

Cod and sole behaviour in an offshore wind farm

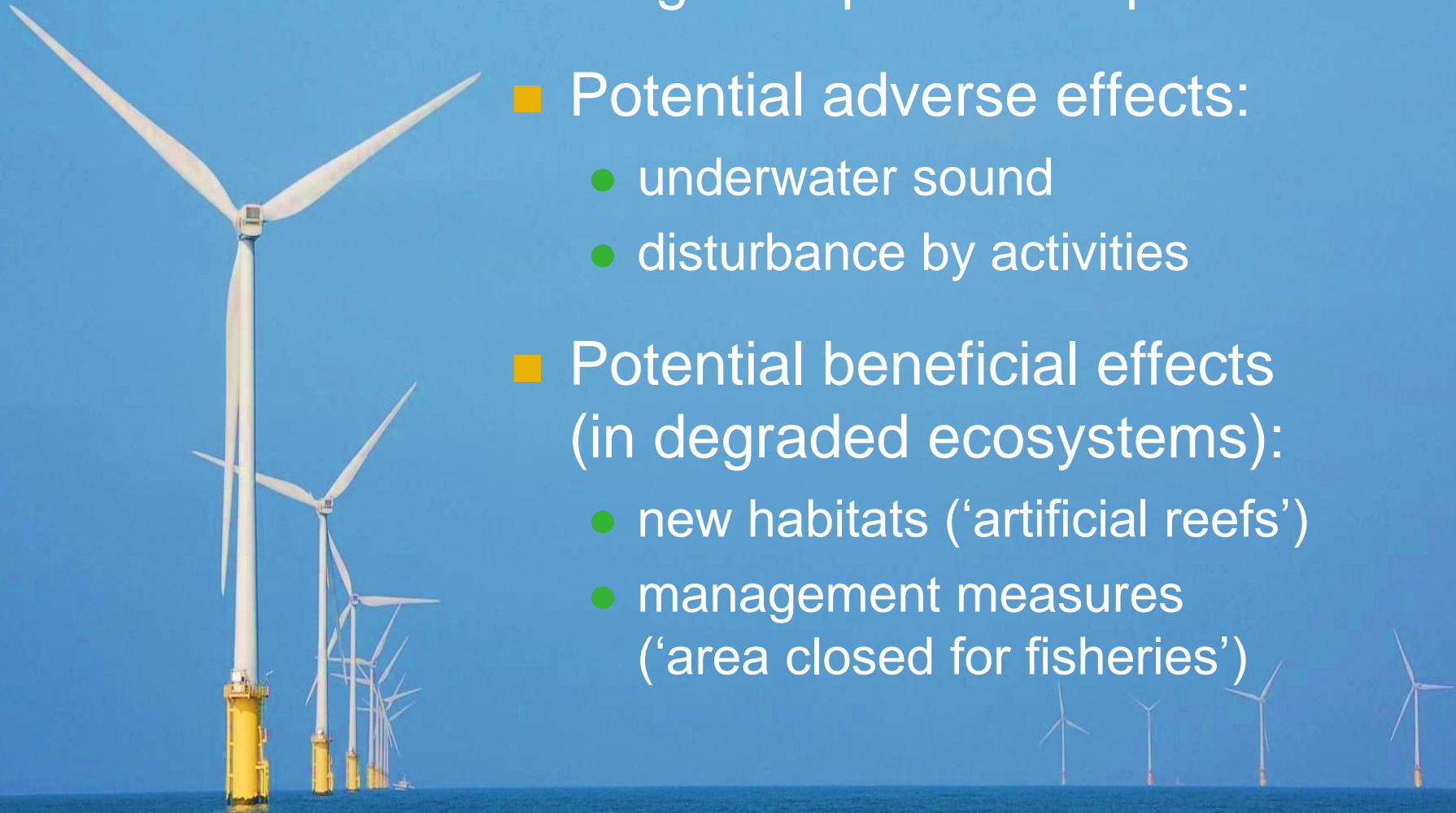
Erwin Winter, Geert Aarts, Olvin van Keeken
IMARES, Wageningen UR, the Netherlands



Response of fish to offshore wind farms

During the operational phase

- Potential adverse effects:
 - underwater sound
 - disturbance by activities
- Potential beneficial effects (in degraded ecosystems):
 - new habitats ('artificial reefs')
 - management measures ('area closed for fisheries')



Fish species selected for this study



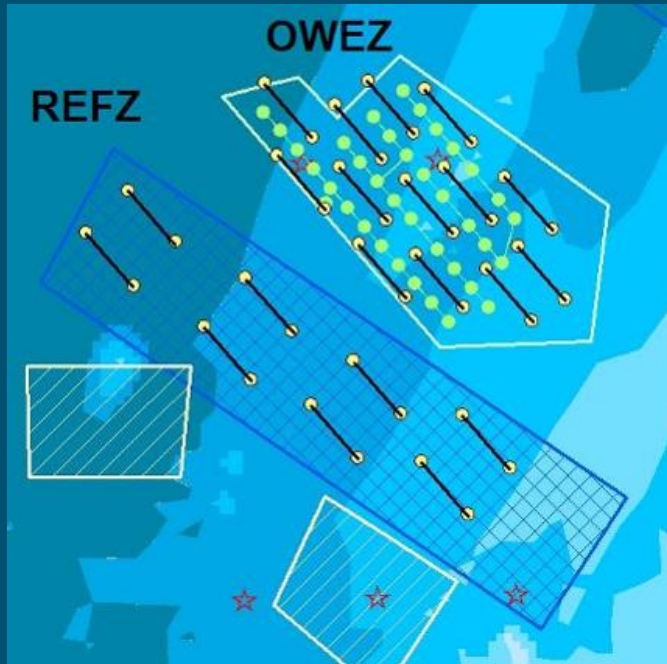
Sole (*Solea vulgaris*)



Atlantic cod (*Gadus morhua*)

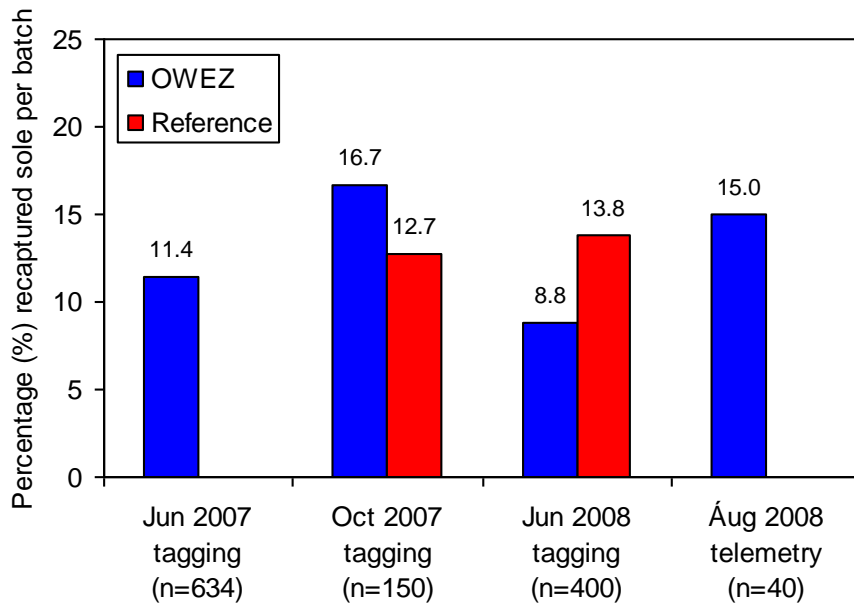
Mark-recapture experiment sole

If residence time of sole in wind farm is high then tag rate return from fisheries will be lower for OWEZ than REFZ groups



Oktober 2007: REFZ 150, OWEZ 150 sole tagged
June 2008: REFZ 400, OWEZ 400 sole tagged

