

Alaska Coastal Marine Weather Observation Network

NOAA
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Coastal Marine Weather Observing System at East Amatuli Island, AK

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**National Oceanic and Atmospheric Administration
National Weather Service, Alaska Region**

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Title - Alaska Coastal Marine Weather Observation Network

Section 1 - Statement of Need or Deficiency - A coastal marine weather observation network is needed to establish a baseline information infrastructure to provide better weather data for the Alaskan coastline. The basis for locating new marine weather observing systems is (a) the contribution to the protection of life and property and (b) to provide real-time access to the observations for individual decision making among the recreational and commercial marine community.

The availability of coastal weather information is inadequate to non-existent across most of the Alaskan coastline. There are currently only nine coastal marine automated observing systems (C-MAN) in Alaska. Most are located either along Cook Inlet, which is the main shipping channel into Anchorage, or in Prince William Sound along the oil tanker transit path. There is one station in Southeast Alaska at Five Finger Lighthouse.

Specifically, the requirement for a new coastal marine observation network in Alaska is based on the following issues:

1. The climate record shows that Alaska is warming far more quickly than the "lower 49" states. Alaska climate patterns are dictated by latitude, surrounding oceans, physical relief, and the interaction of these with the global circulation. Climate change in Alaska is driven by the combined affects of interannual/decadal variations (El Nino/Southern Oscillation, Pacific Decadal Oscillation, and Arctic Oscillation) and exhibits a long term "global warming" signal. Temperature and precipitation data from these proposed coastal stations will help to better analyze and correlate these interannual/decadal cycles with trends in national and global climate change.
2. The local impacts of changes in the global and national climate are considerable in Alaska, especially along the coastlines. The greatly reduced season of shore fast ice is resulting in increased coastal erosion. Over the past few years, several communities have lost hundreds of feet of shoreline protection due to the winter storm surges. Routine marine weather observations are required to initialize the forecast and warning process by providing real time ground truth and verification of our forecast and warning services.
3. Demands on Alaska mariners to increase fisheries production is resulting in their need to operate in marginal to high risk weather conditions. The NWS implementation of the Integrated Forecast Preparation System (IFPS) will allow forecasters to provide high resolution forecast and warning graphics to support better risk management decisions by Alaska mariners. However, without the proposed coastal observation network, the warnings

will lack the specific details necessary to support mariner decisions. The data is required to both initialize the forecast grids and to verify the quality of the forecasts.

4. Over the past three decades some of our federal partners, including the Coast Guard, have been forced to reduce their presence at several coastal locations. This has resulted in a reduction of their agency cooperative program of providing weather information from those locations. This initiative will re-instate a regular weather observation program at those coastal locations, in support of the above requirements.

Section 2- Proposal Summary - The Alaska Coastal Marine Network consists of 36* automated observation platforms that provide real time observations of wind speed and direction, temperature and dew point temperature or humidity and atmospheric pressure. The total initiative cost is \$10.2M** with an anticipated 4-year deployment schedule.

Section 3 – Summary of Updates from 2003 Proposal - In 2003, the Alaska Coastal Marine Observation Network proposal consisted of 38 automated observational platforms. Due to the deployment of NDBC buoys and installation of FAA observations and regionally supported NWS equipment, the Alaska Region has reduced the requirement to 36 platforms and modified the prioritization schedule.

Cost projections outlined in Section 5 include a 5% inflation increase to each fiscal year of the implementation schedule. This changes the 2003 total projected cost of \$9.79M to \$10.2M.

Section 4 - Performance Measure Targets - The NWS has established GPRA goals for marine forecast performance through FY09. The basis for these goals was a desired 20% improvement in wind and wave forecasts over 10 years beginning in 2002. In keeping with that vision, performance goals through FY10 may be extrapolated (below).

The Alaska Region participates in the National Marine Verification Program, but the number of Alaska stations included in the database is minimal, mainly due to the lack of available observations. Given the comparatively small number of data points and the short sampling period (less than 2 years for some data points), we are not yet able to derive meaningful trends in marine performance measures for Alaska. However, the implementation of the Alaska Coastal Marine Network would create the necessary baseline infrastructure to expand the marine verification program and provide the data needed for comprehensive performance analysis and improvement over time. The table below shows a comparison between the National goals and verification scores in Alaska. It is possible that Alaska Region goals could be elevated substantially with more data available.

