

Pilot study

Field report



Sensor tagging feeding humpback

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This pilot study is a part of a Akvaplan-Niva's plan to monitor ecological changes in local fjords of northern Norway, during the presence of overwintering herring filling up these fjords during some short winter month.



Introduction and summery

Small scale coastal projects, testing out tagging equipment and collecting baseline data on whales, is a relatively new activity in Norway. The team on the research vessel Blåstål, have been involved in a number of whale studies from a scientific as well as from a media/film perspective, and since 2011 it is clear that there are numerous opportunities to study basic whale biology during the winter month from November to February in certain Norwegian fjords and basin systems.

For the last 3 years, the Easter movement of a large herring biomass is filling up in fjords of northern Norway. Along with this attractive pray, a number of predator species follows the herring into coastal waters. Especially humpback whales and killer whales are sighted associated with the presence of this overwintering herring. This year we also observed fin whales in the northern fjords, especially in Kaldfjorden. The fin whales have been observed in the area of Andfjorden since 2011, however this has been later in the winter in the month of January and February. Probably we will during January have a southern movement of a larger part of the herring biomass observed in Kaldfjorden and surrounding fjords, transiting into Andfjorden for some weeks. We have observed a high number of humpback whales and killer whales, as well as presence of fin whales in Andfjorden until the first week of February over the last 2 years, however, when the number of whales decreases in Andfjorden we have no reference of the following whales movements.

The objectives of this pilot project, was to merge with Akvaplan-Niva's other activities in Kaldfjorden, where our focus was mainly on the effort of sensor tagging humpback whales. This is the first operational year (2013), tagging whales in these fjords. We have deployed a new type of sensor, the WC TDR10-F, logging dive profiles and attempting to log enough data to able post processing GPS positions. We have deployed 10 TDR10-F tags on 10 different animals, and we have also deployed one satellite tag on one Humpback whale using a SPLASH tag from Wildlife Computers. A total of 10 biopsy samples were collected during the tagging attempts, and ID photos of 20+ humpback whales have been taken during this trail.

This report summarizes the outcome of this pilot trial, which was conducted by a team of totally 4 scientists and film expertise from Norway. The field work was conducted from the vessel "Blåstål" with the team living in a land based station in Tromvik at Kvaløya, Northern Norway.

The crew of RV Blåstål during the trail.

Role	Affiliation	23 November– 9 December
Cruise leader / Arts tagger	LKARTS-Norway	Lars Kleivane
MMO /Driver/Arts tagger	UiO	Rune Roland Hansen
Documentation / Driver/Diver	Fenris Film AS	Per Børre Kiserud**
MMO /Photo ID / Tracker	LKARTS-Norway	Tora Haabet*

* Embarked on the 25 of November and disembark on the 7 of December

** Embarked on the 1 of December and disembark on the 9 of December

Trail objectives and tasks

Trail objective

Collect baseline data on humpback whales feeding on herring in local fjords of Kvaløya.

Trail tasks

The objective of the trial will be met through the execution of the following specific primary and secondary tasks:

Primary task

1. Tag humpback whales with TDR10-F tags and record baseline information of horizontal and vertical movement and surface behavior, during feeding activities in the large biomass of herring filling up the western fjords of Kvaløya during November and December 2013.

Secondary tasks

1. Evaluate, test and assess the TDR10-F tag and related tagging techniques on humpback whales, using the ARTS system.
2. Evaluate, test and assess the SPALSH tag and related tagging techniques on humpback whales, using the ARTS system
3. Collect biopsy samples of the tagged animals, using a new robot, the LKRobotBiopsyCarrier (LKRBC).
4. Collect ID photo pictures of humpback whales
5. Assess Western fjords of Kvaløya suitable/non-suitable operation area for working with humpback whales and killer whales



Target species

Method –Operational area and equipment

Operation area

We were operating from our campsite at Tromvik, West on Kvaldøya with the primary operation area within one hour from Tromvik. The boat Blåstål was moved to Kjosén in the southern part of Kaldfjorden for 3 nights, in order to be operative from a more sheltered harbor.



