

# Cod and sole behaviour in an offshore wind farm

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# 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*)

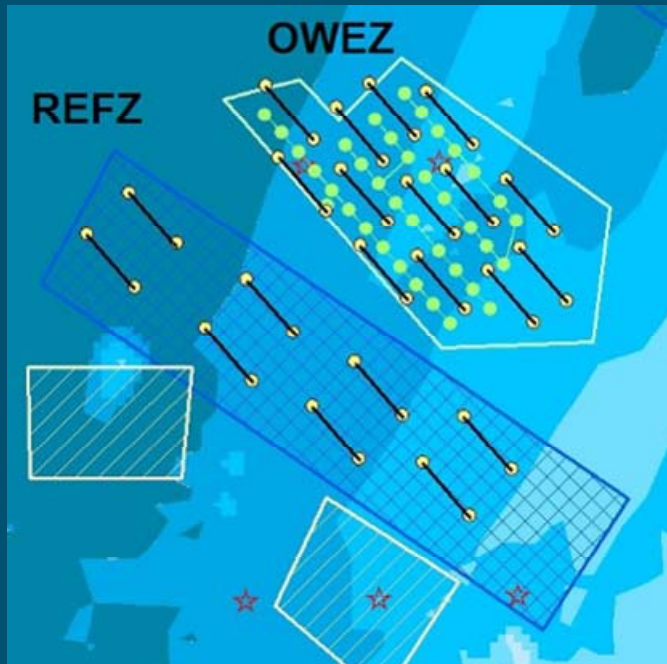


Atlantic cod (*Gadus morhua*)



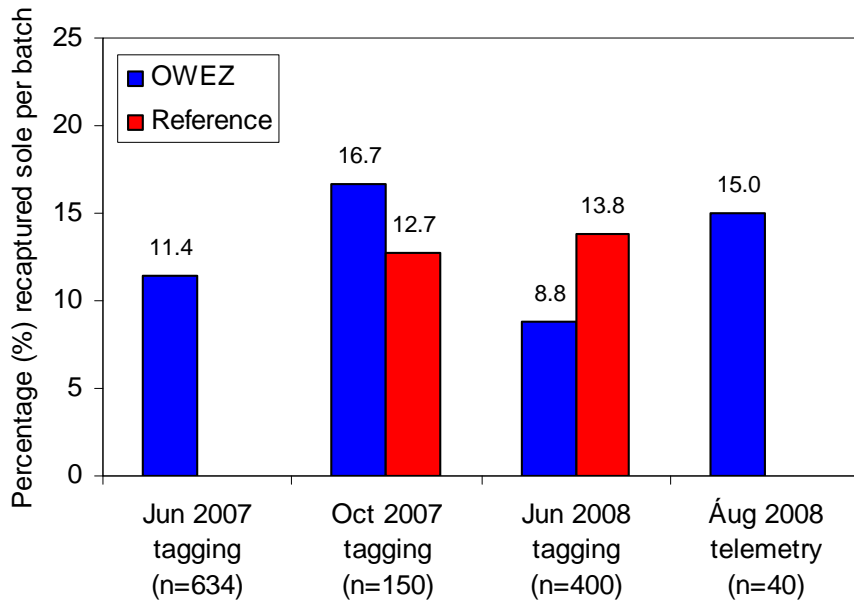
# Mark-recapture experiment sole

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

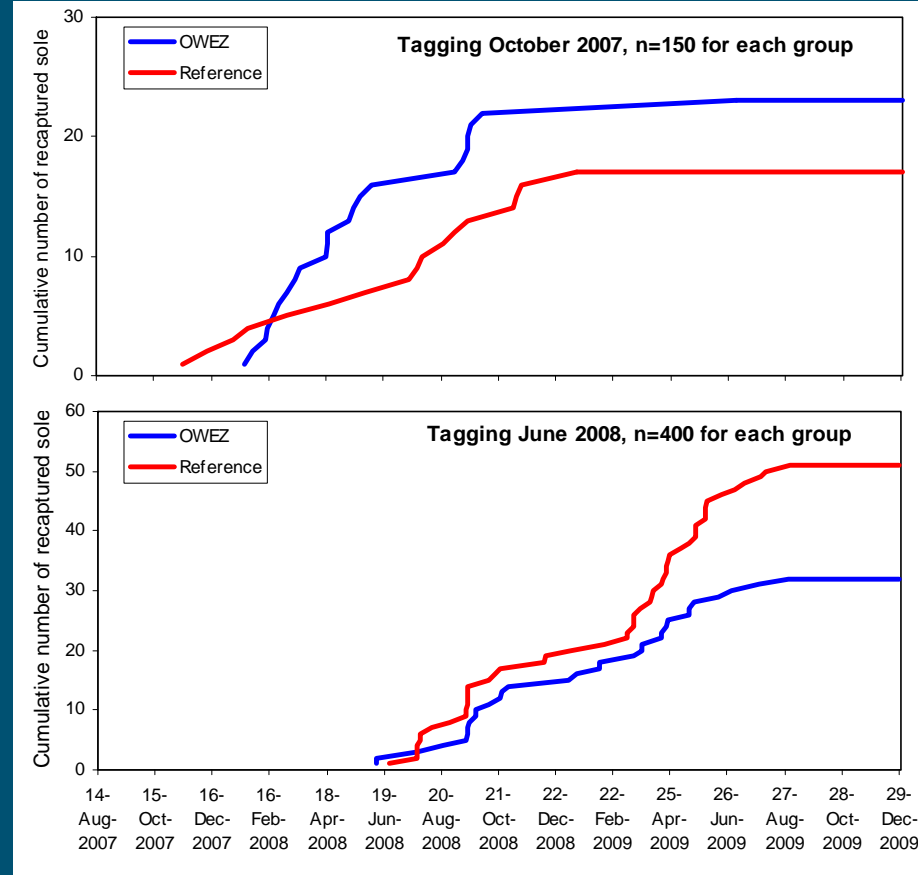
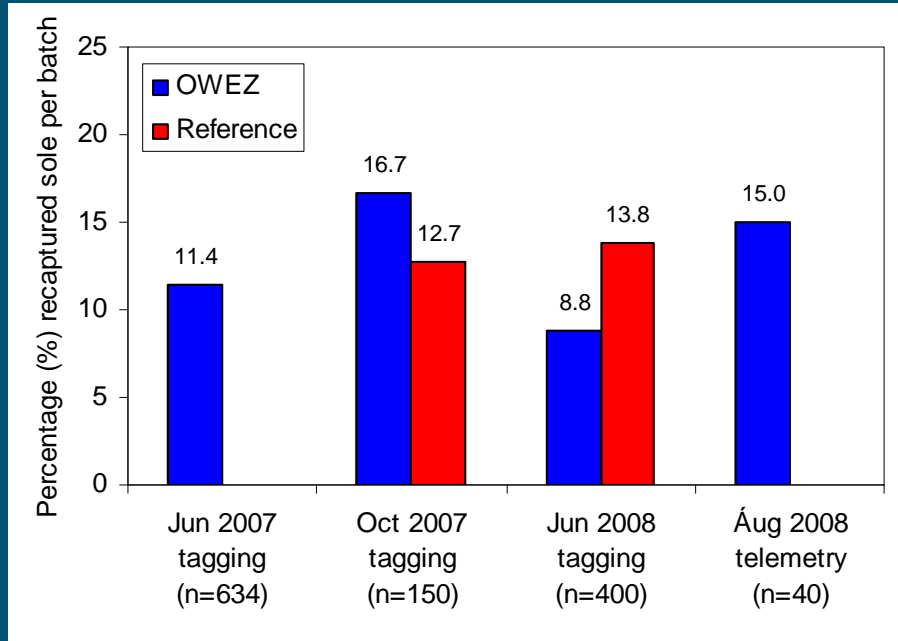
# Mark-recapture experiment sole