Marine Forecasts	Actual			Goals				
	2003	2004	2005	2006	2007	2008	2009	2010
Wind Speed Accuracy (%)								
National	.57*	.58*	.57*	.56	.57	.58	.58	.59
Alaska	.44	.49*	.49*	.45	.46	.47	.48	.49

* The performance averages came in considerably higher than expected. This is partially due to an increase in maritime observations from 2003-2005, however fluctuations in annual performance are expected due to variations in climate and other environmental and operational factors. It is unknown at this time if this positive trend is sustainable.

Section 5 - Implementation Concept - Coastal marine observing station location criteria are subdivided into three categories: (1) value to climatological services, (2) value to NWS weather forecast and warning services, and (3) value to commercial shipping, commercial fishing, and recreation activities. The total possible value is 100, which is the sum of the three categories.

Climate Value maximum 30

The **climate** value number is based upon the relevance of the proposed location to the NOAA Climate Reference Network (CRN) and its importance in monitoring global climate change.

Importance to climate monitoring = 0 - 15

Relevance to NOAA CRN Program = 0 - 15

Weather Forecasting Value maximum 30

The weather forecasting value number includes (1) the **density** of the marine observation network, which considers NWS forecast verification, and (2) the impact of a proposed observation site in assessing the **meteorological information** needed for forecast and warning operations.

Distance to next marine observation and value to verification program		Impact on Meteorology	
100 nm or greater and no marine ob in the forecast zone	15	High	15
50-100 nm and/or no marine ob in the forecast zone	12	Medium	10
20-50 nm and/or only one other marine ob in the forecast zone	8	Low	5

Distance to next marine observation and value to verification program		Impact on Meteorology	
<20 nm and/or two or more marine obs in the forecast zone	3	-	-

Marine Use/Customer..... Value maximum 40

This number includes (1) the value of a proposed location relative to **marine use** and (2) **customer feedback** from the marine community. The marine use value number is based upon the level of vessel activity with regard to commercial **fishing, shipping, and recreation** over the past five years. Maps of shipping routes, the number of commercial fisheries in an area, and information about recreation and tourism were used to define those activity areas. The closer an active area is to a proposed observation location, the higher the number. Recreation includes non-commercial fishing and tour boats.

The customer value number is based upon interviews with commercial shipping and fishing organizations over the past five years from conferences, boat shows, expositions, and in-person discussions. The more frequent the concurrence with a location, the higher the number.

Fishing = 0 - 10
Shipping = 0 - 10
Recreation = 0 - 10
Customer = 0 - 10

Section 6 - Schedule/Cost - Prioritization of the proposed observation locations has been accomplished following the guidelines described above. An implementation schedule would be based upon these priorities in coordination with the agencies involved in the building and deployment of the equipment, namely the National Data Buoy Center and the U.S. Coast Guard. The complete prioritized list can be provided on request.

The funding profile accounts for a phased implementation over 4 years and includes O&M. Some level of support commercial transportation will likely be needed for equipment installations in the most remote locations. These anticipated costs are also included in the schedule.

FY07 – 1.79M
FY07 – 2.82M
FY08 – 3.48M
FY10 – 2.11M
Total – 10.2M

Proposed Coastal Marine Observation Locations							
Priority	Location/ Landmark	Latitude (decimal)	Longitude (decimal) in degrees W unless otherwise indicated	Criteria			
				<u>Forecast</u> Obs Density Meteorology	<u>Climate</u> Importance CRN	<u>Marine Use</u> Fishing Shipping Recreation Customer	Total
1	Yasha Island/ Point Gardner	56.9	134.55	D-12 M-15	I-12 R-15	F-10 S-8 R-7 C-10	89
2	Lincoln Rock Light (vice Caamano Pt.)	56.057	132.696	D-12 M-15	I-12 R-15	F-10 S-5 R-10 C-10	89
3	Diomedes	65.737	168.942	D-15 M-15	I-15 R-15	F-10 S-3 R-2 C-10	85
4	Strait Island/ Sumner Island	56.395/ 56.406	133.706/ 133.803	D-12 M-14	I-15 R-12	F-10 S-3 R-8 C-10	84
5	Ugak Island	57.39	152.29	D-8 M-15	I-12 R-15	F-10 S-10 R-5 C-8	83
6	Glacier Bay	58.761	136.349	D-12 M-15	I-12 R-15	F-10 S-0 R-8 C-10	82
							PKZ033
							PKZ036
							PKZ220
							PKZ035
							PKZ132
							PKZ011

