



MARINE MAMMAL COMMISSION

4 April 2014

Ms. Jolie Harrison
Incidental Take Program Supervisor
Permits and Conservation Division
National Marine Fisheries Service
Office of Protected Resources
1315 East-West Highway
Silver Spring, MD 20910

Dear Ms. Harrison:

The Marine Mammal Commission (the Commission), in consultation with its Committee of Scientific Advisors on Marine Mammals, has reviewed the December 2013 application submitted by Furie Operating Alaska LLC (Furie) seeking authorization under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA) to take small numbers of marine mammals by harassment incidental to a 3D seismic survey in Cook Inlet, Alaska, to be conducted from May to November 2014. The Commission also has reviewed the National Marine Fisheries Service's (NMFS) 4 March 2014 notice (79 Fed. Reg. 12160) announcing receipt of the application and proposing to issue the authorization, subject to certain conditions.

RECOMMENDATIONS

Based on its review of the information provided, the Marine Mammal Commission recommends that the National Marine Fisheries Service—

- defer issuance of the proposed incidental harassment authorization until such time as the National Marine Fisheries Service can, with reasonable confidence, support a conclusion that the proposed activities would affect no more than a small number of Cook Inlet beluga whales and have no more than a negligible impact on the population;
- work with the Fish and Wildlife Service and the Commission to develop a policy that sets forth clear criteria and/or thresholds for determining what constitutes “small numbers” and “negligible impact” for the purpose of authorizing incidental takes of marine mammals; and
- develop clear policies and issue clear criteria for ensuring full consideration of the effects of each new activity in combination with the cumulative effects of other ongoing and planned activities in Cook Inlet.

If the National Marine Fisheries Service decides to issue the requested authorization notwithstanding the risk of significant impacts on the Cook Inlet population of beluga whales, the Marine Mammal Commission recommends that the National Marine Fisheries Service—

- either (1) use the estimated, rather than requested, number of takes of belugas in its small numbers and negligible impact determinations for all operations proposed to be conducted in Cook Inlet, without applying reductions in takes based on assumptions regarding the

- effectiveness of mitigation measures and/or (2) incorporate daily aerial surveys to ensure that the number of takes authorized are not exceeded;
- authorize, at a minimum, the average estimated number of takes for harbor porpoises and harbor seals;
 - specify reduced vessel speeds of 5 knots or less when one or more whales are within 274 m or when weather conditions reduce visibility (as proposed in Furie's application)—NMFS should specify speed reductions in all incidental harassment authorizations, when applicable;
 - require Furie to coordinate with Apache, and other companies that may be proposing to conduct seismic operations in Cook Inlet in 2014, to deploy a series of bottom-mounted, passive acoustic monitoring buoys throughout the combined survey areas to collect additional information on marine mammal presence and movements;
 - require Furie to determine detection probabilities for each of the proposed observation platforms (aerial, shore, and vessel) and under the various sea states, weather conditions, and light levels encountered in Cook Inlet at times when activities would be conducted;
 - restrict Furie from conducting seismic operations during months other than those requested in and analyzed as part of its application; and
 - encourage Furie and other applicants proposing to conduct seismic surveys in Cook Inlet in 2014 to collaborate on those surveys and, to the extent possible, submit a single application seeking authorization for incidental harassment of marine mammals—NMFS should take the same approach in future similar circumstances.

BACKGROUND

Furie proposes to conduct a 3D seismic survey in Cook Inlet, Alaska, from May to November 2014 in an area of approximately 868 km². The project area is located primarily in the Kitchen Lights Unit area of Cook Inlet, but would extend from Tyonek in the north to the Forelands in the south. Furie would use two source vessels simultaneously, each equipped with a 2,400-in³ airgun array. One of the vessels also would deploy a 440 to 1,800-in³ airgun array for use in shallow waters. Other survey equipment would include a 10-in³ mitigation airgun, a transceiver (pinger), and a transponder. Other vessels would be used for passenger transport, node deployment/retrieval, and monitoring. The receiving and recording systems to be used may be a nodal system, an ocean-bottom cable system, or a combination of the two. Furie would conduct the survey for approximately 120 days, but would collect seismic data only during slack tide periods (day and night).