Maps of the operational area zoomed in on the right map

Equipment

Main Logistical Components

The BlåStål is a 27 feet steelboat, rigged with a setup for tagging and tracking whales, holding a fly bridge and a tagging platform in the front. Basically we returned to base camp every day, however if acquired there is room for sleeping in the front cabin for two persons. Mainly, we were 4 persons during the tagging period while during the tracking periods staffing according to the situation.



RV Blåstål with an outdoor upper bridge and a setup with Yagi antennas for tracking (left) and gunner platform (right)

Contact with the other tagger team, as well as local contact with fishermen and local photo enthusiasts indicated where to focus our primary effort and visual search for humpback whales. The BlåStål was outfitted with DFHorten radio tracking system. Principal effort from BlåStål was ARTS tagging and testing of new tagging equipment (TDR10_F and SPLASH tag, with suction cup and barb attachment, respectively), documentary effort (photo & video), ID photo collection of humpback whales, and VHF-tracking of tagged animals.

ARTS – DTAG system

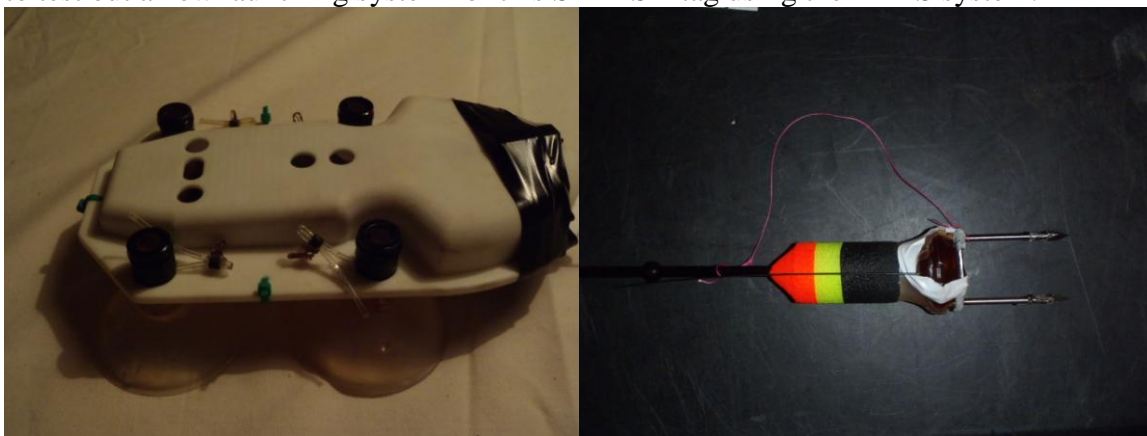
The ARTS-DTAG system has been extensively tested under controlled conditions and during field testing since 2008. We have since 2012 modified the sight, and mounted a new manometer. This is in order to improve the performance of the system. We will basically deploy the TDR10-F tag at 9-10 bar at medium distances (6-9 meters) and 10-11 bar at longer distances (10-15 meters), while the SPLASH tag with GPS will be launched at 16-17bar on distances up to 15 meters. When deploying the SPLASH tag we will use a new 12mm barrel. Evaluation of the results and adjustments in the setup will be continuous. The documentation of each launching of the TDR10-F and the SPLASH tag with the ARTS is a priority issue.



To the left the ARTS system ready for launching, and at right the LKRobotBiopsyCarrier in detail

Tags

The TDR10-F tag is a archival tag logging dive profiles and collecting satellite passages on a FastLock GPS antenna. This tag is housed in a setup similar to the DTAG housing, with a float and a VHF beacon. The release system is based on galvanic time releases (GTR). The SPLASH tag from Wildlife computers is transmitting positions and depth profiles through the ARGOS system. A modified ARTS barrel (12mm) have been produced for this trail in order to test out a new launching system for this SPLASH tag using the ARTS system.