Mark-recapture experiment sole

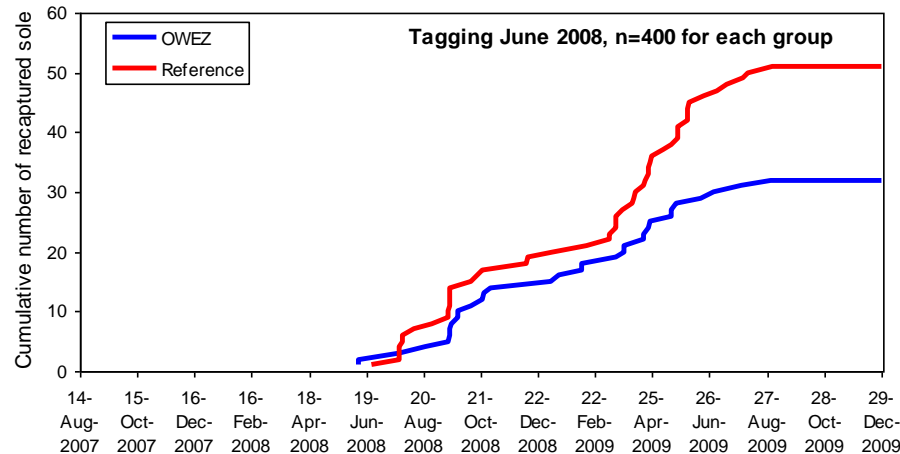
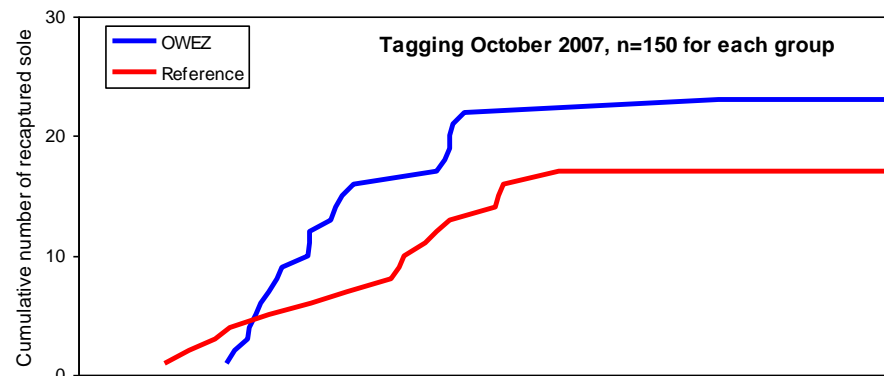
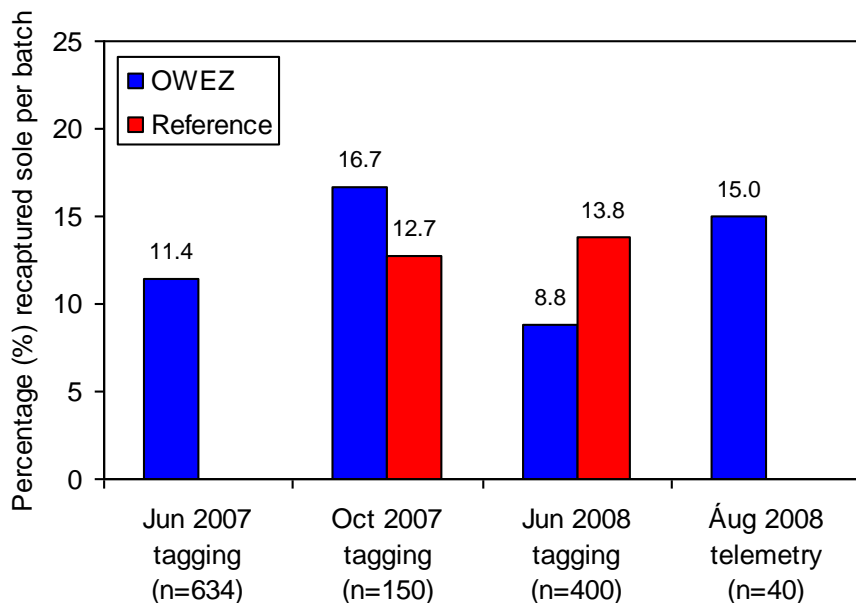


