**Agenda Item D-1(b)(1)**
**October 2012**

# Overview of Vessel Monitoring System Discussion Paper[1] October 2012

## I. Introduction

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. In April 2012, the Council reviewed the discussion paper, along with the IFQ Implementation Committee and the Enforcement Committee. After reviewing the discussion paper and listening to public testimony, the Council requested the discussion paper be expanded to identify the needs for management, enforcement, compliance, and safety in the fisheries and what is the appropriate technology for meeting those needs (Section V). The Council also requested that the expanded discussion paper should include:

- Target species, gear, and area declarations (Section IV)
- Geo-fencing and the implications and cost ramifications to the fishing fleet and agency for use of this capability (Section IV)
- Increased poll rates and the implications of this change to both the fishing fleet and enforcement agencies (Section IV)
- Potential data transfer applications or electronic log books (Section IV)
- Electronic monitoring and the tradeoffs between this technology and VMS (Section IV)
- Purpose and need for VMS requirements in other U.S. regions and whether VMS used in these other regions has been successful in meeting the purpose and need (Section IX)
- Potential for including VMS cost in the observer fee (Section VII)

## 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 to the NOAA Fisheries Office of Law Enforcement (OLE) at fixed 30-minute intervals. 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

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- Cabling between the VMS and both antennas

All of these units used in the Alaska region are capable of allowing NOAA OLE to communicate with the unit and modify the reporting frequency. This is accomplished by adding 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 1 along with the cost of the units.

In general across all regions, 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.

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. VMS coverage

This section provides a brief description of the current VMS coverage in the North Pacific. 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 participate 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) |

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 23 vessels without a VMS unit are greater than or equal to 60'.

**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 | 1 | 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. This section will focus on fleet that not required to carry VMS.

Table 3 presents the number of vessels in these fleets 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 is 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 a 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 | 0 | 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 an FFP, while 441 vessels operate with an FFP. In contrast, for those 230 halibut IFQ vessels that operate with a VMS unit, nearly all (227 vessels) have an FFP. For the halibut CDQ fleet, most of these vessels do not carry VMS and do have an FFP. As for the sablefish IFQ fleet, most of these vessels operate with an 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

## IV. Other features of VMS and potential alternatives to VMS

In the North Pacific, VMS is a relatively simple system that sends vessel identification and location at fixed 30-minute intervals. However, VMS units are capable of much more. A VMS unit may incorporate targeted species, gear, and area declarations, variable poll rates, geo-fencing, and transfer of data such electronic log books.

*Declarations*

A declaration system requires a vessel operator to declare on their VMS unit which species is being targeted, the gear being used to target that species, and the area the vessel will be targeting these species. Creating a fishery declaration system would facilitate enforcement and compliance monitoring. Vessels may be permitted to participate in multiple fisheries that authorize numerous fishing gears. The

declaration system would provide NOAA OLE with advance notice of the target fishery and the gear possessed onboard, which provides Enforcement with critical information concerning which regulations apply to that particular vessel during that trip. A declaration system is not currently utilized in the North Pacific region. One example of a declaration system currently in use is in the Northeast region. Vessels in that region must declare target species, gear, and area to be fished and are not permitted to change this declaration while outside a VMS demarcation line.

*Polling Rate*

The rate at which VMS units send signals can be remotely programmed or altered. Units in North Pacific are programmed to report every 30 minutes 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, but also increased data management costs. NOAA OLE may sometimes program a VMS unit to report a vessel's position more frequently, for example, if it appears to be operating near a no-transit or no-fishing zone. In another example, increased polling rate may be needed when vessels are operating in medium or small no fishing zones. The required one poll every 30 minutes may not be sufficient enough to know if a vessel is transiting through a no fishing zone or if the vessel is fishing. In general, the average additional cost to the VMS user for each incremental additional poll, repeated over the entire month, is $25.88.

