the surface water of Rhode Island and Block Island Sounds using extracted chlorophyll pigments, model simulations and intercalibration with SeaWiff satellite imaging:

1. Completed a total of 112 boat surveys of Rhode Island and Block Island Sounds; 41 cruises by R. Sykes (fisherman), 39 by M. Marchetti (fisherman), 13 SAMP bird survey trips (P. Paton), and 19 additional cruises including 8 with Ullman and Codiga and 2 Endeavor cruises. This task is 100% complete.

2. Field surveys collected 2,286 water samples from 762 stations (3 replicates per each station) documenting seasonal/annual variations in extracted chlorophyll and nutrient concentrations in the SAMP study area. This task is 100% complete.
3. 100 measures of water clarity (extinction coefficient values) were taken at various locations in the sounds. These measures are used along with the abundance of plankton (measured by extracting plant pigments) to model plankton production. 43 Secchi disk measurements from R. Sykes, 35 Secchi disk measurements from M. Marchetti, 8 Secchi disk were taken during cruises on RV Hudner, 5 vertical light profiles using submarine photometer, approx. 22 CTD and 8 CTD casts during Endeavor cruise. This task is 100% complete
4. Completed intercalibration of light measurements on Block Island with monitoring stations at Kingston, RI and Falmouth, MA. We used a 78 day record of incident light, from a monitoring station we established at the Block Island Airport, to determine how incident light varies through the SAMP region. Sunshine data will be used along with water clarity to drive plankton production models. This task is 100% complete.

Task 2: Measures of carbon input to RI/BI Sound sediments:

1. Particle traps were deployed on three occasions at 2 stations in Rhode Island Sound and 1 station in Block Island Sound to collect material settling to the sediments from overlying water. Collected particles were analyzed for plant pigments and organic content. This task is 100 % complete

Task 3: Metabolic rates and nutrient cycling in sediments:

1. Collected intact benthic cores three times from three stations (2 in Rhode Island Sound and 1 in Block Island Sound). Sediment oxygen demand and nutrient remineralization rates were determined by incubation. This task is 100% complete

ATTACHMENT 2
Ocean Special Area Management Plan (SAMP) Supplemental Activities
Total Funds: $2.8 million

Status of Research as of October 15, 2010

1. Title: High Resolution Modeling of Meteorological, Hydrodynamic, Wave and Sediment processes in SAMP study area

Principal Investigators:
Stefan Grilli, J. Harris

Project Description: The objectives are to: 1) accurately characterize and map wind fields, including their boundary layer structure, in the preselected areas for potential wind farm development. A more accurate prediction of wind power potential is key to wind farm operations and economics, whereas extreme wind farms and shear effects are important for wind turbine support and blade design; 2) accurately characterize and map hydrodynamic fields, including regional and wind include currents, and wind-generated waves, in the pre-selected areas . Such fields are important for wind turbine support and foundation design and represent forcing for bottom sediment processes); and 3) accurately characterize and map potential for sediment suspension for bottom velocity for combined waves and currents. This is important for wind turbine foundation design and durability.

Percent of Activities Completed: 98% COMPLETE
Products completed:

- Final draft report summarizing all results of model development and application: **"High resolution modeling of meteorological, hydrodynamic, wave and sediment processes in SAMP study area"** in Appendix A # 6
- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/06-Grilli-HiResModA.pdf

Status: Final submitted considering peer comments

2. Title: High Resolution Screening Analysis for Block Island Site

Principal Investigators: Malcolm Spaulding and Annette Grilli

Project Description: This study will apply the screening tools developed during the early part of the Ocean SAMP (TDI and Ecological Services Value Index) to the area south and southeast of Block Island in order to determine the appropriate sites for a wind farm in this area. Study objectives include: 1) Performing high resolution screening analysis for in state water site, south/southeast of Block Island. Use revised wind field from high resolution meteorological modes, seabed data from geophysical surveys, and improved

engineering based values for the Technology Type within the TDI analysis and PCCA framework; and 2) Apply Ecosystem Services Value Index to same site to assist in screening.

