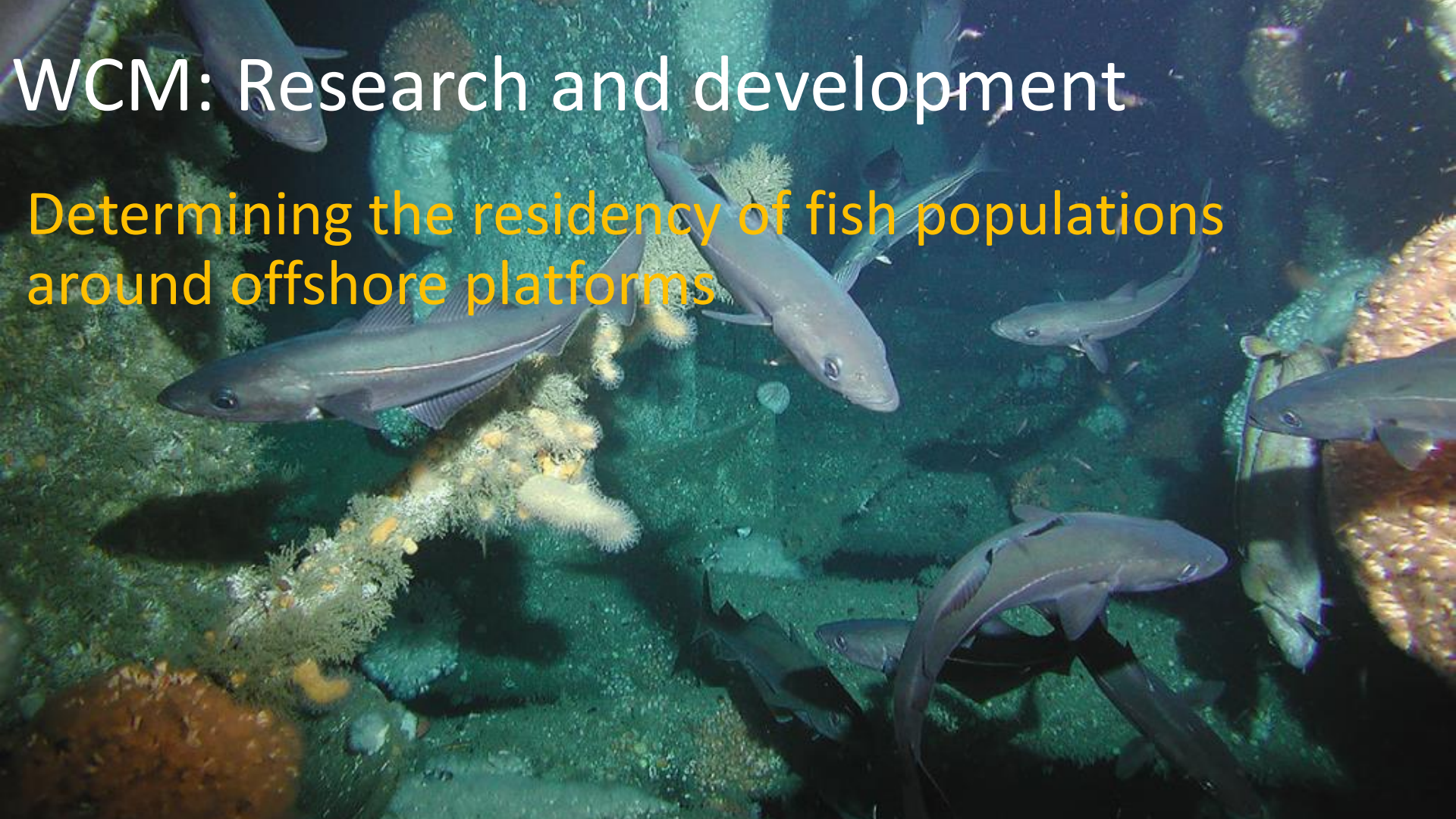
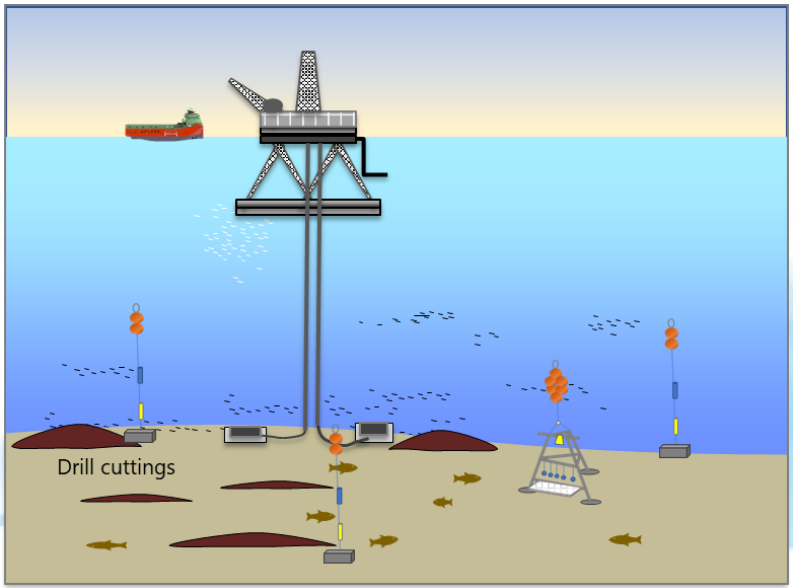
WCM: Research and development

Determining the residency of fish populations around offshore platforms



Rationale

- Significant genotoxic and neurotoxic responses have been measured in wild fish near offshore installations. Need to know the whereabouts of the fish to link exposure with effect.
- Too deep for capture, tag and release. Use baited tags.
- The WP will develop a suitable method to monitor fish movement, which will be made applicable to the offshore scenario.
- Questions:
  - What is the best bait to use?
  - How long does the tag stay in the fish?
  - Is there a reliable signal between tag and receiver?
  - Can we identify the fish with video surveillance?



