

Overview of Vessel Monitoring System Discussion Paper April 2012

I. Introduction

Since 2000, the Council has been extending requirements for Vessel Monitoring System (VMS) coverage to new categories of commercial fishing vessels, in order to enforce new regulations primarily pertaining to Steller sea protection measures and protection measures for EFH and HAPC. In October 2011, the Council approved a motion to initiate a discussion paper to review the use of and requirements for VMS in the North Pacific fisheries and other regions of the U.S. The Council stated that while there is uncertainty regarding whether a major change to or expansion of VMS requirements is necessary in the North Pacific, there is interest in reviewing the current state of the North Pacific VMS requirements in addition to other regions' application of VMS. The Council also specified that the Council's IFQ Implementation Committee should review the paper and provide recommendations prior to Council review. Per the Council, the intent of the committee review is to provide depth to the discussion paper, specifically on implementation issues associated with the potential for VMS requirements in the halibut and sablefish IFQ fisheries. In December 2011, the Council recommended that Council review of the discussion paper be scheduled for the April 2012 meeting. The discussion paper includes a description of VMS and its benefits, a review of existing VMS requirements in the North Pacific, a summary of the most recent 2007 Council action related to expanding VMS requirements, a summary of VMS coverage in the North Pacific, cost estimates for VMS, and a review of VMS applications in other regions.

II. Description of VMS

VMS in Alaska is a relatively simple system involving a tamperproof VMS unit, set to report a vessel identification and location at fixed 30-minute intervals to the NOAA Fisheries Office of Law Enforcement (OLE). Some of these units allow NOAA OLE to communicate with the unit and modify the reporting frequency. The Alaska system is relatively simple, because it doesn't require the range of functions that are required for VMS in some other regions of the United States. Moreover, the Alaska system doesn't require the VMS unit to report on the status of other vessel sensors (in addition to the GPS units).

VMS units on a vessel have the following components:

- A power source and power cabling
- A GPS antenna to pick up satellite signals
- The VMS itself – a box about the size of a car radio containing a GPS and VHF radio
- A VHF antenna to transmit the report to a satellite
- A battery
- Cabling between the VMS and both antennas

Some people with VMS units add optional equipment by connecting an onboard computer to the VMS unit. This can significantly enhance communications, and the potential for onboard use of information collected by the VMS. It is, however, not needed to comply with Alaska's VMS standard.

Fishing firms must use VMS units supplied by vendors approved by NOAA OLE. Approval is required to ensure integration of privately supplied VMS units and NOAA OLE data processing capabilities. VMS

transceiver units approved by NMFS are referred to as type-approved models. A list of approved VMS units is available from the NOAA OLE (website at http://www.nmfs.noaa.gov/ole/ak_faqs.html) and is also provided in Appendix 2 along with the cost of the units.

VMS units transmit position information to a communications satellite. From the communications satellite, the vessel's position is transmitted to a land-earth station operated by a communications service company. From the land-earth station, the position is transmitted to the communications service company, which in turn transmits the data to the NOAA OLE processing center. At the center, the information is validated and analyzed before being disseminated for surveillance, enforcement purposes, and fisheries management.

From the VMS data server, the rate at which VMS units send signals can be remotely programmed or altered. Units in Alaska are programmed to report every half hour but can be reprogrammed in response to pre-defined criteria. For example, a vessel can be monitored more frequently. Obviously, more frequent reports mean more data and therefore a more accurate picture of the vessel's activity. NOAA OLE may sometimes program a VMS to report a vessel's position more frequently, for example, if it appears to be operating near a no-transit or no-fishing zone.

Position data is received and stored by NMFS. This data is also sent out to field offices for analysis of vessel activity. VMS is reviewed and analyzed daily, using a range of manual and automated checks. These checks identify such anomalies as vessels failing to send VMS signals or entering closed waters. Manual checks are completed by an operator monitoring the vessel movements on a computer screen. The operator examines vessel tracks, which are overlaid on digitized maps. Automated checks are run at various times over a 24-hour period. They detect instances of possible non-compliance and highlight them for later follow-up by VMS personnel. When an instance of non-compliance is detected, it is referred to field agents or officers for follow-up after assuring all components are functioning properly.

Access to VMS data is gained through a secure, web-based system and viewable on a color chart on a computer monitor. NOAA OLE Special Agents and Enforcement Officers can monitor vessel activity from their computers. In Alaska, there are also two Enforcement Technicians who are tasked with monitoring vessel activity using VMS. In-season managers in the NMFS Alaska Region Sustainable Fisheries Division and U.S. Coast Guard also have access to the VMS data. Information collected under a VMS program is considered confidential and is subject to the confidentiality protection of Section 402 of the Magnuson Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

III. Benefits of VMS

Benefits of VMS coverage fall into five categories: (1) enforcement, (2) in-season management, (3) safety, (4) scientific benefits, and (5) other benefits.

VMS can make it possible to leverage existing enforcement efforts. Knowledge about the location of the fleet can make it easier for the law enforcement personnel to enforce a wide range of fishery regulations. Given the increasing complexity of regulations and the need to add special management zones/closed areas, coupled with limited-access permits allowing vessels to fish in certain areas, VMS has become an important tool for enforcement personnel for monitoring vessel compliance with regulations. VMS can also play an important role in monitoring compliance with no-transit zones and no-fishing zones. VMS can help deter smuggling and misreporting of the type of quota share harvested in rationalized fisheries.

