

*A Business Case for the Continuance of the  
United States Coast Guard High-frequency Broadcasts of  
National Weather Service Marine Weather Forecasts*

***FINAL REPORT***

December 2007



## ***EXECUTIVE SUMMARY***

This report presents a business case for the continuance of the United States Coast Guard (USCG) high-frequency (HF) broadcasts of National Weather Service (NWS) marine weather forecasts. These broadcasts include voice, radiofacsimile, and SITOR. The broadcasts cover forecasts within Meteorological Areas IV, XII, and XVI as defined by the World Meteorological Organization.

The business case is built on public comment on questions asked in the *Federal Register* and an investigation of options for receiving marine weather information. The Request for Public Comment provided a 120-day opportunity for mariners to comment on their use of USCG HF broadcasts and other sources, the impact that discontinuance might have on their operations, and the alternatives that they might consider in case of discontinuance. The investigation of options was an activity conducted separately from the analysis of public comments. Options were compiled from sources known to the USCG and NWS and a subsequent search of the Internet for additional information. Options included alternatives mentioned in the public comments.

The Request for Public Comment drew more than 1,100 comments. The analysis determined that 821 responses were from offshore and/or high-seas operators, those who would be impacted by the loss of these broadcasts. The study received many duplicate or amplifying comments from the public. There were three times as many responses from recreational users as commercial users.

The Request for Public Comment also drew responses from vessel fleets and associations; a total of seven vessel representatives responded. Also, the NWS Marine and Coastal Weather Service Branch provided comments.

This report presents a high-level understanding of the public demand for the USCG HF broadcasts and the impact on the public if they were discontinued. To encourage maximum participation by operators, few questions were asked and the questions were open-ended. Answers to questions of concern to the research team often had to be inferred from public comments, and broad categorizations were necessary to confidently describe results.

This report concludes that:

***The responding public collectively perceives that the USCG HF broadcasts are essential to their safety. There is no viable alternative to the USCG HF broadcasts because present alternatives are perceived by the public to be out of financial reach. Also, marine weather forecasts available through these alternative sources may not guarantee the same level of accuracy, timeliness, and/or sufficiency as provided by the USCG HF broadcasts.***



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# ***1. INTRODUCTION***

## ***1.1. Purpose of the Report***

This report has been prepared for the United States Coast Guard (USCG) Spectrum Management Division (CG-622) to present a business case for assessing the demand for and impact of USCG high-frequency (HF) radio broadcasts of National Weather Service (NWS) marine weather forecasts. These broadcasts include voice, radiofacsimile, and SITOR. The report examines the demand for these broadcasts by mariners and the risk impact on them if these broadcasts are discontinued.

## ***1.2. Scope and Limitations of the Report***

The risk impact is based on the assembled comments of the public in response to a Request for Public Comment that was advertised in the *Federal Register*. The opportunity to comment was from 26 April to 24 August 2007 (120 days). The impact assessment is based on the perceived risk to the mariners who responded.

The report presents a high-level understanding of impacts. To encourage maximum participation by mariners, few questions were asked and the questions were open-ended. Answers to questions of concern to the research team often had to be inferred from public comments, and broad categorizations were necessary to confidently describe results.

## ***1.3. How the Report Is Organized***

The report consists of nine sections, which are outlined below.

- Section 1. **Introduction.** This section outlines the purpose, scope, and limitations of the report.
- Section 2. **Why Does the USCG Broadcast Marine Weather Forecasts?** This background section outlines the commitments that the United States has to transmit weather information. However, it notes that the USCG broadcasts are one of many ways in which the United States fulfills these commitments, which raises the question, “What is the demand?”
- Section 3. **Options for Receiving Marine Weather Information.** This section discusses the sources available to the mariner who operates offshore within Meteorological Areas (METAREAs) IV, XII, and XVI. The section outlines the service provided, the typical equipment and its cost, and the coverage area.
- Section 4. **Assessing Demand and Impact.** This section describes the data-collection technique and its limitations in modeling the demand for and impact (value) of USCG HF broadcasts and other sources for marine weather broadcasts.

- Section 5. **Observations.** This section presents an overview of the data-collection, conditioning, and categorization efforts and lessons learned. It discusses the data-processing issues that affect the certainty of results.
- Section 6. **Results – Responses from Mariners.** This section presents the summary data for responses that the research team could determine were from operators or owners of vessels that sail/operate offshore and/or on the high seas.
- Section 7. **Results – Responses from Groups of Mariners.** This section presents the comments received from representatives of groups of mariners (e.g., fleet offices, associations).
- Section 8. **Results – Other Comments.** This section highlights comments received from the NWS Marine Dissemination Manager. His agency is responsible for the marine weather forecasts that the USCG broadcasts. Also, this section captures public comments that were ancillary to the specific questions asked in the Request for Public Comment.
- Section 9. **Summary and Conclusions.** This section synthesizes the information contained in the previous sections to ascertain whether the public demand for USCG HF broadcasts and the value (cost-benefit) of these broadcasts (compared to known alternative sources) justify continuing these marine weather broadcasts.



## 2. WHY DOES THE USCG BROADCAST MARINE WEATHER FORECASTS?

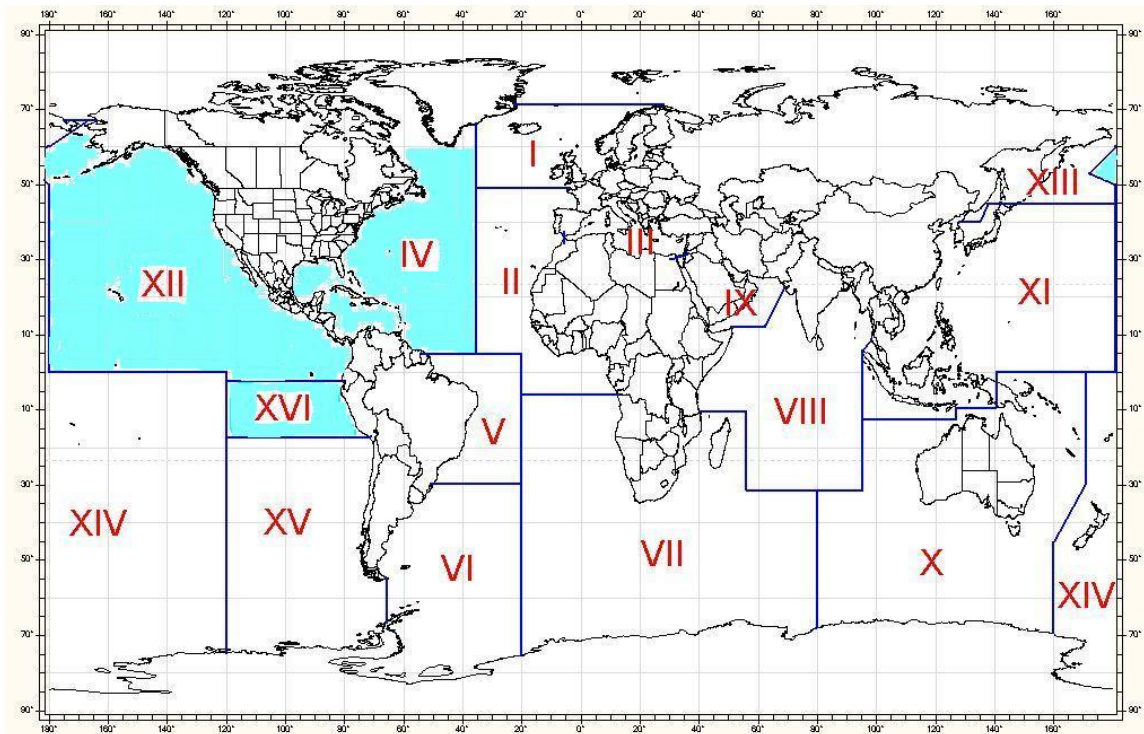
The USCG has routinely transmitted radiofacsimile and voice marine weather broadcasts by HF for decades to generations of mariners. These broadcasts meet the United States' obligation under the Safety of Life At Sea Convention (SOLAS V/5), which states:

*“ . . . Governments undertake to co-operate in carrying out . . . twice daily, by terrestrial and space radiocommunication services, weather information suitable for shipping...in text, and as far as practicable, graphic form including . . . charts transmitted by facsimile or in digital form.”*

These broadcasts are free of charge to the mariner as required by 47 U.S. Code 357, which states:

*“ . . . authorities of the U.S. shall promptly bring the (information concerning safety if at sea, including weather) received by them to the knowledge of those concerned . . . at no charge.”*

Pursuant to the SOLAS Convention (International Maritime Organization [IMO]), the World Meteorological Organization (WMO), and U.S. statutes, the NWS prepares marine weather forecasts for IMO/WMO METAREAs IV, XII, and XVI. Figure 2.1 graphically presents these significant oceanic regions.



**Figure 2.1 U.S. METAREAs of Responsibility**

- **METAREA IV:** The western part of the North Atlantic Ocean eastward of the North American coast to 35°W, from 7°N to 67°N, including the Gulf of Mexico, Caribbean Sea, and the sea area between 7°N and the South American coastline eastwards to the French Guyana/Brazil frontier in 4° 30'N
- **METAREA XII:** The eastern part of the Pacific Ocean, west of the North and South American coast and east of 120°W, from 3° 24'S to the equator, thence to 180°, to 50°N thence northwestward to 53°N 172°E, northeastward following the marine frontier between the United States and Russian Federation waters to 67°N
- **METAREA XVI:** The South Pacific Ocean between 18° 21'S and 3° 24'S bounded by the coast of Peru and 120°W

The NWS is funded to broadcast marine weather over Inmarsat-C/SafetyNET and NOAA Weather Radio, but has no funding or infrastructure to support broadcasts on HF radio. Congress authorized the USCG to cooperate with the NWS in 14 U.S. Code 147, which states:

*“In order to promote the safety of life and property on and over the high seas and waters over which the United States has jurisdiction,...the Commandant may cooperate with the (NOAA) by procuring, maintaining, and making available, facilities and assistance for . . . communicating weather phenomena and for disseminating weather data, forecasts and warnings.”*

Thus, as an agency of the United States, the USCG supports an international obligation to transmit safety information to mariners. This is done as a cooperative arrangement, and HF broadcasts are one of many ways in which NWS information is transmitted to mariners.

Because HF is considered by many to be nearing obsolescence, what is the demand for these broadcasts? To understand this question, we need to study (1) the options available to the mariner and (2) what the mariner might do if HF broadcasts were discontinued.

### **3. OPTIONS FOR RECEIVING MARINE WEATHER INFORMATION**

This section discusses options available to the mariner who operates seaward of 25 nautical miles (nm) and within the METAREAs for which the United States currently provides marine weather information. These options are compiled from sources (e.g., nongovernmental organizations, trade associations, vendors) known to the NWS and USCG and a subsequent search of the Internet for additional information. Options include alternatives reported by mariners responding to the Request for Public Comment.

The discussion of each option outlines the service provided, the typical equipment needed to receive weather information via that service, the coverage area, and the approximate purchase cost and any annual service costs. Approximate costs represent a sample of vendor products and include only major system components, which are identified in publicly available literature, as necessary for receiving and processing weather information. No installation costs are estimated. Costing a system and installation with certainty requires vessel specifics; therefore, these approximate costs should be used for preliminary comparisons between options. The three options discussed in this section are as follows:

1. USCG HF radio transmission, which includes voice, radiofacsimile, and text transmissions. USCG HF radio transmission is included as a benchmark.
2. HF radio transmission other than USCG
3. Satellite service provider transmission, which is divided between regional and international services

The options do not include offshore mobile telephones or VHF radio. Mobile telephones do not function beyond 10 miles offshore and, even where they do, the band width is too small to allow much information to be downloaded. VHF radio is unreadable beyond 25 miles or so offshore.

#### **3.1. Option #1 – USCG HF Radio Transmission**

The USCG broadcasts NWS weather forecasts and warnings using 24 HF radio transmitters (transmitting on frequencies between 3 and 30 MHz) located at 7 USCG communications stations in the United States and Guam. The range of these HF radio transmissions depends upon operating frequency, time of day, and atmospheric conditions, and varies from only short distances to several thousand miles. There are currently three types of HF radio broadcasts:

1. HF voice broadcasts are performed in the upper sideband mode using a synthesized voice known as "Iron Mike" ("Perfect Paul" retired in April 2007). This voice is very distinctive and serves as an aid in identifying and copying these weather broadcasts.<sup>1</sup>

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<sup>1</sup> <http://www.nws.noaa.gov/om/marine/home.htm>

2. HF radiofacsimile broadcasts provide graphic weather maps and other graphic images via HF radio. Maps are received using a dedicated radiofacsimile receiver or a single sideband shortwave receiver connected to an external facsimile recorder or PC equipped with a radiofacsimile interface and application software.<sup>1</sup>
3. SITOR (Simplex Teletype Over Radio) text broadcasts performed in mode B, FEC provide offshore and coastal forecasts. SITOR is also known as Narrow Band Direct Printing (NBDP). SITOR/NBDP is an automated direct-printing service similar to NAVTEX, but it does not offer the same functionality, such as avoiding repeated messages.<sup>1</sup>

Table 3.1 lists the type of equipment needed, the purchase and applicable service costs, and the covered METAREAs. Costs refer to the following types of equipment:

- HF SSB marine radios are 150W 12VDC transceivers. At the higher end are those that use digital signal processing. The examples ranged from Icom M700PRO (\$1,100) to Icom M802 (\$1,800).<sup>2</sup>
- Weather facsimile recorders are programmable 12 or 24VDC units that are maritized. The examples ranged from \$2,500 (Furuno Fax 408) to \$7,000 (Furuno Fax 410).<sup>3</sup> Furuno also has FAX 207 (a combination SSB receiver and facsimile) for \$2,300; however, it is not available through Furuno USA.
- SITOR/NAVTEX receivers are paperless 12 or 24VDC units that ranged from \$500 (Furuno NX300) to \$1,700 (Furuno NX700).<sup>3</sup>

**Table 3.1 USCG HF Radio Transmission Options**

Service Option	Equipment Needed to Receive the Transmission	Purchase Cost	Service Cost	METAREAs Covered
HF voice	HF SSB marine radio and antenna	\$1,100 to \$1,800	None	IV, XII, and XVI
HF fax	HF SSB marine radio, antenna, and facsimile recorder; or all-in-one facsimile receiver	\$2,300* to \$4,300**	None	IV, XII, and XVI
SITOR	NAVTEX receiver and antenna	\$500 to \$1,700	None	IV, XII, and XVI

\* Furuno FAX 207 all-in-one facsimile receiver

\*\* Furuno FAX 408 plus Icom M802

<sup>2</sup> [http://www.icom-marine.com/icom\\_hf\\_ssb\\_radios.htm](http://www.icom-marine.com/icom_hf_ssb_radios.htm)

<sup>3</sup> <http://www.furuno.com/Furuno/Rooms/DisplayPages/LayoutInitial?Container=com.webbridge.entity.Entity%5BOID%5BC4EFDB11D0EC414A8E83D038F9F048B4%5D%5D>

### 3.2. Option #2 – HF Radio Transmission Other than USCG

HF radio transmissions by which weather information can be accessed include voice and low baud rate data.

1. HF voice transmission other than by USCG. This mode typically leverages amateur radio, commonly referred to as "Ham" radio. Amateur radio can be operated almost worldwide; however, certain restrictions may exist, and advanced permits may be required when operating within the territorial limits of another country. Within the United States, amateur radio is regulated by the Federal Communications Commission (FCC). Among the many aspects of amateur radio, "Hams" operate several maritime "nets" where weather and other information of interest to mariners is exchanged. These nets are popular in areas of the world that have a large yachting population and where weather is dynamic, such as in the Caribbean. Weather reports are typically exchanged in voice via single sideband.<sup>1</sup>
2. HF low-speed data transmission. SSB services can provide e-mailed warnings and low baud rate weather data to the mariner. Described below are SailMail and OCENS WeatherNet services.

The SailMail Association is a nonprofit association of yacht owners that operates and maintains an e-mail communications system for use by its members. E-mail that is sent to a SailMail member's e-mail address can be seamlessly retrieved via SSB radio. SailMail has a worldwide network of SSB-PACTOR radio stations; coastal SailMail Association PACTOR stations are part of the Maritime Mobile Radio Service. The SailMail system uses e-mail transfer protocol designed for communications systems that have limited bandwidth.<sup>4</sup>

The mariner also can use OCENS WeatherNet or OCENS GRIB Explorer software (a streamlined version of the former) to access gribbed, binary data available through SSB services to obtain weather products that are highly compressed text, images, charts, buoy data, etc.<sup>5</sup> WeatherNet offers 7-day text forecasts and 0.25 degree GRIBs for the METAREAS of concern. WeatherNet Alaska provides 72-hour forecasts for wind, waves, and precipitation; surface analysis charts; North Pacific 500mb charts; Alaska satellite images; Bering Sea ice analysis charts; and Bering Sea ice forecast charts.<sup>6</sup>

Table 3.2 lists the type of equipment needed, the purchase and applicable service costs, and the covered METAREAS. Costs refer to the following types of equipment and services:

- HF SSB marine radios are 150W 12VDC transceivers. The voice option uses the same examples as those in Table 3.1. The HF e-mail and low baud rate data options considered transceivers that had digital signal processing.

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<sup>4</sup> <http://www.sailmail.com>

<sup>5</sup> <http://www.ocens.com/globalstar/usa/wxnet.htm?gusa>

<sup>6</sup> November 2005 OCENS press release; see [http://www.ocens.com/press\\_release.htm](http://www.ocens.com/press_release.htm)

- Modems covered PACTOR II and PACTOR III modes. For HF e-mail, the examples ranged from the SCS PTC-IIex PACTOR Modem (\$740) to the SCS PTC-IIex Modem with PACTOR III Mode License (\$890). For low baud rate data, the examples ranged from SCS PTC-IIusb PACTOR Modem (\$950) to SCS PTC-IIusb Modem with PACTOR III License (\$1,100).<sup>7</sup> Some vendors package the transceiver and PACTOR modem together, such as the Furuno FS1503EM (\$2,500)<sup>8</sup>
- Computers are 2.0 GHz, Windows XP®-based processors, and 12-inch LCD monitors warranted to work within the marine environment (i.e., marinized). The examples range from \$3,800 (MarineNav Nautilus Elite, which includes monitor)<sup>9</sup> to \$4,600 (MarinePC MPC-M2 processor costing \$1,600 plus MPC-AWM12R monitor costing \$3,000).<sup>10</sup>
- OCENS WeatherNet service is a yearly subscription (\$100) and charges the mariner for specific data downloads. The subscriber fee is included; however, no estimate is given for downloads, which can range from \$0.15 to \$1.00 each (as advertised in August 2003 press releases). GRIB Explorer software (\$200) facilitates receipt of compressed data files, so its price is included in equipment costs.

**Table 3.2 HF Radio Transmission Options Other than USCG**

Service Option	Equipment Needed to Receive the Transmission	Purchase Cost	Service Cost	METAREAs Covered
HF voice other than USCG	HF SSB marine radio	\$1,100 to \$1,800	None	IV, XII, and XVI
HF e-mail	HF SSB marine radio and modem	\$2,500* to \$2,700**	\$250 per year (SailMail)	IV, XII, and XVI
HF low-speed data	HF SSB marine radio, <sup>***</sup> modem, marinized computer, and OCENS software	\$6,800 to \$7,700	\$350 per year (SailMail plus OCENS)	IV, XII, and XVI

\* Furuno FS1503EM

\*\* SCS PTC-IIex plus Icom M802

\*\*\* Icom M802

### 3.3. Option #3 – Commercial Satellite Transmission

Weather information can be accessed through subscriptions to satellite providers, which provide either (1) regional service (primarily covering the continental land mass with its footprint extending offshore) or (2) international service (global coverage).

<sup>7</sup> <http://www.yachtwire.com/webstore/index.html?c5.html&1>

<sup>8</sup> [http://www.furuno.com/Furuno/Rooms/DisplayPages/LayoutInitial?Container=com.webridge.entity.Entity\[OID\[D1A092372802754E8751F9FFAA38612C\]\]](http://www.furuno.com/Furuno/Rooms/DisplayPages/LayoutInitial?Container=com.webridge.entity.Entity[OID[D1A092372802754E8751F9FFAA38612C]])

<sup>9</sup> [http://www.marinenav.ca/prod\\_comparisons.html](http://www.marinenav.ca/prod_comparisons.html)

<sup>10</sup> <http://www.marinepc.com/pdfs/PriceList.pdf>

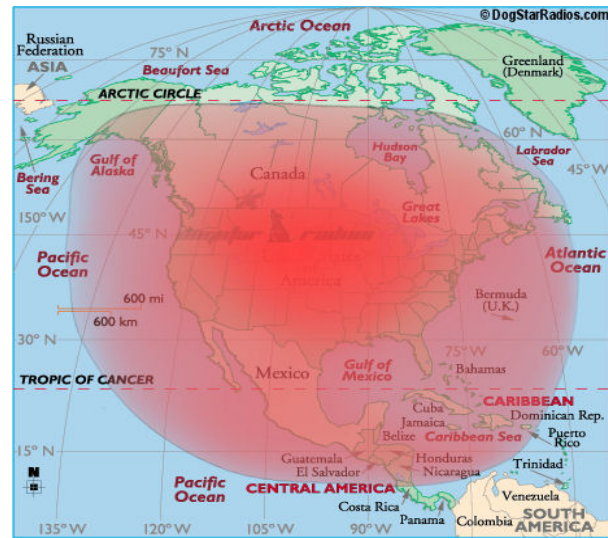
### 3.3.1 Regional Satellite Service Providers

Regional satellite service providers include companies such as XM and Sirius. Figures 3.1 and 3.2 show the advertised coverage areas for both XM and Sirius service.