Acoustic tags (transmitters) and receivers

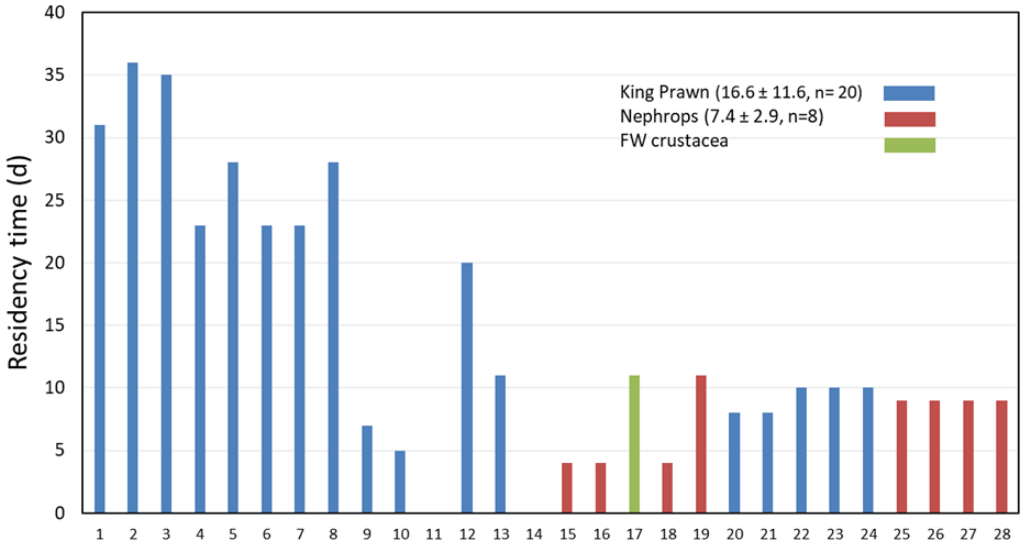
- Collaboration with Thelmabiotel (thelmabiotel.com)
- Receivers and acoustic tags measuring activity and tilt.

Label	Ø (mm)	Length (mm)	Weight in air (g)	Info sent (sec)	Life time (months)	Frequency (KHz)	Information
A-MP9L	9	30	6.6	30-90	6-7	67, 69, 71	Activity and tilt
A-MP13	13	32	6.9	30-90	6-7	67, 69, 71	Activity and tilt
A-LP16	16	44	18.4	30-90	6-7	67, 69, 71	Activity and tilt

Laboratory experiments with cod

- 1) Suitability of bait:
  - Squid > prawn > cod > herring
- 2) Tags baited 2 squid, 1 cod:
  - 5 fish cod taken but tag dropped out
- 3) 3 tags in King prawns, 2 in cod fillet - 5 fish:
  - only King prawns eaten by fish
- 4) 5 tags in King prawns – 10 fish:
  - all 5 baited King prawns eaten with 10 minutes.