The principal tags used during this trail, with the TDR10-F at left and the SPLASH tag to the right

Results –overview of operation and achievements

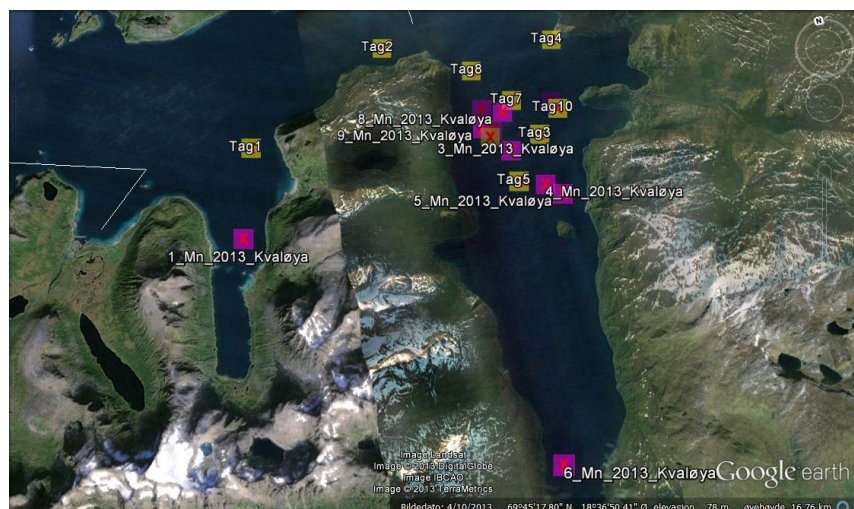
Achievements

During 17 days from the 23 of November to the 9 of December 2013, a total of 15 days was accessible for the pilot trail in Grøt fjorden and Kald fjorden, West of Kvaløya. Of the 14 days in these fjords roughly 70% were within weather conditions for tagging (n=10), two days with weather restrictions, and then two days were needed for arranging equipment and transportation. The average daylight gave us 4-5 hours of suitable working conditions, however, the whales were close to harbor so we did not need to search long hours for targets. The tagging and biopsy equipment was operated by Lars Kleivane, using the whale-tag launcher ARTS for TDR10-F, while the satellite tag was deployed by Rune Roland Hansen also using the ARTS system with a new 12mm barrel. A new robot had been designed enabling biopsy sampling during tag deployment, the LKRobot Biopsy Carrier (LKRBC). A total of 16 launchings resulted in 10 successful deployments with the sensor package TDR10-F tags. The satellite SPLASH tag was deployed on the first launching.

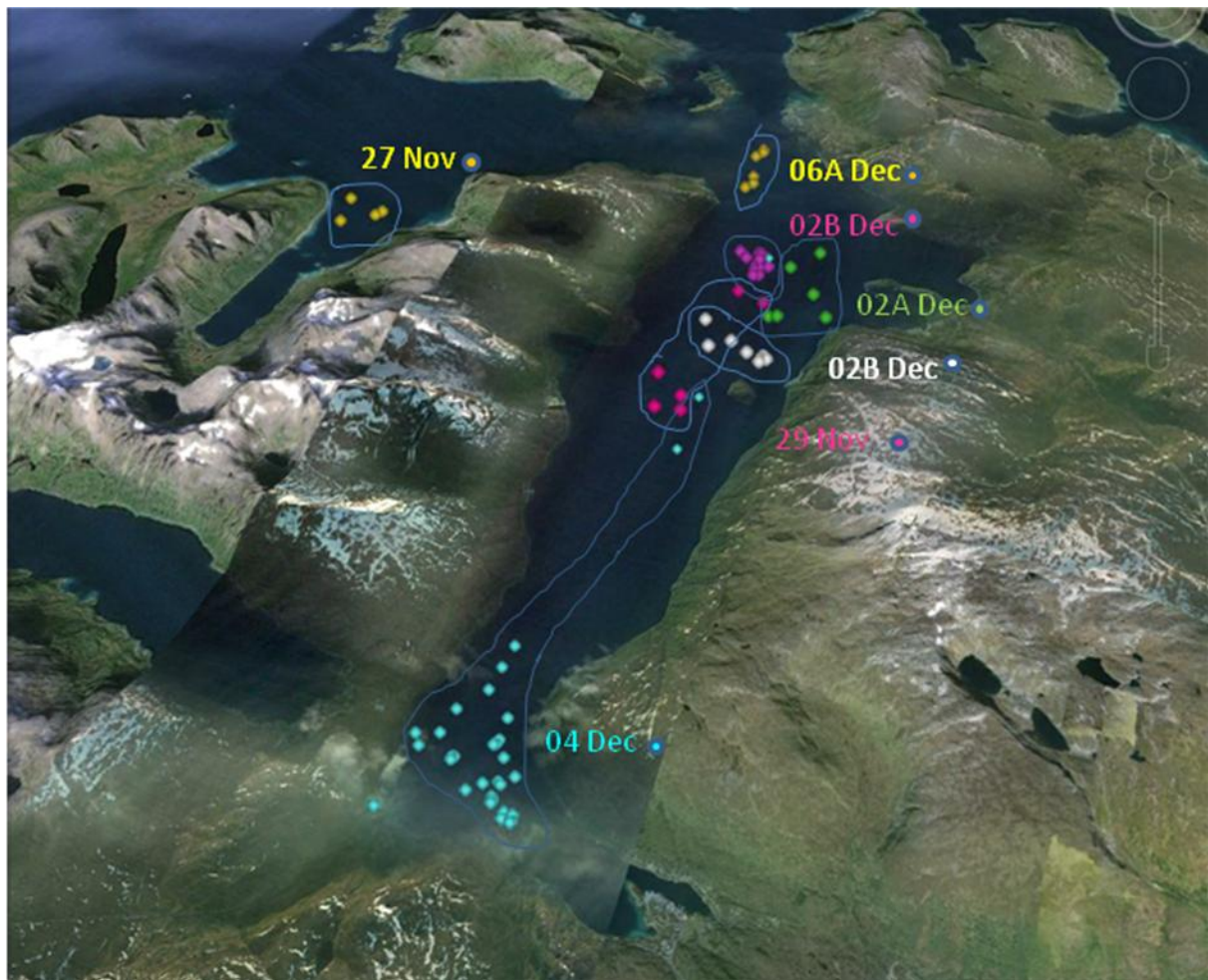
The table is showing the tag deployments