*Geo-fencing*

A unique feature of VMS is the ability to use geo-fencing, which is setting a virtual perimeter for a geographic area. When used in conjunction with VMS, geo-fencing allows Enforcement to create an area which, when entered by a vessel equipped with VMS, will trigger an automatic increase in the polling rate. When the vessel exits the area, the polling rate will be reduced to the normal one poll every 30 minutes. Geo-fencing allows for alerts (general email or text message) to be sent to the agency or VMS user if deemed necessary. Increased polling as well as email alerts would result in higher VMS costs that may need be borne by industry using these areas.

Geo-fencing is a spatial management application not currently utilized in Alaska. However, its application has potential, for example in conjunction with EFH and HAPC conservation areas. Currently, VMS in Alaska is used to monitor fishing activities within EFH and HAPC conservation areas. A geo-fence creates an electronic spatial extension of specific area. The fence monitor is triggered when the electronic transmitter crosses the fence or boundary line. Importantly, more than one parameter can be linked to an individual VMS transmitter, including position, vessel characteristics, type, and speed. Of course, not all vessel behaviors warrant a closer look when operating within an area. A closer look could be triggered when a vessel of certain type enters a geo-fence and exhibits certain behavior, such as reduced speeds for fishing. In this instance, the vessel's speed would be at slower than normal transit speed (approximately 4 knots). Vessel type and behavior would alert OLE VMS observers for further investigation, if warranted. Lastly, the geo-fence would be activated when a vessel carrying VMS first crosses the boundary line and then at specific intervals, depending on the size of the area and the required confidence needed to adequately monitor vessel activities in each area, until the vessel departs the geo-fenced area.

*Two-way communication*

VMS units can also be used to communicate through electronic messages with shore-based fishery personnel, which could allow fishery participants to: communicate directly with NOAA OLE in the case of a power disruption; download updated software without removal of the device; communicate with manufacturers to remedy malfunctions; receive required software upgrades with little interference; communicate with vessel owners and processors; and send distress calls to monitoring companies in the

event of an emergency. One example of the communication features of VMS is the transmitting of electronic logbooks. Currently, electronic logbooks are sent daily via email for those fleets required to transmit their electronic logbooks. However, electronic logbooks could be sent via the VMS units. Although not necessarily useful for fleets that currently have satellite communication capabilities, transmitting electronic logbooks via VMS for smaller vessels that don't have satellite communication capabilities could be significant.

*Alternatives 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.

Another possible alternative could be electronic video systems. The term "electronic monitoring" (EM) is very broad, and include a wide range of technologies such as VMS, electronic logbooks, video, and the integration of video with other data sources such as radio frequency identification tag readers, net pinger hydrophones, winch sensors, and hydraulic pressure monitors. The discussion to-date of EM in the North Pacific, however, has primarily focused on the use of cameras, and the terms are largely used synonymously in Alaska. To date, the EM programs that are being developed for Alaska as part of the restructured observer program have not included VMS technology. Although the camera systems would likely include vessel position data via an onboard GPS, the position would not be transmitted on a real-time basis. Instead, the vessel position data would be stored for later review. In contrast, the primary benefit of VMS is its real-time reporting of a vessel's position. At this stage, the EM pilot project proposed for 2013 targets small vessels (40' to 57.5' LOA) that are fishing halibut or sablefish IFQ, which corresponds with the two of the fleets that are currently not covered by VMS. However, the project is only designed for limited fleet deployment, so would not provide widespread coverage for this fleet.

## V. Management, Enforcement and Compliance, and Safety Needs for Alaska Fisheries

***Management***

NMFS apportions groundfish TACs and prohibited species limits (PSC) between and within the BSAI and GOA. Catch accounting determines catch location based on reports by vessel operators and by at sea observers. In-season management needs to verify catch location information provided by vessel operators and observers. For example, catcher vessels report groundfish delivered to Alaska ports on an Alaska Department of Fish and Game fish ticket. Federal reporting areas, which are used by the Council for setting TACs, may not align well with the State statistical areas.