Figure 3.1 XM Coverage Area<sup>11</sup>



Figure 3.2 Sirius Coverage Area<sup>11</sup>



XM Weather. Most services provided by XM include real-time data reports that are updated about every 12 minutes. Reports that may be of interest to mariners are NOAA buoy observations; NWS hurricane tracks; NWS marine zone, high seas, and offshore forecasts; surface analysis charts; large-scale surface (10 meters above sea level) wind speed and direction maps; wave height based on the nearest hour forecast of highest waves; and mean wave direction based on the nearest forecast. All forecasts do not extend beyond 36-hour outlooks.<sup>12</sup>

Table 3.3 lists the type of equipment needed, the purchase and applicable service costs, and the covered METAREAS. Service has a one-time \$50 activation fee. Costs refer to the following types of equipment and services:

- Typical equipment for XM Weather service includes a digital receiver, an antenna, and a display device, usually a marinized computer. WxWorx on Water is required software to display the XM Weather Satellite Service products. The receiver, antenna, and software are bundled by WxWorx (\$1000).<sup>13</sup> For this option we used the same marinized computers as in Table 3.1 to price equipment costs.
- XM Weather service offers four weather data packages: Skywatch, Fisherman, Sailor, and Master Mariner. The master mariner package (\$50/month) provides near real-time and forecast data and hurricane tracks. The Fisherman and Sailor packages (\$30/month)

<sup>11</sup> <http://www.dogstarradios.com/sirasasecoma.html>

<sup>12</sup> [http://www.xmradio.com/pdf/existing/weather/xmwm\\_productdefs.pdf](http://www.xmradio.com/pdf/existing/weather/xmwm_productdefs.pdf)

<sup>13</sup> [http://store.wxworx.com/Merchant2/merchant.mvc?Screen=PROD&Product\\_Code=WP&Category\\_Code=99](http://store.wxworx.com/Merchant2/merchant.mvc?Screen=PROD&Product_Code=WP&Category_Code=99)

are limited to near real-time observations and marine weather statements and warnings. Skywatch (\$10) provides even less information. We used the Master Mariner package pricing for service costs.<sup>14</sup>

**Table 3.3 XM Satellite Service Provider Option**

<b>Equipment Needed to Receive the Transmission</b>	<b>Purchase Cost</b>	<b>Service Cost</b>	<b>METAREAs Covered</b>
Receiver, antenna, WxWorx software, and marinized computer	\$4,800 to \$5,600	\$50 per month	IV and XII (in limited areas only)

Sirius Marine Weather. Similar to XM, Sirius offers a variety of weather reports, including the following: weather radar, tropical storm tracks, sea surface temperature, storm cell tracks, marine zone forecasts, tropical statements, marine observations and buoy reports, cloud cover and height, and wave forecasts.

Table 3.4 lists the type of equipment needed, the purchase and applicable service costs, and the covered METAREAs. Service requires a one-time \$50 activation fee. Costs refer to the following types of equipment and services:

- Typical equipment costs for Sirius Marine Weather service includes a digital receiver, antenna, and a display device, usually a marinized computer. WxMate is required software to display the Sirius Weather products. The receiver, antenna, and software are bundled by AirGator (\$1,300).<sup>15</sup> For this option we used the same marinized computers as in Table 3.1 to price equipment costs.
- The Sirius Marine Weather subscriber service is offered at three levels: Mariner service (\$30/month) provides near real-time data and limited forecast data (out to 3 hours). Voyager service (\$60/month) provides Mariner service data and forecasts out to 24 hours. Professional service (\$100/month) provides Voyager service and forecasts out to 96 hours. For pricing purposes only the Voyager and Professional services are used.<sup>16</sup>

**Table 3.4. Sirius Marine Weather Service Provider Option**

<b>Equipment Needed to Receive the Transmission</b>	<b>Purchase Cost</b>	<b>Service Cost</b>	<b>METAREAs Covered</b>
Receiver, antenna, WxMate software, and marinized computer	\$5,100 to \$5,900	\$60 to \$100 per month	IV and XII (in limited areas only)

<sup>14</sup> [http://www.xmradio.com/weather/ma\\_service\\_pricing.xmc](http://www.xmradio.com/weather/ma_service_pricing.xmc)

<sup>15</sup> [http://www.wxmate.com/component/page,shop.browse/category\\_id,5/option,com\\_virtuemart/Itemid,50/](http://www.wxmate.com/component/page,shop.browse/category_id,5/option,com_virtuemart/Itemid,50/)

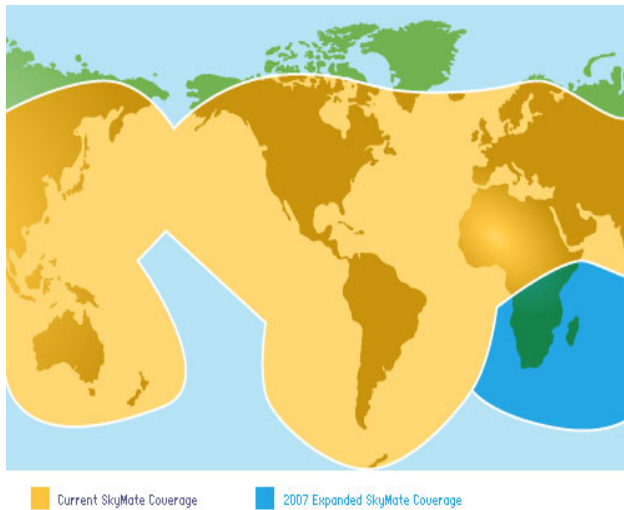
<sup>16</sup> [http://www.sirius.com/wi/i/marineweather/marine\\_faq.html](http://www.sirius.com/wi/i/marineweather/marine_faq.html)



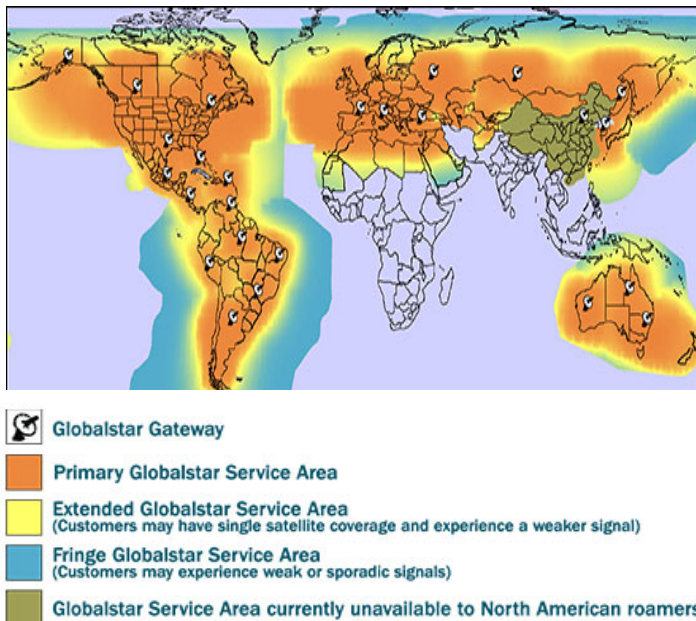
### 3.3.2 International Satellite Service Providers

International satellite service providers include companies such as Skymate, Inmarsat, Globalstar, and Iridium. Figures 3.3, 3.4, and 3.5 show the advertised coverage areas for Skymate, Globalstar, and Inmarsat. Iridium advertises that its coverage includes oceans and all land areas, including the poles.

**Figure 3.3 Skymate Coverage Area<sup>17</sup>**



**Figure 3.4 Globalstar Coverage Area<sup>18</sup>**

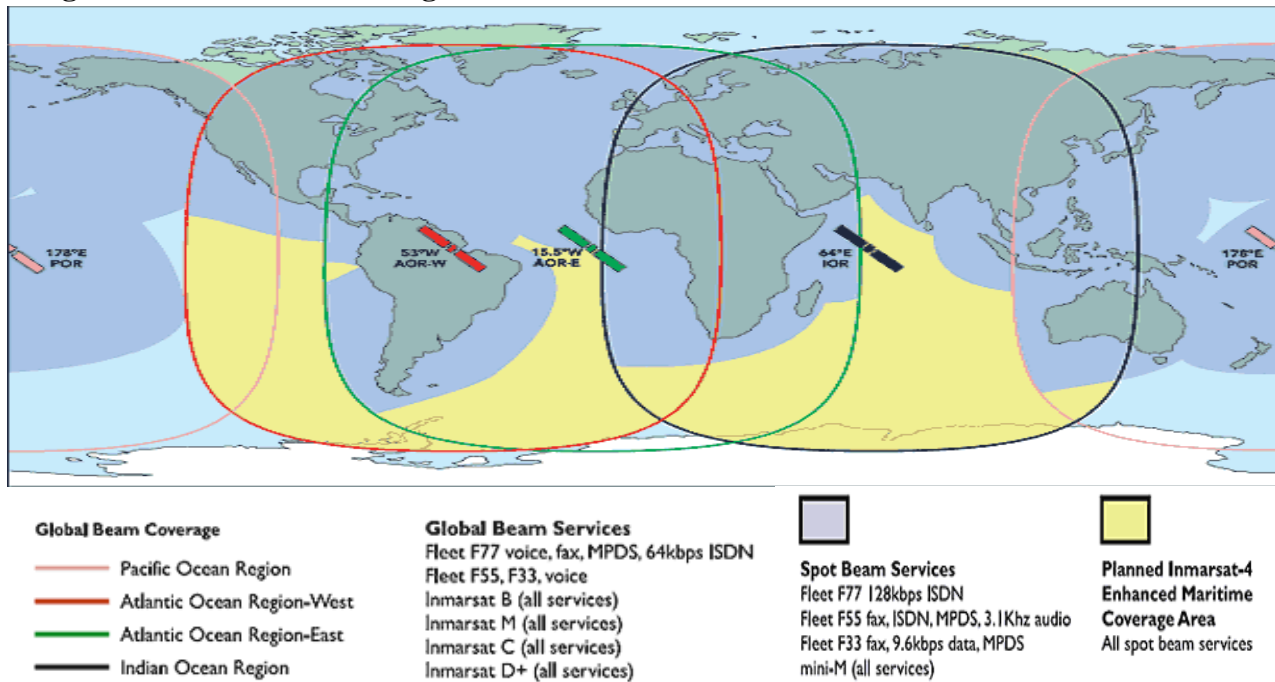


Coverage may vary. Map denotes coverage for voice and Direct Dial-Up data calls only.

<sup>17</sup> [http://www.skymate.com/coverage\\_map.html](http://www.skymate.com/coverage_map.html)

<sup>18</sup> <http://www.globalstarusa.com/en/content.php?cid=300>

**Figure 3.5 Inmarsat Coverage Area<sup>19</sup>**



International satellite service can be divided into three categories: voice and low baud rate services, text services, and high-speed and voice services.

Voice and low-speed data transmission. Voice and low-speed data service providers include Iridium, Globalstar, and Inmarsat Mini-M. These satellite telephone systems can make calls to nearly anywhere; however, they are limited to 2400 baud rates. Table 3.5 lists the type of equipment needed, the purchase and applicable service costs, and the covered METAREAs. Services are separated between voice and data services.

- Voice requires only the phone and subscriber service. Example phones had literature that implied they were suitable for the marine environment. Globalstar and Iridium had numerous service plans (i.e., bundled minutes). Examples give the minimum bundled minutes that appear practical for the mariner who uses the phone exclusively for weather information.
- Low baud rate data also requires a marinized computer with telephone modem and weather data subscriber service and software. For this option we used the example computers previously used to cost options in Tables 3.2, 3.3, and 3.4. The example weather data subscriber service and software are the OCENS WeatherNet and GRIB Explorer, respectively, which were previously described under Option #2, HF low baud rate data.

<sup>19</sup> <http://www.inmarsat.com/Support/Coverage/BGAN.aspx>

**Table 3.5 International Satellite Service Provider Voice and Low Baud Rate Data Options**

Service Option	Equipment Needed to Receive the Transmission	Purchase Cost	Service Cost	METAREAS Covered
Globalstar voice	GSP 1700 phone	\$1,000 <sup>20</sup>	\$65/month with first 150 minutes free; \$1/min thereafter <sup>21</sup>	IV, XII, and XVI
Iridium voice	9505A phone	\$1,400 <sup>22</sup>	\$150/month with first 100 minutes free; \$1.10/min thereafter <sup>22</sup>	IV, XII, and XVI
Inmarsat Mini-M voice	HN6-9201 phone	\$2,500 <sup>23</sup>	\$1.90 to \$2.10 per minute <sup>24</sup>	IV, XII, and XVI
Globalstar low-speed data	Phone, modem, software, and marinized computer	\$5,000 to \$5,800	Globalstar charges plus \$100/year (OCENS)	IV, XII, and XVI
Iridium low-speed data	Phone, modem, software, and marinized computer	\$5,400 to \$6,200	Iridium charges plus \$100/year (OCENS)	IV, XII, and XVI
Inmarsat Mini-M low-speed data	Phone, modem, software, and marinized computer	\$6,500 to \$7,300	Inmarsat charges plus \$100/year (OCENS)	IV, XII, and XVI

Text transmission. Text services include Inmarsat C (including mini-C) and Orbcomm.

- Inmarsat C supports SafetyNET, an international service for broadcasting meteorological warnings/forecast text messages. It is recognized by the IMO Global Maritime Distress and Safety System (GMDSS) and can be viewed as comparable to USCG SITOR broadcasts. SafetyNET data are available at no charge. However, Inmarsat C is a 1200 baud (600 baud throughput) store and forward data system. Inmarsat found a way to put weather charts on Inmarsat C. It has filed under DMS.
- Orbcomm’s satellite system is similar to Inmarsat C, but Skymate, which is the company that offers services to the mariner through the Orbcomm system, has no comparable service as SafetyNET. Rather, Skymate provides on-demand NWS warning messages and specific point forecasts.

Table 3.6 lists the type of equipment needed, the purchase and applicable service costs, and the covered METAREAS.

- Typical equipment costs are for the receiver, antenna, software, and marinized computer. The equipment examples considered for these services are the Furuno FELCOM16 Inmarsat Mini-C Mobile Earth Station with Ship Security Alert System (\$2,300)<sup>25</sup> and

<sup>20</sup> [http://www.outfittersatellite.com/adobe/globalstar\\_adobe.pdf](http://www.outfittersatellite.com/adobe/globalstar_adobe.pdf)

<sup>21</sup> [http://gitsat.com/docs/Globalstar/GIT\\_GlobalstarAirtime04.01.05.pdf](http://gitsat.com/docs/Globalstar/GIT_GlobalstarAirtime04.01.05.pdf)

<sup>22</sup> [http://www.outfittersatellite.com/adobe/iridium\\_mot\\_adobe.pdf](http://www.outfittersatellite.com/adobe/iridium_mot_adobe.pdf)

<sup>23</sup> [http://www.outfittersatellite.com/adobe/BGAN\\_HNS9201.pdf](http://www.outfittersatellite.com/adobe/BGAN_HNS9201.pdf)

<sup>24</sup> [http://www.orbitresearch.co.uk/docs/phone\\_costs.html](http://www.orbitresearch.co.uk/docs/phone_costs.html)

<sup>25</sup> <http://www.furuno.com/Furuno/Rooms/DisplayPages/LayoutInitial?ProductCategory=com.webridge.entity.Entity%5B0ID%5B8F2CA644EB68B24986BFE7568ED9B674%5D%5D&Product=com.webridge.entity.Entity%5B0ID>

Skymate 100 (\$1,200).<sup>26</sup> We again used computers previously costed for Tables 3.2, 3.3, 3.4, and 3.5.

- Subscription service for Skymate has four levels: Drydock, Silver, Gold, and Platinum. The two highest levels permit receipt of 20,000 and 50,000 characters per month and cost \$35 and \$70 per month, respectively. Skymate estimates that NWS text warnings consume 1,000 characters per report; therefore, these represent the minimum range of service appropriate for mariners.<sup>24</sup> Inmarsat charges per the minute based on baud rate; 2400 baud data rate is \$1.95 per minute.<sup>27</sup>

**Table 3.6 International Satellite Service Provider Text Options**

Service Option	Equipment Needed to Receive the Transmission	Purchase Cost	Service Cost	METAREAs Covered
Orbcomm text	Receiver, antenna, and marinized computer	\$5,000 to \$5,800	\$35 to \$70 per month	IV, XII, and XVI
Inmarsat Mini-C text	Receiver, antenna, and marinized computer	\$6,100 to \$6,900	\$2.00 per minute	IV, XII, and XVI

High-speed data transmission. High speed is between 56,000 and 124,000 baud rates. These rates are achieved by the Inmarsat Fleet series (Inmarsat B), which can offer the equivalent of weather facsimile service that is of higher quality than currently available by HF radio. Of the Inmarsat Fleet series, only the Nera Fleet 33 (\$8,600) is designed for smaller vessels. There is no monthly subscriber fee; rather the user pays for a 9,600 baud rate (\$3.35 per minute). NWS weather information can be accessed through the Internet.<sup>28</sup>

Table 3.7 lists the type of equipment needed, the purchase and applicable service costs, and the covered METAREAs. Typical equipment costs are for the receiver, antenna, and marinized computer. Again we used computers previously costed for Tables 3.2, 3.3, 3.4, 3.5, and 3.6.

**Table 3.7. International Satellite Service Provider High-speed Data Option**

Equipment Needed to Receive the Transmission	Purchase Cost	Service Cost	METAREAs Covered
Receiver, antenna, and marinized computer	\$12,000 to \$13,000	\$3.40 per minute	IV, XII, and XVI

### 3.4. Summary Costs for Options

Table 3.8 lists the approximate equipment procurement and annual service cost ranges and the estimated 10-year cost range for the three primary options and their suboptions. These ranges

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%5BFEB699D2BF288E4A925DAB3A89E326B9%5D%5D&Container=com.webridge.entity.Entity%5B0ID%5B942306466D81D0458E1F92F94D4885B6%5D%5D

<sup>26</sup> [http://www.skymate.com/user\\_groups/recreational\\_boating.html](http://www.skymate.com/user_groups/recreational_boating.html)

<sup>27</sup> <http://www.satphonestore.com/index.cfm?page=itemdetail&ID=277>

<sup>28</sup> <http://www.satphonestore.com/index.cfm?page=fleet>

use the lowest minimum and highest maximum costs described in the previous sections. The information in Table 3.8 comes from data in Tables 3.1 through 3.7.

Table 3.8 approximates the costs incurred by the commercial mariner who has a constant need for marine weather information. The estimates assume that (1) prices do not change over the 10-year period and (2) equipment is replaced once during the 10-year period. For subscriber plans that have a per-minute charge, the standard usage rate is assumed to be 150 minutes per month.

**Table 3.8 10-year Projected Cost for Each Option (Assumes Constant Use)**

Option	Compiled from Information in Table #	Equipment Procurement Cost	Annual Service Cost	10-year Cost	METAREAS Covered
		A	B	= (2 * A) + (10 * B)	
1.1 HF voice by USCG	3.1	\$1,100 to \$1,800	None	\$2,200 to \$3,600	IV, XII, and XVI
1.2 HF facsimile by USCG	3.1	\$2,300 to \$4,300	None	\$4,600 to \$8,600	IV, XII, and XVI
1.3 HF SITOR (text) by USCG	3.1	\$500 to \$1,700	None	\$1,000 to \$3,400	IV, XII, and XVI
2.1 HF voice by other than USCG	3.2	\$1,100 to \$1,800	None	\$2,200 to \$3,600	IV, XII, and XVI
2.2 HF e-mail (text) by other than by USCG	3.2	\$2,500 to \$2,700	\$250	\$7,600 to \$7,900	IV, XII, and XVI
2.3 HF low-speed data by other than USCG	3.2	\$6,800 to \$7,700	\$350	\$17,000 to \$19,000	IV, XII, and XVI
3.1 Satellite text and low-speed data	3.3 and 3.4	\$4,800 to \$5,900	\$600 to \$1,200	\$16,000 to \$24,000	IV and XII (in limited areas only)
3.2 Satellite voice	3.5	\$1,000 to \$2,500	\$780 to \$3,800	\$9,800 to \$43,000	IV, XII, and XVI
3.3 Satellite low-speed data	3.5	\$5,000 to \$7,300	\$880 to \$3,900	\$19,000 to \$53,000	IV, XII, and XVI
3.4 Satellite text	3.6	\$5,000 to \$6,900	\$420 to \$3,600	\$14,000 to \$50,000	IV, XII, and XVI
3.5 Satellite high-speed data	3.7	\$12,000 to \$13,000	\$6,100	\$86,000 to \$88,000	IV, XII, and XVI

Many recreational mariners will have a seasonal demand for marine weather. Their approximate costs for seasonal usage is about half of the 10-year costs listed in Table 3.8. This estimate assumes that (1) seasonal demand for marine weather information is constant for 6 months, (2) equipment is not replaced during the 10-year period, and (3) prices do not change during the 10-year period. The cost model does not include nominal service costs that may be charged by service providers when service is not needed. For subscriber plans that have a per-minute charge, the standard usage rate is assumed to be 150 minutes per month.



## **4. ASSESSING DEMAND AND IMPACT**

This section describes the strategy available to the research team to collect data about the demand for and impact (value) of USCG HF broadcasts and other sources of marine weather forecasts. It outlines analytical constraints imposed by the Government's data-gathering objectives. This helps the reader understand the type, breadth, and depth of questions asked of vessel operators. The section presents those questions and concludes with a discussion of the limitations imposed by the data-gathering technique to model demand and impact.