Date	Id-Field	TOW pos	TOW	TOFF	Picup pos	Pickup Time	Biopsy	ID Photo
27.11.2013	1_Mn_2013_Kvaløya	N 69°46,087'; Ø 018°30,126'	13:49	17:27	N 69°47,316'; Ø 018°30,919'	19:14		no
29.11.2013	2_Mn_2013_Kvaløya	N 69°47,235'; Ø 018°39,956'	10:29	19:13	N 69°48,420'; Ø 018°36,654'	20:40	135	yes
30.11.2013	3_Mn_2013_Kvaløya	N 69°46,567'; Ø 018°40,658'	11:07	11:23	N 69°46,718'; Ø 018°41,903'	12:47	235	no
02A.12.2013	4_Mn_2013_Kvaløya	N 69°46,009'; Ø 018°41,614'	10:56	23:18	N 69°48,065'; Ø 018°43,366'	04.12.2013 10:55	335	yes
02B.12.2013	5_Mn_2013_Kvaløya	N 69°45,835'; Ø 018°42,156'	11:37	12:46	N 69°46,123'; Ø 018°40,660'	12:55	435	yes
04.12.2013	6_Mn_2013_Kvaløya	N 69°42,523'; Ø 018°39,704'	09:30	17:09	miss	05.12.2013 09:50	535	yes
05.12.2013	7_Mn_2013_Kvaløya	N 69°46,905'; Ø 018°40,165'	11:06	11:43	N 69°47,279'; Ø 018°41,172'	17:50?	635	yes
06A.12.2013	8_Mn_2013_Kvaløya	N 69°47,134'; Ø 018°40,711'	10:22	10:36	N 69°47,826'; Ø 018°39,925'	12:55	no	no
06B.12.2013	9_Mn_2013_Kvaløya	N 69°46,957'; Ø 018°39,805'	10:59	11:02	N 69°46,810'; Ø 018°40,004'	13:16	no	yes
07.12.2013	10_Mn_2013_Kvaløya	N 69°47,147'; Ø 018°42,674'	12:40	Lost	N 69°47,037'; Ø 018°42,859'	13:15	yes	no