VMS is used intensively by in-season managers to determine when to open and close fisheries. VMS provides in-season managers with useful information about the levels of effort active in particular areas at particular times. This has become very useful for gauging how much longer a given TAC will last, and

therefore, how much longer a given fishery may be kept open without either exceeding the TAC, or leaving fish unharvested. Managers can also use VMS information to help determine locations of high incidental catch of prohibited species catch (PSC) and groundfish to inform the fleet where high incidental catch is occurring so the fleets can adjust fishing behavior to reduce incidental catch. Inseason managers also use VMS to assign catch to smaller spatial areas in the NMFS Catch Accounting system and to quality check spatial information reported on fish tickets.

VMS provides a valuable tool for search and rescue efforts in the event of a vessel in distress. While non-reporting of a VMS unit is not an indication of distress, should a search and rescue (SAR) coordinator be made aware of a distress situation, whether by activation of a vessel's EPIRB, a May Day call, or other established method of signaling distress, the SAR controllers can then use VMS to determine the vessel's last known position, and the time of that last position. Often times this will greatly reduce the search area and increase the speed of response as surface and aviation assets can head directly to that last known position without waiting for time-consuming analysis to determine the size of the search area.

A comprehensive use of VMS in Alaska could also be of considerable utility to NMFS and the Council in evaluating the coverage obtained through the restructured observer program. In short, VMS provides tracklines of the activity of fishing vessels polled on some established schedule. Observers, in turn, collect the start and stop locations of all fishing activity when they are on board a vessel. VMS, when available, is currently used to validate the fishing positions provided by observers as a quality control check. In addition, and more importantly, the fishing positions obtained from observed boats can be compared with a comprehensive set of VMS tracklines to evaluate coverage in relation to overall fleet activity. Thus, the spatial and temporal distribution of observer coverage could be evaluated, and gaps in coverage readily identified. This would aid the tuning of observer coverage rates to better meet the information needs of NMFS and the Council.

Finally, spatial data on fishing and the environment is very important for scientific research into the fishery and environmental, social, and economic impacts of fishing related to changes in fishery regulations. Fish stocks, habitat, ecosystem impacts, and social and economic patterns of fishing activity have important spatial dimensions. VMS information is a useful supplement to self-reported spatial information, and to observer reports.

Scientists and economists at NOAA Fisheries Alaska Fisheries Science Center have utilized VMS data for a variety of purposes. The following are example of work that has been done, or is ongoing, utilizing VMS data as ASFC:

- VMS data (total numbers of vessel pings per square area) as a surrogate variable for total fishing effort, in order to examine the spatial and temporal distribution of fishing effort from different gear types in the Bering Sea. These data were used as a supplemental input to modeling Pacific cod tagging data (Liz Conners, per comm.)
- VMS data was used to more precisely identify the fishing tracks of commercial fishing boats. These data, combined with acoustic data collected opportunistically from the pollock fleet, has provided data to study the potential effects of commercial fishing on pollock aggregation dynamics (Steve Barbeaux, per comm.).
- VMS data as part of the Bering Sea Integrated Ecosystem Research Program to assist in identifying when catcher-processor fishing trips start and end from the time period 2003 through 2007 when clear trip-level records are not available (Alan Haynie, pers. Comm.).
- VMS data has also been utilized to look at fishing distribution on a small scale (Craig Rose, pers. Comm.).

To the degree that VMS data can be utilized to identify whether or not fishing is occurring, VMS data can potentially provide a complement to other sources of data about effort in different fisheries and where that effort is occurring.

IV. Previous Council action on this issue

Since 2000, the Secretary of Commerce has introduced VMS requirements or options in connection with several management actions as noted in Table 1. Together, these numerous regulations have created VMS requirements for the groundfish and crab fleets.

Table 1 Description of VMS requirements

Source of VMS requirement	Description of VMS requirement	Regulations
Steller Sea Lion Measures	Vessels in any Federal reporting area that participates in the Atka mackerel, Pacific cod, or pollock directed fisheries.	679.7(a)(18)
EFH/HAPC	All vessels named on an FFP or FCVP when operating in the Aleutian Islands subarea or in adjacent State waters	679.28(f)(6)(ii), 679.7(a)(21)
EFH/HAPC	All vessels named on an FFP or FCVP when operating in the GOA or adjacent State waters with nonpelagic trawl or dredge gear	679.28(f)(6)(iii), 679.7(a)(22)
Rockfish Program	Vessels that are assigned to a rockfish cooperative when operating in a reporting area off Alaska from May 1 until November 15, or until the cooperative has submitted a termination of fishing declaration.	679.28(f)(6)(iv), 679.7(n)(3)(i)
Rockfish Program	Vessels that are subject to a sideboard limit when operating in a reporting area off Alaska from July 1 until July 31.	679.7(n)(3)(ii)
GOA Pacific cod sector splits	A vessel in Federal reporting areas 610, 620, or 630, that receives and processes groundfish from other vessels.	679.28(f)(6)(v)
Sablefish vessel clearance requirement	Any vessel who fishes for sablefish in the BSAI	679.42(l)(1)
Crab Rationalization Program	Any vessel harvesting Crab Rationalization crab	680.7(c)(2), 680.23(a)(1), and 680.23(b)(1)

In June 2005, the Council discussed the VMS issue, in connection with EFH/HAPC related proposals to implement VMS for the GOA. During that discussion, the Council recommended that NMFS develop an analysis and alternatives to address the issue of broader VMS application in the GOA and BSAI in a manner that meets enforcement, monitoring, and safety issues. In response to the Council's request in June 2005, staff prepared a discussion paper for the December 2005 meeting, which included comprehensive implementation alternative, and alternatives that would reduce the burden of VMS requirements on the operators of small vessels, and of commercial fishing vessels that only entered Federal waters with the intent to transit between fishing areas within state waters. At the December 2005 meeting, the Council adopted a purpose and need statement and a list of alternatives for analysis. The purpose and need statement is provided below.