### **4.1 Data-gathering Strategy**

To ascertain the current demand for and value of USCG and other sources of marine weather forecasts, a desirable data-collection schema would be to append requests to the end of these broadcasts asking the vessel operator to acknowledge receipt and provide specific comments. Also, comments gathered from operators would be required to answer specific questions, and completion of a survey form would be ideal. Although desirable, this customer survey approach had a significant drawback.

The above approach is governed by the Paperwork Reduction Act (PRA) of 1995. The PRA requires that any customer satisfaction survey requested of 10 or more people by a federal agency be reviewed and approved by the Office of Management and Budget (OMB). The review is a lengthy process that would have delayed delivery of the business case well after the date desired by CG-622.

Consequently, CG-622 selected a different approach, announcing that the USCG was accepting comments from the public (the announcement was not sent specifically to vessel operators). This was accomplished by posting a notice, Request for Public Comment, in the *Federal Register*. The questions that were used to guide public comment were open-ended. This approach did not require OMB review. Even so, the time between the research team's submission of the notice and it being published was 140 calendar days.

The notice was published in the *Federal Register* (Volume 72, Number 80) on 26 April 2007; a reprint appears in Appendix A. The notice and subsequent comments were tracked under Docket Number USCG-2007-27656. Public comments were accepted for 120 days from 26 April to 24 August 2007. The public submitted comments to the U.S. Department of Transportation (U.S. DOT) Docket Management Facility by Internet, mail, facsimile, or courier. All comments were converted to electronic text or .pdf files and stored in the U.S. DOT Docket Management System.

Immediately following the 26 April notice, CG-622 and the NWS Marine and Coastal Weather Services Branch (W/OS21) notified their respective liaisons about the Request for Public Comment. These liaisons included the organizations listed in Table 4.1. The notice also appeared in maritime news articles published by Government watchdogs (e.g., Holland and Knight).

**Table 4.1 Organizations Notified About the Request for Public Comment by CG-622 and W/OS21**

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• Boat U.S.	• W/OS21 e-mail list of radiofacsimile users
• Fishing Vessel Safety Advisory Committee	• W/OS21 e-mail list of weather broadcast users
• International Association for Marine Electronics Companies	• Participants in the NOAA Volunteer Observing Ships Program
• Maritime Institute of Technology and Graduate Studies	• Radio Technical Commission for Maritime Services
• National Boating Safety Advisory Committee	• SEA TOW
• National Marine Electronics Association	• Seven Seas Cruising Association
• NOAA ships	• Towing Vessel Safety Advisory Committee
• W/OS21 e-mail list of commercial vendors	• USCG Auxiliary
• W/OS21 e-mail list of electronics magazine editors	• World Meteorological Organization

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**4.2. Data-gathering Objectives and Constraints**

To facilitate response and maximize the number of comments received by vessel operators, the CG-622 limited the questions to eight brief, easily understood, open-ended ones that could be answered quickly with minimal effort.

**4.3. Data-gathering Questions**

Eight questions were included in the Request for Public Comment. Table 4.2 lists (1) those questions, (2) how comment data were used in this analysis, and (3) how those questions were referenced in Section 6.

**4.4. Limitations in Assessing Demand and Impact**

The approach (Request for Public Comment) produces a limited picture of the demand for and value of USCG HF broadcasts. The comments received are from members of the public who (1) were informed of the notice, (2) had the ability to respond, and (3) took time to respond. Therefore, the responses are neither random nor a representative sample. Any extrapolation of the results to the population of mariners would have high uncertainty.

The questions ask for comments that do not define well the weather-related risks of responding operators. For example, two operators may give similar answers to Question 8 in Table 4.2; however, their risks may be different if they are affected by different weather patterns. Consequently, there is high uncertainty in equating the perceived impacts between responding operators. Regardless, the report assumes that all offshore and high-seas operators are equally at risk.



**Table 4.2 Questions Posed to the Public and How Public Comments Were Used in This Report**

Question Appearing in the Request for Public Comment	How the Data Were Used in This Analysis	How the Question Is Referred to in This Report
<p>Question 1. Please indicate your position in the maritime community. Please be as specific as possible, e.g., captain of 600' oil tanker, 1<sup>st</sup> mate of 500 unit containership, owner/operator of 45' cruising sailboat, fleet manager of a 27 vessel shipping company, yacht delivery captain, etc.</p>	<p>Answers were used to assemble a valid set of responses for further risk analysis (i.e., responses from vessel operators/owners).</p> <p>The research team used the MISLE-defined vessel service types as a sorting tool. These service types were rolled up under more general categories as shown in Appendix B. The tool and comment data helped the research team designate vessels as either commercial or recreational.</p> <p>Comments from persons who indicated that they represented more than one vessel received the same weight as an individual who owned or operated a single vessel.</p> <p>Comments not from any of the above were separately considered by the research team.</p>	<p>Who are they? See Subsection 6.1.</p> <p>Comments from individuals who represented more than one vessel are in Section 7.</p> <p>Other public comments appear in Section 8.</p>
<p>Question 2. What are your primary sources for obtaining marine weather forecasts? (For example, Inmarsat-C/SafetyNet, USCG HF radio broadcasts, USCG MF Radio Broadcasts, USCG VHF radio broadcasts, NOAA Weather Radio, NAVTEX, shoreside Internet, radio/television, or any commercial service/system.)</p>	<p>Answers were used to identify the current ways in which vessel operators received marine weather forecasts.</p> <p>Operators who responded that they primarily used MF, VHF, shoreside Internet, and/or radio/television could be operating nearshore, and their responses were closely reviewed before being counted with other offshore operators.</p> <p>Many offshore operators listed more than one source as primary. The research team counted all sources that the operator listed.</p>	<p>What are their primary sources for obtaining weather forecasts? See Subsection 6.3.</p>

**Table 4.2 Questions Posed to the Public and How Public Comments Were Used in This Report (cont'd)**

Question Appearing in the Request for Public Comment	How the Data Were Used in This Analysis	How the Question Is Referred to in This Report
<p>Question 3. Do you use Coast Guard HF radio voice broadcasts to receive marine weather forecasts? (Yes or No) If yes, how often do you use USCG HF voice broadcasts and how critical are they to your safety and operation as compared to the other sources you listed in your response to Question 2?</p>	<p>Answers to the first question were used to identify the number of offshore operators who depend on the particular USCG broadcast. It was also used to calculate the estimated total cost for the responding offshore operators to convert to other available sources if the HF transmissions were discontinued.</p> <p>The second question (How often do the offshore operators use the broadcast?) was seldom answered in a manner that gave enough data for assigning usage rates. The report lists sample comments. Cost calculations used in the conclusions have to assume that the operators who use broadcasts will request them as often as needed (and as affordable) to safely navigate offshore.</p>	<p>Do they use USCG HF broadcasts (i.e., voice, radiofacsimile, and/or SITOR)? See Subsection 6.4.</p> <p>How often do they use USCG HF broadcasts? See Subsection 6.4.1.</p>
<p>Question 4. Do you use Coast Guard HF radiofax broadcasts to receive marine weather forecasts? (Yes or No) If yes, how often do you use Coast Guard HF radiofax broadcasts and how critical are they to your safety and operation as compared to the other sources you listed in your response to Question 2?</p>	<p>The third question (How critical is each type of USCG broadcast as compared to the other sources listed in Question 2?) was also seldom answered in a manner that permitted quantitative comparisons. Most vessel operators stated or implied that USCG broadcasts they received were “critical” or “important” to them.</p>	<p>How critical are the USCG HF broadcasts as compared to other sources that they use? See Subsection 6.4.2.</p>
<p>Question 5. Do you use Coast Guard HF radio Simplex Teletype over Radio (SITOR) (also known as Narrow Band Direct printing (NBDP)) to receive marine weather forecasts? (Yes or No) If yes, how often do you use Coast Guard SITOR radio broadcasts and how critical are they to your safety and operation as compared to the other sources you listed in your response to Question 2?</p>		

**Table 4.2 Questions Posed to the Public and How Public Comments Were Used in This Report (cont'd)**

Question Appearing in the Request for Public Comment	How the Data Were Used in This Analysis	How the Question Is Referred to in This Report
<p>Question 6. What alternative source(s) for obtaining marine weather forecasts would you pursue if Coast Guard HF broadcasts were no longer available? How would you rate the alternative source(s) in terms of (a) user cost and (b) usefulness of the information as compared to the Coast Guard HF broadcast it replaces?</p>	<p>Answers to the first question were used to estimate the number of operators who are prepared and not prepared to shift to alternative sources for marine weather forecasts. The result may indicate whether more outreach is needed to educate operators.</p> <p>Answers were cross-referenced with Question 7 answers that indicated "...discontinuance of USCG HF broadcasts will not significantly impact vessel operations." The results compare the operators' perceived ability to manage weather risk to their knowledge of other sources for acquiring weather information.</p>	<p>Do they have an alternative source for marine weather forecasts? See Subsection 6.6.</p>
	<p>Answers to the second question were used to score options listed in Section 2 in terms of perceived affordability and usefulness to the operators.</p>	<p>What concerns do they have about the alternative sources for marine weather forecasts? See Subsection 6.7.</p>
<p>Question 7. Would the loss of Coast Guard HF marine weather broadcasts impact you? Please explain.</p>	<p>Answers were used to identify whether there were significant impacts perceived by the vessel operators and how the vessel operators might address their situations.</p> <p>Answers were cross-referenced with Question 2 answers that indicated that operators used weather information other than that supplied by USCG HF broadcasts. The result compares the operators' perceived ability to manage weather risk to their experience in using other sources for acquiring weather information.</p>	<p>How would the loss of USCG HF broadcasts impact them? See Subsection 6.5.</p>
<p>Question 8. How far seaward does your vessel primarily operate (i.e., coastal [0-25nm seaward], offshore [25-200nm seaward], or high seas [greater than 200nm])? In what geographic area(s) do you generally operate your vessel? (For example, mid-Atlantic, New England, North Central Pacific, Hawaii, Gulf of Mexico, etc.)</p>	<p>Answers were used to identify offshore operators (i.e., high seas and offshore). Vessels that were only in coastal transit were not included in the set of valid responses.</p> <p>Geographic names that were outside METAREAs IV, XII, and XVI were excluded, with the exception of the Great Lakes. Because of transmitter location, METAREA IV was subdivided between Atlantic and Caribbean/Gulf of Mexico.</p>	<p>Where do they sail/operate? See Subsection 6.2.</p>



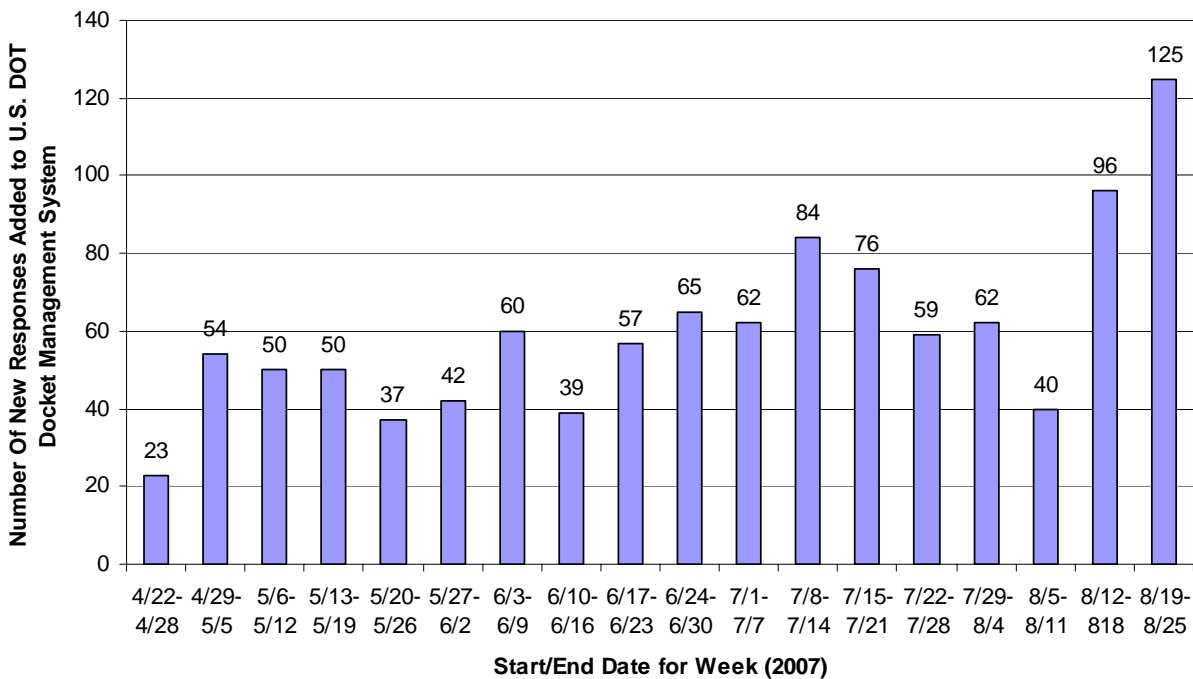
## 5. OBSERVATIONS

This section presents an overview of the data-processing effort, which includes data collection, conditioning, and categorization. It points out data-related issues that affect the certainty of results that appear in Section 6. The section concludes with a summary of public comments that were received about the data-gathering strategy.

### 5.1. Data Collection and Validation

The 120-day period for public comment, which extended from 26 April through 24 August 2007, resulted in 1,111 comments being posted on Docket Number USCG-2007-27656. The research team downloaded 1,081 public comments that had been posted to the Docket as of 5:00 p.m. on 24 August 2007, and used those comments for this study.

Figure 5.1 depicts the number of comments received weekly. The submission rate for comments increased after the first month, with the greatest number of submissions coming in the last 2 weeks of the period.



**Figure 5.1 Weekly Rate of Public Comments Submitted to the Docket Management Facility**

Of the 1,081 comments reviewed by the research team, 165 were duplicate or amplifying submissions from responders. Some responders sent in their comments more than once, most likely to ensure receipt or to emphasize their concerns. Other responders sent supplemental comments that the research team combined with their previous submissions. Many of the

supplemental comments were triggered by the research team writing back to the responders asking for additional information. Responders who had not adequately answered Questions 1 and 8 (i.e., demographics) were targeted. Appendix C is the form letter that the research team sent to 458 responders.

Of the remaining 915 comments ( $1,081 - 165 = 915$ ), 821 comments appeared to be from offshore and high-seas vessel operators. The 95 comments that were screened by the research team were read in their entirety and could be categorized as one of the following.

- From persons (26 responses) who wrote comments that did not directly or indirectly address any of the questions asked by the Request for Public Comment
- From persons (64 responses) who were vessel operators who stated or implied that they sailed/operated near shore (i.e., within 25 nm of the coast). Many of these comments addressed the use of VHF sources for their marine weather broadcasts.
- From vendors (5 responses)

The 821 responses that the research team attributed to offshore and high-seas vessel operators (hereafter referred to as vessel operators) were the data set used to categorize answers to the questions in Table 4.2.

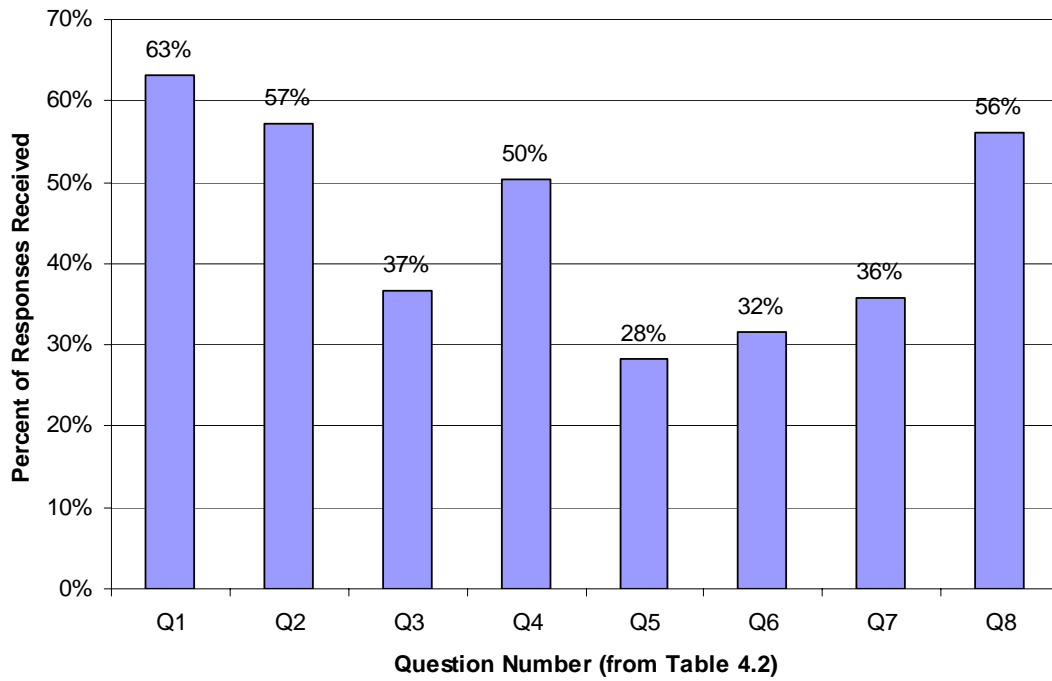
Ideally, each vessel operator would have answered all the questions in Table 4.2. However, the Request for Public Comment process could not impose this requirement. So only about 22% (179 responders) answered all or nearly all the questions.

Figure 5.2 shows how complete (i.e., the number of questions that each responder answered) the comments were. Figure 5.2 credits comments that directly answered questions; no credit is given for implied answers. So, Figure 5.2 shows that 33% of the vessel operators did not directly answer any question;<sup>29</sup> about 39% answered at least half of the questions.

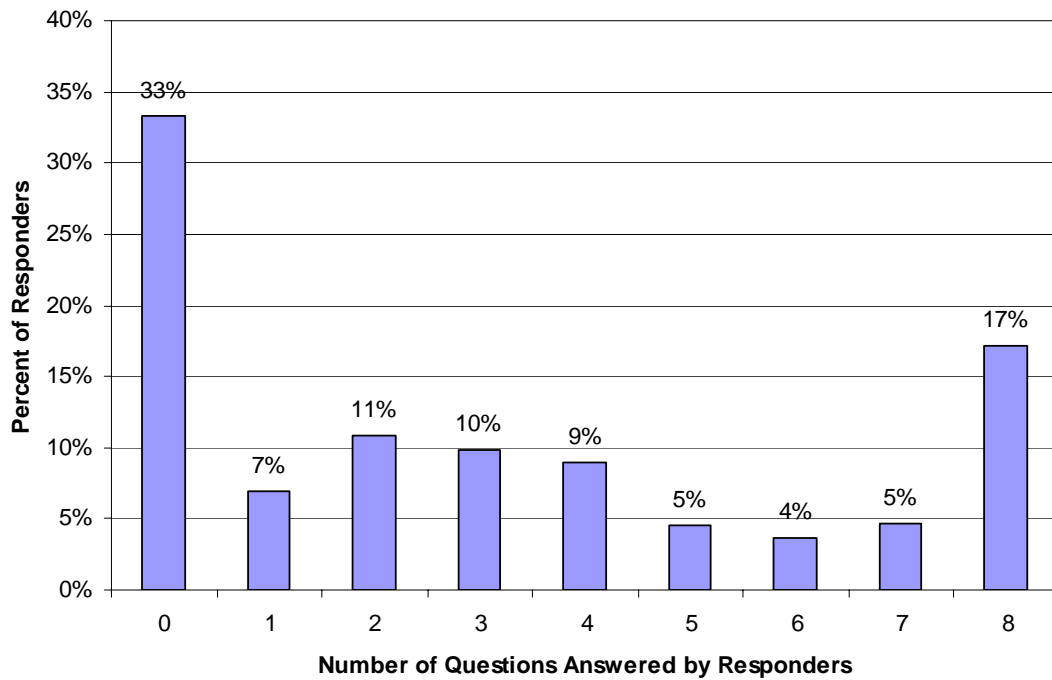
Figure 5.3 shows which questions were directly answered by vessel operators. None of the questions were directly answered by more than 63% of the vessel operators. In general, vessel operators were the best at answering questions about demographics and what they used as their primary source for receiving weather information (i.e., Questions 1, 8, and 2), and the worst at answering questions about SITOR use and their preference for alternative sources (i.e., Questions 5 and 6).

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<sup>29</sup> Because their comments implied that they were offshore or high-seas operators and although they did not clearly state it, the research team included their comments in the data set.



**Figure 5.2 Number of Questions that Were Directly Answered by Offshore and High-seas Operators**



**Figure 5.3 Offshore and High-seas Operators Who Directly Answered Each Question**

## **5.2. Data Conditioning and Categorization**

Data conditioning divided the content within the free-form, open-ended comments of the vessel operators into answers for each of the eight questions in Table 4.2. In so doing, the research team first examined comments in their entirety, assigned direct answers, and then inferred answers when possible. The ability to make inferences varied by question as well as by comment. Researchers with maritime backgrounds had to identify ancillary comments that logically implied answers. Using this approach, the research team could not infer answers to all questions that were not directly answered by vessel operators. However, this inductive approach increased the data available for analysis. Section 6 includes a discussion about inferred answers as appropriate.

The research team also devised a set of standard answers that could categorize responses. The categorizations permitted a high-level quantitative assessment of results. The answer categories are discussed in Section 6.

