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Under the MMPA and Incidental Take Statement under the ESA

MARINE SPECIES MONITORING

for the U.S. Navy's

Gulf Of Alaska

Temporary Maritime Activities Area

Annual Report 2015

December 15, 2015

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INTRODUCTION

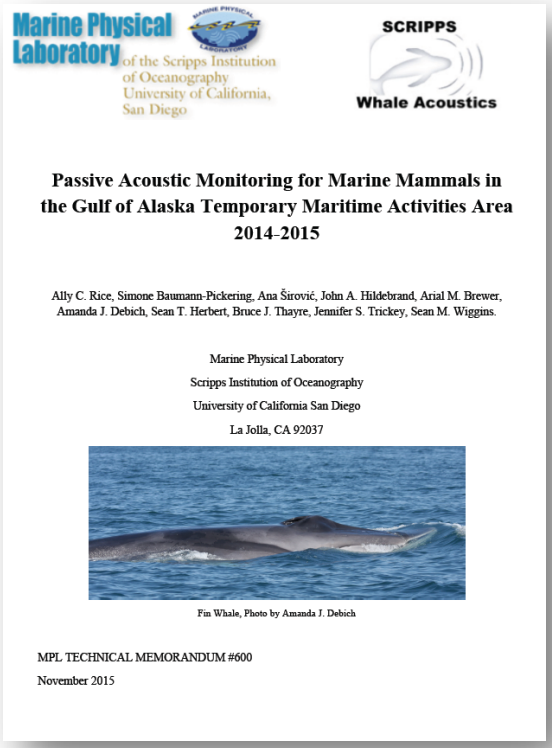
The U.S. Navy (Navy) prepared this Year 5 Annual Monitoring Report covering the period from November 1, 2014 through October 31, 2015 in compliance with the National Marine Fisheries Service (NMFS) Final Rule and Letter of Authorization under the Marine Mammal Protection Act and Incidental Take Statement within the Biological Opinion prepared by NMFS under the Endangered Species Act for the U.S. Navy's Gulf of Alaska Temporary Maritime Activities Area (GOA TMAA).

Navy met and exceeded its current monitoring obligations for 2014-2015 as specified in the NMFS' Final Rule, Letter of Authorization, and Biological Opinion for the GOA TMAA.

Monitoring results are briefly summarized in this report with detailed technical analysis contained in Rice et al. (2015) (*cover page shown below*).

Additionally, the Navy's biennial Northern Edge exercise occurred from 15-26 June 2015 within the GOA TMAA. No other Navy in-water activity or vessel movement other than the Northern Edge exercise period in June 2015, occurred in the GOA TMAA from November 2014 to October 2015.

This is the final monitoring report under the current GOA TMAA authorization.



Marine Physical Laboratory of the Scripps Institution of Oceanography University of California, San Diego

SCRIPPS Whale Acoustics

Passive Acoustic Monitoring for Marine Mammals in the Gulf of Alaska Temporary Maritime Activities Area 2014-2015

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Fin Whale, Photo by Amanda J. Debich

MPL TECHNICAL MEMORANDUM #600
November 2015

YEAR 5 SUMMARY

Navy committed to long-term passive acoustic monitoring within the GOA TMAA as the most scientifically valid and cost effective means of obtaining year-round marine mammal occurrence data (DoN 2010).

During this reporting period, two separate passive acoustic monitoring technologies were used.

1) Bottom-mounted passive acoustic devices: Up to five (5) autonomous bottom-mounted High-frequency Acoustic Recording Packages (HARP) from Scripps Institution of Oceanography were deployed within the GOA TMAA Sites ranged from the continental shelf, to the continental slope, and extending to specific seamounts in the south (**Figure 1**).