Percent of Activities Completed: 100% COMPLETE

Products completed:

- Final report summarizing results of application of screening analysis: **"High Resolution Application of the Technology Development Index (TDI) in State Waters South of Block Island"** in Appendix A # 17
- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/17-HiResTDI-A.Grilli.pdf

Status: Final Report Complete

Related presentation: "Preliminary Screening Analysis for Ocean SAMP," Malcolm Spaulding, Stakeholders Meeting, February 2009.
Access the presentation at:
http://seagrant.gso.uri.edu/oceansamp/pdf/presentation/present_paton_birds.pdf

3. Title: Buoy Based Oceanographic and Meteorological Observations: Block Island and Deep Water Site

Principal Investigators:
Malcolm Spaulding, Dan Codiga

Project Description: This study will deploy two fully instrumented buoys; one off the southern coast of Block Island and the second in the general vicinity of Cox's Ledge. The buoys will collect data for one year. The data will be analyzed in the Codiga and Ullman Physical oceanographic study and used for model validation in the Grilli et al hydrodynamic, wind and wave modeling study. Once analyzed, this data will provide additional insight into the circulation, waves and meteorology of both sites as well as assist in verifying predictions for the hydrodynamic, wind and wave modeling study.

Percent of Activities Completed: 100 % COMPLETE

Products completed:

- Final reports:
  a. Final report summarizing results: **"Wind Resource Assessment in the Vicinity of a Small, Low Relief Coastal Island"** in Appendix A # 19
- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/19-SpauldingEtAl-WindAsses_reduced.pdf

Status Final Report Complete

b. Final report summarizing results: **"Analysis of Extreme Wave Climates in Rhode Island Waters South of Block Island"** in Appendix A # 8

- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/08-AsherEtAlWaves.pdf

Status Final Report Complete

c. Final report summarizing results: **"Evaluation of Wind Statistics and Energy Resources in Southern RI Coastal Waters"** in Appendix A # 20

- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/20-AGrilliEtAl-EvalWind.pdf

Status: Final Report Complete

d. Final report summarizing results: **"Meteorological Model based Wind Resource Assessment in the Vicinity of Block Island"** in Appendix A # 21

- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/21-SpauldingEtAl-MetModel.pdf

Status: Final Report Complete

4. Title: Moored Array Deployments and Vessel-Based Surveys to Characterize Currents and Hydrography of Rhode Island Coastal Waters

Principal Investigators:
Dan Codiga and Dave Ullman

Project Description: This effort enhances original scope by using new, direct observations from previously un-sampled areas that have now taken on importance to the planning process for offshore energy production structures. This work complements the separately-described extension effort ("buoy-based sampling") that will collect one-year time series records of a broad array of parameters (including meteorology, passive acoustic, and water quality) using fully-equipped buoys. The initial deployment will be for 2-3 months in state waters at sites chosen to improve the spatial coverage of physical oceanographic parameter sampling near the fully-instrumented buoy. Subsequently a 2-3 month deployment will be in federal waters to improve the spatial coverage of physical oceanographic parameter sampling near the fully-instrumented buoy there. Vessel-based 3-day spatial CTD surveys will be carried out during the moored array deployment and recovery cruises. These new observations (including surface wave characteristics, and baseline information to support sediment transport studies) are of central importance to planning for offshore structure development.

Percent of Activities Completed: 98% COMPLETE

Products completed:

- Final reports summarizing all research results:
  a. **"Characterizing the Physical Oceanography of Coastal Waters Off Rhode Island, Part 1: Literature Review, Available Observations, and A Representative Model Simulation"** in Appendix A # 2
- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/02-CodigaUllman-PhysOcean_reduced.pdf

Status: Final Report Complete

b. **"Characterizing the Physical Oceanography of Coastal Waters Off Rhode Island, Part 2: New Observations of Water Properties, Currents, and Waves"** in Appendix A # 3

- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/03-UllmanCodiga-DraftJune2010.pdf

Status: Final submitted considering peer comments

Related presentation: "Characterizing the Physical Oceanography of Coastal Waters Off Rhode Island, Dan Codiga and Dave Ullman, Stakeholders Meeting, January 2010. http://seagrant.gso.uri.edu/oceansamp/pdf/presentation/present_codiga_physicalocean.pdf

5. Title: Acoustic Noise and Electromagnetic Effects

Principal Investigators:
James H. Miller, Gopu R. Potty

Project Description:

This study will quantify the underwater acoustic noise environment in the state waters southwest of Block Island in the summer. Automated Information System (AIS) date will be collected during the acoustic data collections efforts providing ship identification, location, course and speed. In addition, we will build and deploy an underwater magnetometer to address the fishermen's concern about underwater electromagnetic (EM) effects on the fish. The feedback we received at the Ocean SAMP Stakeholder meeting made clear the importance of these EM measurements. This system will be towed across the Jamestown power cables and data results will be compared to the ambient measurement at the Ocean SAMP sites. Since the cables already in Narragansett Bay have not seemed to have any effect on lobsters or fish, it may allay some of their concerns. Project team will measures airborne noise on land at Mohegan Bluffs and at sea at pre-selected sites. Project team will also design and build the underwater magnetometer data collection system. This accelerated data collection

effort of acoustic and electromagnetic noise will allow for the prediction of effects of offshore wind turbines on marine animals including mammals, fish and invertebrates.