## **5.3. Public Comments About Data-gathering Strategy**

A comment from a commercial fisherman who operates in the Pacific and receives USCG HF voice marine weather broadcasts expressed difficulty in responding to the Request for Public Comment. His comment came in response to a research team form letter (Appendix C) that asked for additional data that would be useful for analysis. His response was as follows:

*“[The research team] wrote me saying I had to finish questions 2,4,5,6,7, I can not seem to find tho[se] questions. I type in the web address <http://dms.dot.gov> to google and this is where I was sent. Like I said before. [i]f you are asking for public comment on the need for weather broadcasting. It HAS TO BE EASY...!!!! This is not...!!! We are Fisherman, Not computer programers.... Sorry to vent my frustration on you.”*

In the U.S. DOT Docket Management System (DMS), the questions are in the first file of Docket Number USCG-2007-27656. The first file is the Request for Public Comment. If a vessel operator had no familiarity with the DMS and had limited time to explore it, the questions would be difficult to locate.



## **6. RESULTS – RESPONSES FROM MARINERS**

This section summarizes the answers made by vessel operators/owners to the eight questions listed in Table 4.2. No distinction is made between comments from vessel owners and operators, so data about responses from vessel operators include the responses of vessel owners. Persons commenting that they represented a group of mariners had their responses counted as one entry. The comments of these persons are discussed further in Section 7.

The summary data are presented in the following subsections:

- Subsection 6.1. “Who are they?” This subsection identifies the vessels by type and service. Service categories (i.e., commercial and recreational) are used to differentiate operator answers to other questions because they represent a larger set of the operators and the service type is used to estimate costs of alternative sources that might be used by the operator if HF broadcasts are discontinued.
- Subsection 6.2. “Where do they sail/operate?” This subsection identifies the general regions in which all the vessels listed in Subsection 6.1 operate. METAREA IV was divided between Atlantic and Caribbean/Gulf of Mexico because the numbers substantiated the division. However, the Pacific Ocean was not divided between METAREAS XII and XVI because many answers were not specific enough.
- Subsection 6.3. “What are the primary sources for obtaining weather forecasts?” This subsection outlines an organizing framework the research team used to categorize vessel operator responses. It shows the answers for all responding operators, answers sorted by commercial and recreational operators, and answers sorted by the regions in which operators reported they sailed.
- Subsection 6.4. “Do they use USCG HF broadcasts (i.e., voice, radiofacsimile, and/or SITOR?” This subsection examines vessel operator responses to Questions 3, 4, and 5 (see Table 4.2). Each question required a three-part answer. The first part – general usage – is presented. The remaining parts, which were (1) frequency of usage and (2) comparisons between USCG broadcasts and other sources, received few comments.
- Subsection 6.5. “How would a loss of USCG HF broadcasts impact them?” This subsection outlines an organizing framework the research team used to categorize vessel operator responses. It shows the answers for all responding operators, answers sorted by commercial and recreational operators, and answers sorted by the regions in which operators reported they sailed.

Subsection 6.6. “Do they have an alternative source for marine weather forecasts?” This subsection outlines an organizing framework the research team used to categorize vessel operator responses. It shows the answers for all responding operators, answers sorted by commercial and recreational operators, and answers sorted by the regions in which operators reported they sailed. It also examines the ways in which vessel operators, who perceive that their operations will not be significantly impacted, might address the loss of USCG HF broadcasts.

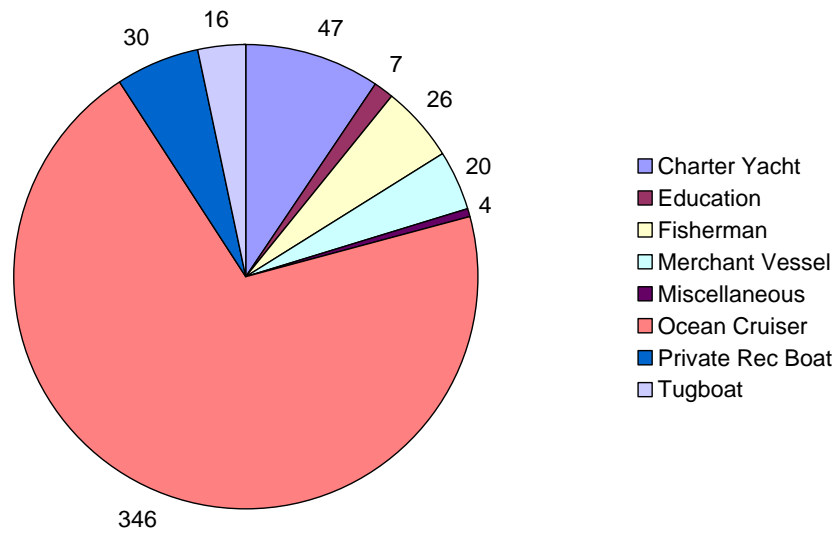
Subsection 6.7. “What concerns do they have about the alternative sources for marine weather forecasts?” This subsection compares the number of concerns expressed about an alternative source to the number of times the public mentioned that source in order to rate the acceptability of the source. Concerns are divided between cost and usefulness.

### **6.1. Who Are They?**

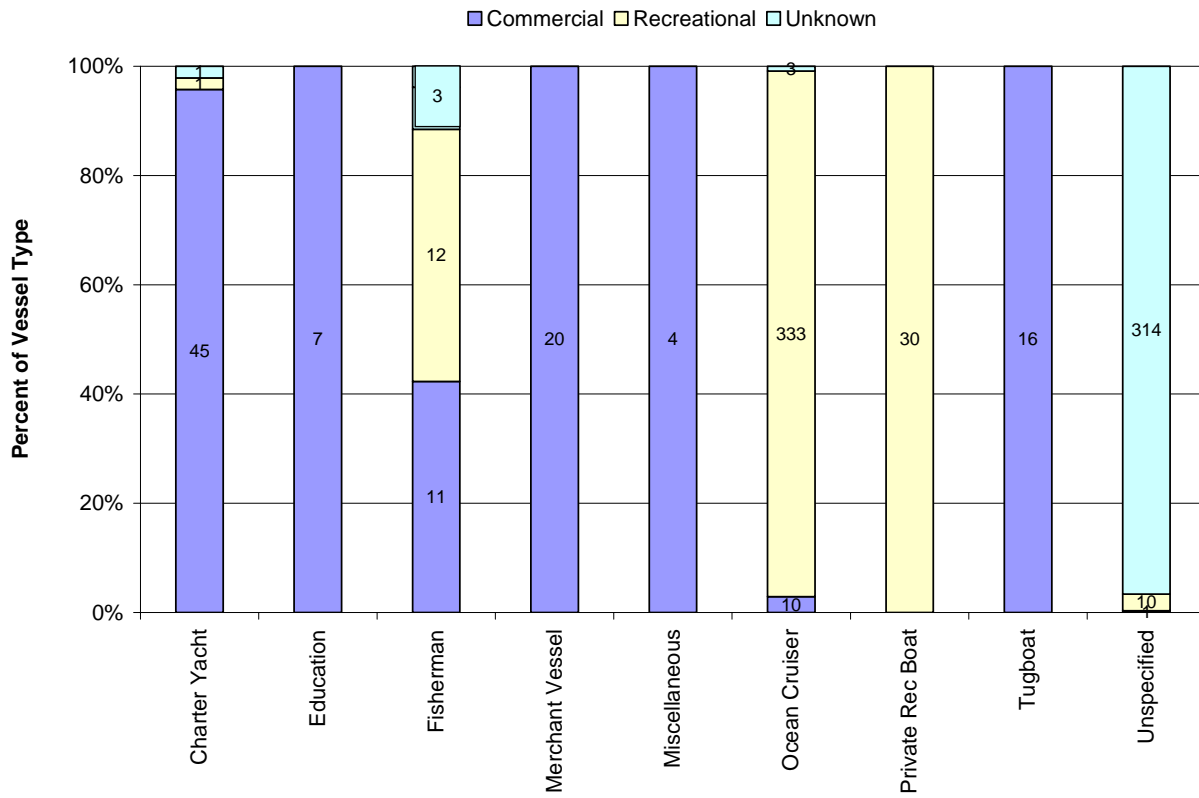
Many responses could be identified by vessel type; even more could be identified by vessel service (i.e., commercial or recreational). However, almost 40% had only enough information to verify that the response was from someone who operated or owned a vessel.

- **By vessel type:** 496 responders indicated that they were operators/owners of charter yachts, school ships, fishing vessels, merchant vessels, ocean cruisers, private recreational vessels, tugboats, or other miscellaneous vessels that could not be grouped under one of the former categories. Miscellaneous vessels included salvage ship, research vessel, dive boat, and marine contractor. Figure 6.1 is a pie chart that graphically depicts the responses received from these eight vessel types.
- **By service:** When all responses are sorted in this way, there were 114 responses from commercial operators and 386 from recreational operators. Figure 6.2 is a stacked bar chart that shows the reported commercial and recreational uses of the eight vessel types. The numbers in the bars are the number of responses. Seven vessels that had been categorized by vessel type could not be categorized by vessel service.
- **Unspecified:** 320 responders provided inadequate information about their vessel and its service, which required these responses to be designated as “unspecified.”

Eighty-three percent of vessel operators/owners gave return addresses in the United States. Only 83 operators (10%) provided no contact information; 59 operators (7%) gave information indicating that they were outside the United States.



**Figure 6.1 Vessel Operators Who Responded**



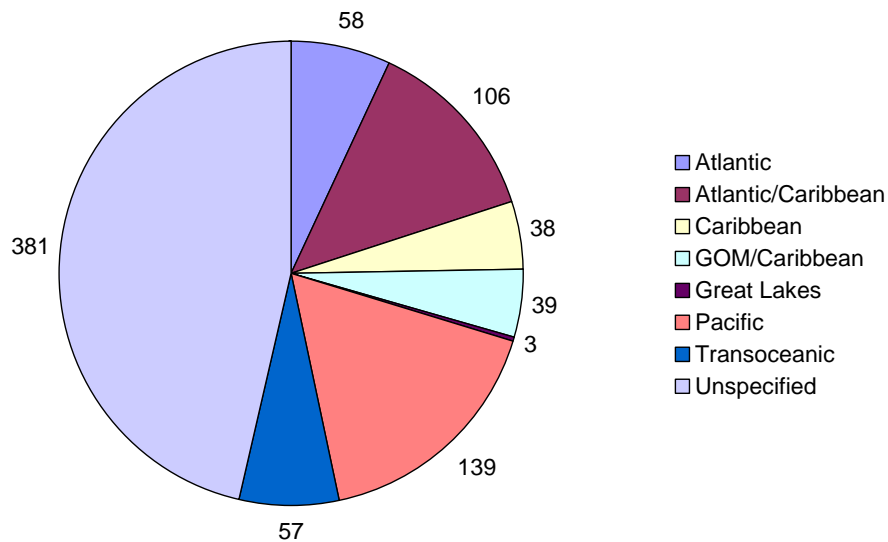
**Figure 6.2 Operator Responses by Vessel Type and Service**

## 6.2. Where Do They Sail/Operate?

Of the 821 responses, 440 operators (54%) gave information that answered this question. The reported sailing/operating behaviors were categorized as follows:

- Atlantic operation (METAREA IV)
- Atlantic/Caribbean operation (METAREA IV)
- Caribbean operation (METAREA IV)
- Gulf of Mexico (GOM)/Caribbean operation (METAREA IV)
- Great Lakes operation (METAREA IV). The Great Lakes were included because offshore transits can be farther than 25 nm from the shoreline.
- Pacific operation (METAREAs XII and XVI)
- Transoceanic operation (METAREAs IV, XII, and XVI)
- Unspecified. The operator made comments implying that the vessel operated seaward of 25 nm but did not provide anything else.

Figure 6.3 graphically depicts these behaviors reported by the offshore/high-seas operators. This figure represents all 821 responses.



**Figure 6.3 Offshore and High-seas Vessel Operations Represented in Operators' Responses**

The research team assigned these behaviors to three regions: Atlantic, Caribbean/GOM, and Pacific. Table 6.1 shows (1) the sailing/operating behaviors assigned to these areas, (2) the sum of those commenting who might operate in these areas, and (3) the number of HF transmitters that are used to broadcast forecasts for these regions. This table represents 440 responses.

**Table 6.1 Regions in Which Members of the Public Indicated that Their Vessels Sailed/Operated and the USCG Transmitters that Serve Those Regions**

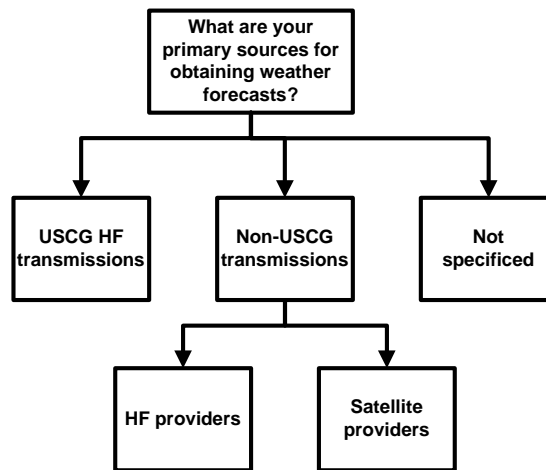
Item	Atlantic Region	Caribbean/GOM Region	Pacific Region
Reported Operating Behavior	<ul style="list-style-type: none"> <li>▪ Atlantic operation</li> <li>▪ Atlantic/Caribbean operation</li> <li>▪ Great Lakes operation</li> <li>▪ Transoceanic operation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Caribbean operation</li> <li>▪ GOM/Caribbean operation</li> <li>▪ Atlantic/Caribbean operation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Pacific operation</li> <li>▪ Transoceanic operation</li> </ul>
Total Operators*	224	183	196
Commercial Operators**	52	30	43
Recreational Operators	153	142	123
Transmitters Supporting HF Broadcasts for These Areas in 2007	Boston, MA – 3 Chesapeake, VA – 3	New Orleans, LA – 4	Guam – 3 Honolulu, HI – 3 Kodiak, AK – 3 Pt Reyes, CA – 4

\* "Total Operators" is the sum of commercial, recreational, and unspecified vessels.

\*\* Commercial fishermen responded as follows: one in the Atlantic, one in the Caribbean/GOM, and six in the Pacific.

### 6.3. What Are Their Primary Sources for Obtaining Weather Forecasts?

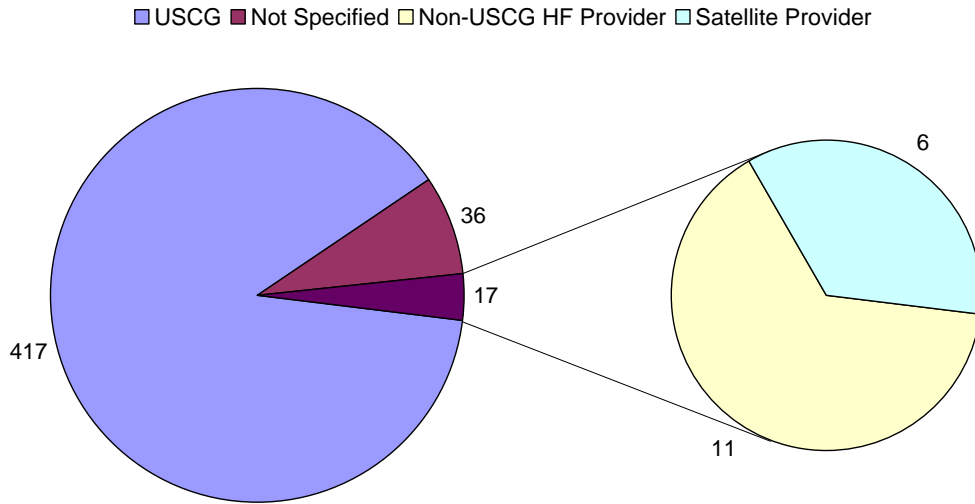
Of the 821 responses, about 57% provided comments that answered this question. The research team categorized the answers as shown in Figure 6.4. The “not specified” category is for responses that provided insufficient data to differentiate between USCG and non-USCG transmissions.



**Figure 6.4 Framework for Categorizing Vessel Operator Comments About “What Are Your Primary Sources for Obtaining Weather Forecasts?”**

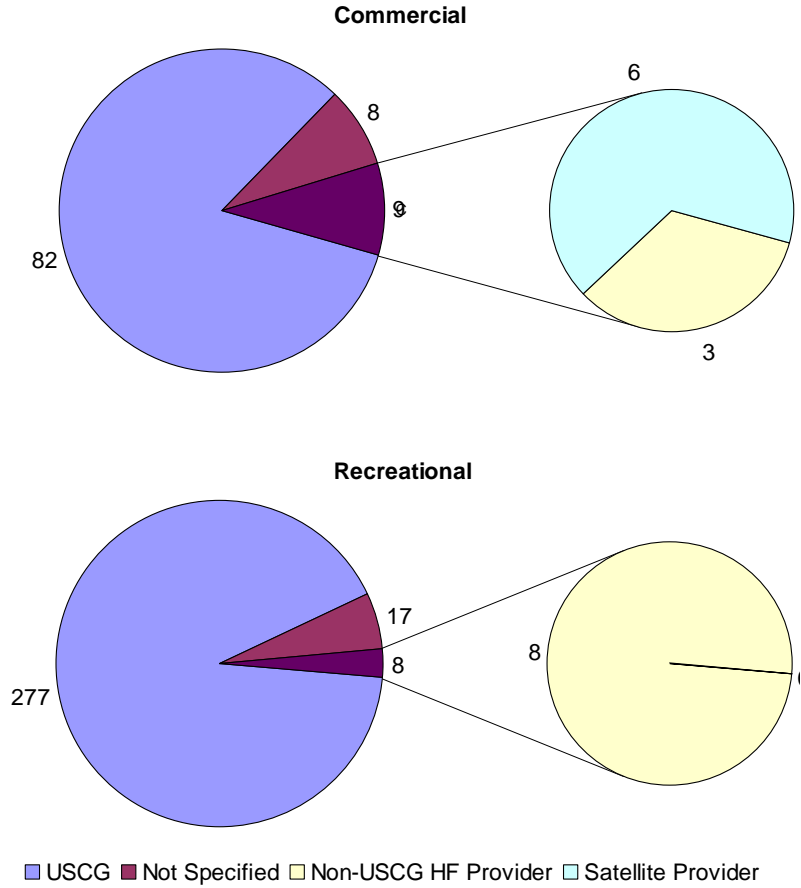
This information is graphically depicted in the following figures:

- Figure 6.5 shows responses from 470 operators. The vast majority (89%) clearly stated that they relied on USCG HF broadcasts as their primary source for marine weather information.

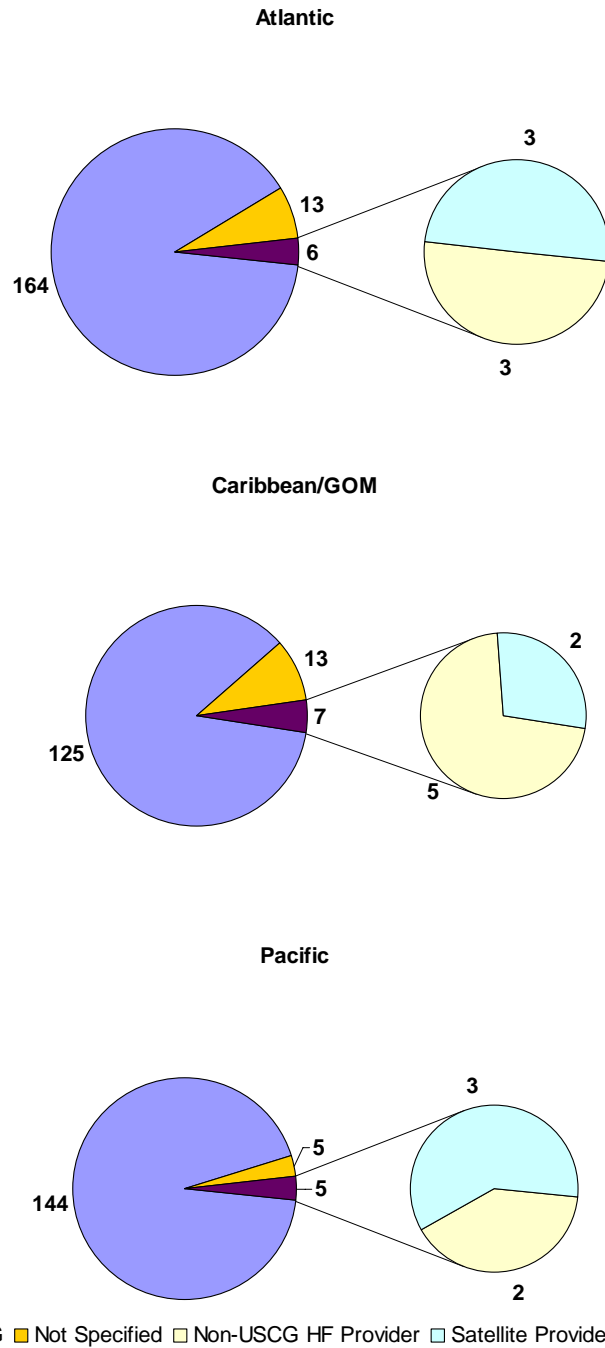


**Figure 6.5 Primary Sources of Marine Weather Forecasts Used by Responding Vessel Operators**

- Figure 6.6 shows 401 responses by commercial and recreational operators, which represent 86% and 78%, respectively, of those operators identified in Subsection 6.1. The recreational operators were slightly more dependent (92%) than commercial operators (83%) on USCG HF broadcasts. This dependency is unchanged even if one applies the “not specified” responses to the totals for USCG. Also, only the commercial operators (about 6%) used satellite providers as their primary source.
- Figure 6.7 shows responses by region in which vessels sail/operate. The research team cross-referenced answers for Question 2 and Question 8 to assemble these data. About 80% of the vessel operators identified in Table 6.1 answered Question 8. It appears that operators are equally highly dependent on USCG HF marine weather broadcasts regardless of region.



