COOK INLET CONTINGENCY PLAN

BACKGROUND SECTION

BACKGROUND: PART ONE – SUPPORT INFORMATION

A. SUBAREA PLAN

This Subarea Contingency Plan (SCP) supplements the *Alaska Federal/State Preparedness Plan for Response to Oil and Hazardous Substance Discharges/Releases* (*Unified Plan*). The SCP in conjunction with the *Unified Plan* describes the strategy for a coordinated federal, state and local response to a discharge or substantial threat of discharge of oil or a release of a hazardous substance from a vessel, offshore or onshore facility, or vehicle operating within the boundaries of the Cook Inlet Subarea. For its planning process, the federal government has designated the entire state of Alaska as a planning "region" and the western half of the state as a planning "area." The State of Alaska has divided the state into ten planning regions of which one is the Cook Inlet Region. As part of the *Unified Plan*, this SCP addresses this Cook Inlet Region; to avoid confusion with federal terms, the region is referred to as the Cook Inlet Subarea.

This plan shall be used as a framework for response mechanisms and as a pre-incident guide to identify weaknesses and to evaluate shortfalls in the response structure before an incident. The plan also offers parameters for vessel and facility response plans under the Oil Pollution Act of 1990. Any review for consistency between government and industry plans should address the recognition of economically and environmentally sensitive areas and the related protection strategies, as well as a look at the response personnel and equipment (quantity and type) available within the area (including federal, state, and local government and industry) in comparison to probable need during a response.

B. SUBAREA DESCRIPTION

As defined by Alaska regulations, the Cook Inlet Subarea encompasses the boundaries of the Kenai Peninsula Borough, the Municipality of Anchorage, and the Matanuska-Susitna Borough, including adjacent shorelines, waters of Cook Inlet and waters having as their seaward boundary a line drawn in such a manner that each point on it is 200 nautical miles from which the territorial sea is measured. Figures E-1 through E-4 depicts this area.

The subarea encompasses a very diverse array of topographical features, including extremely mountainous terrain, ice fields, tidewater and piedmont glaciers, river deltas and broad tidal mudflats, rocky shoreline, and boreal forests.

Figure E-1
Cook Inlet Area Map

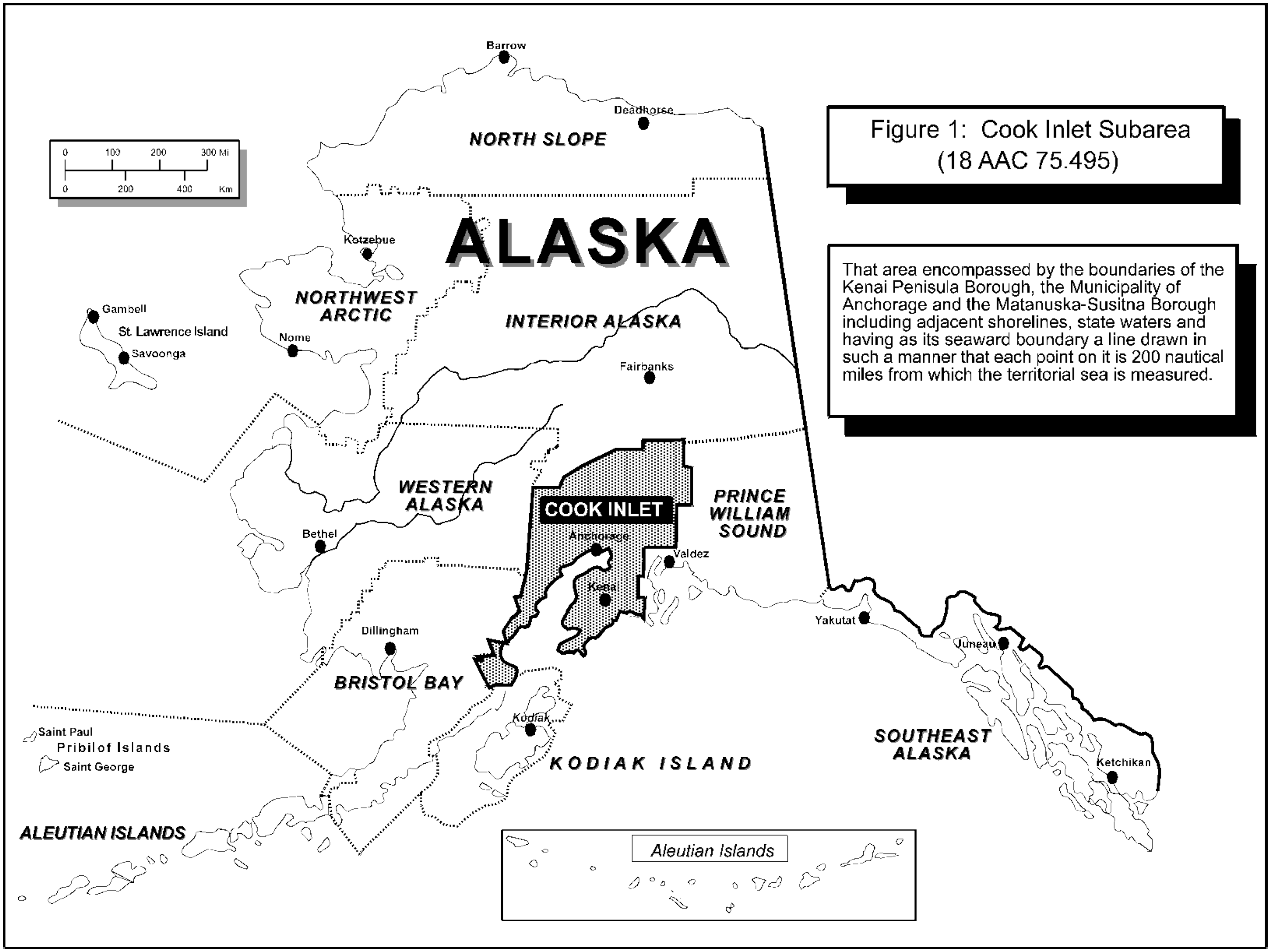


Figure E-2
Cook Inlet Detailed Subarea Map

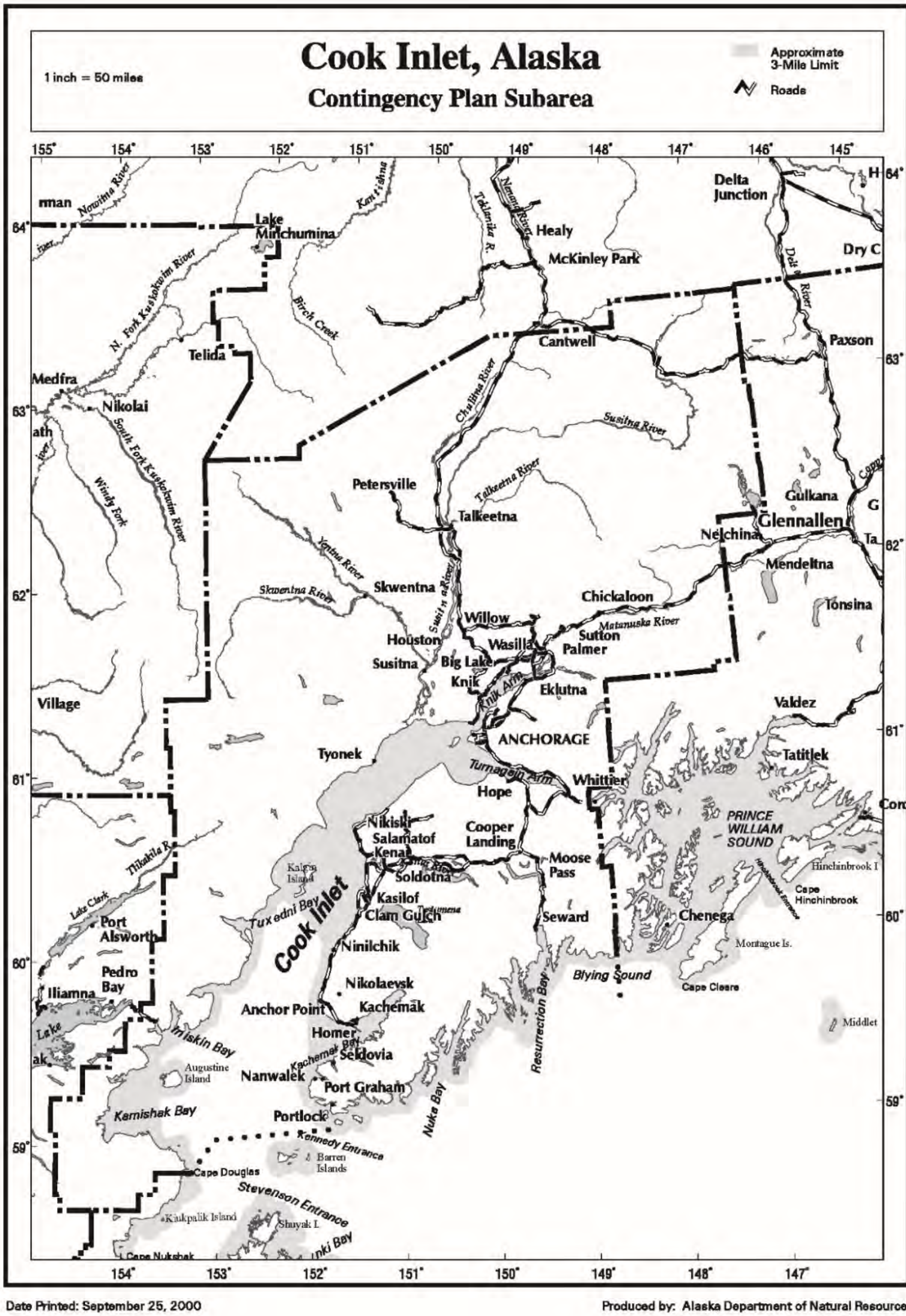


Figure E-3
Cook Inlet USGS Topo Map Index

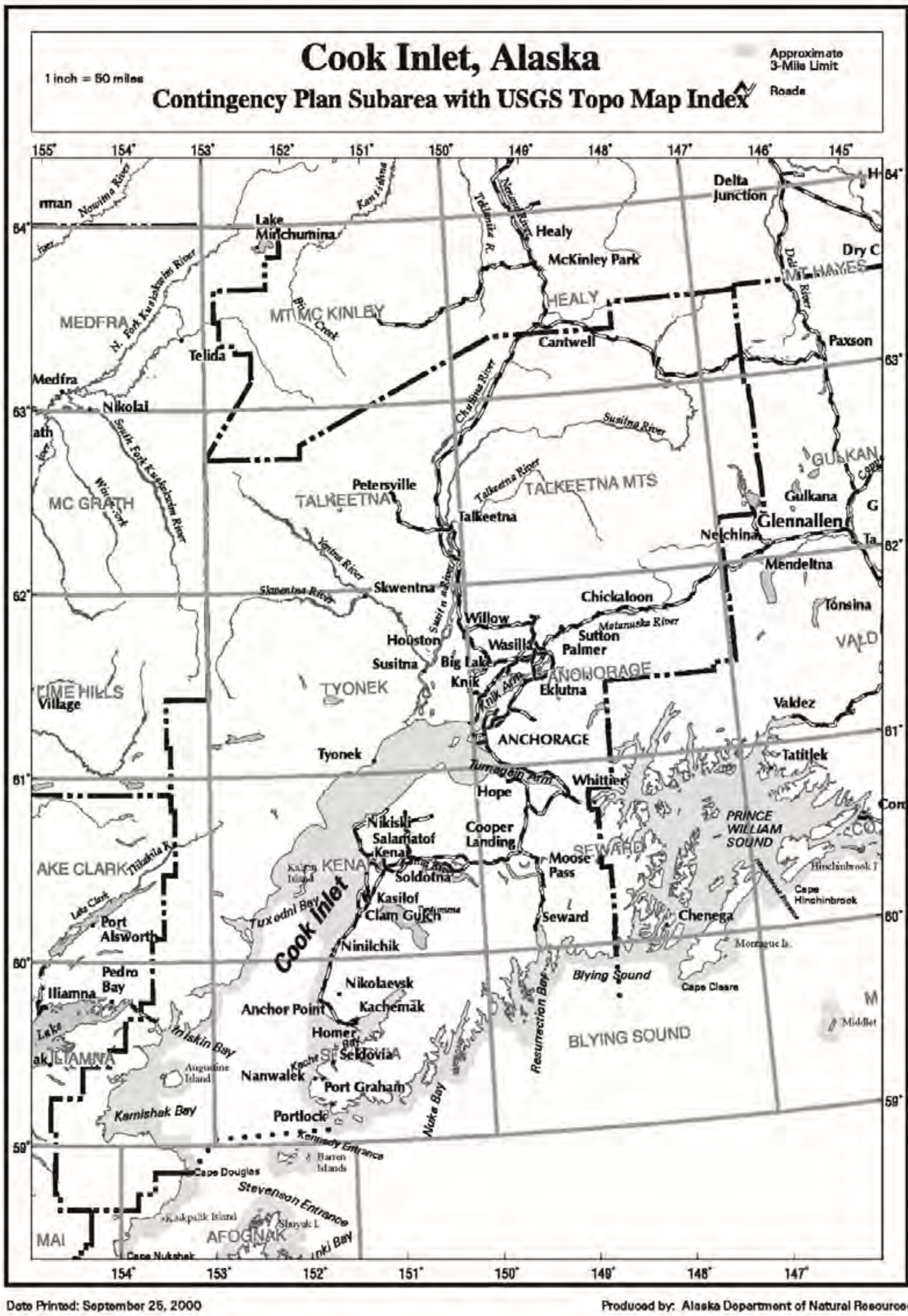
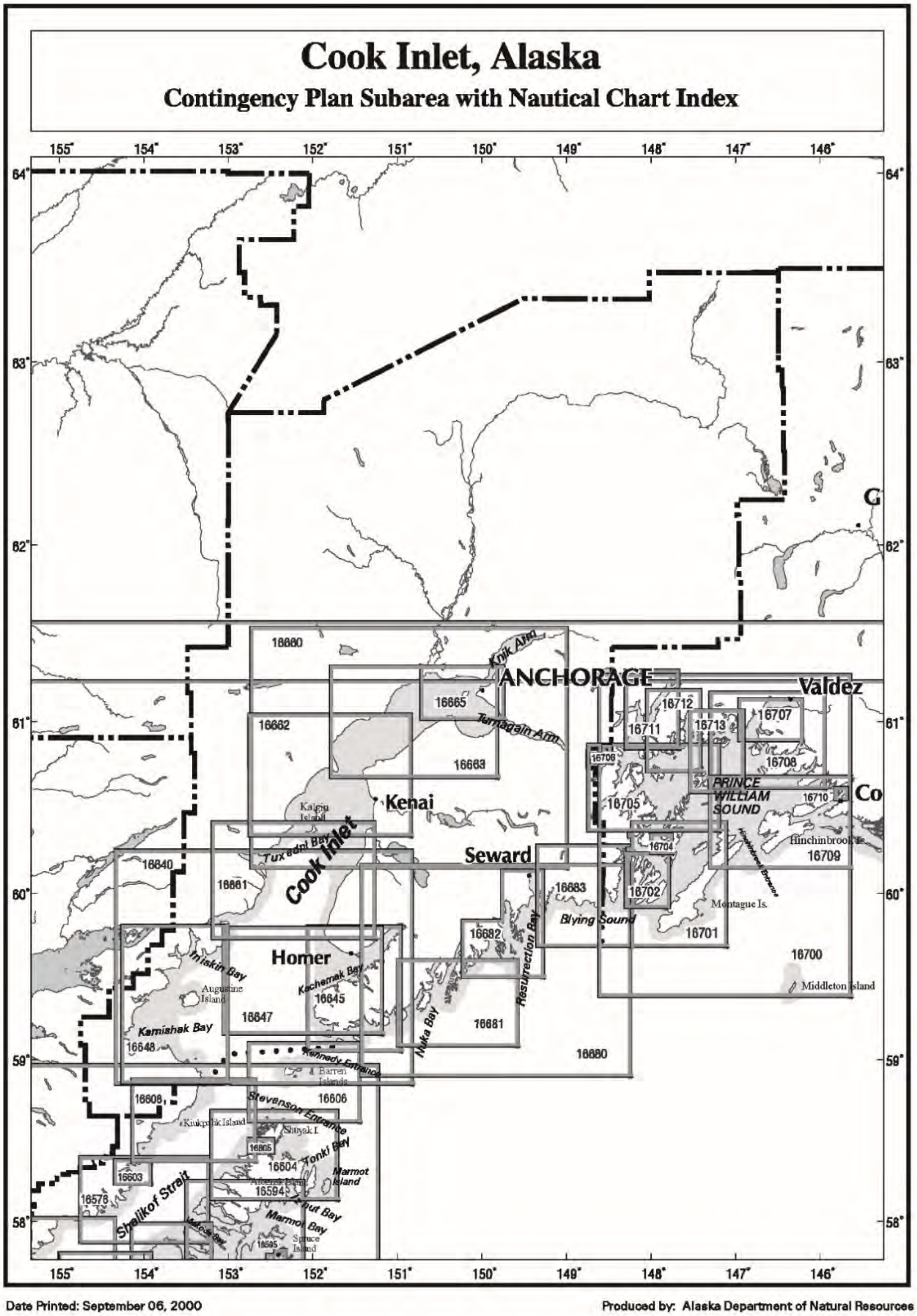