NMFS preliminarily has determined that the proposed activities could modify temporarily the behavior of small numbers of up to six species of marine mammals, but that the total taking would have a negligible impact on the affected species or stocks. NMFS does not anticipate any take of marine mammals by death or serious injury. It believes that the potential for temporary or permanent hearing impairment will be at the least practicable level because of Furie's proposed mitigation and monitoring measures, as well as additional measures proposed by NMFS, which include—

- (1) conducting in-situ sound source and sound propagation measurements for the full airgun arrays (each alternating at 2,400 in³), the shallow water airgun array (440 to 1,800 in³), and the

- mitigation airgun (10 in³) and adjusting, as necessary, the proposed safety zones (i.e., based on Level A harassment thresholds of 180 and 190 dB re 1 μ Pa for cetaceans and pinnipeds, respectively) and the disturbance zones (i.e., based on Level B harassment threshold of 160 dB re 1 μ Pa for all marine mammals) for the various sources;
- (2) using both shore- and vessel-based observers to monitor the safety and disturbance zones during all daytime operations, including while the airgun array and nodes are being deployed or recovered from the water;
 - (3) using ramp-up, delay, power-down, and shut-down procedures to prevent takes of marine mammals within the safety zones;
 - (4) implementing additional delay and power-down procedures if any marine mammal is observed approaching or within the disturbance zone;
 - (5) implementing additional delay and shut-down procedures if a beluga whale cow-calf pair or an aggregation of four or more belugas whales, killer whales, harbor porpoises, gray whales, or Steller sea lions is observed approaching or within the disturbance zone;
 - (6) prohibiting ramp up of airguns during nighttime operations or during low-light hours after an extended shutdown (i.e., when airguns have not been operating for at least 10 minutes);
 - (7) prohibiting operation of airguns within 16 km of the mean high water line of the Susitna Delta (Beluga River to the Little Susitna River) from mid-April to mid-October;
 - (8) ceasing seismic survey operations (i.e., airguns and pingers) and notifying NMFS if the authorized numbers of takes for any marine mammals are met or exceeded;
 - (9) altering vessel speed or course during seismic operations, when practicable, to avoid having a marine mammal enter the safety zone;
 - (10) avoiding vessel-related interactions with marine mammals by (a) steering around or avoiding concentrations or groups of whales when operating vessels, (b) reducing vessel speed and avoiding multiple changes in direction and speed when one or more whales are within 274 m, and (c) adjusting speed of support vessels in poor visibility conditions;
 - (11) conducting aerial surveys on a daily basis in the project area, even if the airguns are not operating (weather and safety permitting);
 - (12) conducting aerial surveys when survey operations occur within 1.6 km of a river mouth to identify (and presumably avoid) areas where beluga whales congregate and harbor seals haul out;
 - (13) limiting aerial surveys to an altitude not less than 305 m at all times and to a radial distance of 457 m or greater when marine mammals are present (except during takeoff, landing, or an emergency situation);
 - (14) reporting injured and dead marine mammals to NMFS and the local stranding network using NMFS's phased approach and suspending activities, if appropriate; and
 - (15) submitting field and technical reports and a final comprehensive report to NMFS.

The mitigation and monitoring measures listed in this letter are based on the draft incidental harassment authorization language at the end of the *Federal Register* notice. However, the Commission notes that some of the measures listed at the end of the *Federal Register* notice were not mentioned or discussed in the main body of the notice (e.g., prohibiting operation of airguns within 16 km of the mean high water line of the Susitna Delta). NMFS has clarified that the language regarding proposed mitigation and monitoring measures provided at the end of the notice is correct and the Commission has based its review and comments on those measures. Unfortunately, the inclusion of required mitigation measures without any discussion as to why they were included does

not provide the public with an understanding of why NMFS included the additional proposed measures and how they were considered in NMFS's determination of negligible impact.

RATIONALE

NMFS's determinations regarding small numbers and negligible impact on beluga whales

The Commission continues to have significant concerns regarding the declining number of Cook Inlet beluga whales, the likelihood of a continued decline, and the causative role that disturbance of whales may have in the observed trend. In other letters about proposed seismic activities in Cook Inlet, the Commission has recommended that NMFS defer issuance of the incidental harassment authorizations until it has better information on the cause or causes of the ongoing decline and has a reasonable basis for determining that authorizing additional takes would not exacerbate that decline. The Commission continues to believe that, given the precarious status of the Cook Inlet beluga whale population, any activity that may contribute to the observed decline should not be viewed as having a negligible impact on the population. Consistent with these continuing concerns, the Commission once again recommends that NMFS defer issuance of the proposed incidental harassment authorization until such time as NMFS can, with reasonable confidence, support a conclusion that the proposed activities would affect no more than a small number of Cook Inlet beluga whales and have no more than a negligible impact on the population.