Percent of Activities Completed: 100% COMPLETE
Products completed:

- Final report summarizing all research results: **"Acoustic Noise and Electromagnetic Study in Support of the Rhode Island Ocean SAMP"** in Appendix A # 12
- Access the report at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/12-Miller-Acoustics.pdf

Status: Final Report Complete

Related Presentation: "RI Wind Farm Siting Study – Acoustic Noise and Electromagnetic Effects," Jim Miller, Stakeholders Meeting, April 2009.
http://seagrant.gso.uri.edu/oceansamp/pdf/presentation/present_miller_noise.pdf

6. Title: Regional Subsurface Geology, Surficial Sediment, Benthic Habitat Distribution, and Cultural Resources

Principal Investigators:
John W. King, Rob Pockalny

Project Description: Project team will: 1) perform sub-bottom mapping using high power profiler, south of Block Island in State waters (complements prior side scan and sub-bottom surveys already completed but penetrates to deeper depths); 2) complete detailed archaeology studies in state waters; and 3) complete detailed ground-truth studies near proposed wind turbine sites. In a pre-selected site in federal waters, project team will perform side scan and sub-bottom surveys including high power profiler, in deeper areas offshore identified during the screening process, complete a literature search and identify targets for archaeology studies, and complete ground-truth studies for side scan mapping in federal waters.

Percent of Activities Completed: 100% COMPLETE

Products completed:

- Final reports summarizing all research results:

a. **"Benthic Habitat Distribution and Subsurface Geology Selected Sites from the Rhode Island Ocean Special Area Management Study Area"** in Appendix A # 4

- Access the report at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/04-King%20et%20al%20SAMPreport_reduced.pdf

Status: Final Report Complete

Related presentation: "Rhode Island Ocean SAMP: Fall 2008 Endeavor Cruise Results and Proposed Future Work. This presentation covers the research effort to develop and analyze an inventory of ocean floor sediments within the Ocean SAMP," John King, Stakeholders meeting, January 2009.
http://seagrant.gso.uri.edu/oceansamp/pdf/presentation/present_king_update.pdf

b. **"Investigations into Block Island's Submerged Cultural Sites and Landscapes for the Rhode Island Ocean Special Area Management Plan 2010"** in Appendix A # 5

- Access the report at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/05-Mather-ArcheologyResources_reduced.pdf

Status: Final Report Complete

Related presentation: "Ocean SAMP: Submerged Historic Sties in the Vicinity of Block Island," Rod Mather and John Jensen, Stakeholders Meeting, January 2010.
http://seagrant.gso.uri.edu/oceansamp/pdf/presentation/present_mather_historicsites.pdf

7. Title: Assess the spatial distribution, abundance, and movement ecology of water and land birds for the Ocean SAMP study area.

Principal Investigators:
Peter W.C. Paton and Scott R. McWilliams

Project Description: The purpose of this task is to assess the spatial distribution and abundance of birds in the offshore waters. The project team's approach is to conduct boat and aerial surveys to systematically survey the entire Ocean SAMP study area. These surveys are designed to quantify the distribution of foraging waterbirds and their local and regional movement patterns throughout the year to assess changes in the spatial distribution of resident and migratory species. The project team will also conduct focused research on Roseate Terns (Sterna dougallii), a species that has been federally listed as endangered since 1987. Additional systematic surveys in nearshore waters will also be conducted to assess Roseate Tern use of nearshore habitats, including locations of foraging sites and local movement patterns. It is expected that this information will allow CRMC to develop new Ocean SAMP policies, procedures, and mitigation measures that will better protect the birds and their essential habitats as well as place and operate offshore wind turbines with the least impact on birds.