## Both batches combined

recaptured	60	74	134	Observed G=	1.67
not recaptured	490	476	966	William's correction=	1.00
<b>totals</b>	<b>550</b>	<b>550</b>	<b>1100</b>	p-value=	0.20

# Mark-recapture experiment sole

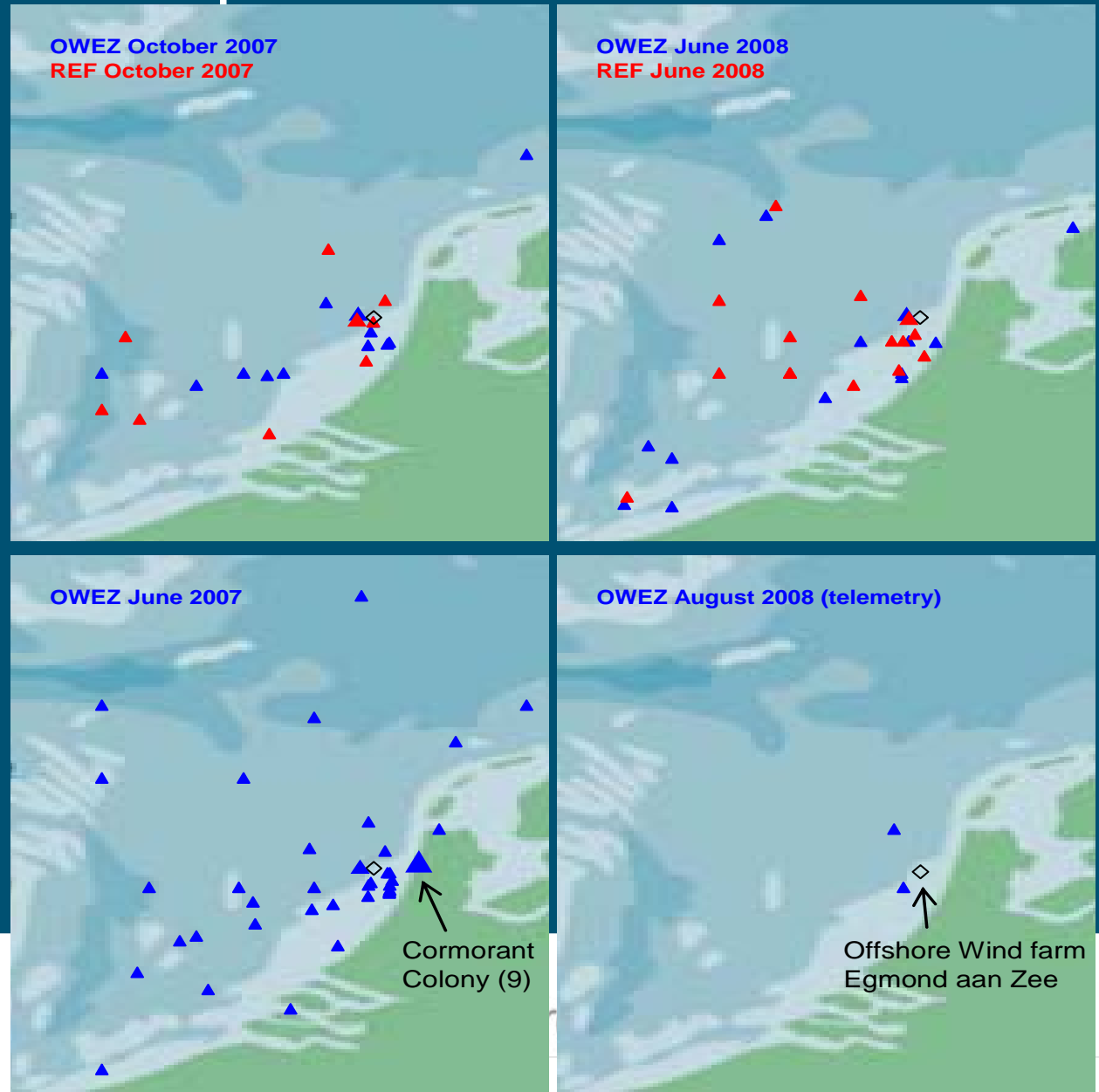


