This management plan has been developed in accordance with NOAA regulations, including all provisions for public involvement. It is consistent with the congressional intent of Section 315 of the Coastal Zone Management Act of 1972, as amended, and the provisions of the Alaska Coastal Management Program. October 15, 2005.
As Reserve Manager, I would like to acknowledge the tireless efforts of the Reserve staff in developing this Management Plan. From the actual drafting of portions of the plan to repeated reviews, discussions, layouts, and consistency issues, the staff persevered on all accounts with smiles. Their stamina and focus are the foundation of this Plan. I would like to acknowledge that all photos and scientific illustrations used in the Plan were from Reserve staff.

I would also like to acknowledge the efforts of the Reserve’s Community Council and partners in providing invaluable feedback that has strengthened the Plan. This was truly a collaborative effort that is shaping the future direction of Kachemak Bay National Estuarine Research Reserve.

The Alaska Department of Fish and Game, Kachemak Bay National Estuarine Research Reserve is part of the National Estuarine Research Reserve System (NERRS), established by Section 315 of the Coastal Zone Management Act, as amended. Additional information about the System can be obtained from the Estuarine Reserves Division, Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, US Department of Commerce, 1305 East West Highway – N/ORM5, Silver Spring, MD 20910.

Financial support for this publication was provided by grants (#NA04NOS420084; #NA05NOS4201106) under the Federal Coastal Zone Management Act, administered by the Office of Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, Silver Spring, MD.
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<td>Alaska Islands and Ocean Visitor Center</td>
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<td>CHA</td>
<td>Critical Habitat Area</td>
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<td>CISPRI</td>
<td>Cook Inlet Spill Prevention and Response, Inc.</td>
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<td>Convention on International Trade in Endangered Species</td>
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<td>CTP</td>
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<td>Clean Water Act</td>
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<td>EVOS</td>
<td>Exxon Valdez Oil Spill</td>
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<td>GEM</td>
<td>Gulf of Alaska Ecosystem Monitoring (Program)</td>
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<td>GIS</td>
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<tr>
<td>Abbreviation</td>
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<tr>
<td>GRF</td>
<td>Graduate Research Fellowship</td>
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<td>Kasitsna Bay Laboratory</td>
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<td>KBNERR</td>
<td>Kachemak Bay National Estuarine Research Reserve</td>
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<td>KPB</td>
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<td>MOU</td>
<td>Memorandum of Understanding</td>
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<td>NCCOS</td>
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<td>NERR</td>
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<td>NERRS</td>
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<td>NGO</td>
<td>Non-Governmental Organization</td>
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<td>National Marine Fisheries Service, NOAA</td>
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<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
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<td>NOS</td>
<td>National Ocean Service, NOAA</td>
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<td>NPDES</td>
<td>National Pollutant Discharge Elimination System</td>
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<td>NWR</td>
<td>National Wildlife Refuge</td>
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<td>OCRM</td>
<td>Office of Ocean and Coastal Resource Management, NOAA</td>
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<td>PWS</td>
<td>Prince William Sound</td>
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<tr>
<td>RSA</td>
<td>Reimbursable Services Agreement</td>
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<td>SCA</td>
<td>Student Conservation Association</td>
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<tr>
<td>SOC</td>
<td>Species of Concern</td>
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<td>SWMP</td>
<td>System-Wide Monitoring Program</td>
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<td>USACE</td>
<td>United States Army Corps of Engineers</td>
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<tr>
<td>USC</td>
<td>United States Code</td>
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<td>USEPA</td>
<td>United States Environmental Protection Agency</td>
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<td>USFWS</td>
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<td>WHSRN</td>
<td>Western Hemisphere Shorebird Reserve Network</td>
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EXECUTIVE SUMMARY

BACKGROUND

The Kachemak Bay National Estuarine Research Reserve (Kachemak Bay NERR or KBNERR), located in Homer on the Kenai Peninsula in Alaska, is managed by the Alaska Department of Fish and Game (ADF&G) in cooperation with the National Oceanic and Atmospheric Administration (NOAA). Designated in 1999 and one of 26 National Estuarine Research Reserves, the mission of Kachemak Bay NERR is to enhance understanding and appreciation of the Kachemak Bay estuary and adjacent waters to ensure that these ecosystems remain healthy and productive. Kachemak Bay NERR coordinates research and education within the 1,501-km² (370,905-ac) Reserve, as well as the 2,658-km² (656,806-ac) watershed. Encompassing vast subtidal zones, intertidal expanses, extensive marsh systems, and terrestrial forests, the Reserve is home to 11 species of marine mammals, 36 species of terrestrial mammals, 244 species of birds, 120 species of fish, 404 species of marine invertebrates, 125 species of marine algae, and 663 species of vascular plants.

The current Management Plan for the Reserve was adopted at the time of designation in 1999. Reserve’s are required to update their Management Plans every five years to reflect additions, deletions, or changes in the programs direction. The majority of the Research and Education goals identified in the current Plan were realized over the last 5-year period. However, due to significant staff adjustments, facility construction, and a departmental reorganization, some goals were not achieved in their entirety. A note should be made that the staff adjustments, facility construction, and departmental reorganization that occurred have resulted in positive changes to the Kachemak Bay NERR program.

MANAGEMENT PLAN

With a steadily increasing resident and visitor population, the Reserve is working diligently to establish baseline data, provide educational opportunities for the public, and develop science-based training programs for decision-makers, so the best information and tools are used to determine the direction into the future. Issues driving the Reserve’s programmatic direction and focus include:

- larval and juvenile fisheries recruitment and life history dynamics;
- climate change;
- coastal dynamics (natural and anthropogenic), including landuse change;
- natural hazards;
- socioeconomics associated with coastal resources; and,
- public access.

To address these issues, the Management Plan has been divided into eight focused sections that address the Reserve’s goals and objectives, with specific strategies identified as steps to reach the mission:

1. **Research and Monitoring**: Staff and visiting investigators conduct process-oriented research focused on obtaining baseline knowledge of the Bay and its watershed, and
expanding hydrographic and biological monitoring that can be used for long-term comparisons.

2. **Education and Outreach**: The Education program targets audiences of all ages and backgrounds for traditional, experiential, training, and outreach opportunities. The education program is also upgrading and expanding the Reserve’s exhibitry to better interpret scientific data collected by the Research program.

3. **Program Administration**: The Administrative team works to support the Reserve’s budgetary and personnel needs, including developing stable funding and grant match sources.

4. **Public Access and Visitor Use**: Working with partners, the Reserve plans to assess visitor needs and complement current public access as allowable.

5. **Land Acquisition**: While the Reserve is not actively acquiring property, staff will work with lead agencies and organizations to protect essential parcels for long-term resource conservation. This five-year Management Plan update does not include a boundary expansion.

6. **Resource Conservation**: The Reserve relies heavily on the existing land managers and regulations in protecting its resources.

7. **Stewardship and Manipulation**: Stewardship activities, including restoration of previously impacted areas, may be coordinated and monitored by the Reserve.

8. **Partnerships**: Partnerships are critical to the growth of the Reserve. They should be carefully selected and fostered for long-term development.

By actively using this Plan to guide the Reserve, Kachemak Bay NERR is striving to become a recognized resource for both NOAA, ADF&G, and the community by conducting impartial, relevant research that is interpreted through education and outreach to coastal and resource managers, addressing issues specific to identified needs.

*For copies of the Kachemak Bay NERR Management Plan, please call 907-226-4652 or visit our website at [www.kbayrr.org](http://www.kbayrr.org).*
1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF PLAN

National Estuarine Research Reserves are established to provide opportunities for long-term estuarine research and monitoring, estuarine education and interpretation, and to provide a basis for more informed coastal management decision-making. The Kachemak Bay National Estuarine Research Reserve (NERR) is one of 26 reserves designated by the National Oceanic and Atmospheric Administration (NOAA) (Figure 1). Kachemak Bay NERR is required by NOAA to complete or update a Management Plan for the site every five years, as outlined in the NERR Program Regulations [15 Code of Federal Regulation (CFR) Part 921 – Appendix 1] to ensure consistency with the goals, objectives and policies of the National Estuarine Research Reserve System.

The Management Plan for Kachemak Bay NERR is a forward-thinking document that outlines objectives and strategies to meet programmatic, staffing and facility goals over the next five years. This plan is somewhat different than the previous Kachemak Bay NERR Management Plan, which was part of the initial designation Plan and the Final Environmental Impact Statement (EIS). Over the past five years, the Reserve has experienced changes, challenges, and opportunities that have shaped a new direction for the Reserve, as reflected in the goals and objectives that serve as the framework for this plan.

The Plan is written to be fiscally realistic, given available and planned funding in the context of current and anticipated projects. The goals are aggressive, yet attainable, and will challenge the Reserve to strive toward internal excellence and appropriate partnerships to achieve them. Given this ambitious framework, it is reasonable to expect that external factors beyond Reserve control, such as funding fluctuations and newly arising issues, may impact the implementation of specific strategies outlined in this plan. As much as practicable, the Reserve will moderate these factors and continue forward with the outlined goals to ensure the long-term health and sustainability of the Kachemak Bay ecosystems.
2.0 NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

As the parent agency for the National Estuarine Research Reserve System (NERRS or Reserve System), it is essential that the individual NERRs nest themselves within the overarching goals identified by NOAA’s Strategic Plan, 2003-2008:

- protect, restore, and manage the use of coastal and ocean resources through an ecosystem approach to management;
- understand climate variability and change to enhance society’s ability to plan and respond;
- serve society’s needs for weather and water information;
- support the Nation’s commerce with information for safe, efficient, and environmentally sound transportation; and,
- provide critical support for NOAA’s mission.

The Reserve System develops goals, strategies, and specific plans to further support NOAA’s mission to understand and predict changes in the Earth’s environment and conserve and manage coastal and marine resources to meet our Nation’s economic, social, and environmental needs.

2.1 NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

The National Estuarine Reserve System (NERRS or Reserve System) was created by the Coastal Zone Management Act (CZMA) of 1972, as amended, 16 USC Section 1461, to augment the Federal Coastal Zone Management (CZM) Program. The CZM Program is dedicated to comprehensive, sustainable management of the Nation’s coasts.

The Reserve System is a network of protected areas established to promote informed management of the Nation’s estuaries and coastal habitats. The Reserve System currently consists of 26 reserves in 21 states and territories, protecting over one million acres of estuarine lands and waters. The reserves within the NERR System are established and managed through a federal-state partnership to ensure long-term management and protection.

2.1.1 Mission

As stated in the NERRS regulations, 15 CFR Part 921(a), the National Estuarine Research Reserve System mission is:

*The establishment and management, through federal-state cooperation, of a national system of Estuarine Research Reserves representative of the various*
regions and estuarine types in the United States. Estuarine Research Reserves are established to provide opportunities for long-term research, education, and interpretation.

To retain focus on the above referenced mission, NOAA developed goals for the NERRS that serve as the basis for national programmatic development.

2.1.2 Goals
Federal regulations, 15 CFR Part 921(b), provide five specific goals for the Reserve System:

❖ Ensure a stable environment for research through long-term protection of National Estuarine Research Reserve resources;
❖ Address coastal management issues identified as significant through coordinated estuarine research within the System;
❖ Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
❖ Promote federal, state, public, and private use of one or more Reserves within the System when such entities conduct estuarine research; and,
❖ Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

These overarching goals provide a context for linking the NERRs at the National level, while allowing sites to capitalize on their individuality and site-specific distinctions. The mission and goals of the individual reserves are dove-tailed with both the mission and goals of the NERRs, as well as the strategic goals developed collectively by NOAA’s Estuarine Reserves Division (ERD) and the reserves.

2.1.3 National Estuarine Research Reserve System Strategic Goals 2003-2008
The Reserve System began a strategic planning process in 1994 in an effort to help NOAA achieve its environmental stewardship mission to ‘sustain healthy coasts’. In conjunction with the strategic planning process, ERD and reserve staff have conducted a multi-year action planning process on an annual basis since 1996. The resulting five-year action plan provides an overall vision and direction for the Reserve System. The goals and objectives of Kachemak Bay NERR align with the goals and objectives of the National program.

The objectives for the NERRS Strategic Plan goals (revised 2002) are listed in Table 1 below.

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<tr>
<td>#1: Improve coastal decision making by generating and transferring knowledge about coastal ecosystems.</td>
</tr>
<tr>
<td>Objective 1: Increase ecological understanding of estuaries through research and monitoring</td>
</tr>
</tbody>
</table>
Objective 2: Increase understanding about relationships among estuaries and human activities, social issues, values, and behaviors through research and monitoring

Objective 3: Enhance the transfer of knowledge, information, and skills to coastal decision makers for improved coastal stewardship

Objective 4: Provide education programs for students, teachers, and the public for increased literacy about estuaries

#2: Enhance and expand the National Estuarine Research Reserve System.

Objective 1: Maintain and enhance the integrity of reserve habitats through stewardship and restoration

Objective 2: Enhance the long-term integrity and diversity of reserve habitats by implementing land acquisition plans

Objective 3: Ensure reserves have facilities to meet NERRS goals and programmatic needs

Objective 4: Identify and designate new reserves consistent with NERRS policy

#3: Increase awareness, use, and support of the Reserve System and its estuarine science, education, and stewardship programs.

Objective 1: Enhance the system’s ability to promote reserve products, services, and opportunities

Objective 2: Increase visibility and credibility of NERRS within key professional communities

Objective 3: Enhance outreach and partnership activities for increased governmental and community support

2.2 BIOGEOGRAPHIC REGIONS

NOAA has identified eleven distinct biogeographic regions and twenty-nine subregions in the United States, each of which contains several types of estuarine ecosystems (15 CFR Part 921, NERRS Typological Classification Scheme – Figure 2, Appendix 2).

The Kachemak Bay NERR is representative of the Aleutian Island subregion of the Fjord biogeographic region. It is the only reserve that currently exists in the Fjord region, which, in the United States, is situated entirely within the State of Alaska.
When complete, the NERR System will contain examples of estuarine hydrologic and biological types characteristic of each biogeographic region. Each reserve is responsible for conducting research, and providing educational and interpretive services that are applicable to its region. As of 2005, the NERR System includes twenty-six reserves and two reserves in the process of designation (Figure 3).

Individual Reserves are listed in alphabetical order Table 2 with their designation date.

<table>
<thead>
<tr>
<th>NERR</th>
<th>Designation</th>
<th>NERR</th>
<th>Designation</th>
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</thead>
<tbody>
<tr>
<td>Apalachicola, FL</td>
<td>1979</td>
<td>North Inlet-Winyah Bay, SC</td>
<td>1992</td>
</tr>
<tr>
<td>Chesapeake Bay, MD</td>
<td>1985, 1990</td>
<td>Old Woman Creek, OH</td>
<td>1980</td>
</tr>
<tr>
<td>Chesapeake Bay, VA</td>
<td>1991</td>
<td>Padilla Bay, WA</td>
<td>1980</td>
</tr>
<tr>
<td>Delaware, DE</td>
<td>1993</td>
<td>Rookery Bay, FL</td>
<td>1978</td>
</tr>
<tr>
<td>Elkhorn Slough, CA</td>
<td>1979</td>
<td>San Francisco Bay, CA</td>
<td>2003</td>
</tr>
<tr>
<td>Grand Bay, MS</td>
<td>1999</td>
<td>Sapelo Island, GA</td>
<td>1976</td>
</tr>
<tr>
<td>Great Bay, NH</td>
<td>1989</td>
<td>South Slough, OR</td>
<td>1974</td>
</tr>
<tr>
<td>Guana Tolomato Matanzas, FL</td>
<td>1999</td>
<td>St. Lawrence, NY</td>
<td>proposed</td>
</tr>
<tr>
<td>Hudson River, NY</td>
<td>1982</td>
<td>Texas, TX</td>
<td>proposed</td>
</tr>
<tr>
<td>Jobos Bay, PR</td>
<td>1981</td>
<td>Waquoit Bay, MA</td>
<td>1988</td>
</tr>
<tr>
<td>Kachemak Bay, AK</td>
<td>1999</td>
<td>Weeks Bay, AL</td>
<td>1986</td>
</tr>
<tr>
<td>Narragansett Bay, RI</td>
<td>1980</td>
<td>Wells, ME</td>
<td>1984</td>
</tr>
</tbody>
</table>

2.3 NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM ADMINISTRATIVE FRAMEWORK

The Estuarine Reserves Division (ERD) of the Office of Ocean and Coastal Resource Management (OCRM) administers the Reserve System. The Division establishes standards for designating and operating reserves, provides support for reserve operations and system-wide programming, undertakes projects that benefit the Reserve System, and integrates information from individual reserves to support decision-making at the national level.
NOAA also coordinates with the Reserve’s State partner. Kachemak Bay NERR’s State partner is the Alaska Department of Fish and Game (ADF&G). Reserve operations are administered under ADF&G’s Division of Sport Fish, and outlined, in part, in a Memorandum of Understanding (MOU) between ADF&G and NOAA (Appendix 3). This MOU establishes the federal-state framework for coordination, cooperation, and communication regarding the Reserve.

The management structure for NOAA and ADF&G is as follows:

As required by Federal regulation, 15 CFR Part 921.40, OCRM periodically evaluates reserves for compliance with Federal requirements and with the individual reserve’s Federally-approved management plan.

NOAA also conducts periodic performance evaluations of reserves as a requirement of Sections 312 and 315 of the CZMA. Evaluations are conducted at least once every four years to determine whether the State’s management is consistent with NERRS programmatic goals and objectives. Financial assistance from NOAA for reserve operations and programs is dependent upon satisfactory performance evaluations.

The last 312 Evaluation for Kachemak Bay was conducted in the spring of 2003 and identified two primary concerns: (1) the timely submission of grant proposals and reports; and, (2) the need for collaboration with ADF&G to develop financial stability for the Reserve. Since the 312 Evaluation, the Reserve has worked to submit all proposals and reports on time, meeting both state and federal timelines. ADF&G, Division of Sport Fish has worked with the Reserve to secure State funding for two staff positions, Administrative Assistant and Accounting Clerk I. This funding is now used toward the 30% match needed each year for the annual NOAA Operations award. In addition to the two staff positions, the Division of Sport Fish has provided essential guidance in identifying sources to secure the remaining match. ADF&G and Reserve staff have worked hard to address the concerns raised in the 312 Evaluation and feel strongly that the next evaluation will highlight this improvement, as well as the incredible strides made
by the Research and Education programs. The results of that evaluation, as well as
ADF&G’s response to the evaluation are provided in Appendix 4.

2.3.1 System-Wide Programs
The Estuarine Reserves Division currently provides support for three system-wide
programs: the System-Wide Monitoring Program (SWMP); the Graduate Research
Fellowship (GRF) Program; and, the Coastal Training Program (CTP). These programs
will be discussed further in their respective sections of this Management Plan:

<table>
<thead>
<tr>
<th>Program</th>
<th>Chapter</th>
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</thead>
<tbody>
<tr>
<td>System-Wide Monitoring Program</td>
<td>Research Chapter</td>
</tr>
<tr>
<td>Graduate Research Fellowship Program</td>
<td>Research Chapter</td>
</tr>
<tr>
<td>Coastal Training Program</td>
<td>Education Chapter</td>
</tr>
</tbody>
</table>

ERD also provides support for reserve initiatives on restoration science, invasive
species, K-12 education, and reserve specific research, monitoring, education, and
resource stewardship initiatives and programs.
3.0 ALASKA DEPARTMENT OF FISH AND GAME

The Alaska Department of Fish and Game’s mission is to protect, maintain, and improve the fish, game, and aquatic plant resources of the State, and manage their use and development for the maximum benefit of the people of the State, consistent with the sustained yield principle. To that end, the Department supports five Divisions: Wildlife Conservation, Sport Fish, Commercial Fisheries, Subsistence, and Administrative Services. The Reserve is housed in the Division of Sport Fish.

3.1 DIVISION OF SPORT FISH

The Division of Sport Fish was established in 1951 as part of Alaska’s territorial government to oversee Alaska’s developing sport fisheries. Its creation coincided with the passage of the Dingle-Johnson Act that gave states and territories dedicated federal funds to conduct scientific research related to recreational fisheries. Today, the Division is responsible for oversight and management of Alaska’s sport and personal use fisheries worth more than 500 million dollars annually. A recently completed Strategic Plan details the mission, vision, goals, objectives, and strategies of the Division of Sport Fish.

The Division has an annual budget of approximately $45 million. Nearly all of the funds are derived from user-pay sources including the sale of fishing licenses, stamps, and sport fishing-related equipment and fuel. The primary funding sources are the State’s Fish and Game Fund and the Federal Sport Fish Restoration Program.

The Division of Sport Fish’s mission is to:

*Protect and improve Alaska’s recreational and personal use fisheries. This includes stock assessment, management, hatchery production, access development and maintenance, habitat assessment and permitting, information and education, enforcement and planning and survey activities*

3.1.1 Division of Sport Fish Strategic Plan 2004

The Strategic Plan supports the recognition that sport fishing opportunities are an essential element of Alaska’s economy and essential to the well-being of Alaskans. This Plan guides current activities and budget decisions. As with any dynamic planning process, this Plan will continue to be refined over time, with the public involved in making modifications. The goals and objectives of this Strategic Plan are outlined in Table 3 below. The goals and objectives of Kachemak Bay NERR complement the goals and objectives of the State program.

*Let your hook be always cast. In the pool where you least expect it, there will be fish.*

Ovid
<table>
<thead>
<tr>
<th>Table 3. ADF&amp;G, Division of Sport Fish Strategic Plan Goals and Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1: Sustain recreational fishing opportunities while optimizing social and economic benefits from these opportunities.</td>
</tr>
<tr>
<td><strong>Objective A:</strong> To sustain fisheries and conserve wild stocks with management based on scientifically sound assessments</td>
</tr>
<tr>
<td><strong>Objective B:</strong> To assess and meet the demand for a variety of recreational fishing experiences</td>
</tr>
<tr>
<td><strong>Objective C:</strong> To support effectiveness of management measures by increasing compliance with laws and regulations</td>
</tr>
<tr>
<td><strong>Objective D:</strong> To promote partnerships with other agencies, users, tribal entities, and other stakeholders to sustain Alaska’s fisheries resources</td>
</tr>
<tr>
<td><strong>Objective E:</strong> To consider social and economic aspects of management options designed to sustain recreational fishing opportunities</td>
</tr>
<tr>
<td>#2: Conserve, manage, and improve Alaska’s aquatic, riparian, and upland habitats to ensure sustainability of Alaska’s fishery resources.</td>
</tr>
<tr>
<td><strong>Objective A:</strong> To manage public access to fisheries such that the immediate and cumulative impacts to aquatic, riparian, and upland habitats are minimized</td>
</tr>
<tr>
<td><strong>Objective B:</strong> To manage aquaculture to minimize the immediate and cumulative impacts to aquatic, riparian, and upland habitats</td>
</tr>
<tr>
<td><strong>Objective C:</strong> To protect Alaska’s aquatic, riparian, and upland habitats from aquatic nuisance species</td>
</tr>
<tr>
<td><strong>Objective D:</strong> To minimize immediate and cumulative impacts of land and water development to aquatic, riparian, and upland habitats</td>
</tr>
<tr>
<td><strong>Objective E:</strong> To ensure sufficient water quantity and quality necessary to sustain aquatic, riparian, and upland habitats</td>
</tr>
<tr>
<td><strong>Objective F:</strong> To develop and/or conduct scientifically sound research projects to better understand the relationships among fish, their habitats, and fishing in both fresh and marine waters</td>
</tr>
<tr>
<td><strong>Objective G:</strong> To develop a management strategy for non-game populations and their associated habitats</td>
</tr>
<tr>
<td>#3: Foster a public that is consistently informed and involved in recreational fisheries.</td>
</tr>
<tr>
<td><strong>Objective A:</strong> Educate Alaskans of all ages about stewardship and about the value of sustaining Alaska’s fishery resources</td>
</tr>
<tr>
<td><strong>Objective B:</strong> To inform anglers of opportunities to participate in Alaska’s recreational fisheries</td>
</tr>
<tr>
<td><strong>Objective C:</strong> Inform and involve the public to ensure management decisions are generally understood and accepted</td>
</tr>
<tr>
<td>#4: Recruit, develop, empower, and retain a diverse, dedicated, motivated, empowered, and effective workforce.</td>
</tr>
<tr>
<td><strong>Objective A:</strong> Through various outreach efforts, strive to achieve demographic distributions within job classes so that our workforce better reflects Alaska’s population</td>
</tr>
<tr>
<td><strong>Objective B:</strong> Increase the number of highly qualified applicants to at least five candidates for each job recruited</td>
</tr>
<tr>
<td><strong>Objective C:</strong> Provide each staff member with opportunities for professional development to enable them to perform competently and excel in their current position and to prepare qualified employees to be competitive candidates for more advanced jobs</td>
</tr>
<tr>
<td><strong>Objective D:</strong> Ensure continuation and development of divisional services by planning for anticipated and unanticipated vacancies</td>
</tr>
<tr>
<td><strong>Objective E:</strong> Manage our workforce so that the running five year average annual turnover rate is less than 5% of full-time permanent staff leaving divisional employment with other divisions, agencies or the private sector</td>
</tr>
<tr>
<td><strong>Objective F:</strong> Foster an effective, productive, and open work environment</td>
</tr>
<tr>
<td><strong>Objective G:</strong> Ensure a physically safe and well-equipped work environment</td>
</tr>
</tbody>
</table>
4.0 KACHEMAK BAY
NATIONAL ESTUARINE RESEARCH RESERVE

The mission of the Kachemak Bay NERR is to:

Enhance understanding and appreciation of the Kachemak Bay estuary and adjacent waters to ensure that these ecosystems remain healthy and productive.