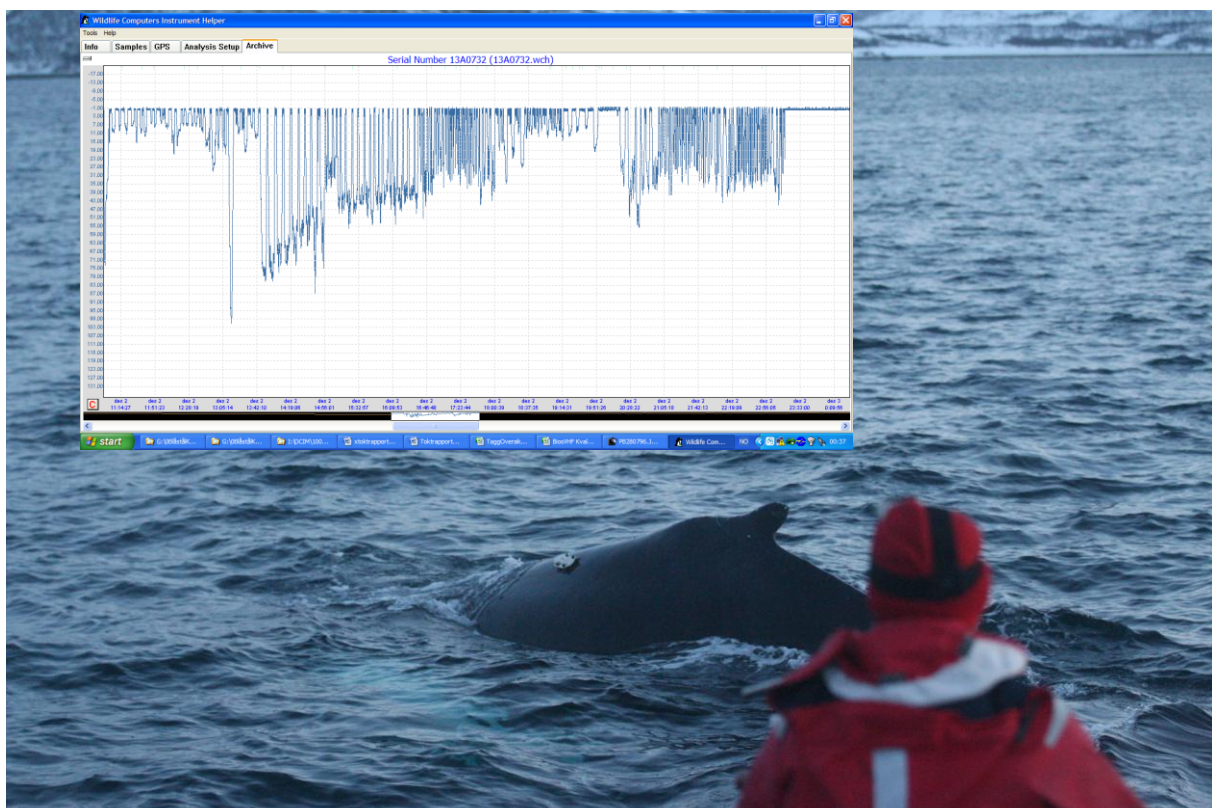
The Map is showing the TDR10-F deployments in pink, while in yellow are the tag recovery positions. The satellite tag was deployed on the 8 of December in the area close to the pickup point of Tag1



Overall view of the tracks of 7 tagged humpback whales in Kaldffjorden and Grøtffjorden during the period from 27 of November to the 6 of December 2013.



One example of a TDR10-F deployment (02ADec), with the dive profile in the upper window.