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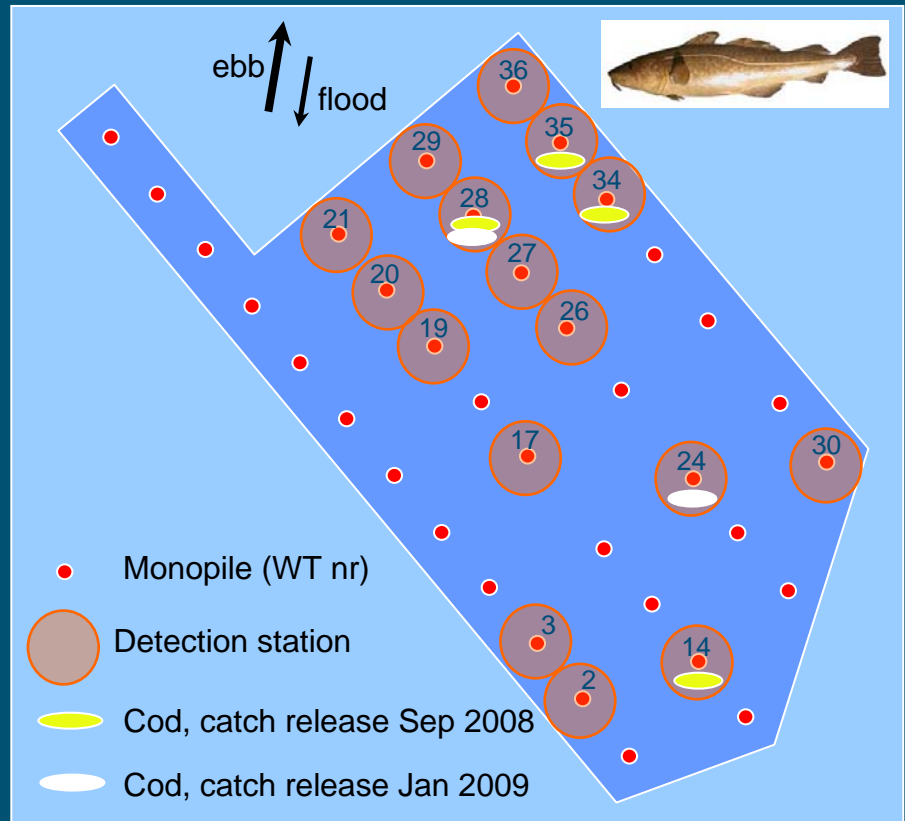
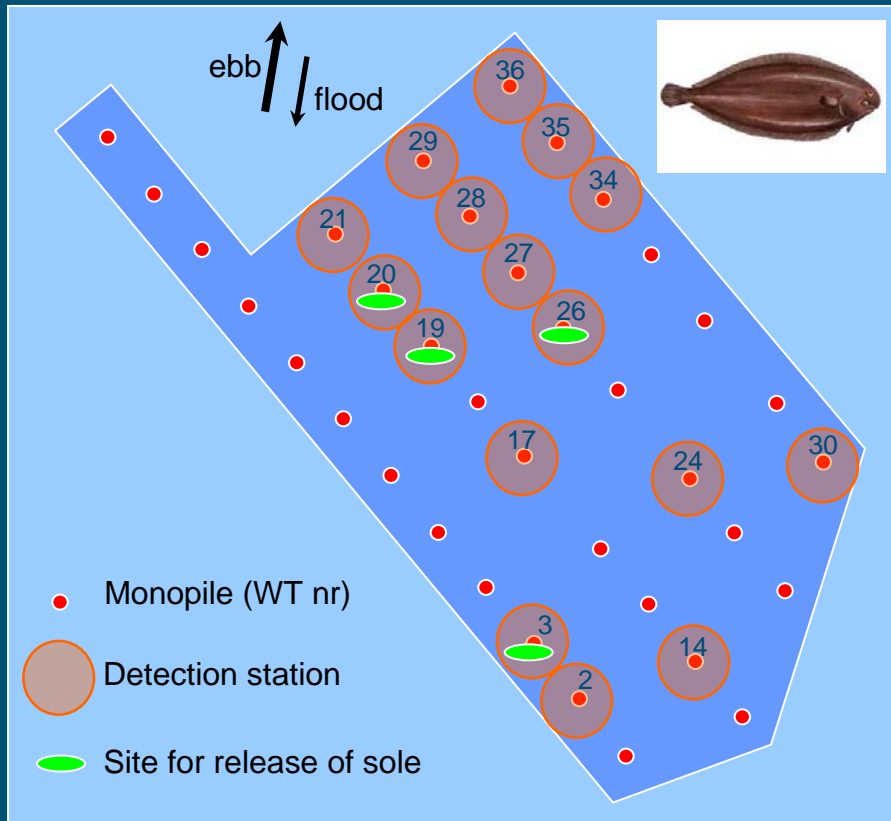
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# Mark-recapture experiment sole