In its response to the Commission's most recent letter (dated 31 January 2014) regarding a similar proposed survey to be conducted by Apache Alaska Corporation (Apache) in Cook Inlet during the 2014 open-water season, NMFS stated that it used the best available scientific information to determine that the seismic survey would (1) have a negligible impact on the beluga whale population and (2) take only small numbers of belugas relative to their population size (79 Fed. Reg. 13626). The determinations were based on NMFS's analyses of acoustic and other impacts of the survey, the parameters of the proposed survey, the seasonal distribution and habitat-use patterns of belugas, and the required mitigation and monitoring measures. In its "small numbers" finding, NMFS considered the percentage of belugas authorized to be taken in the survey (9.6 percent of the population) to be consistent with previous authorizations.

It is difficult to judge the soundness of NMFS's analyses and conclusions regarding the impacts of Apache's seismic survey, and any additional impacts that would result from Furie's proposed survey, in the absence of clear and consistent criteria regarding how NMFS is defining small numbers and negligible impact. As suggested in previous Commission letters, the best approach for developing generally applicable criteria for defining those terms would be for NMFS, the Fish and Wildlife Service, and the Commission to work together to develop an appropriate working definition that then could be made available for public review and comment. Accordingly, the Commission recommends that NMFS work with the Fish and Wildlife Service and the Commission to develop a policy that sets forth clear criteria and/or thresholds for determining what constitutes "small numbers" and "negligible impact" for the purpose of authorizing incidental takes of marine mammals. The Commission understands that NMFS has been working on developing a policy and would welcome an opportunity to discuss that policy before it is finalized.

Furie's proposed survey would be conducted in roughly the same general area and at the same time of year as portions of the 2014 Apache survey and, as such, would likely result in additional takes of the same beluga whales, as well as additional whales. NMFS also is considering a third application from a different company seeking authorization for takes associated with drilling activities in Cook Inlet during the 2014 open-water season. As in previous years, the Commission is concerned that NMFS is not adequately addressing the combined or cumulative effects of activities on beluga whales in Cook Inlet. NMFS subsequently is not able to rule out the possibility that the combined, aggregate, or cumulative disturbance associated with the broad suite of activities occurring in the Inlet (e.g., oil and gas exploration and production; port construction; shipping; coastal development; military activities; fisheries; discharge of contaminated water; etc.) is contributing to the continued decline of that endangered population. The Commission remains concerned that NMFS is analyzing each activity in isolation without adequate consideration of activities being conducted concurrently or the cumulative impact of all sources of disturbance in Cook Inlet on the beluga whale population, especially when the status quo already appears to be at a possible tipping point for that population.

Rather than continuing to consider only the incremental effects of new activities in its issuance of incidental take authorizations, and in light of growing interest in oil and gas development in Cook Inlet, the Commission recommends that NMFS develop clear policies and issue clear criteria for ensuring full consideration of the effects of each new activity in combination with the cumulative effects of other ongoing and planned activities in Cook Inlet. There are several potentially useful tools for accomplishing this, including the development of clear criteria for making negligible impact determinations as recommended previously. In addition, the ongoing development of a recovery plan for the Cook Inlet beluga whale provides an excellent opportunity to promote additional research needed to identify the cause or causes of the population's decline and to investigate the possible cumulative effects of multiple factors. That research could be coupled with periodic reviews of all sources of potential disturbance to beluga whales in Cook Inlet, adoption of measures to mitigate such disturbance, and regular evaluations of the effectiveness of current conservation measures.

The Commission believes that precautionary management of authorizations issued under section 101(a)(5) of the MMPA is an important tool for mitigation or even prevention of takes in the face of considerable uncertainty, such as in the case of Cook Inlet beluga whales. It is the Commission's understanding that NMFS is exploring options to engage stakeholders more broadly in efforts to address and minimize cumulative effects on Cook Inlet beluga whales. The Commission appreciates NMFS's invitation to assist in the planning and convening of stakeholder-based forums and encourages NMFS to expedite such actions.