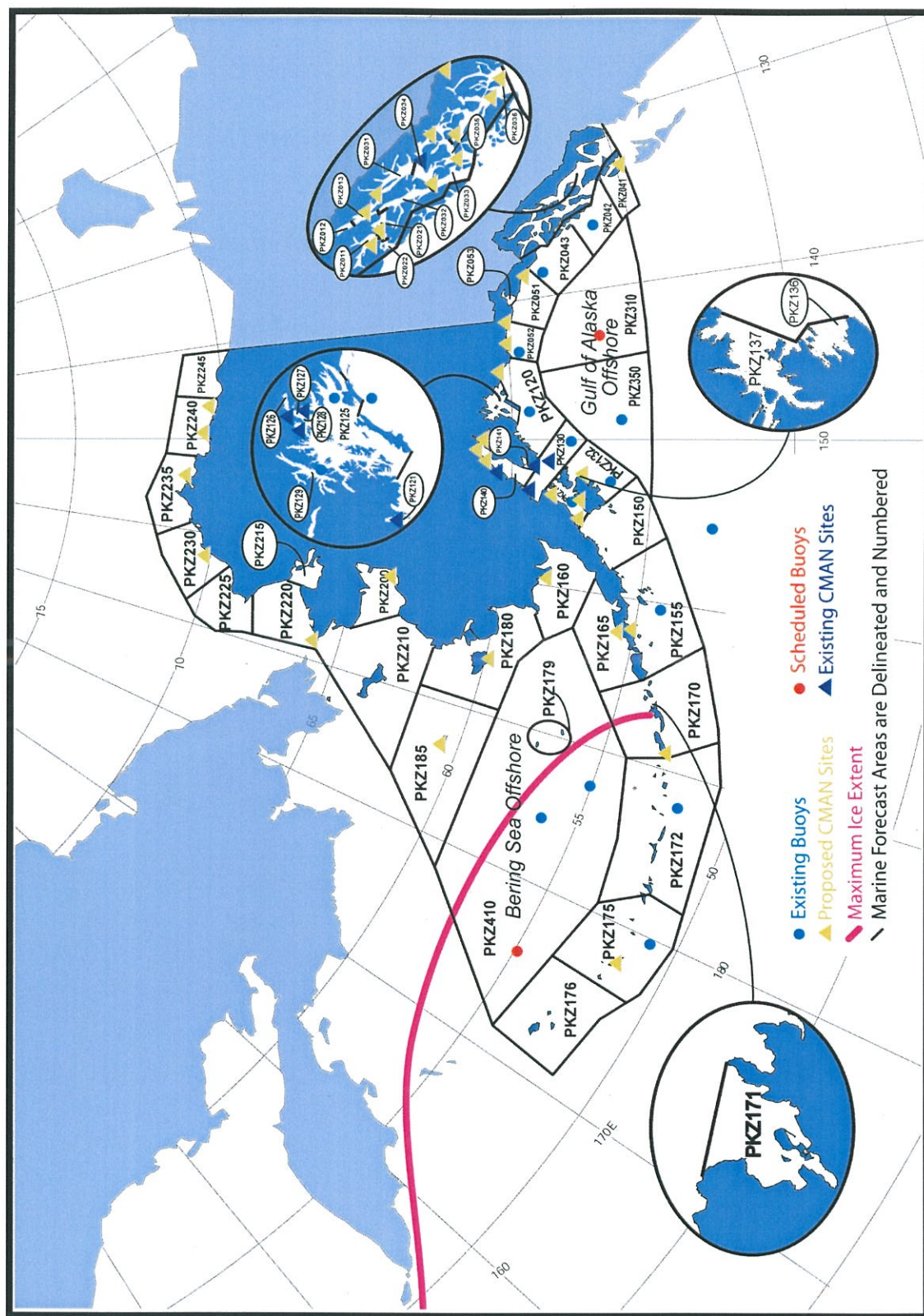
7	St. Matthew Island	60.56	173.04	D-15 M-15	I-15 R-15	F-10 S-3 R-0 C-8	81	PKZ185
8	Cape Muzon/Cape Chacon	54.668	132.689	D-8M-14	I-12R-15	F-10S-8R- 5C-9	81	PKZ041
9	Point Carolus/ Icy Strait	58.30	136.05	D-12 M-14	I-10 R-15	F-10 S-5 R-7 C-8	81	PKZ021
10	Karluk	57.64	154.35	D-3 M-15	I-15 R-15	F-10 S-8 R-5 C-8	81	PKZ138
11	Kalgin Island	60.34	152.08	D-3 M-15	I-15 R-15	F-10 S-10 R-3 C-10	81	PKZ140
12	Copper River Delta	60.44	145.03	D-3 M-15	I-12 R-15	F-10 S-10 R-5 C-10	80	PKZ120
13	Guard Island	55.445	131.873	D-8 M-14	I-12 R-12	F-10 S-5 R-8 C-10	79	PKZ036
14	Cape Yakataga	60.066	142.431	D-8 M-15	I-15 R-15	F-5 S-8 R-3 C-10	79	PKZ052
15	Point Arden/ Grand Island	58.096	134.096	D-8 M-13	I-15 R-15	F-10 S-5 R-7 C-10	78	PKZ031