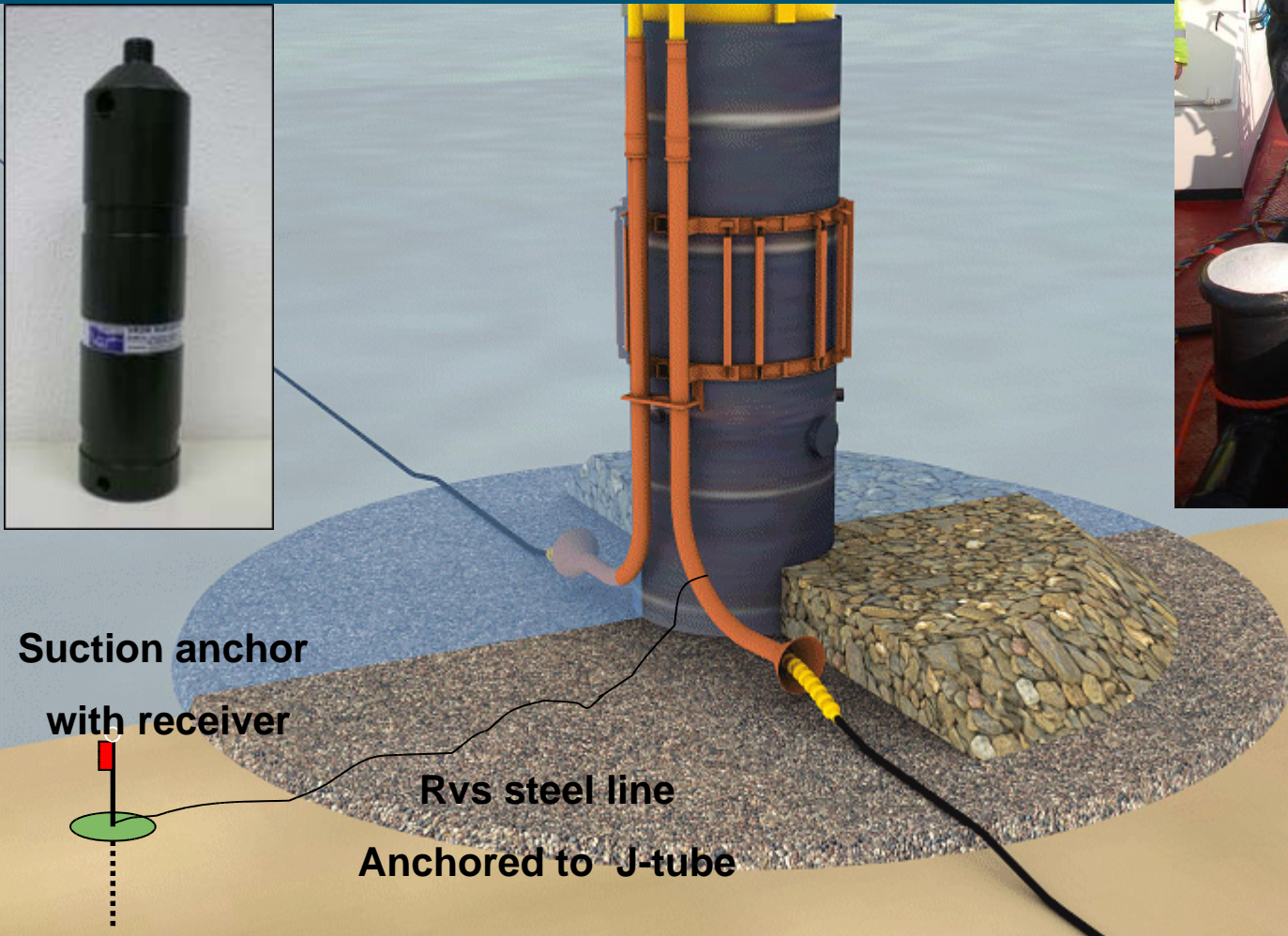


# Telemetric experimental set-up