Figure E-4
Cook Inlet Nautical Chart Map Index



C. AREA OF RESPONSIBILITY

This SCP covers the region outlined above. The U.S. Coast Guard (USCG) Captain of the Port (COTP) for Western Alaska is the pre-designated Federal On-Scene Coordinator (FOSC) for navigable water ways within the subarea (as agreed to and stipulated in a memorandum of understanding between EPA and USCG). EPA is the pre-designated FOSC for the Inland Zone which encompasses all lands, rivers, streams, and drainages inland of the 1000-yard wide band which parallels the Alaskan coastline. These zones are clearly defined in the *Unified Plan*. It is possible that incident may occur in locations that do not fall under federal jurisdiction and there will be no FOSC in these instances.

The State of Alaska places jurisdiction of spill response for the Cook Inlet Subarea under the Central Alaska Region of the Alaska Department of Environmental Conservation (ADEC). The State On-Scene Coordinator (SOSC) for the Central Alaska Region is the pre-designated SOSC for the entire Cook Inlet Subarea.

Memoranda of Understanding/Agreement (MOU/MOA) between the USCG/EPA and the EPA/State of Alaska further delineate the OSC responsibilities. The *Unified Plan, Annex K* includes copies of these MOUs/MOAs.

D. REGIONAL STAKEHOLDER COMMITTEE

A Regional Stakeholder Committee (RSC) will normally be activated for significant incidents. The RSC was previously referred to as the Multi-Agency Coordination Committee (MAC). Unlike the MAC defined in the ICS of the National Incident Management System, the RSC for a spill response does not play a direct role in setting incident priorities or allocating resources. The RSC can advise the Unified Command (under the guidance of the Liaison Officer) and provide comments and recommendations on incident priorities, objectives and action plans.

Figure E-9 provides the general location of the RSC in relation to the Unified Command organizational structure and suggested/potential membership of the RSC. Membership on the RSC is dependent upon the location of the incident and the interests or jurisdiction of the affected communities, landowners, and special interest groups. Government agencies will not normally use the RSC to provide input to the Unified Command. Federal agency personnel will participate within the ICS structure under the leadership of the FOSC; state personnel will do so under the guidance of the SOSC. During an incident in which no FOSC is taking part, federal agencies with jurisdictional responsibilities for resources at risk could participate as a member of the RSC, thus retaining a channel for input on containment, oversight, and cleanup. The preferred approach is to include these agencies as part of the overall ICS structure.

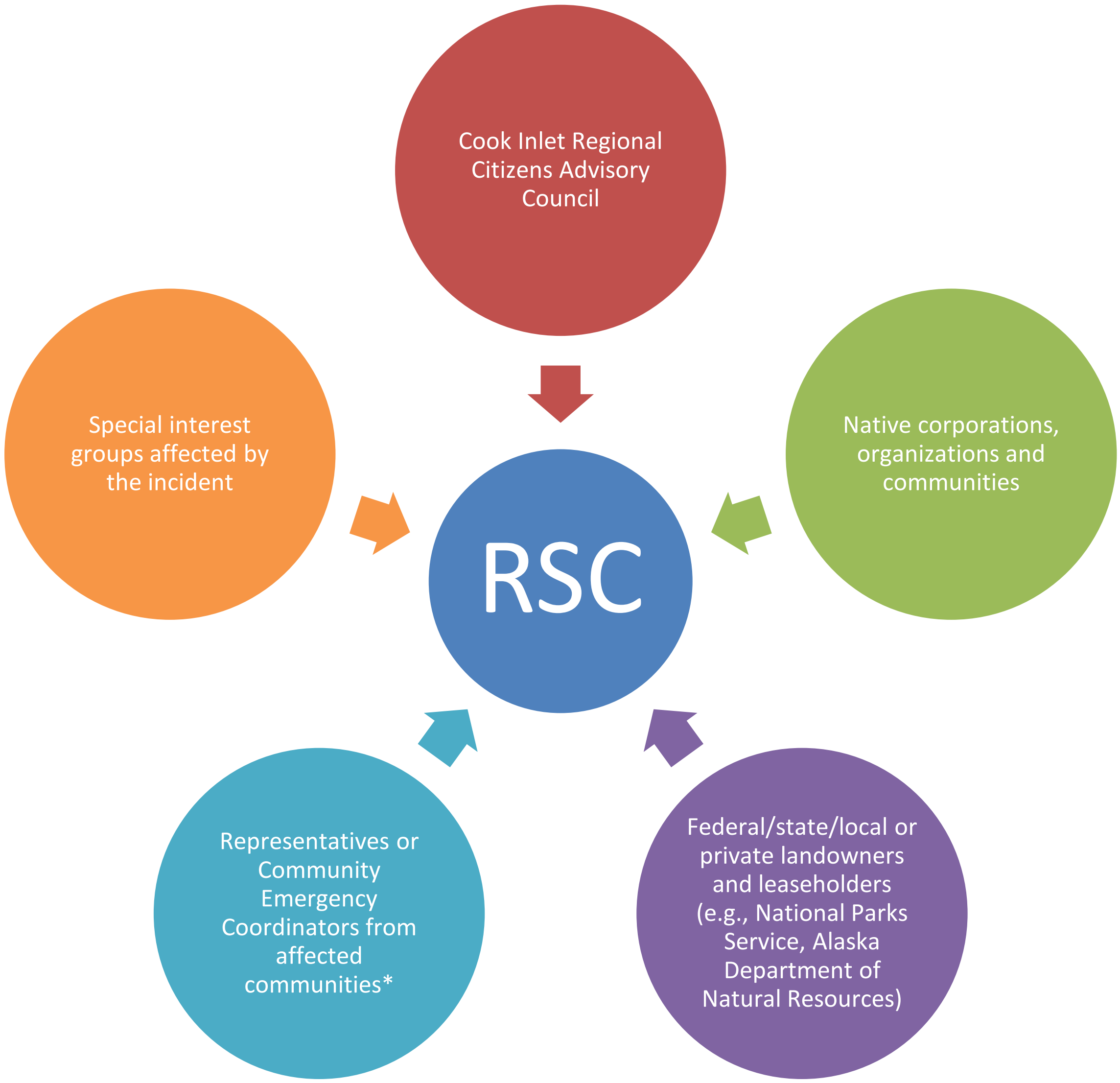
Figure E-9
Cook Inlet RSC ICS Organizational Position

** As long as there is an immediate threat to public safety, the Local On-Scene Coordinator (LOSC) will serve as the ultimate command authority if the FOSC or SOSC does not assume the lead role for response, or the LOSC requests a higher authority* to assume that responsibility.

As indicated above, the RSC is not directly involved in tactical operations, though some of its members may be. The RSC's role is to convey to the Unified Command information relating to the authority, concerns and expertise of its members. RSC members recommend to the Unified Command overall objectives and priorities and review the Incident Action Plans developed by the Unified Command.

RSC activities will be coordinated by the Liaison Officer. RSC discussions will be documented, and recommendations or dissenting opinions expressed outside of the RSC meetings with the Unified Command will be communicated to the Unified Command through the Liaison Officer. The RSC will be chaired initially by the Liaison Officer. After convening, the RSC will then elect its own chair.

Figure E-10
RSC Suggested Membership



Note: *Communities may include the following

- Alexander Creek
- Anchorage
- Big Lake
- Butte
- Chase
- Chickaloon
- Clam Gulch
- Cohoe
- Cooper Landing
- Crown Point
- Fox River
- Fritz Creek
- Funny River
- Girdwood
- Halibut Cove
- Happy Valley
- Homer
- Hope
- Houston
- Jakolof Bay
- Kachemak City
- Kalifonsky
- Kasilof
- Kenai Peninsula Borough
- Kenai
- Knik/Fairveiw
- Lazy Mountain
- Matanuska-Susitna Borough
- Meadow Lakes
- Moose Pass
- Nanwalek
- Nikiski
- Nikolaevsk
- Ninilchik
- Palmer
- Port Graham
- Primrose
- Ridgeway
- Salamatof
- Seldovia
- Seward
- Skwentna
- Soldotna
- Sterling
- Sutton
- Talkeetna
- Trapper Creek
- Tyonek
- Wasilla
- Willow

E. REGIONAL CITIZENS ADVISORY COUNCIL

The Cook Inlet Regional Citizens Advisory Council (RCAC) is a local citizens group with an Oil Pollution Act of 1990-mandated role in Cook Inlet spill response activities. In this role, the RCAC participates with the incident management team at the emergency operations center and monitors on-water activities during a spill. The RCAC has four primary tasks to perform during a spill: observe, verify, inform, and advise. Cook Inlet RCAC provides local knowledge and technical expertise within the ICS structure (e.g., as part of the Operations, Planning Sections and the Joint Information Center).

By observing and verifying emergency spill response and cleanup efforts, the RCAC is able to properly inform local residents, communities and concerned groups. The RCAC also provides information on local knowledge and concerns to incident commanders that can prove valuable to operational decisions. The RCAC is a resource for the Unified Command and participates in the Regional Stakeholder Committee when it is established and functioning for a spill response.

Specific responsibilities of the RCAC include:

- Providing a voice for local communities and citizens in the policies and decisions that affect them.
- Advising the oil industry and the public on oil spill prevention and response, and ways to mitigate the environmental impact of terminal, offshore oil facilities, and tanker operations.
- Monitoring terminal, tanker, and offshore oil facilities operations and implementation of spill prevention and response plans.
- Increasing public awareness of private oil industry's current capabilities in spill prevention and response, and the environmental impacts of oil transportation.
- Fostering long term partnership between industry, government and local communities.
- Conducting independent research.
- Participating in, monitoring, and critiquing actual spill responses, spill drills, deployment exercises, and spill simulations conducted by industry. The RCACs also assist industry and regulatory agencies in drill planning and post-drill evaluations.
- Participating in the Regional Stakeholder Committee.
- Preparing and maintaining an RCAC Emergency Response Plan outlining the Council's role and operating procedures in the event of a major spill.

F. SUBAREA COMMITTEE

The primary role of the Subarea Committee is to act as a preparedness and planning body for the subarea. The pre-designated FOSC for the subarea and the pre-designated SOSC from ADEC compose the primary membership of the Subarea Committee. Each member is empowered by their own agency to make decisions on behalf of their organization and to commit the organization to carrying out roles and responsibilities as described in this plan and the *Unified Plan*.

The pre-designated FOSCs for the area (EPA & USCG), and the SOSC will serve as chairpersons of the committee. They will select work group members and provide general direction and guidance for the work groups and the Subarea Committee.

The Subarea Committee is encouraged to solicit advice, guidance or expertise from all appropriate sources and establish work groups as necessary to accomplish the prepared need and planning task. The FOSC should solicit the advice of the Alaska Regional Response Team to determine appropriate work group representatives from federal, state, and local agencies.

1. Subarea Committee Members

The Cook Inlet Subarea Committee is comprised of representatives from the following federal, state and local agencies:

- U.S. Coast Guard, COTP Western Alaska
- U.S. Environmental Protection Agency
- Alaska Department of Environmental Conservation
- Borough or local government, when applicable

The Cook Inlet Subarea Committee also seeks advice and expertise concerning environmental and economic issues from federal, state and local agencies, and private industries, such as:

- Alaska Department of Fish and Game
- Alaska Department of Natural Resources
- Alaska Department of Military and Veteran Affairs
- Alaska Railroad Corporation
- Alaska Chadux Corporation
- Cook Inlet Spill Prevention and Response, Inc.
- Cook Inlet Regional Citizens Advisory Council
- Federally-recognized tribes
- Local borough, city and tribal governments
- Local Emergency Planning Committees
- Regional/local businesses
- National Marine Fisheries Service
- National Oceanic and Atmospheric Administration
- U.S. Department of the Interior-Office of Environmental Policy and Compliance
  - U.S. Fish and Wildlife Service
  - National Park Service
  - Bureau of Land Management

2. Subarea Work Groups

The Subarea Committee seeks to solicit advice, guidance or expertise from all appropriate sources and establish work groups as necessary to accomplish the preparedness and planning tasks. The Subarea Committee selects the work group members and provides general direction and guidance for the work groups. In addition to federal, state and local agency representatives, work group participants may include facility owners/operators, shipping company representatives, cleanup contractors, emergency response officials, marine pilot associations, academia, environmental groups, consultants, response organizations and representatives from any applicable regional citizen s' advisory councils.

The Cook Inlet Subarea Committee has formed the following work groups:

The Sensitive Areas Work Group is chaired by the Department of Interior-Office of Environmental Policy and Compliance representative. This work group coordinates the preparation of the necessary information for each separate subarea and ensures that the information is submitted in a common format. Participation by local community staff is vital to acquire local input and validate existing information. The Cook Inlet Subarea-specific sensitive areas information has been prepared and incorporated into the *Sensitive Areas Section* of this plan.

The Logistics Work Group is co-chaired by representatives from USCG, EPA, and ADEC. This work group is responsible for preparing the *Resources Section* of this plan.

The Operations Work Group is co-chaired by representatives from USCG, ADEC, and EPA. This work group is responsible for scenario development and the refinement/expansion of the Emergency Notification Lists located in the *Response Section* of this plan.

BACKGROUND: PART TWO – RESPONSE POLICY & STRATEGIES

The strategy for responding to a specific spill or hazmat incident depends upon numerous factors. The strategy can change as the situation changes. As a general rule, the strategies listed below should be used as a guide in developing an effective response. Consider all factors that may affect the particular situation and revise/modify/expand these priorities as the situation dictates. The *Response Section* of this plan contains some specific information on response procedures and ramp-up timelines. Additional information can be found in the *Unified Plan*.