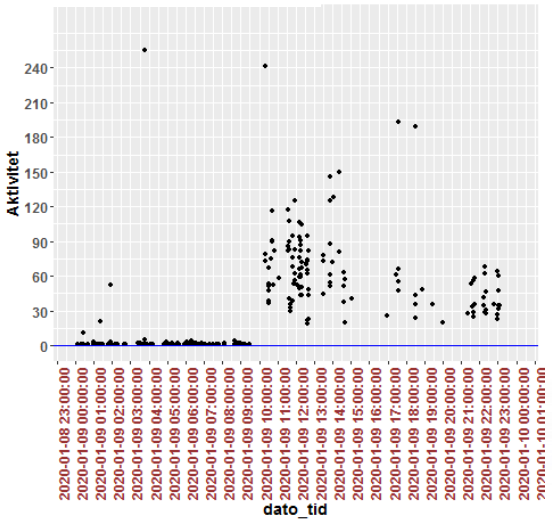
Tag residency in the fish



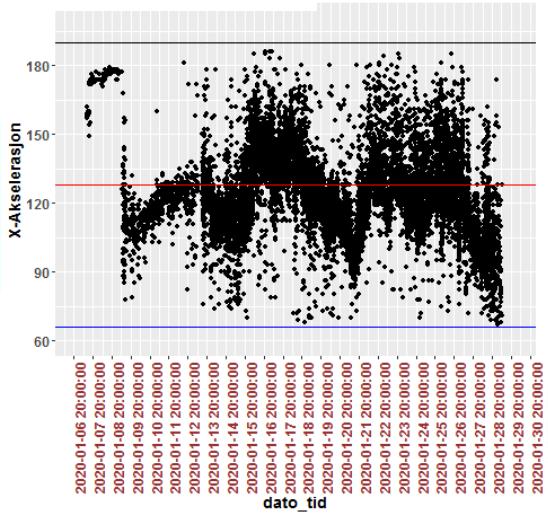
Tad ID	Size (ø mm)	Bait	Eaten		Excreted		Residency (d)
			Date	Time	Date	Time	
11	9	King prawn	09.01.20	11:20	09.02.20	21:20	31
17	9	King prawn	09.01.20	14:30	14.02.20	19:30	36
23	13	King prawn	09.01.20	14:50	13.02.20	21:20	35
13	9	King prawn	13.01.20	16:30-40	05.02.20	-	23
19	9	King prawn	13.01.20	16:30-40	10.02.20	03:45	28
25	13	King prawn	13.01.20	16:30-40	05.02.20	-	23
31	16	King prawn	13.01.20	16:30-40	05.02.20	-	23
37	16	King prawn	13.01.20	16:30-40	10.02.20	08:00	28
15	9	King prawn	29.01.20	10:45-11:50	05.02.20	-	7
21	13	King prawn	29.01.20	10:45-11:50	03.02.20	10:00	5
33	16	King prawn	29.01.20	10:45-11:50	29.01.20	-	4 h
39	16	King prawn	29.01.20	10:45-11:50	18.02.20	-	20
35	16	King prawn	29.01.20	10:45-12:05	09.02.20	10:25	11
27	13	King prawn	29.01.20	14:15	29.01.20	-	20 min
21	13	Nephrops (h)	05.02.20	-	09.02.20	01:15	4
33	16	Nephrops (t)	05.02.20	-	09.02.20	01:15	4
13	9	FW crustacea (t)	06.02.20	11:30-12:30	17:02.20	17:20	11
25	13	Nephrops (t)	06.02.20	12:15-12:55	10:02.20	03:00	4
31	16	Nephrops (t)	06.02.20	11:45	17:02.20	17:00	11
11	9	King prawn	28:02.20	13:20	07.03.20	17:50	8
17	9	King prawn	28.02.20	13:40	07.03.20	17:10	8
23	13	King prawn	28.02.20	13:30	09.03.20	02:10	10
29	13	King prawn	28.02.20	13:30	09.03.20	02:10	10
35	16	King prawn	28.02.20	13:15	09.03.20	02:35	10
15	9	Nephrops (t)	28.02.20	10:00-11:00	08.03.20	07:45	9
21	13	Nephrops (t)	28.02.20	11:30	08.03.20	07:40	9
27	13	Nephrops (t)	28.02.20	11:00-12:00	08.03.20	-	9
39	16	Nephrops (t)	28.02.20	10:30-11:00	08.03.20	07:35	9