Catch can be highly variable. Effort can shift on short notice. In-season management must project closure dates over at least 24 hours, and at times up to 4 or 5 days. Catch and effort variability impact management of many of the groundfish and prohibited species catch allocations. An inaccurate closure date results in catch that is greater or less than the specified TAC. Catch in excess of the TAC is contrary to the goals of fisheries management. Conservative closures that lead to subsequent openings add costs to

the fishing industry by generating additional fishery startup expenses. Amounts of TAC remaining may not be enough to sustain an additional fishery, leaving a portion of the TAC stranded and an economic loss to the fishing industry.

In addition to controlling effort to more precisely match harvest and TACs without unnecessary closures, In-season managers also control the incidental catch of non-target species. Target fisheries are closed if catch of an incidental species approaches the overfishing level (OFL)[2].

In general, VMS, more than any other technology, provides in-season managers specific effort information in real-time that leads to improved closure precision. Other technologic tools do not provide the required real-time element combined with positional data that is necessary for purposes of in-season management. Recognizing the versatility of VMS data, in-season managers have been using VMS data to address many of these noted management needs in many Alaska fisheries.

Vessel VMS reports are distributed to in-season managers with a very short lag, of about 1.5 hours. Tracks of all active commercial fishing vessels that are required to carry VMS are reported. In-season managers identify vessels by target fishery and overlay VMS reports on maps showing important management areas. Using historic information, in-season managers know which vessels are fishing for which target species and they can make informed estimates of catch rates by fishery. This real-time information is especially important in fisheries that are normally conducted very quickly.

VMS is used in combination with catch reporting to monitor areas of high incidental catch or hot spots. When hot spots are identified, fleets are notified. VMS is used to help determine whether these hot spots are avoided. VMS information can determine whether or not an OFL closure will be necessary. With the confidence obtained from VMS fishing location reports, in-season managers can manage less conservatively.

***Enforcement and Compliance***

The enforcement of fishery regulations in the North Pacific continually proves to be difficult and challenging, due in part to the large area that must be covered, the remoteness of much of the region, extreme weather conditions, limited enforcement infrastructure, large fleets, and the complexity of the regulations.

The frequency and severity of fishing violations is affected by the resources used for traditional enforcement measures. Traditional enforcement measures include recordkeeping and reporting requirements, review and validation of these records and reports, at-sea monitoring and surveillance using patrol aircraft and vessels, dockside inspections, investigative work by NOAA OLE agents, and prosecutions by NOAA's Office of General Council and the U.S. Department of Justice.

<u>Rationalization</u>

While rationalization brings many benefits, it increases the demands placed on enforcement agencies. These burdens fall particularly heavy on the Coast Guard, which provides the primary enforcement presence on the water.

The nature of the problem is suggested by consideration of the changes in the halibut fishery under individual fishing quotas. In 1994, the last year of the "Olympic" halibut fishery in Alaska, there were a

[2] The terms overfishing and overfished mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis.

lot more vessels on the water, but the total fishing season only last three days. Fishing operations were highly concentrated in time and space, the degree of concentration was easily anticipated and it was relatively easy to schedule resources to monitor large numbers of operations within the short time period.

Now, the number of vessels has dropped significantly, but in general the fishing season starts in mid-March and lasts until mid-November. As seasons have lengthened, more vessel and aircraft days are required to continue to provide the presence needed to deter potential violators and to identify actual violations. It is not as easy to anticipate fishing effort peaks; fishing is not constrained by short seasons, and tends to be less concentrated in time and space.

Because rationalization programs tend to greatly spread out fishing effort in both time and space, it becomes increasingly difficult and resource intensive for the Coast Guard to achieve adequate enforcement presence to compel compliance and deter would be violators. This applies across the board to the range of regulations enforced by the Coast Guard, including safety, IFQ-related and other regulations.

Programs that create individual rights to a share in an allowable catch create incentives for fishermen to misreport landings and to attempt to smuggle fish past the normal monitoring systems. Fishermen who are not exceeding their harvest allocations get fewer fish for their harvesting rights, and the harvesting rights lose value.