Purpose Statement

- 1) *To ensure/maximize the viability of the management, monitoring, and enforcement of additional spatial/temporal fishing boundaries and rationalization programs in the most cost-effective and efficient manner possible.*
- 2) *To enhance the scientific understanding of the impact of fishing activity on the marine environment in the most cost effective and efficient manner possible.*
- 3) *To permit more cost-effective and productive use of observers.*
- 4) *To increase the safety of fishing operations.*

Need Statement

The broader application of VMS to meet the increasing management, enforcement, monitoring, scientific, and safety issues caused by the development of additional spatial/temporal fishing boundaries, rationalization programs, and other evolving management and enforcement requirements.

At the February 2006 meeting, preliminary analysis indicated that under the comprehensive implementation alternative, vessels using seine, gillnet, power troll, and hand troll gear to fish for salmon and herring might be required to carry VMS. In some instances, vessels using these gears fished in State managed fisheries in the EEZ. NOAA OLE and the Coast Guard indicated there was little need to monitor movements of these vessels, as long as they didn't have an FFP or operator in Federal waters with other gears. These are not gears that are used to harvest federally-managed species, and they are not gears that may potentially damage bottom habitat in the EEZ. However, the Council determined that the public had not received adequate notice to comment on this alternative, and decided to defer action on modifying the alternative until its April 2006 meeting. At its April 2006 meeting, the Council revised Alternative 2 to include the above clarification and scheduled the action for initial review in October 2006.

At the October 2006 meeting, a draft RIR/IRFA was provided to the Council. During that meeting, the Council (a) adopted a problem statement to accompany the statement of purpose and need, (b) requested the evaluation of new options, and (c) rescheduled the analysis for initial review at its February 2007 meeting. The alternatives and options are provided in Appendix 1.

At the February 2007 meeting, the Council received a preliminary initial review draft. At that meeting the Council decided to postpone indefinitely any further work on a comprehensive VMS program. The Council noted that other tools may be available to address specific problems or enforcement needs for different circumstances, and a comprehensive solution may not be optimal. When this occurred, further analytical work was suspended on all the alternatives and options.

At its April 2007 meeting, the Council requested a discussion paper on VMS requirements in the dinglebar fishery. After the presentation of the discussion paper at the February 2008 meeting, the Council requested preparation of an analysis to exempt the dinglebar gear from VMS requirements. In June 2008, the Council recommended exempting dinglebar fishermen from the VMS requirement. The Council concluded that any risk of illegal fishing in the Cape Ommaney and Fairweather Grounds HPACs was insufficient to justify monitoring by VMS, given the cost imposed on lingcod fishermen. The Council reiterated a previous decision, that the need for VMS monitoring in Council fisheries should be evaluated on a case-by-case basis.

V. VMS coverage

This section provides a brief description of the current VMS coverage in the North Pacific. Table 2 shows the number of groundfish, crab, and halibut vessels that as of 2010 have a VMS unit and the number of

vessels without a VMS unit. Of the total 1,656 groundfish, crab, and halibut vessels, 546 have a VMS unit, while 1,110 do not have a VMS unit. Of those 1,110 vessels that are not equipped with a VMS unit, 346 vessels are less than 30' LOA and 731 vessels range in length from 30' to 59'. The remaining 33 vessels without a VMS unit are greater than or equal to 60'. Note that the data is showing a few large groundfish vessels without VMS, but

Table 2 Vessel count of all North Pacific groundfish, halibut, and crab vessels with and without VMS units in 2010

Vessel length	No VMS	VMS	Total
<30	346	0	346
30-59	731	247	978
60-89	21	96	117
90-124	2	137	139
125-200	0	55	55
200+	0	21	21
Total	1,110	556	1,656

Source: AKFIN Vessel Table and Patty Britza of Sustainable Fisheries

Looking at VMS coverage by fleet, four fleets remain, to a large degree, without VMS units. These fleets are the halibut IFQ, halibut CDQ, GOA sablefish IFQ, and jig. The remaining groundfish and crab fleets are required to have VMS units onboard their vessels. Given that the groundfish and crab rationalized fleets already require VMS, the remaining portion of this section will focus on the small vessel fleets, which include the halibut IFQ, halibut CDQ, GOA sablefish IFQ, and jig fleets.

Table 3 presents the number of vessels with and without VMS grouped into vessel length categories for each of the small vessel fleets. The fleet with largest number of vessels not equipped with a VMS unit is the halibut IFQ group. Amongst this fleet, there are 170 vessels under 30' and 640 vessels ranging in length from 30' and 59' that are not equipped with a VMS unit. For the halibut CDQ fleet, most of the fleet is less than 30' in length and are not equipped with a VMS unit. The sablefish IFQ fleet is generally composed of vessels ranging in length from 30' to 59'. Amongst this fleet, 223 vessels do not have VMS unit and 103 vessels do have VMS unit. The remaining jig fleet also generally falls within the 30' to 59' vessel length group. Amongst this fleet, 56 vessels do not have a VMS unit, while 11 vessels do have a VMS unit.