This mission has been and will continue to be implemented by: (1) developing a comprehensive research and monitoring program that builds a database of baseline information for long-term monitoring and future change analyses; (2) establishing an educational leadership presence in the community and region through innovative, hands-on programs that expand beyond traditional learning experiences; and, (3) translating science-based data to decision-makers, the community, and the general public to promote more informed decision-making and challenge individuals to become better stewards of the environment.

Issues driving the Reserve’s programmatic direction and focus over the next five years include:

- larval and juvenile fisheries recruitment and life history dynamics;
- climate change;
- coastal dynamics (natural and anthropogenic), including landuse change;
- natural hazards;
- socioeconomics associated with coastal resources; and,
- public access.

In addition to the mission, the Reserve operates under a unifying Vision that emphasizes focus and commitment:

- We believe that gaining an understanding and appreciation of how high latitude coastal (watershed, estuarine, and marine) ecosystems function will lead to responsible and sustainable use of Alaskan coastal resources.
- We believe that the Kachemak Bay estuary and adjacent waters provide an outstanding living laboratory in which to conduct high latitude coastal research.
- We are committed to providing leadership and building partnerships in order to conduct and promote excellence in regional research and education.
- Our aim is that the Reserve’s high-quality, integrated Research and Education programs will result in better decision-making and stewardship of coastal resources and habitats.

4.1 MANAGEMENT AUTHORITY

Kachemak Bay NERR, consistent with its designation as a non-regulatory program, does not implement land-use regulations or controls, but instead relies upon the existing local, state, and federal regulatory and management authorities (EIS 1998).
The land and waters within Kachemak Bay NERR are in public ownership and managed by state entities. Three state legislatively designated areas (Figure 4) are included in the Reserve:

1. Kachemak Bay Critical Habitat Area (CHA);
2. Fox River Flats CHA; and,
3. those portions of Kachemak Bay State Park and State Wilderness Park (KBSP) that drain into Kachemak Bay.

These designations provide the strongest resource conservation afforded by the State of Alaska. In addition to these designations, Kachemak Bay NERR is also consistent to the maximum extent practicable with the Alaska Coastal Management Program (ACMP) (Appendix 5).

Note: There are private ownerships along the Reserve’s boundary. As the Reserve’s programs move forward, it is anticipated that collaboration with these landowners will develop.

Alaska’s coastal areas differ from the continental United States coasts in that large, contiguous tracts of relatively pristine state lands and waters remain intact. The area within the Kachemak Bay NERR boundary represents over 370,905 acres of publicly-
owned and, almost exclusively, State-managed lands and waters, making it the largest reserve in the national system (EIS 1998).

ADF&G is the lead management agency for the Reserve. As part of establishing the Reserve, ADF&G signed Memoranda of Understanding (MOU) with the other primary landholders within the Reserve boundary:

- Alaska Department of Natural Resources (ADNR) [Alaska Division of Parks and Outdoor Recreation (ADPOR) and Division of Land] (including uplands, wetlands, tidelands, and waters) (Appendix 6);
- US Fish and Wildlife Service (USFWS), Alaska Maritime National Wildlife Refuge (NWR) in Homer (for tidelands and uplands adjoining Beluga Slough) (Appendix 7); and,
- City of Homer (for certain city-owned lands and tidelands) (Appendix 8) (EIS 1998).

Land and water management responsibilities within the Reserve are relatively simple with two principal land managers: ADF&G Sport Fish Division oversees the two Critical Habitat Areas and ADNR (ADPOR and Division of Land) manages the State Park. These two State agencies signed a Cooperative Agreement in 1989 to coordinate management of State lands and waters within the Fox River Flats and Kachemak Bay Critical Habitat Areas (CHAs), and Kachemak Bay State Park (KBSP)(Appendix 6). Land-use patterns within and adjacent to the Reserve are depicted in Figure 5.
4.2 GENERAL LOCATION

Kachemak Bay NERR’s headquarters is located in Southcentral Alaska on the Kenai Peninsula in the City of Homer. In 2001, the Reserve began a partnership with the Alaska Maritime National Wildlife Refuge to construct a joint office facility with a Visitor Center. This building, known as the Alaska Islands and Ocean Visitor Center (AIOVC), was completed in the fall of 2003 and Reserve staff began operating out of the office in December of that year.

Kachemak Bay is an elongated embayment contiguous with the southeastern entrance to Cook Inlet (Figure 4). The Bay is 63 km (39 mi) long and 39 km (24 mi) wide at its entrance between Anchor Point and Point Pogibshi, with more than 515 km (320 mi) of shoreline. Homer Spit projects 7.2 km (4.5 mi) out into the Bay, dividing it into an ‘inner’ and ‘outer’ Bay. The inner Bay is east of Homer Spit to the head of Kachemak Bay, and the outer Bay is west of Homer Spit to the mouth of Kachemak Bay. Kachemak Bay is bordered on the north by the rolling hills and bluffs of the Kenai lowlands and on the south by the Kenai Mountains, with the watershed encompassing more than 2,658 km$^2$ (1,026 mi$^2$).

The Bay has a maritime climate influenced by the North Gulf of Alaska waters. Cool summers, mild winters, moderate precipitation and frequent storms characterize the area. Average winter air temperatures in Homer on the north side of the Reserve range from −12ºC (10ºF) to 5.5º (42ºF), and summer temperatures average 5.5ºC (42ºF) to 15ºC (59ºF). While in Seldovia, on the southern side of the Reserve, winter air temperatures reach lows of -12ºC (10ºF), and summer temperatures range from 4ºC (40ºF) to 18ºC (65ºF) (www.seldovia.com 2002).

Annually, Homer receives an average of 0.7 m (25 in) of annual precipitation. Comparatively, Seldovia averages 0.9 m (35 in) of annual precipitation (www.seldovia.com 2002).

4.2.1 Historical Background
Reserve Designation and Operation
Under Federal law (16 USC Section 1461), a state can nominate an estuarine ecosystem for Research Reserve status so long as the site meets the following conditions:

- the area is representative of its biogeographic region, is suitable for long-term research and contributes to the biogeographical and typological balance of the System;
the law of the coastal state provides long-term protection for the proposed Reserve’s resources to ensure a stable environment for research;

designation of the site as a Reserve will serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation; and,

the coastal state has complied with the requirements of any regulations issued by the Secretary [of Commerce].

Reserve boundaries must include an adequate portion of the key land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation.

If the proposed site is accepted into the NERR System, it is eligible for NOAA financial assistance on a cost-share basis with the state. The state exercises administrative and management control, consistent with its obligations to NOAA, as outlined in a Memorandum of Understanding. A Reserve may apply to NOAA’s ERD for funds to help support operations, research, monitoring, education/interpretation, stewardship, development projects, facility construction, and land acquisition.

The Kachemak Bay NERR was designated in 1999 as the 23rd reserve in the NERR System. It has operated for the past five years under the Final EIS/Management Plan developed during the designation process. Now, at the end of the initial five years, this updated Management Plan will provide a fresh perspective and focus on federal programs, state support, and community partnerships, rather than the designation and EIS information associated with the current Management Plan.

4.2.2 Boundaries
Reserve boundaries generally encompass two classifications of areas: (1) core land and waters, and (2) buffer land and waters. Core designated areas are considered vital to the functioning of the estuarine ecosystem, such that they must be under a level of control sufficient to ensure the long-term viability of the Reserve for research on natural processes.

In Kachemak Bay NERR, the core land and waters include the Fox River Flats and Kachemak Bay Critical Habitat Areas.

Buffer land and waters protect the core area and provide additional protection for estuarine-dependent species, including those areas that are rare or endangered. When determined appropriate by the state and approved by NOAA, the buffer areas may also include an area necessary for research and interpretation facilities.

In Kachemak Bay NERR, buffer lands and waters include those portions of Kachemak Bay State Park draining into Kachemak Bay, as well as other publicly-owned lands in Beluga Slough and Homer Spit.

The boundary for Kachemak Bay NERR encompasses two State Critical Habitat Areas (CHAs) (Fox River Flats and Kachemak Bay) and one State Park (Kachemak Bay State
Park) (Figure 4). The State CHAs comprise 923 km$^2$ (229,100 ac) within the Reserve boundary [Fox River Flats = 27 km$^2$ (7,100 ac); Kachemak Bay = 926 km$^2$ (222,000 ac)], while Kachemak Bay State Park, Alaska’s first State Park, makes up the remaining 554 km$^2$ (137,000 ac).

### 4.2.3 Climate

The climate in the Kachemak Bay watershed is maritime and is characterized by a relatively moderate seasonal range of temperatures, high humidity, and ample rain and snow. The Bay and the Pacific Ocean minimize large extremes in the air temperature, resulting in mild winters and cool summers. Annually, the mean Homer temperatures vary from the low of 15ºC (60ºF) in summer to the low of 5ºC (30ºF) in winter (National Oceanic and Atmospheric Administration, Climate Diagnostic Center 1998). Daily weather, however, can range from sunny and clear to hailing and rainy within the same afternoon (KBNERR 2001).

Most of the 0.7 m (25 in) of annual precipitation occurs in late summer and fall. The majority of snow falls from November to March, and it frequently rains on warm winter days (Savard and Scully 1984). Despite its maritime climate, the Kachemak Bay watershed does not receive as much precipitation as nearby Seward because the high peaks of the Kenai Mountains and the outer coast’s steep fjords trap moisture-laden clouds from the Gulf of Alaska, preventing much rain and snow from reaching Kachemak Bay (Figure 6)(KBNERR 2001).

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**Spotlight**

**The Good Friday Earthquake**

At 5:36 PM Alaska Standard Time (3:36 AM March 28, 1964 UTC), a fault between the Pacific and North American plates ruptured near College Fjord in Prince William Sound. The earthquake lasted for three to five minutes in most areas. Ocean floor shifts created large tsunamis, which resulted in many of the deaths and much of the property damage. Vertical displacement of up to 11.5 m (38 feet) occurred, affecting an area of 250,000 km$^2$ (100,000 miles$^2$) within Alaska. 131 people were killed as a result of the earthquake: nine in the earthquake itself, 106 from tsunamis in Alaska, and 16 from tsunamis elsewhere. Property damage was estimated at over $300 million (1964 dollars), or $1.8 billion in 2005 U.S. dollars. ([http://en.wikipedia.org/wiki/Good_Friday_Earthquake](http://en.wikipedia.org/wiki/Good_Friday_Earthquake))

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Both glacial and tectonic forces have been active in shaping the present features of Kachemak Bay. Active volcanoes (Mt. Douglas, Mt. Augustine, Mt. Iliamna, and Mt. Redoubt) lie just outside of the western boundary of the Reserve. Remnants of huge Pleistocene glaciers are still present in the form of Grewingk, Dixon, Portlock, Wosnesenski, and Doroshin glaciers, as well as the Harding Icefield (EIS 1998). Though glacial valleys and outwash plains dominate the morphology of the Bay, three significant fault zones have contributed to the geologic character of Kachemak Bay. Two of these zones, identified as the 'Tutka Fault Zone' and the 'Doroshin Fault Zone', are roughly perpendicular to the axis of the Kenai Mountains. The third zone, identified as the 'Halibut Cove Lagoon Zone', is nearly parallel to the axis of the Kenai Mountains (ADNR 1995, EIS 1998).

The most notable seismic event in recent history was the 1964 Good Friday earthquake on March 27, the second strongest earthquake ever recorded in the world. The 1964 earthquake, centered between Anchorage and Valdez, released stress that had accumulated in the subduction zone where the North American and Pacific plates converge. This earthquake measured 9.2 on the Richter Scale and was felt around the globe. Regional vertical displacement in the form of uplift and subsidence occurred throughout the Cook Inlet, the Kenai Peninsula, and the Copper River Delta. In the Kachemak Bay area, severe effects included land subsidence, landslides, earth fissures, submarine landslides, compaction, and erosion. Water quantity and quality problems were also found in the well water (Waller and Stanley 1966). The end of the Homer Spit sank stranding people (KBNERR 2001). The primary impacts were:

- 0.6 m to 1.8 m (2 ft to 6 ft) subsidence of the entire area;
- earth flows;
- landslides; and,
- minor fissuring.

The Homer Spit forms a distinguishing natural feature in Kachemak Bay. The Spit itself extends 7.2 km (4.5 mi) into the Bay and is second in length in the United States only to Dungeness Spit in Washington, an 8-km (5-mi) long sand spit (KBNERR 2001). Composed of unconsolidated sands and gravels, the geologic origin of the Spit is believed to be both glacial and littoral. The Spit was created between 14,000 to 15,000 years ago as the submarine end moraine of a glacier that filled the Bay during the Naptowne glaciation (Reger and Pinney 1997).

Over time, the process of erosion and the movement of longshore currents worked together to deposit sand and gravel from the adjacent bluffs, building the Spit. Human forces began shaping and influencing the Spit in the 1940s. Though erosional and depositional processes continue to shape the Spit, more dramatic changes have been brought about by human modification (KBNERR 2001).

The Fox River delta at the head of Kachemak Bay is a typical deltaic plain created by sedimentary deposition from Sheep Creek, and the Fox and Bradley Rivers (EIS 1998). The Fox River Flats area is an extensive, shallow, depositional delta of mudflats and marsh, which receives the waters and sediments of the Fox River, Sheep Creek, Bradley
River, Battle Creek, and Martin River. Alternately, they are flooded by the high tides of Kachemak Bay, making the area a large coastal wetland community that is uncommon in Southcentral Alaska (KBNERR 2001).

4.2.5 Physiography and Hydrology
The entire Reserve boundary, including both land and water, encompasses approximately 1,501 km$^2$ (580 mi$^2$ or 370,905 ac) – the water alone encompasses more than 60% of the area or approximately 917 km$^2$ (354 mi$^2$). Comparatively, the watershed that drains into this area is an estimated 2,658 km$^2$ (1,026 mi$^2$) in size. At roughly three times the size of the Bay, the Reserve’s watershed, because of it’s fjordal structure, is small compared to many areas where the watershed is more than ten times the size of estuary.

The finest workers in stone are not copper or steel tools, but the gentle touches of air and water working at their leisure with a liberal allowance of time.

North and South Sides of Bay
The northern and southern sides of the watershed have dramatically different geomorphology, geology, climate, vegetation, soil, and hydrology characteristics. Hydrology also differs between the two sides. The north side of the watershed, which has gentle topography, and the head of the Bay have much more extensive river systems than the south side of the Bay, where steep topography and glaciation limit the length of the rivers. Melting snow and rain drive the hydrologic system of the northern watershed, including the Anchor River, and determines the timing of peak flows. On the southern side, snow melt in the early summer, and glacial melt in the late summer, are the predominant influences (Vonderheide pers. comm.). The rolling hills and gentle slopes of the northern side of the watershed are underlain by sedimentary rock, while the jagged glaciated peaks of the southern side are underlain by ancient bedrock (KBNERR 2001).

The climates of the northern and southern sides are also rather different. The southern side is wetter, and much more snow and precipitation falls annually in Seldovia than in Homer. As a result, the wetter, steeper southern side supports the most northern reach of the temperate rain forest. In comparison, the drier, flatter northern side supports a mixed deciduous and conifer community that transitions to tundra that comprises much of the Peninsula’s eastern side.

The head of Kachemak Bay is characterized by extensive tidal flats, braided drainages, and marshlands. The northern shore consists of cliffs composed
mostly of sand and clay leading down to shallow mud flats. The southern shoreline consists of hard rock cliffs and deep embayments. Many islands are also found along the southern shore (EIS 1998).

Several major glacial streams discharge into inner Kachemak Bay: Fox, Martin, Wosnesenski, and Bradley rivers; and Sheep, Battle, Halibut, Portlock and Grewingk Creeks. In addition, several minor nonglacial streams discharge into Kachemak Bay along the southern shore. The northern coast is drier, and only eight small nonglacial streams of limited drainage enter the inner Bay from that side (Trasky et al. 1977, EIS 1998).

The rolling terrain behind the northwest shore suggests that river flow is controlled by precipitation. About 90% of the area immediately north of the Bay is drained by the Anchor River, discharging directly into Lower Cook Inlet (Knull 1975, EIS 1998).

**Inner and Outer Kachemak Bay**

The Homer Spit is a striking geologic feature of Kachemak Bay, and it also has a dramatic impact on the Bay's circulation. The Spit bisects the Bay into inner and outer zones. These zones differ in freshwater influence and in wave action. The outer saline Bay is a mixing basin for the cold, saline, nutrient-rich Alaskan coastal current. The Alaskan coastal current comes from the southeast via the Cook Inlet and from the glacial fresh water that drains from the Bay's tributaries. It is a high-wave-energy environment that receives the full force of swells from across the Inlet.

The inner Bay has a lower salinity because the influence of freshwater tributaries is stronger in the semi-contained water found behind the Homer Spit. The inner Bay also remains calmer because the Homer Spit blocks the swells from the Inlet. Water masses from the inner and outer zones or the Bay meet during the daily tidal cycle.

**4.2.6 Oceanography**

Kachemak Bay averages 46 m (150 ft) in depth, the bottom being relatively flat with the exception of a 100-160 m (330-540 ft) trench that runs along the southern edge. The deepest part of the Bay is a 176-m (576-ft) depression located north of Cohen Island at the entrance to the inner Bay, known as the Jakolof Trench (EIS 1998).

The dominant water movement in Kachemak Bay is the oscillatory flood and ebb of the tide. The net circulation (independent of, but largely driven by, the tidal currents) in the outer Bay is characterized by an influx of clear ocean water from the Gulf of Alaska on the south side of the Bay and a corresponding outflow of glacial runoff derived fresh water on the north side of the Bay. The central region of the outer Bay is believed to contain two semipermanent gyres (Trasky et al. 1977, EIS 1998).

Studies of inner Kachemak Bay (Bright et al. 1960) found an average freshwater layer depth during summer of 3.6 m (12 ft) and a salinity ranging from nearly zero at stream mouths to 32.5 ppt at the entrance to the inner Bay (EIS 1998). Although fed
in part by glacial streams, water in the outer Bay is generally quite clear with a very low suspended sediment load. Suspended sediment concentrations in the inner Bay are normally higher than in the outer Bay, particularly in spring and summer, due to glacial and river runoff near the head of the Bay. Eroding bluffs along the north side of the inner and outer Bay contribute additional sediments (EIS 1998).

Tides in Kachemak Bay and Lower Cook Inlet are semi-diurnal with a significant inequality between successive low waters. This means there are two high tides within a lunar (24 hour 50 minute) day, one of which will generally exceed the other by several feet. The mean diurnal range in Kachemak Bay is 4.7 m (15.4 ft) at Seldovia. Highest tides exceed 6.9 m (22.5 ft) and the lowest tides are about –1.8 m (-6.0 ft) (Trasky et al. 1977, EIS 1998).

Surface water temperatures in the Bay range between a high of 12.8°C (55°F) in the summer and a low of -2°C (28°F) in the winter (EIS 1998).

4.2.7 Circulation
Circulation in outer Kachemak Bay is believed to be dominated by two large gyres, a counterclockwise rotating gyre in the eastern half and a clockwise rotating gyre in the western half. Net transport in the outer Bay is generally northward whether or not the gyres are present (Figure 7) (EIS 1998). Surface waters in the outer Bay are apparently derived largely from coastal upwelling (divergence) northwest of the Chugach Islands. This may significantly increase available nutrient concentrations and greatly enhance biological productivity in outer Kachemak Bay (EIS 1998).

Figure 7. Detail of the surface gyres in inner Kachemak Bay

In general, vertical circulation within inner Kachemak Bay appears typical for a positive, partially mixed estuary, consisting of a strong outflow of relatively fresh surface water and influx of more saline waters at depth.
Circulation is strongly influenced, if not controlled, by freshwater runoff during the spring and summer (Figure 7). However, tides provide an integral and very significant driving force in the circulation of the inner Bay, and fall and winter circulation can be largely tidally driven (EIS 1998).

Fresh water, introduced primarily by the Fox, Bradley, and Martin Rivers and Sheep Creek at the head of the Bay, flows out of the Bay along the northwest shore. The gyre movements and horizontal mixing processes tend to distribute the freshwater layer throughout the inner Bay (EIS 1998).

4.3 BIOLOGICAL COMPONENTS

From 1500-m (5,000-ft) high alpine peaks to 176-m (576-ft) deep sea trenches, Kachemak Bay houses a diversity of flora and fauna. In Kachemak Bay and its watershed, the following species have been documented: 11 species of marine mammals, 36 species of terrestrial mammals, 244 species of birds, 1 species of amphibian, 120 species of fish, 404 species of marine invertebrates, 125 species of marine algae, and 663 species of vascular plants. There are undoubtedly additional species that have yet to be documented, especially fish, invertebrates, marine algae and plants (EIS 1998). Kachemak Bay’s varied coastline, numerous freshwater sources, and diverse geomorphology create a microcosm of Southcentral Alaskan habitat types (KBNERR 2001). A brief overview of major floral and faunal components within the Reserve is presented below. A more detailed summary of existing plant communities and their composition is provided in Appendix 9. Species lists are provided in Appendix 10.

4.3.1 Flora

Aquatic – Subtidal
The Homer Spit bisects Kachemak Bay into inner and outer Bays with the inner having more freshwater influence, turbidity, and protection from Lower Cook Inlet waves than the outer Bay. The Spit also creates a constriction that channels the tide to the southern side of the inner Bay. The photic zone supports photosynthesis and large populations of surface-dwelling species and plankton. The aphotic zone below is colder, darker, and has more marine influence because fresh water floats in a lens on the surface. No photosynthesis occurs in the aphotic zone; it receives most of its nutrients from decomposing plankton and other marine life (KBNERR 2001). Kelp forests are the primary subtidal plant community and are dominated by bull kelp. The largest kelp bed in the Bay lies off Bluff Point.

Aquatic - Intertidal
The Bay's 8.5 m (28 ft) tidal range creates a wide band of intertidal habitats (Figure 8). On the southern shore, rocky substrates are intermixed with beaches and tidal flats. Protected beaches are contrasted with those with high wave energy (KBNERR 2001). In addition to forming the base of the marine food chain, aquatic plants provide habitat
structure for a wide variety of organisms. The rocky substrates of Kachemak Bay support the highest diversity of plant communities. Algae are well-developed from the mid-intertidal zone to a depth of about 20 m (66 ft). Rockweed is most abundant at upper intertidal levels. Red algae (red ribbon, frilly red ribbon, stiff red ribbon) are most abundant in disturbed or stressed areas, usually from medium to low intertidal levels. A variety of kelps predominate at low intertidal levels, extending into subtidal areas. Eelgrass beds occur in Seldovia, Jakolof, Kasitsna, and Mud Bays (Lees 1977). Large expanses of eelgrass are found along the northern shoreline in the low intertidal zone (EIS 1998).

**Figure 8. Intertidal Habitat Mapping Project**
The Kachemak Bay NERR intertidal habitat mapping project, showing links to associated data and photos.

**Figure 9. Salt Marsh Mapping Project**
The Kachemak Bay NERR salt marsh mapping project, showing links to associated data and photos.