**Figure 6.6 Primary Sources of Marine Weather Forecasts Used by Responding Commercial and Recreational Operators**



**Figure 6.7 Primary Sources of Marine Weather Forecasts Used by Responding Operators According to the Region in Which Their Vessels Sail/Operate**



**6.4. Do They Use USCG HF Broadcasts (i.e., Voice, Radiofacsimile, and/or SITOR)?**

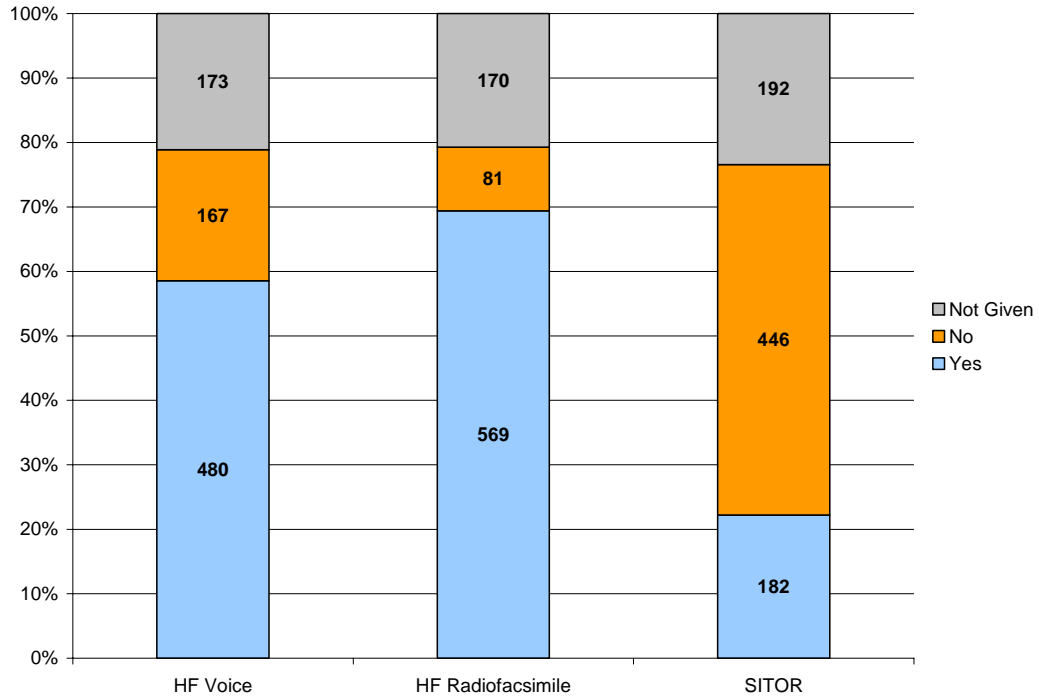
This subsection compiles answers from Questions 3, 4, and 5 in Table 4.2. Less than half of the vessel operators answered this question directly. From Figure 5.3, the fewest comments (only 28%) were made about SITOR. Even still, the research team could infer the answer (i.e., implied YES or NO) when a comment was examined in its entirety. By doing so, the additional data raised the response rate to more than 79%. Table 6.2 summarizes the responses received from vessel operators.

**Table 6.2 How Vessel Operators Answered Questions About Using USCG HF Marine Weather Broadcasts**

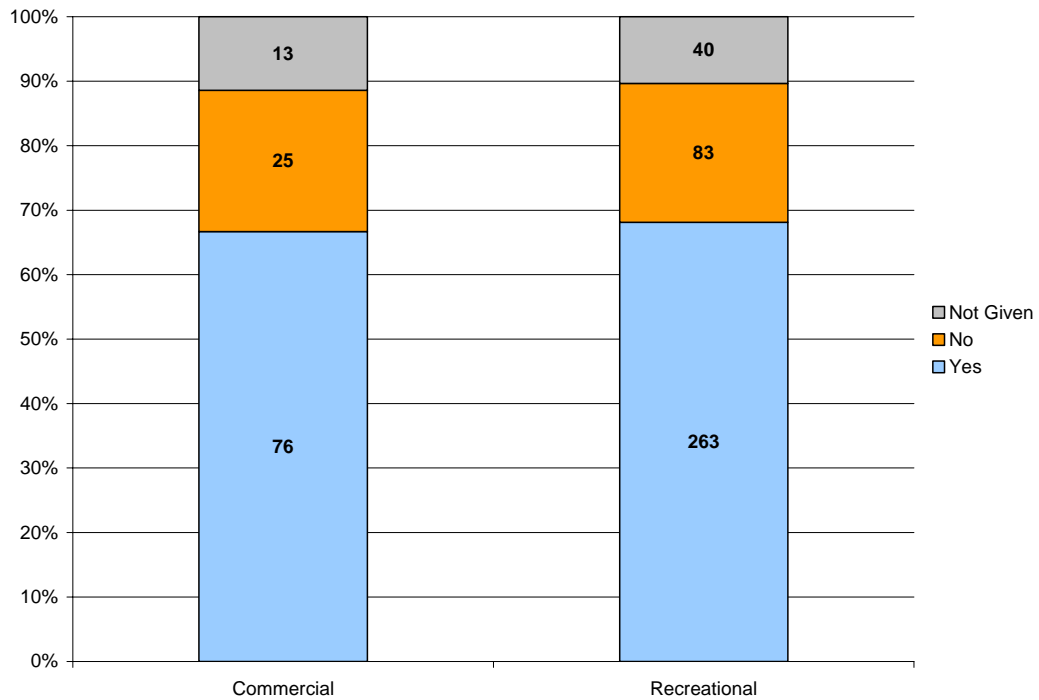
Do you use...?	Total responses analyzed	Does use . . .		Does not use . . .		Not given
		Answered affirmatively (i.e., YES)	Comments implied YES	Answered that they did not use the broadcast (i.e., NO)	Comments implied NO	Could not determine usage from comments
HF voice broadcasts	820	292	188	47	120	173
HF radiofacsimile broadcasts	820	385	184	28	53	170
HF SITOR broadcasts	820	43	139	187	259	192

In Figures 6.8 through 6.14, the usage data are organized graphically as stacked bar charts. The bar charts show whether the operator is considered by the research team as a user, nonuser, or use is not known (i.e., not given).

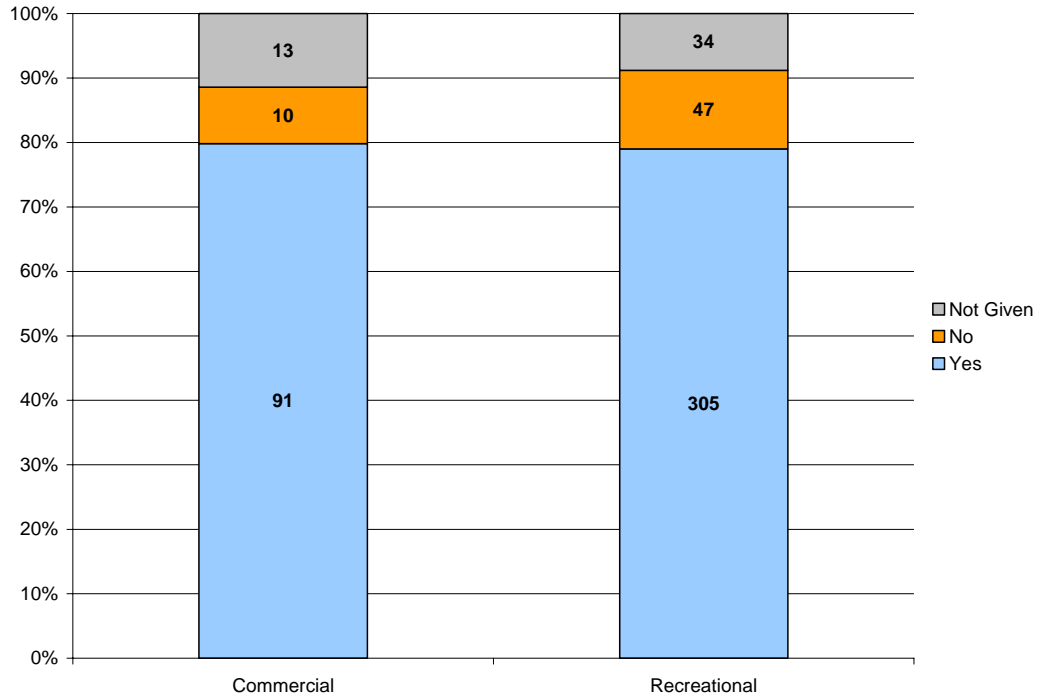
- Figure 6.8 compiles all responses regarding usage of HF voice, HF radiofacsimile, and SITOR broadcasts. More than 58% of the vessel operators use either voice and/or radiofacsimile broadcasts. It appears that vessel operators have a slightly greater interest in radiofacsimile than voice broadcasts. Few (about 22%) operators expressed interest in SITOR.
- Figures 6.9 though 6.11 show responses regarding broadcast usage by commercial and recreational operators. These two communities gave responses that were nearly identical and mirrored the overall results presented in Figure 6.8, except that the commercial operators might use SITOR slightly more than recreational users.



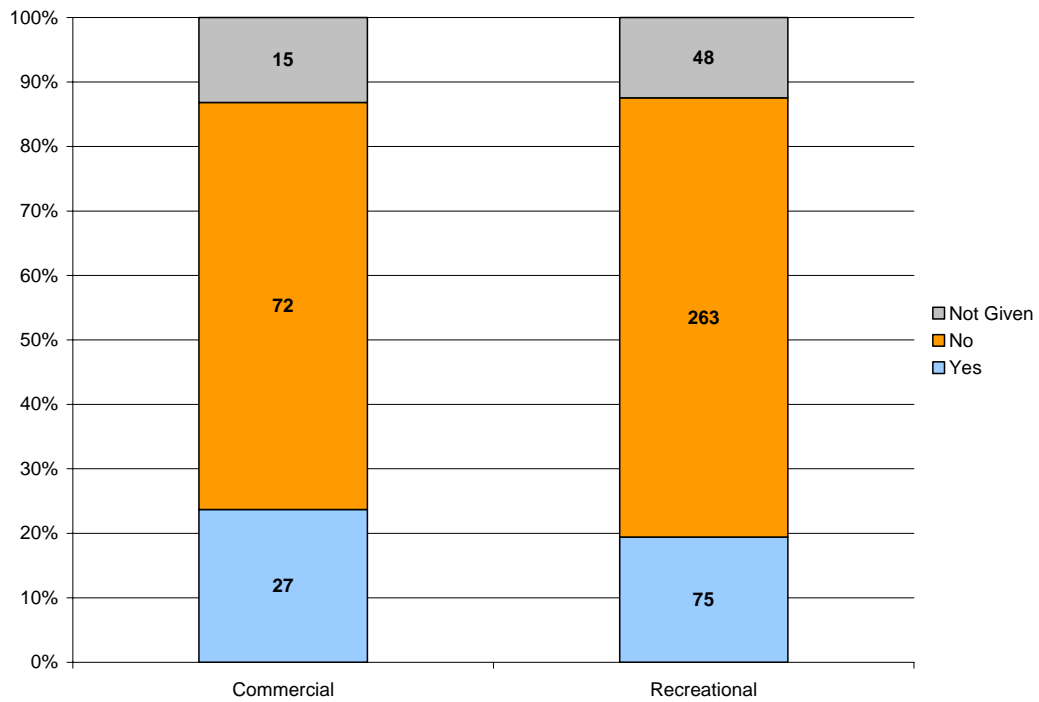
**Figure 6.8 Responding Vessel Operators Who Use USCG HF Marine Weather Broadcasts**



**Figure 6.9 Responding Commercial and Recreational Operators Who Use USCG HF Voice Marine Weather Broadcasts**

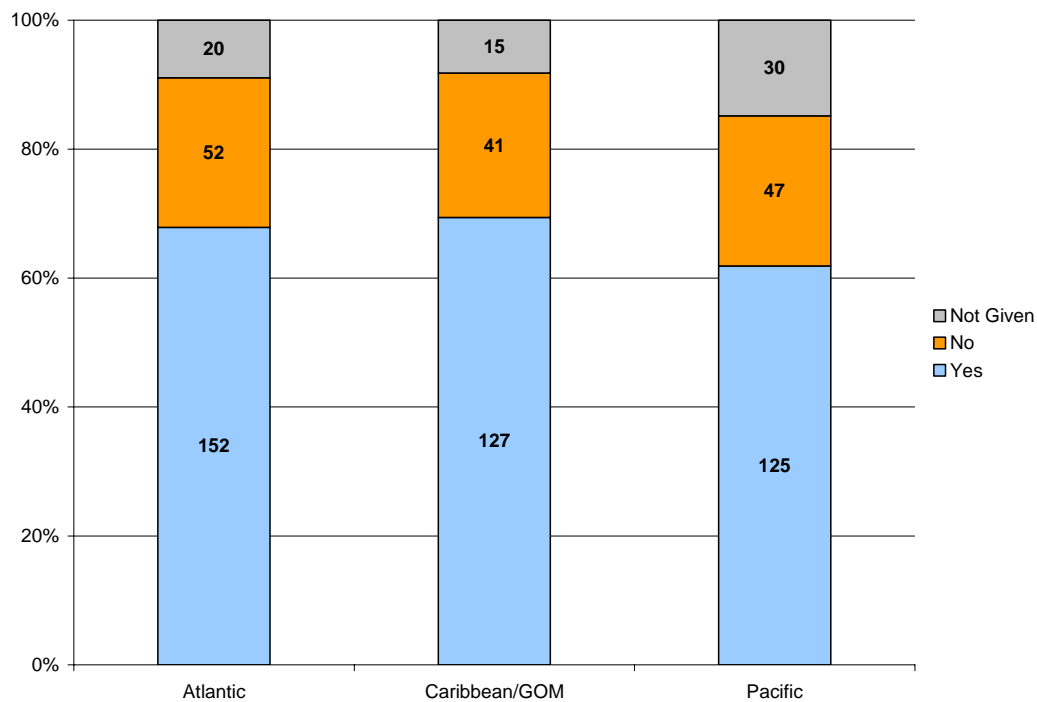


**Figure 6.10 Responding Commercial and Recreational Operators Who Use USCG HF Radiofacsimile Marine Weather Broadcasts**

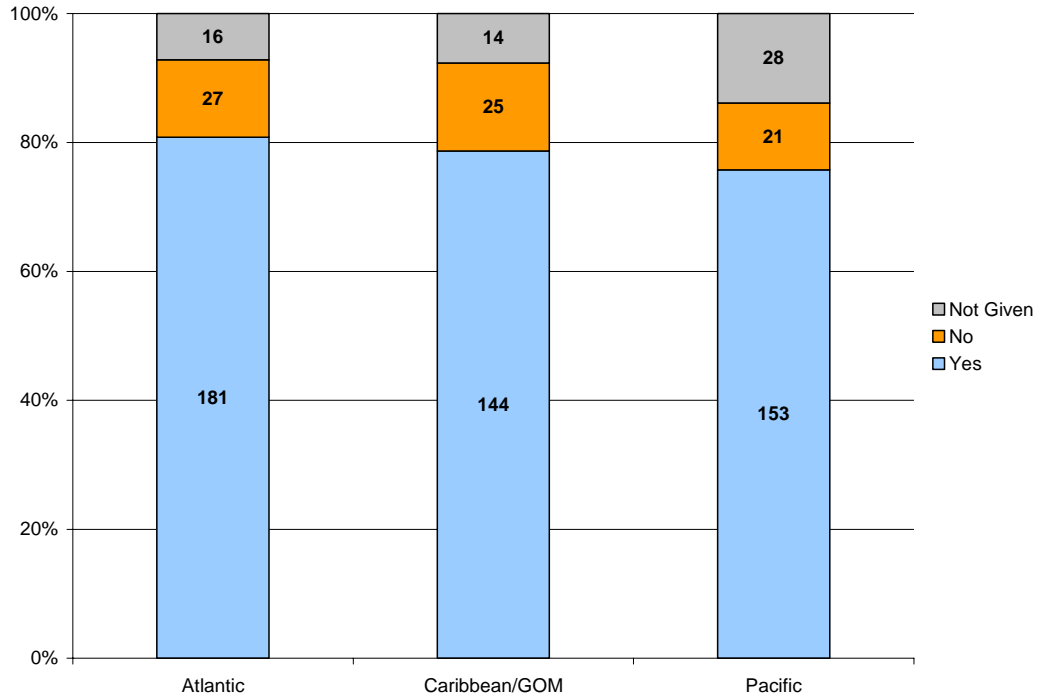


**Figure 6.11 Responding Commercial and Recreational Operators Who Use USCG SITOR Marine Weather Broadcasts**

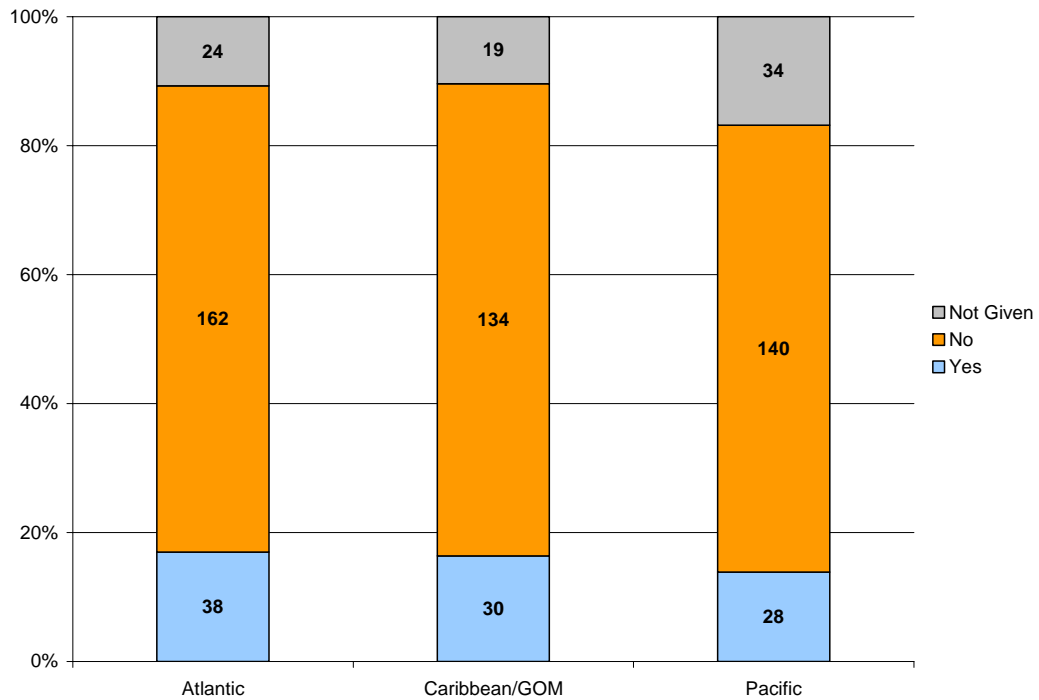
- Figures 6.12 through 6.14 show responses regarding broadcast usage by regions in which vessels sail/operate. Overall, the regional results expressed similar levels of interest as the results in Figure 6.8, except that all responders used SITOR slightly less and the Pacific operators used voice slightly less. Factors that affected the results include, but may not be limited to, the following.
  - Only those responses from operators who also identified their operating region were considered. In Subsection 6.2 we observed that 54% of the vessel operators identified their operating region.
  - Fewer operators in the Atlantic and Caribbean/GOM than in the Pacific left this question unanswered.
  - The 106 operators who sail/operate in the Atlantic and Caribbean contributed to the similarities that exist among the Atlantic and Caribbean/GOM responses. See Figure 6.3. The 106 operators represented more than 47% of the responders in these regions.



**Figure 6.12 Responding Operators' Use of USCG HF Voice Marine Weather Broadcasts by Regions in Which Their Vessels Sail/Operate**



**Figure 6.13 Responding Operators' Use of USCG HF Radiofacsimile Marine Weather Broadcasts by Regions in Which Their Vessels Sail/Operate**



**Figure 6.14 Responding Operators' Use of USCG SITOR Marine Weather Broadcasts by Regions in Which Their Vessels Sail/Operate**

#### **6.4.1 How Often Do They Use the USCG HF Broadcasts?**

This question was seldom answered in a manner that gave enough data for assigning usage rates. The responses indicate that the public needed more guidance and might have benefited from a list of choices. The following are sample answers.

