

Migration study on Atlantic cod (*Gadus morhua*) using pop-up satellite tags

Johannes Sturlaugsson
Erlendur Geirdal
Gudmundur Geirdal



Laxfiskar
www.laxfiskar.is



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Main aims

- Fishery-independent geographical mapping on migration routes of Icelandic cod
- Behaviour ecology of cod mapped based on measurements on fish depth, sea temperature and light
- Evaluation of PSATs usability for studies on cod migration



Tagging of cod

Site: Cod spawning grounds in Bay Faxafloi off SW-Iceland

Date: April 30, 2012

Fishing gear: Gill nets

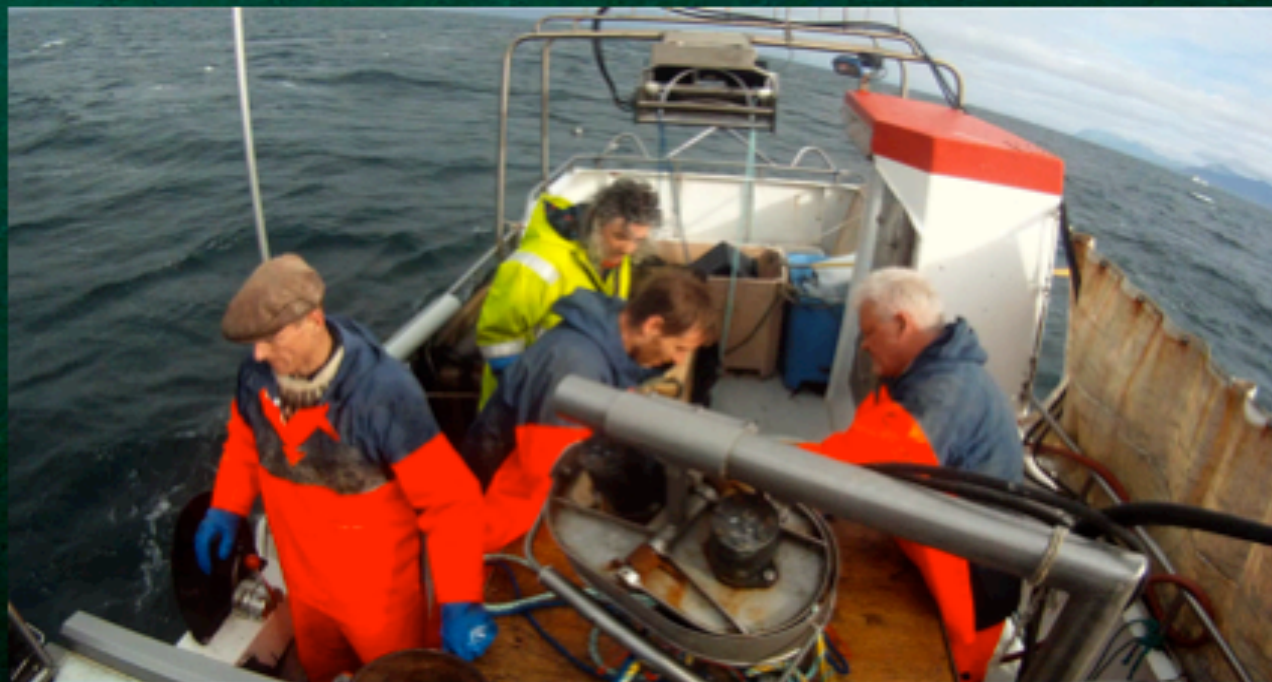
Number: 8 cod (3 males & 5 females) tagged with PSATs

Size: 105 -136 cm in length

Study period: 8 months (tags pop-up time May-Dec with monthly interval)

Measurements: Fish depth (pressure), temperature & light (1,25-10 min intervals)