Misreporting the quota used to harvest fish can have serious results. If separate quotas have been defined to protect distinct stocks of fish, misreporting the quota used to catch fish can lead to overharvesting of some stocks. This can reduce future biomass, and future allowable harvests and reduce quota values for all persons actually holding quota for the stock being overfished

Unlike other monitoring tools, VMS's ability to provide positional information in real-time helps deter or identify attempts to bypass systems to monitor landings. If fishermen were carrying a transmitting VMS, it would be possible to compare the VMS track against the areas in which he claimed to have operated, following a trip. If the fishermen never entered the area from which the catch was claimed, NOAA OLE would have evidence of a fishery violation or at least evidence that raises questions for NOAA OLE. NOAA OLE can use VMS to not only monitor vessel activity, but also to compare with log book records during a dockside boarding.

Regulated areas

In the past ten years there has been a large increase in the number of regulated areas adopted by the Council. Many of these regulated areas have been implemented to help control harvests of target species or to provide protection for non-target components of the ecosystem. These areas are widely dispersed over 2,000 miles throughout the Gulf of Alaska and Bering Sea/Aleutian Islands. Regulations governing transit and fishing in these areas are varied and complex. There are areas closed year-round, closed seasonally, and closed due to PSC triggers. Some are closed to vessel transit, others are closed to some gear types and not to others, and some are closed to specific target species.

VMS is the only technology currently in use in the North Pacific that provides real-time positional information. If a vessel is carrying an active VMS, NOAA Enforcement and the Coast Guard have the capability to determine the vessel's location at all times. If an area is closed to all transiting, VMS can determine compliance based upon VMS transmissions, eliminating the need for random surface or aerial patrols. Vessels would not have legitimate reasons to be in a no-transit area.

If an area, otherwise open to vessel transit, is closed to fishing, or to specific types of fishing, or to particular classes of vessels, the situation is more complex. Vessels may have legitimate reasons to transit the area. Some vessels may be allowed to fish in the area, and others may not be. Determining the activity of a vessel (e.g., fishing), based solely on its VMS track, is extremely difficult. VMS does not track the type of fish being brought on board a vessel, so it cannot be used to detect a directed fishing violation. Enforcement personnel can use it to monitor a vessel's behavior, its path with respect to closed or restricted areas, or area known to have stocks of fish species at particular times of year. This information, combined with knowledge about the vessel itself, its size, its processing capacity, the gears it uses, may allow NOAA OLE to identify vessels that are behaving suspiciously. It is then possible to work with the Coast Guard to target a vessel or area for more careful examination by vessel, plane, or helicopter.

***Safety***

Search and Rescue (SAR) is a challenge for the Coast Guard in Alaska because of the large fishing vessel fleets, and the extreme distances and weather that the Coast Guard must contend with on a regular basis. Kodiak is the furthest west that the Coast Guard operates an air station in Alaska. Air Station Kodiak is the primary SAR response resource for the Bering Sea. Due to refueling and alternative landing requirements, it may take a helicopter 2 to 3 hours just to get to the eastern edge of the Bering Sea and could take as long as 10 hours to reach the western end of the Aleutian Islands.

Commercial fishing vessels in the EEZ are required to carry lifesaving equipment which includes an emergency positioning indication radio beacon (EPIRB) that can be manually activated or is automatically activated if the vessel sinks. Some EPIRBs incorporate a GPS, while others do not. Coast Guard EPIRB requirements for fishing vessels do not require that the EPIRB include a GPS unit.

Unless the EPIRB has a built in GPS, or retrieves and stores location data from another on-board GPS, location information will not be precise, and may come with a time lag. The EPIRB location is computed based on 406 MHz signals sent to a satellite in a series of pulses. The satellite transits the sky and exploits the Doppler effect to determine the location of the EPIRB, by measuring the changes in the timing between receipt of the EPIRB impulses.

Often times an EPIRB satellite will only acquire the distress signal from a low angle orbit. In this case, only vessel identifying information is transmitted, but not a location. The satellite is unable to correlate a position until the next pass, which can take from five minutes up to two hours and longer in unusual circumstances. In the meantime, the Coast Guard will make call outs to the vessel, and broadcast an Urgent Marine Information Bulletin. Delays in the receipt of location information can reduce the potential for a successful SAR mission.