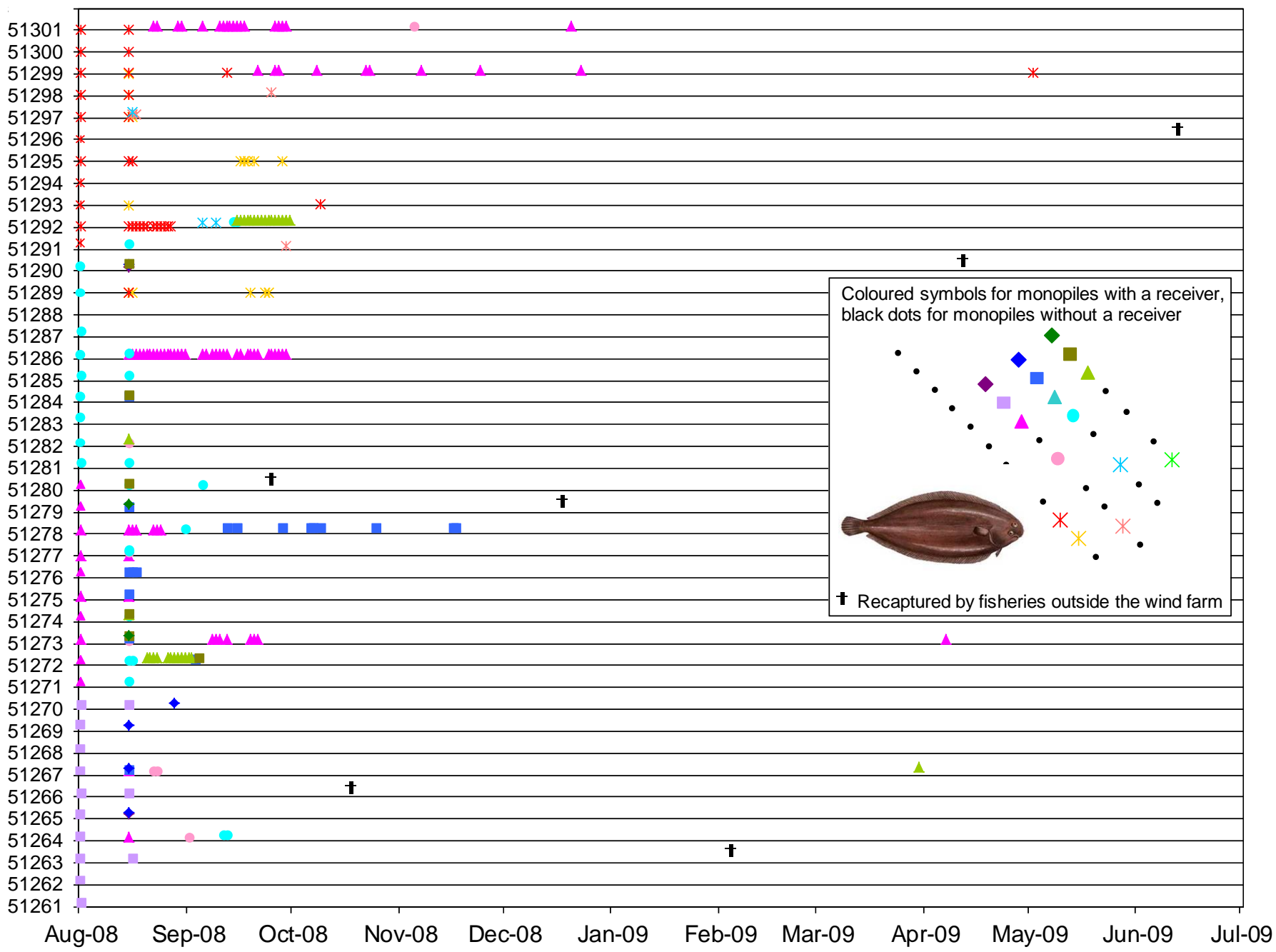




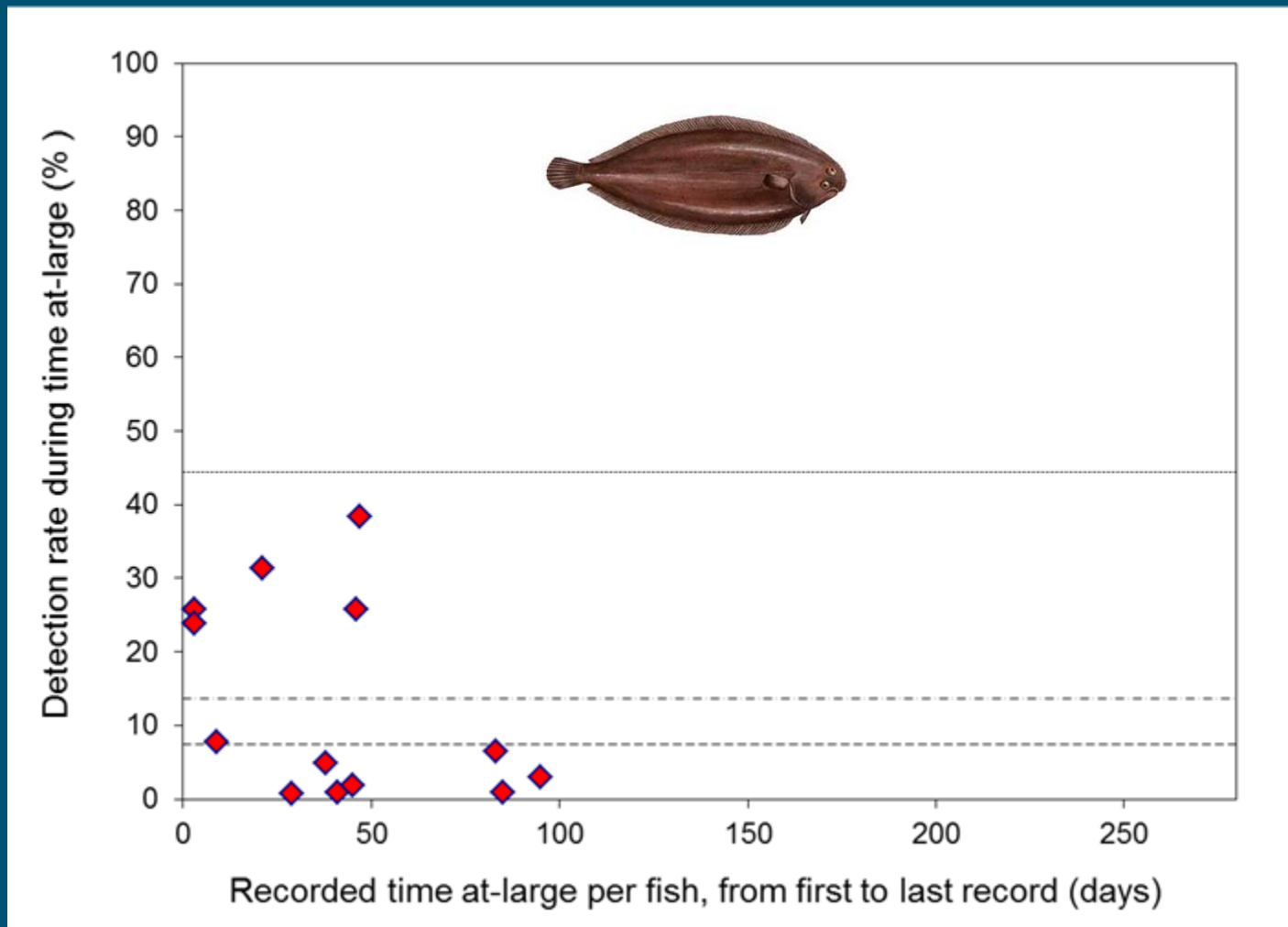
# Building the receiver