If NMFS decides to issue the requested authorization, notwithstanding the Commission's recommendations and the possibly significant impacts on the Cook Inlet beluga population, then the Commission has the following additional comments and recommendations regarding concerns with Furie's application and NMFS's analysis of that application.

Ensuring takes of beluga whales do not exceed those requested

Furie has requested authorization to take far fewer beluga whales than were estimated to be taken during the proposed survey. In its estimation of potential takes, Furie identified four priority areas of operation (Priority Areas 1, 2, 3a, and 3b; Figure A-2 in the application). Furie is considering two slightly different survey scenarios for those four areas, contingent on the final selection of the seismic contractor (Proposal A or B), but the final scenario chosen is not expected to change significantly the area estimated to be ensonified at levels greater than 160 dB re 1 μ Pa (estimated to be 1,925 km² based on Proposal A, which is the larger area of the two proposals).

Furie calculated monthly densities of belugas in both high- and low-concentration areas within Cook Inlet (see Figures A-9 through 24 in Furie's application). Those densities were based on information provided in Hobbs et al. (2005) and reanalyzed by Goetz et al. (2012), using the 2012 population estimate of 312 whales (Hobbs et al. 2013). For each month of proposed activity (May through November), Furie estimated the number of takes by Priority Area by first multiplying the portion of the survey area that would have either high or low concentrations of belugas by the associated densities. It then summed the number of estimated takes from each of the two concentration areas to obtain a total estimate for that area and month. Considering various scenarios of months in which surveys might occur in each of the Priority Areas under Proposal A, Furie estimated that as few as 58 and as many as 186 belugas could be exposed during the estimated 120-day survey period. It was not clear from Furie's application or NMFS's notice which scenarios were used to derive this range in estimated takes of belugas. However, Furie requested authorization to take by Level B harassment only 18 whales. Furie stated that the lesser number of requested takes was based on reductions expected to result from the implementation of its proposed mitigation measures and on the number of animals observed during Apache's 2012 seismic survey.

Like Apache, Furie has proposed a number of mitigation measures to ensure that beluga whale takes are minimized including: (1) using a number of visual monitoring methods (i.e., aerial, shore-, and vessel-based surveys) to maximize the likelihood of detecting any belugas that may be present in the survey area, (2) powering down seismic operations if a beluga is observed to be approaching or within the disturbance zone, (3) shutting down if an aggregation of four or more beluga whales or a cow/calf pair is observed approaching the disturbance zone, and (4) ceasing seismic survey operations (i.e., airguns and pingers) and notifying NMFS immediately if authorized numbers of takes for belugas or any other marine mammals are met or exceeded.

The Commission did not raise specific concerns regarding the efficacy of Apache's proposed monitoring measures in its letter regarding the Apache survey, in part because of Apache's proposed use of aerial and shore-based observers in addition to vessel-based surveys. However, in retrospect, this may have been an oversight. Monitoring by aerial observers represented only a small fraction (approximately 1 percent) of the total monitoring effort during Apache's 2012 seismic survey, while shore-based monitoring represented considerably more (approximately 19 percent)¹. It is not clear how much of the survey area proposed by Apache or Furie for the 2014 open-water season could be monitored from shore. Neither company has proposed to conduct passive acoustic monitoring in

¹ Monthly monitoring reports for Apache's 2012 seismic survey operations are available at http://www.nmfs.noaa.gov/pr/pdfs/permits/apache_monthly_reports.pdf

2014, even though that monitoring method represented approximately 29 percent of Apache's total monitoring effort in 2012. The vast majority of monitoring conducted by Apache in 2012 was with vessel-based observers, representing approximately 51 percent of its total monitoring effort.

The Commission has repeatedly raised concerns regarding the limitations of vessel-based visual monitoring to detect marine mammals, especially in the far field. The reliance on vessel-based visual monitoring is especially troubling given the weather, sea state, and turbid conditions commonly experienced in Cook Inlet, the distance to the edge of the disturbance zone (9.5 km for both the Apache and the Furie survey), and the low profile of belugas, which makes them difficult to detect even under ideal conditions. These concerns, coupled with the much smaller number of belugas that Furie has requested authorization to take relative to its estimated takes and the additional impacts that this second seismic survey represents to an already vulnerable population, forces the Commission to reconsider whether measures similar to those authorized for Apache would be adequate for ensuring that Furie's activities would result in no more than 18 beluga takes. For these reasons, the Commission recommends that NMFS either (1) use the estimated, rather than requested, number of takes of belugas in its small numbers and negligible impact determinations for all operations proposed to be conducted in Cook Inlet, without applying reductions in takes based on assumptions regarding the effectiveness of mitigation measures, and/or (2) incorporate daily aerial surveys to ensure that the number of takes authorized are not exceeded.