A. FEDERAL RESPONSE ACTION PRIORITIES/STRATEGIES

The following priorities are general guidelines for response to a pollution incident. They are based in the premise that the safety of life is of paramount importance in any pollution incident, with the protection of property and the environment, although important, being secondary. Nothing in this part is meant to indicate that higher priority items must be completed before performing a lower priority task. They may be carried out simultaneously or in the most logical sequence for each individual incident.

- Priority One: Safety of Life – For all incident which may occur, the safety of personnel, including response personnel, must be given absolute priority. No personnel are to be sent into an affected area without first determining the hazards involved and that adequate precautions have been taken to protect personnel.
- Priority Two: Safety of Vessel/Facility and Cargo – The facility and/or vessel and its cargo shall become the second priority.
- Priority Three: Protection of the Environment by elimination of the pollution source – Containment and recovery of oil in the open water must be effected expeditiously to preclude involvement of the beaches and shorelines. Due to remote location and restricted accessibility, it is extremely difficult to protect the majority of coastline by diversion and exclusion methods. Therefore, securing the source and open water containment and recovery are especially critical and should normally be the first line of defense to protect the environment. Likewise, spills which occur on land or in upland water courses will be dammed, boomed, diked, etc., as feasible to prevent the spread of the pollutant downstream. Note: In situ burning (*Unified Plan, Annex F* for checklist) of a vessel and its pollutants may be an alternative considered by the OSCs; this strategy places environmental protection priorities above saving the vessel and its cargo.
- Priority Four: Protection of the Environment by diversion/exclusion, dispersion, or in situ burning – In the event of that the location of a spill or the weather conditions do not permit open water recovery, protection of the shoreline becomes paramount, especially areas of greatest sensitivity. It is not possible to protect some areas entirely or even in part. It may be necessary to sacrifice some area in order to achieve the best overall protection of the environment, The OSC may consider in situ burning as a response option. *Refer to the Unified Plan, Annex F, Appendix II* for an in situ burning checklist. The use of dispersant must be considered early in the response phase while the oil is in the open water and conditions are agreeable. The *NCP, Subpart J* and the *Unified Plan, Annex F, Appendix I* address in detail the responsibilities of the FOSC in the use of chemicals.
- Priority Five: Protection of the Environment by beach cleanup and the use of sacrificial areas – It may not be possible to protect the entire shoreline from oil; in fact, spilled product may be allowed purposely to come ashore in some areas as an alternative to damaging other, more sensitive areas.

Selection of the proper shore line cleanup technique depends on many different factors, including the following:

- o Depth of oil in the sediment
- o Type of oil (tar balls, pooled oil, viscous coating, etc.)
- o Trafficability of equipment on the shoreline
- o Environmental or cultural sensitivity of the oil shoreline
- o Prevailing oceanographic and meteorological conditions

The best way to minimize debate over the most appropriate response is to involve all interceded government and private agencies and other stakeholders. The shoreline assessment groups shall attempt to agree on the amount and character of the oil that is on the shorelines, anticipate interactions between the stranded oil and the environment, and assess the geological and ecological environment of the involved shorelines. Once a consensus is met on these parameters, an approach must be developed to determine the proper treatment required.

Shoreline cleanup options may include the use of physical and/or chemical processes. Physical shoreline cleaning methods include techniques such as natural recovery, manual sorbent application, manual removal of oiled materials, local pressure flushing, manual scraping, mechanical tilling, and mechanical removal using heavy equipment. Chemical shoreline cleanup products may increase the efficiency of water-washing during the cleanup of contaminated shorelines. However, the product must be listed on the NCP Product Schedule, and authorization must be obtained from the ARRT and the OSC of the spill. Bioremediation is also considered as a shoreline cleaning method. Bioremediation is the application of nutrients to the shoreline to accelerate the natural biodegradation of oil. The OSCs shall request site-specific guidelines for source protection measures required during shoreline cleanup operation.

B. STATE OF ALASKA RESPONSE PRIORITIES

- Safety: Ensure the safety of persons involved, responding, or exposed to the immediate effects of the incident.
- Public Health: Ensure protection of public health and welfare from the direct or indirect effects of contamination of drinking water, air, and food.
- Environment: Ensure protection of the environment, natural and cultural resources, and biota from the direct or indirect effects of contamination.
- Cleanup: Ensure adequate containment, control, cleanup and disposal by the responsible party or supplement or take over when cleanup is inadequate.
- Restoration: Ensure assessment of contamination and damage and restoration of property, natural resources and the environment.
- Cost Recovery: Ensure recovery of costs and penalties to the Response Fund for response, containment, removal, remedial actions, or damage.

BACKGROUND: PART THREE - SUBAREA SPILL HISTORY, OIL FATE & RISK ASSESSMENT

A. NAVIGABLE WATERS SPILL HISTORY

The following spill history was obtained from ADEC and USCG. This partial listing includes only the more significant spills (over 1000 gallons) or hazardous material releases (over 100 pounds), plus several potentially severe incidents. This partial and abbreviated spill history is provided to give an overall view of the vast array of facility and transportation-related accidents that can occur.

The Cook Inlet Subarea supports a wide variety of vessel traffic ranging from the smallest finishing vessel to crude oil tankers. Refined products and crude oil are routinely shipped in and out of the inlet. In addition, Liquefied Natural Gas (LNG) tankers call at the Kenai Pipeline dock facility. Many crude oil development and production platforms operate in the area. Crude oil pipelines and natural gas pipelines cross Cook Inlet and Turnagain Arm in several locations.

DATE	INCIDENT	LOCATION	RELEASED (GALLONS)	PRODUCT RELEASED
7/2/1987	T/V *Glacier Bay*	Kenai	Up to 210,000	ANS crude oil
6/22/1988	Mystery spill	Pickworth Dock, Anchorage	≈ 300	Refined product
8/5/1988	Mystery spill	Upper Cook Inlet	100	Heavy product
11/2/1988	M/V *Alaska Constructor*	Trading Bay, Upper Cook Inlet	10,000 30,000	Gasoline Diesel
11/14/1988	Marathon Spark Platform	Upper Cook Inlet	≈ 23,000 to 46,000	Cook Inlet crude oil
12/12/1988	T/V *Oriental Crane*	Nikiski	≈ 7,600	Bunker C fuel oil
1/31/1989	Amoco Platform Anna	Upper Cook Inlet	≈ 4,600	Crude oil
8/19/1989	M/V *Lorna B*	Upper Cook Inlet	Vessel sank with 80,000	Diesel fuel
12/17/1990	T/V *Coast Range*	Cook Inlet	≈ 700	Crude oil
8/1/1991	Port Graham fuel facility	Cook Inlet	Unknown	Diesel fuel
8/13/1991	M/V *Atlantic Seahorse*	Cook Inlet	≈ 4,000	Diesel fuel
4/26/1992	ARCO King Salmon Platform	Upper Cook Inlet	≈ 336 to 420	Crude oil
8/28/1992	F/V *Loon*	Outer Kenai Coast	≈ 1,500	Diesel fuel
12/5/1995	Tesoro Tank Farm	Nikiski	≈ 2,500 to 2,900	Crude oil
3/6/1997	Steelhead Platform	Trading Bay	≈ 9,000	Diesel fuel
2/6/1999	T/V *Chesapeake Trader*	Between Nikiski and Homer	420	Crude oil
10/1/2002	Trading Bay Facility	Trading Bay	525	Crude oil
1/15/2009	M/V *Monarch sinking*	Upper Cook Inlet	22,000	Diesel fuel and other petroleum product
5/23/2015	M/V *Thors Hammer*	Gore Point	6,000	Diesel

B. INLAND SPILL HISTORY

DATE	INCIDENT	LOCATION	RELEASED (GALLONS)	PRODUCT RELEASED
3/1/1990	Cook Inlet Pipeline	Drift River Terminal	≈ 84,000	Crude oil
8/16/1991	Shell Western ENP	Nikiski	≈ 84,000	Crude oil
2/22/1995	Defense Fuels Supply Center	Whittier	113,000	Jet fuel
7/28/1995	Unocal Swanson River Field	Kenai	≈ 840	Crude oil
5/2/1997	Anchorage International Airport	Anchorage	> 3,000	Jet fuel (Jet A)
7/17/1997	Elmendorf Air Force Base	Elmendorf	13,600	Jet fuel (JP-8)
9/4/1997	Elmendorf Air Force Base	Elmendorf	6,300	Aviation fuel
10/27/1997	Elmendorf Air Force Base	Elmendorf	100,000	Aviation fuel
8/2/1998	Mat-Su Palmer Correctional Facility	Palmer	10,000	Diesel
1/6/1999	Swanson River Field	Kenai	2,520	Crude oil
6/22/1999	Glenn Highway MP 84/85 on Long Lake side of the road	Glenn Highway MP 84/85	4,500	Jet fuel (Jet B)
10/31/1999	Alaska Railroad MP 268.5	Canyon Creek	15,000	Jet fuel (Jet A)
11/21/1999	Kenai Swanson River Field	Kenai	2,520	Crude oil
12/22/1999	Alaska Railroad MP 262	Gold Creek	120,000	Jet fuel
4/13/2000	Tesoro Pipeline Terminal	Port of Anchorage	5,082	Diesel
6/29/2001	Truck Rollover	Junction of the Seward Highway and the Sterling Highway	4,000	Asphalt
10/29/2001	Truck Rollover	Mike 52 Sterling Highway near Gwin's Lodge	7,000	Gasoline
7/18/2008	Illegal Dumping	Milepost 49.5 of the Parks Highway, Wasilla	1,000	Various used oil product
1/9/2012	XTO Energy Facility Tank 3	Nikiski	3,150	Crude oil
4/17/2014	Cook Inlet Energy West McArthur River Unit	McArthur River	1,050	Crude oil
6/20/2014	Hilcorp Swanson River Field LACT Prover Containment	Swanson River Field	1,682	Crude oil
7/28/2010	C-17 Crash	Elmendorf AFB	4,000	Aviation fuel
10/7/2010	Big State Logistics Tanker Rollover	Glann Highway MP 78, Chickaloon	2,464	Diesel
11/4/2010	Big State Logistics Tractor Trailer	MP 177 Parks Highway, Honolulu Creek	3,040	Diesel
11/16/2010	F-22 Crash	48 miles SW Cantwell	1,343	Aviation fuel
12/28/2010	FAA, Site 251 Tank 6 Historical Spill	FAA Air Route Traffic Control, Elmendorf	1,000	Diesel
7/7/2012	JBER Gas Station	Elmendorf Bldg 6210	1,024	Gasoline

DATE	INCIDENT	LOCATION	RELEASED (GALLONS)	PRODUCT RELEASED
9/25/2013	Granite Construction Asphalt Overflow	1085 Long Street, Anchorage	4,000	Asphalt
4/19/2014	Flint Hills Terminal	Port of Anchorage	4,273	Gasoline
7/1/2014	Alaska Laser Wash Minnesota Drive	Anchorage	1,000	Used oil (all types)
7/22/2014	Flint Hills Terminal	Port of Anchorage	3,500	Aviation fuel
9/4/2015	Fisher's Fuel Tanker Rollover	Palmer	1,000	Gasoline

C. HAZMAT RELEASE HISTORY

DATE	INCIDENT	LOCATION	RELEASED	PRODUCT RELEASED
2/27/1986	Alaska Railroad	Crown Point transfer station near Moose Pass	50 tons	Urea
3/13/1989	Tesoro Alaska Petroleum Company		2 tons	Sulfer dioxide
3/14/1989	Tesoro Alaska Petroleum Company		1 ton	Ammonia
5/25/1989	Unocal, Chemical Plant		6,500 lbs	Ammonia vapor
6/21/1989	Unocal, Chemical Plant		600 lbs	Ammonia vapor
11/15/1989	ARCO, Swanson River 41-33	Kenai	126 gal	15% hydrochloric acid
12/3/1989	Unocal, Chemical Plant		100 lbs	Ammonia vapor
1/29/1990	VECO, Swanson Facility	Kenai	21 gal	Xylene
3/20/1990	Unocal, Chemical Plant		65 gal	Sulfuric acid
6/30/1990	Unocal, Chemical Plant		500 gal	Sulfuric acid
9/14/1990	Tesoro, North Kenai Plant	Kenai	1 ton	Sulfur
9/7/1991	Unocal, Chemical Plant	Kenai	2,670 lbs	Ammonia
9/11/1991	SOI/Great Western Chemical		100 gal	Sodium hypochlorite
11/27/1991	Dowell-Schlumberger		70-80 gal	15% Hydrochloric acid
7/10/1992	Union, Chemical Plant	Kenai	≈ 5,400 lbs	Ammonia
8/3/1993	Unocal, Chemical Plant	Kenai	1,500 lbs	Ammonia
9/17/1993	Unocal, Chemical Plant	Kenai	100 gal	Sodium hydroxide
6/8/1996	Unocal, Chemical Plant	Kenai	8,943 lbs	Ammonia - anhydrous
6/18/1996	Unocal, Chemical Plant	Kenai	6,006 lbs	Ammonia – anhydrous
1/25/1997	Crowley Barge Oregon Capsized	Ninilchik	12,500 tons	Urea
9/16/1997	Truck Accident	Nikilchik River	34,000 lbs	Solid sulfur
10/31/1997	Unocal, Chemical Plant	Kenai	20,000 lbs	Ammonia –

DATE	INCIDENT	LOCATION	RELEASED	PRODUCT RELEASED
				anhydrous
4/21/1998	Unocal, Chemical Plant	Kenai	49,605 lbs	Ammonia – anhydrous
7/1/1998	Icicle Seafood Plant	Homer	35,000 lbs	Ammonia
9/21/1998	Unocal, Chemical Plant	Kenai	6,500 gal	Methyldiethanolamine
8/20/1999	Unocal, Chemical Plant	Kenai	9,000 gal	Methyldiethanolomine
12/23/1999	ISO Tank	Between Tacoma, WA and Anchorage	44,000 lbs	Methanol meruptan
11/5/2000	Ben Boeke Ice Arena	Anchorage	4,000 gal	Freon
9/27/2002	Alaska Pacific University	Anchorage	3 gal	Chlorine
7/16/2007	Agrium Plant	Nikiski	2,1000 gal	Undetermined hazardous chemicals
11/5/2007	Samson Tug & Barge	Cape Decision	17,800 lbs	Propane
5/23/2008	HR Trucking Truck Rollover	Sterling Highway, Cooper Landing	48,300 lbs	Urea
6/25/2008	Agrium Plant	Nikiski	4,500 lbs	Ammonia – anhydrous
7/10/2008	Tesoro Refinery	Nikiski	10,226 lbs	Sulfur dioxide
7/17-20/2008	Agrium Plant	Nikiski	52,000 lbs	Ammonia – anhydrous
8/18/2008	TG Service Tanker Truck Rollover	MP 179 Parks Highway	5,000 gal 150 gal	Compressed Methane Diesel fuel
9/28/2008	Aurora Gas Moquawkie #4 Well Blow-out	Upper Cook Inlet near Tyonek	11,000 gal	Drilling mud
5/13-28/2009	Tesoro Refinery	Nikiski	≈ 78,000 lbs	Sulfur dioxide
11/15/2010	Univar Co.	Anchorage	2,640 gal	Corrosion inhibitor
12/13/2010	Doyon Utilities	Fort Rich Base Center	110 gal	Ethylene Glycol
2/7/2011	Tesoro Refinery	Nikiski	409 lbs	Sulfur dioxide
2/19/2011	Nordaq Shadura #1 D/M	Nikiski	420 gal	Drilling mub
5/21/2011	Elmendorf Fire Foam	Elmendorf	250 gal	Fire foam
8/2/2011	Steelhead	Central Cook Inlet	100 gal	Therminal
10/19/2011	Nikiski Beach Road	Nikiski	240 gal	Corrosion inhibitor
11/21/2011	Tesoro Sulfur Recovery Unit	Nikiski	2,950 lbs	Sulfur dioxide
11/27/2011	ConocoPhillips LNG Plant	Nikiski	1,358 lbs	Nitric Oxide
3/8/2012	Baker Hughes	Kenai	200 gal	Ethylene Glycol
3/13/2012	Weaver Brothers	Kenai	4,140 gal	Methanol
5/13/2012	Tesoro Refinery	Nikiski	7,000 lbs	Sulfur dioxide
7/28/2012	MP 46 Seward Highway	Summit Lake	200 gal	CCS-1
9/16/2012	Tesoro Refinery	Nikiski	1,350 lbs	Sulfur dioxide
10/23/2012	Tesoro Sulfur Recovery Unit	Nikiski	6,500 lbs	Sulfur dioxide