Both batches combined

recaptured	60	74	134
not recaptured	490	476	966
totals	550	550	1100

Observed G= 1.67
 William's correction= 1.00
 p-value= 0.20

Mark-recapture experiment sole

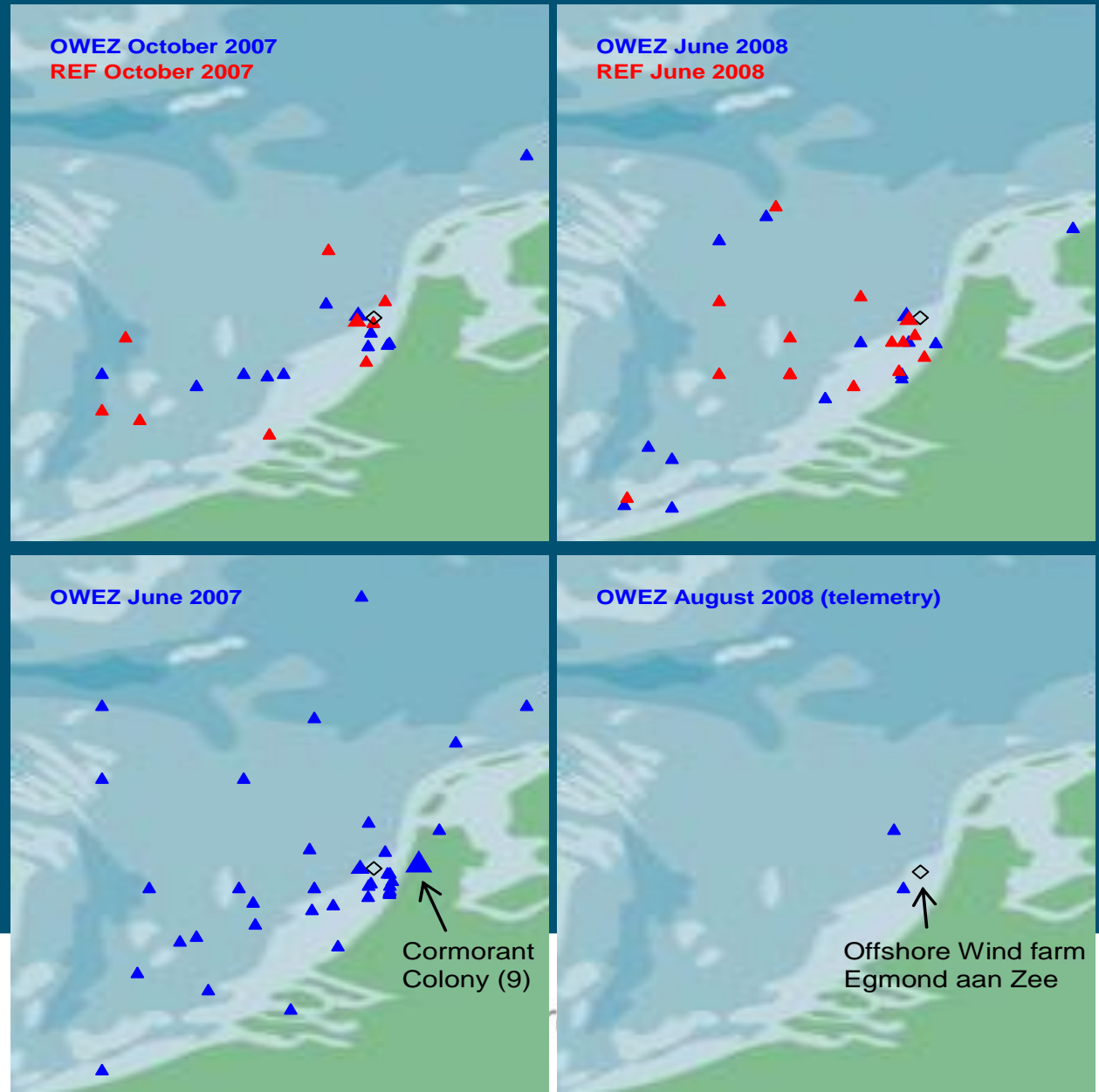


Both batches combined

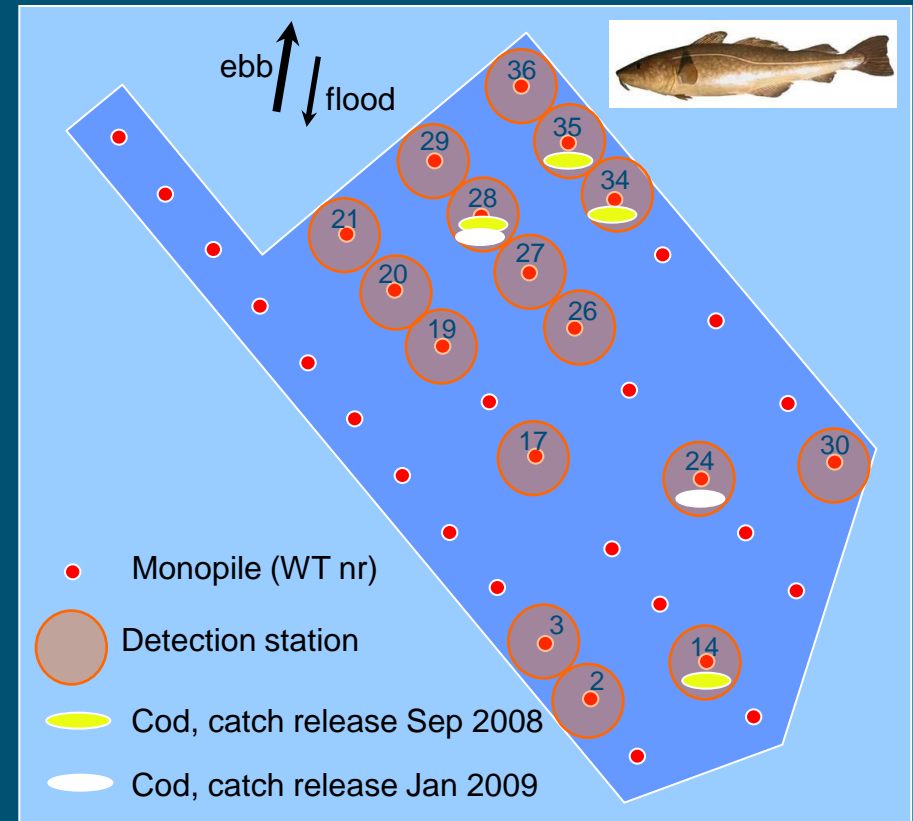
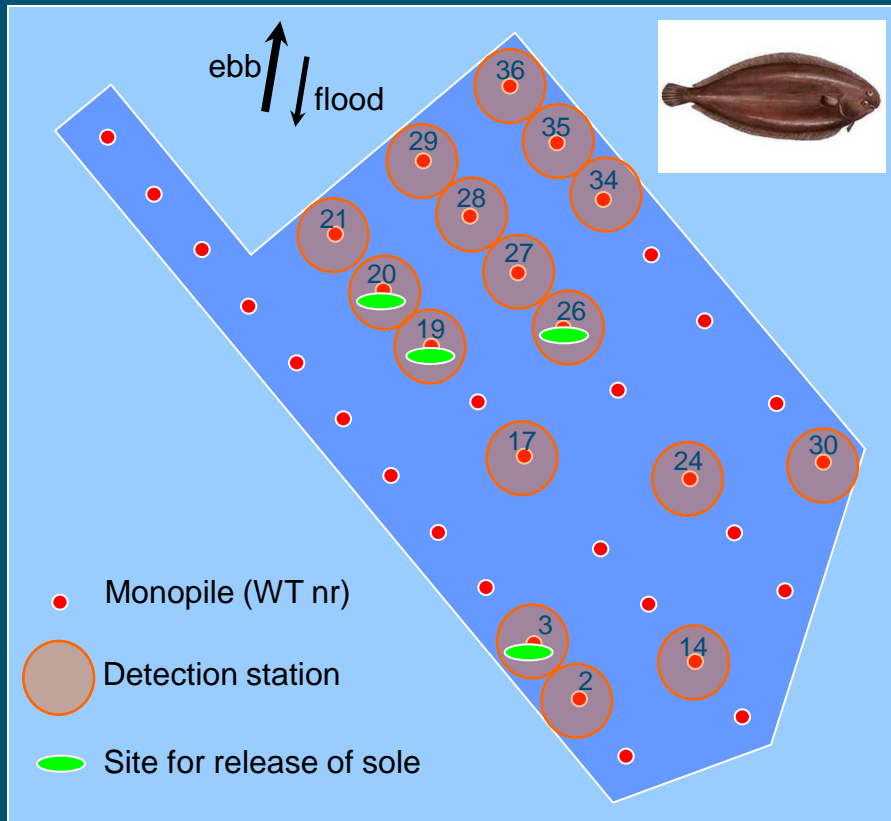
recaptured	60	74	134
not recaptured	490	476	966
totals	550	550	1100