- “several times a day”
- “daily”
- “for trip planning”
- “supplemental”
- “while sailing offshore”
- “routinely”

#### **6.4.2. How Critical Are the USCG HF Broadcasts as Compared to Other Sources That They Use?**

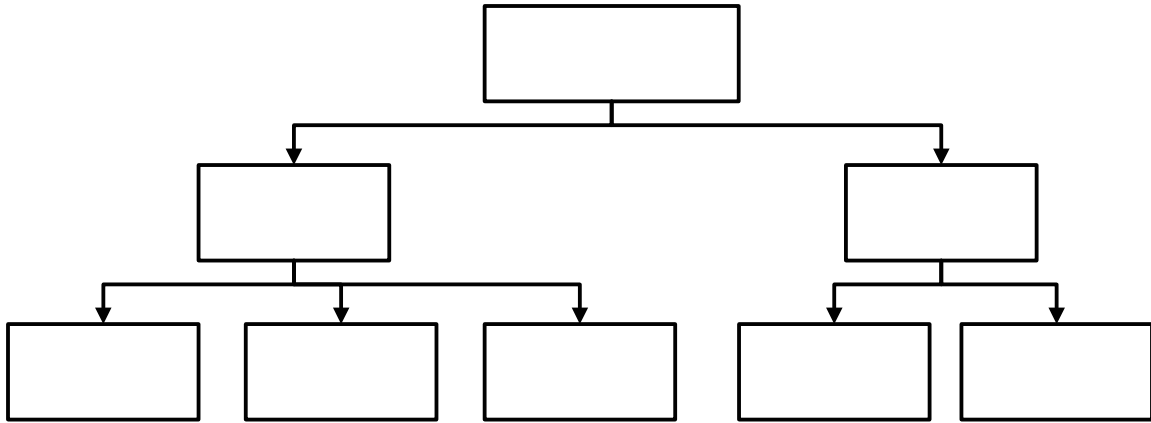
This question was seldom answered in a manner that permitted quantitative comparisons. Most vessel operators stated or implied that USCG broadcasts they received were “critical” or “important” to them. The responses indicate that the public needed more guidance and might have benefited from a list of choices.

#### **6.5. How Would a Loss of USCG HF Broadcasts Impact Them?**

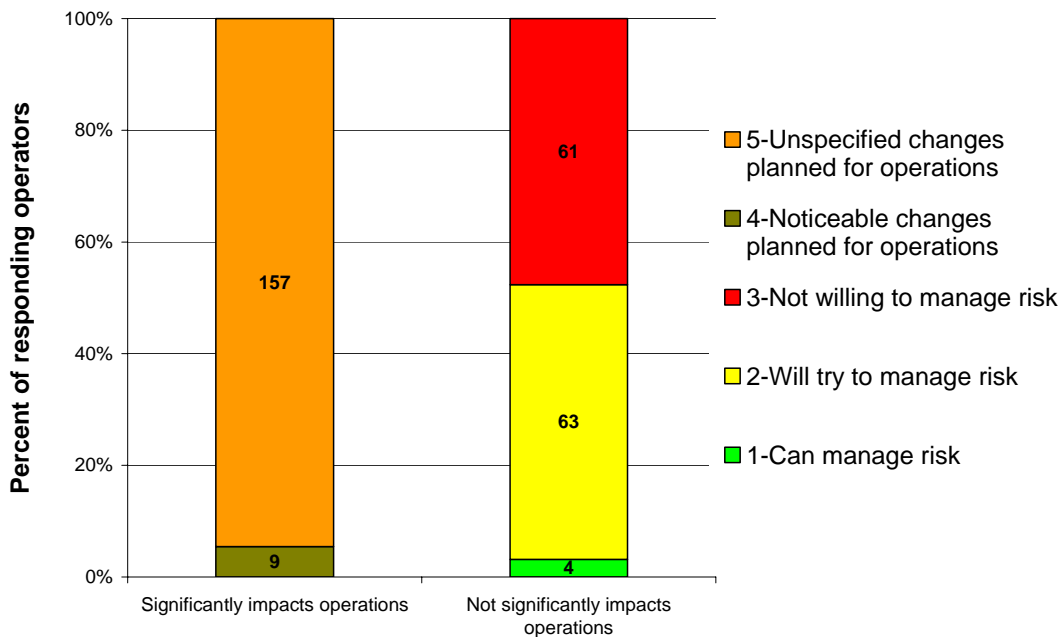
The research team was able to categorize the answers to this question as shown in Figure 6.15. These data are graphically summarized in Figures 6.16 through 6.18.

Figure 6.16 shows all (294) responses from vessel operators and presents two bars: one counting responses that perceived operational impact as “significant” and another counting responses that perceived operational impact as “not significant.” The stacked elements in each bar correspond to the subsequent actions that might be taken by the vessel operator. These actions appear across the lowest tier of Figure 6.15.

- “Significant” impact implies that the vessel operator would likely alter the way in which the vessel operates. The majority (about 57% of the responding operators) indicated that their operations might be so impacted. About 3% of the responding operators indicated that their operations would noticeably changed, such as staying closer to shore or spending less time offshore or on the high seas.
- “Not significant” impact implies that the vessel operator would likely not alter the way in which the vessel operates. Few (about 1% of the responding operators) felt capable of managing the risk of not having information supplied by USCG HF broadcasts. The remaining responses were equally divided between trying other sources (21%) and not doing anything (21%).



**Figure 6.15 Framework for Categorizing Vessel Operator Comments About “Would the Loss of USCG HF Marine Weather Broadcasts Impact You?”**



**Will not significantly impact vessel operations**

**Figure 6.16 Perceived Impacts on and Subsequent Actions of Responding Vessel Operators Should the USCG Discontinue HF Marine Weather Broadcasts**

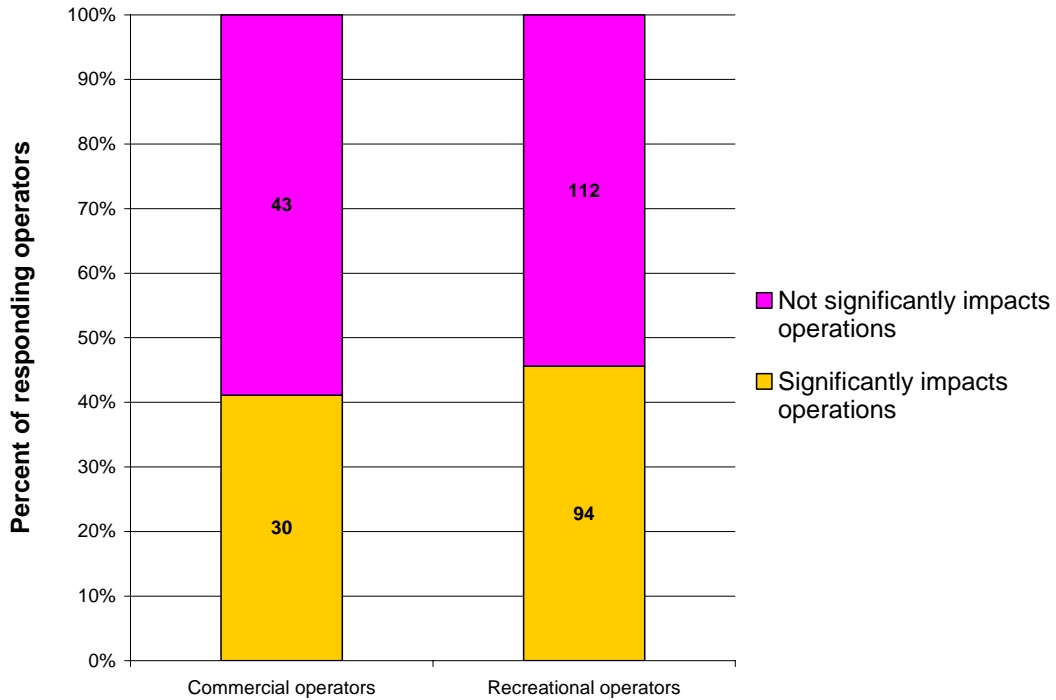
**Operator can manage the risk**

**Operator can manage the risk**

Figure 6.17 shows all (279) responses from commercial and recreational operators regarding the perceived impacts on their operations. Fewer (less than 46%) of these operators expressed concern that the impact was significant.

- Has other sources for marine weather forecasts
- Can afford the alternative

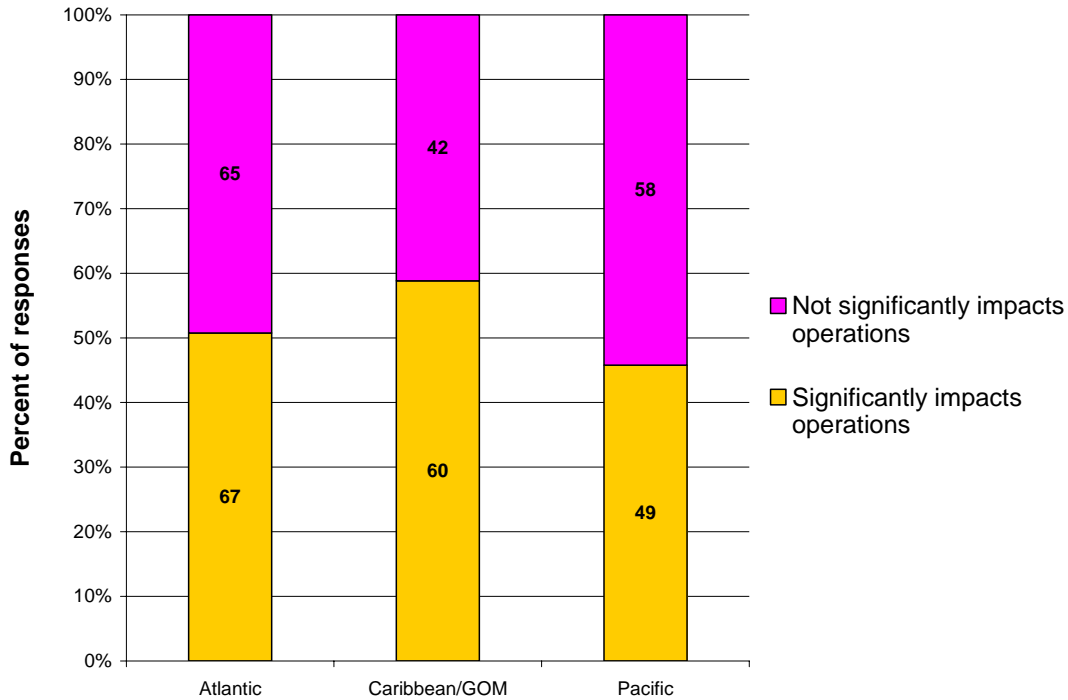
- Willing
- Not certain
- Not certain



**Figure 6.17 Perceived Impacts of Discontinuing USCG HF Marine Weather Broadcasts on Responding Commercial and Recreational Operators**

Figure 6.18 shows all (341) responses by region in which vessels sail/operate. The operators in the Caribbean/GOM mirrored the concern expressed in Figure 6.16 (i.e., 59% considered the impact significant to their operations). Fewer Atlantic and Pacific operators expressed concern; the Pacific had the least (46% of responding operators).





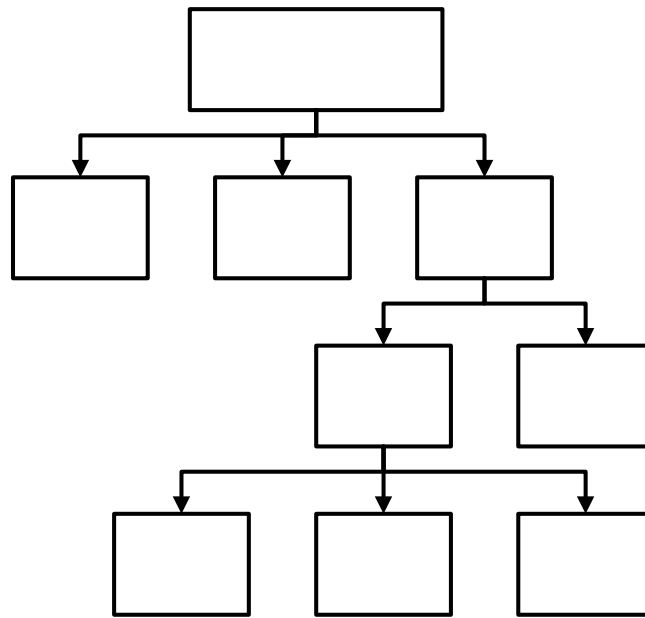
**Figure 6.18 Perceived Impacts of Discontinuing USCG HF Marine Weather Broadcasts on Responding Operators Sorted by Regions in Which Their Vessels Sail/Operate**

#### ***6.6. Do They Have an Alternative Source for Marine Weather Forecasts?***

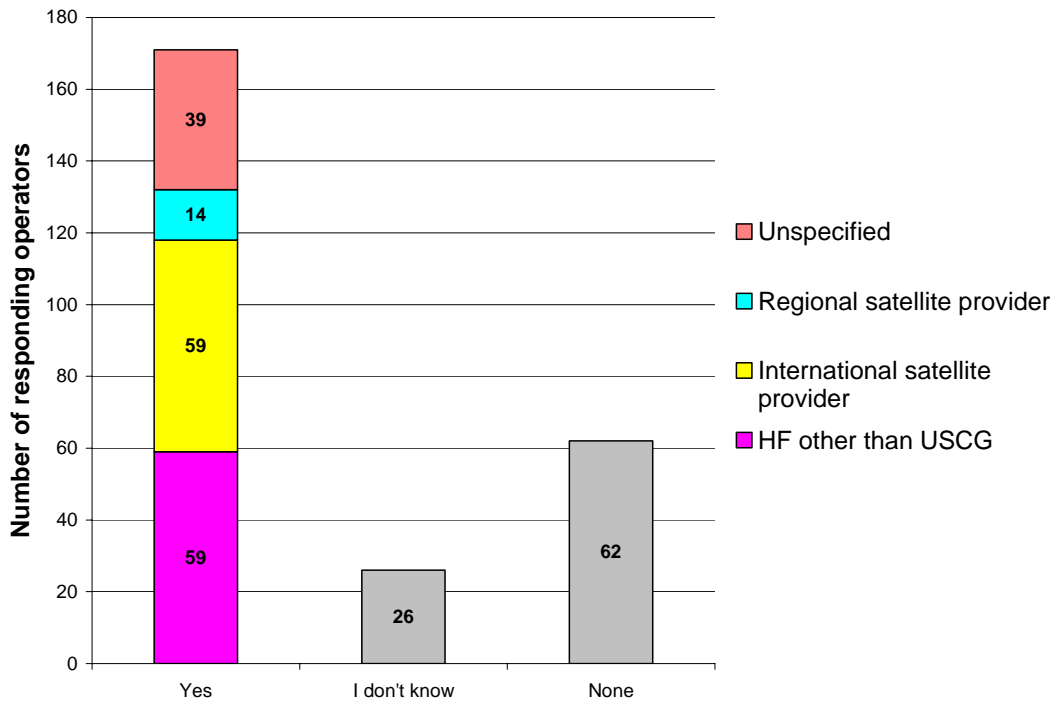
The research team was able to categorize the answers and explanations as shown in Figure 6.19. These data are graphically summarized in Figures 6.20 through 6.22.

Figure 6.20 compiles all (259) responses into a bar chart.

- Twenty-four percent of vessel operators considered no alternative source as suited to their needs. The bar labeled “none” represents these responses.
- Ten percent of vessel operators could not determine whether any alternative source was suited to their needs. The bar labeled “I don’t know” represents these responses.
- Sixty-six percent of vessel operators identified an alternative source. Of equal interest were HF services other than USCG (23%) and international satellite providers (23%).
  - “Unspecified” was assigned when (1) the operator indicated that he/she had an alternative source but did not name any and (2) the operator did not identify any sources other than the USCG HF broadcasts in answering Question 2.



**Figure 6.19 Framework for Categorizing Vessel Operator Comments About “What Alternative Source(s) for Obtaining Marine Weather Forecasts Would You Pursue if USCG HF Broadcasts Were No Longer Available?”**

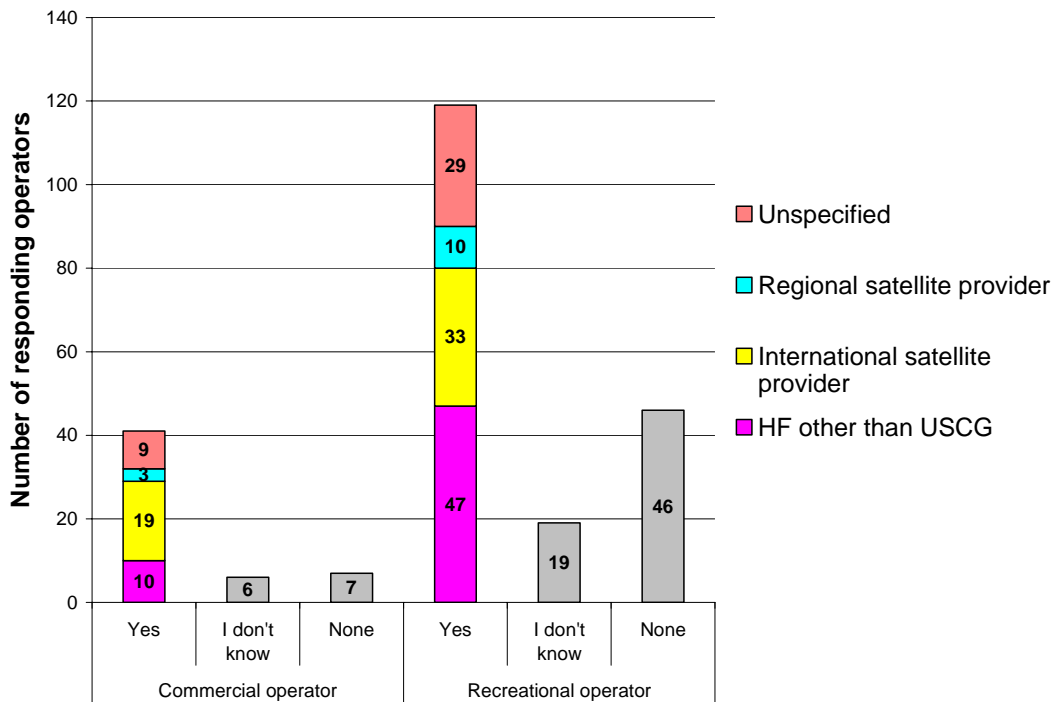


**Figure 6.20 Alternative Sources Suitable to Responding Vessel Operators Should the USCG Discontinue HF Marine Weather Broadcasts**

- When the responder named an “international satellite provider,” “regional satellite provider,” or “HF other than USCG” as either a primary source under Question 2 or as an alternative source under Question 6, the named source was counted.

Figure 6.21 shows 238 responses by commercial and recreational operators.

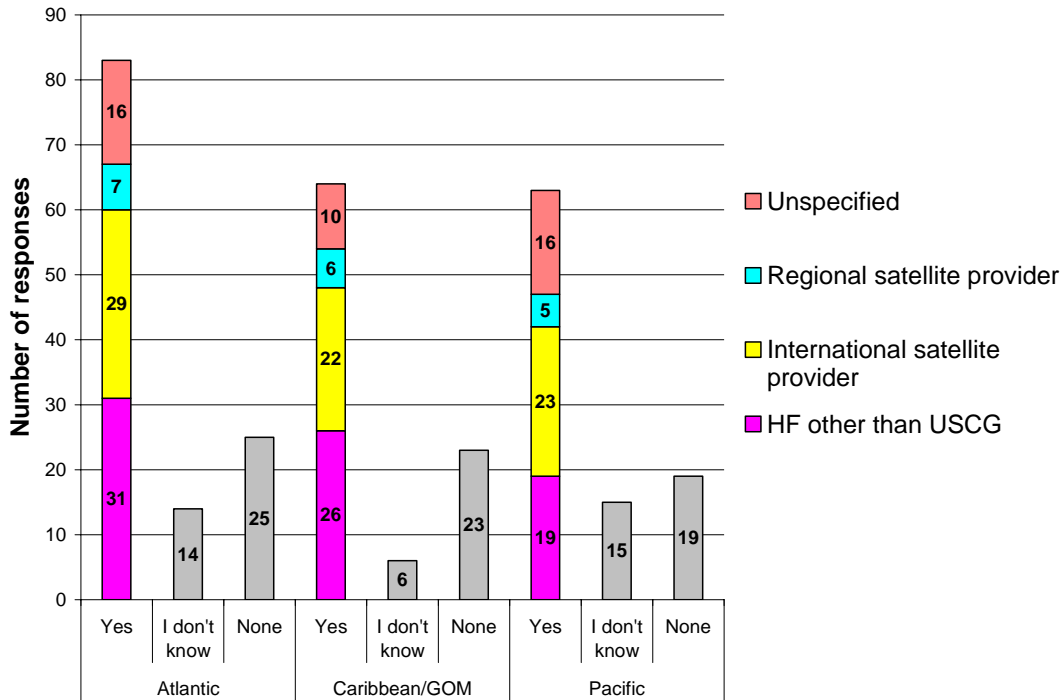
- Seventy-six percent of commercial operators indicated that they had a suitable alternative source. Thirty-five percent of those responding preferred international service providers. HF services other than USCG had the next highest number of responses.
- Sixty-five percent of the recreational operators indicated that they had a suitable alternative source identified. Twenty-six percent of them preferred HF services other than USCG. International service providers had the next highest number of responses.



**Figure 6.21 Alternative Sources Suitable to Responding Commercial and Recreational Operators Should the USCG Discontinue HF Marine Weather Broadcasts**

Figure 6.22 shows 312 responses by region in which vessels sail/operate.

- Sixty-eight percent of Atlantic and Caribbean/GOM operators indicated that they had a suitable alternative source. At least 37% of them preferred HF services other than USCG. International satellite providers had the next highest number of responses.
- Sixty-five percent of Pacific operators indicated that they had a suitable alternative source identified. Thirty-seven percent of them preferred international service providers. HF services other than USCG had the next highest number of responses.