Percent of Activities Completed: 100% COMPLETE
Products completed:

- Final report summarizing all research results: **"Spatial Distribution, Abundance, and Flight Ecology of Birds in Nearshore and Offshore Waters of Rhode Island"** in Appendix A # 11

- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/11-PatonAvianReptV3_reduced.pdf

Status: Final Report Complete

Related Presentation: "Assessing Rhode Island Sound's Nearshore and Offshore Avian Resource Prior to Potential Alternative Energy Development," Peter Paton, Stakeholders Meeting, October 2009.
http://seagrant.gso.uri.edu/oceansamp/pdf/presentation/present_paton_birds.pdf

8. Title: Spatial and Seasonal Distribution of Phytoplankton, Primary Production, and Flux of Organic Matter to Benthic Habitats

Principal Investigators:
Scott Nixon, Stephen Granger

Project Description: Project team will characterize the water column, including the bottom interactions in state waters of Block Island and Rhode Island Sounds between the mainland and Block Island and south of Block Island in state waters. By employing the fishing community, research which will enable this study to expand the coverage in space and time of water sample collections for the determination of phytoplankton biomass (chlorophyll a), primary productivity (14C uptake), and vertical light distribution in the water column. This will accelerate the development of sea-truthed algorithms to estimate the productive base of the food chains throughout the sounds using satellite imagery. In Federal waters, project team will characterize the water column focusing on the northeast quadrant of the SAMP study area. This area has emerged thus far as having high potential for the major wind farm site. Once again the fishing community will be engaged. Additional time on the RV Capt. Bert (required for sediment collection) will enable us to acquire data on primary production and phytoplankton abundance in this important offshore area where no information is currently available and studies would likely be required as part of a future EIS. We will also deploy traps in this area to measure the flux of organic matter and energy from the water column to the bottom that is supporting the bottom fishery in the area. The delivery of food to the bottom will be confirmed by collecting sediment cores and measuring the rate of metabolism (oxygen uptake and nutrient regeneration) in the laboratory.

Percent of Activities Completed: 100% COMPLETE
Products completed:

- Final report summarizing all research results: **"Spatial and Temporal Variability of Surface Chlorophyll, Primary Production, and Benthic Metabolism in Rhode Island and Block Island Sounds"** in Appendix A # 9
- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/09-Nixon_Oviatt_Samp.pdf

Status: Final Report Complete

9. Title: Inventory of Significant Historic Properties, Archaeological Sites, Tribal Areas of Traditional Cultural and Religious Importance, and Recreational Areas

Principal Investigators:
Jennifer McCann and Teresa Crean

Project Description: The goal of this study is to document significant historic properties, archaeological sites, tribal areas of traditional cultural and religious importance, and recreational areas, that are within or adjacent to the Ocean SAMP project area. The project team will begin identifying relevant properties using existing data from the Rhode Island Geographic Information System (RIGIS) and then will verify these sites directly with the State Historic Preservation Officer (SHPO) of the Rhode Island State Historical Preservation and Heritage Commission (RI HPHC). The end product will include a map and listing of properties that are listed on the National Register of Historic Places or are determined to be eligible for inclusion. In addition, the project team will document available definitions or evaluation criteria related to potential adverse visual impacts as defined in federal regulations.

Percent of Activities Completed: 100% COMPLETE

Products completed:
Information incorporated into Cultural and Historic Chapter
Status: Draft Chapter in public comment period

10. Title: Refined Assessment of Fisheries Activity

Principal Investigators:
Jennifer McCann, Tiffany Smythe

Project Description: This study will refine the initial assessment of fishing activity that has been conducted during year 1 of the Ocean SAMP. The purpose of this assessment is to refine the Ocean SAMP area fisheries usage maps with activity maps based on state and federal fisheries monitoring data. Data will be obtained from the RI Department of Environmental Management (DEM) and the National Marine Fisheries Service (NMFS) to map fisheries activity within the SAMP area over the past ten years (1999 – present). Datasets include DEM logbook data and NMFS fisheries observer data, vessel trip report (VTR) data, and vessel monitoring systems (VMS) data. Using these datasets, the study team will create GIS data layers and maps showing the locations of fishing activity within the SAMP area separated out by gear type, targeted species, and other attributes. These data layers and maps will then be used to refine and corroborate the 2009 RI Sea Grant fisheries usage maps, which were created through meetings and interviews with fishermen. These data layers and maps will also be used to enhance the SAMP fisheries

chapter and to inform the development of the SAMP zoning map for Rhode Island's offshore waters.