Observed G= 1.67
 William's correction= 1.00
 p-value= 0.20

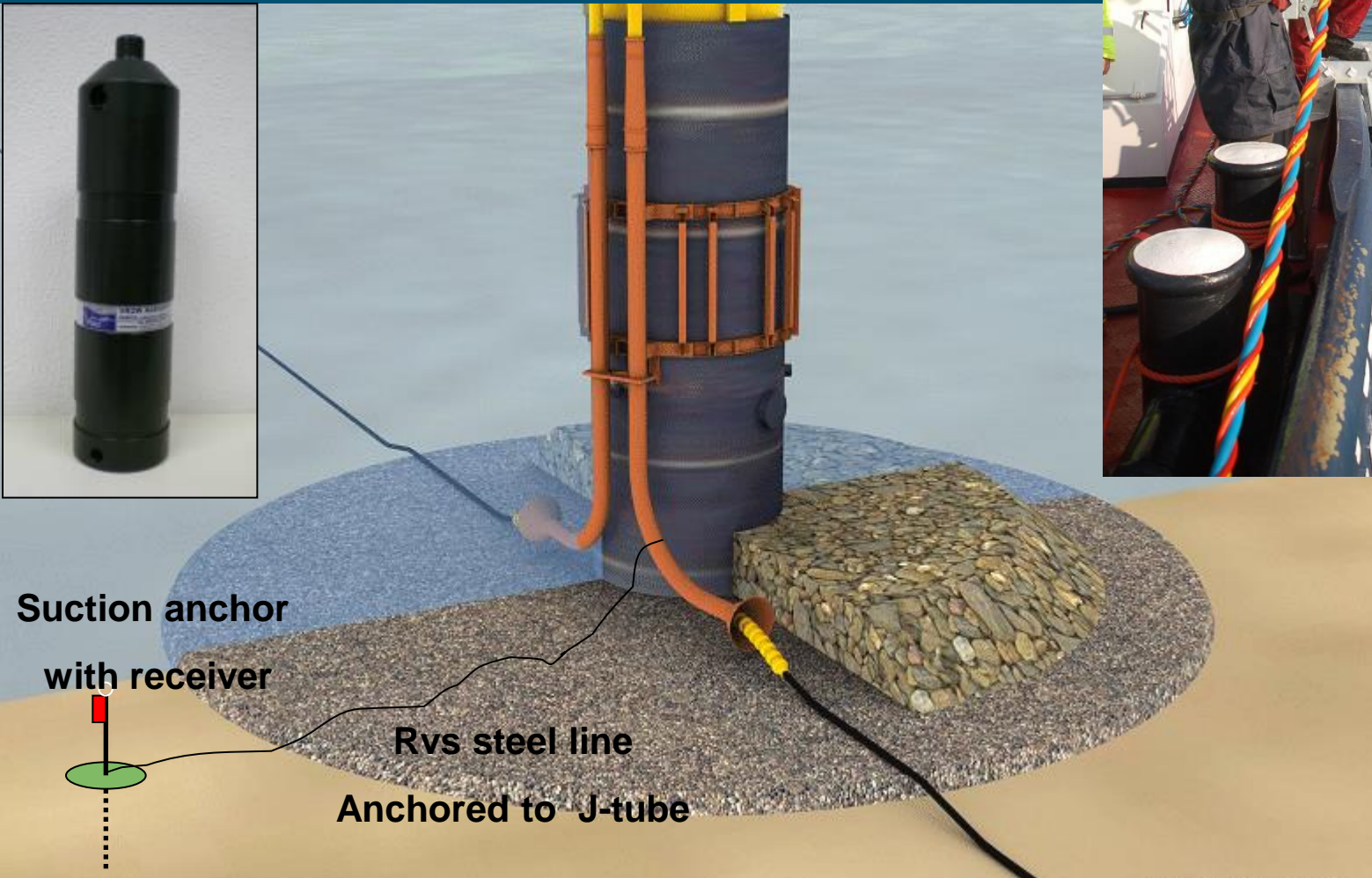
Mark-recapture experiment sole



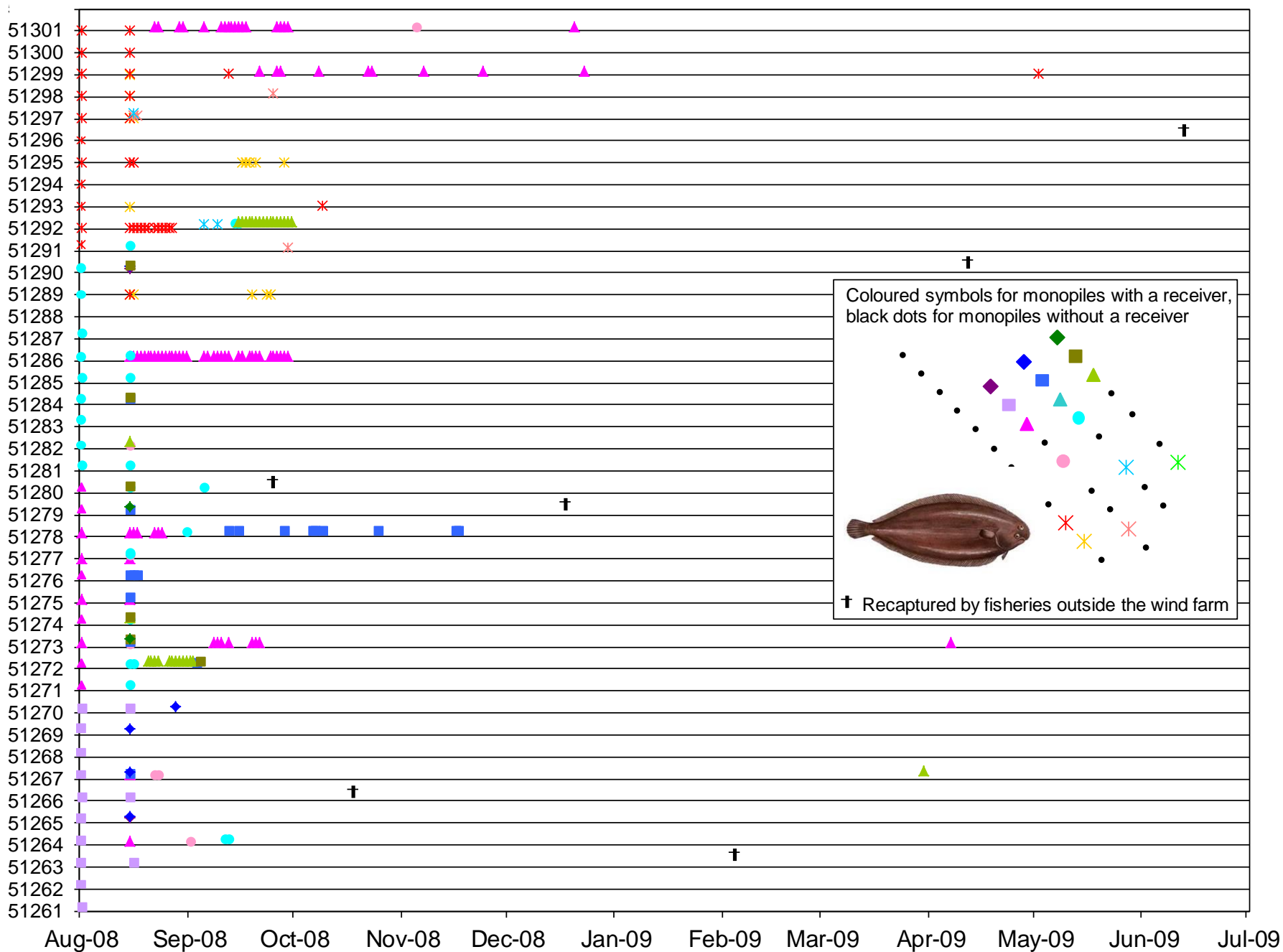