**Terrestrial – Head of the Bay**
An extensive tidal marsh surrounds the head of the Bay at Fox River Flats, and numerous smaller marshes lie at the heads of protected bays and fjords (Figure 9). The northern shore’s eroding sandstone bluffs grade into unconsolidated substrates of mixed sand, gravel, and cobble beaches, as well as extensive mudflats (KBNERR 2001). Fox River Flats represents the largest coastal wetland in Kachemak Bay, encompassing approximately 29 km² (7,100 ac) of wetlands.
and tideflats. The Flats are composed primarily of saltwater herbaceous sedges and unvegetated mud flats. Two sedges dominate the upper intertidal zone: Ramenski sedge and Lyngbye sedge. Large and small ponds are numerous near the upper edge of the intertidal zone. Pond water is silty and fresh, although salinities up to 5% have been recorded (Batten et al. 1978). Aquatic vegetation in the ponds is dominated by pondweeds and mare’s tail. The coastal marsh grades into grassland dominated by reedgrass, or an inner marsh in which sedges, grasses, and forbs are common (Batten et al. 1978). Cottonwood groves and alder thickets transition into coniferous forests at higher elevations (EIS 1998).

**Terrestrial – Southern Shore**

The second largest salt marsh within the Reserve is found in China Poot Bay on the southern shoreline. Twenty-one species of flowering plants have been identified in the 2.4-km$^2$ (600 ac) China Poot marsh, a relatively low diversity compared to other salt marshes in Alaska (Crow 1978). An alkali grass, along with several succulent species, and arrowgrass dominate plant communities. These communities depend upon frequent, if not daily, tidal inundation. Much of the litter and detritus from these marsh communities is flushed into the Bay, contributing to the productivity of the marine environment (ADF&G 1993, EIS 1998).

The Kenai Mountains along the southern boundary are segmented by deep ravines, rock walls, glaciers, and icefields. Lower slope vegetation is dominated by mature stands of Sitka spruce and smaller stands of mixed spruce-deciduous forest. Cottonwoods and willows cover the floodplains and lower river valleys of the region. At the upper extent of the forest and on the steeper or wetter slopes below the treeline, tall shrubs (primarily alder, mixed with raspberry, elderberry, and devil’s club) are the main vegetation type. The higher elevations are composed of grassy meadows, alpine tundra, bare rock, and snowfields (USACE 1982, EIS 1998).

**Terrestrial – Northern Shore**

The northern side of Kachemak Bay is part of an extensive lowland, where the maritime climate from the southeast and the continental climate from the northwest mix across a gradual topographic gradient. Interior and maritime species overlap and hybridize in this area, including several of the dominant tree species (KBNERR 2001).

The region northeast of Kachemak Bay is primarily rolling terrain and broad, flat valleys. Deep ravines cut by tributaries intersect the bluffs bordering the Bay and the Fox River Valley. Lutz spruce and birch are found in the forested areas. On the steeper hillsides, tall shrub stands containing alder, elderberry, and devil's club are found. On the more
exposed slopes above the tall shrubs, subalpine and alpine tundra is characterized by low bearberry, blueberry, and a variety of other low-growing vegetation (EIS 1998).

4.3.2 Fauna

**Aquatic**

**Rocky Substrates** - Rocky habitats support the most diverse aquatic communities. Invertebrates are most abundant and diverse where currents are high and least abundant and diverse in slow currents. Jakolof Bay supports the most robust subtidal macroinvertebrate communities known in Southcentral Alaska (Lees et al. 1980). Most of the macroinvertebrates are sedentary filter feeders, such as clams. Grazers, such as chitons and sea urchins, are abundant. Abundant predatory macroinvertebrates are primarily sea stars, snails, and hermit crabs.

**Sand and Mud Substrates** – Since seaweeds are largely absent, detritus forms the base of the food web in the sand and mud regions of outer Kachemak Bay. Much of the detritus is comprised of plant material carried by currents from rocky habitats in Kennedy Entrance and southern Kachemak Bay (Lees et al. 1980).

Invertebrate abundance in sand and mud substrates is strongly influenced by seasonal conditions, and dominance patterns are influenced by tidal exposure. Most invertebrates in sand and mud substrates are deposit or suspension feeders. Many species are more abundant at lower tidal levels; however, species composition does not appear to be affected by tide stage (Dames & Moore 1978).

Mud flats have greater species richness, biomass, and diversity of perennial species than sand beaches and, consequently, attract the highest numbers of shorebirds and ducks (Dames & Moore 1978).

**Fish and Shellfish** - The historical abundance and diversity of fish and shellfish in Kachemak Bay are the product of a nutrient rich environment, providing critical habitat for numerous species during various life phases. While the Bay historically supported king crab, tanner crab, and shrimp fisheries, those fisheries are no longer commercially viable. While these
fisheries were closed in the late 1980's and early 1990's primarily due to overharvest, it is unknown as to why after 15 years of closure, the populations have not rebounded. Currently, the most heavily commercially harvested invertebrates are octopus and littleneck clams, with a shift from shrimp to these species and groundfish, such as Pacific cod (Figure 10).

**Salmon** - There are twenty-five documented anadromous fish streams flowing into Kachemak Bay. Eight of these are considered to be major salmon producers. Five species of Pacific salmon are found in this marine environment: chinook, sockeye, coho, pink, and chum. Adult salmon are found in marine water from late April to late September and in fresh water from late May to late November. On the south side of the Bay, natural runs of salmon, in order of abundance, include pink, chum, sockeye, coho, and chinook salmon. The largest natural run of coho salmon is in the Fox River at the head of the Bay. Enhanced runs of coho and chinook salmon are maintained at the Fishing Hole on Homer Spit. Enhanced runs of pink salmon are maintained in Tutka Bay; and enhanced runs of sockeye salmon are maintained in China Poot Creek and English Bay.

**Other Marine Fish** - Adult Pacific herring are known to winter in offshore feeding grounds and in the spring move into sheltered bays to spawn. Major herring spawning areas in Kachemak Bay are Mud Bay, Bear Cove, Mallard Bay, and Tutka Bay. Pacific halibut are found throughout the Bay. Flatfish, walleye pollock, and Pacific cod are also found in the Bay. Distributions of flatfish, pollock, and cod have been documented through ADF&G trawl surveys since the 1970’s. Kelp beds along the outer southern shores of Kachemak Bay, near Seldovia, are home to significant numbers of rockfish. Other abundant species include spiny dogfish and skates.

**Crab** – Historically, there were three species of commercially harvested crab found in the Bay: king, dungeness, and tanner (Figure 11). Dungeness crab inhabit the Bay from the intertidal zone to depths of more than 76 m (250 ft). Adults are found in the shallow, nearshore waters along the north shore. Younger, smaller crabs are found in the shallow intertidal areas along the southern shore. Although population numbers are currently depressed, king crab have historically been common south of Anchor Point. Tanner crab are usually found in deeper water in the fall and winter, and in shallow water for mating and

![Figure 11. Commercial Crab Catch, Southern District of the Cook Inlet Management Area](image-url)
spawning in spring and summer.

**Clams** - Kachemak Bay has substantial populations of clams, including Pacific littlenecks, butter clams, surf clams, various cockles, razor clams, and several *Macoma* (baltic, stained, chalky, oblique, and bent-nosed). Hard-shelled clams can be found in the lower intertidal region on protected gravel-sand-mud beaches. Soft-shelled clams are usually found in areas of mixed sand and mud, or mud and gravel.

**Freshwater Fish** – The Kachemak Bay watershed includes several freshwater habitats: glacial rivers, streams, ponds, and lakes; clearwater rivers, streams, ponds, and lakes; and, riparian areas. An abundant food source of insects (stoneflies, mayflies, caddisflies, dragonflies, and damselflies) support anadromous and freshwater fish species, such as euchalon, salmonids, lampreys, sticklebacks, and rainbow trout.

**Birds** - Two hundred forty-four species of birds have been identified on and around Kachemak Bay (Erikson and West 1992). Kachemak Bay is the most important marine bird habitat in Lower Cook Inlet (Erikson 1977), with no comparable areas in Upper Cook Inlet. During winter months over 90% of the marine birds in Lower Cook Inlet are found in Kachemak Bay (Erikson 1977). Kachemak Bay is also important for avian feeding, nesting, rearing, and migratory staging throughout the year. The inner Bay coastline has an estimated total year-round density of 1,758 birds/km² (679 birds/mile²) (Arneson 1980).

In 1996, Kachemak Bay was dedicated as an international site of the Western Hemisphere Shorebird Reserve Network. An international site designation indicates that the site hosts greater than 100,000 shorebirds or 10% of a flyway population.

**Marine Mammals** - While the Reserve is not directly responsible for monitoring these species, coordination with key partners ensures that these species will retain their presence and function in the Kachemak Bay system. Over eleven species of marine mammals have been documented in Kachemak Bay, including whales, porpoises, Steller sea lions, seals, and sea otters.

**Reptiles** – Only one species of reptile has been documented in the Reserve, a deceased green sea turtle. This species was documented in 1996, during an El Nino year. While this may have been an anomaly, it is important to track these occurrences in conjunction with global climate change.
**Terrestrial**

**Mammals** - At least 36 species of terrestrial mammals inhabit Fox River Flats and the region around Kachemak Bay. Large mammal species that occur around the area include moose, mountain goat, Dall sheep, black bear, and brown bear. Coyote, lynx, fox and wolf are also found in the region.

**Amphibians** – Only one species of amphibian has been recorded in the Kachemak Bay area. The wood frog, *Rana sylvatica*, has not been thoroughly studied; its life history and range have not been well documented.

### 4.3.3 Listed Species

An estimated 15 species within the Reserve are listed for protection under State and/or Federal regulations (Table 4). The State of Alaska identifies any species or subspecies of fish or wildlife or population of mammal or bird native to Alaska that has entered a long-term decline in abundance or is vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance as a Species of Special Concern (SOC).

Under this listing, the State will:
- review existing information on the species;
- publish a notification of listing, including a summary of the information that led to listing;
- identify critical seasonal habitat (if known);
- if appropriate, initiate or increase survey and monitoring efforts, population or habitat studies, enhancement efforts, and/or regulatory review; and,
- recommend management action.

By establishing a State Species of Concern (SOC)

The Federal species designations include endangered, threatened or candidate listings:
- **Endangered Species** – an animal or plant species in danger of extinction throughout all or a significant portion of its range.
- **Threatened Species** – an animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- **Candidate Species** – an animal or plant for which the Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a listing regulation is precluded by other higher priority listing activities.
- **Proposed Threatened Species** – an animal or plant that is being proposed for threatened status.
List, the State can:

- protect species or subspecies and forestall or mitigate serious threats to fish or wildlife populations before they become critical;
- identify conservation concerns at an earlier stage while avoiding the necessity for listing on the State Endangered Species List or through the Federal Endangered Species Act; and,
- provide for recovery efforts to be initiated under a more flexible management system. A byproduct of this new list will be to help the State focus conservation efforts on ecosystems and problems that may affect a variety of species and habitats.

The following species occurring within the Reserve have protected status at the identified State and/or Federal level(s):

Table 4. State and Federal Listed Species in Kachemak Bay NERR

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>State Status</th>
<th>Federal Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birds</td>
<td></td>
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<tr>
<td>spectacled eider</td>
<td>Somateria fischeri</td>
<td>SOC</td>
<td>T</td>
</tr>
<tr>
<td>Steller eider</td>
<td>Polysticta stelleri</td>
<td>SOC</td>
<td>T</td>
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<tr>
<td>peregrine falcon – arctic</td>
<td>Falco peregrinus tundrius</td>
<td>SOC</td>
<td></td>
</tr>
<tr>
<td>peregrine falcon - American</td>
<td>Falco peregrinus anatum</td>
<td>SOC</td>
<td></td>
</tr>
<tr>
<td>olive-sided flycatcher</td>
<td>Contopus cooperi</td>
<td>SOC</td>
<td>C</td>
</tr>
<tr>
<td>gray-cheeked thrush</td>
<td>Catharus minimus</td>
<td>SOC</td>
<td></td>
</tr>
<tr>
<td>blackpoll warbler</td>
<td>Dendroica striata</td>
<td>SOC</td>
<td></td>
</tr>
<tr>
<td>Townsend's warbler</td>
<td>Dendroica townsendi</td>
<td>SOC</td>
<td></td>
</tr>
<tr>
<td>Mammals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>brown bear</td>
<td>Ursus arctos</td>
<td>SOC, Kenai Peninsular Population</td>
<td></td>
</tr>
<tr>
<td>harbor seal</td>
<td>Phoca vitulina</td>
<td>SOC</td>
<td></td>
</tr>
<tr>
<td>Steller sea lion</td>
<td>Eumetopias jubatus</td>
<td>SOC</td>
<td>E, T</td>
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<tr>
<td>sea otter</td>
<td>Enhydra lutris kenyoni</td>
<td></td>
<td>PT</td>
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<tr>
<td>beluga or white whale</td>
<td>Delphinapterus leucas</td>
<td>SOC</td>
<td></td>
</tr>
<tr>
<td>humpback whale</td>
<td>Megaptera novaeangliae</td>
<td>E</td>
<td>E</td>
</tr>
</tbody>
</table>

T = threatened; E = endangered; C = candidate

4.4 RESERVE GOALS, OBJECTIVES, AND STRATEGIES

4.4.1 Management Plan Framework

The Kachemak Bay NERR Management Plan has been developed to address specific goals, objectives and strategies within the Research, Education and Administration programs for the next five years. This Plan has been revised and updated from the previous plan, the Final EIS and Management Plan for designation, approved by NOAA in 1999. A staff retreat was held in the fall of 2003 to develop long-term goals, objectives and strategies. Programmatic meetings were held in the fall and winter of 2004 to update and further refine the respective strategies. Additional staff retreats were held in early 2005, to finalize staff input. The draft was then submitted to the Reserve’s Community Council and partners for review. A public meeting was held in the spring of
2005 to encourage community participation. This Plan spans a five-year period from July 2005 (FY06) through 2010 (FY11).

This Management Plan will be used to develop five-year Action Plans for each programmatic section: Research and Monitoring, Education and Outreach, and Program Administration. The Action Plans will further define the Reserve’s programs by defining Tasks under the identified Goals, Objectives, and Strategies. Additionally, each program will develop an Annual Work Plan that targets specific components to be completed during the state fiscal year. Program Action Plans will be completed in winter FY06 with Annual Work Plans initiated in the spring of 2006.

Issues driving the Reserve’s programmatic direction and focus include:
- larval and juvenile fisheries recruitment and life history dynamics;
- climate change;
- coastal dynamics (natural and anthropogenic), including landuse change;
- natural hazards;
- socioeconomics associated with coastal resources; and,
- public access.

Since the Reserve is managed under a partnership between NOAA and ADF&G, Division of Sport Fish, it is necessary for the goals and objectives of the Reserve to align with those of the administering agencies. Consequently, as each Reserve goal and objective is discussed within the text of the Management Plan Framework, Research and Monitoring, Education and Outreach, and Program Administration sections of this Management Plan, the over-arching goals and objectives from the NERRS Strategic Plan and the ADF&G, Division of Sport Fish Strategic Plan are identified. The Reserve also works very closely with the community through the Reserve’s Community Council, which is comprised of nine community members. Additionally, Reserve progress and accomplishments relative to the previous Management Plan’s goals and objectives are briefly discussed in Appendix 11.

The mission of the Kachemak Bay NERR is to:

*Enhance understanding and appreciation of the Kachemak Bay estuary and adjacent waters to ensure that these ecosystems remain healthy and productive*

The goals to support this mission are identified in Table 5. Objectives for these goals are addressed in the respective programmatic sections. Since Kachemak Bay NERR is relatively young, the objectives outlined in the Plan are at varying stages of development: currently underway, in initial development, and in the future. The following table also identifies the degree of programmatic development for each objective using the following key:

- currently underway
- initial development
- future
<table>
<thead>
<tr>
<th>#1: Recognition of Kachemak Bay Research Reserve as a regional center for uniting research and education.</th>
<th>All Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1: Facilitate regional coastal education and research programs among agencies, communities, universities, NGOs, and tribal governments</td>
<td></td>
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<tr>
<td>Objective 2: Facilitate the integration of research and education</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>#2: Increase understanding of the natural and human processes occurring in the coastal environment.</th>
<th>Research and Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1: Provide baseline information necessary to support research and resource management community needs within the Reserve</td>
<td></td>
</tr>
<tr>
<td>Objective 2: Determine the factors affecting spatial and temporal variability of ecologically important variables</td>
<td></td>
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<tr>
<td>Objective 3: Determine the linkages between the marine, nearshore, and watershed ecosystems and how changes affect those systems</td>
<td></td>
</tr>
<tr>
<td>Objective 4: Study the relationships between socio-economic factors and environmental changes</td>
<td></td>
</tr>
<tr>
<td>Objective 5: Promote informed decision-making on resource issues</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>#3: Foster responsible stewardship of the coastal environment.</th>
<th>Education and Outreach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1: Increase knowledge and understanding of how coastal ecosystems function</td>
<td></td>
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<tr>
<td>Objective 2: Increase appreciation of the importance of coastal environments</td>
<td></td>
</tr>
<tr>
<td>Objective 3: Promote informed decision-making regarding uses of coastal environments</td>
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<table>
<thead>
<tr>
<th>#4: Foster a public that is involved with and supportive of Reserve activities.</th>
<th>Education and Outreach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1: Increase awareness of the Reserve’s mission and goals</td>
<td></td>
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<tr>
<td>Objective 2: Encourage partnerships and involvement in Kachemak Bay NERR’s functions</td>
<td></td>
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<tr>
<td>Objective 3: Increase awareness of the benefits of Kachemak Bay NERR’s Research and Education programs</td>
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<tr>
<th>#5: Maintain a workforce that is motivated and effective in attaining the Reserve mission.</th>
<th>Program Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1: Provide each employee with opportunities for professional development to enable them to perform competently and excel in their current position and to prepare qualified employees to be competitive for more advanced jobs</td>
<td></td>
</tr>
<tr>
<td>Objective 2: Provide a positive, supportive, safe work environment</td>
<td></td>
</tr>
<tr>
<td>Objective 3: Maintain a workforce capable of attaining program goals and objectives</td>
<td></td>
</tr>
</tbody>
</table>
Objective 4: Provide effective leadership structure to accomplish the mission and goals of the Reserve

Objective 5: Develop and implement a stable funding strategy

While Reserve activities are programmatically interwoven, most goals can be defined with a specific program (Research and Monitoring, Education and Outreach, or Program Administration) as lead. However, certain organizational targets cross programmatic boundaries and apply functionally to the Reserve as a whole. Goal #1 is described here as an over-arching goal, while Goal #2 (Research and Monitoring), Goal #3 (Education and Outreach), Goal #4 (Education and Outreach), and Goal #5 (Program Administration) are outlined in the subsequent chapters.

Goal #1 cross-cuts programmatic boundaries and focuses on what the Reserve as a holistic unit is striving toward. Kachemak Bay NERR has already progressed substantially with respect to the goal of interweaving research and education within Reserve programs. The Reserve has also made significant strides to connect research and education at the community level. While this local effort will continue to strengthen, the Reserve is looking to reach out regionally to join research and education in an effort get the best scientific data to decision-makers and the general public, promoting a better informed region.

While the administrative support is a key element, this goal is rooted in sound Research and Education programs as addressed within their respective individual plans. It is the combination of a robust Research program, a dynamic Education program, and a strong Administrative backbone that will foster this goal for long-term success.

4.4.2 KACHEMAK BAY NERR GOAL #1

KACHEMAK BAY NERR GOAL #1:
RECOGNITION OF KACHEMAK BAY RESEARCH RESERVE AS A REGIONAL CENTER FOR UNITING RESEARCH AND EDUCATION.
(NERRS Strategic Plan Goal #3; ADF&G, Sport Fish Strategic Plan Goal #3)

Objective 1. To facilitate regional coastal education and research programs among agencies, communities, universities, non-governmental organizations (NGOs), and tribal governments
(NERRS Strategic Plan Goal #3, Objectives 2 and 3; ADF&G, Sport Fish Strategic Plan Goal #3, Objectives A and C)

Strategies:
- Provide collaboration, leadership, and coordination of coastal education and research (e.g., KBEEA, Research Advisory Committee)
- Keep researchers abreast of activities in the Bay
- Conduct ‘What’s New in the Bay’ workshops at local villages, within ADF&G, and for various agencies and organizations on the Kenai Peninsula
Objective 2. Facilitate the integration of research and education
(NERRS Strategic Plan Goal #3, Objectives 1, 2, and 3; ADF&G, Sport Fish Strategic Plan Goal #3, Objectives A and C)

**Strategies:**

- Coordinate with existing education programs to develop and maintain a high standard of marine and estuarine-based research and education
- Serve as a focal point for Kachemak Bay research by supporting studies, and aiding in disseminating completed research results, including the use of CTP as an outlet
- Develop effective translation and communication about research in the Reserve (e.g., coordination meetings, program fact sheets, press packets)
- Collaborate with and support other Kachemak Bay educational programs (e.g., Pratt Museum, Center for Alaska Coastal Studies, Alaska Maritime NWR, Cook Inlet Keeper, schools, tribal centers) in marine education and coastal stewardship exhibits
- Support regional research endeavors, collaborating and aiding in coordination of efforts when appropriate
- Develop Reserve informational packets for visiting officials, dignitaries, and funders to increase the visibility of the Reserve
- Establish mechanism for effectively communicating Reserve projects and results up through the State chain of command and to NOAA
- Establish and maintain links to research, marine science education, interpretation, and outreach institutions and programs in Kachemak Bay, the State of Alaska, the eastern Pacific, North American coastal regions, and similar international sites

**SPOTLIGHT**

**Kachemak Bay Environmental Education Alliance**

In March of 2000, representatives from over 15 marine, estuarine, and natural resource organizations involved in environmental education in the Kachemak Bay watershed came together to share their concerns and aspirations for science education in this region. One outcome of this forum, organized by the Research Reserve and held at the Kasitsna Bay Lab, was the formation of an alliance of Kachemak Bay Environmental Educators (KBEEA). Participants of this new alliance envisioned an environmental education system of excellence in Kachemak Bay that would inspire life-long learning and commitment to environmental stewardship and sustainability among Kachemak Bay residents and visitors.

Alliance members identified and prioritized activities for focus:

1) identifying field educational sites and facilities within the watershed, as well as teacher resources (for field trips, pre-visit, and post-visit activities);
2) developing a process to effectively coordinate the use and application of these resources;
3) developing a coordination plan for K-12 education-based visitor programs within the watershed;
4) providing follow-up KBEEA strategic planning workshops; and,
5) compiling a long-term strategic plan designed to provide a comprehensive watershed-based environmental education program for estuarine and coastal environmental literacy.

All of the above activities have been addressed since that initial meeting, with much progress made on the identification and coordination of existing programs, facilities, and teacher resources, including a field trip planning website (http://www.homerfieldtrips.com).
5.0 RESEARCH AND MONITORING [§921.50]

5.1 INTRODUCTION

The Reserve System provides a mechanism for addressing scientific and technical aspects of coastal management problems through a comprehensive, interdisciplinary, and coordinated approach. Research and monitoring programs, including the development of baseline information, form the basis of this approach. Reserve research and monitoring activities are guided by national and state plans that identify goals, priorities, and implementation strategies for these programs. This approach, when used in combination with the education and outreach programs, will help ensure the availability of scientific information that has long-term, system-wide consistency and utility for managers and members of the public to use in protecting or improving the understanding and management of estuaries by examining impacted natural processes, habitats, or organisms in their respective environments.

Issues driving the Reserve's research direction and focus include:

- larval and juvenile fisheries recruitment and life history dynamics;
- climate change;
- coastal dynamics (natural and anthropogenic), including landuse change
- natural hazards;
- socioeconomics associated with coastal resources; and,
- public access.

Management of lands within the Reserve is conducted by other agencies, including the Alaska Department of Fish and Game, the Alaska Division of Parks and Outdoor Recreation, and the City of Homer. Kachemak Bay NERR's research program emphasizes research on uplands issues affecting marine, nearshore, and coastal processes. Also, several state and federal agencies manage specific species (such as migratory birds, large mammals, and marine mammals), thus, again research conducted by the Reserve focuses on species gaps and complementary studies to minimize overlap.

5.2 NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM RESEARCH GOALS

Research at Kachemak Bay NERR is designed to fulfill the Reserve System goals as defined in the following program regulations:

- Address coastal management issues identified as significant through coordinated estuarine research within the System;
- Promote Federal, state, public, and private use of one or more reserves within the System when such entities conduct estuarine research; and,
Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

5.2.1 National Estuarine Research Reserve System Research Funding Priorities

Federal regulations, 15 CFR Part 921.50(a), specify the purposes for which research funds are to be used:

- Support management-related research that will enhance scientific understanding of the Reserve ecosystem;
- Provide information needed by reserve managers and coastal ecosystem policy-makers; and,
- Improve public awareness and understanding of estuarine ecosystems and estuarine management issues.