network



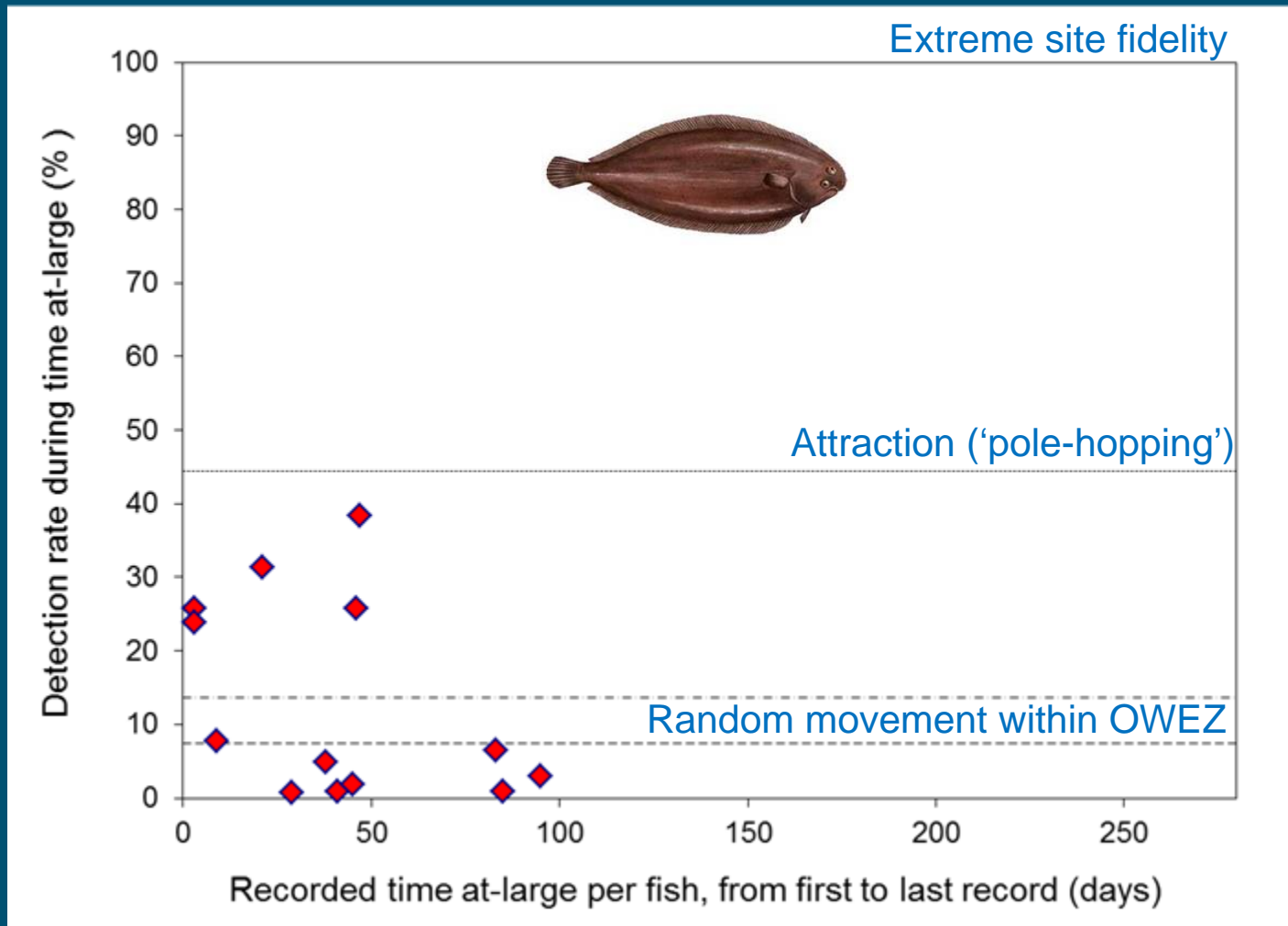
Sole ID number, release site (symbol)