Percent of Activities Completed: 95% COMPLETE
Products completed:
Information incorporated into Ocean SAMP Fisheries Resources and Uses Chapter
Status: Draft Chapter in public comment period

11. Title: Geospatial Data Support for a Revised Wind Farm Site Screening Analysis (Phase II)
Peter August, URI Department of Natural Resources Science
Charles LaBash, URI Department of Natural Resources Science
Christopher Damon, URI Department of Natural Resources Science
This project will provides mapping support for the analytical, visualization, outreach, and communication needs of the Ocean SAMP assessment process. The researchers are consolidating all relevant and available geospatial data and metadata, converting them to a common geography, and making the data accessible over the Internet. They are also taking the new data emerging from the SAMP process and creating new maps and other cartographic and analytic products. All of these materials are available online via the www.narrbay.org web portal.

Percent of Activities Completed: 98% COMPLETE

Products completed: (LINKS?)

- Geographic Information System (GIS) training course for Ocean SAMP researchers
- Web portal housing maps and data used to develop the offshore zoning plan.
- Research-specific maps and data. These items are developed as needed in support of research efforts and include such items as providing maps for stakeholders and stakeholder meetings; assisting research teams with data visualization and spatial analyses; and developing maps for the final Ocean SAMP report.
- A web site within WWW.NARRBAY.ORG that will serve as a repository for geospatial data, marine databases, metadata, analytical and cartographic products resulting from the study.
- Cartographic and analytic products used in the screening analysis.

Status**:** **Ongoing - Continual GIS graphic and marine data base support for entire Ocean SAMP Research and Policy process**

Attachment 3

Ocean Special Area Management Plan (SAMP)

Total Funds: $3.2 million

Status of Research as of October 15, 2010

1A. Title: Engineering in Support of the SAMP: Wave and storm surge characterization for Rhode Island coastal waters

Principal Investigators:
Malcolm L. Spaulding, URI Graduate School of Oceanography, Ocean Engineering
Stephan Grilli, URI Graduate School of Oceanography, Ocean Engineering

Project Description: This study is divided into three separate components: (1) wave, and storm surge characterization for RI coastal waters; (2) marine transportation paths based on AIS data, and (3) revised wind farm site screening analysis. A key focus is to perform a detailed comparison of the mean annual wind speeds as provided by AWS TrueWinds and used in the ATM screening study to other wind data sources, including data from the U.S. Army Corps of Engineers, and then adjust the AWS wind resource maps if appropriate to accurately represent the wind resource.

Percent of Activities Completed: 100% COMPLETE

Products completed:

- Final draft Technical report summarizing all results of model development and application: "**Analysis of Extreme Wave Climates in Rhode Island Waters South of Block Island"** in Appendix A- # 8
- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/08-AsherEtAlWaves.pdf)
- GIS maps of wind speeds, storm surge, wave heights, and wave breaking zone contours

Status: Final Report Complete

1B. Title: Engineering in Support of the SAMP: Marine transportation paths based on AIS data

Principal Investigators:

Malcolm L. Spaulding, URI Graduate School of Oceanography, Ocean Engineering
Stephan Grilli, URI Graduate School of Oceanography, Ocean Engineering

Project Description: The study objectives are to analyze Automated Identification System (AIS) data to determine the transportation corridors in southern Rhode Island coastal waters, and to compare the AIS data to U.S. Coastal Guard shipping lanes, fairways and precautionary areas to determine impacts of recent changes in transportation rules for the study area.

Percent of Activities Completed: 100% COMPLETE

Products completed:

- Information incorporated into **Chapter 7 - Marine Transportation, Navigation and Infrastructure**
- GIS maps of the AIS tracks with USCG regulated areas overlaid

Status: Draft Chapter in public comment period

1C. Title: Engineering in Support of the SAMP: Revised wind farm site screening analysis

Principal Investigators:
Malcolm L. Spaulding, URI Graduate School of Oceanography, Ocean Engineering
Annette Grilli, URI Graduate School of Oceanography, Ocean Engineering

Project Description: The study objectives are to perform a detailed review of Phase I site screening for Rhode Island coastal waters, refine the screening study, and develop a ranked list of sites for potential development.