Table 3 Vessel count of VMS equipped halibut IFQ, halibut CDQ, sablefish IFQ, and jig vessels by length

Fleet	VMS equipped	Vessel length					Total
		<30'	30'-59'	60'-89'	90'-124'	125'-200'	
Halibut IFQ vessels	No	170	640	20	1	0	831
	Yes	0	183	40	6	1	230
Halibut CDQ vessels	No	170	30	0	0	0	200
	Yes	0	8	3	0	0	11
Sablefish IFQ vessels	No	3	223	18	0	1	245
	Yes	0	103	29	12	8	152
Jig vessels	No	10	56	0	0	0	66
	Yes	0	11	0	0	0	11

Source: AKFIN Vessel Table and Patty Britza of Sustainable Fisheries

Table 4 provides a vessel count of halibut IFQ, halibut CDQ, sablefish IFQ, and jig vessels with and without a VMS unit that also have a Federal Fisheries Permit (FFP). Looking at the 831 halibut IFQ vessels that are not equipped with a VMS unit, 390 vessels operate without a FFP, while 441 vessels operate with a FFP. In contrast, those 230 halibut IFQ vessels that operate with a VMS unit, nearly all (227 vessels) have a FFP. For the halibut CDQ fleet, most of these vessels do not carry VMS and do have a FFP. As for the sablefish IFQ fleet, most of these vessels operate with a FFP, but 226 vessels are not equipped with a VMS unit.

Table 4 Vessel count for jig, halibut IFQ and CDQ, and sablefish IFQ fleets with VMS and FFP

VMS	FFP	Fleets			
		Jig	Halibut IFQ	Halibut CDQ	Sablefish IFQ
No	No	48	390	189	19
	Yes	18	441	11	226
Yes	No	4	3	2	2
	Yes	7	227	9	150

Source: AKFIN Vessel Table and Patty Britza of Sustainable Fisheries

Table 5 provides average catch for halibut IFQ and halibut CDQ vessels with and without a VMS unit that are less than a specific vessel length. The vessel length categories are 25' and under, 30' and under, and 32' and under. For the 25' and under group and the 30' and under 30' group, no halibut IFQ vessels or halibut CDQ vessels were equipped with VMS, so there was no average catch to report. Looking first at the 25' and under group, the average catch was 3,604 pounds for halibut IFQ vessels, while the average catch for halibut CDQ vessels averaged 1,847 pounds. For vessels 30' and under, the average catch for halibut IFQ vessels was 6,407 pounds, while the average catch for halibut CDQ vessels was 4,880 pounds. Finally, for the 32' and under vessels, the average catch for halibut IFQ without VMS was 12,548 pounds, while the average catch for halibut IFQ with a VMS unit was 52,211 pounds. For halibut CDQ vessels that are 32' or less without a VMS unit was 6,365. There were no 32' and under halibut CDQ vessels that were equipped with a VMS unit, so there was no average catch to report.

Table 5 Average catch (lbs) by length for the halibut IFQ and halibut CDQ fleets

VMS	Vessel length	Halibut IFQ	Halibut CDQ
No	< = 25'	3,604	1,847
Yes	< = 25'	0	0
No	< = 30'	6,407	4,880
Yes	< = 30'	0	0
No	< = 32'	12,548	6,365
Yes	< = 32'	53,211	0

Source: AKFIN Vessel Table and Patty Britza of NMFS Sustainable Fisheries

VI. Estimated cost of VMS

VMS costs for operations are expected to fall into the following categories:

- Purchase and freight
- Installation charges
- Initiation fee, if any
- Sale taxes

- NOAA OLE notification
- Transmission costs
- Maintenance costs
- Lost fishing time due to unforeseen breakdowns
- Replacement cost

It is difficult to estimate the average costs of installing and operating VMS. The fleet is diverse, and there are a variety of VMS packages available. Currently, there are 4 NOAA-approved VMS units available for use in the Alaska region. There is no quantitative information about the extent to which fishermen are paying list, or a negotiated sale price, the time requirements for installation, the nature of the transmission packages they are buying, or the average number of days or months they are transmitting. Average cost estimates are summarized in Table 6.

Table 6 Average cost of VMS

Base unit cost with data terminal	\$2,971
Installation	\$239
Brackets	\$60
Initiation fee (with satellite service provider)	\$150
Notify NOAA OLE	\$11
Sales taxes	\$108
Total acquisition and installation w/out reimbursement	\$3,539
Transmission costs for one year for two poll per hour	\$815
Maintenance and repairs for one year	\$77

Note: Unit costs are from survey of NOAA approved VMS units available in the Alaska region. Installation and maintenance costs originated from the VMS exemption for dinglebar fishermen analysis dated March 31, 2009.

NOAA does have a current VMS reimbursement program that is jointly managed by NOAA and the Pacific States Marine Fisheries Commission, but that is subject to future appropriations. This program provides for reimbursement of a maximum for \$3,100 per unit and covers the cost of the VMS transmitter unit. To be eligible for reimbursement, vessel owners/operators must purchase an approved VMS unit and have it installed on their vessel and activated. Upon completion of the installation and activation, the vessel owner/operator must contact the VMS Support Center to ensure the vessel is properly registered in the VMS system. Once this completed, NOAA OLE will issue the vessel a number that the vessel operator then includes on their reimbursement application with the Pacific States Marine Fisheries Commission. This reimbursement does not cover costs associated with tax, labor, and installation.