Telemetric experimental set-up



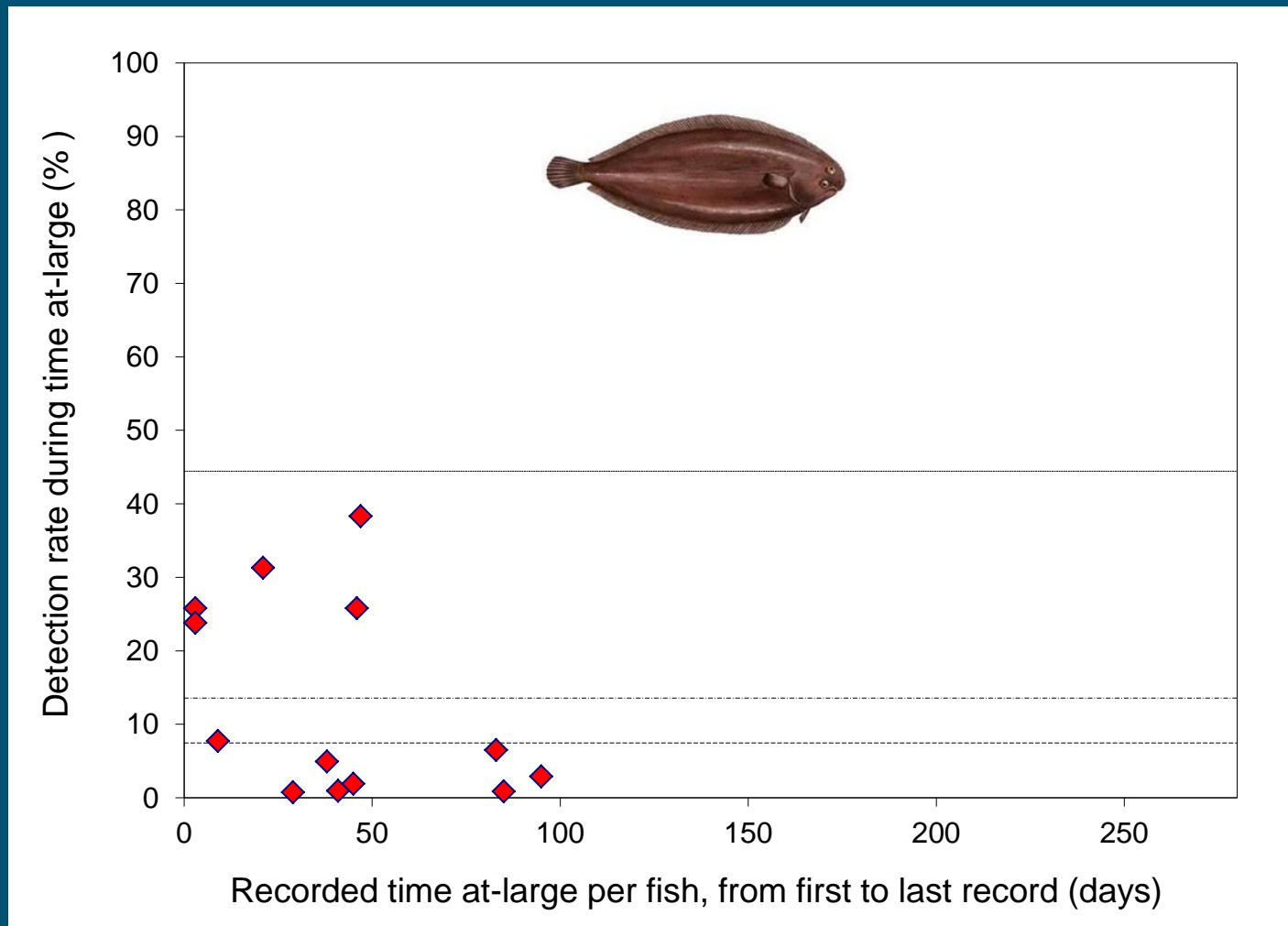
Building the receiver network



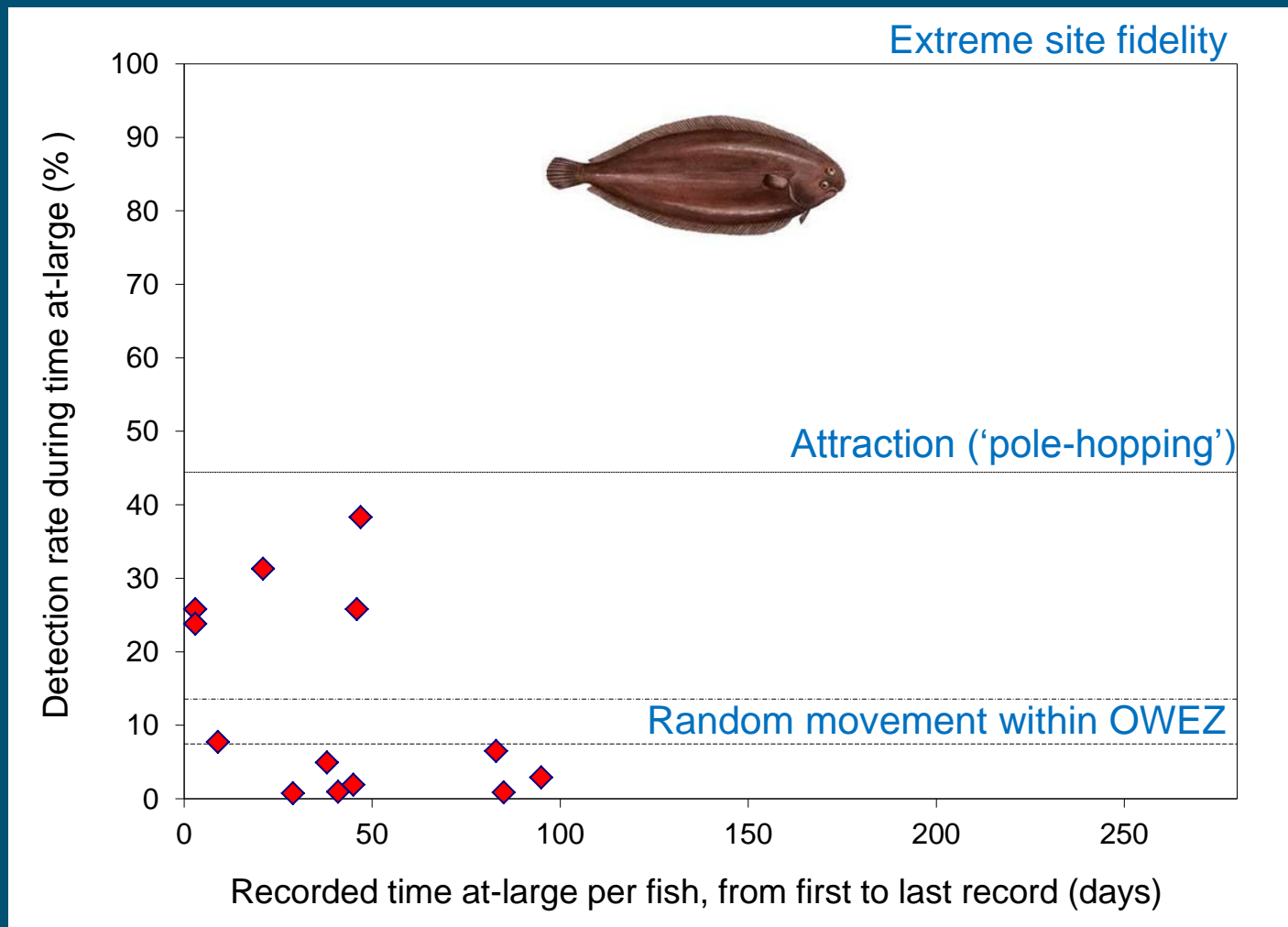
Sole ID number, release site (symbol)