**Figure 6.22 Alternative Sources Suitable to Responding Vessel Operators Should the USCG Discontinue HF Marine Weather Broadcasts Sorted by Regions in Which Their Vessels Sail/Operate**

In subsection 6.5, 128 responses to Question 7 (Q7) indicated “discontinuance of USCG HF broadcasts will not significantly impact vessel operations.” Their subsequent actions were grouped according to the manner in which the operators would manage their risk (i.e., risk behaviors). The research team cross-referenced these inferred risk behaviors to the operators’ choices for alternative sources for marine weather forecasts. These choices came from answers to Question 6 (Q6). The team also cross-referenced from Question 2 (Q2) answers the operators gave for primary sources for marine weather broadcasts. Table 6.3 assembles these data to show how risk behaviors may relate to source selections.

Conclusions derived from the summary data in Table 6.3 are limited for the following reasons:

- Vessel operators were not required to answer each question.
- Vessel operators who considered a source their primary one when answering Question 2 did not necessarily pick that source as an alternate when answering Question 6 (i.e., the sum of responses can be misleading).
- Comments often required the research team to infer operator behaviors and choices.

**Table 6.3 Comments as They Relate to How Operators Who Will Be Significantly Impacted Might Address the Loss of USCG HF Broadcasts**

How the operator can manage the situation (Q7)	Unspecified alternative source will be used (Q6)	HF other than USCG has been used (Q2)	HF other than USCG will be used (Q6)	Regional satellite provider has been used (Q2)	Regional satellite provider will be used (Q6)	International satellite provider has been used (Q2)	International satellite provider will be used (Q6)	No alternative source will be used (Q6)	Don't know if any alternative source is suitable (Q6)
Operator can manage the risk		3	3			3	3		
Operator will try to manage the risk	12							4	5
Operator is not willing to manage the risk	2	10	7		2		3	31	9

Given the analytical limitations associated with this data set, the research team made only two observations:

- All operators who implied that they can manage their risk have used other sources and support them as their alternative.
- The majority (57%) of operators who are unwilling to manage risks indicated that they will not use another source for obtaining marine weather forecasts.

### ***6.7 What Concerns Do They Have About the Alternative Sources for Marine Weather Forecasts?***

To understand public acceptance of alternatives to USCG HF broadcasts, the research team compared the number of concerns expressed about an alternative source to the number of times the vessel operators mentioned that source.

- The research team counted all vessel operator responses that mentioned any of the alternative sources for marine weather forecasts. These data were primarily derived from answers to Questions 2 and 6. If a vessel operator indicated that a source (e.g., regional satellite provider) was a primary source and mentioned it again as an alternative source, the source received one count. If the operator only mentioned it as a primary source or only mentioned it as an alternative source, the source received one count.
- The team also counted any stated or implied concerns regarding cost or usefulness of an alternative source. Use concerns included adequacy of coverage and availability of desired weather data. A repeated concern by a vessel operator about an alternative source

only received one count (e.g., an operator’s concern about satellite service cost that was stated twice in his/her response; that is, in answers to Question 2 and Question 6).

Table 6.4 assembles the data and shows the concerns as a percentage of times an alternative source was mentioned in all the responses from vessel operators. Table 6.4 represents responses from 74 operators.

**Table 6.4 Concerns Pertaining to Alternative Sources Expressed by Vessel Operators**

Alternative Source	Number of Times the Alternative Source Is Mentioned by Vessel Operators	Number of Times the Vessel Operators Noted a Concern About the . . .	
		Cost of the Alternative Source	Usefulness of the Alternative Source
HF other than USCG	59	51	41
Regional satellite provider	14	12	14
International satellite provider	59	54	16

Regarding cost: At least 86% of the time when any alternative sources were mentioned, the cost of these alternative sources were considered an issue to vessel operators.

Regarding usefulness: Vessel operators had the least issue with international satellite providers. Only 27% of the time when this alternative source was mentioned, the usefulness of its products was considered an issue by vessel operators.

## ***7. RESULTS – RESPONSES FROM GROUPS OF MARINERS***

This section highlights seven comments received from persons who stated that they represented a group of mariners. As noted in Section 6, these responses were given no extra weight (i.e., count multiplier) because the research team did not validate the number of vessels represented.

Table 7.1 organizes the seven comments according to the eight questions asked in the Request for Public Comment.





**Table 7.1 Responses from Persons Who Indicated that They Represented a Group of Mariners**

Question 1	Please indicate your position in the maritime community.
Response A	The American Waterways Operators is the national trade association representing the owners and operators of tugboats, towboats and barges serving the waterborne commerce of the United States. Our mission is to promote the long-term economic soundness of the industry, and to enhance the industry's ability to provide safe, efficient and environmentally-responsible transportation through advocacy, public information and the establishment of safety standards.
Response B	<p>The American Sail Training Association is the national sail training organization of the United States, and is a charter member of Sail Training International, the corresponding world-wide organization. ASTA conducts active programs relating to maritime safety for its vessel-operating members, and holds national Safety at Sea conferences at least every other November.</p> <p>ASTA also serves as a collective voice for the sail training industry in the United States. It has an organizational membership of more than 250 sail training vessels – principally small business non-profit organizations with a small operating budget.</p> <p>Many ASTA member vessels operate in a near-coastal and ocean capacity carrying young sail trainees. A conservative estimate of trainees sailing on board these member vessels could number as high as 3000 individuals.</p> <p>In addition, ASTA organizes the Tall Ships Challenge® series of races and port events. This typically involves an additional number of foreign-flag sail training vessels operating on the coasts of the United States, adding something approximating 500 additional individuals involved aboard sail training vessels.</p>
Response C	This response is submitted on behalf of the members of Boat U.S, many of whom travel on waters beyond the reception range of the VHF weather service provided by NOAA.
Response D	I am an employee of Crowley. I am responsible for the communications and navigation equipment for our fleet of twenty-two sea-going tugs on the East Coast and the Gulf of Mexico. I also, on occasion, provide technical advice to other business units. I am only speaking for our East Coast and Gulf of Mexico areas of tug and barge operations.
Response E	I would like to comment on behalf of a small number of ships (5-7, mostly Fruit Juice Tankers) that are in my VOS fleet.
Response F	I am a Master of Steam and Motor Vessels up to 100 tons and Owner/President of our firm, Sea Service, L.L.C. We are a Great Lakes operator of tugs (1), barges (3), workboats (1) and Pilot boats (3) in Duluth, Superior, Green Bay and Chicago. We operate 24 hours a day, 7 days a week in all weather, as is demanded by the commercial shipping industry. We also assist recreational boats when stranded or in distress.
Response G	Representing the Morro Bay Commercial Fishermen's Organization that consists of approximately 80 small businesses involved in the fishing industry on the Central Coast of California. Most of which are commercial fishing vessels.
Question 2	What are your primary sources for obtaining marine weather forecasts?
Response A	AWO member companies primarily use Coast Guard HF radio voice and fax broadcasts, VHF weather radio, National Oceanic and Atmospheric Administration (NOAA) VHFFM Broadcasts, National Weather Service VHF Weather Radio, NAVTEX and National Weather Service product requests via e-mail. Some AWO members also utilize Inmarsat C/SafetyNet and Coast Guard HF radio Simplex Teletype over Radio (SITOR). Vessels that are equipped with Internet capabilities also utilize weather Web site information from NOAA.
Response B	Our member vessels primarily use a combination of USCG very high frequency (VHF) radio broadcasts, NOAA weather radio, USCG HF radio broadcasts and USCG HF radiofax broadcasts.
Response C	These citizen mariners largely rely upon short wave radio reception of HF-SSB weather information and warnings broadcast by the U.S. Coast Guard's HF weather service transmissions. A number of these mariners also use weather fax equipment.
Response D	Our primary sources on the vessels are: USCG HF weather fax, USCG HF voice broadcasts, NWS VHF Weather Radio, NAVTEX, and NWS ftp product request via e-mail (text only). We use Inmarsat-C/SafetyNet and SITOR only on a few A3 equipped vessels.
Response E	These ships have no e-mail capability and must rely on the HF Fax and TELEX for all their weather information. They often comment on how grateful they are for the quality of the information and ease of access.
Response F	Normally, our crews use the NOAA VHF weather broadcasts several times a day. We have on occasion used the HF broadcasts, but not regularly. Overall, the HF broadcasts are not critical to our safe operation.
Response G	CGHF, Radio/FAX VHF, and computer.
Question 3	Do you use USCG HF radio voice broadcasts to receive marine weather forecasts? If yes, how often do you use USCG HF voice broadcasts and how critical are they to your safety/ operation as compared to other sources?
Response A	Most AWO coastal member companies utilize the Coast Guard HF radio voice broadcasts on a daily basis. These transmissions are critical to the operations and safety of vessels operating in coastal commerce.
Response B	<i>No comment was made.</i>
Response C	Yes. Members who use HF report that they are using the broadcasts every synoptic hour while they are at sea. These same members report that HF Wx when out of VHF range represent a primary source of weather information apart from actual Wx observations.

**Table 7.1 Responses from Persons Who Indicated that They Represented a Group of Mariners (cont'd)**

Response D	Yes. Nearly all of our EC and Gulf vessels use these broadcasts daily. They use the voice broadcasts from VA as well as the broadcasts over the frequencies used for weather fax transmitted between scheduled fax transmissions. The voice broadcasts are critical to vessel safety and route planning during hurricane season and during the winter weather season in NW Atlantic.
Response E	<i>No comment was made.</i>
Response F	<i>No comment was made.</i>
Response G	Yes. Used when we are out of range of normal broadcast up to 33% of fishing effort.
Question 4	<b>Do you use USCG HF radiofax broadcasts to receive marine weather forecasts? If yes, how often do you use USCG HF radiofax broadcasts and how critical are they to your safety/ operation as compared to other sources?</b>
Response A	Most AWO coastal member companies utilize the Coast Guard HF radiofax broadcasts and receive most products multiple times throughout the day. The fax broadcast is one of the few ways mariners can receive geographical weather charts on many of their vessels and is crucial to the operation of their vessels. For vessels without Internet capabilities, the radiofax is the only method available to receive satellite photos.
Response B	<i>No comment was made.</i>
Response C	Yes. Members report receiving faxes every synoptic hour, especially SFC analysis, wind/wave Fcst, 500 mb analysis and fcst, 24 and 48 sfc fcst. These fax maps are key to route planning when used in conjunction with the HF voice broadcasts and thus the overall safety of the vessels, trainees and crew.
Response D	Yes. All of our East Coast and Gulf Coast vessels make every effort to receive most of the products for every broadcast. I know that Crowley Petroleum (on both coasts), and Crowley Marine Services (in the Pacific Northwest and Alaska) use the HF radiofax broadcasts extensively. This is the most critical broadcast. This broadcast is the only way we have to receive the graphical weather charts in a usable quantity on many of our vessels. The radiofax broadcast is the only way we have to receive a satellite photo at all.
Response E	<i>No comment was made.</i>
Response F	We use the HF weather fax service occasionally. It is very helpful and the best source for accurate weather forecasts, including the important sea state and wind conditions with approaching fronts. Unfortunately, the equipment is expensive and not very forgiving in a smaller vessel's tight interior quarters.
Response G	Yes. Very often as they give us a heads-up for planning our operation for the days ahead. The 24, 48, 72, and 96 hour forecasts have been proven to be the most accurate, and when offshore we can time our effort to get out of harms way.
Question 5	<b>Do you use USCG SITOR to receive marine weather forecasts? If yes, how often do you use USCG SITOR radio broadcasts and how critical are they to your safety/ operation as compared to the other sources?</b>
Response A	Simplex Teletype over Radio (SITOR) is rarely used in the towing industry.
Response B	<i>No comment was made.</i>
Response C	Most of our members do not use SITOR.
Response D	We rarely use SITOR, and on a very limited basis. We have only a few vessels GMDSS A3 equipped that on occasion use SITOR. It is not critical to us.
Response E	<i>No comment was made.</i>
Response F	We do not use SITOR.
Response G	No.
Question 6	<b>What alternative source(s) for obtaining marine weather forecasts would you pursue if USCG HF broadcasts were no longer available? How would you rate the alternative source(s) in terms of (a) user cost and (b) usefulness of the information as compared to USCG HF broadcasts?</b>
Response A	Outside of the Coast Guard HF broadcasts, towing vessel operators would pursue installing Internet capabilities (at a high cost) to access weather information through the NOAA Web site. Other sources of information are the NOAA VHF-FM Broadcasts, the National Weather Service e-mail request service and NAVTEX receivers. There are other options such as satellite radio or Weather Channel Marine; however, these services are expensive and not offered throughout the industry's service area.  Getting all weather information via e-mail would be extremely costly and place a large burden on the industry to install new computer systems onboard the vessels. The only method for receiving Internet information is via satellite while at sea. This method is extremely slow and very costly for use on a per-minute basis.
Response B	The most likely alternative sources would be Inmarsat-C or commercial services.  a) Our information suggests an initial hardware and installation cost of the antenna/receiver (such as Inmarsat) at about USD\$10,00. This initial lump sum cost is further amplified by an unbudgeted increase of \$1000 per month going forward to download an amount of weather information from the web comparable to what is today obtained by way of the HF weather services proposed for discontinuation. In the aggregate, these represent a very significant increase in operating costs for our members.  b) The usefulness of the substitute information would be comparable to the USCG HF information, but at obviously a much greater cost burden per vessel, multiplied over a large number of vessels.
Response C	<i>No comment was made.</i>

**Table 7.1 Responses from Persons Who Indicated that They Represented a Group of Mariners (cont'd)**

Response D	We would probably use the NWS ftp e-mail request service to cover some text forecasts combined with reading the weather over our HF Coastal radio station. I would probably install Navtex receivers on those vessels without them. I would attempt to seek permission from the FCC to experiment with sending the charts over HF ourselves, since this is so critical to have during hurricane season.  Getting all of our text weather via e-mail would be too costly and a burdensome expense. Reading it over the HF involves added personnel costs and increases traffic on the HF airwaves. At this time, we do not have a viable alternative to the HF radiofax broadcast of charts. Other methods would be extremely costly, and we would have to deal with limited onboard space constraints. There are alternatives (such as wx via XM, or Wx Channel Marine), but they do not provide comprehensive coverage of our entire service area, and also are cost prohibitive.
Response E	<i>No comment was made.</i>
Response F	We would use computer generated weather information and NOAA VHF radio.
Response G	The loss of CGHF would certainly add to the danger of our operation if we could not use it to plan for future weather conditions that could jeopardize our fishing operations. Safety is what is at stake here for many in the fleet.
<b>Question 7</b>	<b>Would the loss of USCG HF marine weather broadcasts impact you?</b>
Response A	The loss of the Coast Guard HF marine weather broadcasts could denigrate safety in the towing industry. The safety of vessels at sea would be adversely impacted and the alternatives leave gaps in service. This would be especially troublesome during hurricane season, when mariners need as much information as possible to transit safely. These broadcasts are a primary factor in protecting the lives of mariners and the environment during hurricane
Response B	Sailing ships – our entire membership – are by their nature <i>profoundly</i> weather-dependent, far more so than virtually any other craft. In light of the very active weather seasons we have witnessed in the last 2 years, discontinuation of this service and the resulting loss of HF Wx broadcasts will be highly detrimental to the safety and operations of our member vessels. This is in addition to the substantial unbudgeted financial burden mentioned above.
Response C	Discontinuing the present HF weather broadcast service would deprive these boaters of a useful and occasionally critical source of current and forecast weather information. It would critically deprive them of access to warnings of severe weather.
Response D	The loss would be devastating -- mainly the HF weather fax. The safety of our vessels at sea would be adversely impacted. Alternatives leave gaps and are costly. This would be especially troublesome during hurricane season, where mariners need as much information available as possible. What you don't see and we have no way of showing is how valuable these HF charts have been in avoiding hurricanes.
Response E	<i>No comment was made.</i>
Response F	Not very much.
Response G	<i>No comment was made.</i>
<b>Question 8</b>	<b>How far seaward does your vessel primarily operate? In what geographic area(s) do you generally operate your vessel?</b>
Response A	AWO's 400 member companies operate on the inland and intra-coastal waterways; the Atlantic, Pacific and Gulf coasts; the Great Lakes; in the non-contiguous trades to Puerto Rico, Hawaii and Alaska; and, ports and harbors around the country. Towing vessels also operate internationally traveling to Canada, Central America, South America, Korea, Russia, West Africa and the Persian Gulf. AWO operators transit the Pacific and Atlantic oceans, the Gulf of Mexico, the Gulf of Alaska, the Bering Sea and the Sea of Japan. While towing vessel operators do not expect the voice and radiofax broadcasts to encompass their entire area of operations, the broadcasts are extremely beneficial when returning to the US.
Response B	The ASTA membership is comprised of vessels that sail in a variety areas ranging from the Great Lakes to Bermuda, to Hawaii to Caribbean to Gulf of Mexico and all points in between. The largest components of the membership are split between two demographics operating 0-25 nm offshore and 25-200 nm offshore. The remaining members (roughly 20%) operate more than 200 nm offshore.
Response C	<i>No comment was made.</i>
Response D	We operate high seas (>200 Nm), traversing coastal and offshore areas. Areas include but are not limited to: NW Atlantic, West Atlantic, Coastal and off shore Florida, Caribbean, Puerto Rico, USVI, Gulf of Mexico, and Mexico. Contracts also take us to/from Trinidad, South America and West Africa; salvage jobs take us anywhere.
Response E	<i>No comment was made.</i>
Response F	3 -100 N (Great Lakes and inland waters).
Response G	Our vessel works out to 200 hundred miles on a regular basis.



## **8. RESULTS – OTHER COMMENTS**

This section includes (1) comments from the NWS/Marine and Coastal Weather Service Branch and (2) a compilation of public comments that were received but were beyond the scope of the eight questions analyzed in Section 6.

Table 8.1 provides the comments received from Mr. Tom Rulon, Marine Dissemination Program Manager for NWS/Marine and Coastal Weather Service Branch. He is responsible for disseminating the NWS marine weather forecasts that are broadcasted by the USCG. Mr. Rulon participated in the development of the Request for Public Comment. He also relayed the Request for Public Comment to many organizations (see Subsection 4.1) and has experience in surveying users of these marine weather forecasts. He submitted his comments before the public comments were analyzed by the research team. Mr. Rulon is not a member of the research team.

Table 8.2 compiles public comments that were general in nature and that focused on either supporting the continuation of USCG HF marine weather broadcasts or discontinuing them. These comments are separate from the results discussed in Section 6. Vendor comments are excluded. Nearly all comments favor continuation of the broadcasts.

**Table 8.1 Comments by the Marine Dissemination Program Manager for the NWS/Marine and Coastal Weather Service Branch**

<b>Topic</b>	<b>Comment</b>
User Feedback	The Notice and responding to the eight questions has served to limit public comment. Many commercial activities and recreational mariners may have been unaware of the Notice altogether by the seasonal and sporadic nature of their activities despite all outreach efforts. Further those wishing to respond, many of whom may be at sea or in remote locations, may have found it too difficult in their present circumstance. Therefore, the 1000+ responses to the Notice represent only a very small sample of those with an interest in seeing weather forecasts continued to be broadcast via HF voice, SITOR and radiofax. Further there are those who benefit indirectly, e.g. seafood consumers, who benefit from a safe and efficient fishing industry but would not respond to the Notice.
Safety of Life and Property, Economic Benefits, Quality of Life	The value of accurate, timely and sufficient weather information for the Safety of Life and Property and Economic Benefits derived from maritime activities cannot be overstated. Mariners are completely reliant on weather information for their safety and operations. Our nation's economy completely relies on the efficient flow of imported and exported goods and foodstuffs. The safe enjoyment of our marine environment by recreational mariners is analogous to our National Parks. The value of HF broadcasts is noted in the Safety of Life At Sea (SOLAS) convention. If the USCG were to discontinue HF weather broadcasts, mariners will be put risk and the economic consequences could be far out of proportion to the required funding. In addition, the USCG may incur direct costs and impact to their mission by having to respond to Search and Rescue situations which could have been averted. It should be noted that in any emergency at sea it is not only the mariner requiring assistance and the USCG who are affected and at risk, but all those who render assistance either directly or indirectly.