VII. Enforcement costs

Given the reduction in enforcement budgets for both U.S. Coast Guard and NOAA OLE, it becomes more critical to leverage the technological means of surveillance and locating fishing fleets across the entire North Pacific. For example, IFQ halibut vessels, which make up approximately 64% of the total groundfish, crab, and halibut fishing vessels in Alaska waters and is the single largest fishery by number of vessels in Alaska, operates almost entirely without VMS. Given these vessels are only permitted to fish in certain areas because of area-specific TACs, the enforcement and monitoring of the IFQ halibut fleet is costly. The U.S. Coast Guard cost for monitoring and enforcing the IFQ halibut and sablefish fleet was approximately \$17 million in 2011 (see Appendix 3 for calculations). With VMS, monitoring of the IFQ halibut and sablefish fleets would greatly enhance the ability of both the U.S. Coast Guard and NOAA OLE to monitor these vessels to ensure they are operating in compliance with their permits. While requiring all IFQ vessels to have operational VMS units will not result in a reduction in enforcement

expenditures, VMS units on all IFQ vessels will greatly enhance the efficiency of U.S. Coast Guard operations by reducing the time spent searching for vessels and vectoring in U.S. Coast Guard cutters for boardings. With a more efficient monitoring of the IFQ fleets, the U.S. Coast Guard and NOAA OLE could focus on monitoring and enforcement of other fleets that have had historically low enforcement contact rates due to the necessity of using limited assets and time on high precedence fisheries. This results in both more effective enforcement and monitoring for the IFQ fleets, and leveling out the enforcement and monitoring assets across the entire North Pacific fishing industry.

VIII. Alternative tools to VMS

An alternative tool to VMS is Automated Information System (AIS). This alternative to VMS could provide some of the location information that is provided by VMS, but there are significant issues with this system as the information is not protected. Because anyone can get access to AIS information, many fishermen turn their AIS unit off while they are fishing to protect their fishing locations from their competitors. In addition, AIS is not a satellite based system, so it is contingent upon line of sight communications and receive locations. There are currently not enough AIS receivers around the state to provide accurate fishing locations. U.S. Coast Guard type approved AIS units range in price from \$500 for an AIS Class B transponder to \$4,000 for an AIS Class A transponder, not including installation. Costs vary greatly for installation due to the differences in vessel configuration and level of integration necessary for other shipboard systems.

IX. VMS requirements in other regions

The Council requested a review of the VMS applications in other regions. However, due to the way VMS is implemented, it is more appropriate to review the VMS applications from the six NOAA regions. These regions are the Northeast, Southeast, Southwest, Northwest, Alaska, and Pacific Islands.

The Northeast region encompasses all EEZ waters from Maine south to North Carolina, and includes the boundaries of both the New England Fishery Management Council and the Mid-Atlantic Fishery Management Council. VMS coverage in this region is the most comprehensive of any NOAA region. Fishing vessels are required to carry an operational VMS if they are operating in the following fisheries: scallop, monkfish, surfclam, ocean quahog, Maine mahogany quahog, and herring. With the exception of the scallop fishery, vessels in these fisheries must transmit a VMS signal once an hour. Vessels in the scallop fishery must transmit at least twice per hour. Vessels may power down their VMS units if (a) the vessel will be continuously out of the water for more than 72 hours and the vessel is issued and has onboard a NMFS letter of exemption, or (b) the vessel has a limited access permit and signs out of the VMS program for a minimum of 30 consecutive days, does not engage in any fisheries, and the vessel is issued and has onboard a NMFS letter of exemption. Prior to crossing the VMS demarcation line, generally defined as the state water boundary, vessels must declare on their VMS units targeted species, gear, and area to be fished. Vessels are not permitted to change this declaration while outside the VMS demarcation line. For fisheries that do not require VMS, vessels already carrying VMS must continue to broadcast position information in these other fisheries, but do not require target species, gear, or fishing area.

Figure 1 shows an example of a VMS snapshot in the Northeast region (a color version is on the last page of this document). The figure shows one position per vessel, color-coded to the vessel's activity. Each color represents a different fishery. The benefit of the color codes is that enforcement personnel can get a quick view of where the various fleets are located in relationship the areas where fishing is permitted and the authorized gear.