DATE	INCIDENT	LOCATION	RELEASED	PRODUCT RELEASED
11/6/2012	Happy Valley Road Bravo Pad	Nikilchik	730 gal	Drilling mud
12/2/2012	Tesoro Sulfur Recovery Unit	Nikiski	5,007 lbs	Sulfur dioxide
12/9/2012	Apache Pad G	Tyonek CDP	588 gal	Propylene Glycol
11/22/2013	Tesoro Sulfur Recovery Unit	Nikiski	1,169 lbs	Sulfur dioxide
3/11/2014	O'Malley Ice Arena	Anchorage	200 lbs	Ammonia – anhydrous
4/21/2014	Tesoro Refinery	Nikiski	524 lbs	Sulfur dioxide
5/5/2014	Tesoro Refinery	Nikiski	652 lbs	Sulfur dioxide
5/6/2014	Tesoro Refinery	Nikiski	578 lbs	Sulfur dioxide
6/17/2014	Tesoro Refinery	Nikiski	610 lbs	Sulfur dioxide
5/30/2016	Tesoro Refinery	Nikiski	2,807 lbs	Sulfur dioxide
6/6/2016	Tesoro Refinery	Nikiski	531 lbs	Sulfur dioxide
2/6/2013	Pegasus Aviation	Anchorage	250 gal	Propylene glycol
3/17/2013	Swanson River Field	Swanson River Field	210 gal	Drilling mud
6/26/2013	King Salmon Platform	North Cook Inlet	890 gal	Ethylene Glycol
7/10/2013	Hilcorp Ninilchik Gas Field	Nikilchik	126 gal	Drilling Mud
7/24/2013	Hilcorp Soldotna Creek Unit	Swanson River Field	250 gal	Drilling Mud
10/10/2013	Hilcorp Susan Dionne	Ninilchik	200 gal	Drilling Mud
10/29/2013	Emerald Alaska	Nikiski	100 gal	Methanol
10/30/2013	OSK Tote Spill	Nikiski	270 gal	Glycol
11/22/2013	Girdwood DOT	Girdwood	3,000 gal	Magnesium chloride
12/24/2013	Hilcorp Grind and Inject	Swanson River Field	210 gal	Drilling muds
1/3/2014	Cook Inlet Energy Pad 5	West Central Kenai	126 gal	Drilling muds
1/19/2014	Cook Inlet Energy	West Central Kenai	420 gal	Drilling muds
2/7/2014	King Salmon Platform	North Cook Inlet	332 gal	Scale inhibitor
6/1/2014	King Salmon Platform	North Cook Inlet	630 gal	Drilling muds
6/6/2014	Cook Inlet Energy Osprey Platform	North Cook Inlet	290 gal	Drilling muds
7/17/2014	CPAI Beluga River Unit M-Pad	Beluga	126 gal	Other
12/12/2014	Hilcorp Tank Setting 1-33	Swanson River Field	100 gal	Glycol and other
2/23/2015	Elmendorf Hanger #12	Elmendorf Air Force Base	770 gal	Propylene Glycol
3/15/2015	Hilcorp Kenai Gas Field	Kenai Gas Field	126 gal	Drilling muds
3/19/2015	Span Alaska Baraplug 50	Cooper Landing	24,000 lbs	Calcium chloride
8/28/2015	Meth Lab Bust 1055 S Gurn Circle	Palmer	100 gal	Various chemicals related to meth cooking
9/26/2015	Hilcorp King Salmon Platform	North Cook Inlet	115 gal	Ethylene glycol
9/26/2015	Hilcorp Swanson River Field	Swanson River Field	800 gal	Ethylene glycol
11/3/2015	Hilcorp Swanson River Field	Swanson River Field	400 gal	Ethylene glycol
1/9/2016	Hilcorp Swanson River Field	Swanson River Field	150 gal	Methanol

DATE	INCIDENT	LOCATION	RELEASED	PRODUCT RELEASED
2/21/2016	Tote F/V *Midnight Sun*	Port of Anchorage	450 gal	Defoam X
3/30/2016	JBER	Elmendorf	200 gal	Fire fighting foam

D. SPILL SUMMARY

Below is a spill data analysis report providing findings related to spills reported to ADEC for the nine year period extending from January 1, 2006 to December 31, 2015.

TOTAL SPILLS	TOTAL VOLUME	AVERAGE SPILL SIZE	AVERAGE SPILLS/YEAR	AVERAGE VOLUME/YEAR
3,836	323,138	84	384	62,223

TOP 5 CAUSES		
Cause	***Spills***	***Gallons***
Seal Failure	98	100,399
Human Error	881	48,084
Leak	433	24,840
Equipment Failure	503	16,386
External Factors	57	16,367

TOP 5 PRODUCTS		
Product	***Spills***	***Gallons***
Produced Water	108	115,839
Diesel	957	61,307
Process Water	25	22,970
Drilling Muds	40	17,738
Gasoline	468	15,083

TOP 5 FACILITY TYPES		
Facility Type	***Spills***	***Gallons***
Natural Gas Production	193	108,310
Oil Production	360	44,213
Vehicle	547	26,945
Refinery Operation	96	23,621
Vessel	320	23,001

Note: The data summary above excludes spills reported in pounds and potential spills

E. OIL FATE AND GENERAL RISK ASSESSMENT

1. Fate of Spilled Oil

Weathering is a combination of chemical and physical processes that change the physical properties and composition of spilled oil. These processes include evaporation, oxidation, biodegradation, emulsification, dispersion, dissolution, and sedimentation. Below are definitions of these processes and how they relate to oil spills.

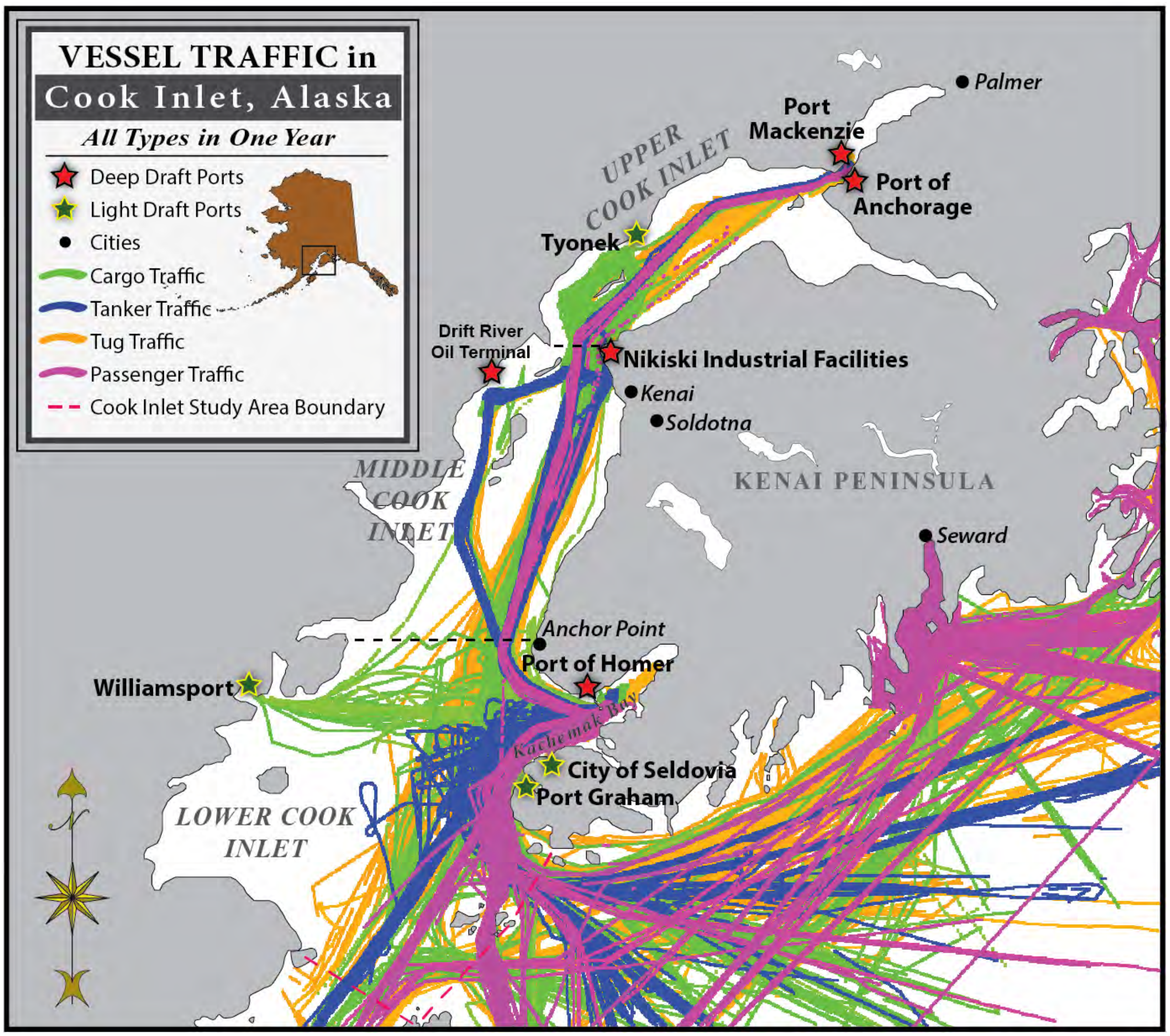
- Evaporation occurs when substances are converted from liquid state to vapor. During an oil spill, lighter components can evaporate into the atmosphere, leaving behind heavier components. Evaporation rates depend on the composition of the oil and environmental factors like wind, waves, temperature, currents, etc. For example, lighter refined products, such as gasoline, tend to evaporate very quickly because they have a higher proportion of lighter compounds. Heavier oils, like bunker oil, contain relatively few light compounds and leave viscous residues, composed of heavier compounds.
- Oxidation is a chemical reaction between two substances, which results in loss of electrons from one of the substances. This chemical reaction can take place between spilled oil and oxygen in the air or water. This reaction can produce water soluble compounds that can dissolve or form persistent compounds call tars. Oxidation of oil is a very slow process but can be enhanced by sunlight.
- Biodegradation occurs when microorganisms, such as bacteria, fungi, and yeast, break down a substance by feeding on it. Seawater contains a range of microorganisms that can either partially or completely degrade oil. Nutrient levels, water temperature and oxygen availability can all affect biodegradation, which tends to be quicker in warmer environments.
- Emulsification is a process where small droplets of one liquid become suspended in another liquid. During a spill, emulsification takes place when strong currents or waves suspend water droplets in oil. Water-in-oil emulsions are frequently called "mousse" and are more persistent than the original oil.
- Dispersion is the break up and diffusion of substances from their original source. In an oil spill, turbulent seas can break oil into various sized droplets and mix them into the water column. Smaller droplets can stay suspended while larger droplets tend to resurface, creating a secondary slick. The amount of oil dispersed depends on the oil’s chemical and physical properties and the sea state. For example, lower viscosity oils such as diesel, have higher dispersion rates in rough seas. Chemical dispersants may be used to enhance dispersion.
- Dissolution is the process of dissolving one substance in another. Many oils contain light aromatic hydrocarbons, like benzene and toluene, which are water soluble. During a spill, these compounds readily dissolve in water or evaporation into air, which is faster than dissolution.
- Sedimentation is a process where spilled oil chemically binds with, or adheres to, particulates in the water column, creating a density greater than the original oil. If the density of oil/particulate compounds becomes greater than water, particles will settle out of the water column. Sedimentation is much more common in shallow, nearshore areas because of the greater amount of suspended particulates.

The various types of petroleum products respond quite differently when released into the environment. Spills of refined product that enter the water generally will disperse and experience significant evaporation and spreading, making recovery difficult. Crude oil and Intermediate Fuel Oils (bunker fuel) will be affected by the same natural degradation factors but to a much lesser degree; these oil spills are "persistent" in nature and will require aggressive actions and innovative techniques to successfully mitigate harm.

2. General Risk Assessment

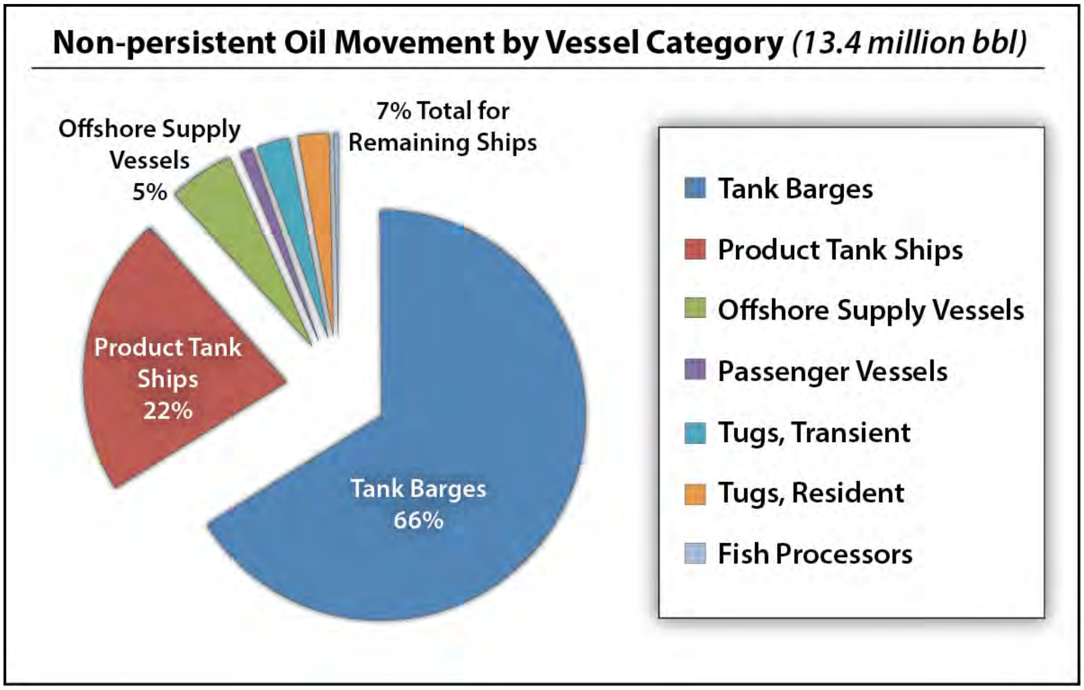
Considerable vessel traffic transits the waters of the Cook Inlet Subarea, ranging from small fishing and recreational vessels to large oil tankers and freight vessels. Both crude and refined oil products are shipped into Cook Inlet. Figure E-11 shows vessel routes mapped as part of the Cook Inlet Risk Assessment based on 2010 vessel activity (Cape International, 2012).