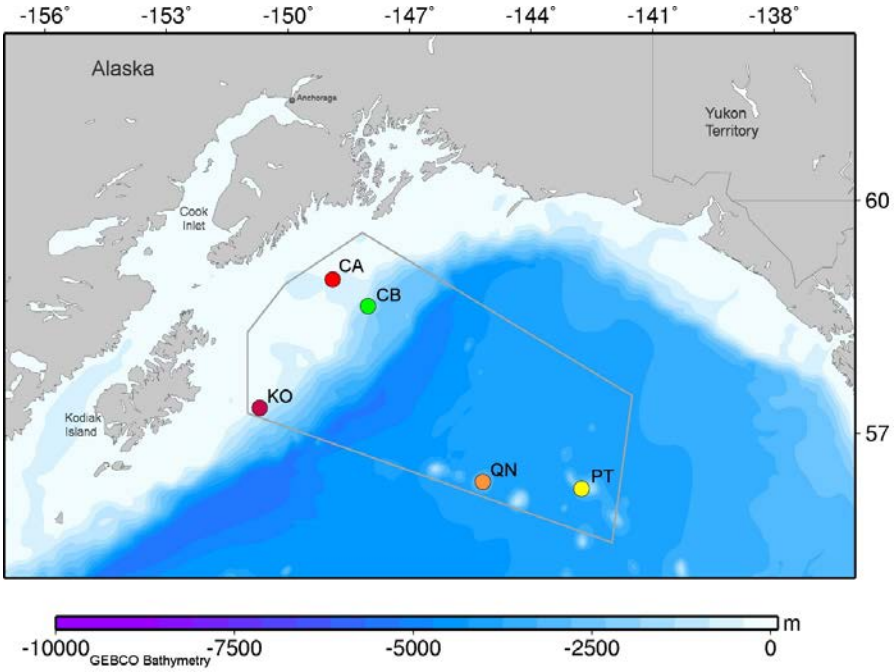
A total of **23,996 hours covering 999 days** of acoustic data were recorded in these deployments covering the period from April 2014 through May 2015 [1] (Rice et al. 2015).

2) Underwater water glider deployment: In addition to the bottom mounted passive acoustic devices, an underwater glider with passive acoustic sensors was used for the first time along the continental slope within the GOA TMAA from July 11 through August 27, 2015 (approximately 46 days)(**Figure 1**). A Kongsberg Seaglider™ owned by the University of Washington- Applied Physics Laboratory (UW APL) was successfully deployed by a joint group of researchers from UW APL and Oregon State University.

While this particular field deployment was funded by US Pacific Fleet specifically for GOA TMAA monitoring, continuing glider and sensor development is under funding from the Marine Mammals and Biology Program Code 322, Office of Naval Research[2].

[1] Technical details on HARP design and capability are available at:
http://cetus.ucsd.edu/technologies_AutonomousRecorders.html
HARPs record marine mammal vocalizations and echolocation clicks, as well as anthropogenic sounds on internal hard drives that must be retrieved during field service calls approximately every 7-10 months depending on battery life. Because HARPs have to be deployed and subsequently then data retrieved after retrieval from the water, there is always a lag in the dates analyzed verse calendar dates.

[2] http://www.onr.navy.mil/Science-Technology/Departments/Code-32/All-Programs/Atmosphere-Research-322/Marine-Mammals-Biology.aspx