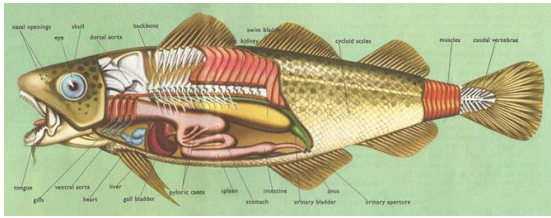
Output data

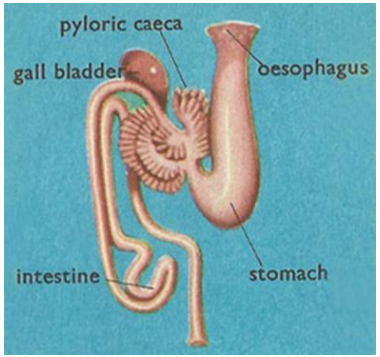
Tag being eaten



Tag within a fish



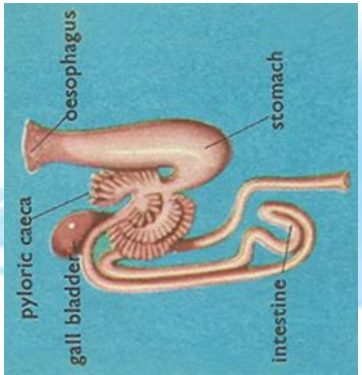




Location of the tag in the fish

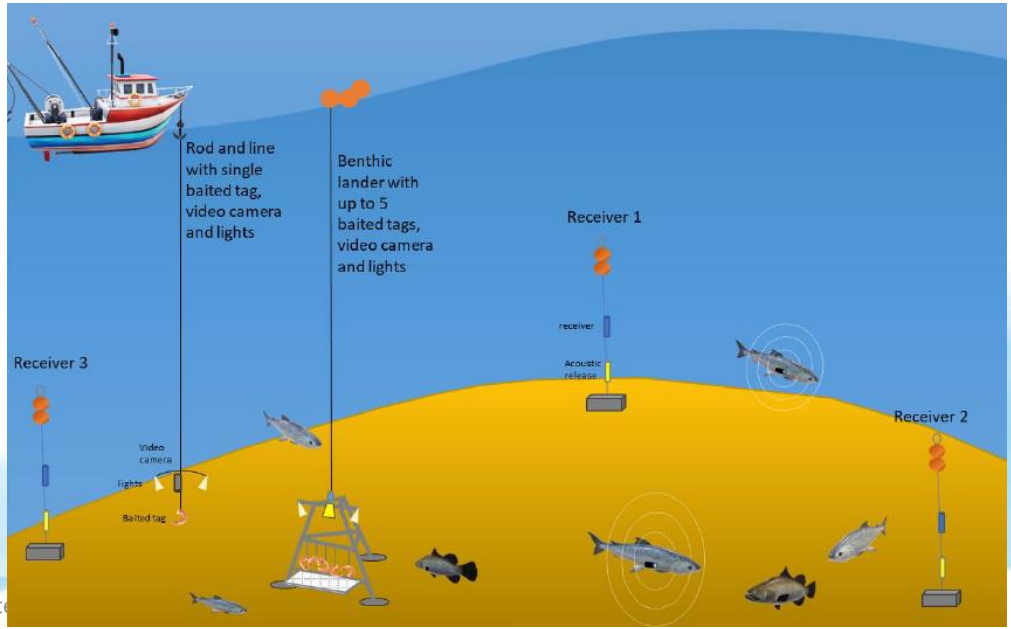
- Test ended after 4 days

Tank	Fish	Weight (g)	Length (cm)	Tag size (ø mm)	Notes
1	1	2334	62	-	
1	2	2395	56	-	
1	3	3782	73	16	Tag still wrapped in prawn, located in the stomach
1	4	2541	58	-	
1	5	4304	71	16, 13	Tags still wrapped in prawn, located in the stomach
1	6	3135	62	-	
1	7	701	41	9, 9	Tags still wrapped in prawn, located in the stomach
1	8	968	40	-	
2	1	3209	70	9, 16	Tags still wrapped in prawn, located in the stomach
2	2	1823	57	16	Tag still wrapped in prawn, located in the stomach

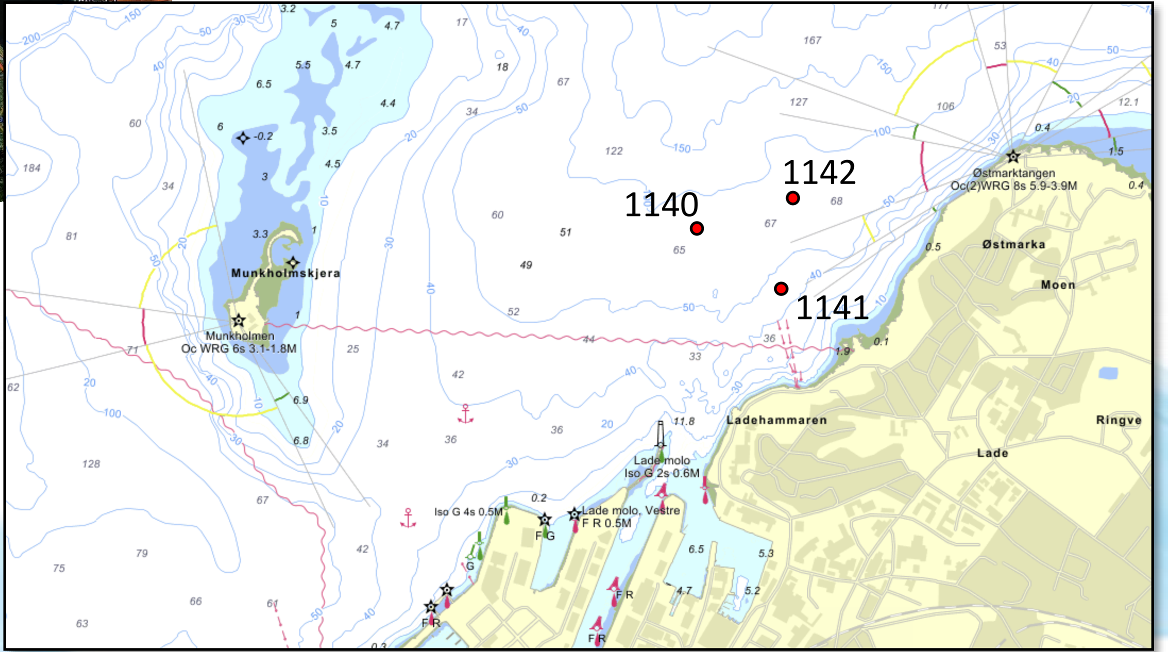


Field trial in Trondheimsfjord

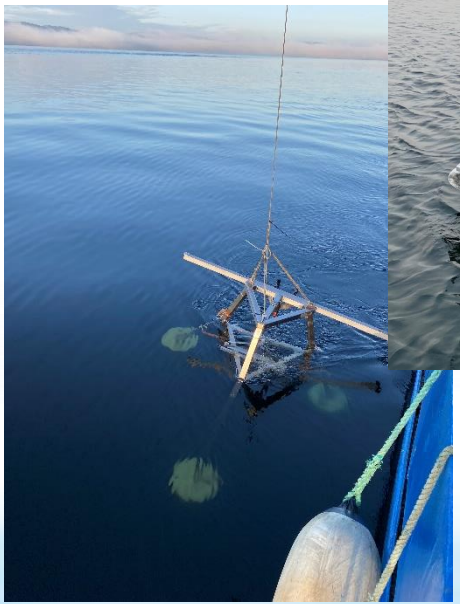
- Baited tags fed to wild fish populations in the Trondheimsfjord
- Local fisherman to join 2 day trip, providing information on best location and fishing techniques
- Use rod and line fishing with light and video camera, as well as the benthic lander

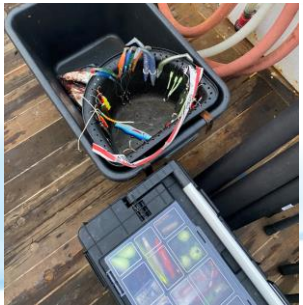



Uthaug
Opphaug
Skavdalen
Brekstad
Frengen
Fevåg
Leksvik
Blankbygda
Bergbygda
Beian
Rø
Storvatnet
Sjursvika
Selva
Grønningen
Uddu
Kvithylla
Vanvikan
Seter
Småland
Skatval
Stadsbygd
Selbekken
Trondheim
Lade
Ingdalen
Vikhammer
Ranheim
Rye
Kjøra
Sverresborg
Charlottenlund
Selsbakk
Byneset
Spongdal
Heimdal
Viggja
Bratsberg
Børsa
Øysanden
Buvika