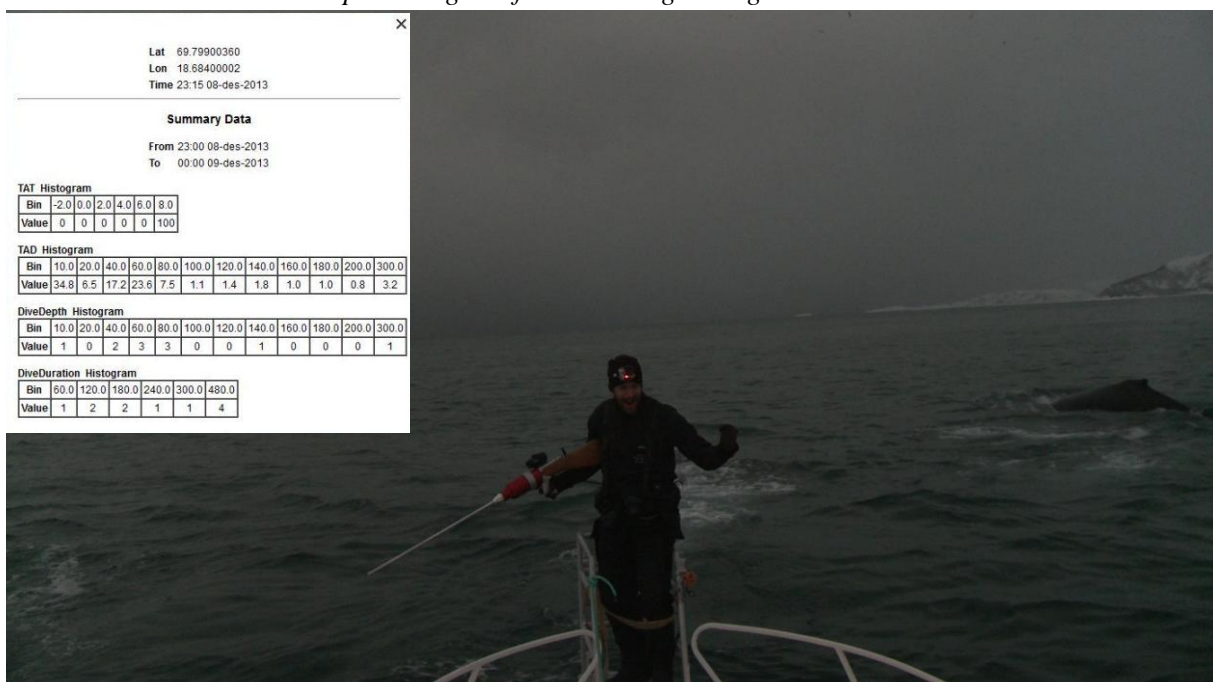


On the 8 of December on SPLASH satellite tag was deployed to a humpback whale in the outer part of Grøtffjorden. Below are the first 4 days of track of this animal.



The SPLASH tag was added to the field objectives in last part of the preparations, by Rune Roland Hansen (UiO). As a part of his Doctor theses, this method will be evaluated for longer term movements in relation to sound exposure. The tag is transmitting positions over the ARGOS system along with dive depth histograms, and this tag is the first to be deployed on whales for such studies in Norwegian waters.

This picture is just after tag deployment, and you can see the setup with the ARTS and a 12mm barrel. The window show the dive depth histogram from this tag during 1 hour.



Even though the light was limited we obtained a good number of ID photo pictures of humpback whales, however, since this was a secondary task this activity was not prioritized compared with the main task of tagging whales. If the main task was to collect ID pictures we would have sampled a considerable higher number.

ID-photos were taken by Tora Haabet during total 7 days (29th and 30th November, and the 2th, 4th, 5th 6th and 7th December 2013) in Kaldfjorden, using Canon EOS-1D Mark III camera with 70-200mm IS zoom lens (f/2.8 aperture). Additionally we collected some few ID pictures of killer whales.

When screening the photographic material of >3700 pictures, we confirm roughly 23 ID pictures of humpback whales. Sanna Kuningas will analyze the killer whale ID pictures for here PhD thesis, while the ID of humpback whales will be copied in 2x and handed over to Akvaplan-Niva and IMR, respectively, for further studies. Furthermore, a total of 10 biopsy samples were collected of humpback whales during this trail with Blåstål in Grøttfjorden and Kaldfjorden, during November and December 2013. These will also be handed over to IMR for further genetic analyzes. Seven of the biopsy samples are matched with the ID Tail of the animal.



Examples of ID photo identification of humpback whales, picturing the tails. Biopsy samples were collected from these animals with sample 0435 at left and 0535 to the right.

The secondary objectives of evaluate, test and assess both the TDR10-F tag and the SPLASH tag using the whale tag launcher ARTS, was well tested. From our results both tags are now adapted to the ARTS and are today operational using this system.

Mood post tagging on the upper bridge of Blåstål



Another secondary task was to test out the LKRobot Biopsy Carrier (LKRBC). We modified the Giraff leg (holding the biopsy tip), along with testing out different impact angles, which resulted in successful setup for this system.