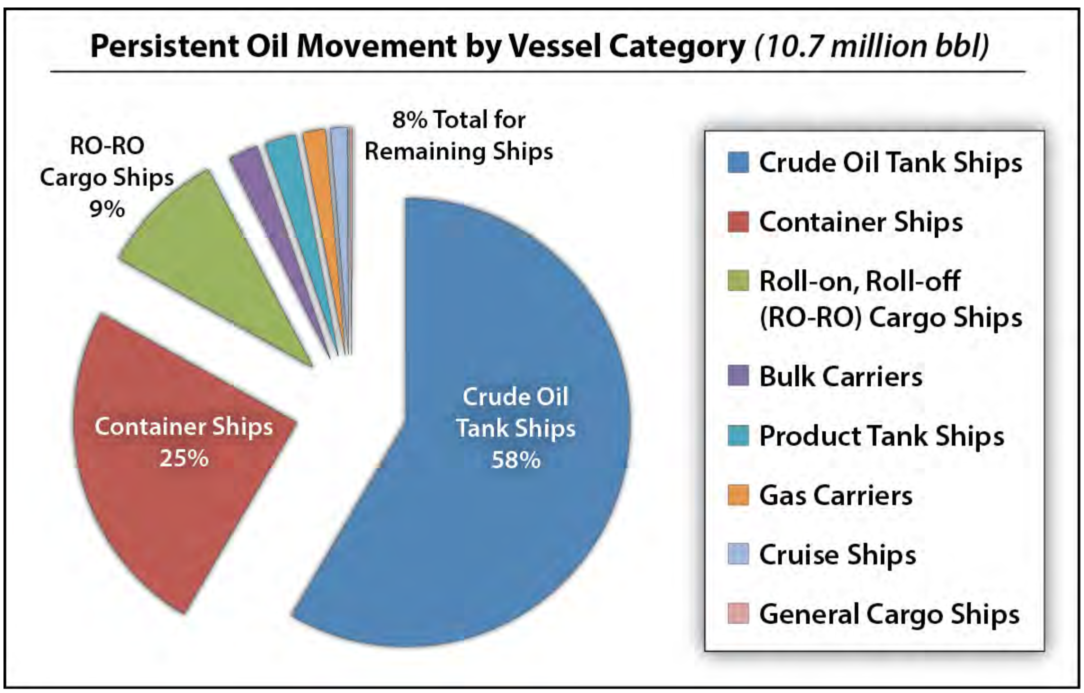
Figure E-11
2010 Vessel Traffic in Cook Inlet (Cape International, 2012)



According to the vessel traffic study, 13.4 million bbl of non-persistent oil and 10.7 million bbl of persistent oil (including oils of low, medium, and heavy persistence) were transported on Cook Inlet waters in 2010. (Cape International, 2012). See Figure E-12.

Figure E-12
Non-persistent and Persistent Oil Moved via Vessels > 300 GT in Cook Inlet in 2010
(Cape International, 2012)





Most oil exploration and production activities are concentrated in the East Forelands area, between Kenai and Nikiski, and along Trading Bay, between West Foreland and North Foreland. Offshore platforms are also located in Trading Bay and in the upper portions of Cook Inlet. Since 2012, jack-up rigs have been used in addition to the 16 fixed platforms put in place since the early 1960s.

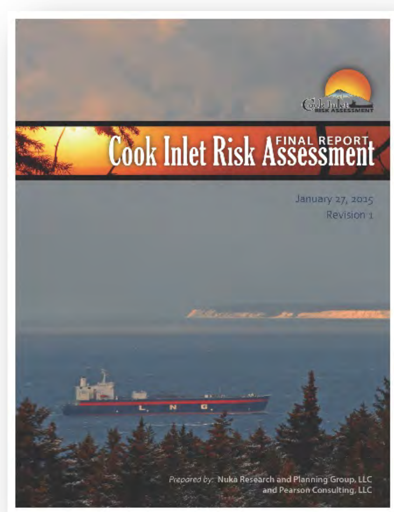
Several submerged pipelines cross the inlet in this area. Noncrude products are stored in tank farms in Anchorage and other areas of upper Cook Inlet. The subarea includes onshore and offshore crude oil production facilities, major crude oil and non-crude oil storage, and terminal facilities in Anchorage, Nikiski, and Redoubt Bay.

The region also contains the southern half of the Alaska Railroad system, which transports passengers and cargo including oil and hazardous substances, from Seward and Whittier to Anchorage and Fairbanks. The majority of the state's highway system is also located in this region with major roadways linking Anchorage with communities to the south on the Kenai Peninsula and to the north in the Matanuska-Susitna Borough and beyond.

In remote towns or villages, where refined products are stored in tank farms, the highest probability of spills occurs during fuel transfer of refined products to the tank farm from another source, such as the fuel barge, or from feeder lines from the tank farm onto users. Another threat for spills or chemical releases exists in the loading/unloading activities with vessels at port. This is not to say that these spills are common, but that precautions should be observed.

Spills in this subarctic-maritime climatic zone require careful preplanning to overcome the effects imposed by the moist, cold-weather environment. Machinery and people face significant challenges when operating in acute cold. The severe stresses imposed by winter conditions, with extreme temperatures and the extended darkness, can seriously reduce individual efficiency over a given period.

Cold weather conditions can prove beneficial, at times: ice and snow can act effectively as natural barriers, impeding the spread of oil, and can be used effectively to create berms for spill containment. Techniques for organizing and responding to spills in arctic environments have been developed and applicable supporting information should be consulted during an event.



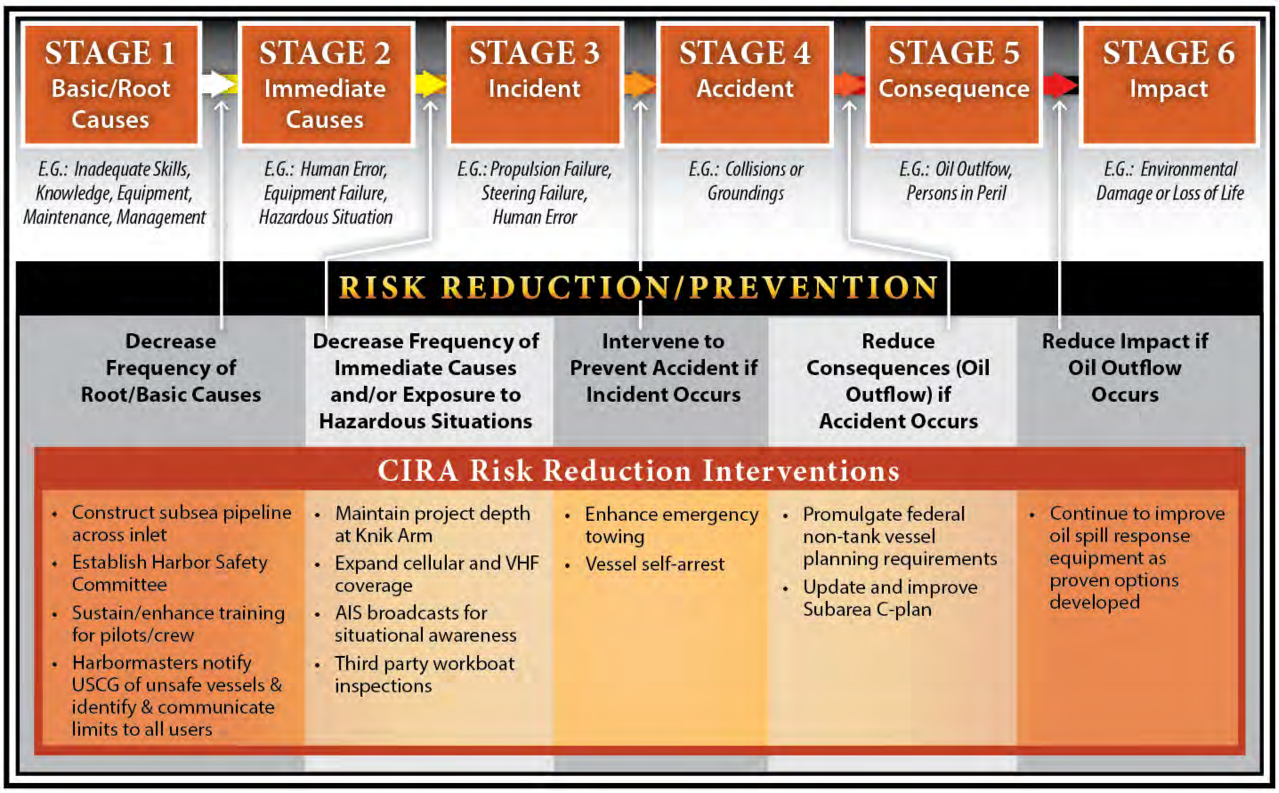
The summer months expose many more species, both in diversity and numbers, to the negative effects of oil spills. Whereas in winter, most species have left the region and the snow and ice conditions may buffer the soil from the affect of released oil, during the warmer months the land, flora and fauna are all quite vulnerable to an oil spill. Though summer daylight increases the available work hours to allow almost continuous operations, the extended light does not increase the number of hours response personnel can safely perform tasks.

<u>Cook Inlet Risk Assessment Project:</u> The Cook Inlet Regional Citizens Advisory Council (Cook Inlet RCAC), ADEC and USCG implemented the Cook Inlet Risk Assessment in 2011-2014 to examine the risk of oil spills posed by the marine vessels transiting through or within the region.

The risk assessment examined the types and sizes of vessels plying Cook Inlet and dominant accident types to identify future oil spill risks based on vessel size, type, and frequency. The first phase of the risk assessment applied a semi-qualitative analysis. The study relied primarily on historical data, expert opinion, and lessons learned from prior studies. The results of the first phase were used to provide a basis for the identification and initial ranking of risk reduction measures. In the second phase of the project, a multi-stakeholder Advisory Panel developed recommended risk reduction options that should be sustained, enhanced, or initiated for Cook Inlet. These are summarized in Figure E-13. More detailed discussion is found in the final report for the project at: http://cookinletriskassessment.com/

Figure E-13

Risk Reduction Measures Explored in Cook Inlet Risk Assessment



Alaska/Arctic Risk Assessment Project:_The National Oceanic and Atmospheric Administration (NOAA) conducted an Assessment of Marine Oil Spill Risk and Environmental Vulnerability for the State of Alaska that was published in 2014. This study estimated the current and future Incident Rates, Maximum Most Probable Discharge (MMPD) and the Worst Case Discharge (WCD) for oil spill of four different oil types in Cook Inlet. The study concluded that for Cook Inlet the current MMPD is 830 bbl, the second highest of the areas in the study, and the current WCD is 1,900,000 bbl, the third highest for the areas in the study. When the incident rates and potential discharge size is consider with the potential consequences of such discharges the study ranked Cook Inlet as having the fourth highest relative risk of the areas studied.

3. Wind, Ice and Current Conditions

The following information gives an overview of wind, tide and current conditions in the Cook Inlet Region. Much of the available data is general in nature and should be supplemented by area-specific updates and information from local residents. Included in this section are maps of net surface currents.

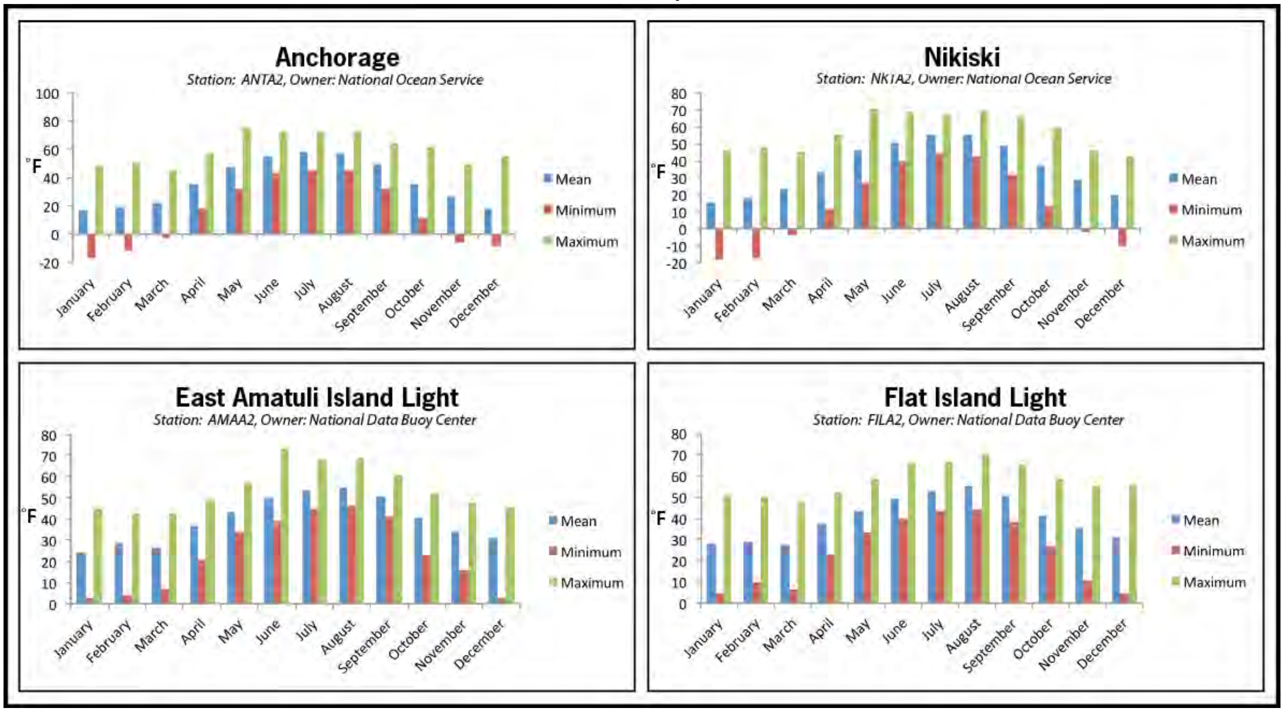
Physical Features: Cook Inlet is a large, elongated body of water oriented in a southwest to northeast direction in southcentral Alaska. It is approximately 150 miles long, and its width ranges from about 10 miles between the East and West Forelands in the north, to approximately 80 miles between the Kenai Peninsula and the mouth of the McNeil River in Kamishak Bay, toward the south. The inlet experiences the second largest tidal fluctuations in the world, frequently exceeding twenty feet, with tidal current velocities as fast as 8 knots (Sienkiewicz et al, 1992). Tidal flats are a dominant coastal feature along Cook Inlet, although marshes, rocky shores, sand and gravel beaches, and wave-cut platforms are also quite common.

Climate: The Cook Inlet area climate is generally transitional, having properties of both a maritime and a continental climate. As moisture-laden air masses from the Gulf of Alaska are lifted by the Kenai Mountains, condensation forms rain or snow. Most of the precipitation is deposited on the windward side and tops of the mountains. The Cook Inlet area receives an average of 24.81 inches of precipitation a year, with an annual average of 16 inches in Anchorage. Snow is likely from October through April. The driest period is typically April through June.

A 1995 Minerals Management Service report on the Cook Inlet area noted that, generally, an inland high-pressure cell characterizes winter with frequent storm progressions from the west along the Aleutian chain. During summer, low pressure develops over the inland area, with reduced storm passage. Summer and fall are characterized by a transition between these generalized patterns (MMS, 1995).