Percent of Activities Completed: 100% COMPLETE

Products completed:

- Final Technical report summarizing all results of model development and application: "**Application of Technology Development Index and Principal Component Analysis and Cluster Methods to Ocean Renewable Energy Facility Siting**" in Appendix A- #16
- Access the paper at: at http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/16-SpauldingTDI.pdf
- GIS maps of all parameters used in the screening analysis

Status: Final Report Complete

2. Title: RI Wind Farm Structures/Foundations Study – Support Structures and Foundations for Offshore Wind Turbines

Principal Investigators:
Sau-Lon James Hu, URI Graduate School of Oceanography Ocean Engineering
Christopher D. P. Baxter, URI Graduate School of Oceanography Ocean/Civil Engineering

Project Description: The study objectives are to perform a detailed assessment of the technology used for support structures and foundations for offshore wind turbines; evaluate the relevant parameters (water depth, depth to bedrock, scour depth, wind and wave loads, etc.) that govern the choice of the different technologies; and estimate the relative costs of the different technologies based on known site conditions in RI coastal waters.

Percent of Activities Completed: 100% COMPLETE

Products completed:

- Final Technical report: "**Development of a Technology Type Factor for Jacket Structures for Offshore Wind Turbines in Rhode Island**" in Appendix A- # 18
- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/18-Hu-Baxter-Tech.pdf
- GIS maps of support structure dimensions, penetration depths of monopile foundations, and relative cost estimates of the different designs for each location within the GIS incorporating relevant site and loading conditions.

Status: Final Report Complete

3. Title: RI Wind Farm Siting Study- Acoustic Noise and Electromagnetic Effects

Principal Investigators:
James H. Miller, URI Graduate School of Oceanography, Ocean Engineering
Gopu Potty, URI Graduate School of Oceanography, Ocean Engineering

Project Description: The study objectives are to perform detailed analyses of the atmospheric noise conditions, underwater noise conditions and electromagnetic field conditions existing in the candidate locations; predict the atmospheric and underwater noise levels and electric and magnetic (EM) fields during and after construction of the wind facility in the candidate locations; and estimate the effects of the added noise and EM fields on marine mammals, turtles, and other animals native to the region.

Percent of Activities Completed: 100% COMPLETE

Products completed:

- Final draft Technical report: **"Acoustic Noise and Electromagnetic Study in Support of the Rhode Island Ocean Special Area Management Plan 2010**" in Appendix A- # 12
-
- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/12-Miller-Acoustics.pdf
- GIS maps of the radiated noise from the wind facility, and the prediction of level A (injury) and level B (behavioral) zones of influence for various species.

Status: Final Report Complete

4. Title: Characterizing Physical Oceanography of the Rhode Island Coastal Ocean

Principal Investigators:
Dan Codiga, URI Graduate School of Oceanography
Dave Ullman, URI Graduate School of Oceanography

Project Description: The study objectives are to summarize general characteristics of physical oceanography of the region; catalogue available observations and modern published model outputs from numerical simulations constrained by observations; characterize tidal currents, sub-tidal flow, seasonal variations, responses to wind and riverine forcing on timescales shorter than seasonal, and temperature and salinity fields and their seasonal variations; and estimate strengths of extreme currents.

Percent of Activities Completed: 98% COMPLETE

Products completed:

- Final Technical report **#1: "Characterizing the Physical Oceanography of Coastal Waters Off Rhode Island, Part 1:Literature Review, Available Observations, and A Representative Model Simulation "**in Appendix A- # 2
- Final draft Technical report **#2: "Characterizing the Physical Oceanography of Coastal Waters Off Rhode Island, Part 2: New Observations of Water Properties, Currents, and Waves"** in Appendix A- # 3
- Access the both papers at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/02-CodigaUllman-PhysOcean_reduced.pdf and http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/03-UllmanCodiga-DraftJune2010.pdfInformation to generate GIS layers of tidal current ellipse characteristics, subtidal current magnitude and direction by season at the surface; and temperature and salinity by season at the surface; and extreme surface currents.

Status: Report 1 - Final Complete
Report 2 - Final submitted considering peer comments

5. Title: Geospatial data support for a revised wind farm site screening analysis

Principal Investigators:
Peter August, URI Natural Resource Science
Christopher Damon, URI Natural Resource Science

Project Description: The study objectives are to consolidate geospatial data and metadata to support the analytical, visualization, outreach, and communication needs of the wind farm assessment process; assist in the development and implementation of a Phase II site screening process for Rhode Island coastal waters; and develop a common graphic template for mapping products emerging from the site screening process and assist in the production of cartographic products to support project analysis and communication requirements.