VMS provides significant advantage for SAR operations because of the real-time reporting of positional data. Other monitoring technologies are limited because they lack this real-time capability. For example, the Council and NMFS have been developing an electronic video monitoring program as a component of the restructured observer program, to be implemented in 2013. While this technology would include vessel position data via an onboard GPS, the information is merely stored for later review. Additionally, for 2013, the program is strictly voluntary, and will only be deployed on a small number of vessels (likely less than 60). VMS is currently deployed on 556 vessels.

The addition of a VMS unit, combined with EPIRB equipped GPS, may provide a relatively accurate measure of the area within which survivors may be found. In many situations, this may help reduce the time it takes SAR teams to find and rescue survivors. In those cases where an EPIRB does not have a GPS or provide coordinates from another on-board GPS, the use of VMS to identify the last known

position will provide precise location information for the location of drifting survivors and debris. Reducing the amount of time between receipt of a distress signal and the location of survivors can play an important role in reducing fatalities in a sinking. The Coast Guard could save search time by beginning a search in the general vicinity of the last known position from VMS before the accurate position from the EPIRB is transmitted. A comprehensive VMS program also provides the Coast Guard with a picture of all fishing vessels near a vessel in distress. The Coast Guard can determine the location of nearby fishing vessels and whether they can respond to a vessel in distress. Good Samaritans provide an invaluable resource to get help to those in distress when they may be hours away from Coast Guard resources.

## VI. Previous Council action on Comprehensive VMS Requirements

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 there 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 2.

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 HAPCs 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.

## VII. 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 (Appendix 1). There is no quantitative information about whether fishermen are paying list price, or a negotiating sale price, what the time requirements are for installation, what the nature is 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 is completed, NOAA OLE will issue the vessel a number that the vessel operator then includes on their reimbursement application to the Pacific States Marine Fisheries Commission. This reimbursement does not cover costs associated with tax, labor, and installation. Annual transmission, maintenance and repair costs of the VMS unit are estimated to be less than $1000 a year.

Since VMS is an electronic monitoring system, the Magnuson-Stevens Act provides authority to assess a fee to cover VMS costs. The Council recently adopted a restructured observer program, which assesses a 1.25% ex-vessel fee on some fishery sectors to cover the cost of observers and electronic monitoring systems. During the development of the restructured program, however, the Council's discussion about the electronic monitoring (EM) component focused on using electronic video monitoring in these fisheries, rather than requiring VMS. In determining the amount of the fee assessed to industry, the Council was not envisioning the cost of VMS. While a voluntary EM pilot project is being proposed for 2013, further regulations will be required to institute a mandatory EM program of any kind.

## VIII. 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, the IFQ halibut fleet, which makes 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). VMS 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.

## IX. VMS requirements in other regions

The Council requested a review of the VMS applications in other regions. Due to the way VMS is implemented, it is most 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 via their VMS units the target 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 while participating in these other fisheries, but are not required to declare target species, gear, or fishing area.

Figure 1 shows an example of a VMS snapshot in the Northeast region. 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 to the areas where fishing is permitted and the authorized gear.