The table includes biopsy samples of humpback whales collected in Kaldfjorden in Nov. and Dec. 2013

Kvaløya 2013										
Date 2013	Species	FieldID	Pos.	S.Size	W.No.	S. No.	Skin	Blubber	System	ID-foto
27.nov.	Knøl	1_Mn_2013_Kvaløya	N 69°46,087'; Ø 018°30,126'	5	1	no	ns	ns	ARTS/LKRBC	no
29. nov.	Knøl	2_Mn_2013_Kvaløya	N 69°47,235'; Ø 018°39,956'	2	1	0135	yx2	14mm	ARTS/LKRBC	Yes
30. nov.	Knøl	3_Mn_2013_Kvaløya	N 69°46,567'; Ø 018°40,658'	3	1	0235	yx2	12mm	ARTS/LKRBC	no
2. des.	Knøl	4_Mn_2013_Kvaløya	N 69°46,009'; Ø 018°41,614'	3	1	0335	yx2	ns	ARTS/LKRBC	Yes
2. des.	Knøl	5_Mn_2013_Kvaløya	N 69°45,835'; Ø 018°42,156'	2	1	0435	yx2	ns	ARTS/LKRBC	Yes
4. des.	Knøl	6_Mn_2013_Kvaløya	N 69°42,523'; Ø 018°39,704'	3	1	0535	yx2	ns	ARTS/LKRBC	Yes
5. des.	Knøl	7_Mn_2013_Kvaløya	N 69°46,905'; Ø 018°40,165'	4	1	0635	yx2	25mm	ARTS/LKRBC	Yes
6. des.	Knøl	No tag	Kaldfjorden	5	1	0735	yx2	20mm	ARTS/LKRBC	Yes
6. des.	Knøl	8_Mn_2013_Kvaløya	N 69°47,134'; Ø 018°40,711'		2	0835	yx2	ns	ARTS/LKRBC	no
6. des.	Knøl	No tag	Kaldfjorden		3	0935	yx2	65mm	ARTS/LKRBC	Yes
6. des.	Knøl	9_Mn_2013_Kvaløya	N 69°46,957'; Ø 018°39,805'	4	1	no	ns	ns	ARTS/LKRC	no
7. des.	Knøl	10_Mn_2013_Kvaløya	Kaldfjorden	6	1	1035	yx2	60mm	ARTS/LKRBC	no

*ID photos under IDBiopsy folder, times in UTC

The fifth secondary task stands strong after this first year of tagging activities in Kaldfjorden and surrounding fjords. Even though we in periods had bad weather forecast it was possible within the fjord systems to find enough shelter to operate from small boats. All in all it is a very suitable operational area for this type of activity.

Base camp in Tromvik



Collaborating organizations

This pilot research project is part of Akvaplan-Niva's activities, under the overall project conducting ecosystem based coastal surveys, involving the following partners; Akvaplan-Niva, Sea Mammal Research Unit (SMRU), NORUT, LKARTS-Norway, UiO and Fenris Film AS. It is funded through a joint venture, with Akvaplan-Niva as main contributor. The Norwegian Defense Research Establishment (FFI), has contributed with logistics on equipment and permits. All animal experiments were carried out under permits issued by the Norwegian Animal Research Authority (Permit No. S2011/38782), in compliance with ethical use of animals in experimentation.

Acknowledgement

It has been a great and new experience in a new operational area attending this multi-task operation that Akvaplan-Niva is elaborating for the coming years in these fjord systems. We would like to thank Martin Biuw for his calm and encouraging support, and also that this trail ever happened due to his effort on such short notice. - Merci

Recommendations

1. From experience this year we cannot rely only on the GPS fastLoc technology for positioning in these fjord systems. In future project tagged whales should be monitored closer by using a tracker boat and following the tagged animal visual if possible and by instruments using the DFHorten radio direction finder box.
2. Future work may benefit from our experiences, focusing on cheaper tags and increasing the number of tag deployments. It would be possible to make a combined VHF-TDR tag, with the aim of multiple-day deployments. These tags would then be monitored from land based strategic points along the fjord systems.
3. We suggest to increase the field period from 2 to 3 weeks, in order to cover more of the start-point of this event, and also able focus on other species like the killer whales and fin whales.
4. Add an element of standard line transects in Kaldfjorden, Grøt fjorden and Ersfjorden, parallel with new drone technologies, to assess the number of animals in the fjord system at this time of the year. If possible run a survey at the start and at the end of the period.
5. ID picture all animals at the beginning and at the end of the trail period in these fjords.