1142
1140
1141
Munkholmskjera
Munkholmen
Oc WRG 6s 3.1-1.8M
Østmarktangen
Oc(2)WRG 8s 5.9-3.9M
Østmarka
Moen
Ladehammaren
Ringve
Lade
Lade molo
Iso G 2s 0.6M
Iso G 4s 0.5M
Lade molo, Vestre
F R 0.5M

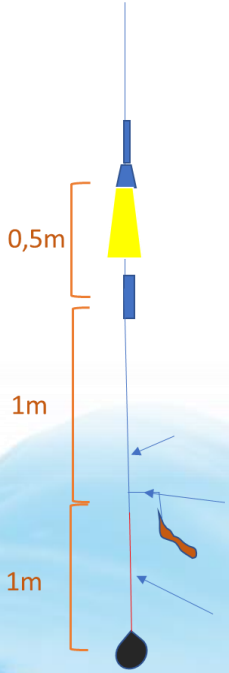

SPACE LAB





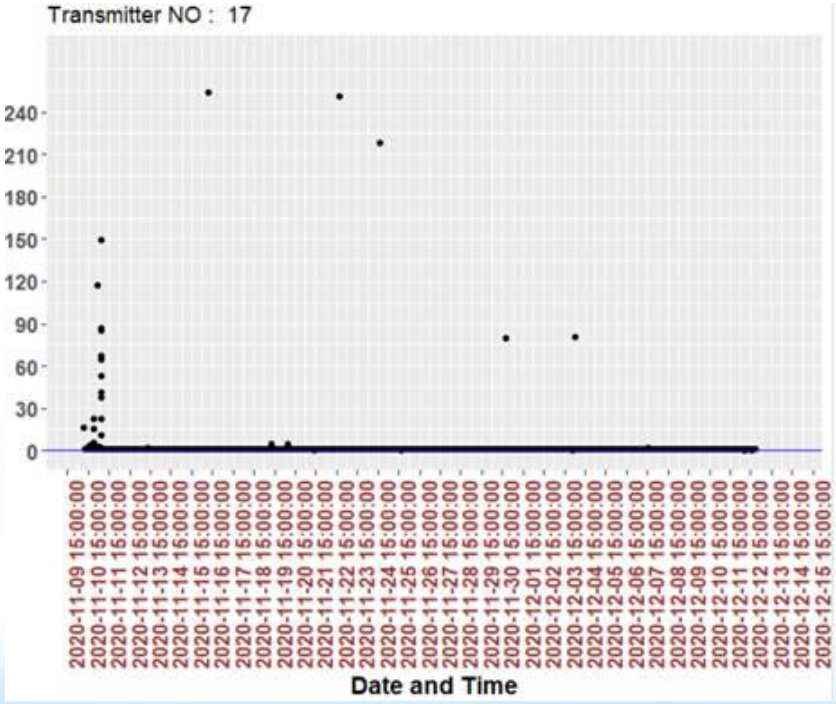
Video from the water wolf

- Only one tag taken up (baited with kreps, tag 17)