The Reserve System is focusing on the following research areas listed below to support the above referenced priorities:

- Eutrophication, effects of non-point source pollution and/or nutrient dynamics;
- Habitat conservation and/or restoration;
- Biodiversity and/or the effects of invasive species;
- Mechanisms for sustaining resources within estuarine ecosystems; and/or,
- Economic, sociological, and/or anthropological research applicable to estuarine ecosystem management.

This chapter has been developed in conjunction with national and state priorities with input and guidance by the current Research staff and other Kachemak Bay NERR staff. Community input is received through the Research subcommittee and the Reserve Community Council.

The Kachemak Bay NERR has a growing science program with a vision to become a leading research facility for the Lower Cook Inlet and surrounding Gulf of Alaska waters. The factors influencing the processes and components of Kachemak Bay are fundamentally driven by large-scale processes. The region of scientific emphasis (Figure 12) extends to the east as far as the Pye Islands in Kenai Fjords National Park, to the south as far as Shuyak Island in the Kodiak Archipelago, to the west across Cook Inlet, and to the north as far as Kasilof. This region extends beyond the Reserve boundaries to encompass areas that affect or are affected by waters within the Kachemak Bay NERR boundaries. This area also connects to areas of study emphasis by outside research and monitoring groups. Since there are differences in research emphases among the various groups, we expect that collaborative research will develop within and beyond the defined region of emphasis.
The Kachemak Bay NERR is well positioned to monitor the waters flowing from the Gulf of Alaska into Cook Inlet, water exchange within Cook Inlet and Kachemak Bay, and flow out through Shelikof Strait. As a sentinel site for the region, the Kachemak Bay NERR can serve a vital function by providing the scientific and management communities with baseline and long-term datasets. For example, establishing regional physical oceanographic conditions will provide data for predictive models and an understanding of how the inland bodies of water exchange with the Gulf of Alaska and how these interactions drive ecological linkages (i.e. larval recruitment patterns).

Research emphasis
At this developmental stage of the Kachemak Bay NERR, it is important to define baseline maps and datasets for future research. Therefore, during the next five years, emphasis will be placed on conducting research that describes the habitats throughout Kachemak Bay NERR boundaries and surrounding areas that affect conditions within those boundaries. This emphasis will build upon the Reserve’s site characterization, providing a more detail.

Kachemak Bay NERR is a component of the ADF&G, Division of Sport Fish. As such, the Reserve’s Research program must support the mission of the Division. However, a difference in funding sources allows Kachemak Bay NERR to conduct research outside the normal ADF&G programs. The basic philosophy is to conduct research that is normally outside ADF&G research projects, but compliments ADF&G research and supports ADF&G research goals.

5.3 RESERVE RESEARCH GOALS AND OBJECTIVES

There are four expected research foci to be pursued (not in priority order). The first three components are based on geographic location and the fourth covers all locations.

1. MARINE ENVIRONMENT
2. NEARSHORE ENVIRONMENT
The marine region is defined as areas deeper than 15 m (49 ft). The nearshore region covers studies conducted from shallow waters through the intertidal zone. The watershed includes the surrounding upland and wetland systems. As can be expected, the research goals will often cross these arbitrary boundaries; however, the divisions simplify the organization of objectives.

The Research objectives are primarily aligned with:

- the NERRS Strategic Plan, Goal #1 – improve coastal decision-making by generating and transferring knowledge, and
- the ADF&G, Division of Sport Fish Strategic Plan, Goal #2 - conserve, manage, and improve Alaska’s aquatic, riparian, and upland habitats to ensure sustainability of Alaska’s fishery resources.

The Objectives provided in this section are overarching and are not expected to be completed during this five-year period. The Strategies may be fully or partially achieved during this period.

**General Approach**

There are a few approaches that should be considered common to achieving the goals and objectives:

- encourage research by outside groups, especially toward Reserve priorities;
- collaborate with groups conducting research in the Kachemak Bay area;
- pursue funding to conduct research by Kachemak Bay NERR staff;
- synthesize and disseminate existing information; and,
- coordinate with Kachemak Bay NERR’s Education Program to provide information for informal, formal, and CTP education and outreach.

This approach supports the NERRS and ADF&G research specific goals already mentioned. It also supports the research of partnering agencies that monitor or manage specific areas or species.

Developing the best understanding of processes within the Kachemak Bay NERR region requires a wide range of expertise. To obtain that level of expertise, the Reserve must encourage other groups to conduct research within the Reserve and its watershed. In many cases, this encouragement only requires identifying potential researchers and providing the background information necessary to develop strong proposals. The next level of encouragement involves offering facility and personnel support.

*Knowledge of the oceans is more than a matter of curiosity. Our very survival may hinge upon it.*

John F. Kennedy
Collaborations are expected to develop through several tracks. Collaborations with ADF&G staff will develop through research that supports the existing ADF&G research. Collaborations with other groups, such as Kasitsna Bay Laboratory, University of Alaska Fairbanks, University of Alaska Anchorage, and others, will develop given common research interests, Kachemak Bay’s capabilities for technology testing, and complimentary research capabilities. Collaborations will also progress to provide support for some outside research projects. Most of the encouraged projects are to be conducted by researchers located far from the Reserve. Many of those projects will require the on-the-ground expertise of Kachemak Bay NERR staff to assist with and/or maintain those programs. When such projects closely align with Kachemak Bay NERR research goals, partnerships will be developed to provide support for those projects.

Given the funding structure of Kachemak Bay NERR, research interests of Reserve staff, and the goals of the Research program, Research staff will need to pursue outside funding to conduct projects, including research relevant to regional and Kachemak Bay NERR-specific needs. Research staff will also examine how NOAA and ADF&G funds can be used to achieve the research needs of Kachemak Bay NERR. One mechanism for the use of NOAA funds is to encourage the Graduate Research Fellowship students to study issues listed within this Management Plan.

Some of the Research objectives may be achieved through the collection and synthesis of existing information and data. Reserve Research staff will examine the means to collect the relevant information and when necessary convert it into forms that meet the needs of Kachemak Bay NERR research goals (e.g. Fish and Game reports, research at Kasitsna Bay Laboratory).

5.4 KACHEMAK BAY NERR GOAL #2

KACHEMAK BAY NERR GOAL #2: INCREASE UNDERSTANDING OF THE NATURAL AND HUMAN PROCESSES OCCURRING IN THE COASTAL ENVIRONMENT.
(NERRS Strategic Plan Goal #1 and Goal #2; ADF&G, Sport Fish Strategic Plan Goal #2)

As an evolving Reserve, it is vital to inventory and map the habitats within and surrounding the Reserve. These habitat maps provide the basis for process studies and the evaluation of temporal change. The expansive area and diversity of habitats – subtidal to alpine – requires the separation of habitat types into manageable blocks. It is important to work with other groups to incorporate existing information and other efforts in developing the overall habitat classification.

Objective 1. To provide baseline information necessary to support research and resource management community needs within the Reserve.
(NERRS Strategic Plan Goal #1, Objectives 1 and 2, and Goal #2, Objective 1; ADF&G, Sport Fish Strategic Plan Goal #2, Objectives A, C, D, F, and G)

MARINE Strategies:
Map the subtidal habitats of Kachemak Bay
Determine circulation patterns in Kachemak Bay and exchange of water between Kachemak Bay, the Gulf of Alaska, and Lower Cook Inlet

NEARSHORE
Strategies:
- Map intertidal habitats and salt marshes within Kachemak Bay
- Map and inventory the extent of submerged aquatic vegetation
- Map the present and historic coastlines of Kachemak Bay
- Inventory marine invertebrate populations in the study area

WATERSHED
Strategies:
- Map the wetland habitats within the Kachemak Bay NERR and its watershed draining into the Reserve
- Map critical stream habitats for the watershed draining into the Reserve
- Map the historical and present human use of the land surrounding Kachemak Bay
- Inventory the species, life histories, and habitat preferences of fish in the Kachemak Bay watershed

Objective 2. Determine the factors affecting spatial and temporal variability of ecologically important variables.
(NERRS Strategic Plan Goal #1, Objectives 1 and 2, and Goal #2, Objective 1; ADF&G, Sport Fish Strategic Plan Goal #1, Objective A, and Goal #2, Objectives D and F)

MARINE
Strategies:
- Determine factors affecting the distribution and timing of primary productivity within the research area
- Determine how patterns in primary productivity affect higher trophic levels
  Determine how circulation patterns affect larval recruitment
- Relate how changes in oceanographic properties affect fish populations
- Determine if non-indigenous species are present, established, expanding, and affecting community composition

NEARSHORE
Strategies:
- Determine the rates, volumes, and frequency of sediment transport along the shore
Determine the timing and magnitude of larval recruitment
Determine if non-indigenous species are present, established, expanding, and affecting community composition

WATERSHED Strategies:
- Determine factors that influence larval fish utilization of the stream continuum
- Determine how stream communities respond to land-use changes
- Determine if non-indigenous species are present, established, expanding, and affecting community composition

Objective 3. Determine the linkages between the marine, nearshore, and watershed ecosystems and how changes affect those systems.
(NERRS Strategic Plan Goal #1, Objectives 1 and 2, and Goal #2, Objective 1; ADF&G, Sport Fish Strategic Plan Goal #1, Objective A and Goal #2, Objectives D, F)

Strategies:
- Determine the flux of nutrients between the watershed and marine environments
- Examine how physical changes in the watershed (such as glacial runoff and land use change) affect coastal dynamics
- Relate how changes in watershed properties (such as spruce bark beetle impacts) affect fish populations

Objective 4. Study the relationships between socio-economic factors and environmental changes.
(NERRS Strategic Plan Goal #1, Objectives 1 and 2, and Goal #2, Objective 1; ADF&G, Sport Fish Strategic Plan Goal #1, Objective E)

Strategies:
- Identify potential socio-economic questions
- Identify mechanisms to conduct the research in the study area

Objective 5. To promote informed decision-making on resource issues.
(NERRS Strategic Plan Goal #1, Objective 3, and Goal #3, Objectives 1, 2, and 3; ADF&G, Sport Fish Strategic Plan Goal #2, Objective F)

Strategies:
5.5 RESERVE MONITORING PROGRAM

Achievement of the research objectives requires a mixture of specific research programs and long-term monitoring strategies. Several monitoring programs exist within Kachemak Bay, from water quality monitoring to coastal change to wildlife monitoring programs, all of which are led by a variety of organizations and agencies. A subset of monitoring programs occurring within the Reserve boundary are identified below.

5.5.1 System-Wide Monitoring Program

It is the policy of Kachemak Bay NERR to implement each phase of the System-Wide Monitoring Plan initiated by ERD in 1993, and as outlined in the Reserve System regulations and strategic plan:

- **Phase I**: Environmental Characterization, including studies necessary for inventory and comprehensive site descriptions;
- **Phase II**: Site Profile, to include a synthesis of data and information; and,
- **Phase III**: Implementation of the System-wide Monitoring Program.

The System-Wide Monitoring Program provides standardized data on national estuarine environmental trends, while allowing the flexibility to assess coastal management issues of regional or local concern. The principal mission of the monitoring program is to develop quantitative measurements of short-term variability and long-term changes in the integrity and biodiversity of representative estuarine ecosystems and coastal watersheds for the purposes of contributing to effective coastal zone management. The program is designed to enhance the value and vision of the reserves as a system of national references sites. The program is designed with three main components in the Reserve System and the first is in operation.

1. **Abiotic Variables**: The monitoring program currently measures water quality (pH, conductivity, salinity, temperature, dissolved oxygen, turbidity, water level) and atmospheric conditions (temperature, relative humidity, barometric pressure, wind speed and direction, down-welling irradiance, precipitation). In addition, the program collects monthly nutrient (nitrate, nitrite, ammonium, phosphate, silicate) and chlorophyll a samples and monthly diel samples at one SWMP data logger station. Each reserve uses a set of automated instruments and weather stations to collect these data for submission to a centralized data management office.
These data are compiled electronically at a central data management “hub”, the Centralized Data Management Office (CDMO) at the Belle W. Baruch Institute for Marine Biology and Coastal Research of the University of South Carolina. They provide additional quality control for data and metadata and they compile and disseminate the data and summary statistics via the web (http://cdmo.baruch.sc.edu), where researchers, coastal managers and educators readily access the information. The metadata meets the standards of the Federal Geographical Data Committee.

The System-Wide Monitoring Program may continue to expand. This program currently requires 4 data sondes to be deployed and maintained on a year-around basis at four sites in each reserve. Kachemak Bay NERR has two permanent locations: Homer and Seldovia, with a sonde 1 m (3 ft) below the surface and a second 1 m (3 ft) above the bottom at each location (Figure 13). This arrangement is used to answer questions related to the surface and subsurface flow within the Bay. Nutrient sampling at each permanent site will continue on a monthly basis for the primary nutrients. A meteorological station located atop the Land’s End Hotel at the end of the Homer Spit measures weather conditions every 15 minutes. The program is currently moving towards realtime delivery of this data.

As funding allows, data sondes will be deployed seasonally along the axis of Kachemak Bay, or a fifth permanent station will be established at Port Graham. This enhancement of the monitoring program will improve our ability to answer questions related to water mixing and exchange within Kachemak Bay. Working with the mariculture industry within the Reserve will allow the placement of sondes at safe locations and facilitate instrument exchange and maintenance. Additionally, chlorophyll fluorescence will be added to the routine measurement suite. The feasibility of expanding the nutrient monitoring program will be examined to identify additional sampling locations along the axis of the Bay.

2. Biotic Variables: The Reserve System will incorporate monitoring of organisms and habitats into the monitoring program as funds become available. The first aspect likely to be incorporated will quantify vegetation (e.g., marsh vegetation, submerged aquatic vegetation) patterns and their change over space and time. Sampling design will follow pilot programs as NERRs biomonitoring moves toward national implementation with established protocols accepted by all reserves. Other aspects that could be incorporated include monitoring benthic, nekton and plankton communities, as well as invasive species. Commercial shipping, sport fishing, mariculture, and other activities provide mechanisms for introducing invasive species. Over the next five years, Kachemak Bay NERR intends to develop a community-based monitoring program designed to aid in the early detection of potential invasive species.
3. **Landuse, Habitat Mapping and Change**: This component will be developed to identify changes in coastal ecological conditions with the goal of tracking and evaluating changes in coastal habitats. The main objective of this element will be to examine the links between watershed land use activities (e.g. development), climate change (e.g. glacial runoff), and coastal habitat quality.

### 5.5.2 Other Monitoring Programs

1. **Fish and Game**
The Sport Fish and Commercial Fisheries Divisions of ADF&G monitor a number of fish and invertebrate populations within Kachemak Bay and the surrounding waters. Trawl surveys and the offshore test fishery have been conducted since the 1970s, making them among the longest State fisheries monitoring programs. Other monitoring programs, such as littleneck clam abundance and groundfish harvest assessments, provide valuable biological data. As applicable, Kachemak Bay NERR will work with these programs to supplement the measurements.

2. **Alaska Ocean Observing System**
The Alaska Ocean Observing System’s mission is to improve Alaska’s ability to rapidly detect changes in marine ecosystems and living resources, and predict future changes and their consequences for the public good (www.aoos.org).

It is expected that the Alaska Ocean Observing System (AOOS) will begin implementation within the next five years. Kachemak Bay NERR is working to participate in the AOOS program, potentially as a hub for Lower Cook Inlet information. Kachemak Bay NERR is looking to automate SWMP data collection and delivery as part of the AOOS effort and deploy additional sensors within Cook Inlet as part of the monitoring program.

### 5.6 GRADUATE RESEARCH FELLOWS

The Graduate Research Fellowship Program supports students to produce high quality research in the reserves. The fellowship provides graduate students with funding for 1-3 years to conduct their research, as well as an opportunity to assist with the research and monitoring program at a reserve. Projects must address coastal management issues identified as having regional or national significance; relate them to the Reserve System research focus areas; and, be conducted at least partially within one or more designated reserve sites.

Students work with the Research Coordinator or Manager at the host reserve to develop a plan to participate in the reserve’s research and/or monitoring program. Students are asked to provide up to 15 hours per week of research and/or monitoring assistance to the reserve. This training may take place throughout the school year or may be concentrated during a specific season.

Students will be recruited through NOAA’s Graduate Research Fellowship Program to address questions of interest as defined by the NERRS and Kachemak Bay NERR.
Bay NERR Research priorities. Current GRF student projects are focused on primary productivity and crustacean habitat preferences. The students are expected to be capable of designing and conducting an appropriate research project within the Reserve. The Research Coordinator and other Kachemak Bay NERR staff will assist, as much as possible, in improving the students’ research plans and in conducting the research. Since the nearest university with a graduate program is approximately an hour flight from Kachemak Bay NERR, it is not expected that the student will necessarily spend large amounts of time at the Reserve. The students’ research activities within the Reserve will be scheduled on an annual basis so that the GRF’s can be housed at the Reserve’s bunkhouse.

5.7 CICEET

Research conducted by NERRs and outside scientists can be funded through the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET), a partnership between NOAA and the University of New Hampshire (UNH). CICEET uses the capabilities of UNH, the private sector, academic, and public research institutions throughout the US, as well as the 26 reserves in the Reserve System, to develop and apply new environmental technologies and techniques.
6.0 EDUCATION AND OUTREACH [§921.13(a)(4)]

6.1 INTRODUCTION

The Reserve System provides a vehicle to increase understanding and awareness of coastal and estuarine systems and improve decision-making among key audiences to promote stewardship of the nation’s coastal resources. Education and outreach at the reserves incorporate a range of programs and methodologies that are systematically tailored to key audiences around priority coastal resource issues and incorporate science-based content. Kachemak Bay NERR staff work with local communities and regional groups to address coastal processes, primary productivity, and invasive species. Through integrated research and education programs, the reserve helps communities develop strategies to deal successfully with these coastal resource issues.

Issues driving the Reserve’s overall direction and focus include:

- larval and juvenile fisheries recruitment and life history dynamics;
- climate change;
- coastal dynamics (natural and anthropogenic), including landuse change;
- natural hazards;
- socioeconomics associated with coastal resources; and,
- public access.

The Reserve’s Education Program incorporates elements of these issues, especially as components are addressed by research, into its formal, informal, and coastal training programs. The unification of research and education is an overarching goal for the entire Reserve. Since this coordination is addressed in Chapter 4 under Kachemak Bay NERR Goal #1, it will not be addressed within this Chapter.

Formal and informal education and training programs in the NERRS target K-12 students, teachers, university and college students, and faculty, as well as coastal decision-maker audiences, such as environmental groups, professionals involved in coastal resource management, municipal and county zoning boards, planners, elected officials, landscapers, eco-tour operators, and professional associations.

K-12 and professional development programs for teachers include the use of reserve developed coastal and estuarine science curricular activities aligned with state education standards and involve on-site classroom activities and field trips. Reserve education activities are guided by national plans that identify goals, priorities, and implementation strategies for these programs. Education and training programs, interpretive exhibits, and community outreach programs integrate elements of NERRS science, research, and monitoring activities and ensure a systematic, multi-faceted, and (community-based) locally-focused approach to fostering stewardship.

6.2 NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM EDUCATION MISSION AND GOALS
The National Estuarine Research Reserve System’s mission includes an emphasis on education, interpretation, and outreach. The Education program at Kachemak Bay NERR is designed to fulfill the reserve system goals as defined in the regulations (15 CFR Part 921(b)):

- Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation; and,
- Conduct and coordinate estuarine research within the system, gathering and making available information necessary for improved understanding and management of estuarine areas.

6.2.1 National Estuarine Research Reserve System Education Objectives

Education-related objectives in the Reserve System Strategic Plan (FY 03-08) include:

- Enhance the transfer of knowledge, information and skills to coastal decision makers for improved coastal stewardship. (KBNERR Goal #3, Objective 3 – to promote informed decision-making regarding uses of coastal environments), and
- Provide education programs for students, teachers and the public to increase literacy about estuarine systems. (KBNERR Goal #3, Objective 1 – to increase knowledge and understanding of how coastal ecosystems function; Goal #3, Objective 2 – to increase appreciation of the importance of coastal environments).

This chapter has been developed in conjunction with national and state priorities with input and guidance by the current Education staff and other Kachemak Bay NERR staff. Community input is received through the Education subcommittee and the Reserve Community Council.

The community of Homer has several education and outreach organizations. Through the designation and development of the Reserve, the education and outreach organizations met to determine respective roles, identify niches to be filled, and define complementary programs. Through this process, the Reserve defined its education and outreach role, specifically as it relates to scientific research. For example, while Kachemak Bay NERR’s Education Program will discuss primary productivity, its role in the food chain, and recent research on the topic, the Reserve will not take classes on boats to collect plankton, as that niche is filled by another education organization within the community. The Reserve’s Education program will concentrate its efforts on three primary programs:

- **Formal Education**: Classroom and field activities are provided for public, private and homeschool students, ranging from kindergarten to university levels. Classes and workshops are also provided for professional
teacher development to both pre-service and classroom teachers.

**Informal Education:** Provided primarily at the AIOVC, these programs draw voluntary participants from the general public of all ages, including both residents and visitors to the area.

**Coastal Training Program:** The Coastal Training Program provides up-to-date scientific information and skill-building opportunities to individuals and groups who are responsible for making decisions that affect coastal resources. Through this program, Kachemak Bay NERR can ensure that coastal decision-makers have the knowledge and tools needed to address critical resource management issues.

### 6.3 RESERVE EDUCATION GOALS AND OBJECTIVES

Kachemak Bay NERR is a component of the ADF&G, Division of Sport Fish. As such, education programming must support the mission of the Division. However, the Reserve’s Education programming focuses on the marine environment. This complements the traditional Sport Fish aquatic education program, which emphasizes sport fishing opportunities and resources found primarily in freshwater environments. While the Kachemak Bay NERR and Sport Fish Education programs have a different primary focus, the staffs have developed a close working relationship that ensures programmatic continuity and complimentary outcomes.

The Reserve’s Education goals are primarily aligned with:

- the NERRS Strategic Plan, Goal #1 - improve coastal decision-making by generating and transferring knowledge, and Goal #3 - increase awareness, use, and support of the reserve system and its estuarine science, education, and stewardship programs; and,
- the ADF&G, Division of Sport Fish Strategic Plan, Goal #3 - foster a public that is consistently informed and involved in recreational fisheries.

**General Approach**

Over the next five years, Education staff will work to achieve the goals and objectives outlined in this plan using these common strategies as guiding principals:

- work closely with Reserve Research staff to collaborate on proposals, ensuring tightly linked research and education projects;
- work closely with Reserve Research staff on education and outreach programs;
- collaborate with ADF&G Sport Fish educators, local communities, the Reserve Community Council, the Education sub-committee, and regional groups on education programs, activities, and training opportunities;

*For in the end we will conserve only what we love. We will love only what we understand. We will understand only what we are taught.*  
B. Dioum
team with community, regional associates, and Native villages to produce and provide education and outreach programs and materials to formal, informal, and CTP audiences;
provide regular programmatic updates for the Reserve’s website, www.kbayrr.org;
determine the efficacy of the Reserve’s Education programs by developing a framework for evaluation; and,
pursue grant-funding opportunities to meet specific program needs.

Along with these common strategies, many of the Reserve’s Education programs will incorporate multiple forms of outreach products, including literature, interactive CDs, hands-on laboratories, scientific illustrations, and video components. Since people learn in many different ways, this diversity of outreach tools will allow visitors to choose the method most suitable to their learning needs. For example, the same topic can be presented in multiple formats to suit readers, hands-on learners, visual learners and auditory learners. This multiple format design will cross-cut all Education programs: formal, informal, and CTP.