Percent of Activities Completed: 98% COMPLETE

Products completed:

- A web site within WWW.NARRBAY.ORG that will serve as a repository for geospatial data, metadata, analytical and cartographic products resulting from the study.
- Cartographic and analytic products used in the screening analysis.

Status: Ongoing - Continual GIS graphic and marine data base support for entire Ocean SAMP Research and Policy process

6. Title: Marine Mammal and Sea Turtle Analysis for the Rhode Island Ocean Special Area Management Plan

Principal Investigators:
Robert Kenney, URI Graduate School of Oceanography

Project Description: The objective of this project is to perform detailed analyses and mapping of the spatial and temporal distributions and relative abundances of all marine mammals and sea turtles in the marine waters of the State of Rhode Island and adjacent areas.

Percent of Activities Completed: 100% COMPLETE

Products completed:

- Seasonal GIS maps of all occurrences of all species of marine mammals and sea turtles based on all available sighting and stranding data.
- Seasonal GIS maps of interpolated relative abundances (i.e., sightings per unit effort, SPUE) of those marine mammals and sea turtles with sufficient numbers of sightings, corrected for survey effort, based only on the appropriate aerial (turtles) or aerial and shipboard (mammals) survey data.
- Final Technical report: "**Marine Mammals and Sea Turtles of Narragansett Bay, Block Island Sound, Rhode Island Sound, and Nearby Waters: An Analysis of Existing Data for the Rhode Island Ocean Special Area Management Plan"** – Appendix A # 10
- Access the Technical report at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/10-Kenney-MM&T_reduced.pdf.

Status: Final Report Complete

7. Title: Air Quality and meteorology studies in support of Ocean SAMP

Principal Investigators:
John Merrill, Graduate School of Oceanography
Brian Heikes, Graduate School of Oceanography

Project Description: The study objectives are to analyze prevailing winds, storm occurrence and precipitation distributions (type, intensity, and frequency and determine the intensity, duration and frequency of fog and other obstructions to visibility in the context of safety for marine and aircraft transportation. The team will also estimate the probability of icing conditions in the offshore area in the context of static loading of structures, and will characterize the meteorological environment in the context of air pollution outbreaks associated with stagnant wind conditions and near-surface trapping of pollutants. Finally, the team will compile and summarize applicable regulations on air quality and related impacts of working vessels associated with the contemplated structures and facilities.

Percent of Activities Completed: 100% COMPLETE

Products completed:

- Final draft Technical report: "**Fog and Icing Occurrence, and Air Quality Factors for the Rhode Island Ocean Special Area Management Plan 2010" – Appendix A # 7**
- Access the Technical report at:
  http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/07-MerrillWeather.pdf
- Figures and tables with quantitative data, air quality parameters and related information.

Status: Final Report Complete

8. Title: Wind Farm Siting Study -Regional Subsurface Geology, Surficial Sediment, Benthic Habitat Distribution, and Cultural Resources

Principal Investigators:
John W. King, URI Department of Oceanography

Project Description: The study objectives are to conduct coarse resolution geophysical, geological, biological surveys and groundtruthing studies of prospective wind farm sites; develop a GIS data layer of regional subsurface geology that includes identification of depth to bedrock and the type of materials overlying bedrock; develop a GIS data layer of geologic habitat; develop a GIS layer of biological habitat (benthic community type and structure) using the NOAA CMECS (coastal marine ecosystem ecological classification standard) classification system; identify and assess the potential for submerged historical archaeological sites and properties within select parts of the Ocean SAMP study area; identify and assess the potential

for submerged *prehistoric* archaeological sites within select parts of the Ocean SAMP study area; and augment cultural resources assessments #5 & 6 above using existing and newly acquired geophysical survey data.

Percent of Activities Completed: 100% COMPLETE

Products completed:

- Final Technical report **#1: "Benthic Habitat Distribution and Subsurface Geology Selected Sites from the Rhode Island Ocean Special Area Management Study Area "**in Appendix A- # 4
- Final Technical report **#2: "Investigations into Block Island's Submerged Cultural Sites and Landscapes for the Rhode Island Ocean Special Area Management Plan 2010**" in Appendix A- # 5
- Access the both papers at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/04-King%20et%20al%20SAMPreport_reduced.pdf and http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/05-Mather-ArcheologyResources_reduced.pdf
- Low resolution GIS data layers (maps) of depth to bedrock and overlying materials, geological habitat (bottom type and depositional environment), biological habitat (benthic community) in CMECS classification system (i.e., biotope), and cultural resources.
- Geological, biological, and archaeological interpretation and supporting data for data layers (maps).