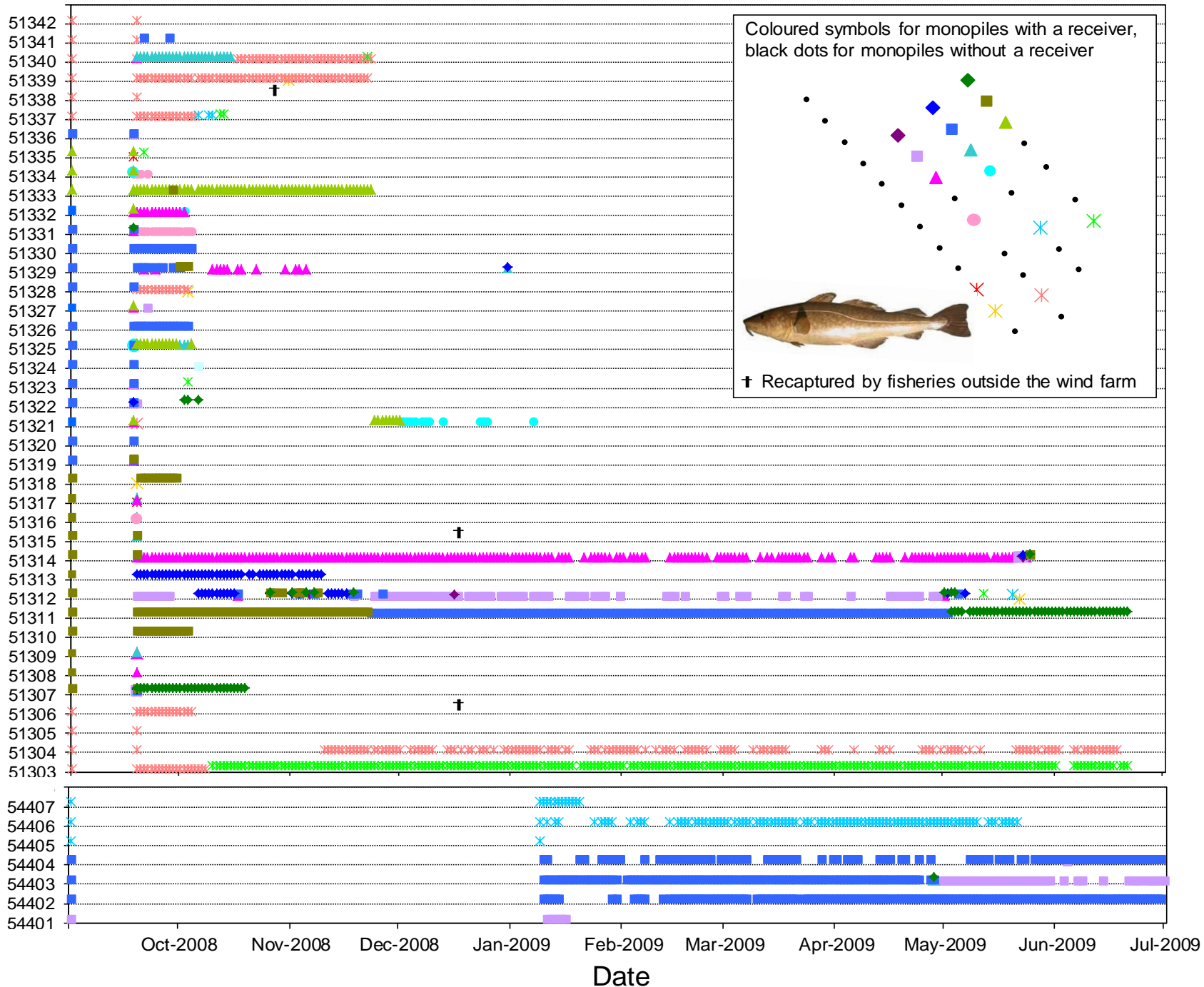
Sole using wind farm as habitat



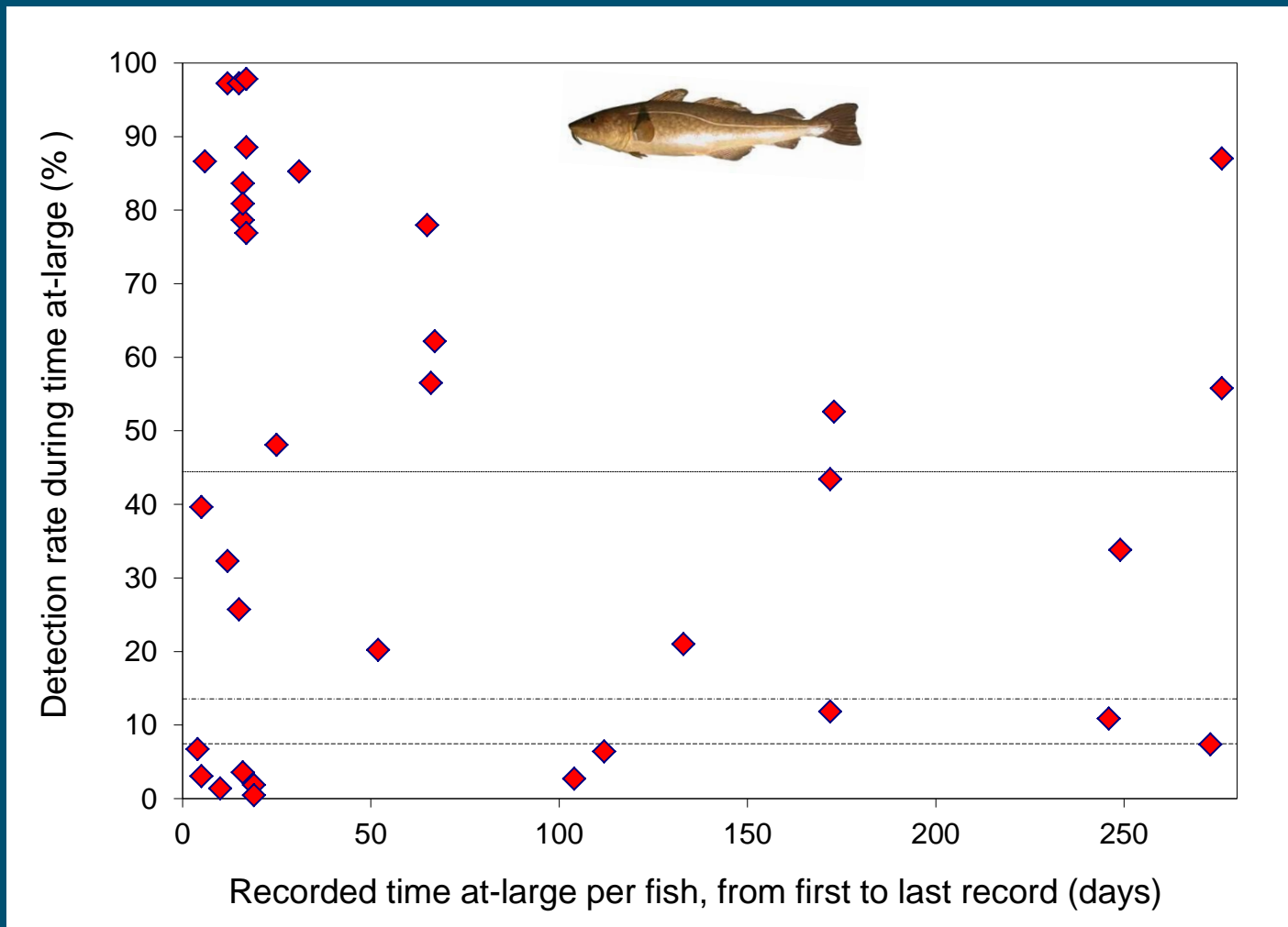
Sole using wind farm as habitat



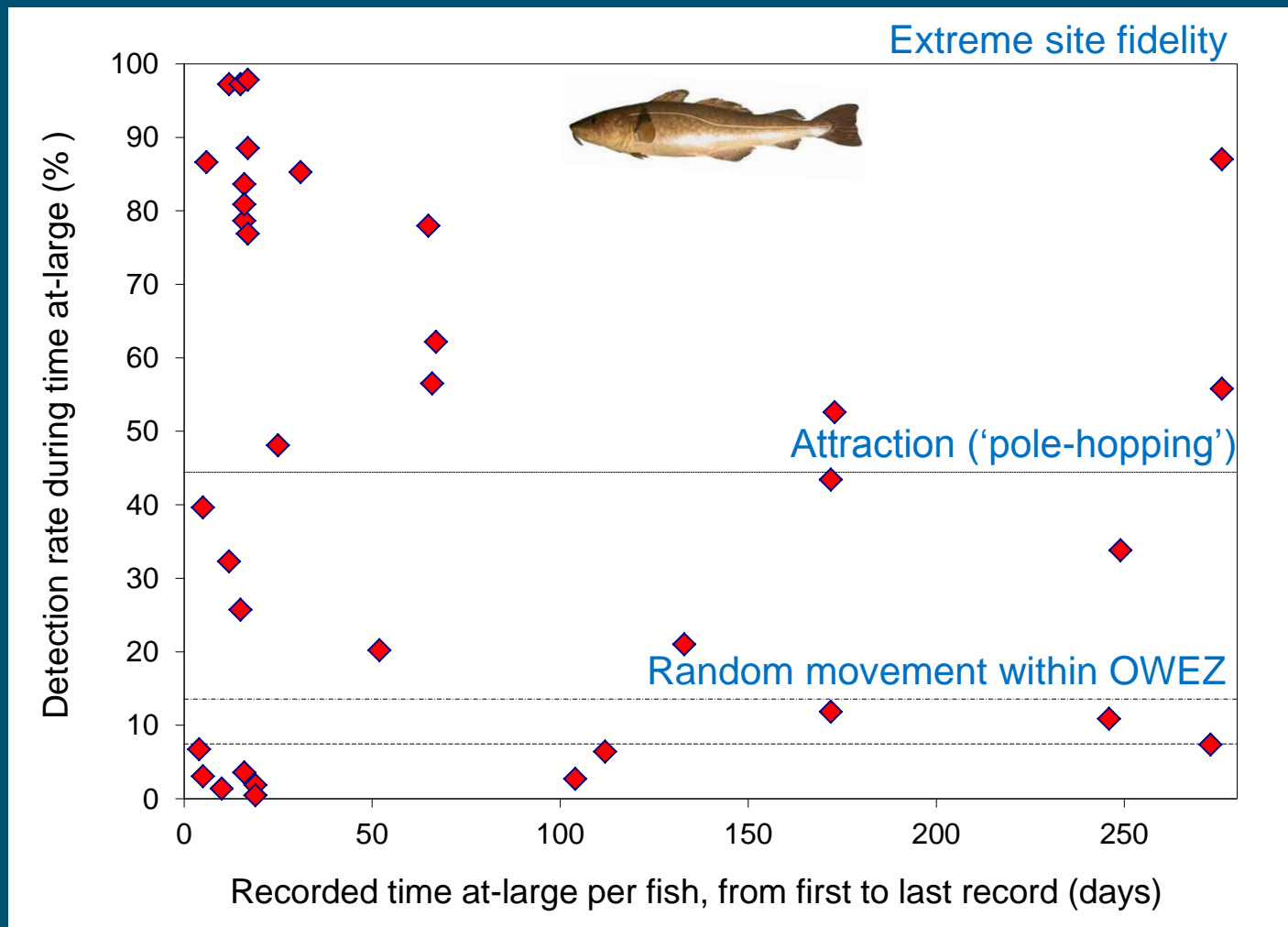
Cod ID number, release site (symbol)