6.4 KACHEMAK BAY NERR GOAL #3

Objective 1. To increase knowledge and understanding of coastal environments, especially Kachemak Bay and the Gulf of Alaska
(NERRS Strategic Plan Goal #1, Objectives 3 and 4 and Goal #3, Objective 3; ADF&G, Sport Fish Strategic Plan Goal #3, Objectives A and C)

FORMAL EDUCATION
Strategies:
- Provide professional teacher development opportunities based upon feedback from the education community
- Provide K-12 level off-site marine science activities and materials for the classroom
- Provide K-12 level on-site field-based opportunities

INFORMAL EDUCATION
Strategies:
- Provide educational opportunities throughout Southcentral Alaska
- Develop and provide information programs to outreach Reserve activities

COASTAL TRAINING PROGRAM
Strategies:
Train coastal resource managers and user groups on coastal processes

**Objective 2. To increase appreciation of the importance of coastal environments, especially Kachemak Bay and the Gulf of Alaska**
(NERRS Strategic Plan Goal #1, Objective 4 and Goal #3, Objectives 1 and 3; ADF&G, Sport Fish Strategic Plan Goal #3, Objective A)

**INFORMAL EDUCATION**
*Strategies:*
- Incorporation of hands-on, discovery-based, interactive laboratory and field learning opportunities in all education and interpretive activities
- Provide educational opportunities at the Alaska Islands and Ocean Visitor Center

**Objective 3. To promote informed decision-making regarding uses of coastal environments**
(NERRS Strategic Plan Goal #1, Objective 3 and Goal #3, Objective 2; ADF&G, Sport Fish Strategic Plan Goal #3, Objectives A and C)

**FORMAL EDUCATION**
*Strategies:*
- Educate students about coastal processes, responsible stewardship, and decision-making activities
- Provide mentorship opportunities for community members and junior high school, senior high school, and university students

**INFORMAL EDUCATION**
*Strategies:*
- Develop and provide public information programs to outreach Reserve research through appropriate venues

**COASTAL TRAINING PROGRAM**
*Strategies:*
- Train coastal resource managers and user groups

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**6.5 KACHEMAK BAY NERR GOAL #4**

**KACHEMAK BAY GOAL #4:**
FOSTER A PUBLIC THAT IS INVOLVED WITH AND SUPPORTIVE OF RESERVE ACTIVITIES.
(NERRS Strategic Plan Goal #1 and Goal #3; ADF&G, Sport Fish Strategic Plan Goal #3)
Objective 1. To encourage partnerships and involvement in Kachemak Bay NERR functions
(NERRS Strategic Plan Goal #1, Objective 3 and Goal #3, Objectives 1, 2, and 3; ADF&G, Sport Fish Strategic Plan Goal #3, Objectives A and C)

Strategies:
- Promote partnerships and collaborations
- Develop volunteer programs to support Reserve activities

Objective 2. To increase awareness of the benefits of Kachemak Bay NERR’s Research and Education programs
(NERRS Strategic Plan Goal #1, Objective 4 and Goal #3, Objectives 1, 2, and 3; ADF&G, Sport Fish Strategic Plan Goal #3, Objective A)

Strategies:
- Host, assist in planning, and/or provide expertise for marine/coastal science-related events for the general public
- Encourage public attendance of ‘Brown Bag’ seminars
- Provide a ‘Speaker’s Bureau’ of Reserve staff and Community Council members to interested organizations
- Outreach Research and Education programs on the Reserve’s website
- Provide ‘What’s New in the Bay’ presentations to interested groups
- Provide news releases of Reserve activities and encourage feature articles and radio/TV spots

6.6 FORMAL EDUCATION PROGRAM
The Kachemak Bay NERR formal education program is focused primarily on K-12 students throughout Southcentral Alaska. Over the last five years, the number of students participating in this program has expanded ten-fold, with over 3,500 student contact hours (2,000 participants) occurring during the 2004-2005 school year.

Kachemak Bay NERR Education staff, as with staff of any marine science facility, are faced with numerous challenges to achieve the mission of teaching school-aged students about the marine world: declining school budgets; requirements that field-based programming meet State science standards; and school districts that are addressing the No Child Left Behind Act. These factors combine to place challenges not only on the school, but also marine science education providers.
The Reserve is working with local school districts, school administrators, and classroom teachers to ensure that all programming meets the needs of the students and is aligned with State and school district science standards. Each inquiry-based marine science program developed by Reserve staff is designed to target a specific grade and its associated science standards. Programs are designed to allow students to participate in Kachemak Bay NERR Education programming without repeating the concepts taught each year that they visit the facility.

6.7 INFORMAL EDUCATION PROGRAM

Kachemak Bay NERR is housed in the AIOVC with the Alaska Maritime NWR. During its first year of operation in 2004, the Visitor Center exceeded most visitation expectations, with over 75,000 visitors coming through the doors to learn about Alaska’s marine environment. The Visitor Center has allowed KNBERR staff to interact with people of all ages from around the world and introduce them to the NERRS and, in particular, the work being done by Reserve staff. In an effort to give guests to this facility additional information, Kachemak Bay NERR offers interpretive exhibits within the Alaska Islands and Ocean Visitor Center that highlight the research done by Reserve scientists and others working in the Kachemak Bay region. While the visitation at the AIOVC has been an incredible boon for the Education Program, it has also challenged the Education staff to keep up with an ever-increasing demand. The Education Program is currently reviewing a variety of levels of service that can be provided given existing resources and will incorporate those results, as well as resource needs for continued growth, into their Education and Outreach 5-Year Action Plan.

A key education program provided to the informal visitor is the Kachemak Bay NERR Discovery Labs (e.g. Plankton - High Seas Drifters; Tides and Currents; Dock Studies – Life in the Harbor). These open labs are designed for people of all ages and include inquiry-based activities. The visitors experience is self-directed, allowing each person to devote as much time as they choose at each of the many learning stations. Kachemak Bay NERR staff and volunteers are available at all labs for questions and further discussion. Reserve staff also guide Discovery Walks along the edge of Beluga Slough. These walks are offered to all ages and include time to observe and experience a local salt marsh.

6.8 COASTAL TRAINING PROGRAM

The Coastal Training Program provides up-to-date scientific information and skill-building opportunities to coastal decision-makers who are responsible for making decisions that affect coastal resources. Through this program, National Estuarine Research Reserves can ensure that coastal decision-makers have the knowledge and tools they need to address critical resource management issues of concern to local communities.
Nationally, the Coastal Training Program offers training by reserves related to coastal habitat conservation and restoration, biodiversity, water quality, and sustainable resource management and integrate reserve-based research, monitoring, and stewardship activities. Programs target a range of audiences, such as land-use planners, elected officials, regulators, land developers, community groups, environmental non-profits, businesses, and applied scientific groups. These training programs provide opportunities for professionals to network across disciplines, and develop new collaborative relationships to solve complex environmental problems. Additionally, the CTP provides a critical feedback loop to ensure that professional audiences are informed on local and regional science and research priorities. Programs are developed in a variety of formats ranging from seminars, hands-on skill training, participatory workshops, lectures, and technology demonstrations. Participants benefit from opportunities to share experiences and network in a multidisciplinary setting, often with a reserve-based field activity.

Partnerships are important to the success of the program. Reserves work closely with State Coastal Programs, Sea Grant College extension and education staff, and a host of local partners in determining key coastal resource issues and identification of target audiences. Partnerships with local agencies and organizations are critical in the exchange and sharing of expertise and resources to deliver relevant and accessible training programs that meet the needs of specific groups.

The Coastal Training Program requires a systematic program development process, involving periodic review of the reserve niche in the training provider market, audience assessments, development of a three to five year program strategy, a marketing plan, and the establishment of an advisory group for guidance, program review, and perspective in program development. The Coastal Training Program implements a performance monitoring system, wherein staff report data in operation(al)s progress reports according to a suite of performance indicators related to increases in participant understanding, applications of learning, and enhanced networking with peers and experts to inform programs.

The Coastal Training Program is currently the only NERRS-funded education program. The CTP goal is to improve decision-making related to coastal resource management at the local and regional level by providing comprehensive, science-based training. Program partners include: ADF&G; the Alaska Sea Grant program; the Kenai Peninsula Borough Coastal Management program; the Kenai Watershed Forum; the US Environmental Protection Agency (USEPA); and, the Alaska Department of Commerce, Community and Economic Development.

A sense of curiosity is nature’s original school of education.
Smiley Blanton
Each year, the Kachemak Bay NERR provides individual and/or series of workshops, targeted primarily at three identified audiences: coastal policy and decision-makers (e.g. elected officials, planners and regulatory agencies at the local, borough, state, and federal levels); coastal resource managers and scientists (e.g. fishery, wildlife, marine mammal, shellfish) at the state, federal, and tribal levels; and, coastal resource user groups (e.g. ecotourism guides, sport fishing guides, and water taxi services). Depending upon current issues (including coastal erosion, floodplain dynamics, marine mammal viewing, physical oceanography, and baysian statistics) and needs of the area, one or more of these audiences may be targeted annually. An ongoing series of needs assessments for each target audience will occur over the next five years to determine issues and topics of interest from which to develop CTP workshops.

Additionally, the Reserve is situated within the small community of Homer (population 4,000), with several Native villages (Seldovia, Port Graham, and Nanwalek) and Russian villages (Razdolna, Kacehmak Selo, and Voznesenka) located within and along the boundaries. Given the small community size, issues and research addressed by the Reserve are especially relevant to everyone. Kachemak Bay NERR’s Coastal Training Program is being developed to be responsive and proactive to the specific needs and issues impacting community response at the local level. For example, following the December 2004 Asian tsunami, the Reserve, in conjunction with Sea Grant, the University of Alaska Fairbanks, and the City of Homer, held a public meeting to discuss the science behind tsunamis, present tsunami inundation maps, and emergency response. Given that Homer has had tsunamis in the past and has the potential for tsunamis in the future, this presentation was an opportunistic way to disseminate accurate information and better prepare the community for emergency response.
7.0 PROGRAM ADMINISTRATION [§921.13(a)(2)]

7.1 ADMINISTRATIVE FRAMEWORK

The ADF&G is the State agency partner responsible for administering the Research Reserve in conformance with Education and Research goals of Kachemak Bay NERR and the NERR System. Kachemak Bay NERR is positioned within the Sport Fish Division of ADF&G. As necessary, partnerships, cooperative agreements, Reimbursable Services Agreements (RSAs), and other collaborative arrangements will be established with federal and state agencies, research and education institutions and organizations, non-profits, local governments, and others to reach the goals and objectives of the Reserve.

The overall administrative organization for Kachemak Bay NERR is composed of NOAA, ADF&G, the Reserve’s Community Council and key landholders. The Community Council was established to provide community, local government, agency, and other stakeholder input into the continued development and direction of the Reserve. A Charter was developed to provide direction for community involvement with the Reserve through the Community Council (Appendix 12). Subcommittees have been formed to assist in the development and implementation of Research, Education, and Coastal Training programs. Other subcommittees may be formed to assist in implementation of Reserve programs on an ‘as needed’ basis.

The goals and objectives of the Administrative Plan provide support, guidance and structure for the general operations of the Reserve, while forecasting future spending, budgets, staffing and facility needs.

7.2 ADMINISTRATIVE GOALS AND OBJECTIVES

The administrative goals addressed in this plan are aggressive, yet realistic. The concept of retaining, valuing and recognizing staff, while increasing their professional development is essential. The establishment of a long-term stable funding source will alleviate internal stress on staff and also raise morale for the recognition and worth of staff efforts. Finally, increasing the visibility of Kachemak Bay NERR’s identity within the community, region, state and nation will serve to establish the Reserve as a leader in research, education and stewardship, while fostering key partnerships to strengthen and further the Reserve’s mission and goals.

The Program Administration objectives are divided into two categories: leadership and management.

Management is doing a thing right; leadership is doing the right things.
Peter Drucker

The leadership component is external, emphasizing how the Reserve is looking ahead to where it will be positioned in five years - providing Reserve direction.

The management component is internal, identifying the steps necessary to progress from where the Reserve is currently to where it wants to be in five years.

The Administrative goals are primarily aligned with:
NERRS Strategic Plan Goal #3 – increase awareness, use, and support of the Reserve System and its estuarine science, education, and stewardship programs, and the ADF&G, Division of Sport Fish Strategic Plan Goal #4 – recruit, develop, empower, and retain a diverse, dedicated, motivated, empowered, and effective workforce.

7.3 KACHEMAK BAY NERR GOAL #5

KACHEMAK BAY NERR GOAL #5: MAINTAIN A WORKFORCE THAT IS MOTIVATED AND EFFECTIVE IN ATTAINING THE RESERVE MISSION.
(NERRS Strategic Plan Goal #3; ADF&G, Sport Fish Strategic Plan Goal #4)

Objective 1. To provide each employee with opportunities for professional development to enable them to perform competently and excel in their current position and to prepare qualified employees to be competitive for more advanced jobs
(NERRS Strategic Plan Goal #3, Objective 1; ADF&G, Sport Fish Strategic Plan Goals #4, Objective C)

LEADERSHIP
Strategies:
Acquire support to participate in professional marine science education, coastal education, and marine science conferences within and outside Alaska

MANAGEMENT
Strategies:
Enhance support for professional development training

Objective 2. To maintain a workforce capable of attaining program goals and objectives
(NERRS Strategic Plan Goal #3, Objective 1; ADF&G, Sport Fish Strategic Plan Goal #4, Objectives B, F, G)

LEADERSHIP
Strategies:
Enhance communication by developing a structured framework for information exchange
Work with ADF&G to develop an employee recognition program for staff improvement and excellence
Work with ADF&G to recognize the abilities and diversity of the Reserve’s administrative team and to include them on statewide and regional administrative consulting and planning efforts

**MANAGEMENT**

**Strategies:**
- To provide a positive, supportive, safe work environment
- Enhance workforce performance

**Objective 3. To provide effective leadership structure to accomplish the mission and goals of the Reserve**

ERRS Strategic Plan Goal #3, Objective 1; ADF&G, Sport Fish Strategic Plan Goal #4, Objective F)

**LEADERSHIP**

**Strategies:**
- Work with ADF&G to foster a work environment where decision-making skills are developed and recognized

**MANAGEMENT**

**Strategies:**
- Provide a framework for programmatic operations

**Objective 4. To develop and implement a stable funding strategy**

(NERRS Strategic Plan Goal #3, Objective 1; ADF&G, Sport Fish Strategic Plan Goal #4, Objective F)

**LEADERSHIP**

**Strategies:**
- Work with ADF&G to develop an efficient, vertically integrated budgetary system that meets the Reserve’s needs
- Diversify and stabilize funding and match

**MANAGEMENT**

**Strategies:**
- Provide a reporting process that tracks grants and match

### 7.4 FUNDING APPROACH

The funding plan has been developed to show an incremental and consistent change in funding structure with a shift toward more stable funding sources. This is a realistic plan that will be updated annually to track progress toward the final goal. Highest priority will be focused on establishing permanent funding sources for three of
the four core programmatic positions: Research Coordinator, Education Coordinator, and Office Manager. The Office Manager position was added to the list of Core Staff within the Reserve’s Administrative Plan to recognize the essential nature of administrative support to the organization, even though there is no comparable ‘core’ position listed in the NERRS. The fourth core position, Reserve Manager, will be funded through the NOAA Operations grant and other competitive sources. Over the next five-year period, State funding is not being pursued for the Manager position given its close ties with the NOAA program and Reserve operations.

7.5 ANNUAL BUDGET

Kachemak Bay NERR’s general operations and programmatic functions are covered through three primary funding sources: (1) the annual NOAA Operations award; (2) ADF&G, Division of Sport Fish; and, (3) a variety of competitive grant sources. As stated previously, the Reserve is based on a state-federal partnership. This partnership carries into Reserve operations with the annual NOAA Operations award. This award provides funds for Reserve operations and maintenance, personnel, and programmatic activities. This award also requires a 30% non-federal match. Consequently, in addition to the funds currently received by the Reserve from ADF&G, the Reserve also works with partners on cooperative projects and seeks non-federal competitive grants to cover this annual need which totals an estimated $250,000 annually. Securing this non-federal match has been and can be stressful for staff. Obtaining a stable match source for the NOAA Operations award is a primary task for the Administrative team. Future budget projections include additional State funds to reduce the need to pursue non-federal funds to meet match needs, with the understanding that Reserve requests would compete with other State funding requests. The Reserve intends to develop other match options with ADF&G to minimize financial pressure on staff.

Overall budgetary funding is being projected given a 5% annual increase, with a 3% annual inflationary increase, and level funding for the NOAA Operations award.

As stated before, this is a conservative plan for establishing more stable funding. However, there are several approaches, excluding the State, that will be also be pursued to alleviate funding and administrative stress:

- pursuit of a few larger grants, rather then multiple small grants;
- identifying corporate donors with similar goals;
- researching foundations with common issues and strategies;
- working with a private, non-profit group on additional financial resources; and,
- stabilizing match, especially for the annual NOAA Operations award.

7.6 RESERVE STAFF

Staff within the ADF&G are hired under a number of categories, including:

**Permanent Full Time:** Work a minimum of 30 hours/week. Most normal work schedules are 37.5 hours.
**Permanent Part-time:** Work less than 30 hours/week. Must work a minimum of 15 hours/week to be eligible for health insurance with retirement benefits, holiday pay and accrued leave prorated based on the number of hours worked per week. **Permanent Seasonal:** Full time or part-time, but less than 12 months/year. **Nonpermanent:** There are two types: long-term and short-term. Short-term employment is less than 120 calendar days and the employee is not eligible for benefits. If this position goes beyond 120 calendar days, the employee is entitled to holiday pay, accrued leave and health insurance. Both types are not eligible for retirement benefits.

Table 6 outlines current (FY05) staff at Kachemak Bay NERR, hiring status and funding status.

Table 6. Kachemak Bay NERR Current Staff Positions

<table>
<thead>
<tr>
<th>Program</th>
<th>Position</th>
<th>Hiring Status</th>
<th>Funding Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>Manager / Natural Resources Manager II</td>
<td>Permanent, Full Time</td>
<td>100% NOAA</td>
</tr>
<tr>
<td>Administration</td>
<td>Office Manager / Administrative Assistant</td>
<td>Permanent, Full Time</td>
<td>100% ADF&amp;G</td>
</tr>
<tr>
<td>Administration</td>
<td>Administrative Support / Accounting Clerk I</td>
<td>Permanent, Full Time</td>
<td>100% ADF&amp;G</td>
</tr>
<tr>
<td>Research</td>
<td>Research Coordinator / Fisheries Biologist III</td>
<td>Permanent, Full Time</td>
<td>40% NOAA 60% competitive grants</td>
</tr>
<tr>
<td>Research</td>
<td>Biological Specialist / Fisheries Biologist II</td>
<td>Permanent, Seasonal</td>
<td>25% NOAA 75% competitive grants</td>
</tr>
<tr>
<td>Research</td>
<td>GIS Specialist / Research Analyst II</td>
<td>Permanent, Full Time</td>
<td>50% NOAA 50% competitive grants</td>
</tr>
<tr>
<td>Research</td>
<td>Watershed Specialist / Habitat Biologist II</td>
<td>Permanent, Part-time</td>
<td>30% NOAA 70% competitive grants</td>
</tr>
<tr>
<td>Research</td>
<td>Fish and Wildlife Technician III</td>
<td>Short-term, Non-Permanent</td>
<td>100% competitive grants</td>
</tr>
<tr>
<td>Education</td>
<td>Education Coordinator / Education Specialist I</td>
<td>Permanent, Full Time</td>
<td>75% NOAA 25% competitive grants</td>
</tr>
<tr>
<td>Education</td>
<td>Education Specialist / Education Associate III</td>
<td>Permanent, Seasonal</td>
<td>100% competitive grants</td>
</tr>
<tr>
<td>Education</td>
<td>Education Specialist (CTP) / Habitat Biologist II</td>
<td>Permanent, Full Time</td>
<td>100% NOAA</td>
</tr>
<tr>
<td>Education</td>
<td>Illustrator / Fish and Wildlife Technician III</td>
<td>Non-Permanent, Long-term</td>
<td>100% competitive grants</td>
</tr>
<tr>
<td>Education</td>
<td>Videographer / Fish and Wildlife Technician III</td>
<td>Non-Permanent, Long-term</td>
<td>40% NOAA 60% competitive grants</td>
</tr>
</tbody>
</table>

**7.6.1 Current Research Staff**

The Research Coordinator responsibilities include: ensuring proper execution of the System-Wide Monitoring Plan (SWMP); coordination of research activities; supervision of GRF students; supervision and support of the Research staff; and, development of outside funding for research and monitoring activities.

*An empowered organization is one in which individuals have the knowledge, skill, desire, and opportunity to personally succeed in a way that leads to collective organizational success.*

Stephen Covey
The Biological Specialist is currently vacant, but will establish and implement biological monitoring components and lead long-term water quality monitoring. The Watershed Specialist position establishes and implements projects based on a watershed approach, including applied science, functional assessments and community involvement. The GIS Specialist oversees GIS activities at the Reserve, including data collection and capture, metadata integration, and compilation of data layers to ensure compatibility.

### 7.6.2 Current Education Staff

The Education Coordinator responsibilities include: coordination of all Kachemak Bay NERR Education programs; supervision and support of Education staff; and, development of outside funding for education program design and delivery. The Education (Formal/Informal) Specialist oversees K-12 and teacher-training programs, works directly with schools to develop programs, coordinates with agencies and organizations on education efforts, and conducts open labs and other informal programs for the general public. The Education (CTP) Specialist is responsible for the design and facilitation of training programs that have been identified by coastal decision-makers and stakeholders, through a series of systematic needs assessments. The two Fish and Wildlife Technician III positions, Technical Illustrator and Videographer/Editor, incorporates various forms of art and media into Education and Outreach programs.

### 7.6.3 Current Administrative Staff

The Manager position focuses and supervises the overall Reserve Administration, Research, and Education direction. The Manager serves as liaison and representative of the Reserve with various agencies and organizations. The Office Manager oversees the Reserve’s Administration program and supervises Administrative staff. This position also coordinates with State and Federal Administrative offices on programmatic processes and personnel issues, as well as serving as liaison for Reserve Community Council. The Administrative Support position completes purchasing, travel, recordkeeping, inventory, and budget balancing tasks. This position also serves as receptionist and assists with research monitoring programs.

Figure 14 shows a chart of how these positions are organized within the Kachemak Bay NERR programs. Staff are funded through a variety of sources, with only two positions financially secure with stable State funding through ADF&G. The majority of staff submit several competitive grants each year to support portions of their salary.
In striving to establish stable, long-term funding for staff positions, other more subtle shifts in the budget will occur. For example, securing State funds for three of the four core positions will put NOAA funds currently used for these positions back into the general operations budget for facilities operations or programmatic needs. Additionally, Reserve staff receive numerous requests from the public, agencies, and organizations. These activities are generally not covered by project-specific grants, but are extremely important to the long-term standing, partnerships, and functions of the Reserve. Thus, the staff time and costs associated with these requests are absorbed by the general operation of the Reserve. Establishing a stable source for staff funding will allow staff to confidently respond to requests in a professional and timely manner.

7.6.4 Future Staff Needs
While the Reserve does not envision a substantial growth in Reserve staff, certain support positions are needed to more efficiently and effectively complete projects.

Research Staff Needs
It is expected that during the performance period of this Management Plan, the Research staff will expand to include two seasonal Research Assistants. One Research Assistant will support the research activities of the three principal investigators – Research Coordinator, Biological Specialist, Watershed Specialist. The second Research Assistant will support SWMP and other monitoring activities.

Education Staff Needs
Over the next five-year period, it is not anticipated that additional permanent long-term staff will be added to the Education team. However, the use of seasonal staff, university or high school interns, mentor students, community volunteers, and Student Conservation Association (SCA) or AmeriCorps volunteers will be targeted for project-specific functions.

Administrative Staff
The administrative team is particularly critical in its duties to NOAA, ADF&G, and other funding sources. Equally vital to the administrative team’s responsibilities are personnel issues, contracts, grant processing, budgetary tracking, and liaison work with the Reserve’s Community Council. In its current form, the administrative team has potential for high staff turnover, which will lead to lack of knowledge and inconsistency with state and federal protocols, eventually undermining any progress the Reserve has made administratively. Thus, a restructuring of this program will make it more attractive to retain professional, qualified staff.

In addition to the need for administrative restructuring, the programmatic growth anticipated by the Research and Education teams will result in further administrative demands. To meet these anticipated needs, the Administrative team proposes to add a part-time position that would be used to support basic programmatic needs, including lobby reception, running errands, copying, and organizing and scheduling meetings.

7.7 FACILITIES PLAN
7.7.1 Kachemak Bay NERR Facilities

The Reserve maintains offices, educational lab classrooms, research lab, seminar and conference rooms, and a small exhibit area in the Alaska Islands and Ocean Visitor Center (AIOVC), a 3,421-m$^2$ (36,825-ft$^2$), state-of-the-art Visitor Center built and maintained through a partnership with the US Fish and Wildlife Service, Alaska Maritime NWR. Approximately 37% (1,266-m$^2$ or 13,625-ft$^2$) of the Visitor Center is space dedicated to the Reserve and shared with the Refuge.