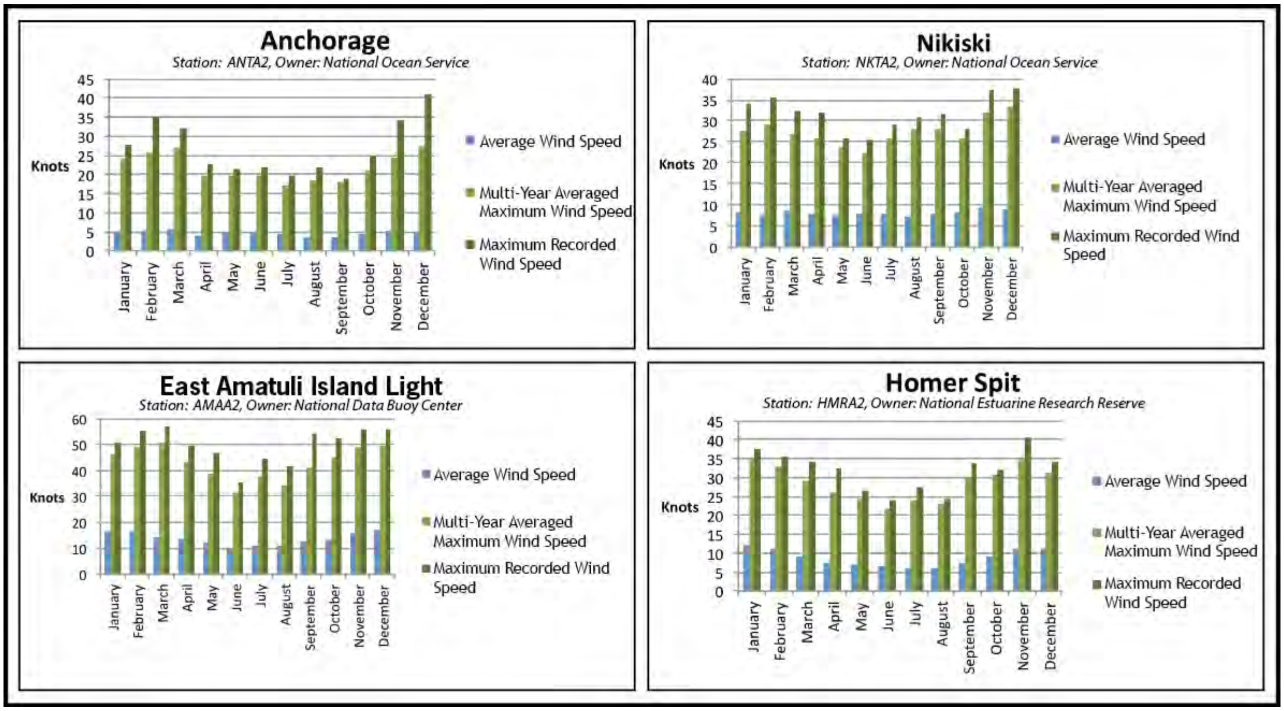
Air temperatures are generally mild for these latitudes and reflect the influence of the land and sea. Without the moderating effects of the Gulf of Alaska, air mass temperatures of the upper Cook Inlet Subarea are more extreme, as noted in a 1977 NOAA study. Occasionally during the winter months, this area will experience short periods of extreme cold and/or high winds when strong pressure gradients force cold air southward from interior Alaska. January is usually the coldest month, and temperatures in the continental location such as Anchorage and Kenai see temperatures below 0 F for 10 to 15 days that month. Temperatures warm noticeably starting in April.. Figure E-14 shows the maximum, minimum, and mean temperatures throughout the year for four locations around Cook Inlet: Anchorage, Nikiski, Flat Island Light (at the tip of the Kenai Peninsula), and East Amatuli Island Light (in the Barren Islands). The graphs are based on shore station data for 2007-2011.

Figure E-14
Temperatures at Four Locations around Cook Inlet (2007-2011 shore station data) (Nuka Research, 2013)



The prevailing winds in Cook Inlet are generally from the north and northeast during the fall, winter, and spring, with common speeds between 0 and 11 knots. Conversely, southerly winds are more frequent during the summer months (NOAA, 1977), with prevailing storm tracks from the southeast. Storms and williwaws (which blow down from the mountains) can cause gales, particularly in early winter. Figure E-15 summarizes the average and maximum wind speeds for four locations around Cook Inlet (Anchorage, Kenai, the Homer Spit, and East Amatuli Island Light in the Barren Islands) for each month.

Figure E-15
Wind Speeds at Four Locations around Cook Inlet (2007-2011 shore station data) (Nuka Research, 2013)



The surrounding mountains influence wind patterns. On the western side of Cook Inlet are the Alaska and Aleutian (Alaska Peninsula) Ranges; on the eastern side are the Talkeetna, Chugach, and Kenai Mountains. The strongest surface winds occur in the coastal area. Offshore winds average between 12 and 18 knots; the winds are slightly less onshore because of surface friction. Extremes of 50 to 75 knots are common in the winter and can exceed 100 knots when channeled. Channeling occurs when surface features constrict winds. For example, water may flow in a wide ocean channel at a speed of five knots. If the channel narrows, the speed of the current increases in order to carry an equal volume of water in an equal amount of time. Wind reacts the same way. Valleys or mountain passes form narrow channels.

Under conditions common in the coastal mountains of Southcentral Alaska, wind speed may double or triple in narrow mountain channels. Ships traveling in the Gulf of Alaska have reported narrow bands of extremely strong winds flowing out of the valleys perpendicular to the Chugach Mountains. The strong winds found in the Turnagain Arm and Matanuska Valley are also examples of channeled winds.

Geology: Sporadic periods of glacial advance and retreat have resulted in complex geologic strata and horizons in the Kenai lowland, the west side of Cook Inlet, Susitna Valley, and west Anchorage. Glaciers are responsible for many distinctive land features such as alpine troughs, scraped and scoured valley floors, and broad outwash plains. Drainage patterns and glaciers often follow faults, carving out valleys and exposing ancient layered plains. The complex mixture of gravel, sand, silt, and clay deposited by glaciers is called till. The most common glacial deposits found in the region are moraines that are composed of glacial till laid down in fairly regular, low, linear hills at the edges of glaciers.

The coastal lowlands from Point Possession to the head of Kachemak Bay, including Kenai, Soldotna, and Homer, generally include low rolling glacial moraines and depressions filled by lakes and muskeg. Many rivers and streams flow through this area. Soils range from gravely clay loam to gravely sand mantled with silty material and bands of volcanic ash.

On the west side of Cook Inlet the coastal lowlands between Tuxedni Bay and Granite Point consist of nearly level, poorly drained outwash plains deposited by large glaciers in the Aleutian Range and Chigmit Mountains. The outwash plains are braided with meandering and shifting stream channels. Most soils consist of sandy glacial outwash, silt, tidal sediments, and gravelly riverwash. The water table is high in most of this area with the exception of a few well-drained natural levees and ridges. North of Granite Point, soils and topography are similar to the coastal lowlands on the east side of Cook Inlet, with glacial moraines and depressions, pothole lakes, and soils formed from gravely clay, sand and silt.

Geologic Hazards: Cook Inlet is tectonically active, and prone to earthquakes, volcanic eruptions, and landslides. The largest historic earthquake in the area was the magnitude 9.2 Good Friday Earthquake in 1964. It is unlikely another earthquake like this will happen in the next 100 years – smaller but potentially equally damaging earthquakes from shallow faults are more likely. The Castle Mountain Fault generated its last large earthquake about 650 years ago, and on average produces an earthquake every 700 years. This fault is the largest known fault breaking the surface of the earth near Cook Inlet, and could produce violent shaking throughout Cook Inlet. Smaller faults, including those that created traps for oil in Cook Inlet, could also produce very destructive earthquakes. Loss of glacier ice may be increasing the risk of earthquakes on unknown faults near those glaciers, as the changing weight adds stress to faults that aren't very active.

Volcanic eruptions are a frequent occurrence along the shores of Cook Inlet. Mt. St. Augustine, Mt. Redoubt, and Mt. Spurr have all produced eruptions in the past few decades, each with ash fall-out in populated areas. In 1989 and 2009 eruptions on Mt. Redoubt caused mud flows that impacted the Drift River Facility. In the recent geologic past, these volcanoes have been prone to larger eruptions and mud slides than we have seen historically, and there is a chance similar very large eruptions could happen again. The Alaska Volcano Observatory monitors and studies the volcanoes on Cook Inlet, working to anticipate eruptions and provide advice about volcanic hazards.

Large landslides pose hazards in some areas of Cook Inlet. In the past few thousand years, the coastline of Cook Inlet has been impacted by at least three giant landslides, one resulting from failure of ancient rock layers near Chinitna Bay, one from collapse of high bluffs near Homer, and one from the collapse of a side of Redoubt Volcano during an eruption. More recently, earthquakes have triggered numerous smaller slides, at least one of which produced a damaging tsunami at the tip of the Homer Spit. Glacial retreat caused a large landslide at Grewingk Lake in 1967, which produced a tsunami nearly 200 feet tall in the lake, flattening forests for miles beyond. Landslides are a potential concern anywhere where there are very steep slopes, especially with loose sediment or weak rocks."

Oceanography:

Bathymetry: Cook Inlet is a semi-enclosed coastal body of water having a free connection to the open sea and within which the seawater collides with freshwater from land drainage. Cook Inlet channels, coves, flats, and marshes are nourished by the constant mixing of terrestrial source waters and marine waters of Shelikof Strait and the Gulf of Alaska (MMS, 1995).

The bottom of Cook Inlet is extremely rugged with deep pockets and shallow shoals. The depths in the upper inlet north of the Forelands are generally less than 120 feet, with the deepest portion located in Trading Bay, east of the mouth of the McArthur River. South of the Forelands, two channels extend southward on either side of Kalgin Island and join in an area west of Cape Ninilchik. South of the cape, this channel gradually deepens to approximately 480 feet and widens to extend across the mouth of Cook Inlet from Cape Douglas to Cape Elizabeth (KPB, 1990:1-4). The bottom of Cook Inlet consists predominately of cobbles, pebbles, and sand with minor proportions of silt and clay.

NOAA navigational charts indicate the depths in Cook Inlet range between 30 and 60 fathoms (180 and 360 feet) in the lower portion of the Inlet, between 20 and 30 fathoms (120 and 180 feet) in the middle section (between Anchor Point and the Forelands), and between 5 and 15 fathoms (30 and 90 feet) in the upper portion of the inlet. However, the charts also indicate the presence of reefs, mud flats, and shoals along the middle section of Cook Inlet, particularly around Kalgin Island and near Trading Bay.
b. Tides & Currents: Hydrographic surveys have indicated a net inflow of relatively clear, saline water from the Gulf of Alaska along the eastern side of the lower inlet, while relatively fresh, silt-laden water flows out the inlet on the west side.

Tides in Cook Inlet are semidiurnal, with two unequal high tides and two unequal low tides per tidal day (24 hours, 50 minutes). The mean diurnal tidal range varies from 18.7 feet at Homer to 29.6 feet at Anchorage. This high tidal range distinguishes Cook Inlet's coastal ecosystem from others in the Pacific Northwest. The mixing of incoming and outgoing tidewater, combined with freshwater inputs, is the main force driving surface circulation (MMS, 1995) (see Figure E-5). Strong tidal currents and inlet geometry produce considerable cross currents and turbulence within the water column. Tidal bores of up to 10 feet have occurred in Turnagain Arm. Bottom current speeds of 1.2 to 1.8 knots can be estimated from the formation of sand bottom waves in the mud flats. Current velocities are also influenced by local shore configuration, bottom contour, and, possibly, wind effects in some shallow areas. Maximum surface current speeds average about three knots in most of the inlet, but currents may exceed 6.5 knots in the Forelands area and speeds of up to 12 knots have been reported in the vicinity of Kalgin Island and Drift River.

There are many tidal rips in Cook Inlet, including three major ones that are persistently found east of Kalgin Island between Anchor Point and the Forelands. These major tide rips are known as the East Rip, the Mid-Channel Rip, and the West Rip (See Figure E-6). A tide rip, as defined by David Burbank in Environmental Studies of Kachemak Bay and Lower Cook Inlet (1977), is a frontal zone (separating different water masses) along which convergence of surface water occurs. Such convergence generally results in the more dense water mass flowing underneath the less dense, leaving floating debris behind at the surface and thereby producing the accumulations of debris found along the rips. These zones of convergence are also normally accompanied by considerable horizontal shear, manifested by sharply differing current velocities on either side of the frontal zone. The major rips (frontal zones) thus constitute natural tracers delineating the boundaries between differing surface currents.

Tide rips are significant features of Cook Inlet that can affect an oil spill response, since not only do they vary throughout a 24-hour period, but they extend from north of the Forelands to lower Cook Inlet (see Figures 5 through 8 below). In fact, the dominant rip, the Mid-Channel Rip, may extend as far south as Shelikof Strait. The Mid-Channel Rip, in the region south of Ninilchik, generally forms the dividing line between clear oceanic water in the eastern inlet and the relatively fresh, silt-laden water in the western inlet (Burbank, 1977). During flood tides, these rips strengthen, and debris is consolidated by the strong surface water convergence, especially along the major rips. Along the zone of the Mid-Channel Rip, a turbulent region of boiling water and large waves is produced. The intensity of the convergence is such that the roaring noise produced by the turbulence can be heard up to 1/4 nautical mile away. Fishing nets and logs are sometimes observed to be pulled under, surfacing again some distance away. During ebb tide, however, the energy is reduced, allowing for collected debris to be spread out as far as 1.5 nautical miles (3 km). The debris can be entrapped for days in this cycle.

Sediment and Salinity: Cook Inlet receives immense quantities of glacial sediment from the Knik, Matanuska, Susitna, Kenai, Beluga, McArthur, Drift, and other rivers. This sediment is redistributed by the intense tidal currents. Most of this sediment is deposited on the extensive tidal flats or is carried offshore through Shelikof Strait and eventually deposited in the Aleutian trench beyond Kodiak. Powered by the Alaska Coastal Current, sediments of the Copper River drainage drift into lower Cook Inlet and Shelikof Strait where they eventually settle to the bottom. Recent survey results of the MMS indicate that about half of the bottom sediments in Shelikof Strait are from the Copper River.

Longshore transport of sediment within Cook Inlet is generally up the inlet, although Kamishak, Tuxedni and Kachemak Bays are areas where this trend is reversed. Homer Spit, in fact, is maintained by longshore sediment transport from the north. Rain and snow events and glacial dam flooding also deposit significant amounts of sediment into Cook Inlet.

Salinity increases rapidly and almost uniformly down the inlet, from Point Possession to East and West Foreland. Slightly higher salinities are found on the east side. This rapid increase can be attributed to heavily loaded glacial runoff from the Matanuska, Susitna and Knik Rivers and subsequent sediment settling in upper Cook Inlet. Local areas of depressed salinity occur off the mouth of large glacially-fed streams, such as the Tuxedni, Kenai, and Kasilof Rivers.

Water Temperature and Ice Conditions: The water temperature in upper Cook Inlet varies with season from 32° to 59° F. The lower Cook Inlet is affected by the intrusion of warmer waters from the Gulf of Alaska; temperatures range from 42° to 50° F.