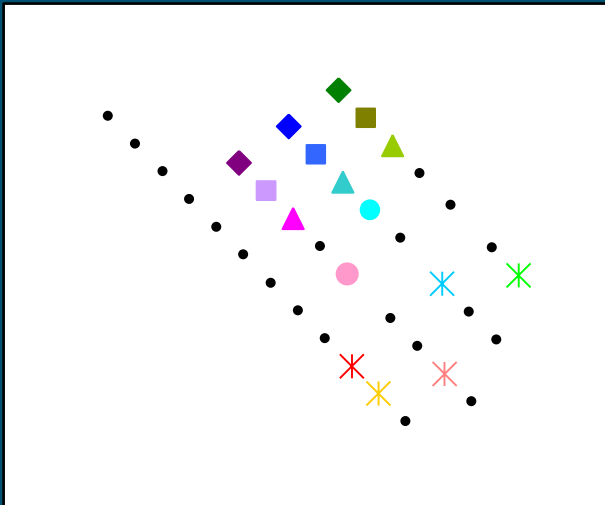
Cod using wind farm as habitat



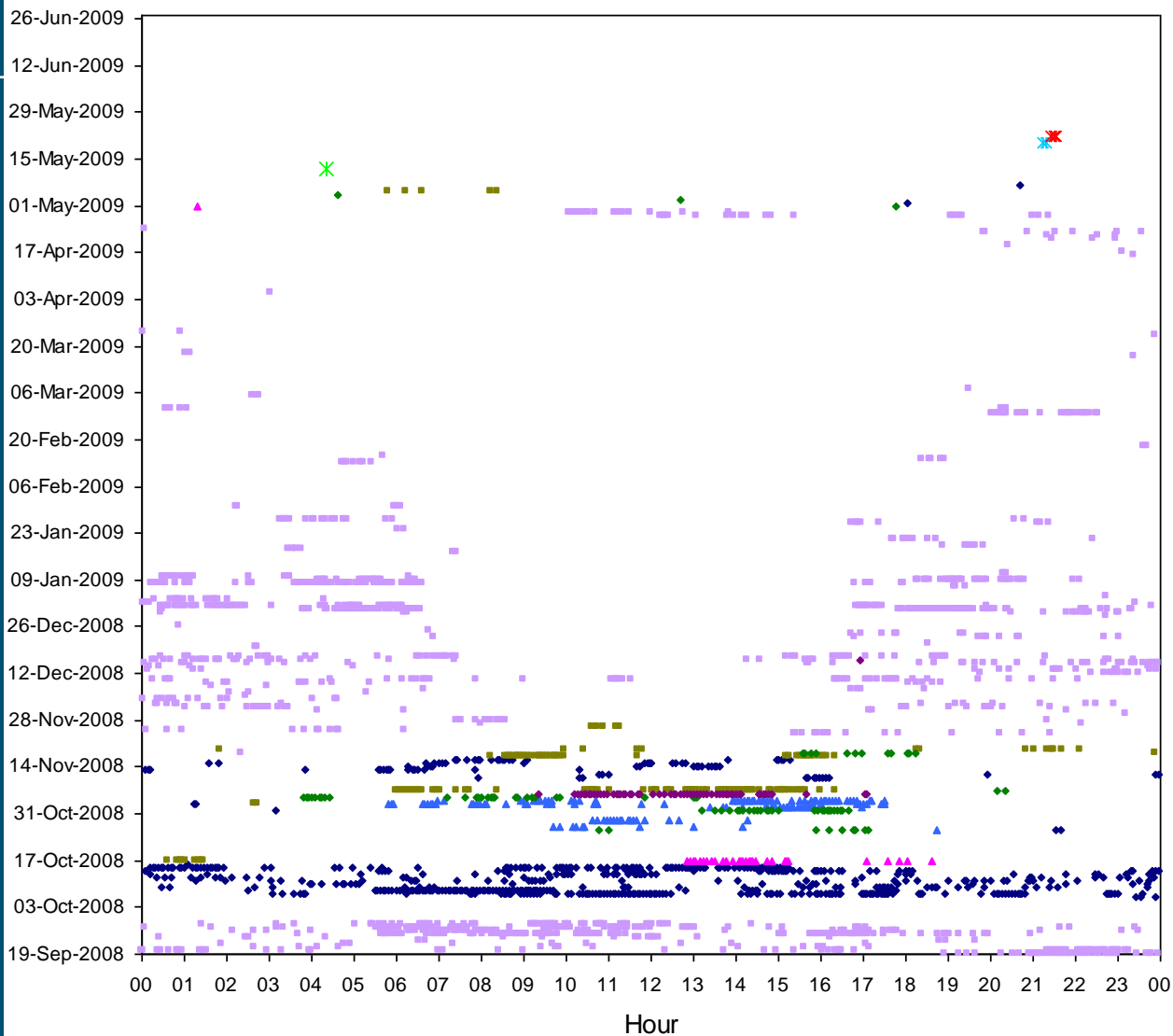
Cod using wind farm as habitat



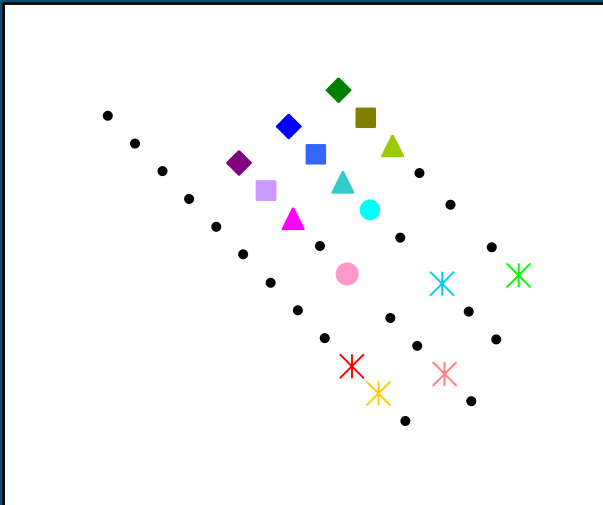
Individual diurnal patterns



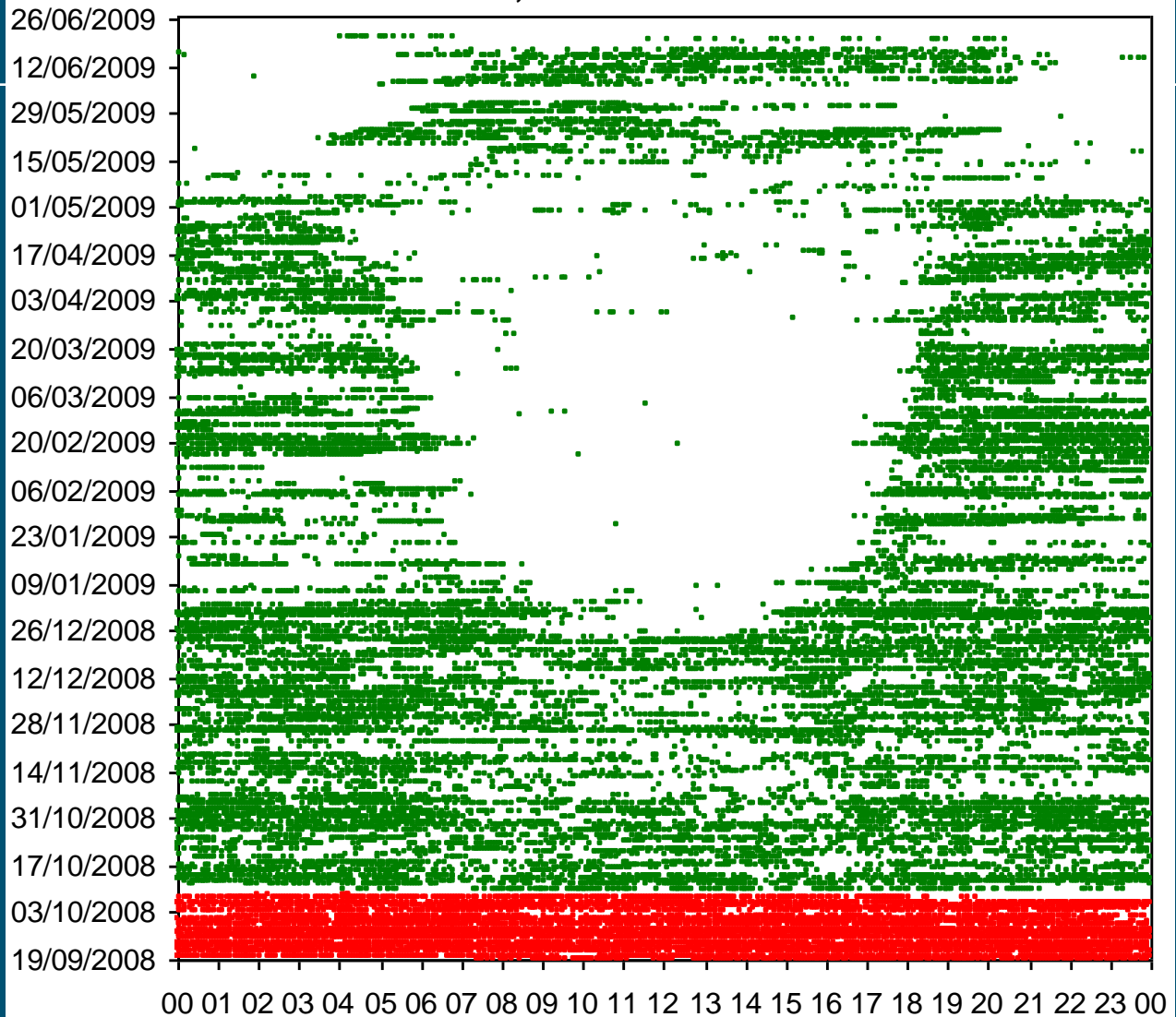
Cod 51312, 38 cm: WT20, 29, 28, 19, 36, 35, 21, 30, 24, 3



Individual diurnal patterns

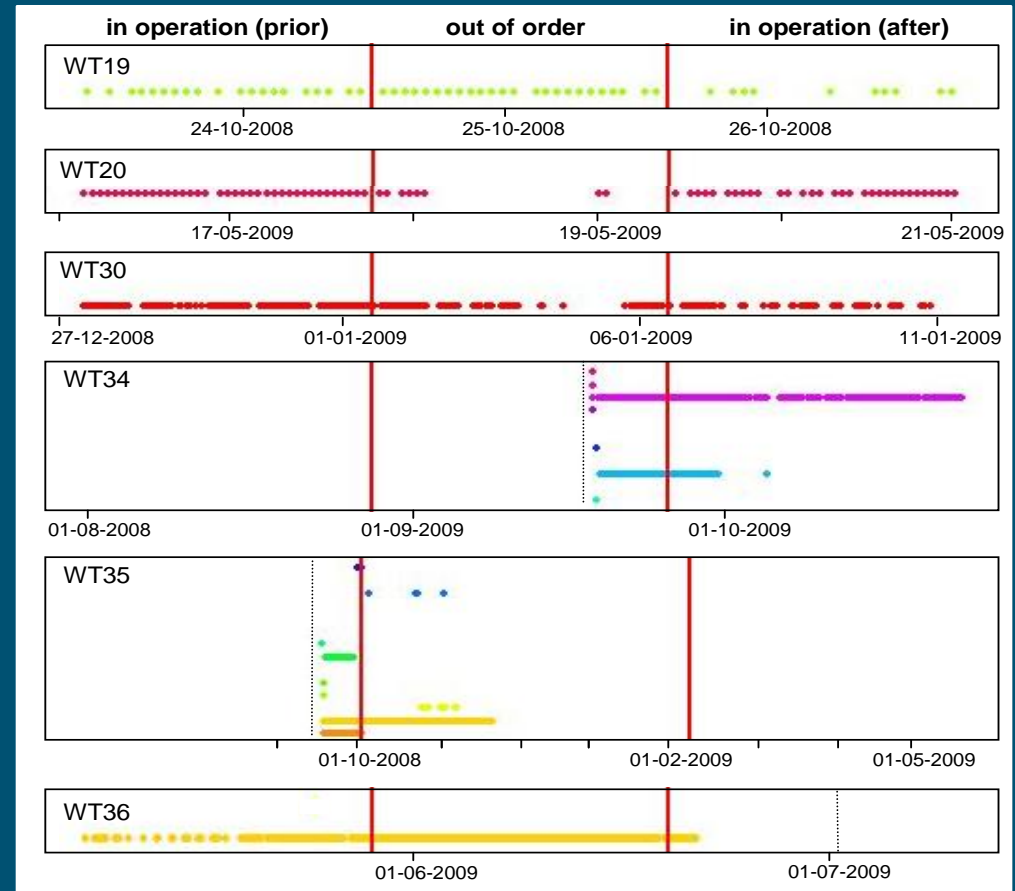


Cod 51302, 34 cm: WT14-WT30



Preference for monopiles that are out of order?

Explorative analysis on cod telemetry dataset yields no indications for this occurring (no significant difference in monopile use)



Conclusions



- Sole appeared indifferent to wind farm
 - Individual movement patterns → larger scale than OWEZ
- Cod → high individual variation in wind farm use
 - Part of the cod showed strong attraction/site fidelity
 - Seasonal changes in habitat use (shelter/feeding?)
 - No preference for monopiles that were out of operation
- For cod, OWEZ might have a beneficiary effect

Acknowledgements ...

... and thank you for your attention!

- The Off Shore wind Farm Egmond aan Zee has a subsidy of the Ministry of Economic Affairs under the CO2 Reduction Scheme of the Netherlands.



End

© Wageningen UR