00:50
02:36

Results from the field trial

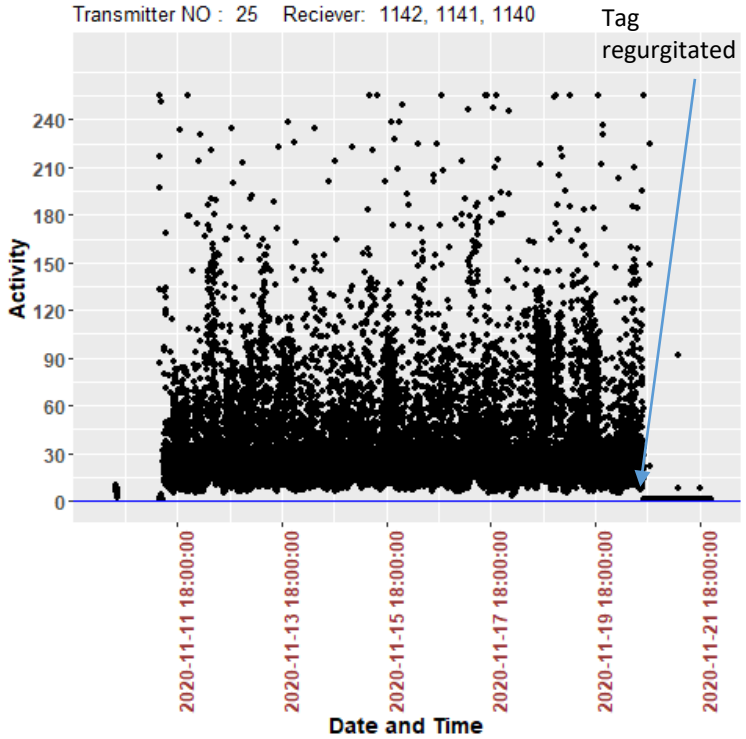


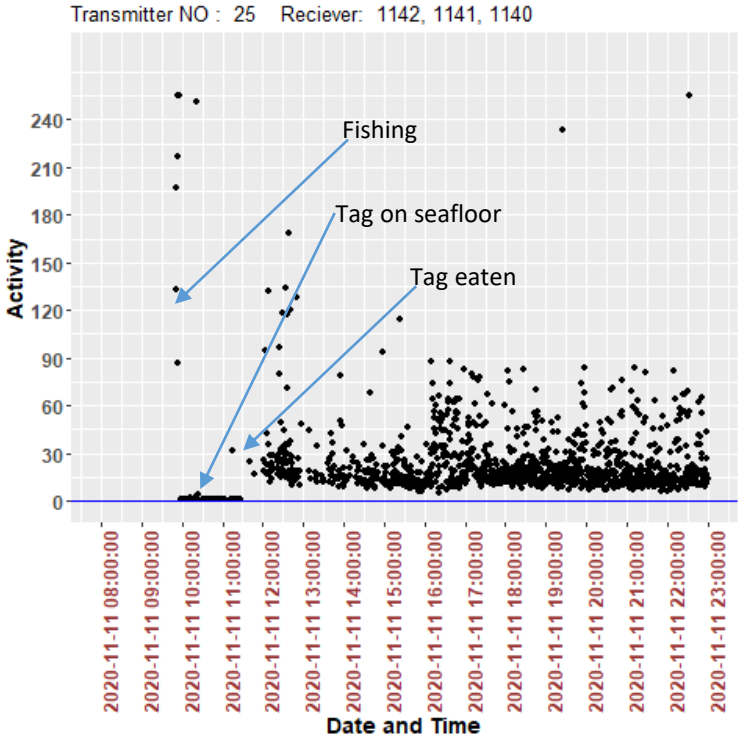
Tag 17:

- Tag was enclosed within red prawn tail
- Initial activity during fishing, then soon after regurgitated or slipped out of bait, whilst feeding.

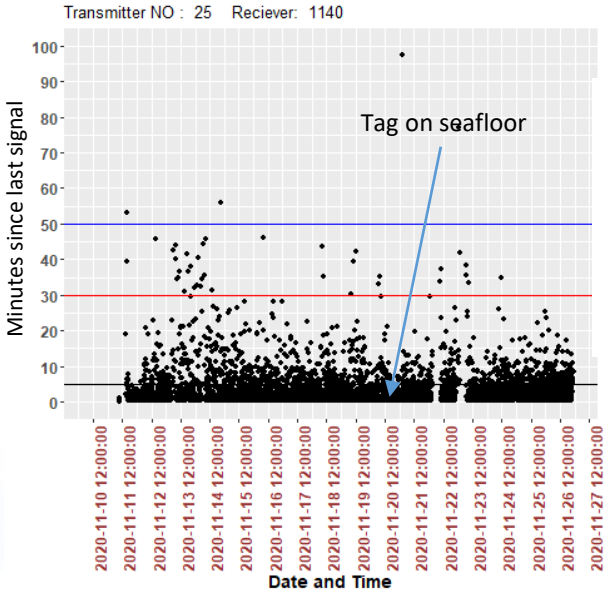
Bait eaten, Transmitter no. 25

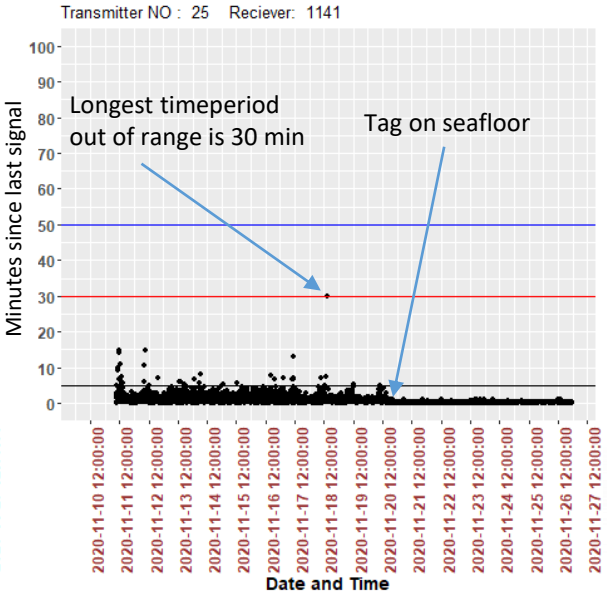
- Tag was enclosed within 2 King prawns
- Initially fell off the line and lay on the sea floor
- After 2-3 h the tag was eaten from the sea floor, with high activity for 9 days.