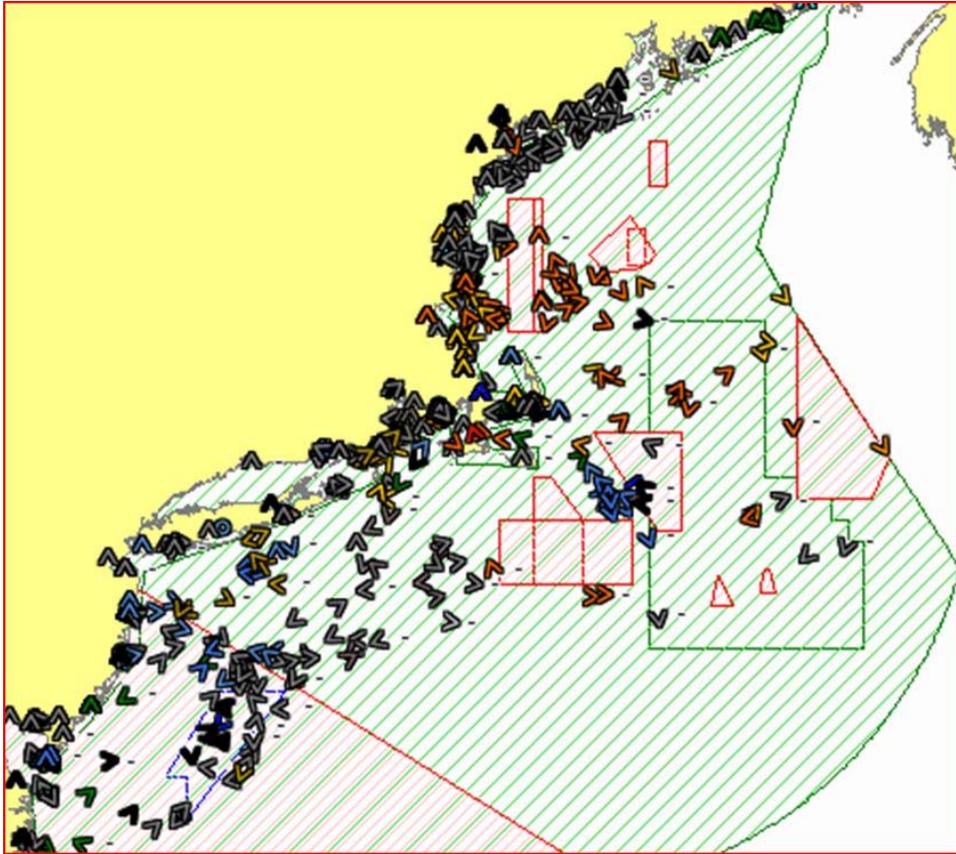


Figure 1 VMS snapshot in the Northeast region

The Southeast region extends from the North Carolina through the Gulf of Mexico to the Southern border of Texas. This region also includes U.S. territories of Puerto Rico and the U.S. Virgin Islands. Vessels required to carry VMS in this region include vessels ranging in length from 12' to 145' LOA that participate in the following fisheries:

- Gulf of Mexico commercial reef fish fishery
- Pelagic longline fishery for highly migratory species
- Shark fishery using gillnet and nonpelagic longline gear
- South Atlantic rock shrimp trawl
- A sample of vessels (about 550 of 1600) in the off-shore Gulf of Mexico shrimp fishery have VMS devices used to estimate effort
- Penalty fishery – vessels required to use VMS because they have violated fishery regulations

The Northwest region covers the states of Washington, Oregon, and California. VMS in this region is required on any fishing vessel in federal waters that takes, retains, or transports groundfish. This requirement applies to any size vessel ranging in length from 17.5' to 308' LOA, which includes skiffs that carry small waterproof boxes to house the VMS unit. VMS declarations include gear type used and area.

The Pacific Islands region covers the waters around the Hawaiian Islands, and the Western and Central Pacific. Noted as the first region to require VMS dating back to the mid-1980s, VMS units are on vessels ranging in length from 41' to 260' LOA in the U.S. fisheries of the Western and Central Pacific, which are

mostly longline vessels with a few bottom fishing vessels operating in the Commonwealth of the Northern Mariana Islands. Additionally, vessels permitted to operate in the Northwest Hawaiian Islands Monument are required to have an operational VMS unit. Information gather from the VMS units in this region are the most basic, providing vessel name, position, date, and time.

Appendix 1

Alternative 1 – no action

Alternative 2 – Require a transmitting VMS on any federally permitted vessel, and on any vessel with IFQ and/or CDQ halibut and/or sablefish on board, when it is operating in the EEZ or adjacent state waters. A federally permitted vessel would include vessels named on a Federal fisheries permit or on a Federal crab vessel permit. A transmitting VMS would also be required on any other commercial fishing vessel that operates in the EEZ with authorized fishing gear (other than hand troll gear, power troll gear, and troll gear, but including dingle bar gear).

Alternative 3 – Vessels are subject to the requirements of Alternative 2, except that they are not required to have a transmitting VMS when operating in a State-managed fishery in State waters, unless a transmitting VMS is required under another federal program. For the purpose of this alternative, a State-managed fishery means a fishery in which the landings are not counted against a Federal total allowable catch.

Alternative 4 – Vessels are subject to the requirement of Alternative 3, except for vessels which are subject to the VMS requirement because they have IFQ and/or CDQ halibut and/or sablefish on board, and that fish only in State waters.

Options – may apply to alternatives two to four:

Smaller operation exempts:

- Vessels less than a certain length overall (LOA) would be exempted from VMS requirements. Options include (1) less than 25 feet (2) less than 30 feet, and (3) less than 32 feet LOA.
- Allows for phased implementation where vessels over 32 feet LOA would be required to have VMS in 2007 and vessel equal to or less than 32 feet LOA by 2008.
- Vessels with minimal annual landings of halibut IFQ and CDQ below the thresholds of 1,000, 5,000, and 10,000 pounds.
- Vessels with minimal annual landings of sablefish IFQ and CDQ below the thresholds of 1,000, 5,000, and 10,000 pounds.
- Vessels deploying dinglebar gear exempt.
- Troll fishermen operating in Federal waters who keep legal IFQ halibut as bycatch in their fishery are exempt.

Transit exemptions:

- Vessels with an FFP, operating in the EEZ, without authorized gear on board (other than hand troll gear, power troll gear, and troll gear, but including dingle bar gear) are exempt.
- Fishing vessels not required to have a FFP would not be required to have a transmitting VMS on board if the vessel operator (a) transits the EEZ with their fishing gear stowed; and, (b) notifies the USCG and NOAA OLE of their intent to simply transit the EEZ (a new check-in/check-out requirements).