Status: Report 1 Final Report Complete

Report 2 - Final Report Complete

9. Title: Spatial distribution and abundance, and flight ecology of Marine and Coastal Birds off coastal Rhode Island

Principal Investigators:
Dr. Peter Paton, URI Department of Natural Resources Science
Dr. Scott McWilliams, URI Department of Natural Resources Science

Project Description: The study objectives are to assess spatial distribution and abundance of birds in RI coastal waters, and how this varies seasonally; compare current avian distribution and abundance data with historical survey data; assess diel patterns of avian use of RI coastal waters; quantify flight ecology for birds and bats in RI coastal waters; and determine foraging and roosting sites for Roseate Terns (a federally-listed species).

Percent of Activities Completed: 100% COMPLETE

Products completed:

- Final Technical report**: "Spatial Distribution, Abundance, and Flight Ecology of Birds in Nearshore and Offshore Waters of Rhode Island Interim Technical Report for the Rhode Island Ocean Special Area Management Plan 2010 "**in Appendix A- # 11
- Access the paper at: http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/11-PatonAvianReptV3_reduced.pdf
- GIS maps of current seasonal distribution and abundance of each bird species in Rhode Island coastal waters, historical patterns of seasonal distribution and abundance of each bird species in Rhode Island coastal waters, temporal and spatial patterns of flight pathways in Rhode Island coastal waters, and distribution and abundance of roseate tern roost sites and foraging sites in Rhode Island.

Status: - Final Report Complete

Outreach Funds

10. Title: Ocean SAMP Policy and Outreach Preparation

Principal Investigator:
Jennifer McCann, CRC/RISG

Project Description: The purposes of the project are to develop a SAMP for Rhode Island's coastal waters that serves as a tool to encourage regulatory and management coordination and consistency among Rhode Island state (CRMC, OER, DEM) and federal agencies (U.S. Department of Energy, ACOE, MMS, and the U.S. Federal Energy Regulatory Commission), other public entities, developers, and environmentalists within this project area; foster and engage a well informed and well represented constituency that understands the Ocean SAMP issues and is involved in the creation of the SAMP; develop a "floating zone" tool that will serve as a mechanism to promote the identification of appropriate sites for the installation of permanent structures; and evaluate and monitor the project to provide partners and stakeholders with information on program development and implementation success.

Percent of Activities Completed: 90% COMPLETE

Products completed:

- Draft Ocean SAMP document (available at http://seagrant.gso.uri.edu/oceansamp/documents.html#samp)
- Policy documents: The Planning and Policy Context for the Rhode Island Ocean SAMP (available at (http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/01-Payne_Policy.pdf) and
- Report of the Ocean SAMP Stakeholder Process (available at http://seagrant.gso.uri.edu/oceansamp/pdf/appendix/22-Payne_stakeholders.pdf)

- Fact Sheets: Ocean SAMP Overview (available at http://seagrant.gso.uri.edu/oceansamp/pdf/documents/doc_osamp_brochure.pdf),
- Ocean SAMP fact sheet (available at http://seagrant.gso.uri.edu/oceansamp/pdf/documents/doc_osamp_factsheet.pdf), and
- Ocean SAMP Regulatory fact sheet (available at http://seagrant.gso.uri.edu/oceansamp/pdf/documents/doc_regulatory_factsheet.pdf)
- Audio series: Available at http://seagrant.gso.uri.edu/oceansamp/documents.html#audio
- Library public presentation series: Available at http://seagrant.gso.uri.edu/oceansamp/documents.html

Project Management Funds

11. Title: Project Management

Principal Investigators:
Sam De Bow, URI Graduate School of Oceanography
Jennifer McCann, URI Coastal Resources Center/Rhode Island Sea Grant

Project Description: The management team purposes are to provide overall management and coordination for Ocean SAMP and all URI projects contributing to wind farm siting issues, and to coordinate project with activities of URI Partnership in Energy and Center of Excellence in Offshore Renewable Energy.

Percent of Activities Completed: 95% COMPLETE

Products completed:
- Monthly oral and quarterly written progress reports
- Ocean SAMP for Coastal Waters of Rhode Island
- Copies of all project reports generated by URI project team
- Manage peer review and final Technical Report submission