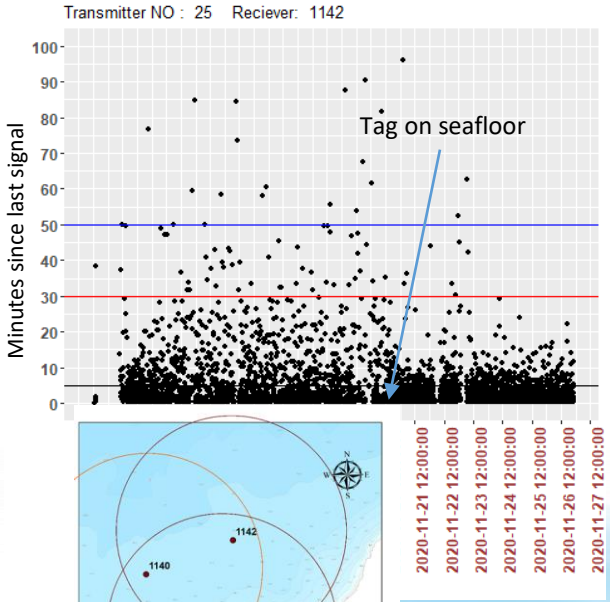


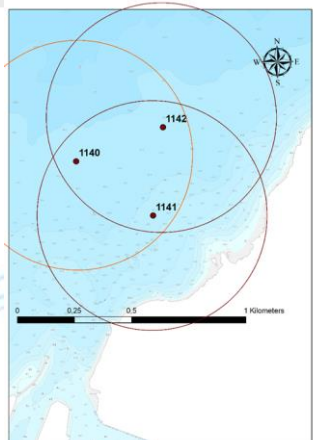


Bait eaten, time between signals



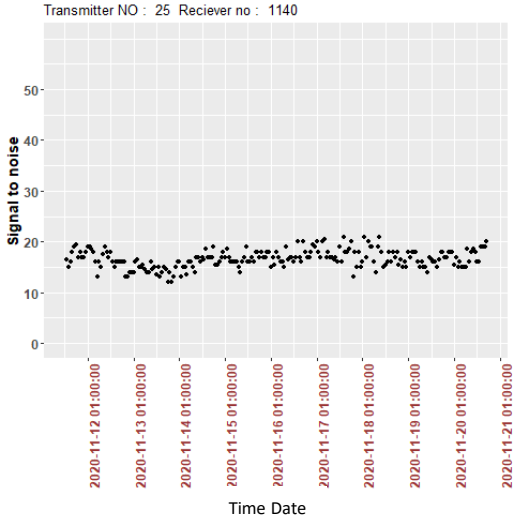


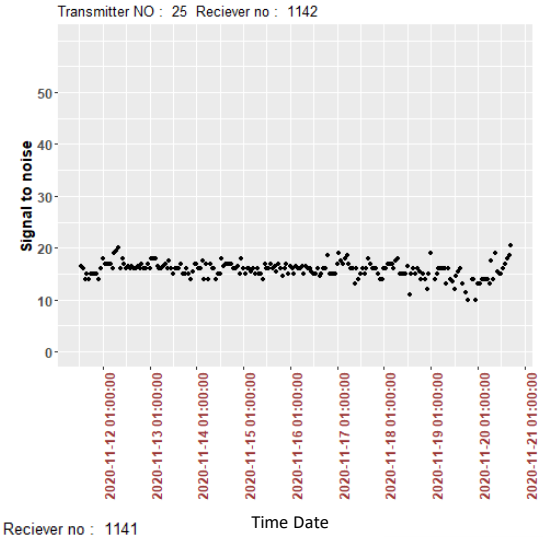


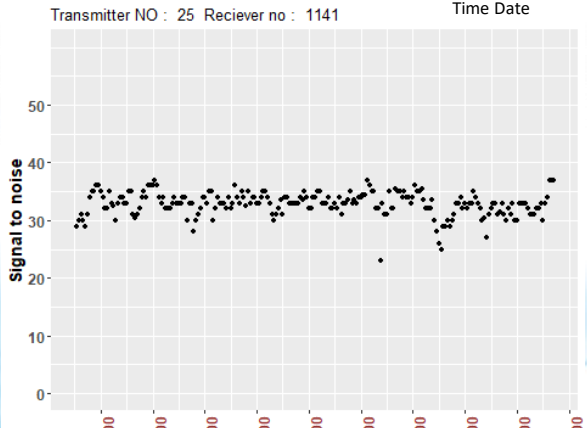


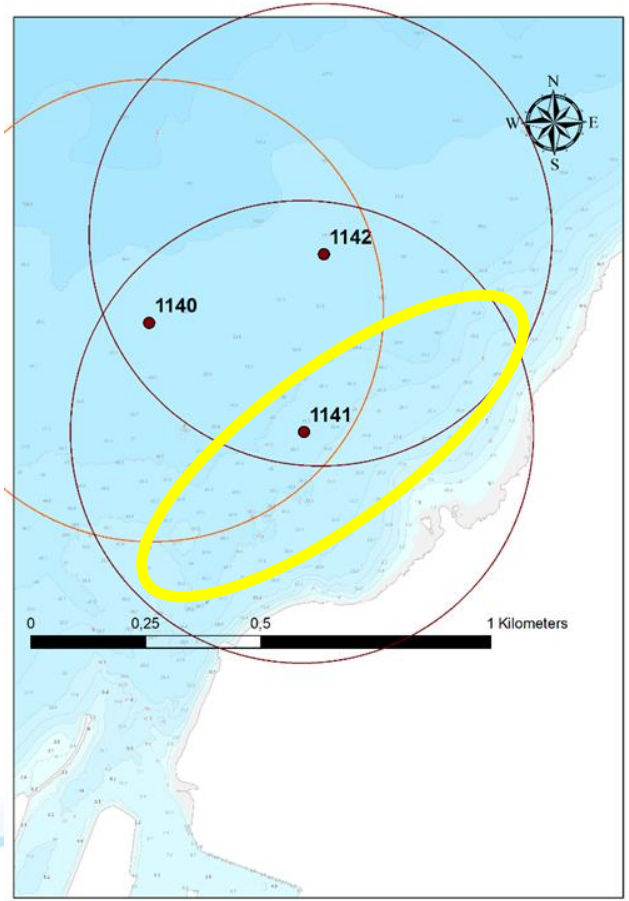
Tag 25 is a 13mm tag, estimated range is 500m (Thelma Biotel)
but there can be large variations depending on sea conditions