# Sole using wind farm as habitat

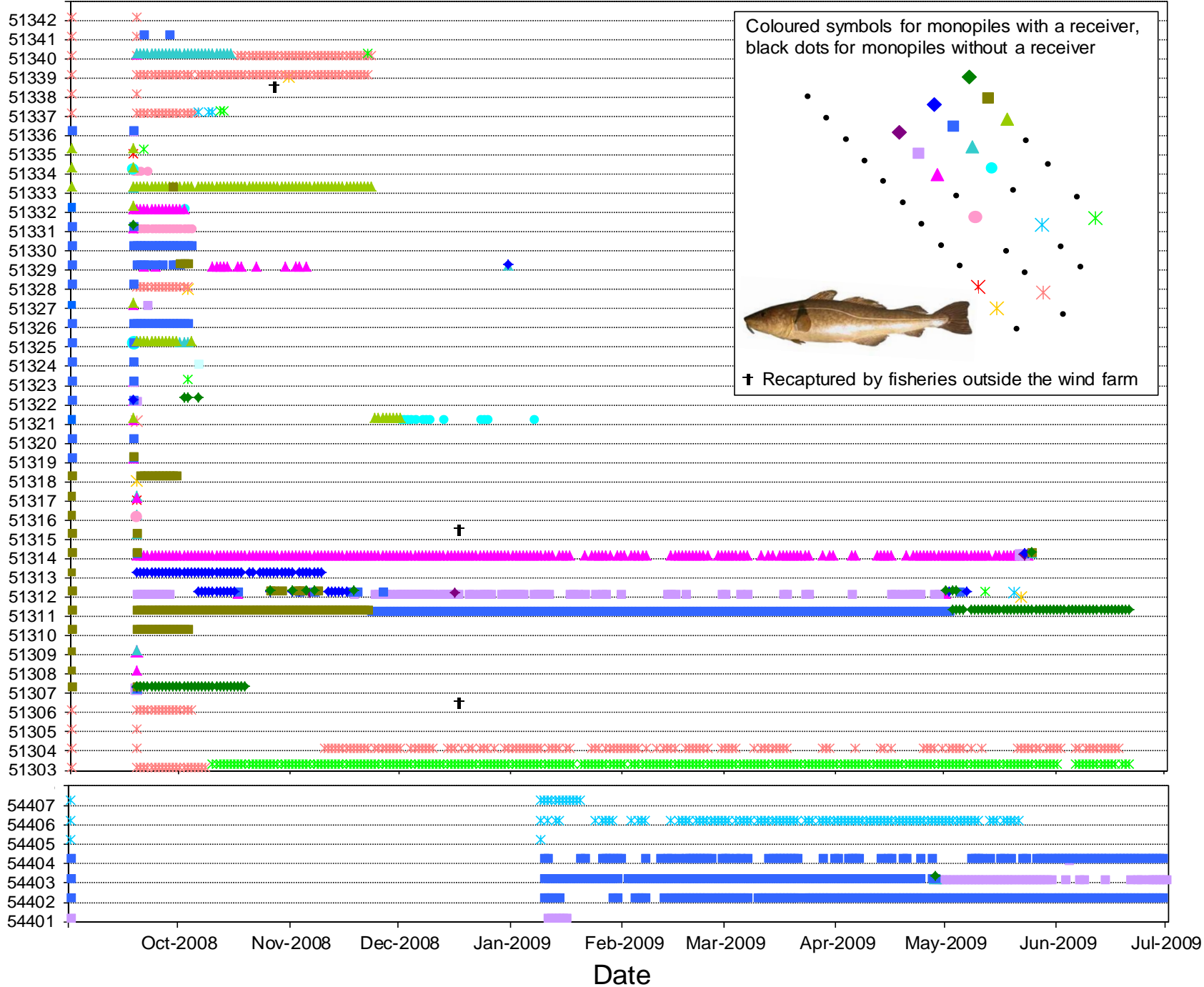


# Sole using wind farm as habitat

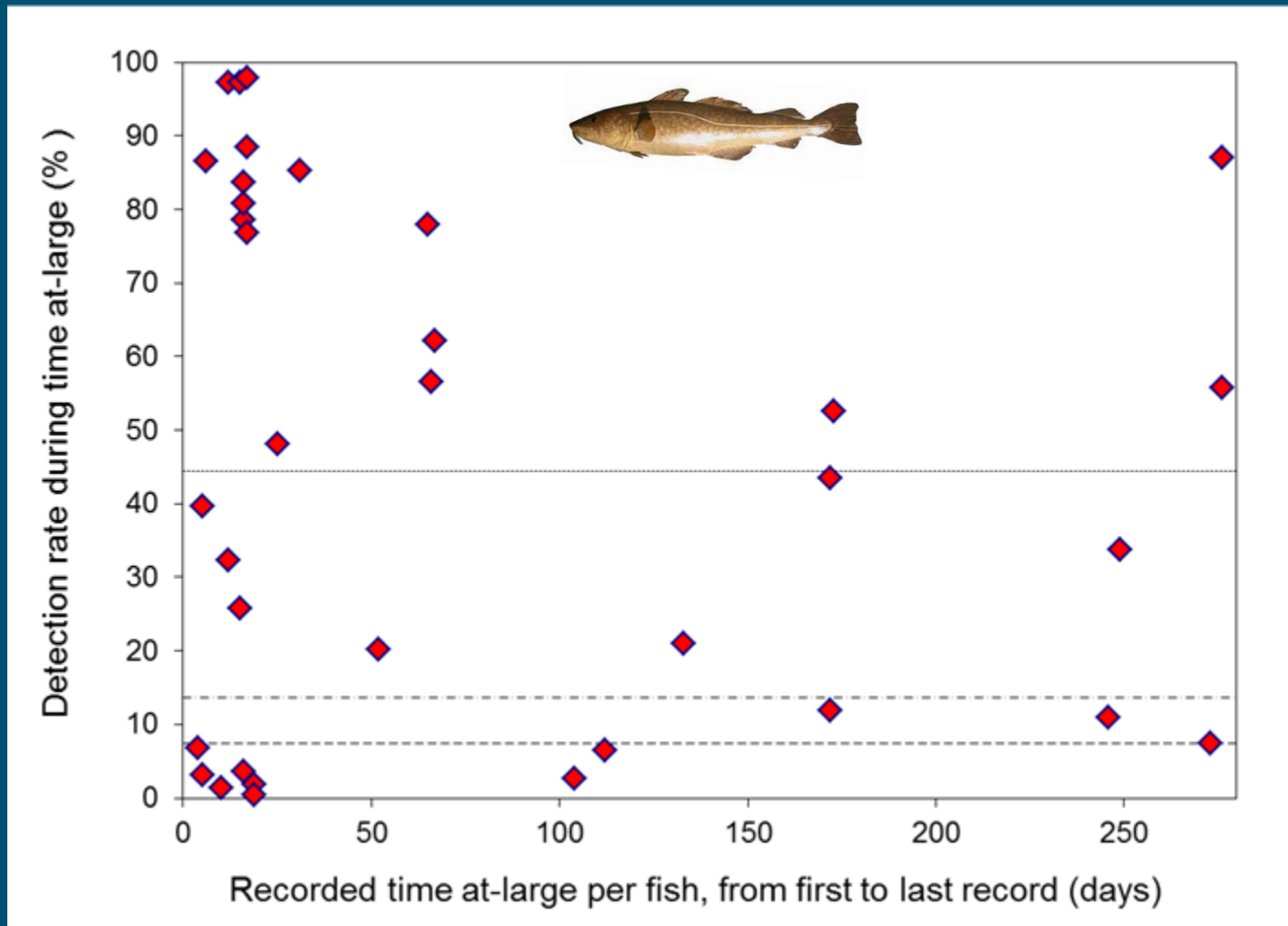