Unclear basis for requested numbers of takes of harbor porpoises and harbor seals

Furie also has requested authorization to take far fewer numbers of harbor porpoises and harbor seals than were estimated to be taken in the proposed survey area (see Table 1). Furie used a different technique to estimate takes for those species than it used for belugas. It derived a single average density for each species and then multiplied that by the total area expected to be ensonified (1,925 km²). However, as with beluga whales, Furie requested authorization to take fewer numbers of animals of those two species based on (1) reductions expected to result from the implementation of its proposed mitigation measures and (2) on the number of animals observed during Apache's 2012 seismic survey.

Table 1. Estimated and requested numbers of takes of harbor porpoises and harbor seals for Furie's 2014 survey season.

	Estimated takes	Requested takes
Harbor porpoises	51	25
Harbor seals	614	160

As noted for belugas, the Commission does not agree that take estimates should be reduced based on assumptions regarding the effectiveness of mitigation measures, particularly for harbor porpoises that are cryptic and difficult to detect visually. Furthermore, it is unclear if Furie would implement mitigation measures when harbor seals are observed in the disturbance zone. Therefore, NMFS should require applicants to base their requested numbers of takes on the best available density estimates and associated ensonified area based on the proposed survey. The Commission made a similar recommendation regarding harbor seal takes in its letter regarding the Apache survey, which NMFS subsequently implemented. Therefore, the Commission recommends that NMFS

authorize, at a minimum, the average estimated numbers of takes for harbor porpoises and harbor seals.

Mitigation and monitoring measures

Furie stated in its application that the speed of the vessels operating in the survey area would be reduced to 5 knots when one or more whales are within 274 m or when visibility conditions are poor. However, an appropriate vessel operating speed was not specified by NMFS in its proposed mitigation measures. To address any ambiguity regarding safe vessel operating speeds, the Commission recommends that NMFS specify reduced vessel speeds of 5 knots or less when one or more whales are within 274 m or when weather conditions reduce visibility. The Commission believes that NMFS should specify speed reductions in all incidental harassment authorizations, when applicable.

As a supplement to visual monitoring, passive acoustic monitoring represents an additional tool that could be useful in the detection of beluga whales throughout the survey area. In its 2012 monthly monitoring report for May, Apache indicated that a monitoring buoy was deployed in 2012 but waves and currents caused damage to the unit. A single over-the-side hydrophone was used instead but the range of that unit was limited (3 km). Researchers have successfully detected belugas and other marine mammals in Cook Inlet with moored buoys (Lammers et al. 2013), and the Commission believes that a series of moored buoys deployed throughout all of the 2014 proposed seismic survey areas in Cook Inlet could provide useful information. Although calls recorded by these buoys would not be useful for real-time mitigation monitoring, the data could be analyzed after the open-water season to better understand beluga and other marine mammal use of the survey areas during and after the surveys. As such, the Commission recommends that NMFS require Furie to coordinate with Apache, and other companies that may be proposing to conduct seismic operations in Cook Inlet in 2014, to deploy a series of bottom-mounted, passive acoustic monitoring buoys throughout the combined survey areas to collect additional information on marine mammal presence and movements.

Very little information is available regarding the ability of observers to monitor exclusion and disturbance zones of various sizes. However, in a recent analysis, Cate et al. (2014) indicated that observers in the Chukchi Sea had only a 60 percent probability of detecting a marine mammal at a distance of 100 m and a near zero probability of seeing a marine mammal at a distance of 250 m or greater. To determine the probability of detecting marine mammals in Cook Inlet, the Commission further recommends that NMFS require Furie to determine detection probabilities for each of the proposed observation platforms (aerial, shore, and vessel) and under the various sea states, weather conditions, and light levels encountered in Cook Inlet at times when activities would be conducted.