Appendix 2

Estimated costs for VMS installation and monthly monitoring in the Alaska Region: There are currently 4 NOAA type approved VMS units available for use in the Alaska Region, although as of July, 2011, no new installations of the GMPCS Thrane & Thrane Sailor TT-3026D VMS Gold are authorized by NOAA. For consistency, these units have been included in the pricing analysis to give the council an overview on cost ranges for these units.

1. CLS America Thorium VMS TST retails for \$3095, and includes the VMS Satellite unit, junction box, and data terminal. CLS America has two standard rate packages with 1 poll/hour costing \$45 per month, and 2 polls per hour costing \$55 per month. They also offer additional data rates for e-mail and other data transfers at a rate of \$1.75 per kilobyte. (As per phone conversations with Michael Kelly at CLS America.)
2. Faria WatchDog 750VMS retails for \$3195 and includes the messaging terminal. This company does not base their rates on number of VMS polls per hour, but rather on the number of bytes of information sent. The basic service is 12,000 bytes per month for \$40.00, and the average poll size for vessels in Alaska is 10 bytes. For 1 poll per hour, every day in a 31 day month, this would equate to about 7440 bytes, leaving a buffer of 4560 bytes for e-mails or other data transfers. The company also has a second data package available for 20,000 bytes per month at a rate of \$54.52. At a poll rate of 2/hour, this would equate to 14,880 bytes of information, with a 5120 byte buffer for additional data transmissions. Vessels requiring more data transmission than this are charged additional fees at a rate of \$1.70 per 1000 bytes, so even a 10,000 byte overage would only cost \$17. (Based upon phone conversations with Peter Harpon, on 16 Feb 2010.)
3. GMPCS Thrane & Thrane Sailor TT-3026D VMS Gold is no longer approved for new installations as of July 2011, but is included here for comparison as one of the type approved units for the Alaska Region. The VMS unit with data terminal costs \$2495, and each data report costs \$0.06. One position report per hour costs \$44 per month, and 2 position reports per hour costs \$88 per month. The company also charges \$1.05 per 175 character e-mail. (http://www.nmfs.noaa.gov/ole/docs/2011/07/noaa_fisheries_service_type_approved_vms_units.pdf)
4. Skymate/Orbcomm's Stellar ST2500G with closed Dell Laptop costs \$3100. Like Faria, Skymate does not charge based upon VMS polls per hour, but bases their rates on the number of characters sent. The standard position report in Alaska is 20 characters in length. Although they offer Silver, Gold, and Platinum data plans, the Silver plan does not provide for enough characters to be valid for current VMS reporting guidelines for the Alaska Region. The Skymate Gold plan costs \$38.99 per month for 20,000 characters. Given the 20 character position report for the region, 1 poll per hour for a 31 day month would equal 14,880 characters, allowing for some room for other data transfers within the guidelines of the data plan. For every 1000 characters over this plan's allotment, the vessel is charged an additional fee of \$1.90. The Skymate Platinum plan costs \$73.99 per month for 50,000 characters. A poll rate of two position reports per hour for a 31 day month would result in usage of 29,760 characters, providing a significant buffer for additional data use. Vessels are charged an additional fee of \$1.40 for every 1000 characters over those allotted to this service plan. (Based upon a phone conversation with Lindsey.)

Below is a table showing cost comparison for the VMS units with average costs for the different units and polling rates.

Company	Base Unit cost with Data Terminal	1 poll/hr. \$/month	Annual Cost for 1 poll/hr.	2 polls/hr. \$/month	Annual Cost for 2 polls/hr.	Additional Data Cost/KB
CLS American Thorium	\$3,095.00	\$45.00	\$540.00	\$55.00	\$660.00	\$1.75
Faria WatchDog	\$3,195.00	\$40.00	\$480.00	\$54.52	\$654.24	\$1.70
GMPCS Thrane & Thrane	\$2,495.00	\$44.00	\$528.00	\$88.00	\$1,056.00	\$2.70
Skymate/Orbcomm (Gold Plan)	\$3,100.00	\$38.99	\$467.88			\$1.90
Skymate/Orbcomm (Platinum Plan)	Same as Gold above			\$73.99	\$887.88	\$1.40
Average Cost	\$2,971.25	\$42.00	\$503.97	\$67.88	\$814.53	\$1.89

Appendix 3

Coast Guard Methodology and Assumptions for IFQ Enforcement Costs

The following is a description of the methodology and assumptions used to arrive at the sum of \$17 million. It should be noted that these are very conservative numbers, and the actual cost is likely much higher due to the amount of time it takes for cutters and aircraft to locate these vessels to conduct a boarding.

Asset hours

The Coast Guard maintains a database of hours used by the various platforms by mission type. Domestic fisheries law enforcement is listed in this database as ELT FISH DOM. This database was used to determine hour usage by major asset type in the 17th Coast Guard District for calendar year 2011.

Aviation Assets and Assumptions

All aircraft resource hours assigned to the mission category "ELT FISH DOM" (Enforcement of Laws and Treaties Fish Domestic) by aviation units operating in the Seventeenth Coast Guard District from March 2011 – October 2011 were pulled from the Coast Guard Business Intelligence (CGBI) database.

Since IFQ Halibut and Sablefish boardings make up 40% (335 out of 833) of the Coast Guard's total fishing vessel boarding goals under the "ELT FISH DOM" resource hour category, we have assumed that 40% of the hours assigned to this resource hour category were used towards enforcement of IFQ Halibut and Sablefish goals. Therefore, to calculate the total USCG expenditures for each resource type, we multiplied the number of resource hours expended by the in government reimbursable rate, and multiplied this value by .40 to arrive at the total cost per asset type. The result is a fairly conservative cost assumption, as the lack of VMS data for most IFQ vessels results in a significantly more time spent in locating vessels targeting IFQ species compared to other fisheries.