Sea ice is normally present in upper Cook Inlet from December through March, and occasionally from November to as late as April. During winter, 100 percent ice coverage may be found in some areas in upper Cook Inlet, and substantial amounts of ice may be present as far south as Kamishak Bay. (NOAA, 1977) While ice conditions can vary year-to-year, at least some ice is typically present around Cook Inlet between December and March. The greatest extent of sea ice coverage is likely to occur in the first half of March, according to the 2001 Marine Ice Atlas for Cook Inlet (Mulherin et al., 2001) The following figure shows the average extent of ice coverage during this time period. Heavy ice may also occur within Homer Harbor (Nuka Research, 2013).

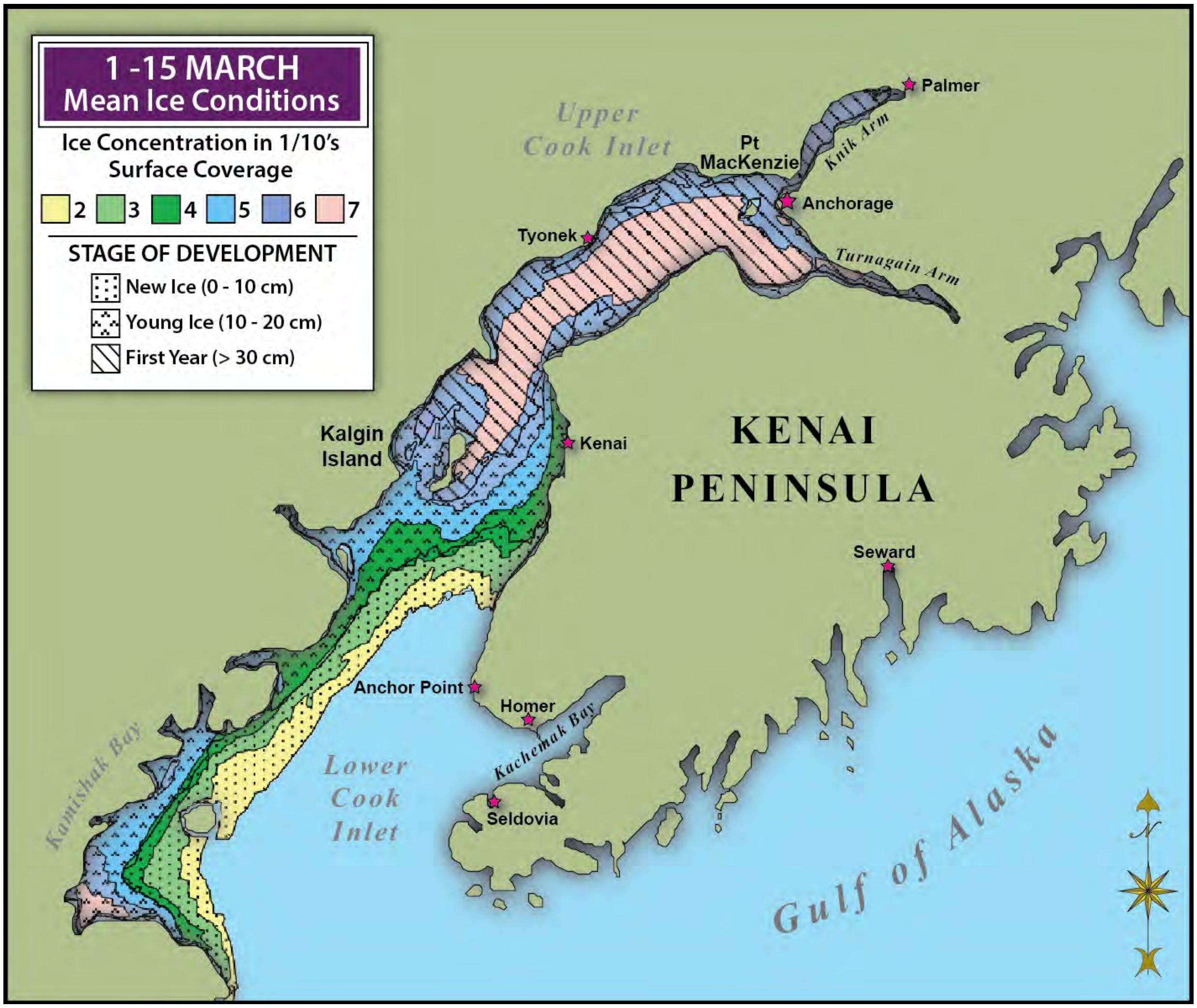
<u>Coastal Resources:</u> As with all areas within Alaska, the Cook Inlet region supports a wide range of wildlife. Depending upon the location within the region, many offshore areas support a highly productive marine ecosystem, rich with intertidal, benthic, and pelagic plant and animal life which supports extensive populations of marine and anadromous finfish, shellfish, seabirds, and marine mammals. An assortment of shorebirds and waterfowl utilize the resources of the region, either as permanent residents or for nesting, wintering, or staging/feeding sites along their migratory paths. During the period when the ocean, lakes and rivers are thawed, the inland and shoreline areas become a haven for migratory waterfowl and other birds.

The rivers, lakes and streams in the subarea provide aquatic habitats for resident and anadromous fish important to commercial fisheries, subsistence harvests, and recreational activities. These fish resources are also a critical food source for upland populations of brown and black bears. In addition to the bears, moose, caribou, wolves, mountain goats, and numerous smaller mammals populate upland areas.

These resident and migratory populations of fish and wildlife depend on the availability of appropriate habitat and environmental conditions in order to exist in the Cook Inlet Subarea. A healthy coastline and continued abundance of marine, intertidal, and upland food sources are vital to the survival of the animal inhabitants of the region, and extremely important to the social, economic, and cultural welfare of local human residents. For additional information on fish and wildlife diversity and abundance in the Cook Inlet Subarea, refer to the Sensitive Areas Section in this plan.

Several communities rely on marine mammals as a traditional food source, and these mammals are present in concentrated areas during certain times of the year. Additionally, some residents engage in a subsistence lifestyle and rely heavily on the availability of the resources in the area. Any spill of significance could devastate the subsistence food harvest and seriously threaten the normal means of existence for many residents. Long-term impacts to these food resources could have a disastrous effect on Native and subsistence lifestyles. The Sensitive Areas Section provides detailed information on the specific resources vulnerable to spills and the locations of these resources within the subarea.

Figure E-16
Average Extent of Sea Ice Coverage in Cook Inlet During the First Half of March (Mulherin et al., 2001)



The primary factor for ice formation in upper Cook Inlet is air temperature, while the major influences in lower Cook Inlet are the Alaska Coastal Current temperature and inflow rate. Cook Inlet ice often first forms in October and melts before ice of a more permanent nature forms in the latter half of November. All ice generally disappears in early April, but some occasionally persists into May. Ice occasionally drifts as far south as Anchor Point. Ice concentrations have been observed in Kamishak Bay extending outward to Augustine Island. Chinitna, Tuxedni and other western Cook Inlet bays may also have occasional ice cover.

Figure E-5
Cook Inlet – Surface Currents & General Rip Zones

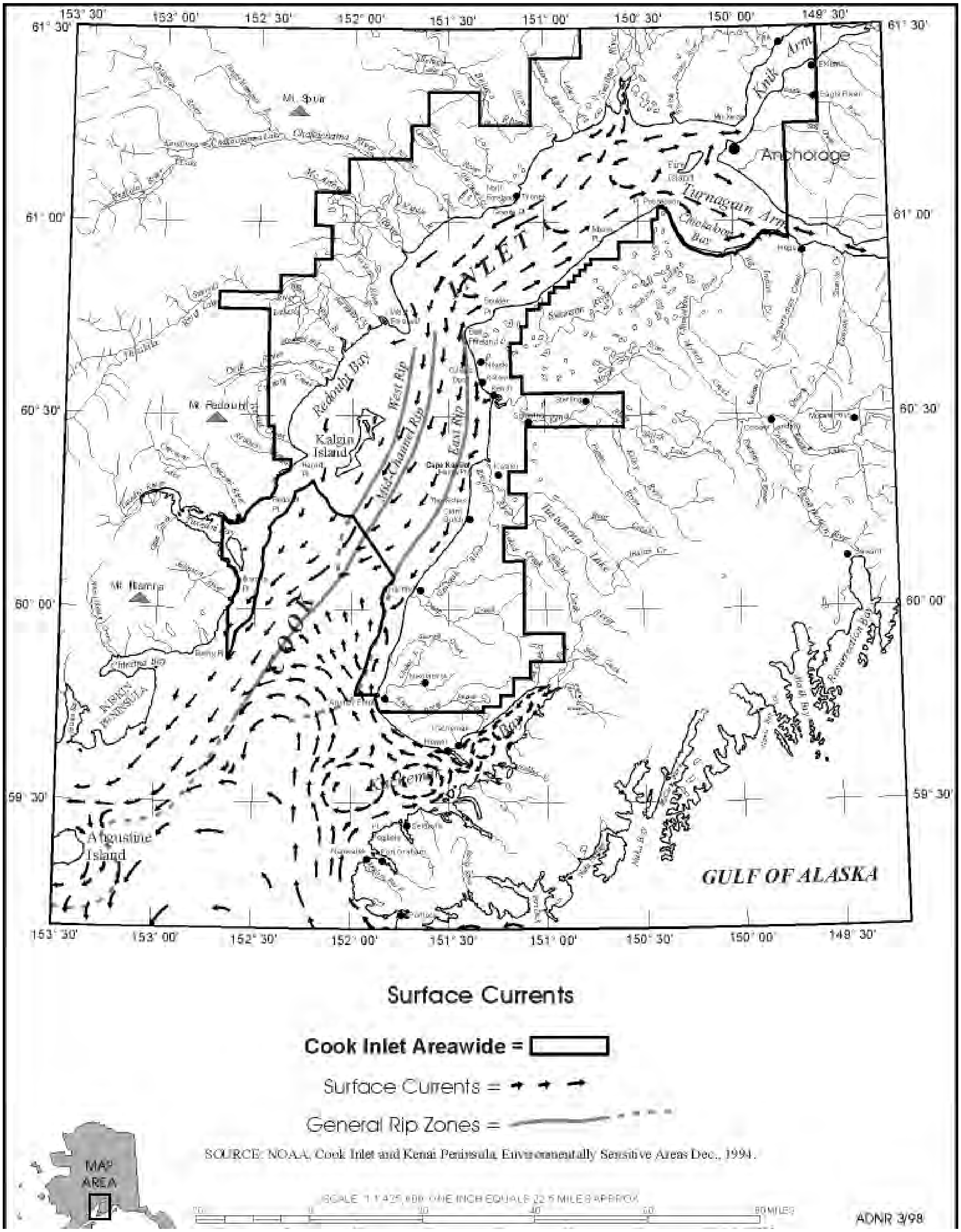


Figure E-6
Middle Cook Inlet Net Circulation & Convergence Zones
(Source: Whitney, J.W. "Proceedings: Cook Inlet Oceanography Workshop" OCS Study, Final Report, June 2000)

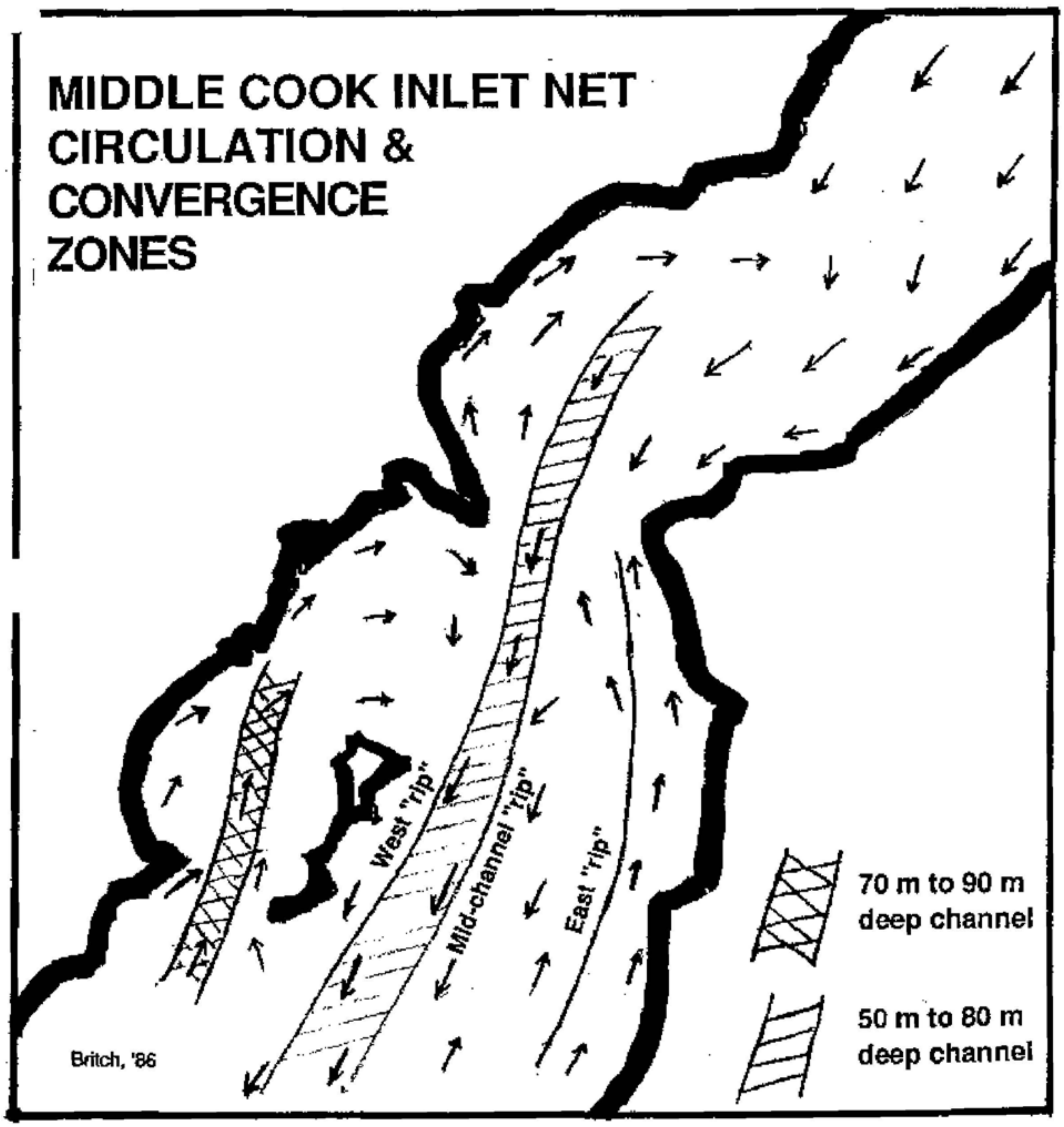


Figure E-7
Major Tide Rips (Flood and Ebb Tides) in Lower Cook Inlet
(Source: Whitney, J.W. "Proceedings: Cook Inlet Oceanography Workshop" OCS Study, Final Report, June 2000)