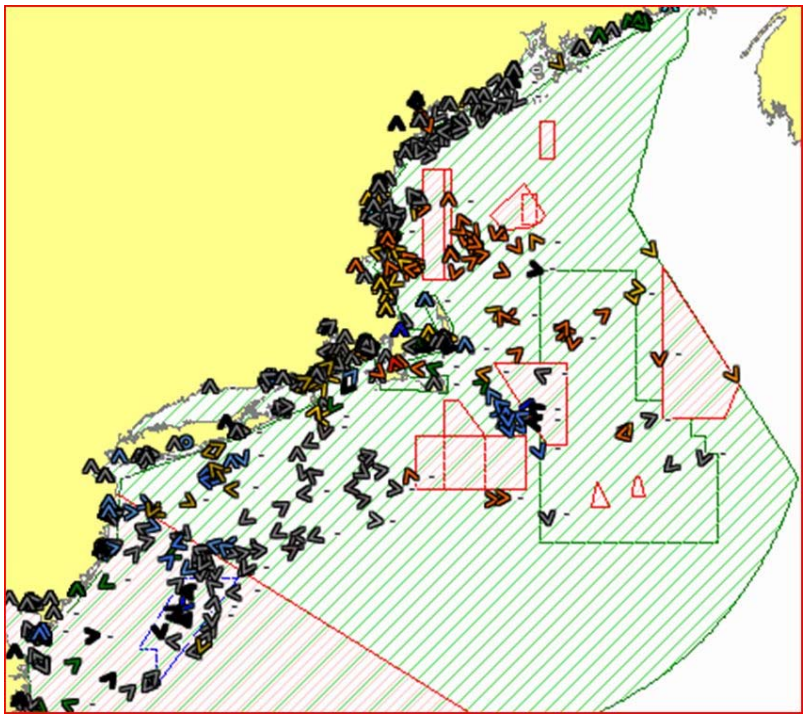

**Figure 1 VMS snapshot in the Northeast region**

The Southeast region extends from the North Carolina through the Gulf of Mexico to the Southern border of Texas. The region also includes U.S. territories of Puerto Rico and the U.S. Virgin Islands. The purpose of VMS in this region is to monitor compliance with area-specific regulations and track and prosecute violations for these restricted or prohibited areas. One example is the reef fishery. The region includes a number of area-specific regulations where reef fishing is restricted or prohibited in order to protect habitat or spawning aggregations of fish. 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. The purpose of VMS in this region is to monitor compliance with groundfish conservation areas. VMS 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. Required VMS declarations the include gear type used and area to be fished.

The Pacific Islands region covers the waters around the Hawaiian Islands, and the Western and Central Pacific. The EEZs in this region is very large and are often non-contiguous. The size of the EEZs creates problems for fisheries surveillance and enforcement, due to the distances involved and the scarcity of suitable logistic support throughout the region. Resources to conduct surveillance and enforcement are constrained by limited budgets and other information for fisheries management is generally insufficient and/or unreliable. The Western Pacific Fishery Management Council has developed the following policy concerning VMS:

- Where appropriate and desired, implement satellite-based fishing vessel monitoring system to assist fishery management programs in the region.
- Develop specific technical and operational guidelines for VMS programs under the authority of each FMP, as appropriate and in consultation with the domestic and foreign fishing industry and relevant government agencies.
- Concentrate VMS programs on the enforcement of area and seasonal closures (i.e., automated, real-time reporting of vessel identification and location) until such time when the Council, NMFS, and state/territorial agencies decide that real-time reporting of fisheries and research data is desirable and feasible.
- When developing VMS programs, consider efficiency and cost-effectiveness for the fishing industry and management agencies.

The Western Pacific was 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 gathered from the VMS units in this region are the most basic, providing vessel name, position, date, and time.

In a recent review of the Western Pacific VMS program in 2010, the program appeared to be meeting the basic needs of the region's conservation and management measures. However, there were a number of issues raised concerning contracted service provider difficulties, the high operating costs of the VMS program, and data sharing arrangements which limit the VMS manager's ability to manage and use the system as well as member countries ability to conduct marine stewardship activities in their EEZ. To address these issues, a number of recommendations were included in the review. Some of these recommendations are noted below:

- Develop a central data base system to store all original VMS data received with a goal of eliminating redundant, separate satellite transmissions to multiple entities
- Move more ongoing/routine responsibilities for VMS management from the commercially-contracted service providers to trained Western and Central Pacific Fisheries Commission staff
- Update data sharing rules to allow the VMS managers, VMS operators, and technicians amongst the key players in the Western Pacific area to have full access to all the data under very strict confidentiality guidelines, and
- Reduce VMS costs by 1) reducing the amount of information transmitted, 2) ensuring correct polling rates across all vessels, 3) reduce polling rates when appropriate, and 4) reduce duplication of data transmission.

## Appendix 1

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 2

***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** *– Vessel 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 IFS 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 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 conducing 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.