Cutter Assets and Assumptions

Coast Guard cutter enforcement generally falls into four classes of vessels, High Endurance Cutters (HECs), Medium Endurance Cutters (MECs), Patrol Boats (WPBs), and Buoy Tenders (WLBs). For all cutters with the exception of WPBs, boardings of IFQ Halibut or Sablefish vessels were tallied for each of the types in calendar year 2011. We applied a 5 hour time period for each of these boardings to account for patrol time to locate the fishing vessel, conduct pre-boarding questions, and complete the vessel boarding. This 5 hour estimate is a conservative assumption as cutters often expend many more resource hours towards IFQ enforcement goals without conducting any boardings due to the large temporal and spatial span of the IFQ Halibut and Sablefish fisheries, poor weather conditions and other factors that hamper enforcement efforts.

WPB's are the workhorses of our afloat IFQ enforcement efforts. Since IFQ Halibut and Sablefish are the only federally managed fisheries in Southeast Alaska, the three WPBs that work for Sector Juneau spend nearly all of their time searching for and boarding IFQ vessels. As such, we estimate that 90% of the "ELT FISH DOM" hours expended by Sector Juneau WPBs are being used for IFQ enforcement. Sector Anchorage WPBs split time between IFQ efforts and other federally managed fisheries in the Gulf of Alaska. Therefore, we have estimated that 50% of the "ELT FISH DOM" hours expended by Sector Anchorage WPBs are used for IFQ enforcement.

Base Unit Costs

The cost for enforcement of the IFQ fisheries is based upon first obtaining a standard rate for each of the platform types used to patrol, locate, and board IFQ vessels. The cost/hour for each of our platform was taken from the Coast Guard COMMANDANT INSTRUCTION 7310.1M, Coast Guard Reimbursable Standard Rates, current as of 31 August 2011. The standard in government reimbursement rates for Coast Guard assets in the Seventeenth District who conducted IFQ enforcement are as follows:

Platform Type	In Government cost \$/hour
C-130 Aircraft	\$14,439
H-60 Helicopter	\$11,251
H-65 Helicopter	\$8,640
High Endurance Cutter (WHEC and WMSL)*	\$12,974
Medium Endurance Cutter (WMEC)	\$12,876
Buoy Tender (WLB)	\$6,301
Patrol Boat (WPB)	\$3,105

*Note – As there is currently no standard rate listed for the WMSL, our new National Security Cutters, we have assumed the cost for these large cutters to be equivalent to the High Endurance Cutter.

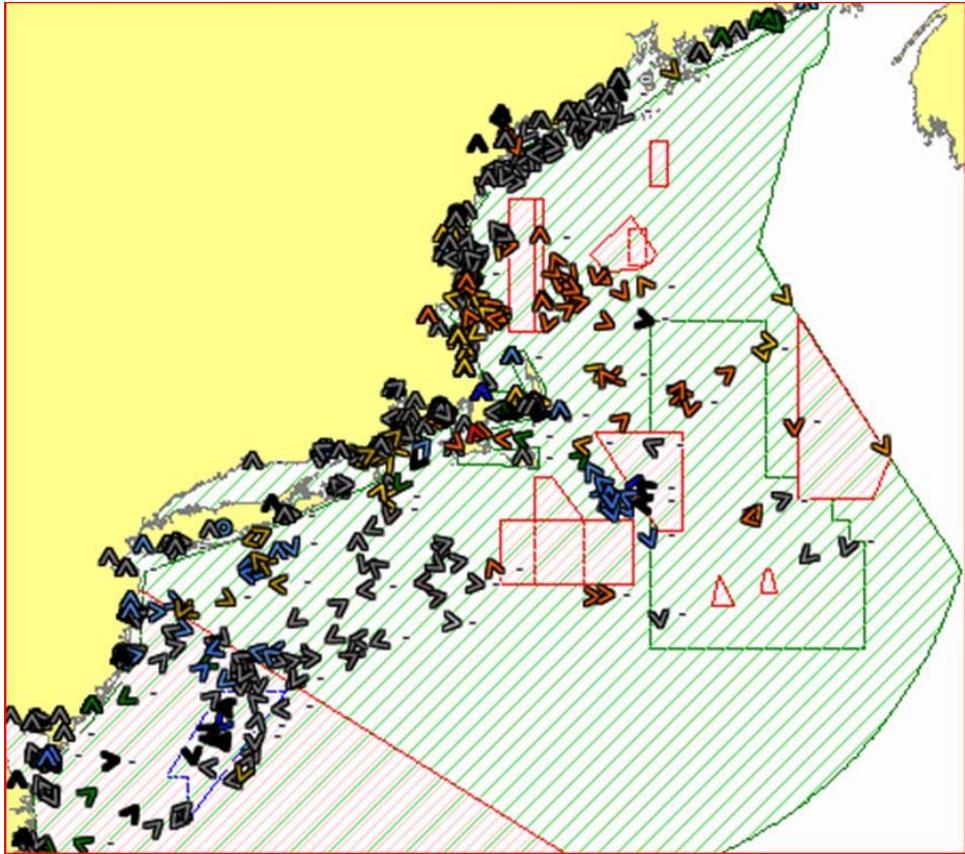


Figure 2 VMS snapshot in the Northeast region