16	Dry Bay	59.11	138.51	D-12 M-13	I-15 R-15	F-5 S-8 R-2 C-8	78	PKZ051
17	Amchitka	51.33	179.50(E)	D-8M-15	I-15R-15	F-10S-10R- OC-5	78	PKZ175
18	Tree Point/ Mary Island	54.803/ 55.078	130.930/ 131.211	D-8 M-13	I-12 R-15	F-10 S-5 R-5 C-9	77	PKZ036
19	Wide Bay	57.39	156.24	D-8 M-15	I-12 R-15	F-10 S-10 R-2 C-7	77	PKZ150
20	Icy Cape	70.33	161.87	D-15 M-15	I-15 R-15	F-0 S-3 R-3 C-10	76	PKZ230
21	Ralston Island/ Naked Island/ Sentinel Island	58.56	135.037	D-8 M-13	I-12 R-12	F-10 S-3 R-8 C-10	76	PKZ013
22	Pitt Point	70.924	153.134	D-15 M-15	I-15 R-15	F-0 S-3 R-3 C-10	76	PKZ235
23	Bullen	70.177	146.854	D-15 M-15	I-15 R-15	F-0 S-2 R-3 C-10	75	PKZ240

24	Icy Cape/ Icy Bay	59.946	141.70	D-8 M-13	I-15 R-15	F-5 S-8 R-2 C-9	75	PKZ051
25	Cape Atushagvik	58.09	154.32	D-8 M-15	I-12 R-15	F-10 S-5 R-2 C-7	74	PKZ138
26	Cape Constantine	58.39	158.89	D-15M-10	I-12R-15	F-10S-3R- 2C-7	74	PKZ160
27	Nikolski	52.86	169.04	D-3 M-15	I-15 R-15	F-10 S-8 R-2 C-5	73	PKZ170
28	Deer Passage	54.96	162.43	D-3 M-15	I-12 R-15	F-10 S-10 R-2 C-5	72	PKZ155
29	St. Michael	63.48	162.039	D-3 M-15	I-15 R-15	F-10 S-3 R-3 C-7	71	PKZ200
30	Cape Mendenhall/ Nunivak Island	59.76	166.16	D-12 M-10	I-15 R-12	F-10 S-3 R-3 C-6	71	PKZ180
31	Beechey Point	70.483	149.15	D-15 M-15	I-15 R-15	F-0 S-2 R-2 C-5	69	PKZ240
32	Blaquiere Point	56.584	132.542	D-3 M-14	I-12 R-12	F-10 S-0 R-7 C-10	68	PKZ035

33	Lieskof Cape	56.00	161.20	D-8 M-10	I-15 R-15	F-10 S-3 R-0 C-6	67	PKZ165
34	Tyonek	61.16	151.67	D-3 M-10	I-10 R-15	F-10 S-10 R-3 C-6	67	PKZ140
35	Hyder	55.917	130.025	D-15M-12	I-12R-15	F-0S-0R- 5C-7	66	N/A
36	Fire Island	61.13	150.28	D-3 M-10	I-10 R-10	F-10 S-10 R-3 C-5	61	PKZ140

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