Bait eaten: median signal to noise ratio indicating distance

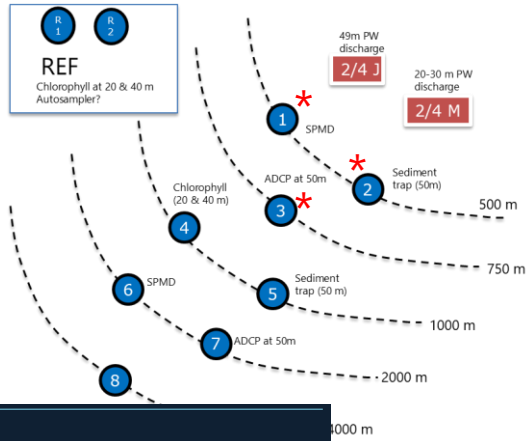




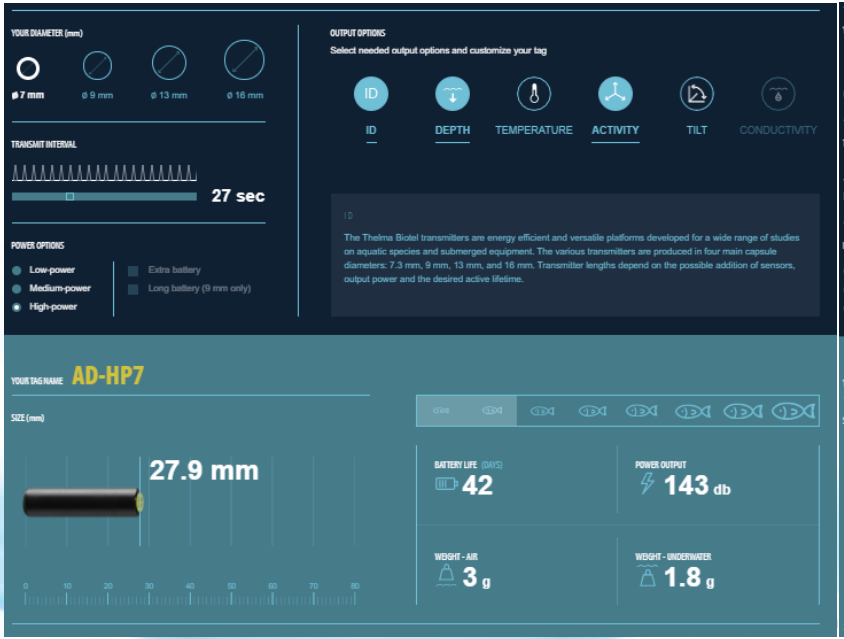




Ekofisk 2021

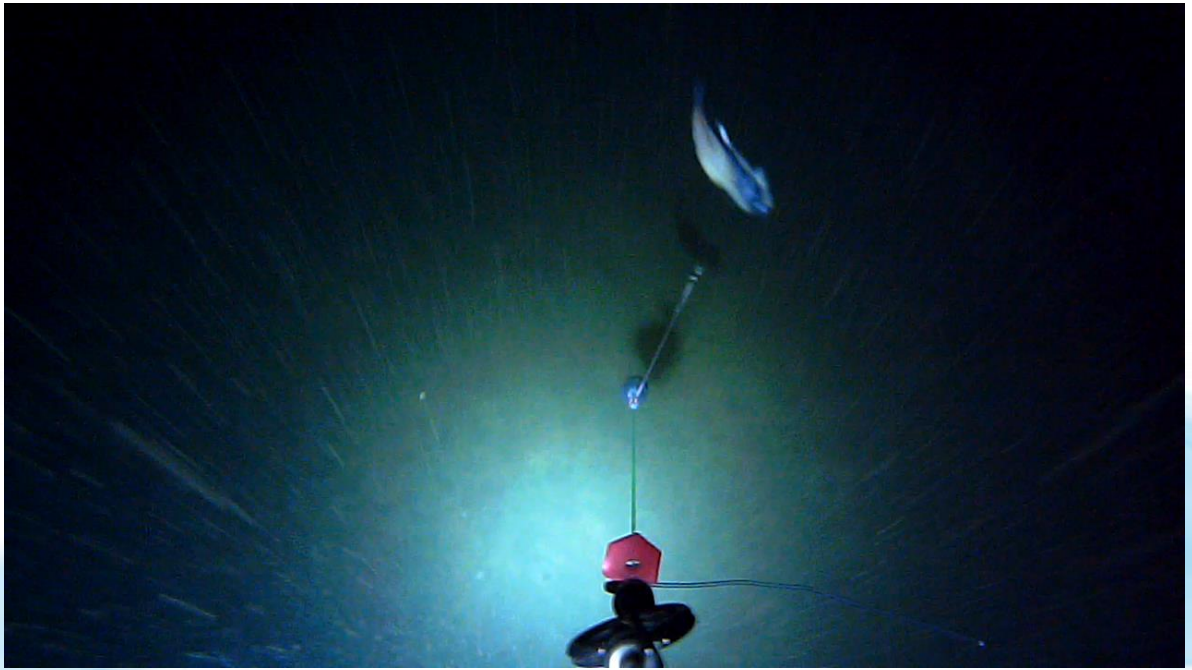


- Depth: 70 m
- Receivers placed in triangulation on mussel rigs 1, 2,and 3
- Use smaller tags 7mm, 9mm with high power, depth and activity



Ekofisk 2021

- Only dab (*Limanda limanda*) and small cod present at Ekofisk
- Unsuited to take the bait
- Cod too small
- Dab nibble at the bait



- More suitable species
  - Ling
  - Tusk
  - Large haddock, cod
  - Saithe
  - Whiting

Thank your for your attention