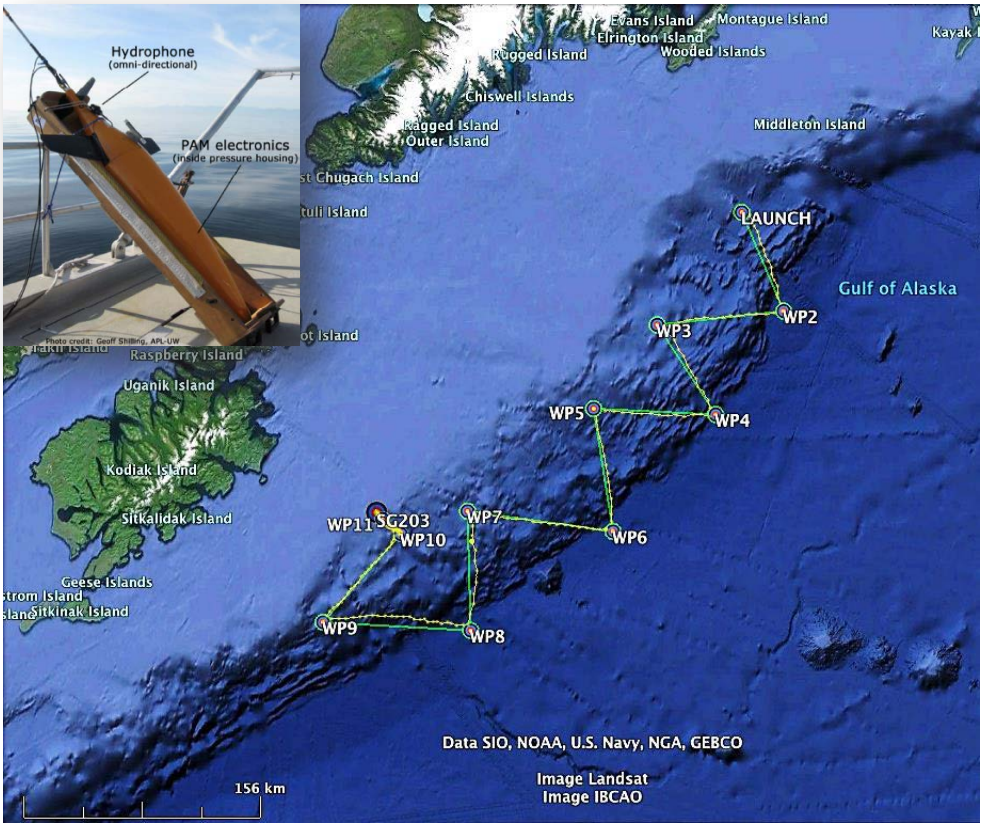


Figure 1. Location of Navy-funded HARPs in the Gulf of Alaska 2014-2015 (top); UW APL Seaglider tracklines for deployment within the Gulf of Alaska (bottom).
(Top figure from Rice et al. 2015)

Bottom-Mounted Passive Acoustic Monitoring

The below information is from the analysis of HARPs deployed in the GOA TMAA for the period April 2014 through May 2015. **Figure 1** shows individual HARP locations mentioned. Specific text is quoted from Rice et al. (2015). Summarized in Rice et al. (2015) are the analytical results primarily for ESA-listed whale species, beaked whales, and anthropogenic sounds:

"Passive acoustic monitoring was conducted in the Gulf of Alaska Temporary Maritime Activities Area (GATMAA) from April 2014 to May 2015 to detect marine mammal and anthropogenic sounds. High-frequency Acoustic Recording Packages (HARPs) recorded sounds between 10 Hz and 100 kHz at five locations:

-shelf site offshore Kenai Peninsula (200 m depth, site **CA**),
-continental slope site in deep water (900 m depth, site **CB**),
-slope site offshore Kodiak Island (230 m depth, site **KO**),
-deep offshore site at Pratt Seamount (1000 m depth, site **PT**), and
-deep offshore site at Quinn Seamount (900 m depth, site **QN**).

Data analysis consisted of detecting sounds by analyst scans of long-term spectral averages (LTSAs) and spectrograms, and by automated computer algorithm detection when possible. The data were divided into three frequency bands and each band was analyzed for marine mammal vocalizations and anthropogenic sounds.

Four baleen whale species were recorded: blue whales, fin whales, gray whales and humpback whales. No North Pacific right whale calls were recorded. Across all sites, blue whales, fin whales and humpback whales were commonly detected throughout the recordings. Blue whale D calls and Central Pacific tonal calls and fin 40 Hz calls peaked in summer months, while blue whale Northeast Pacific B calls and fin 20 Hz calls peaked later in fall months…Humpback whale calling peaked in December 2014 to March 2015.

Signals from three known odontocete species were recorded: sperm whales, Cuvier's beaked whales, and Stejneger's beaked whales. Sperm whales were detected at every site.

Cuvier's beaked whales were detected at sites PT (Pratt Seamount) and QN (Quinn Seamount). Stejneger's beaked whales were detected at sites CB (continental slope site), PT, and QN, with most detections occurring at site CB.

The only anthropogenic sounds detected in the recordings were explosions. Neither mid-frequency active (MFA) sonar events were detected throughout the recordings. Most explosion detections occurred during summer months at sites CA (offshore Kenai Peninsula), CB (continental slope site), KO (slope site offshore Kodiak Island), and PT (Pratt Seamount)."

Species-specific observations from Rice et al. (2015) include:

Blue whales- "Blue whale calls were detected at all sites and were most prevalent during the summer and fall.

- Blue whale Northeast Pacific B calls were detected from May 2014 through January 2015 with a peak in September 2014 and with fewest calls detected at sites CA (offshore Kenai Peninsula) and QN.
- There was no discernable diel pattern for the Northeast Pacific B calls.
- Central Pacific tonal calls were detected at sites CA (offshore Kenai Peninsula), CB (continental slope site), KO (slope site offshore Kodiak Island), and PT (Pratt Seamount) from July to September 2014 with most detections occurring in August. Very few calls were detected at site CA, while most central Pacific tonal call detections occurred at site PT.
- There was no diel pattern for Central Pacific tonal calls.
- Blue whale D call detections were the highest from June to August 2014. Very few D calls were detected at site QN (Quinn Seamount), while most D call detections occurred at site PT (Pratt Seamount).
- There was a possible diel pattern for blue whale D calls with more calling at sunset.
- These results are consistent with earlier recordings at these sites (Baumann-Pickering et al., 2012; Debich et al., 2013; Debich et al., 2014) as well as recordings collected further south in the Gulf of Alaska (Watkins et al., 2000)."