The initial negotiated partnership cost to cover operation and maintenance of the AIOVC was $110,000 annually, based upon Reserve dedicated and shared space. These associated costs were estimates developed during the construction of the facility and cover a five-year operational period. However, after two years of operation (January 2006), the cost estimates will be changed to reflect actual costs, still based upon Reserve dedicated and shared space. Negotiations for updated operation and maintenance costs will begin the spring of 2005.

The Reserve also maintains a separate laboratory workshop and a small modular building with partner offices and a bunkhouse. The Bay Avenue laboratory workshop continues to be used by Research staff as a staging area, to construct and maintain equipment, and for storage. The modular facility served as the Reserve's Headquarters prior to the construction and completion of the AIOVC. Currently, the office space is being used by Reserve partners who are collaborating on projects of common interest. The bunkhouse continues to be used by the Reserve, especially during the field season. These facilities, as well as the AIOVC, are detailed in the Facilities Plan in Appendix 13.

7.7.2 Other Facilities

Kasitsna Bay Laboratory

The Kasitsna Bay Laboratory (KBL) is a research laboratory that provides a unique resource for marine research and teaching. It is a research facility dedicated to excellence in marine science and education near Homer, Alaska in Seldovia. The Laboratory is owned by NOAA's National Centers for Coastal Ocean Science (NCCOS) and used primarily by the University of Alaska Fairbanks (UAF) as a place where people can learn about subtidal, intertidal, seagrass, and terrestrial communities. The Kasitsna Bay Laboratory also supports an active cold-water diving facility used by the National Undersea Research Program at UAF.

This facility is a research facility that has been in operation since the 1960s. NCCOS took over the responsibility for KBL in 1999. Since 2002, over $12M has been invested in rebuilding and upgrading the KBL facility, scheduled for completion in October 2005. NCCOS is currently developing a framework for research and monitoring programs that will be associated with that facility. A draft paper exists that describes the expected interaction between Kachemak Bay NERR and the two groups involved with the lab, National Center for Coastal and Ocean Sciences (NCCOS) and UAF. The Reserve has been and will continue to be involved with the development of the KBL research programs. Kachemak Bay NERR also envisions coordinating use of the Lab with NCCOS for specific projects and visiting investigators.
7.7.3 Future Facility Needs

Research Facilities Needs

Kachemak Bay NERR has two major research related facilities: (1) the AIOVC and (2) the Bay Avenue Laboratory. The main lab and office space within the AIOVC accommodates the Research staff. The laboratory in the AIOVC is used for processing chemical and biological samples, and SWMP data sonde calibrations. The lab has space for four microscope stations, a calibration station, chemical processing area, and four sample preparation stations. Additionally, there is space for several pieces of equipment. An office within AIOVC will be dedicated to telemetry equipment for monitoring SWMP and other monitoring sensors. Unoccupied cubicles and offices can be used to support visiting scientists. The Bay Avenue Laboratory is used for equipment and boat storage, equipment repair, and as a staging area. It also houses a dive locker and shop.

The Kasitsna Bay Laboratory near Seldovia is a facility that may be of interest for individual projects. The Reserve program will most likely take advantage of the flow-through seawater system at that facility to perform manipulative experiments. Kachemak Bay NERR usage of Kasitsna Bay will require payment of standard use fees established by NCCOS and UAF.

No new facilities are planned in the next five years for research efforts. Some minor upgrades are needed to existing facilities and equipment. The Reserve’s skiff will require the addition of a canvas top to allow its use in a wider range of weather conditions. The trailer for the skiff will be upgraded to handle the heavier skiff. Projects that require a boat larger than the existing skiff will be supported by contracting with local vessel operators. The research skiff is shared between the research and education programs. An increase in overall programmatic growth may result in the need for an additional, and potentially larger, vessel for use by Reserve staff.

Education Facilities Needs

As noted earlier, the Kachemak Bay NERR Education program has experienced incredible growth in the numbers of individuals and school classes participating in all aspects of the Reserve’s Education and Outreach programs. The driving force behind this growth is the AIOVC, the joint headquarters of Kachemak Bay NERR and the Alaska Maritime NWR. This building provides dedicated space for the education and outreach functions of the Reserve, including a lab-classroom with a capacity for thirty-two students, lab preparation space, and a 50-seat seminar room. Kachemak Bay NERR staff also has access to the Visitor Center’s 120-seat auditorium. The Reserve’s Education program also foresees the use of the Kasitsna Bay Laboratory as part of the planned teacher training programs.

Scheduling and room use guidelines for the lab classroom are the responsibility of Kachemak Bay NERR Education staff. The classroom is equipped for hands-on marine science activities and is wired for network computer connectivity. The seminar room and auditorium are scheduled through Alaska Maritime NWR staff and provide space for staff and community presentations, trainings, meetings, formal classroom activities and temporary interpretive displays.
**General Description of Proposed Developments**

With the completed construction and opening of the AIOVC, facilities needs for the Reserve have significantly decreased from those identified in the previous Management Plan. While the Refuge had been planning and designing exhibitry for the Visitor Center for more than five years, the Reserve was relatively new and had a minimal amount of time to strategize on exhibits. Plans outlined below enhance the skeletal structure of the existing Reserve exhibits, bringing them up to standard with the remainder of the AIOVC facility. Other plans include working with local partners to provide, enhance, or update their signage and exhibitry to strengthen partnerships, cooperation, and information exchange through the submission of competitive grants. Proposed facility enhancements include:

Table 7. Proposed Future Facilities Enhancements

<table>
<thead>
<tr>
<th>Facility Enhancement</th>
<th>Anticipated Schedule</th>
<th>Cost Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve AIOVC Exhibits</td>
<td>11/05-4/06</td>
<td>$225,000</td>
</tr>
<tr>
<td>Reserve Facility Signage</td>
<td>7/05-6/06</td>
<td>$20,000</td>
</tr>
<tr>
<td>KBSP Signage</td>
<td>10/05-9/06</td>
<td>$70,000</td>
</tr>
<tr>
<td>KBNERR/KBSP Airport/Chamber Displays</td>
<td>10/05-9/06</td>
<td>$30,000</td>
</tr>
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<td>Reserve Traveling Exhibit</td>
<td>7/06-6/07</td>
<td>$30,000</td>
</tr>
<tr>
<td>Reserve Video</td>
<td>10/07-9/08</td>
<td>$100,000</td>
</tr>
<tr>
<td>Pedestrian Underpass</td>
<td>10/07-9/10</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>KBSP-Halibut Cove Lagoon Restoration</td>
<td>10/06-9/08</td>
<td>$150,000</td>
</tr>
<tr>
<td>KBSP and AIOVC Trails</td>
<td>10/07-9/09</td>
<td>$250,000</td>
</tr>
<tr>
<td>Pratt Museum (marine exhibits)</td>
<td>11/05-9/06</td>
<td>$500,000</td>
</tr>
<tr>
<td>Northern Bay State Park Signage</td>
<td>10/08-9/10</td>
<td>$25,000</td>
</tr>
</tbody>
</table>

The Reserve does not anticipate being the primary lead or funder on partnership projects, but recognizes the importance of these projects, and will provide support as time and funding permits to collaborate on their design and completion. Additional details for these projects are provided in the Facilities Plan in Appendix 13.
8.0 PUBLIC ACCESS AND VISITOR USE

Since the Reserve is not the lead agency for land management within the boundary, a formal Public Access Plan has not been developed. However, with intensifying development, increasing resident population, and an expanding tourism industry, the Reserve plans to take an active role in determining general public and visitor use interests and activities for program development within the Reserve. This process and information obtained will be shared with partnering land management agencies for long-term resource management and protection. In working with established processes for surveying user groups, the Reserve can better understand user group types, activities, interests, length of stays, and potentially some basic economics. Finalizing this data collection and analysis by disseminating results to collaborating agencies will strengthen partnerships and aid in reaching respective goals.

8.1 NERRS PRIORITIES FOR PUBLIC ACCESS

Section 921.13(a) (5) of the NERRS regulations requires a Plan for Public Access as part of the overall Reserve Management Plan. Public access can be defined as the ability of all members of the community to pass physically and visually to, from and along the ocean shore, other waterfronts and over public lands. The ability to enjoy the ocean, bays, and rivers is directly related to the ability to reach them from the uplands. A Public Access Plan must try to allow for long-term public use and enjoyment of the water and shoreline, while minimizing damage to the resources themselves (EIS 1998).

8.2 ADF&G, DIVISION OF SPORT FISH PRIORITIES FOR PUBLIC ACCESS

By law, the mission of the Division of Sport Fish is to protect and improve the State’s recreational fisheries resources. The Division of Sport Fish has addressed public access in their Strategic Plan through the following guiding principle - provide for the greatest long-term opportunities for people to use and enjoy Alaska’s fish, wildlife, and habitat resources. Goal #1 in the Strategic Plan is to ‘sustain recreational fishing opportunities while optimizing social and economic benefits from these opportunities’. The Division has a vested interest in protecting and promoting designated public access.

8.3 KACHEMAK BAY NERR PUBLIC ACCESS

The future Kachemak Bay NERR Public Access Plan will respect the continuation of traditional uses in the Bay, while maintaining biological integrity for the Reserve’s research, monitoring, and education goals. The CHAs and the State Park have addressed public access and the preservation of existing uses in their respective Management Plans. Objectives in the Kachemak Bay and Fox River Flats CHA Management Plan mandate maintained or increased opportunity to hunt, fish, and recreate within those areas consistent with CHA goals (ADF&G 1993). The Kachemak...
Bay State Park Management Plan lists objectives for assessing public needs and providing recreational opportunities. This Plan also discusses various access issues in this region (ADNR 1995).

8.3.1 Current Public Access

Most visitors to the Kachemak Bay region arrive in Homer by motor vehicle on the Sterling Highway, or by plane to the Homer airport. The establishment of the Alaska Islands and Ocean Visitor Center on the main highway at Beluga Slough has substantially increased the visibility of the Reserve’s program.

The main access points to Kachemak Bay and Fox River Flats CHAs are via Kachemak Bay proper. There are approximately ten public boat ramps, launches and vehicle access points located around Kachemak Bay, with the Homer Spit, serving as the primary access point. Access can also be gained through Seldovia Harbor, although transportation to Seldovia is possible only by air and water. Other access points include Swift Creek Switchback Trail, Mud Bay, Mariner Park, Bishop’s Beach, Diamond Creek Trail, Bradley River, and Jakolof Bay.

Several major public access points can be found along the Homer Spit, Homer Airport beach, Sterling Highway, and East End Road. Public Access to the beach off of the Sterling Highway is available at Anchor River State Recreation Area (Anchor Point) and Bishop’s Beach, near Beluga Slough in Homer. Public docks are located on the Homer Spit, Seldovia Harbor, Jakolof Bay, and Halibut Cove. A barge dock located at the Bradley Lake Hydropower Project also provides public access, though only at high water. Beluga Slough is easily accessed through several major roads and beaches.

From East End Road, access can be found at Swift Creek Switchback Trail at the end of the road where a switchback trail, authorized by the State for pedestrian, horse, and ATV access only, leads down to the beach. The Fox River Flats Trail runs from the head of the Bay up the valley on the west side of Fox River Flats, providing the main access to the Flats.

Kachemak Bay State Park, Alaska’s first State Park, and only Wilderness Park, contains roughly 1,619 km$^2$ (400,000 ac) of mountains, glaciers, forests and ocean. The estimated 554 km$^2$ (137,000 ac) included in the Reserve’s boundary drain into Kachemak Bay.
A KBSP dock is located at the head of Halibut Cove Lagoon. ADPOR maintains several mooring buoys - one off Glacier Spit at Right Beach; two off Saddle Trailhead; one in Tutka Bay; and, two in Halibut Cove Lagoon. Fifteen State Park trailheads are found on the south side of the Bay. Cabins and campsites at KBSP are available to the public and are found in Halibut Cove (three cabins), China Poot Bay (one cabin), and Tutka Bay Lagoon (one cabin) (ADNR 2004). Although disturbed by logging activities associated with spruce bark beetle damage, there is a trail from Tutka Lagoon that accesses the Rocky River Road, a road from Seldovia to Jakolof Bay (EIS 1998).

Since the south side of the Bay is not accessible by road, it has experienced fewer human impacts over the years. This area retains the more pristine inlets and a wealth of intertidal life that are of great interest for research and educational opportunities. Travel to these areas from Homer requires a boat or small plane. School groups either take the ferry to Seldovia or charter a boat. In the summer, hundreds of boats cross the Bay from Homer to pursue recreational activities. There are also several private ownerships on the south side of the Bay, and these private owners access the park via their property and along the shore to hike, hunt, and beach comb.

**Existing Uses**
Kachemak Bay supports several maritime communities. The primary existing uses of Bay resources include:

- commercial fishing
- sport fishing and hunting
- personal use and subsistence fishing and hunting
- shellfish mariculture
- plant gathering
- livestock grazing
- education uses
- trapping
- transportation and moorage
- recreation and tourism
- shoreline lodges and residences
- pipeline and utility lines
Recreational and subsistence hunting and fishing, commercial fishing, clamming, hiking, camping, and boating are all traditional uses within the boundaries of Kachemak Bay NERR. Several of these activities are subject to state regulation and require licenses and permits based on location in either the Critical Habitat Areas or State Park. Access for the majority of these activities generally takes the form of a boat or small plane.

There are excellent hiking and camping opportunities along the shoreline and in the surrounding forests and mountains (Figure 15). Glaciers and snowfields stretch for miles above the timberline and provide opportunities for skiers and hikers. Park attractions include Grewingk Glacier, Poot Peak, China Poot Bay, Halibut Cove Lagoon, Humpy Creek, and China Poot (Leisure) Lake.

### 8.3.2 Future Public Access

The Reserve does not foresee major expansions in public access over the next five years. However, some minor plans for expansion of public access in Kachemak Bay have been discussed. Access will be improved when necessary, consistent with the goals and objectives of CHAs, KBSP, and the NERR program. Public access plans or needs include:

- the upgrade and new construction of interpretative trails at the AIOVC, allowing improved access to estuarine areas for educational purposes, specifically Beluga Slough (USFWS 1994, EIS 1998);
- given the amount of pedestrian traffic in Homer and the amount of traffic on the Sterling Highway during the summer months, the Reserve is planning to work with the City of Homer and Alaska Maritime NWR to address pedestrian access and safety via a crosswalk, underpass, or other pedestrian conveyance,
a formal trail may be developed for the Fox River Flats CHA to enhance public access, while minimizing impacts to resources,

- State Parks plans to develop hiking and ski trails on the 0.32 km\(^2\) (80-ac) Eveline State Recreation Site, located above McNeil Canyon,
- additional small boat mooring buoys for camping at public beaches to limit impacts by anchors on the diverse and productive intertidal zone, and,
- near the head of the Bay, foot trail access will likely be developed at Cottonwood Creek and/or Eastland Creek on Kachemak Bay State Park lands.

Proposals to increase public access will be reviewed by State Critical Habitat Area and Kachemak Bay State Park staff to ensure compatibility and management needs are met. (EIS 1998). Both of these State entities have representation on the Reserve’s Community Council. The quarterly Council meetings have been modified to provide a platform for the managing and regulatory entities to coordinate on topics or issues of relevance.

**SPOTLIGHT**

**Kachemak Bay Daily Ferry**

Currently, a feasibility study is being conducted to review economic and environmental impacts associated with the proposed Kachemak Bay Ferry, a daily ferry connecting the City of Seldovia to the City of Homer. An estimated $2 million in Intermodal Transportation Enhancement funds have been secured by the Seldovia Native Association to complete the feasibility study. If deemed acceptable, an additional $10 million will be targeted for engineering and construction. This project will result in ferry service daily to and from Seldovia, with additional less frequent stops to Halibut Cove, Tutka Bay, Port Graham, and Nanwalek. This economic development of the south side of the Bay will have a direct effect on the number of visitors accessing this area. It also provides a greater opportunity to transport personal vehicles, including recreational vehicles, to the south side of the Bay. This will increase the need for road upgrades and additional transportation services. These concerns and secondary impacts will be considered as part of the feasibility study.
9.0 LAND ACQUISITION

The Kachemak Bay NERR boundaries were selected to reflect existing state and federal ownerships with adequate controls already in place to ensure future health and productivity of the Reserve. While Kachemak Bay NERR is not actively involved in land acquisition, the ADF&G, Division of Sport Fish and Kachemak Heritage Land Trust (KHLT) protect land and resources through fee simple acquisition, as well as conservation easements.

9.1 ADF&G, DIVISION OF SPORT FISH

The ADF&G, Division of Sport Fish is involved in several aspects of land acquisition. ADF&G assisted in the development of the Habitat Protection component of the Exxon Valdez Oil Spill (EVOS) restoration program, and evaluated over 1 million acres of private land for possible protection or restoration as part of that process. The program’s first large parcel acquisition of 96.3 km$^2$ (23,800 ac) occurred on the southern shore of Kachemak Bay.

By serving on the board for the Bradley Lake Moose Mitigation fund, the ADF&G directs moose habitat preservation, maintenance, and enhancement on the southern Kenai Peninsula, including areas around Beluga Slough, a highly visible component of the Reserve.

The Department also partners on grants, such as the North American Wetlands Conservation Act grant program, with non-governmental organizations, including The Nature Conservancy and Kachemak Heritage Land Trust. These grants have secured lands at Stone Step Lake, Beluga Slough, and Fox River Flats for long-term conservation.

9.2 KACHEMAK HERITAGE LAND TRUST

A non-profit organization, KHLT works to preserve land with significant natural, recreational, or cultural values for public benefit by working with willing landowners on the Kenai Peninsula. Since 1989, the Land Trust has secured more than 20 properties with conservation easements and now owns more than 10 parcels. Many of the parcels KHLT targets complement resource conservation within the Reserve, including lands adjacent to the CHA’s and State Park. The Land Trust also focuses on lands within the City of Homer, including the Beluga Slough area that is used by the Reserve and Alaska Maritime NWR for education and outreach programs.

One generation plants trees...another gets the shade. Chinese proverb
9.3 NERRS BOUNDARY EXPANSION GUIDELINES

The procedures for expanding the Reserve boundary are found in 15 CFR §921.33 (Appendix 16). Basically, NERR boundary changes:

- require written approval from NOAA;
- may require public notice and an opportunity for public comment (this step is not mandatory if the property in question was listed in the Reserve Management Plan or Final EIS); and,
- in certain cases, an environmental assessment or EIS may be required.

9.4 KACHEMAK BAY NERR FUTURE BOUNDARY EXPANSION OPTIONS

The majority of the southern shore is owned by the State, while the northern shore is generally privately owned, Kachemak Bay State Park and the City of Homer hold title to some parcels. The water column of Kachemak Bay is entirely state-owned and designated as part of the Kachemak Bay CHA. The majority of the tidal and submerged lands are also owned by the State, with a few exceptions:

- submerged lands in the Homer Boat Harbor (owned by US Coast Guard);
- tidelands along the City limits (owned by the City of Homer);
- submerged lands in the Seldovia Boat Harbor (owned by the City of Seldovia);
- relatively small, privately-owned tideland parcels at scattered sites around the Bay, within the Kachemak Bay CHA (privately owned); and,
- four private inholdings within the Fox River Flats CHA (privately owned).

Discussions during the initial designation of the Reserve led to several possible expansions of the Kachemak Bay NERR boundary. The most realistic boundary expansion opportunities include the review and incorporation of the following areas:

9.4.1 Base of Spit—Mud Bay and Mariner Park

The City of Homer-owned tidelands up to the mean high water mark surrounding the Spit are within the Reserve boundary.
However, a significant portion of the upper Spit areas are only inundated during the highest tides of the month, and are, thus, above the mean high tide level. These high intertidal flats and salt marshes on either side of the base of the Spit are known as Mud Bay and Mariner Park (Figure 16), and are priorities for future boundary expansion.

A number of years ago, the City of Homer commissioned a report from Dames and Moore in response to a US Army Corps of Engineers (USACE) permit request to open the channel to flush the lagoon. Dames and Moore suggested several alternatives, the first of which was to place the area under a conservation easement to preserve the habitat on-site. Issues concerning the enhancement of bird habitat were identified by the Alaska Department of Transportation (ADOT) to avoid conflicts with the approach to the Homer Airport. The Homer City Council authorized staff to proceed with KHLT on a conservation easement. Subsequent discussions with the Homer Advisory Parks and Recreation Commission occurred with suggestions to exclude the area used for RVs and camping. This would delineate the wetlands portion, and, thereby, the area covered by conservation easement. During the process of determining the wetland portion, it was discovered that ownership in the area had not altogether been transferred to the City of Homer from the state and federal governments, as it should have. At present, this ownership issue has yet to be settled. In addition to protecting this area, the Homer City Council directed KHLT to approach adjacent landowners along the toe of the bluff for conservation easements, which will be pursued after the City of Homer’s conservation easement is secured.

Mud Bay and Mariner Park serve as feeding grounds for an extraordinary number of migrating shorebirds and were designated as part of the Western Hemisphere Shorebird Reserve Network (WHSRN). Mud Bay (east of the Spit) is a classic northern mud flat site, home to a collection of worms, bivalves, crustaceans, and other intertidal life. These organisms are food for birds, crabs, and fish. The mud-based lagoon has been used for several studies on clams, specifically *Macoma* spp. Before the construction of the Homer Spit Road and Homer Airport, Mariner Park (west of the Spit) was a continuation of this diverse mud flat community. Since the tidal flow was interrupted, however, Mariner Park has evolved into a sand cobble ecosystem, and species diversity has declined.

9.4.2 Louie’s Lagoon and Other Protected Habitats on the Spit

In 1997 and 1998, a total of 107 acres in and around Louie’s Lagoon was purchased for nearly $1 million [$422,100 for 0.28 km$^2$ (68.7 ac) of Homer Spit low-lying intertidal flats and salt marsh (Louie’s Lagoon), and $574,000 for 0.15 km$^2$ (38 ac) (Beluga Slough)]. The City of Homer contributed an additional $41,000 toward the Beluga Slough parcel. This acquisition project was instigated by KHLT, and marketed to the TPL for their assistance. The project eventually became a partnership with TPL, KHLT, and the City of Homer submitting successful proposals to the EVOS Trustee Council. These lands are protected by conservation easements held by the US Department of Justice and have also been included in the City of Homer’s Conservation Zone. The location and composition of this Lagoon make it suitable as a site for further studies. The
portions in public ownership should be considered as future additions to the Reserve’s boundary. The City of Homer’s long-term plans include developing this area as a bird observation site.

9.4.3 Critical Habitat Areas and Kachemak Bay State Park
Since the Fox River Flats and Kachemak Bay CHAs are major Reserve components, any inholdings identified in the Management Plan for these areas are relevant to the Reserve. Fee simple acquisition, conservation easements, and donations would be considered as appropriate resource conservation for these inholdings. If acquired, these lands should be considered as additions to the Reserve’s boundary.

Additional inholdings and leases for the CHA’s and inholdings for KBSP are identified in Appendix 14 and Appendix 15, respectively.

9.4.4 New State Park Parcels
In 1989, the Cottonwood/Eastland parcels on the north shore of Kachemak Bay were added to Kachemak Bay State Park. A small purchase of 0.16 km$^2$ (40 ac) in 1995, brought the total unit to approximately 10 km$^2$ (2,500 ac) in size, with an estimated 7.2 km (4.5 mi) of shoreline.

In 1998, the Exxon Valdez Trustee Council funded the acquisition of three parcels on the north side of Kachemak Bay with significant natural habitat values. These parcels included: (1) Baycrest State Recreation Area – 0.36 km$^2$ (90 ac); (2) Overlook Park State Recreation Area – 0.39 km$^2$ (97 ac); and, (3) Diamond Creek State Recreation Area – 0.89 km$^2$ (220 ac) (Figure 17). These parcels are under the authority of Alaska ADNR as State Park units, but not as part of the legislatively-designated Kachemak Bay State Park. The Overlook Park State Recreation Area is managed by Kachemak Bay Conservation Society through an MOU with the ADPOR. These parcels fall within the watershed of the Reserve and could be easily incorporated within the Reserve boundary. These three parcels front over 3.2 km$^2$ (2 mi) of Kachemak Bay’s northern shoreline and reach inland to encompass coastal bluffs and a mixture of upland habitats.
Baycrest and Overlook Park State Recreation Areas lie nearly adjacent to each other and contain extensive tidal pool systems, exhibiting a high diversity of invertebrates and marine algae within the rocky intertidal zone. The areas are popular with local community groups, including public schools and natural history study groups, for field trips, bird watching, and specimen collecting. Overlook Park has a series of ponds below the bluff, which form a small estuarine system. Diamond Creek State Recreation Area rises from the beach to a large wooded bluff with nesting bald eagles and is also an important beach access site.