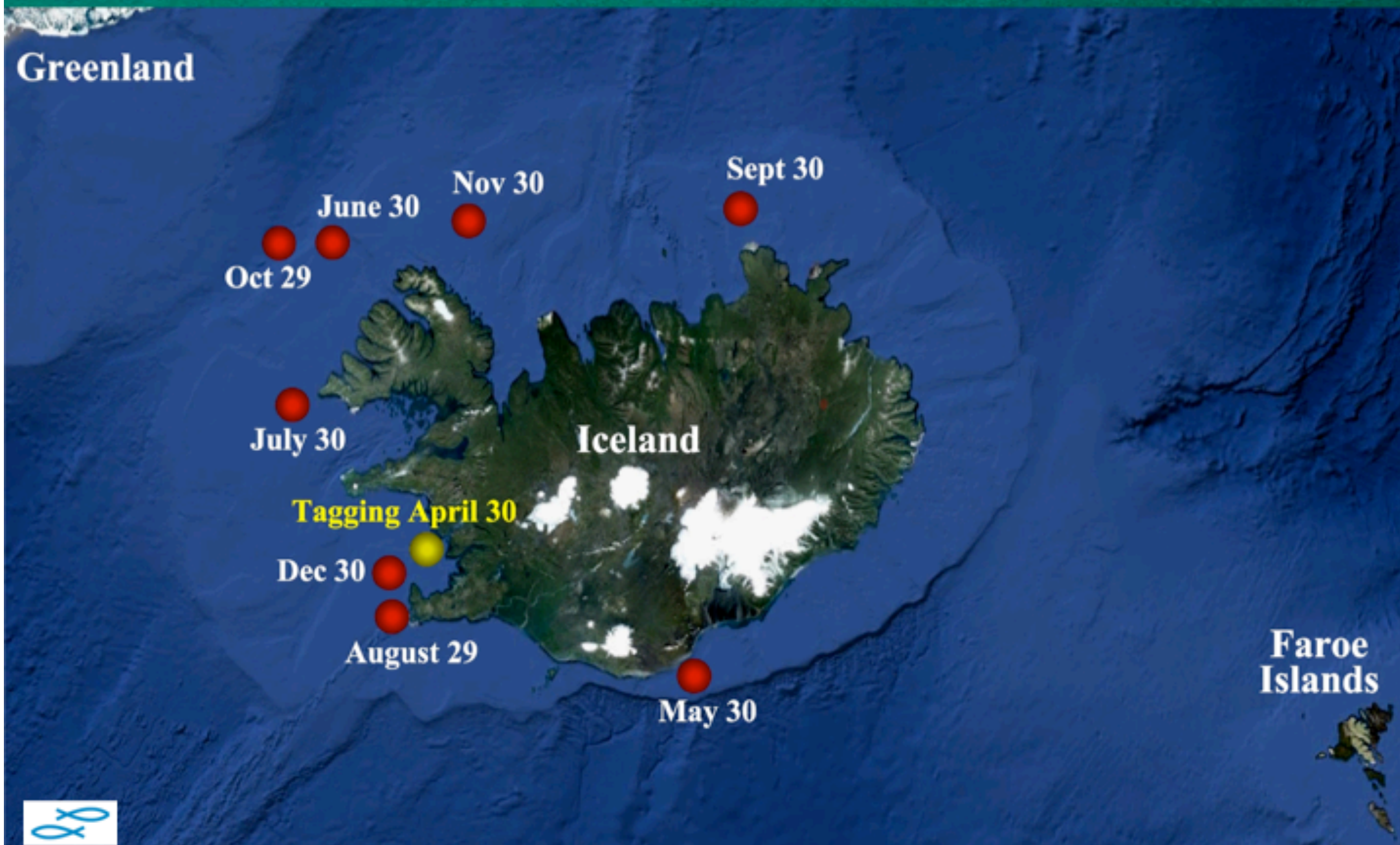
Tag type: Wildlife Computers - MiniPat



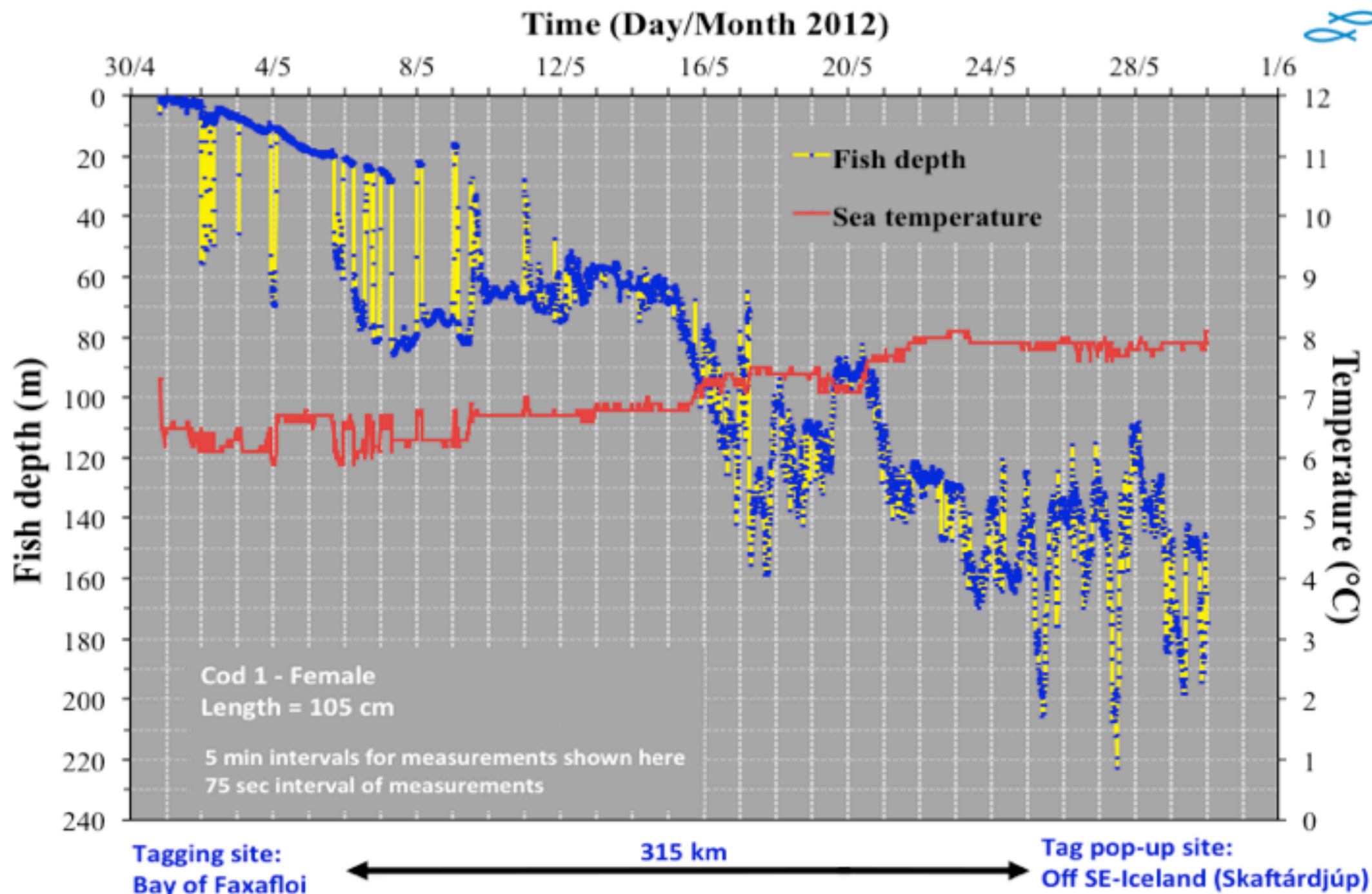
Tagging of cod



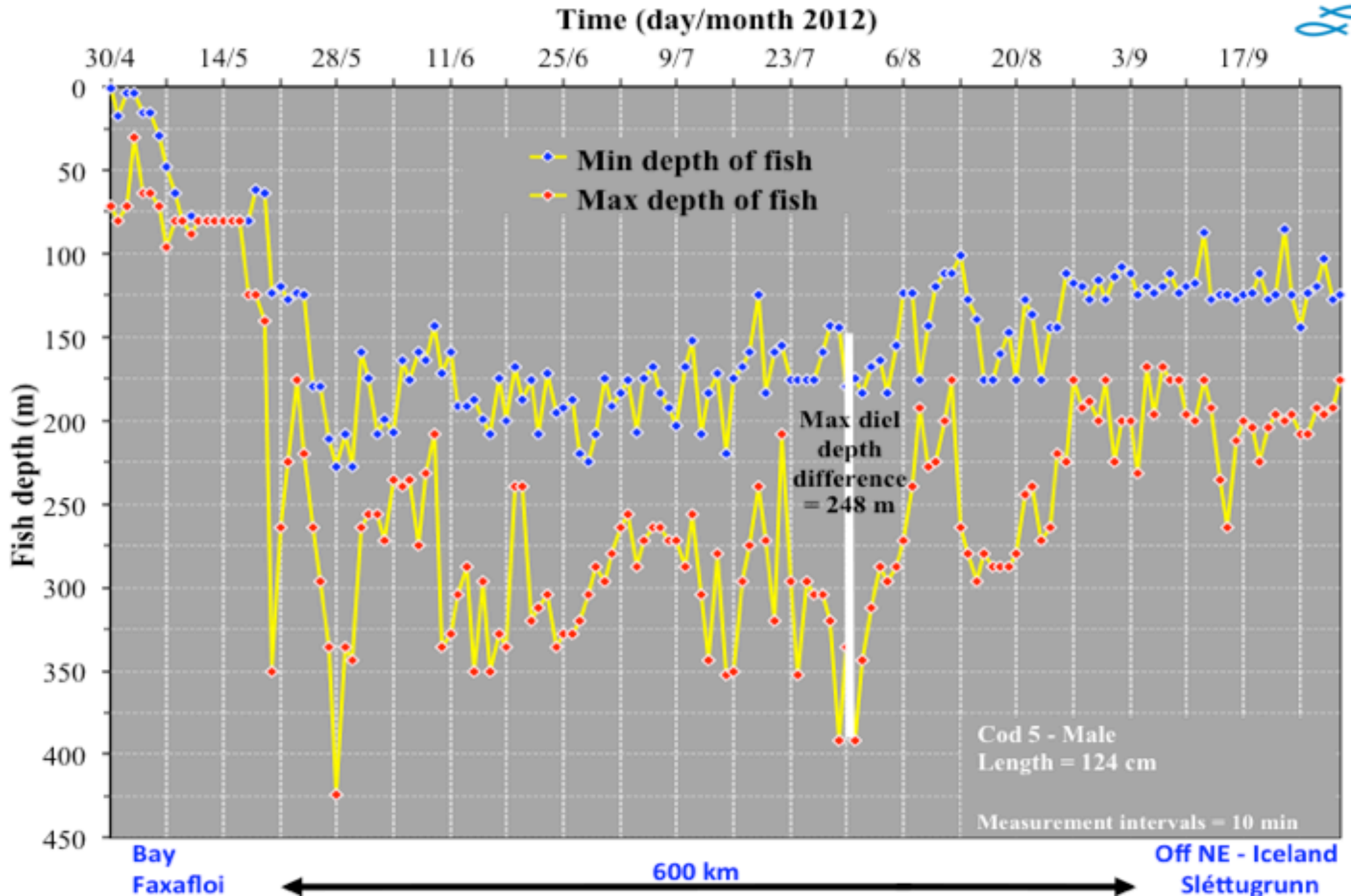
Geological distribution of tagged cod



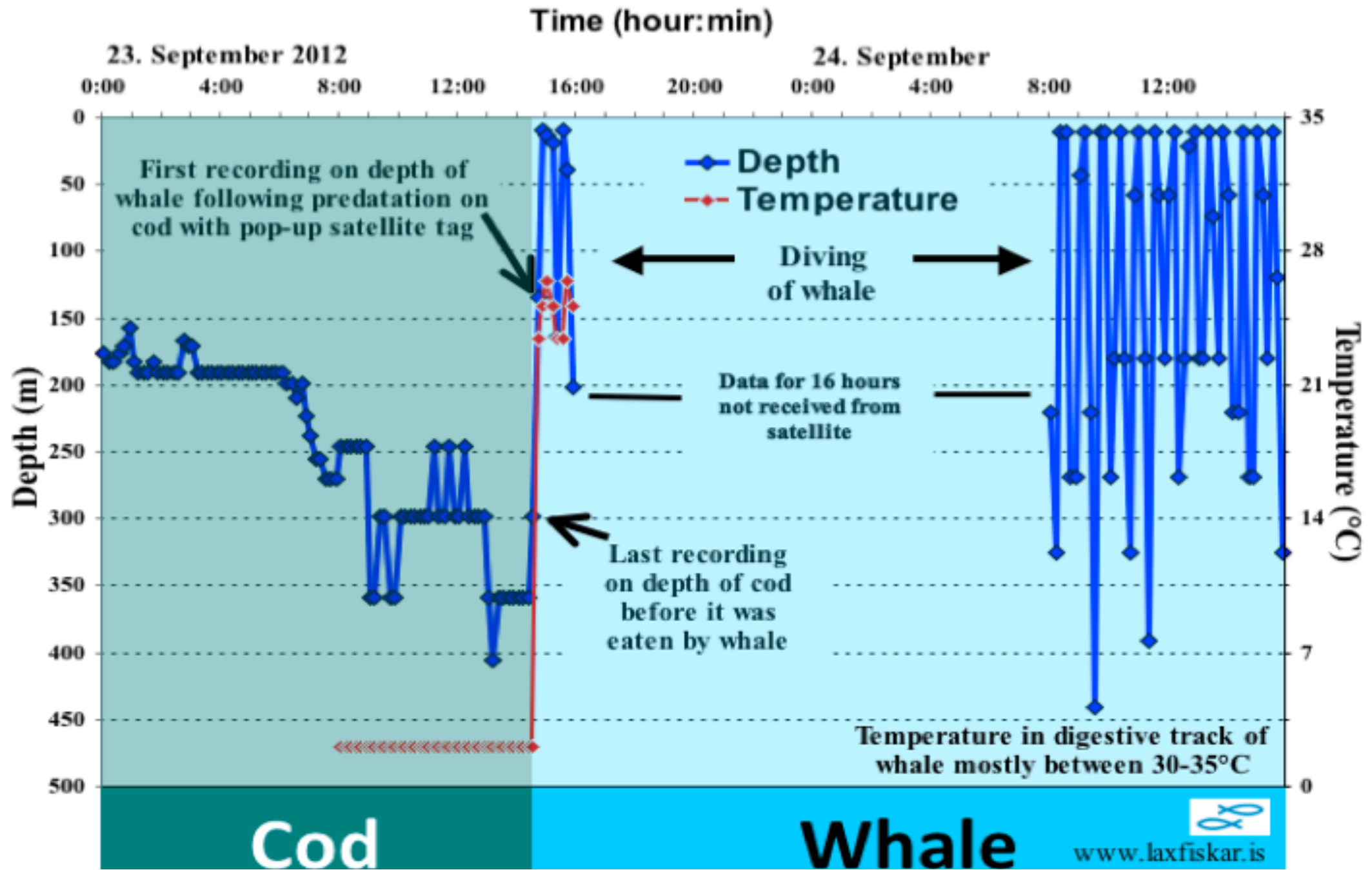
Depth distribution of cod & corresponding temperature in relation to time



Daily depth of cod - minium & maximum



Depth of cod Jonas and sea temperature just before it was eaten by sperm whale and the depth experienced by the whale within the following day



Results – behaviour ecology of large Icelandic cod

- **Feeding migration of cod**

- The cod migrated South, West & North off Iceland