Fin whales- "Fin whales were detected throughout the recordings at all sites.

- Fin whale 20 Hz calls, associated with singing and call-countercall among animals, were the dominant fin whale call type. Peaks in calling occurred September – December 2014.
- There was no discernable diel pattern for 20Hz calls.
- In the eastern North Pacific, fin whale 20Hz calls are generally detected from October through April (Watkins et al., 2000), corresponding to the pattern we observed at these sites.
- Fin whale 40 Hz calls were recorded throughout the recording period at all sites. Peaks in detections occurred from June - August 2014. Site CA (offshore Kenai Peninsula) had the highest number of detections.
- There was no discernable diel pattern for fin whale 40 Hz calls.
- Differences in the timing of peak calling presence per call type may indicate distinct behavioral functions associated with these call types.
- These results are consistent with earlier recordings (Baumann-Pickering et al., 2012; Debich et al., 2013; Debich et al., 2014)."

Humpback whales- "Humpback whales were detected at all sites and were one of the most commonly detected baleen whales throughout the recordings.

- Humpback whale detections were low from April – September 2014 and high from December 2014 through March 2015. Site QN (Quinn Seamount) had the highest number of detections.
- There was more nighttime calling at site KO (slope site offshore Kodiak Island), but no discernable diel pattern for the other sites.
- The substantial presence of humpback whales during the winter does not fit models of whale migration to subtropical or tropical waters during the winter breeding season. These data instead suggest that some whales remain in subpolar waters during the winter.
- In general these results are similar to previous recordings (Baumann-Pickering et al., 2012; Debich et al., 2013; Debich et al., 2014). However, it appears that calling is occurring later in the year (subsiding around April) than in previous recordings (subsiding around March)."

Sperm whale- "Sperm whale echolocation clicks were detected at each site.

- Sperm whale clicks were most prevalent at site CB (continental slope site), with peaks in detections June through late-November 2014 and again in April – May 2015. Site CA (offshore Kenai Peninsula) had the least number of detections.
- There was no discernable diel pattern for sperm whale clicks.
- Site PT (Pratt Seamount) has a peak in detections from August – September and site QN (Quinn Seamount) has a peak from March – April, both of which have not been previously reported
- These results are similar to those in previous monitoring periods for sites CA (offshore Kenai Peninsula), CB (continental slope site) and KO (slope site offshore Kodiak Island) (Baumann-Pickering et al., 2012; Debich et al., 2013; Debich et al., 2014)."

Cuvier's beaked whales- "Cuvier's beaked whale FM pulses were detected at two of the three sites for which there was effort.

- Cuvier's beaked whale FM pulses were detected in low numbers at sites PT and QN. Detections occurred from May – July 2014 at site PT (Pratt Seamount) and from October 2014 – March 2015 at site QN (Quinn Seamount).
- There was no discernable diel pattern for Cuvier's beaked whale detections.
- These results are similar to those in previous monitoring periods for sites PT (Pratt Seamount) and QN (Quinn Seamount) (Baumann-Pickering et al., 2012; Debich et al., 2013; Debich et al., 2014). However, there have been detections at site CB (continental slope site) during previous monitoring periods which were not seen during this period"

Stejneger's beaked whales- Stejneger's beaked whale FM pulses were detected at the three sites for which there was effort.

- Stejneger's beaked whale FM pulses were detected at sites CB (continental slope site), PT (Pratt Seamount), and QN (Quinn Seamount). Detections were most prevalent at site CB, with a peak in detections in October 2014. Detections occurred in low numbers at sites PT and QN.
- There was no discernable diel pattern for Stejneger's beaked whale detections.
- These results are similar to those from the last monitoring period (Debich et al., 2014) but there were slightly more detections during previous monitoring periods (Baumann-Pickering et al., 2012; Debich et al., 2013)."

Seasonal ambient noise sound spectra were reported by Rice et al. (2015) for all five HARP sites:

Ambient Noise- "High levels of underwater ambient noise were recorded at all sites, mostly from environmental and anthropogenic causes, although some sources were also biotic.