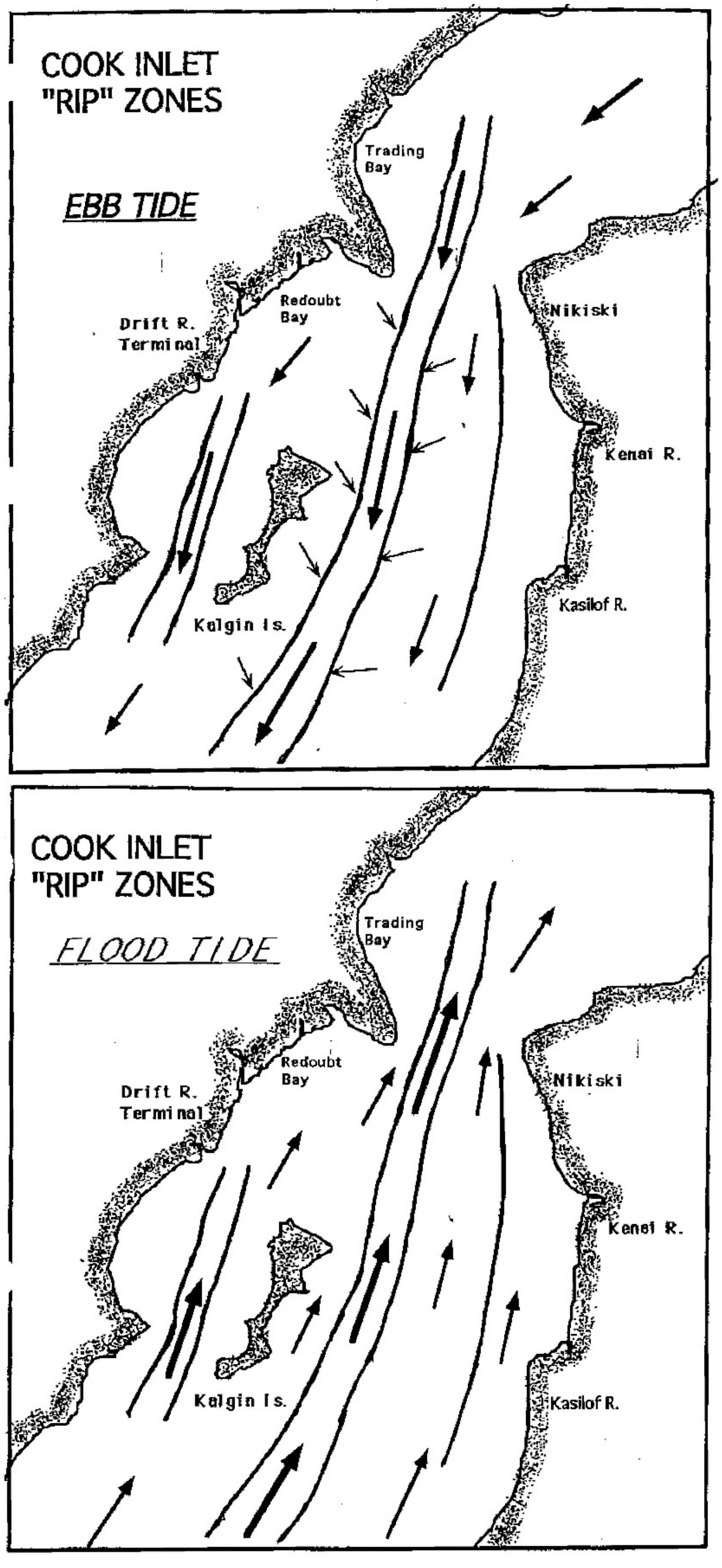
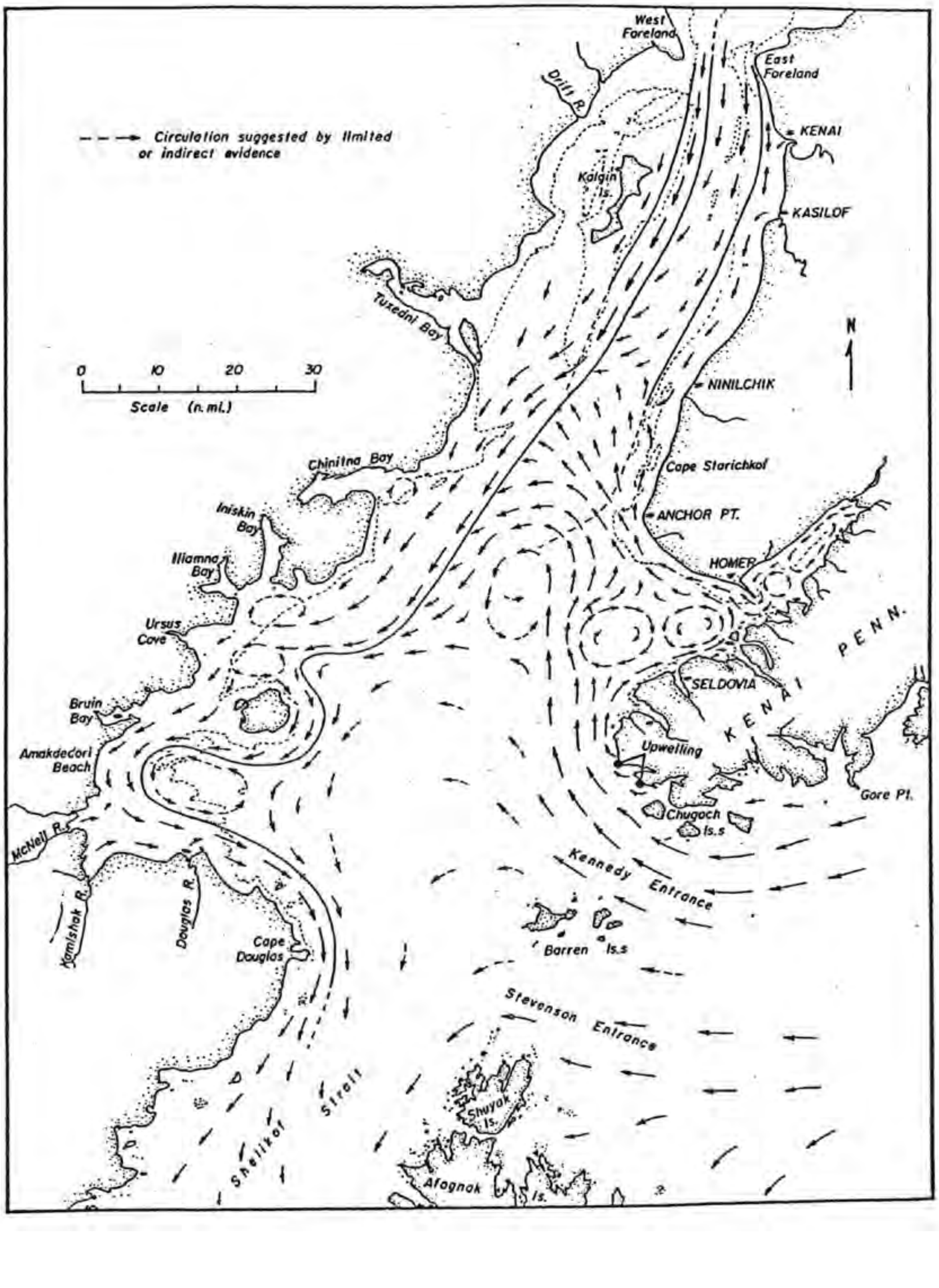


Figure E-8
Net Surface Circulation in lower Cook Inlet
(Based primarily on data collected during the spring and summer seasons. Burbank 1977)



a. Data Sources:

- Alaska Oceanographic Circulation Diagrams and Graphics
- Cape International. 2012. Cook Inlet Vessel Traffic Study. Cook Inlet Risk Assessment.
- Mulherin, N.D., W.B. Tucker, O.P. Smith, W.J. Lee. 2001. Marine Ice Atlas for Cook Inlet, Alaska. U.S. Army Engineer Research and Development Center and U.S. National Oceanic and Atmospheric Administration.
- The National Oceanic and Atmospheric Administration. 2014. Assessment of Marine Oil Spill Risk and Environmental Vulnerability for the State of Alaska.
- Nuka Research and Planning Group, LLC. 2013. Consequence Analysis. Cook Inlet Risk Assessment.
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BACKGROUND: PART FOUR - ABBREVIATIONS & ACRONYMS

AAC	Alaska Administrative Code
ACA	Area Command Authority
ACFT	Aircraft
ACP	Area Contingency Plan
ACS	Alaska Clean Seas (North Slope industry cooperative)
ADCCED	Alaska Department of Commerce, Community and Economic Development
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADMVA	Alaska Department of Military and Veterans Affairs
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation & Public Facilities, also as ADOTPF
AFB	Air Force Base
AIMS	Alaska Incident Management System Guide
AIR	Air Operations
AKNG	Alaska National Guard
ALCOM	Alaska Command
ALMR	Alaska Land Mobile Radio
AMHS	Alaska Marine Highway System (ADOT&PF)
ANCSA	Alaska Native Claims Settlement Act
ANS or ANSC	Alaska North Slope Crude oil
AOO	Alaska Operation Office (EPA)
AP	Associated Press
APSC	Alyeska Pipeline Service Company
ARRT	Alaska Regional Response Team
ATON	Aids to Navigation
AS	Alaska Statue, also Air Station (USAF)
ASAP	As soon as possible
AST	Alaska State Troopers
BBLS	Barrels
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BOA	Basic Ordering Agreement
BOEM	Bureau of Ocean Energy Management
BOPD	Barrels of Oil per Day
BSEE	Bureau of Safety and Environmental Enforcement
CAMEO	Computer-Aided Management of Emergency Operations
CAR	Central Alaska Region (ADEC)
CCGD 17	Commander, Coast Guard District 17
CEC	Community Emergency Coordinator
CEMP	Comprehensive Emergency Management Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CHEMTREC	Chemical Transportation Emergency Center
CISPRI	Cook Inlet Spill Prevention and Response Inc. (industry cooperative)
CMT	Crisis Management Team

COM	Communications equipment/capabilities
COMDTINST	Commandant Instruction (USCG)
COTP	Captain of the Port (USCG)
CP	Command Post
C-Plan	Contingency Plan
CTAG	Cultural Technical Advisory Group
CUL	Cultural Resources
CWA	Clean Water Act
DAA	Documentation/Administrative Assistance
DHS	United States Department of Homeland Security
DHSEM	Division of Homeland Security and Emergency Management (division under ADMVA)
DOC	United States Department of Commerce
DOD	United States Department of Defense
DOE	United States Department of Energy
DOI	United States Department of the Interior
DRAT	District Response Advisory Team (USCG)
DRG	District Response Group (USCG)
DWT	Dead weight tonnage
ECRT	Emergency Communications Response Team (ADMVA)
EEZ	Exclusive Economic Zone
EMS	Emergency Medical Services
ENV	Environmental Unit
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act of 1986
ESA	Environmentally Sensitive Area
ESI	Environmental Sensitivity Index
ETS	Emergency Towing System
F/V	Fishing Vessel
FAA	Federal Aviation Administration
FDA	Food and Drug Administration
FIN	Finance
FIR	Fire Protection/fire fighting
FLIP	Flight Information Publication
FOG	Field Operations Guide
FOSC	Federal On-Scene Coordinator
FPN	Federal Pollution Number
FRP	Facility Response Plan
FWPCA	Federal Water Pollution Control Act
GIS	Geographic Information System
GRS	Geographic Response Strategies
GSA	General Services Administration
HAZMAT	Hazardous Materials
HAZWOPER	Hazardous Waste Operations and Emergency Response
HQ	Headquarters
IAP	Incident Action Plan
IC	Incident Commander

ICP	Incident Command Post
ICS	Incident Command System
IDLH	Immediate Danger to Life and Health
IMH	Incident Management Handbook (USCG)
IMT	Incident Management Team
INMARSAT	International Maritime Satellite Organization
JPO	Joint Pipeline Office
LAT	Latitude
LEG	Legal
LEPC	Local Emergency Planning Committee
LEPD	Local Emergency Planning District
LERP	Local Emergency Response Plan
LNG	Liquefied Natural Gas
LO	Liaison Officer
LONG	Longitude
LOSC	Local On-Scene Coordinator
LRRS	Long Range Radar Station
M/V	Motor Vessel
MAC	Multiagency Coordination Committee
MAP	Mapping
MAR CH	Marine Channel
MED	Medical Support/Health Care
MESA	Most Environmentally Sensitive Area
MLC	Maintenance and Logistics Command (USCG Pacific Area)
MLT	Municipal Lands Trustee Program
MMPD	Maximum Most Probable Discharge
MOA	Memoranda of Agreement
MOU	Memoranda of Understanding
MSD	Marine Safety Detachment (USCG)
MSO	Marine Safety Office (USCG)
MSRC	Marine Spill Response Corp. (national industry cooperative)
NAR	Northern Alaska Region (ADEC)
NAVSUPSALV	U.S. Navy Superintendent of Salvage
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NIMS	National Incident Management System
NIIMS	National Interagency Incident Management System
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOTAMS	Notice to All Mariners; also, Notice to Airmen
NPDES	National Pollution Discharge Elimination System
NPFC	National Pollution Fund Center
NPS	National Park Service
NRC	National Response Center
NRT	National Response Team
NRDA	(Federal/State) Natural Resource Damage Assessment
NSF	National Strike Force

NSFCC	National Strike Force Coordinating Center
NWR	NOAA Weather Radio; also National Wildlife Refuge (USFWS)
NWS	National Weather Service
OHMSETT	Oil and Hazardous Material Simulated Environment Test Tank
OOD	Duty Officer or Officer On Duty
OPA 90	Oil Pollution Act of 1990
OPCEN	Operations Center
OPS	General Response Operations
OSC	On-Scene Coordinator
OSHA	Occupational Health and Safety Administration
OSLTF	Oil Spill Liability Trust Fund
OSRO	Oil Spill Response Office
O/S	On-Scene
PERP	Prevention and Emergency Response Program (ADEC)
PIAT	Public Information Assist Team
PIO	Public Information Officer
PLN	General Planning Operations
POLREP	Pollution Report (USCG)
PPE	Personal Protective Equipment
PPOR	Potential Places of Refuge
PPP	Seafood Processor Protection Plans
RAC	Response Action Contractor
RCC	Rescue Coordination Center
RCAC	Regional Citizens Advisory Council
RCRA	Resource Conservation and Recovery Act of 1978
RMAC	Regional Multi-Agency Coordination Committee
RP	Responsible Party
RPOSC	Responsible Party On-Scene Coordinator
RPD	Recovery, Protection and Decontamination
RQ	Reportable Quantity
RRT	Regional Response Team
RSC	Regional Stakeholder Committee
RV	Recreation Vehicle
SAR	Search and Rescue
SART	Southeast Alaska Response Team (ADEC)
SCAT	Shoreline Cleanup Assessment Teams
SCBA	Self-Contained Breathing Apparatus
SCP	Subarea Contingency Plan
SDS	Safety Data Sheet
SEAPRO	Southeast Alaska Petroleum Resource Organization Inc.
SEC	Security
SHPO	State Historic Preservation Officer (ADNR)
SERVS	Ship Escort Response Vessel Service (Alyeska)
SITREP	Situation Report (ADEC)
SONS	Spill of National Significance
SOSC	State-On Scene Coordinator
SPAR	Spill Prevention and Response Division
SSC	Scientific Support Coordinator (NOAA)

STORMS	Standard Oil Spill Response Management System
T/V	Tank Vessel
TA	Trajectory Analysis
TAPS	Trans Alaska Pipeline System
TPO	Tribal Police Officer
UC	Unified Command
USAF	United States Air Force
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VIRS	Visual Information Response System
VOSS	Vessel of Opportunity Skimming System
VPO	Village Police Officer
VSPO	Village Public Safety Officer
VTS	Vessel Traffic Separation System/Scheme
WCD	Worst Case Discharge
WRR	Wildlife Protection/Care/Rehabilitation/Recovery
WX	Weather