Timing of proposed issuance

Furie has stated that seismic operations would begin no earlier than May and would continue through November. Accordingly, its analyses are based on various scenarios and associated marine mammal interaction rates during those anticipated periods of operation from May through November. However, NMFS has proposed to issue the authorization for the period from May 2014 until May 2015 to allow for delays due to weather or other variables. Although operations from

December 2014 through April 2015 are unlikely due to ice cover, the authorization would not prevent Furie from operating within those months even though no analysis of potential impacts during those months was included in Furie's application. Considering that belugas range more broadly during the winter months (Hobbs et al. 2005), there is an increased potential for interactions to occur if seismic operations are conducted during those months. Additionally, in the presence of ice, darkness, and inclement weather (which occur more frequently during the winter), it is very difficult to detect belugas. Therefore, the Commission recommends that NMFS restrict Furie from conducting seismic operations during months other than those requested in and analyzed as part of its application.

Reducing the potential for duplicative seismic surveys

NMFS recently issued an authorization for marine mammal takes incidental to a seismic survey to be conducted in 2014 in Cook Inlet by Apache. It is not clear whether Apache and Furie are seeking separate authorizations for some or all of the same activities. This should be clarified and the applicants encouraged to combine their requests if overlap exists. In any event, NMFS needs to adopt policies and institute procedures to ensure that separate applications to conduct essentially the same activities in the same areas are considered more holistically. If indeed the applicants are proposing to conduct separate, and possibly duplicative, seismic surveys within the same area, this would increase the numbers of marine mammals taken and expose beluga whales and other marine mammals to unnecessary, avoidable risks. Section 101(a)(5)(D)(ii)(I) of the MMPA directs NMFS to structure incidental harassment authorizations so that they prescribe "other means of effecting the least practicable impact on such species or stock and its habitat." Allowing multiple operators to obtain separate authorizations to conduct potentially duplicative surveys is inconsistent with that mandate. Furthermore, applicants conducting seismic surveys in the same area at the same time should be using the same species-specific density estimates, based on best available science.

The Commission has emphasized the need to minimize duplicative or redundant seismic surveys in all areas of oil and gas exploration. NMFS has had some success in the past in encouraging applicants to collaborate on seismic surveys in areas of common interest. To that end, the Commission recommends that NMFS encourage Furie and other applicants proposing to conduct seismic surveys in Cook Inlet in 2014 to collaborate on those surveys and, to the extent possible, submit a single application seeking authorization for incidental harassment of marine mammals—NMFS should take the same approach in future similar circumstances.

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The Commission appreciates the opportunity to review this incidental harassment authorization. Please contact me if you have questions regarding these recommendations.

Sincerely,



Rebecca J. Lent, Ph.D.
Executive Director

cc: Jon Kurland, National Marine Fisheries Service, Alaska Regional Office

References

- Cate, J., M. Smultea, M. Brees, M. Larson, S. Simpson, T. Jefferson, and D. Steckler. 2014. 90-Day report of marine mammal monitoring and mitigation during a 2D seismic survey by TGS in the Chukchi Sea, August through October 2013. AES Doc. No. 15416-04 13-185. Prepared by ASRC Energy Services, Smultea Environmental Sciences, Clymene Enterprises and Entiat River Technologies for TGS-NOPEC Geophysical Company, National Marine Fisheries Service and U.S. Fish and Wildlife Service. 122 pages plus appendices.
- Goetz, K.T., R.A. Montgomery, J.M. Ver Hoef, R.C. Hobbs, and D.S. Johnson. 2012. Identifying essential summer habitat of the endangered beluga whale *Delphinapterus leucas* in Cook Inlet, Alaska. *Endangered Species Research* 16:135-147.
- Hobbs, R.C., K.L. Laidre, D.J. Vos, B.A. Mahoney, and M. Eagleton. 2005. Movements and area use of belugas, *Delphinapterus leucas*, in a subarctic Alaskan estuary. *Arctic* 58:331-340.
- Hobbs, R.C. 2013. Detecting changes in population trends for Cook Inlet beluga whales (*Delphinapterus leucas*) using alternative schedules for aerial surveys. NOAA Technical Memorandum NMFS-AFSC-252, 25 pages.
- Lammers, M.O., M. Castellote, R.J. Small, S. Atkinson, J. Jenniges, A. Rosinski, J.N. Oswald, and C. Garner. 2013. Passive acoustic monitoring of Cook Inlet beluga whales (*Delphinapterus leucas*). *Journal of the Acoustical Society of America* 134(3):2497-2504.