- Migration distances (shortest seaway) e.g. 315 km/1 month & 600 km/5months
- Temperature & light data showed that all cod located via satellite West & North off Iceland had migrated West of Iceland on their way to their tag pop-up site
- Diel vertical movements usually between 10-50 m
examples of larger variation up to 248 m/day
- Maximum fish depth = 425 m
- Examples of cod spending considerable time in the channel between Iceland & Greenland (Denmark Strait) experiencing temperature down to 0°C at this frontal region with inflow of cold water of the E-Greenland current & warm water of N-Icelandic Irminger Current



Results – behaviour ecology of large Icelandic cod

- **Predation on cod by sperm whale**
 - unique information showing cod eaten when staying at depth close to 300 m
- **The cod study changed partly into a whale study for 1 month**
 - unique data on diving pattern (dives down to > 800 m) & on other behaviour



Results – the methodology

- **The PSATs are feasible to study long-distance migration of Atlantic cod**
- **Fishery-independent mapping of geological distribution & behaviour enabled**
Opens up oceans of opportunities to bring to shore new informations e.g. on :
 - New migration patterns
 - New cod areas. i.e. areas not known before to be utilized by cod
 - Predation on cod
- **Monitoring technology enabling parallel use of data for research & fishery**
 - Two for one in monitoring migration of fish from feasible fish species/stocks is an option that should stimulate co-operation in this field between researchers & the fishery sector



Conclusions

This first study worldwide to use PSATs on Atlantic cod shows that this technology works well for studies on cod that migrates long distances

It is evident that using this sampling method is extremely important in order to sample new data to get answer to some of the crucial questions that we need to answer but where fishery dependant methods can't deliver them



Thanks