**Table 8.1 Comments by the Marine Dissemination Program Manager for the NWS/Marine and Coastal Weather Service Branch (cont'd)**

Topic	Comment
<p>Limited Alternatives for Areas Covered by USCG HF Broadcasts</p>	<p>While the content USCG HF weather broadcasts are available on the Internet (http, ftp and e-mail) via satellite, for many vessels, the HF broadcasts currently serve as the single means to obtain accurate, timely and sufficient weather information. Satellite equipment is not considered a viable alternative by many owners and operators when the initial cost, operating cost, power, space, coverage, and operating constraints are taken into account. Unwisely, even where viable, many owners and operators might choose to not install satellite equipment, or use it sparingly, relying on outdated and/or second-hand weather information, putting themselves and others at risk by not having direct access to accurate, timely, and sufficient weather information.</p> <p>While HF e-mail systems are also a present option for obtaining weather information, they are not a viable means for users to receive multiple graphic charts (too much time, limited spectrum). Further, even for text forecasts only, the existing HF e-mail networks would/could be completely overwhelmed as well as utilizing far greater amounts of the limited HF spectrum than the existing USCG weather broadcasts.</p> <p>A new government satellite broadcast system covering the same areas as the existing USCG HF broadcasts would require large initial Government capital and operating expense as well as user investment in equipment which would not be much cheaper/smaller, etc. than existing point-to-point satellite systems referenced above. The existing GMDSS/SafetyNet system is only viable for limited amounts of text. Via SafetyNet, a suite of graphic products comparable to the existing suite of radiofax products is not technically or economically viable even at the highest levels of compression. The potential of a government marine weather satellite broadcast system should continue to be studied; however, it is not believed to be economically and technically viable for the immediate future.</p> <p>HF broadcasts could be performed (or partially performed) under contract, however, that would require large capital and operating expenditures with no guarantee of continued operations. Ham Nets, volunteer commercial operators, and existing commercial HF systems could not entirely fill the gap of the large infrastructure represented by the USCG. Use of private weather service companies whether by HF or satellite raises nearly identical issues to those presented elsewhere in these paragraphs.</p>
<p>Ease of Use, Cost, and Redundancy</p>	<p>HF broadcasts by voice, SITOR and radiofax require minimal user equipment and training. Many vessels in fact have multiple systems installed to provide redundancy for an extra margin of safety, including those where satellite may serve as a primary means for obtaining weather information. Aboard all but the largest vessels, redundant satellite systems are not currently practicable. As there are no direct operating costs, mariners are not inhibited from obtaining all necessary weather information and thereby putting themselves and others at risk. Significant sales of radiofax equipment and software, and comments from users are strong indicators of the popularity of HF weather broadcasts.</p>
<p>Unintended Consequences</p>	<p>A reduced complement of HF radio equipment on board could heighten the risk to vessels by hindering their capability to initiate and hear calls of distress, and render assistance to others, by reducing their overall communications capabilities. Further, HF is used to receive ancillary information such as navigation and pirate warnings which might not be received if mariners were to perceive there is no great value in carrying HF equipment if weather broadcasts are unavailable.</p>

**Table 8.2 Supplementary Public Comments Regarding USCG HF Broadcasts**

Theme	Example Comments
Continue Broadcasts	<ul style="list-style-type: none"> <li>-I submit that the continued broadcast of weather forecasts and warnings via HF radio is vital to the safe navigation of vessels at sea and in near coastal waters where VHF is either not available or unreadable and the vessel is not equipped with a satellite receiver to obtain this information via the internet, as is the case with many smaller vessels.</li> <li>-I believe it is penny wise and pound foolish to consider discontinuing the service. What you might save daily will be offset by the expense of additional searches.</li> <li>-Please do not shut down the HF weather reporting service. There are many places along the coast where VHF weather reporting is poor to non existent and sailing offshore, even a short distance will put you out of range of any shore side vhf line of sight station. Plan on doing more search and rescue as a replacement when you cut off this important source of safe travel.</li> <li>- I read with dismay of the proposal to eliminate HF weather broadcasts. The weather reports and warnings, and even more so the weather fax transmissions, are absolutely critical to the safety of offshore sailors like myself. Please reconsider.</li> <li>- I feel that many cruising boaters definitely need the weather services provided by the USCG and these services should be continued for boater safety.</li> <li>- I am very concerned about the US Coast Guard's intention to stop providing high frequency (HF) radio broadcast weather forecasts and warnings to offshore sailors. This is a VITAL, life-saving service and should NOT be discontinued.</li> <li>- High Frequency (HF) Radio Broadcasts of Marine Weather Forecasts and Warnings save lives. The cost in lives lost and rescue expenses will surely be more costly than the required upgrades to continue this vital service.</li> <li>- These forecasts are used by mariners, with a program that translate them into actual tracking of storms while one is at sea and has no other method of communications other than HF radio. It would be dangerous for those mariners not to have availability of such publications as we (sailors) sometimes go for 3 days without any other communications, but the HF radio. PLEASE do not stop such important information used by sailing boats while cruising all over the world.</li> <li>- Stopping the HF marine weather broadcasts would be manslaughter. Stopping the broadcasts will kill people. It's not a matter of if, but rather a matter of how many. The program is also more than cost effective. It helps prudent mariners monitor the situation and find safe haven from storms or take appropriate preparatory actions in the very least. The alternative will be many more SAR missions at a vastly higher cost to tax payers. Instead of stopping HF marine weather broadcasts, there should be serious consideration given to expanding the coverage and improving the products and timeliness of delivery.</li> </ul>
Discontinue Broadcasts	<ul style="list-style-type: none"> <li>- I believe we should shut down the HF weather system. Satellite weather fax systems are more common, cheaper, and more reliable than HF radio. Perhaps we could use the money to install more weather buoys that can be accessed from the Internet.</li> <li>- Continuing these weather broadcasts by the USCG given the plethora of other weather data sources is a complete waste of tax payer money.</li> </ul>





## 9. SUMMARY CONCLUSIONS

This section synthesizes and interprets the results presented in Sections 6, 7, and 8 given the issues discussed in Section 5. The section addresses the following four questions:

1. Who are the offshore and high-seas operators who responded to the Request for Public Comment and how many depend on USCG HF broadcasts?
2. How do the responding operators view the possible loss of USCG HF broadcasts as affecting their vessel operations?
3. How might the responding operators respond to the loss of USCG HF broadcasts and what are their concerns about alternatives?
4. Does the public demand for USCG HF broadcasts and the value (cost-benefit) of these broadcasts compared to known alternative sources justify their continuance?

### ***9.1. Who Are the Offshore and High-seas Operators Who Responded to the Request for Public Comment and How Many Depend on USCG HF Broadcasts?***

The public comment consists of three groups: the ocean-cruising community (346 responses), unspecified vessels (320 responses), and commercial operators (104 responses when commercial ocean cruisers are excluded).

- About 54% of these responding operators indicated their operating area. They appeared equally distributed among the North Atlantic, the Caribbean/GOM, and the North/Central Pacific.
- About 57% of them indicated their primary source for obtaining marine weather forecasts and nearly all (more than 83%) relied on the USCG HF broadcasts. Only 3% of those responding were using any satellite provider as their primary source.
- About 79% of them indicated the type of USCG HF broadcast they monitored. More than 58% used either voice and/or radiofacsimile broadcasts. Few (22% or less) used SITOR.

Table 9.1 summarizes the demographics and preferences indicated by the vessel groups that provided comments, which appear in Section 7. Counter to the above statistics, the majority of these comments were received from commercial entities. Similar to the above statistics, the majority relied on USCG HF broadcasts.

The NWS Marine Dissemination Program Manager considers that the 821 responses generated during this study is a small sample of known NWS marine weather forecast users (see Table 8.1). The research team noted in Subsection 4.4 that the sample is neither representative nor random, in that it draws from those mariners who were informed of the Notice and could respond in a timely manner. At least one fisherman indicated difficulty in using the U.S. DOT Docket Management System. Consequently, many more comments might have been received using a different data-collection strategy.

**Table 9.1 Demographics and Preferences Indicated in Comments from Representatives of Vessel Groups**

Vessel Type or Service	Operating Region	Primary Source	USCG HF Broadcast Preference
Commercial fishermen's association	Pacific	Implied that USCG HF is primary and USCG VHF is secondary	Radiofax and voice
Commercial tanker fleet	Not specified	USCG HF implied	Radiofax and SITOR
Three commercial workboat fleets	Two fleets operate in all regions	USCG HF and some have Inmarsat C	Voice and radiofax; preference differs by operating region
	One fleet operates in the Great Lakes and inland waters	Implied that USCG VHF is primary and USCG HF is secondary	Radiofax
Recreational boater association	Not specified	USCG HF	Voice; some use radiofax
School ship association	All regions	Implied that USCG VHF is primary and USCG HF is secondary	Voice and radiofax

***9.2. How Do the Responding Operators View the Possible Loss of USCG HF Broadcasts as Affecting Their Vessel Operations?***

About 36% of them responded, and of those about 57% considered that the loss of broadcasts would alter the way they would operate; 43% considered that they would not change their operations. Only about 1% felt confident that they could manage well the resulting exposure created by the loss of USCG HF broadcasts. Twenty percent were unwilling to manage their heightened exposure, and 57% of these unwilling operators implied that they would not pursue an alternative source for weather information.

Comments from the vessel groups listed in Table 9.1 indicated that safety would be compromised, with the exception of those who operate on the Great Lakes. Many expressed grave concern for safety during hurricane season.

Likewise, public comments supporting continuance of the USCG HF broadcasts (as provided in Section 8) indicated that mariner safety would be compromised and that the outcomes would include more offshore and/or high-seas searches and rescues. Some responders considered the USCG HF broadcasts to be as important as their lifesaving equipment.

The NWS Marine Dissemination Program Manager made similar observations in his comment about the safety of life and property:

*“ . . . If the USCG were to discontinue HF weather broadcasts, mariners will be put [at] risk and the economic consequences could be far out of proportion to the required funding. In addition, the USCG may incur direct costs and impact to their mission by having to respond to Search and Rescue situations which could have been averted. It should be noted that in*

*any emergency at sea it is not only the mariner requiring assistance and the USCG who are affected and at risk, but all those who render assistance either directly or indirectly.”*

**9.3. How Might the Responding Operators Respond to the Loss of USCG HF Broadcasts and What Are Their Concerns About Alternatives?**

From the previous section, it appears that perhaps a quarter of the responding operators would be seeking options, and only a percent of them would feel confident about implementing an alternative source. Of those responding who would seek out an alternative source and named the source, it was equally divided between using other HF services (45%) and using international satellite providers (45%). Preferences for these services varied between commercial and recreational operators; more commercial operators preferred international satellite service and more recreational operators preferred HF services. Also, preferences varied by operating region; more Atlantic and Caribbean/GOM operators preferred HF services and more Pacific operators preferred international satellite service.

Less than 10% of the 821 responders provided comments that helped the research team assess any concerns regarding the cost or usefulness of the alternative sources. But it was clear that cost was a major concern no matter what alternative source was chosen.

From Table 3.8 it is clear that cost could significantly increase for operators who have depended on USCG HF broadcasts as their sole source. Table 9.2 provides a coarse 10-year cost comparison between the USCG HF broadcasts and the alternatives being considered by the responding operators.

**Table 9.2 Possible Change in Life-cycle (10-year) Costs to the Vessel Owner/Operator Associated with Obtaining Marine Weather Broadcasts from Alternative Sources**

<b>Alternative</b>	<b>Estimated 10-year Cost of Equipment and Service Fees to Receive USCG HF</b>	<b>Estimated 10-year Cost of Equipment and Service Fees to Receive Alternative Source</b>	<b>Likely Change in Cost to Vessel Owner/Operator</b>
HF voice by other than USCG	\$2,200 to \$3,600	\$2,200 to \$3,600	No change
HF low-speed data by other than USCG (possible substitute for radiofacsimile)	\$4,600 to \$8,600	\$17,000 to \$19,000	Two- to three-fold increase
HF e-mail by other than USCG (possible substitution for SITOR)	\$1,000 to \$3,400	\$7,600 to \$7,900	Two- to seven-fold increase
Satellite* voice	\$2,200 to \$3,600	\$9,800 to \$43,000	Four- to 11-fold increase
Satellite* low-speed data (possible substitution for radiofacsimile)	\$4,600 to \$8,600	\$19,000 to \$53,000	Four- to six-fold increase
Satellite* text (possible substitution for SITOR)	\$1,000 to \$3,400	\$14,000 to \$50,000	Fourteen-fold increase

\* International satellite provider services were used for this comparison.

Comments from the six impacted vessel groups listed in Table 9.1 indicated the following:

- Two commercial entities (a workboat fleet and the school ship association) would consider using Inmarsat C, but they were very concerned about its expense.
- One commercial workboat fleet would consider setting up its own HF network because of the cost of satellite services.
- The other three (a recreational boater association, tanker fleet, and a commercial fishermen's association) had no alternatives identified.

The NWS Marine Dissemination Program Manager expressed similar concerns about the limited alternatives for areas covered by USCG HF broadcasts:

*“Satellite equipment is not considered a viable alternative by many owners and operators when the initial cost, operating cost, power, space, coverage, and operating constraints are taken into account. Unwisely, even where viable, many owners and operators might choose to not install satellite equipment, or use it sparingly, relying on outdated and/or second-hand weather information, putting themselves and others at risk by not having direct access to accurate, timely, and sufficient weather information.*

*“While HF e-mail systems are also a present option for obtaining weather information, they are not a viable means for users to receive multiple graphic charts (too much time, limited spectrum). Further, even for text forecasts only, the existing HF e-mail networks would/could be completely overwhelmed as well as utilizing far greater amounts of the limited HF spectrum than the existing USCG weather broadcasts.*

*“. . . The existing GMDSS/SafetyNet system is only viable for limited amounts of text. Via SafetyNet, a suite of graphic products comparable to the existing suite of radiofax products is not technically or economically viable even at the highest levels of compression . . .*

*“. . . Ham Nets, volunteer commercial operators, and existing commercial HF systems could not entirely fill the gap of the large infrastructure represented by the USCG. Use of private weather service companies whether by HF or satellite raises nearly identical issues to those presented elsewhere in these paragraphs.”*

#### ***9.4. Does the Public Demand for USCG HF Broadcasts and the Value (Cost-benefit) of These Broadcasts Compared to Known Alternative Sources Justify Their Continuance?***

The ocean-cruising community and other offshore and/or high-seas operators that are represented in this study have identified the USCG HF broadcasts as their primary safeguard in preventing weather-related incidents at sea. They have expressed concern about the adequacy of alternatives. Nearly all expressed concerns about their affordability. Some alternatives that are more affordable do not provide the same type, detail, or frequency of information as what they receive from the USCG HF broadcasts.

*Consequently, this study concludes that the responding public collectively perceives that the USCG HF broadcasts are essential to their safety. There is no viable alternative to the USCG HF broadcasts because present alternatives are perceived by the public to be out of financial reach. Also, marine weather forecasts available through these alternative sources may not guarantee the same level of accuracy, timeliness, and/or sufficiency as provided by the USCG HF broadcasts.*



**APPENDIX A**

***Federal Register/Vol. 72, No. 80/26 April 2007/Notices [USCG-2007-27656]  
titled, “High Frequency (HF) Broadcasts of Marine Weather Forecasts and  
Warnings”; Request for Public Comment***





Attach FR\_HF\_WX\_Notice\_published.pdf here.



***APPENDIX B***

***Tool for Categorizing Vessel Type and Service***



The below table shows CG-3 designated “maritime operations” and MISLE designations for vessels. These were used to generate a categorization scheme for the business case.

<b>Maritime Operations</b>	<b>MISLE Designations</b>	<b>Business Case Designation</b>	
1. Commercial Fishing Vessel	Fish Catching Vessel	Commercial	
	Fishing Catching/Processing Vessel	Commercial	
	Fishing Support Vessel	Commercial	
	Alleutian Trade Act	Commercial	
2. Fish Processing Vessel	Fishing Support Vessel	Commercial	
3. Freight Barge	Container Barge	Commercial	
	Deck Barge	Commercial	
	Dry Cargo Barge	Commercial	
	General	Commercial	
	Hopper Barge	Commercial	
	Integrated Tug and Barge (Barge)	Commercial	
	LASH / SEABEE Barge	Commercial	
	Barge Carrier (e.g. LASH)	Commercial	
4. Freight Ship	Cement Carrier	Commercial	
	Combination Carrier (e.g., OBO)	Commercial	
	Container Ship	Commercial	
	Fishing Support Vessel	Commercial	
	General	Commercial	
	Heavy Load Carrier	Commercial	
	Livestock Carrier	Commercial	
	Ore Carrier	Commercial	
	Pallets Carrier	Commercial	
	Ro-Ro/Container	Commercial	
	Vehicle Carrier	Commercial	
	Woodchips Carrier	Commercial	
	5. Industrial Vessel	Cable laying Vessel	Commercial
		Commercial Dive Support Vessel	Commercial
Cutter/Dredger		Commercial	
Cutter/Dredger Barge		Commercial	
Drydock, Floating		Commercial	
Factory Ship (other than fishing)		Commercial	
Firefighting Vessel		Commercial	
Fishing Support Vessel		Commercial	
Floating Production System		Commercial	
Incinerator Vessel		Commercial	
Industrial Barge		Commercial	
Living Quarters		Commercial	
Orbital Launch Vessel		Commercial	
Pilot Vessel		Commercial	
Pipe laying		Commercial	
Radio Ship		Commercial	
Repair Vessel		Commercial	
Rescue / Standby Vessel		Commercial	
Salvage Vessel		Commercial	
Seabed Mining Vessel		Commercial	
Supply Vessel (not OSV)		Commercial	
Work Boat	Commercial		
Work Float	Commercial		
Work Platform	Commercial		
6. Mobile Offshore Drilling Unit	MODU	Commercial	
7. Offshore Supply Vessel	Fishing Support Vessel	Commercial	
	Floating Production Storage Offloading Vessel	Commercial	
	Floating Storage Offloading Vessel	Commercial	

Maritime Operations	MISLE Designations	Business Case Designation
	Lift Boat	Commercial
	Offshore Supply Vessel	Commercial
8. Oil Recovery	Oil Recovery Vessel	Commercial
9. Passenger (6 or Fewer)	Attraction Vessel	Commercial
	Charter Fishing Vessel	Recreational
	Cruise Ship Launch/Tender	Commercial
	Diving Vessel (Recreational)	Recreational
	Excursion/Tour Vessel	Recreational
	General	Commercial
	Harbor Cruise Vessel	Recreational
	Ocean Cruise Vessel	Recreational
	Parasailing Vessel	Recreational
	Party/Head Boat (other than fish)	Recreational
	River Cruise Vessel	Recreational
	Sailing Vessel	Recreational
	Special Purpose Ship	Commercial
	Submersible	Commercial
	Water Taxi	Commercial
Waterskiing Vessel	Recreational	
10. Passenger (More Than 6)	Amphibious Vessel (DUKW, etc.)	Recreational
	Attraction Vessel	Commercial
	Charter Fishing Vessel	Recreational
	Crew Boat	Commercial
	Cruise Ship Launch/Tender	Commercial
	Diving Vessel (Recreational)	Recreational
	Excursion/Tour Vessel	Recreational
	Ferry	Commercial
	Gaming Vessel	Commercial
	General	Commercial
	Harbor Cruise Vessel	Recreational
	Ocean Cruise Vessel	Recreational
	Party/Head Boat (other than fish)	Recreational
	Permanently Moored Vessel	Commercial
	River Cruise Vessel	Recreational
	Sailing Vessel	Recreational
	Special Purpose Ship	Commercial
	Submersible	Commercial
Water Taxi	Commercial	
11. Passenger Barge (More Than 6)	Passenger Barge	Commercial
12. Public Tankship/Barge	General	Commercial
13. Public Vessel, Unclassified	Buoy/Lighthouse Tender	Commercial
	Hospital Ship	Commercial
	Ice Breaker	Commercial
	Law Enforcement (Non-military) Vessel	Commercial
	Search and Rescue Vessel	Commercial
14. Recreational	Motor Propelled Vessels	Recreational
	Sailing Vessels	Recreational
	Small Watercraft	Recreational
	Submersible	Recreational
15. Research Vessel	Cable Layer	Commercial
	Fishing	Commercial
	General	Commercial
	Oceanographic	Commercial
	Seismographic	Commercial
16. School Ship	General	Commercial
	Research	Commercial
	Sailing School	Commercial

<b>Maritime Operations</b>	<b>MISLE Designations</b>	<b>Business Case Designation</b>
	Training	Commercial
17. Tank Barge	Bulk Liquefied Gas Barge	Commercial
	Bulk Liquid Cargo (Tank) Barge	Commercial
	Integrated Tug and Barge (Barge)	Commercial
	Permanently Moored Vessel	Commercial
18. Tank Ship	Chemical Tank Ship	Commercial
	Gas Carrier	Commercial
	General	Commercial
	Petroleum Oil Tank Ship	Commercial
	Vegetable Oil Tank Ship	Commercial
19. Towing Vessel	Emergency Assist Tow Vessel	Commercial
	General	Commercial
	Integrated Tug and Barge (Tug)	Commercial
	Log Bronc	Commercial
	Pushing Ahead (Towboat)	Commercial
	Salvage Vessel	Commercial
	Ship Assist Tug	Commercial
	Towing Behind (Tug)	Commercial
20. Unclassified	Aircraft (while navigating)	Commercial
	Permanently Moored Vessel	Commercial
21. Government Vessels	Patrol Vessel	Commercial
	Aircraft Carrier	Commercial
	Amphibious Assault	Commercial
	Battleship	Commercial
	Corvette	Commercial
	Cruiser	Commercial
	Frigate	Commercial
	Minesweeper	Commercial
	Special Operations Craft	Commercial
	Submarine	Commercial
	Military Vessel: Critical Cargo	Commercial
	Military Vessel: Other combat/support ship	Commercial





***APPENDIX C***

***Example Form Letter Request for Supplemental Comments***



July XX, 2007

Name  
Address  
City, State Zip

RE: Comment Concerning Coast Guard HF Transmission of Marine Weather Broadcasts

Thank you for submitting comments regarding the importance of Coast Guard HF transmission of marine weather forecasts. I am a Coast Guard contractor analyzing all comments to determine the business case for recapitalizing HF transmitters. In an attempt fully utilize the comment you provided, I would greatly appreciate your answers to the following questions:

- 1) What type of vessel do you work or sail on? What is your position on this vessel?
- 2) Where does your vessel sail/operate?
- 3) How often do you sail/operate in those waters?

You are not obligated to provide additional comment. If you do, your answers to these questions will (1) provide the Coast Guard a better understanding of your situation, and (2) help me properly group your concerns with others we have received.

If you choose to submit follow-up, please mark "Follow-Up Comment" when providing your answers. You may submit comments identified by the docket number USCG-2007-27656 using one of the following methods:

- 1) Website: <http://dms.dot.gov>
- 2) Mail: Docket Management Facility, US Department of Transportation, 400 Seventh Street SW., Washington, DC 20590-0001
- 3) Fax: 202-493-2251

Sincerely,

Emily Hanson  
ABSG Consulting Inc.



## ***APPENDIX D***

### ***Data Tables***

- Appendix D Part 1
- Appendix D Part 2



Attach both data table.pdfs here.

- Appendix D Part 1
- Appendix D Part 2