- Prominent seasonal peaks in noise observed at the frequency band 15-30 Hz during the fall and winter across most sites are related to the presence of fin whale calls, while peaks at 45-47 Hz, relating to blue whale B calls, were present during the late summer and fall at sites CB (continental slope site), KO (slope site offshore Kodiak Island), PT (Pratt Seamount), and QN (Quinn Seamount).
- At sites PT (Pratt Seamount) and QN (Quinn Seamount), there is some evidence of long-range ship noise at frequencies below 100 Hz.
- Sites CA (offshore Kenai Peninsula) and KO (slope site offshore Kodiak Island) show elevated spectrum levels in the 10-100Hz band likely caused by ocean currents and hydrophone support cable strumming from these currents. Site KO also shows a peak from 200-500Hz due to strumming.
- The peak around 230-240Hz visible at sites CB (continental slope site), PT (Pratt Seamount) and QN (Quinn Seamount) is likely due to anthropogenic noise."

Several anthropogenic sounds were detected in the recordings: broadband ship noise and explosions. Given there were no Navy vessel movements or training activity during this analysis period (April 2014 to May 2015) all anthropogenic sounds are from civilian, non-Navy sources:

Shipping Noise- "Broadband ship noise was detected at all sites.

- Broadband ship noise occurred throughout recording periods at all sites, with a peak in May at site CB (continental slope site).
- There was no discernable diel pattern for broadband ship detections.
- In general, there were less broadband ship detections during this monitoring period than in the previous monitoring period (Debich et al., 2014) but a similar number of detections compared to earlier monitoring periods (Baumann-Pickering et al., 2012; Debich et al., 2013)."

Explosions- "Explosions were detected in low numbers.

- Explosions were detected at sites CA (offshore Kenai Peninsula), CB (continental slope site), KO (slope site offshore Kodiak Island) and PT (Pratt Seamount) mainly during summer months. The highest number of detections occurred at offshore site PT but there were no detections at the other offshore site QN (Quinn Seamount).
- Explosion counts for each site were as follows: 31 for CA, 7 for CB, 4 for KO (slope site offshore Kodiak Island), and 125 for PT (Pratt Seamount).
- There were no explosions detected during the winter at site CB (continental slope site) and no detections at site QN (Quinn Seamount) as were seen during previous monitoring periods (Baumann-Pickering et al., 2012; Debich et al., 2013; Debich et al., 2014).
- Though there were few explosion detections, most detections occurred during daytime hours.
- The explosions are likely [non-Navy] fishery-related seal bombs based on the spectral properties of the signals."

Underwater Glider Deployment

A UW APL Seaglider was successfully deployed along the continental slope within the GOA TMAA from July 11 through August 21, 2015. The passive acoustic sensors collected data in the frequency range from 15 Hz to 97 kHz (at 194 kHz sampling rate/ 16-bit resolution suited for identification of baleen and most toothed whales).

The Seaglider uses buoyancy control to travel in a zig-zag pattern making repeated dives to a maximum depth of 3,000 feet then surfacing. While at the surface, the glider transmits by satellite the glider's position and standard Conductivity-Temperature-Density profiles. In general, the glider covered approximately 11 nautical miles per day during its deployment.

Marine mammal vocalization and echolocation detections from the Seaglider deployment are still undergoing analysis as of this report date. The final technical report from the researchers summarizing data results should be available in the spring of 2016 and will be posted to the Navy's public monitoring website: http://www.navymarinespeciesmonitoring.us/

FUTURE EFFORTS

This report concludes the Navy's monitoring within the GOA TMAA under the current NMFS authorizations. The HARPs currently deployed will be permanently retrieved and returned to Scripps Institution of Oceanography for refurbishment. Final data if any not included in previous reports (Baumann-Pickering et al. 2012, Debich et al. 2013, 2014, Rice et al. 2015) will be reviewed, analyzed, and reported during 2016.

In consultation with the NMFS during a June 2016 adaptive management meeting, the Navy and NMFS agreed that Navy-funded monitoring within the GOA TMAA would be revisited during subsequent adaptive management meetings in 2017 and 2018. Given four years of constant 24/7 passive acoustic marine mammal baseline monitoring through the years 2011-2015, scientifically significant ambient background data for a region used infrequently by the Navy has been sufficiently obtained under the current authorization.

Therefore, the Navy with NMFS' concurrence will not fund GOA TMAA marine mammal monitoring in 2016, a year in which no Navy presence is anticipated within the TMAA. A more focused monitoring effort is currently envisioned before, during, and after the Navy's next Northern Edge exercise tentatively scheduled for June or July 2017.

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