A donation of 0.32 km$^2$ (80-ac) occurred in 2002. The parcel is known as Eveline State Recreation Site and is located above McNeil Canyon. State Parks plans to develop hiking and ski trails on this site.

These parcels currently have a different level of protection than KBSP and have individual Management Plans. These areas could be added to the Kachemak Bay NERR boundary in the future. These properties contain estuarine educational opportunities unique for the northern side of the Bay that may complement Kachemak Bay NERR Research and Education objectives.

9.4.5 **Beluga Slough**

For the benefit of the Kachemak Bay NERR, the Alaska Maritime NWR, and the general public, it is a priority to target public ownership for parcels in the Beluga Slough area (Figure 18). Parcels acquired by the City of Homer, ADF&G or the US Fish and Wildlife Service should be assimilated into the Reserve boundaries following modification of the existing MOU’s with the acquiring entity.

The Reserve currently shares a short ‘Beluga Slough’ trail used for interpretive walks with the Alaska Maritime NWR. The AIOVC education programs of both the Reserve and Refuge could benefit by having additional land for interpretive opportunities. During the planning phase of the AIOVC, additional trails were planned in this area. However, due to funding constraints the plans were postponed.
Over time, new opportunities may cause the Reserve to consider boundary additions. Such options would be pursued only if the new areas would aid the Reserve in meeting stated goals, and if the additions are under public ownership or some other arrangement that assures long-term control over the property. Options to extend the boundary may include: a simple boundary expansion for lands that are or become publicly owned (pending agreement with the appropriate owner agency); purchase at the estimated fair market value from willing landowners; a less-than-fee-simple purchase (conservation easement); or, a donation. Consideration of the options outlined above will occur for the next 5-Year Management Plan update, due in 2011.

Over the past five years, due to time constraints, minimal coordination with landholders within the Reserve occurred. While the Reserve does not actively manage these lands, the Reserve envisions strengthening the current partnerships with the major landholders:

- Critical Habitat Areas
- Kachemak Bay State Park
- City of Homer
- USFWS, Alaska Maritime NWR

Improved communication and coordination will result in cooperative efforts, as needed, on land acquisition, management, and potential restoration, as well collaboration on critical resource issues, research needs, and outreach efforts.
10.0 RESOURCE CONSERVATION

10.1 EXISTING RESOURCES

Kachemak Bay NERR is comprised primarily of two State Critical Habitat Areas (Fox River Flats and Kachemak Bay) and one State Park (Kachemak Bay State Park). State CHAs were created ‘to protect and preserve habitat areas especially crucial to the perpetuation of fish and wildlife, and to restrict all other uses not compatible with that primary purpose’. CHAs support essential life functions (e.g., nesting, staging, spawning) or large concentrations of one or more fish and wildlife populations and are managed by the ADF&G (ADF&G 1990). Kachemak Bay State Park was designated ‘to protect and preserve these lands and waters for their unique and exceptional scenic nature’ and is managed by ADNR.

Management by the ADF&G is focused primarily on providing protection for habitat. All uses of the land or water not compatible with that goal are restricted. Hunting, fishing, trapping, and recreational activities are encouraged, when compatible with the primary reason for establishment (ADF&G 1990). Management by ADNR is focused on incorporating compatible recreation opportunities into the natural environment, while preserving natural and scenic features (ADNR 1995).

10.1.1 Fox River Flats CHA

Established in 1972, Fox River Flats CHA encompasses expansive intertidal mud flats and a complex of low-lying marshlands in the lower Fox River Valley at the head of Kachemak Bay (ADF&G 1990).

**Birds** – As a major staging area for thousands of waterfowl and upwards of a million or more shorebirds, the Flats serve as a stopover to rest, loaf, and feed during migration. The most numerous shorebird is the western sandpiper, with dunlin and dowitcher also present. Canada geese compete with grazing cattle in the spring for goose tongue and other newly emerged vegetation. In spring, summer, and fall brackish ponds serve as forage areas for mallard, pintail, American wigeon, and green-winged teal. Scaup, scoter, goldeneye, and merganser feed in the nearshore waters of the Bay. During migration, trumpeter swans are known to concentrate on the Flats. Gulls, and, in the appropriate season, sparrows, warblers, and swallows, can usually be glimpsed. Cottonwood trees along the edge of the Flats host several bald eagle nests (ADF&G 1990).

Note: There are private ownerships along the Reserve’s boundary. As the Reserve’s programs moved forward, it is anticipated that collaboration with these landowners will develop.
**SPOTLIGHT**  
*Sea Duck Survey*

The Alaska Department of Fish and Game Waterfowl Program conducted surveys of waterfowl in Kachemak Bay during March from 1999-2003. Kachemak Bay was divided into 2 strata, shoreline and offshore. We identified 15 species of ducks in Kachemak Bay during winter surveys. Duck abundance and species composition varied spatially by water depth, distance to shore, and shoreline characteristics. Consequently, ducks were not distributed uniformly between strata. Harlequin ducks, goldeneye, mallards, scaup, surf scoters and bufflehead were more frequently encountered in the shoreline than offshore stratum, therefore, a larger proportion of their estimates were generated from skiff surveys rather than from aerial transects. Conversely, white-winged scoters, black scoters, long-tailed ducks, eiders and mergansers were more frequently encountered in the offshore stratum. Black scoters, surf scoters and mergansers, however, were more likely than other species to be represented in both strata. Preliminary analysis indicates that annual estimates of total duck abundance varied from 16,553 ducks in 2000 to 26,348 ducks in 2003. We did not detect a significant trend in numbers for ducks in Kachemak Bay. However, the variability associated with estimates for some species precludes detection of population change over the 5-year period. (Spotlight cited from Petrula and Rosenberg in prep.)

**Mammals** – During the winter months, moose move down the valley from the hills, concentrating along the edges of the Flats to feed on willow. In their search for food, black and brown bear, coyote, red fox, and wolves occasionally cross the Flats. Mink, ermine, muskrat, and river otter are also found on the Flats’ low-lying marshes, with more infrequent visits by lynx and wolverine. Large predators seek prey, such as snowshoe hares, voles, and shrews, in the low-lying marshes. Harbor seals regularly haul out on the tidal flats. Small pods of beluga whale, feeding on herring and hooligan in the spring and salmon in the summer, may be seen near the head of Kachemak Bay (ADF&G 1990).

**Fish** – Fox River, Sheep Creek, Bradley River, and Fox Creek are all anadromous fish streams, supporting coho, chum and pink salmon. Fox River and Fox Creek also support sockeye salmon. Some sockeye and Chinook salmon can be found in Bradley River. Dolly varden are also present in many of the streams (ADF&G 1990).
10.1.2 Kachemak Bay CHA

The Kachemak Bay CHA was established in 1974, providing easy access, offering outstanding recreational opportunities, and protecting a diverse and productive environment. Several significant fisheries (finfish and shellfish) are supported by the Bay. Kachemak Bay hosts tens of thousands of feeding waterfowl, shorebirds, and seabirds in the spring, summer, and fall. Marine mammals and waterbirds remain in the Bay’s protected waters through the winter months (ADF&G 1991).

Partially the result of a large gyre-like circulation pattern, the high level of biological productivity in Kachemak Bay serves to hold shellfish larvae in the Bay. Productivity is further enhanced by a two-layered ‘nutrient trap’ estuarine system where organic nutrients are flushed out of the Bay by surfacewaters and settle to the bottom, then are moved back into the Bay by deep, onshore currents (ADF&G 1991).

**Birds** – Large flocks of geese, ducks and shorebirds move through the Bay and its associated wetlands during the spring and fall migration. Most of these spring and fall migrants use the Fox River Flats staging areas at the head of the Bay (ADF&G 1991).

Kachemak Bay and nearby waters support the highest seabird densities in Cook Inlet during the spring and summer months. Tufted puffins, horned puffins, pigeon guillemots, black-legged kittiwakes, glaucous-winged gulls, and common murres nest on Gull Island, Grass Island, 60 ft. Rock, Hesketh Island, and Point Pogibshi. Kachemak Bay also accommodates 90% of the overwintering seabird and waterfowl populations of Lower Cook Inlet (ADF&G 1991).

**Mammals** – Feeding on marine invertebrates and nearshore fish, mink and river otters forage along the beaches. Coyote, wolves, and an occasional black or brown bear search the beaches for carrion or prey. The shallow and productive nearshore waters provide habitat for sea otters, especially along the rocky southern shore and, along the northern shore in Mud Bay in the winter (ADF&G 1991).

Harbor porpoise are common foragers in the Bay. Harbor seals haul out on the Bradley River Flats and various rocks on the southern boundary of the Bay. Steller sea lions, killer whales, and minke whales are commonly found in Kachemak Bay, with occasional humpback whale, beluga whale, gray whale, northern fur seal, and walrus sightings.

**Fish and Marine Invertebrates** - Some of the richest marine invertebrate communities in all of Cook Inlet are found in Kachemak Bay. The clams, mussels, snails,
worms, and other marine invertebrates found on the mudflats and rocky/gravel beaches of Kachemak Bay serve as forage for sea ducks, dabbling ducks, shorebirds, marine fish and coastal mammals. The south side of Kachemak Bay is fringed with rocky shores and kelp beds interspersed with pocket beaches of sand and gravel, supporting productive intertidal and subtidal marine life. The north side of Kachemak Bay, including Homer Spit, is composed primarily of gravel and sand, with an abundance of razor clams, cockles, and surf clams (ADF&G 1991).

Kachemak Bay is an important finfish and shellfish nursery area, with historical abundances of: herring; salmon; halibut; king, tanner and dungeness crab; and, pink, spot, humpy, side-stripe, and coonstripe shrimp (Figure 20)(ADF&G 1991).

10.1.3 Kachemak Bay State Park

**Birds** – The bays, inlets, and shores of the State Park support many populations of gulls, terns, seabirds, waterfowl, and shorebirds. Many of these birds are migratory, using the Bay for specific seasons, while others spend their entire life on the Bay. The most abundant group of birds are waterfowl, which include diving ducks, sea ducks, dabblers, geese, and swans (ADNR 1995). Numerous species, including common eiders, harlequin dics, mallards, goldeneye ducks, mergansers, scaups, scoters, pintail, and teal, frequent Kachemak Bay (ADNR 1995). Given their extremely diverse diets, feeding habits change by species and season (ADNR 1995).

Populations of bald eagles are found along the lakes, rivers, and bays of the Park. Specifically, Nuka Island hosts the highest concentration of nesting bald eagles on the southern Kenai Peninsula coast (ADNR 1995).

**Mammals** – Visitors to the Park frequently observe marine mammals, such as sea otters, seals, porpoise and whales. Harbor seals use beaches and rocky shores as ‘haul out’ to rest and give birth (ADNR 1995). Sea otters, pushed to extinction by the Russian fur trade, have made a considerable recovery, and can be observed foraging on fish, crab, sea urchins, mussels, and octopus (ADNR 1995).

Land mammals include moose, black bear, mountain goats, coyotes and wolves. While black bear can be found throughout Kachemak Bay State Park, red fox and wolves are rare (ADNR 1995). Coyote populations have not been well defined and their abundance is likely dependent upon available food sources (ADNR 1995). Other small mammals found in the Park include ermine, mink, marten, river otter, wolverine, lynx, hoary marmot, red squirrel, and mice.

**Fish and Invertebrates** – Sockeye, pink, chum, and coho salmon spawn in several of the streams in the Park (ADNR 1995). The release of hatchery-reared Chinook salmon smolt in Halibut Cove Lagoon has sustained a terminal sport fishery (ADNR 1995). Dolly Varden, a species of char, are another popular sport fish found in streams in the Park. Rainbow trout, a popular sport fish stocked in China Poot Lake in the 1950’s, have a self-sustaining population (ADNR 1995).
Reserve Uses
Existing human uses in the Reserve include: education uses; commercial fishing; sport fishing; hunting; personal use and subsistence harvesting of fish, wildlife and plants; shellfish mariculture; reforestation; livestock grazing; recreation/tourism; shoreline lodges and residences; marine transportation and moorage; periodic maintenance dredging; pipeline and utility lines; and, shoreline stabilization activities (EIS 1998).

10.2 USE RESTRICTIONS, PERMIT NEEDS AND REGULATORY AUTHORITY

10.2.1 Regulations and Permit Requirements for Critical Habitat Areas
The designation of a CHA creates a restrictive threshold for activities on both State and private land and waters that may affect the fish and wildlife resources of the area. 5 AAC 95.610 provides the regulatory authority for the CHAs:

The [Kachemak Bay and Fox River Flats Critical Habitat Areas Management] Plan presents management goals and policies for the critical habitat areas and their resources which the department will use in determining whether proposed activities in the critical habitat areas are compatible with the protection of fish and wildlife, their habitats, and public use of the critical habitat areas…. The department will review each special area permit application for consistency with the goals and policies of the management plan…. A special area permit… will be approved, conditioned, or denied based on the criteria set out in the goals and policies in the management plan and on the standards contained elsewhere in 5 AAC 95.

Under state statute any person or governmental agency who desires to conduct an activity within the boundaries of the CHA is required to submit plans and specifications to the ADF&G and receive authorization before proceeding. As authorized by 5 AAC 95, ADF&G requires a Special Area Permit for the following activities:

- construction, placement, and continuing use of any improvement, structure, or real property within the special area;
- destruction of vegetation;
- detonation of an explosive other than a firearm;
- excavation, surface or shoreline altering activity, dredging, filling, draining, or flooding;
- natural resource or energy exploration, development, production, or associated activities;
- water diversion or withdrawal;
- off-road use of wheeled or tracked equipment;
- waste disposal;
- placement or use of a toxic substance;
- grazing or animal husbandry; and,

Understanding our global environment and our role in it is the first step toward living in better harmony with nature.

NOAA website
any other activity that is likely to have a significant effect on vegetation, drainage, water quality, soil stability, fish, wildlife, or their habitat, or which disturbs fish or wildlife other than lawful hunting, trapping, fishing, viewing, and photography.

The standards for conditioning, approving, or denying Special Area Permits state that ADF&G will permit the uses listed above only if it meets or can be conditioned to meet the following standards (5 AAC 95.430):

- The use or activity is consistent with the protection of fish and wildlife and their use, protection of fish and wildlife habitat, and the purpose for which the special area was established;
- The use or activity does not unduly restrict or interfere with the public use and enjoyment of the resource values for which the special area was established; and,
- Any adverse impact on fish and wildlife, and their habitats and any restriction or interference with public use, is mitigated in accordance with 5AAC 95.900.

The types of projects permitted within or adjacent to the Reserve boundary over the past few years include the construction of the AIOVC, the upgrades at Kasitsna Bay Laboratory, individual docks, and lodging facilities.

Permits issued are contingent upon compliance with other sections of the regulations and the approved CHA Management Plan. Permits or approvals from other regulatory agencies are also required for many of the listed activities (ADF&G 1993).

The CHA designation is one of the highest levels of protection that the State may afford to lands and waters. Examples of prohibited activities include: in-water storing or transporting logs, mining, exploring for oil and gas, storing or depositing hazardous materials, operation of personal watercraft, and on-bottom mariculture. A violation of the CHA policies and permits is a criminal offense, Class A misdemeanor. These regulations ensure that any activities allowed within the CHAs will be compatible with the establishment of the Research Reserve (ADF&G 1993).

10.2.2 Regulations and Permit Requirements for KBSP

Appendix 15 summarizes the policies for the legislatively designated areas within the Reserve boundary that are most likely to apply to Kachemak Bay NERR activities. These policies address: research, monitoring, and management studies; fire management; insect infestation; education and outreach programs; visitor use management; trails; and, facility development. The KBSP policies were developed with the input from the public, the Kachemak Bay State Park Citizen’s Advisory Board, and state and federal agencies. The policies were adopted after public review and comment.

ADNR was authorized to create special park use permit regulations under 11 AAC 18. Under this authority, ADNR requires a permit for the following activities:
- assembly of more than 20 persons;
- any promotional or entertainment event;
- camping in a developed campground for longer than 15 consecutive days;
construction or placement of an improvement, structure, or property within the Park and its tidelands;
- discharging explosives;
- conducting exploration, scientific research, or information collection activities requiring authorization under 11 AAC 12;
- commercial activities described in 11 AAC 12;
- recurring or permanent motorized access to land not controlled or owned by the State;
- occupying a campsite with more than allowed number of vehicles;
- uses limited to or prohibited by the director under 11 AAC 12 or 11 AAC 20; and,
- any other incompatible use as defined by statute and regulation, or which does not otherwise have lawful recreation as its primary purpose.

ADPOR reviews the applications for park use permits and may issue a permit for the activities listed above if it is determined that (11 AAC 18.025):
- Park facilities and natural and cultural resources will not be adversely affected;
- the State Park is protected from pollution;
- public use values of the State Park will be maintained and protected;
- the public safety, health, and welfare will not be adversely affected; and,
- the activity is consistent with the Alaska Coastal Management Program (AS 46.40), if applicable.

Permits issued are contingent upon compliance with other sections of the regulations and the approved Management Plan. The permit may contain conditions which are reasonably consistent with protection and use of the Park for the purposes for which it was established. It may also contain reasonable limitations on the equipment used, and the time and area within which the activity is allowed. A permit may be revoked by the director or a local park officer for failure to abide by any permit condition or limitation (11 AAC 18.025).

Activities prohibited within KBSP include: construction or placement of structures other than those developed and maintained by ADPOR; tideland leases; mariculture; livestock grazing; use of bicycles and motorized vehicles; and, removal of any natural resource, including plants and minerals. These regulations ensure that any activities allowed within the CHAs will be compatible with the Research Reserve.

ADPOR also has many regulations prohibiting or restricting specific public use and behavior. These include, but are not limited to: campfires, firearms, aircraft use, disturbance of natural objects, underwater diving safety, anchoring and mooring, vandalism, and refuse and waste.

In addition, ADPOR has specific authority to further close or restrict use of State Park lands and waters under 11 AAC 12.335. Such closure or use restriction determinations
must be necessary for the maintenance of public health and safety, protection of the environment or scenic values, protection of natural or cultural resources, aid to scientific research, implementation of management responsibilities, equitable allocation and use of facilities, or the avoidance of conflict among visitor use activities.

ADPOR also regulates commercial use of the Park under 11 AAC 12. Anyone conducting a commercial activity on State Park land or water is required to apply for and be issued a Commercial Use Permit on an annual basis. The only exception is commercial fishing conducted aboard vessels.

**Alaska Department of Natural Resources/Division of Land**

In addition to the authorities described in the previous section for the State Park, ADNR also has responsibilities for authorizing activities elsewhere in the NERR. ADNR's Division of Land issues permits, leases, easements and rights-of-way for activities as diverse as mariculture operations, large docks, and utility lines. The Division also administers material sales. The ADNR Division of Agriculture has responsibilities for administering grazing leases and permits. The ADNR Division of Mining and Water Management is responsible for issuing permits and certificates to allocate water.

**Alaska Department of Fish and Game**

ADF&G has statewide responsibilities that apply to Kachemak Bay. ADF&G manages all fishing and hunting according to harvest limits and terms established by the Alaska Board of Fish and the Board of Game. The ADF&G Sport Fish Division coordinates departmental review of proposals for projects and activities within legislatively designated special areas (i.e. State game refuges, sanctuaries, and Critical Habitat Areas). If found to be compatible with the purpose(s) for which the special area was created, Sport Fish issues an authorization in the form of a Special Area Permit. If found to be incompatible, Sport Fish issues a denial to the proposal. The ADF&G/Commercial Fisheries Management Division issues operating permits for aquatic farms statewide. Since Kachemak Bay has been designated a State Critical Habitat Area, SF also issues Special Area Permits for aquatic farm operations found within the Critical Habitat Area.

As the custodian of the fish resources of the State, ADF&G requires Fish Resource permits for the collection of fish, shellfish, other invertebrates, and aquatic plants not covered by existing regulations. This requirement includes methods and means (gear), numbers, locations, seasons, or the possession and/or transportation of live fish in any life-stage outside of existing sport, personal use, aquatic farm, and commercial regulations. Fish resource permits are a privilege and will be issued only to those organizations and individuals who meet the departmental requirements specified in this policy, and who are engaged in scientific, educational, propagative, or exhibition activities. The Reserve completes has a Fish Resource permit for organisms used in education and outreach programs.

**Alaska Department of Environmental Conservation**

Alaska Department of Environmental Conservation (ADEC) has the delegated responsibility from the US Environmental Protection Agency (USEPA) for Air and Water Quality Standards and non-point source pollution control activities. The water quality standards are for physical and chemical properties, and are enforced through permitting,
field evaluations and voluntary monitoring activities by public organizations. ADEC comments on permits administered by the Army Corp of Engineers for fill in wetlands and navigable waters under a Section 401 of the Clean Water Act (CWA) (33 USC § 1342 or 1344) certification process.

Regulatory oversight for oil and gas exploration, municipal wastewater, and seafood processing discharge is administered through the National Pollutant Discharge Elimination System (NPDES) by both ADEC and USEPA. Air emissions are regulated by ADEC under delegated permitting responsibility from USEPA.

Oil Pollution Prevention planning for facilities and vessels is conducted by ADEC under regulation 18 AAC 75 which requires a plan review every three years. Cook Inlet Spill Prevention and Response, Inc. (CISPRI) and Chadux currently hold the contingency plans for Cook Inlet and Kachemak Bay.

ADEC also certifies water quality for aquatic farming sites and beaches for shellfish harvest. Some small residential wastewater treatment systems discharge to the marine environment under ADEC plan review.

**SPOTLIGHT**

**Northern Dynasty - Pebble Mine**

The largest gold deposit and second largest copper deposit in North America (www.northern dynasty.com) can be found on the west side of Lower Cook Inlet, just north of Lake Iliamna. The Canadian Corporation of Northern Dynasty is proposing to build an open-pit gold-copper-molybdenum-silver mine at the Pebble site. Trout and salmon rivers - the Kaktuli River and Upper Talarik Creek – flow directly north of this deposit and the associated Nushagak-Mulchatna river watershed and Lake Iliamna drainage, host the world’s largest run of chinook and sockeye salmon (www.neilmoomey.com). Local native villages, including Nondalton, Iliamna, and Newhalen, depend on the Mulchatna caribou herd and salmon runs for subsistence (www.neilmoomey.com). This area is also heavily used by brown bear, rainbow trout, and other wildlife.

In 2004, the Pebble project transitioned from mineral exploration to mine planning and permitting (www.northern dynasty.com). The full extent and timelines for this project will be defined through the permitting process and feasibility studies.

**10.2.3 Other Regulatory Entities**

The US Army Corps of Engineers evaluates applications for discharging dredge and fill material into waters of the United States including wetlands. Federal and State
agencies (including the USFWS, National Marine Fisheries Service, and USEPA), along with local governments (such as the Kenai Peninsula Borough and the City of Homer), review applications for USACE permits, pursuant to the Fish and Wildlife Coordination Act (16 USC 661-666 et. seq.).

Activities associated with the Clean Water Act are regulated by the US Environmental Protection Agency (USEPA). The Clean Water Act (CWA; 33 USC § 1251, et seq.) prohibits the discharge of sediments, fill material and other pollutants into waters of the United States, except as authorized by a permit issued pursuant to Section 402 or 404 of the CWA (33 USC § 1342 or 1344). Section 308(a) of the CWA (33 USC § 1318(a)) authorizes the USEPA to require the submittal of information regarding such discharges.

An approval from the US Coast Guard is required for certain kinds of work in navigable waters. The Kenai Peninsula Borough may review and comment on all state and federal permit applications within the coastal zone, including the CHAs and State Park.

### 10.2.4 Other Planning Entities

A number of other state and municipal plans that apply to the area and with which the Reserve is consistent include:

**Alaska Coastal Management Act**

The Federal Coastal Zone Management Act (CZMA) and the Alaska Coastal Management Act were enacted in 1972 and 1977, respectively. Through these Acts, development and land-use in coastal areas are managed to provide a balance between the use of coastal areas and the protection of valuable coastal resources. Local coastal districts can develop coastal district plans to supplement the statewide standards to reflect important matters of local concern. These coastal district plans are incorporated into the Alaska Coastal Management Program (ACMP) after they are approved by the Department of Natural Resources and the Secretary of the Department of Commerce through the Office of Ocean and Coastal Resource Management. According to the ACMP, federal agency activities and activities requiring a state or federal permit are reviewed for consistency against the statewide standards and coastal district enforceable policies.

**Kenai Peninsula Borough Coastal Management Plan**

The Kenai Peninsula Borough CMP was fully incorporated into the ACMP in 1990. Borough-wide policies are general and not intended to create a substantial change from the existing statewide standards. An update to this Plan is currently in progress, with an anticipated completion date in the summer of 2005.

Where there is water, there are fish.
If we care for the water, the fish will take care of us.

East Indian proverb
The Kenai Peninsula Borough Comprehensive Plan provides general planning
guidance. The most recent Plan was approved in 1992. An update to this Plan is
currently in progress and is anticipated to be complete in 2005.

The Kenai Peninsula Borough worked with Peninsula cities in 2004 to develop the
final draft of a multi-jurisdictional mitigation plan. This document provides guidance
for planning and development relative to hazards, such as earthquakes, floods,
wildfires, tsunamis, seiches, and severe weather events. Information from the
Reserve’s Coastal Erosion CTP has now been incorporated into this Plan.

Additional partnerships should be established with agency regulatory and management
authorities to simplify the operation of the Reserve.

10.2.5 Surveillance And Enforcement Strategy

In addition to statewide regulations, the most stringent regulations on activities in the
Kachemak Bay region (including the Reserve) come from the CHA and State Park.
Many activities are prohibited in these areas. State Park and CHA designations are the
highest levels of protection that the State affords to lands and waters. In many cases,
State Park lands and waters have more restrictive policies and regulations than the
CHAs.

Within the Reserve and its watershed, the main mechanism to enforce State laws and
regulations is through permit review. The managing entities (ADF&G and ADNR) also
conduct surveillance and enforcement within these areas with assistance from Alaska
Department of Public Safety (State Troopers and Fish and Wildlife Protection) officers.
These officers are currently housed in Homer, but are scheduled to move to a new
headquarters office in Anchor Point in the summer of 2005. Collectively, these state
officials have considerable field presence in the Kachemak Bay area. This presence is
expected to continue, even given the

Find your place on the planet, dig in,
and take responsibility from there.  
Gary Snyder

upcoming headquarters move. Some ADF&G
and ADNR employees are deputized officials
with the authority to enforce their respective
Departmental regulations and issue notices of
violation and citations. Officials with the Alaska Department of Public Safety are
commissioned to enforce all laws of the State of Alaska. Therefore, they have the
authority to make arrests or take other appropriate action for violation of State laws and
regulations.

Many uses and activities within Kachemak Bay NERR must be authorized by permits
issued by ADF&G (e.g., Special Area Permits for CHAs) or ADNR (e.g., State tideland
leases or State Park permits). Project inspections are performed to ensure that
permitted activities are carried out appropriately. Enforcement actions, including
issuance of notices of violation, citations or civil litigation, may be taken for unauthorized
activities or for failure to comply with permit conditions. Violations of Special Area regulations are Class A misdemeanors, and are punishable by fines and up to one year in jail. A violation of State Park policies and regulations is a criminal offense punishable by fine or court action.
11.0 STEWARDSHIP AND MANIPULATION

11.1 NERRS AND ENVIRONMENTAL RESTORATION WORK

The NERR System, under 15 CFR Section 921.1 (e), recognizes the need and desirability to allow restoration ‘to improve the representative character and integrity of a reserve’. Manipulative techniques may be required to restore degraded areas or systems that have undergone a physical or ecological alteration. Restoration goals and objectives should focus on the restoration of environmentally degraded areas to their historical environmental status, in terms of original ecological structure or functional equivalent (EIS 1998).

While the Reserve does not necessarily own the land, or serve as the lead management agency for areas potentially in need of restoration, the Reserve understands the importance of restoration, especially as it relates to the scientific understanding of restoration processes. In this capacity, the Reserve foresees supporting and/or collaborating on restoration identification, planning, implementation, and monitoring, as it relates to the health and productivity of Kachemak Bay and its watershed.

11.2 POTENTIAL RESTORATION INITIATIVES

The majority of the area included within the Kachemak Bay NERR boundary is relatively pristine and has not been significantly impacted by human activity. However, there are a few locations within the Reserve that have been impacted and would be candidates for some level of restoration or enhancement activity. While the Reserve does not have a formal Restoration Plan, this Plan will be completed before the next five-year Management Plan update.

The following is a list of potential sites and projects to be considered as restoration needs for the Reserve.

11.2.1 Seldovia and Homer Harbor Monitoring and Restoration

While formal studies have not examined contaminants in Homer or Seldovia Harbors, the activities in these areas suggest a potential for water and sediment quality issues. These Harbors are trafficked by commercial and recreational fisheries vessels, the state Ferry System, ecotourism vessels, and, at times, cruise ships, leaving the potential for petroleum and nutrient impacts as a concern. Adjacent industrial uses, as well as a heavy tourism use, provides opportunity for further nutrient enrichment and fecal coliform contamination.

Since studies have not been conducted to examine nutrients and hydrocarbons in the water and sediment of these harbors, an initial effort should be made to classify the condition of these areas. Results from the initial assessment, will direct future investigations and be used to outline the monitoring protocol necessary to ensure safe water standards are maintained. Initial sampling identified 13 non-indigenous species in Kachemak Bay and Cook Inlet (Hines and Ruiz in press). Another 4 non-
indigenous species were reported, but not verified (Hines and Ruiz, in press). A long-term monitoring program should be established as an early detection for invasion by additional non-native species.

These harbors are not included in the boundary of the Reserve, but are adjacent and have the potential to affect Reserve resources.

**11.2.2 Intertidal Areas On The South Side Of Kachemak Bay**

In recent years, the intertidal areas in Jakolof Bay have become a favorite destination for school groups on educational outings from around the state. The mass influx of fairly unsupervised groups to a finite area have caused great concern among local observers. Sea life has been trampled on the rocky substrate and intertidal creatures have been indiscriminately removed or collected (without the permits required under the Critical Habitat Area), leading to declines in biodiversity in localized areas (EIS 1998).

Community groups working with the NERR are looking to address these issues primarily through educational efforts. However, there may be opportunities to employ restoration methods in other substantially impacted areas, such as Jakolof Bay. The Reserve will examine appropriate restoration strategies.

Options currently include:
- erecting informational bulletin boards or kiosks which inform visitors that a permit is required for removal of any live specimens from the beach or rocks;
- developing a kiosk or pre-visit powerpoint presentation for teachers and ecotour operators on tide pool etiquette;
- outlining a proper protocol for digging clams; and,
- educating the boat operators or providing docents for large groups.

**11.2.3 Mud Bay**

Located on the northeast side of the base of the Homer Spit, portions of Mud Bay experience human impacts from four-wheel drive traffic, harvesting of sea life for food, and possible industrial impacts. To ensure the long-term sustainability of Mud Bay, an assessment outlining resource impacts should be completed to determine the extent of current impacts, projection of future impacts, and potential for restoration and/or moderation of existing activities.

The City of Homer’s Beach Task Force has recently installed directional signage to discourage vehicles on the beach. The Task Force also installed large rocks to block vehicle access to Louie’s Lagoon.

Restoration options might include:
- reducing human impacts (through education);
- studying the rates and causes of sedimentation in these areas; and,
- identifying other potential habitat adjustments (EIS 1998).
11.2.4 Beluga Slough

Alaska Maritime NWR is working with the City of Homer to protect private lands near the drifting mouth of Beluga Slough. Historically, the mouth of this Slough has shifted, at times endangering private lands on Munson Point. In the past heavy equipment was used to rework the mouth, protecting private lands. Recent efforts to protect the private lands have resulted in dumping of concrete forms in an attempt to stabilize the shoreline. To discourage further dumping and provide a level of protection to the already impacted Slough, the Alaska Maritime NWR is working to manage the mouth away from the private structures.

Additionally, the City of Homer and Alaska Maritime NWR are working on small restoration projects in the Beluga Slough area, including:

- maintaining the natural beach berm, which protects Beluga Slough from the ocean. This area once supported nesting eider ducks, but has been damaged by off-road vehicle use;
- preventing driftwood collection;
- enhancing forest edge vegetation disturbed by facilities construction;
- restoring the depleted winter moose browse in the willow scrub (EIS 1998).

11.2.5 Fox River Flats

The Fox River Flats area has historically been used by several groups, including ranchers, hunters, and ATV enthusiasts. This area at the head of the Bay is a highly productive marsh that forms the headwaters of the Bay, channels surface water runoff from adjacent creeks, serves as essential shorebird habitat, and contributes to nutrient cycling in the Bay. The streams in this area also support runs of salmon, although the strength of the runs and rearing value of the Flats have not been well documented. To ensure the long-term sustainability of the Fox River Flats, an assessment outlining user needs and resource impacts should be completed to determine the extent of current impacts, projection of future impacts, and potential for restoration and/or moderation of existing activities.

Several studies were conducted prior to the most recent lease renewal to investigate the effects of grazing on plant communities. In particular, there were references to waterfowl and shorebird habitat, and range evaluation was provided. The studies included exclusion experiments, assessment of cattle utilization, evaluation of plant annual production, ecological site mapping (basic plant communities and soils), and visual reconnaissance assessments by several biologists. The results of these studies indicate that cattle prefer to graze the intertidal sedge communities and to use upland areas for loafing. The reports also indicate that grazing in the upper Fox River Valley is light to nonexistent.
While these studies suggest that grazing pressure in general is light, even in the preferred intertidal areas, notable changes in plant species composition between grazed and ungrazed areas were identified (Swanson and Barker 1992). The exclusion areas were revisited in 1999. Although no statistical tests were reported, the results suggest that vegetation density, height, and seed-head density were reduced in grazed areas compared with ungrazed areas (Swanson 1999). In 2004, the Cattlemen’s Association installed fences in specified areas on the Flats and will be completing an assessment of grazing impacts.

Future restoration efforts may include:
- conducting a resource assessment targeted toward the various users of the Fox River Flats area;
- planning an access trail, in conjunction with Critical Habitat Area staff to minimize user impacts;
- studying the efficacy of the rotational grazing strategy developed during the last lease renewal;
- replanting of preferred intertidal forage species;
- developing a long-term ecological monitoring strategy with baseline data to assess future change;
- surveying rearing habitats for use by juvenile salmon; and,
- determining the strength of salmon runs for long-term management.

11.2.6 KBSP - Ranger Station Estuary Clean-up and Interpretation

The Ranger Station, at the ‘back end’ of Halibut Cove Lagoon borders a small stream that forms a small estuary. Debris from an old fish hatchery was left behind, and over the last twenty years, more debris has accumulated. Minor efforts have been made to clean up and rehabilitate the site. Camping is allowed. There are a few picnic tables, fire rings, and an outhouse. There is also a generator shed with a hydroelectric plant consisting of small log structure. The site is in need of clean-up, hauling away of debris, some native replanting, and eelgrass bed restoration. There is also a small interpretive cabin that is used by visitors; the exhibitry here currently consists of various posters. More formal displays need to be developed. When the chinook
salmon are ‘running’ in the Lagoon in late May and June, this area is a very popular recreational fishing spot.

11.2.7. KBSP – Cottonwood/Eastland Unit Reforestation
These units were logged prior to acquisition for the State Park. It is anticipated that the historic habitats of this site will be restored through a reforestation project. Trails for these units have already been scouted and development of these trails for public use is part of the vision for these components.

11.2.8  KBSP – Structure Removal
Several structures within Kachemak Bay State Park have been damaged in recent years, primarily due to spruce bark beetle damaged trees being blown over. There are old hatchery buildings, outhouses, and cabins that are no longer in working condition. The removal and rehabilitation of these sites should be evaluated to restore public access and/or the natural habitats and functions. If appropriate, plans should be made to secure funding and proceed with these as restoration projects.

11.3 RESEARCH MANIPULATIONS

Habitat manipulations for research purposes are allowed within the Reserve in accordance with the following guidelines (§921.1 (d)): 1) the activity must be consistent with the mission and goals of the NERRS; 2) be limited in nature and extent to the minimum manipulative activity necessary to accomplish the stated research objective; and, 3) be specified in or be compatible with research objectives specified in the Reserve’s Management Plan (EIS 1998).

For research purposes, activities may be allowed which alter or impact conditions in the Reserve. Such experimental manipulations are usually small-scale or have only temporary effects. Examples of potential habitat manipulations for research include, but are not limited to (EIS 1998):

- taking soil cores, boring soil holes, excavating observation wells or profile pits, etc.;
- placement of sampling apparatus (and supporting structures) for aquatic biotic surveys, such as drop nets or fyke nets;
- construction and operation of hydrological monitoring stations, involving devices such as tide gauges and stillwells, current meters, pumps, or electrical probes and sensors;
- installing and anchoring pumps to supply a flow-through seawater system, such as at the Kasitsna Bay Lab;
- marking study plots, boundaries, sampling stations, transects, etc. with stakes, flags, tape, signs, twine, etc.;
- clipping and harvesting of above ground vegetation plots;
in fixed plots, removal of fauna or algae down to bare substrate for studies, such as invertebrate or algae recruitment;

placement of animal exclusion or enclosure cages;

reseeding native species on an experimental level;

construction and use of wildlife observation blinds;

placement of small footbridges or boardwalks to allow access to research areas;

installation of small water control structures for hydrological studies, such as weirs, flumes, canal-checks, riserboards, etc.; and,

release of tracking dyes, etc.

For the parts of the Reserve covered by the CHA or State Park plans, any manipulative activities must be consistent with the policies contained in those plans. These policies were written to ensure that activities are conducted in an environmentally sensitive manner (EIS 1998).
12.0 PARTNERSHIPS

To ensure the long-term health and productivity of the Kachemak Bay estuary, the Reserve is seeking, developing and sustaining partnerships with sister agencies (e.g. within NOAA and ADF&G), outside agencies, organizations and community groups. These partnerships occur at many levels: within an organization; within a state agency; between state agencies; with federal agencies; with corporations, foundations, and organizations; and, with individuals. Built upon commonalities, relationships are forged to meet the respective partners missions, goals and objectives. Ideally, these alliances are symbiotic, with each group benefiting from the relationship.

Building and maintaining these partnerships takes significant time, resources and energy. Thus, maintaining non-beneficial relationships needs to be weighed carefully, so as not to over extend staff commitments.

The Reserve has divided its partnerships into:

🌟 Operating – those entities that fund or oversee administration of the Reserve;
🌟 Landholders – those entities that are major landholders, entities whose missions and functions significantly align and overlap with those of the Reserve, or volunteers within the Reserve;
🌟 Education – those entities that the Reserve collaborates with regularly on education and outreach programs;
🌟 Research – those entities that the Reserve collaborates with regularly on research projects;
🌟 Community – those entities that were involved in the establishment of the Reserve and continue to work with the Reserve in a variety of capacities; and,
🌟 Future – those entities that the Reserve would like to pursue for future collaboration.

12.1 OPERATING PARTNERS

The Reserve’s foundation is based upon four fundamental partners:

1. **NOAA** – As a component of the national system, the Kachemak Bay NERR participates in system-wide programs that further NOAA’s goals and objectives, while the Reserve receives operational and programmatic funds annually to support facilities and ongoing research, education and stewardship.
efforts. This partnership has been, and will continue to be, strong. ([www.coastalmanagement.noaa.gov](www.coastalmanagement.noaa.gov))

2. **AK Department of Fish and Game** – As the State sponsor, ADF&G provides administrative support and some operational funds for research, monitoring, outreach, and watershed-based issues. This partnership has not always been strong. However, a relatively recent reorganization has strengthened this relationship, and stronger ties are anticipated in the future. ([www.sf.adfg.state.ak.us](www.sf.adfg.state.ak.us))

3. **USFWS, Alaska Maritime NWR** – Housed in the same facility (Alaska Islands and Ocean Visitor Center), the Reserve and the Refuge have a significant relationship, involving cost administration, space allocation, and programmatic coordination. This partnership will continue to strengthen. ([www.alaskamaritime.fws.gov](www.alaskamaritime.fws.gov))

4. **Reserve Community Council** - Through quarterly meetings with the Reserve staff, the Community Council acts as a community pulse by serving as a sounding board for Reserve activities and ideas. This partnership has struggled in the past, but is currently solidifying. The Community Council Charter is provided in Appendix 12.

### 12.2 LANDHOLDER PARTNERS

The Reserve’s boundary incorporates three important landholders:

1. **ADF&G, Critical Habitat Areas staff** – A component of ADF&G, the partnership with staff overseeing the Critical Habitat Areas has been on an ‘as-needed’ basis. Strengthening this relationship will provide opportunities for collaboration and cooperation that will benefit the long-term health of the Reserve. ([www.wildlife.alaska.gov](www.wildlife.alaska.gov))

2. **ADNR, Kachemak Bay State Park** – As a major landholder within the Reserve, coordination with KBSP is critical to the protection of the Reserve’s watershed. This partnership has not always been of highest importance, but more close coordination is occurring. ([www.dnr.state.ak.us/parks/units/kbay](www.dnr.state.ak.us/parks/units/kbay))

3. **City of Homer** – As a landholder and primary municipality within the Reserve, the City and Reserve will have many opportunities for collaboration. This partnership has been strong and will continue to strengthen. ([www.ci.homer.ak.us](www.ci.homer.ak.us))

### SPOTLIGHT

**Future Coordination Primary Landholders**

The major components of Kachemak Bay NERR include: Kachemak Bay Critical Habitat Area, Fox River Flats Critical Habitat Area, Kachemak Bay State Park, and certain lands owned by the City of Homer. Over the past 5 years, the Reserve has been working to establish itself, its niche, and its headquarters. During the next five years, the Reserve foresees collaborating with the primary landholders on projects and issues, thus strengthening the ties with those entities that are integrally linked by land and water.

### 12.3 RESEARCH PARTNERS
Several research partnerships exist and relate directly to project funding, tasks, and focus. Examples of two research partnerships include:

1. **Cook Inlet Regional Citizen’s Advisory Council (CIRCAC)** – A regional partner with the Reserve, CIRCAC is represented on the Research Subcommittee and works collaboratively on several projects to maximize results and minimize overlap. ([www.circac.org](http://www.circac.org))

2. **University of Alaska Fairbanks (UAF)** – As an academic partner, the University also serves on the Research Subcommittee, providing significant and diverse resources for cooperative projects. ([www.uaf.alaska.edu](http://www.uaf.alaska.edu))

Other research partners include, but are not limited to:
- Alaska Marine Highway System ([www.dot.state.ak.us/amhs](http://www.dot.state.ak.us/amhs))
- Alaska Ocean Observing Program ([www.aoos.org](http://www.aoos.org))
- Exxon Valdez Oil Spill Trustee Council ([www.evostc.state.ak.us](http://www.evostc.state.ak.us))
- Kenai Watershed Forum ([www.kenaiwatershed.org](http://www.kenaiwatershed.org))
- NOAA, Central Data Management Organization ([www.cdmobaruch.sc.edu](http://www.cdmobaruch.sc.edu))
- NOAA, National Center for Coastal and Ocean Science (Kasitsna Bay Laboratory) ([www.westnurc.uaf.edu/kbay.html](http://www.westnurc.uaf.edu/kbay.html))
- Port Graham – Nanwalek Watershed Council
- University of Alaska, Anchorage ([www.uaa.alaska.edu](http://www.uaa.alaska.edu))
- Environmental Protection Agency ([www.epa.gov](http://www.epa.gov))

**12.4 EDUCATION PARTNERS**

Several education partnerships exist and relate directly to program coordination, projects, and funding. Examples of two education partnerships include:

1. **Pratt Museum** – A local partner with the Reserve, the Pratt Museum and Reserve coordinate in full partnership on long-term visioning, programmatic development, and grant specific projects. ([www.prattmuseum.org](http://www.prattmuseum.org))

2. **Center for Alaskan Coastal Studies** - A local partner with the Reserve, the Center of Alaskan Coastal Studies and Reserve coordinate in full partnership on long-term visioning, programmatic development, and grant specific projects. ([www.akcoastalstudies.org](http://www.akcoastalstudies.org))

Other education partners include, but are not limited to:
- Alaska Sea Grant ([www.uaf.edu/seagrant](http://www.uaf.edu/seagrant))
- Bureau of Indian Affairs ([www.doi.gov/bureau-indian-affairs.html](http://www.doi.gov/bureau-indian-affairs.html))
- IM Systems Group ([www.imsg.com](http://www.imsg.com))
- Kachemak Bay Environmental Education Alliance ([www.homerfieldtrips.com](http://www.homerfieldtrips.com))
- Kenai Peninsula Borough School District ([www.kpbsd.k12.ak.us](http://www.kpbsd.k12.ak.us))
- Kenai Peninsula Science Education Consortium
- Kenai River Center ([www.borough.kenai.ak.us/KenaiRiverCenter](http://www.borough.kenai.ak.us/KenaiRiverCenter))
- NOAA, Coastal Services Center ([www.noaa.csc.gov](http://www.noaa.csc.gov))
12.5 COMMUNITY PARTNERS

The community was very involved in the establishment of the Reserve and the number of partners listed reflects the Reserve’s continued involvement with those organizations:

- Alaska Natural Heritage Program (www.aknhp.uaa.alaska.edu)
- Alaska SeaLife Center (www.alaskasealife.org)
- City of Kachemak (www.officialcitysites.org/city/AK/Kachemak_City/47581)
- City of Seldovia (www.seldovia.com)
- Cook Inlet Keeper (www.inletkeeper.com)
- English Bay Corporation
- Kachemak Bay Conservation Society (www.akvoice.org/members/Kachemak.html)
- Kachemak Heritage Land Trust (www.kachemaklandtrust.org)
- Kenai Peninsula Borough (www.borough.kenai.ak.us)
- Nanwalek IRA Council (www.chugachmiut.org/tribes/nanwalek.html)
- National Park Service – Lake Clark (www.nps.gov/lacl) and Katmai (www.nps.gov/katm)
- Port Graham Village Corporation
- Port Graham Village Traditional Council
- Seldovia Native Association (www.snai.org)
- Seldovia Village Tribe (www.svt.org)

12.6 FUTURE PARTNERS

Finally, there are some exciting, new partnerships that will be sought, developed and fostered over the next five-year period to assist in attaining Reserve goals and expanding the Reserve’s outreach base.

The Reserve is working in partnership with the Friends of Kachemak Bay State Park, which is currently being restructured, to incorporate the non-profit needs of the Reserve. Over the next several months, the group will be renamed the Friends of Kachemak Bay. This is a new partnership for the Reserve and is anticipated to strengthen over the coming years.

Several Research Reserves currently participate in some level of international information exchange at global sites that have similar features. Kachemak Bay NERR is currently brainstorming global sites that have similar features, missions, and issues. The initial focus will be on external information exchange. Several areas have systems similar to Kachemak Bay and establishing communications and methods for information transfer will be a preliminary step.
Several locations, including Russia, Norway, and Chile, have features similar to Kachemak Bay NERR. However, New Zealand has fjord systems similar to Kachemak Bay, characterized by deeply cut glacial trenches residing on the edges of tectonic plates, as well as similar programs and issues. The fjords of New Zealand have similar levels of protection, resources, and structure. The New Zealand Department of Conservation oversees many of the protected lands, leading research, monitoring and CTP-like efforts. They also promote stewardship and restoration.

While in the southern hemisphere, New Zealand is experiencing increasing rates of glacial retreat due to global climate change, very similarly to Kachemak Bay NERR. Some early interests for coordination include:

- northern vs. southern hemisphere information, including salmon fisheries management and other research topics;
- CTP-like outreach;
- Western Hemisphere Shorebird Reserve Network (WHSRN) site comparison; and,
- invasive species (one of Kachemak Bay’s native sea stars is considered invasive in New Zealand).

These similarities may lead to future information exchange and comparative research between these two locations. It may also allow for collaboration and comparisons between northern and southern hemisphere climate change processes.


Alaska Department of Fish and Game. 1993. Lower Cook Inlet salmon run timing curves. Anchorage, AK.


Alaska Department of Fish and Game, Division of Habitat. 1990. Fox River Flats Critical Habitat Area. Brochure.


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