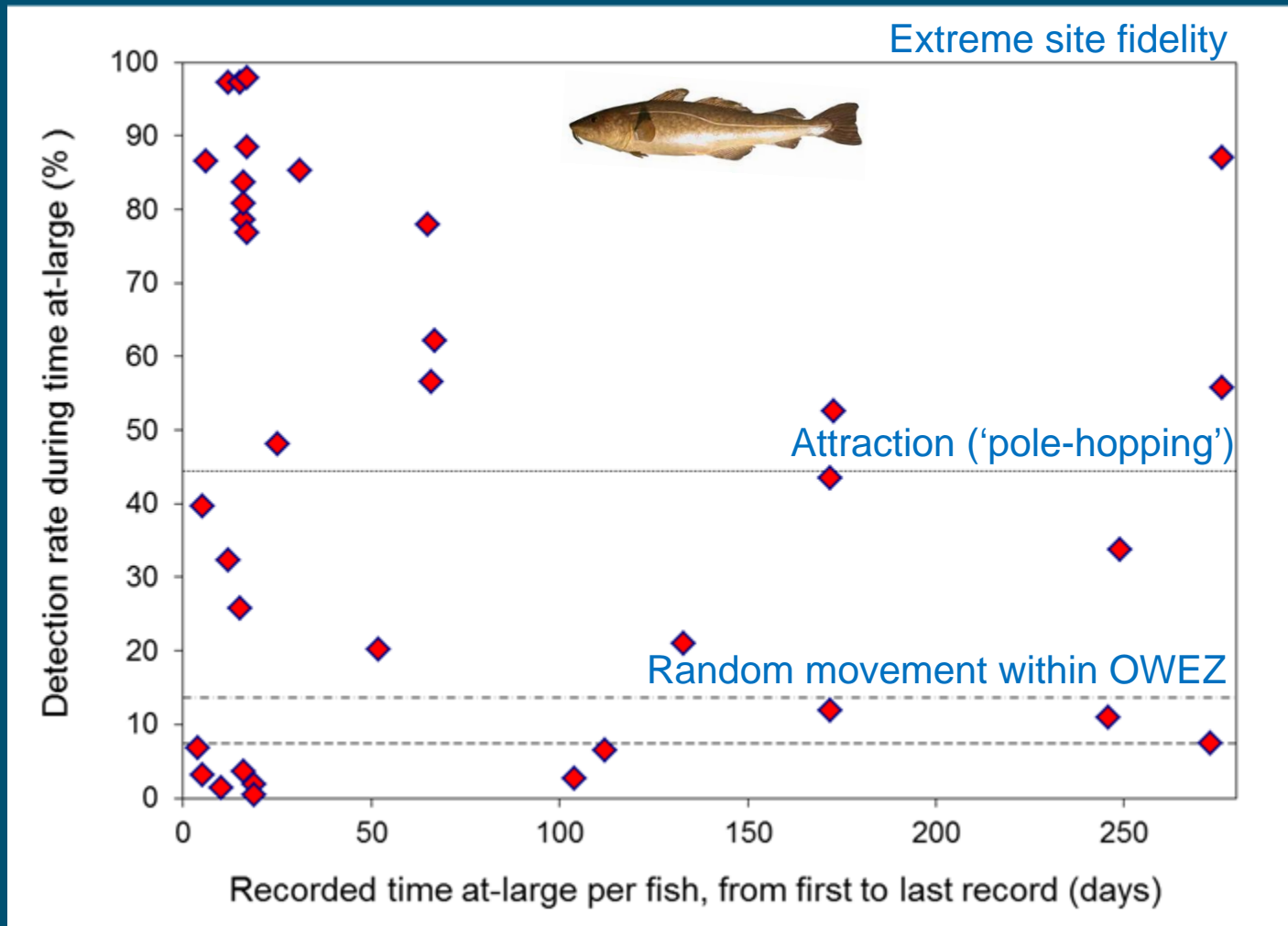
Cod ID number, release site (symbol)



# Cod using wind farm as habitat



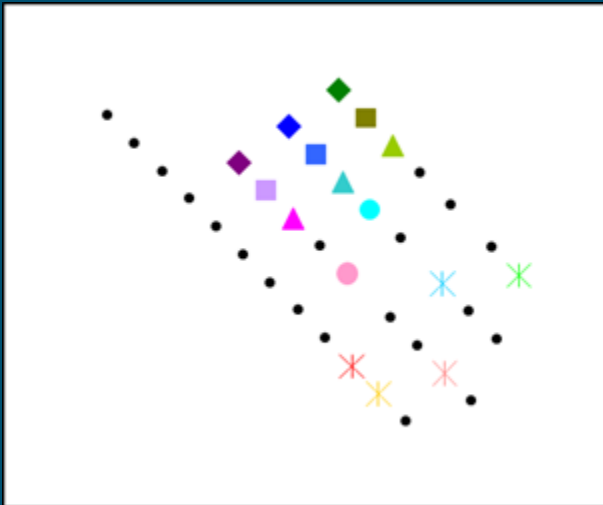
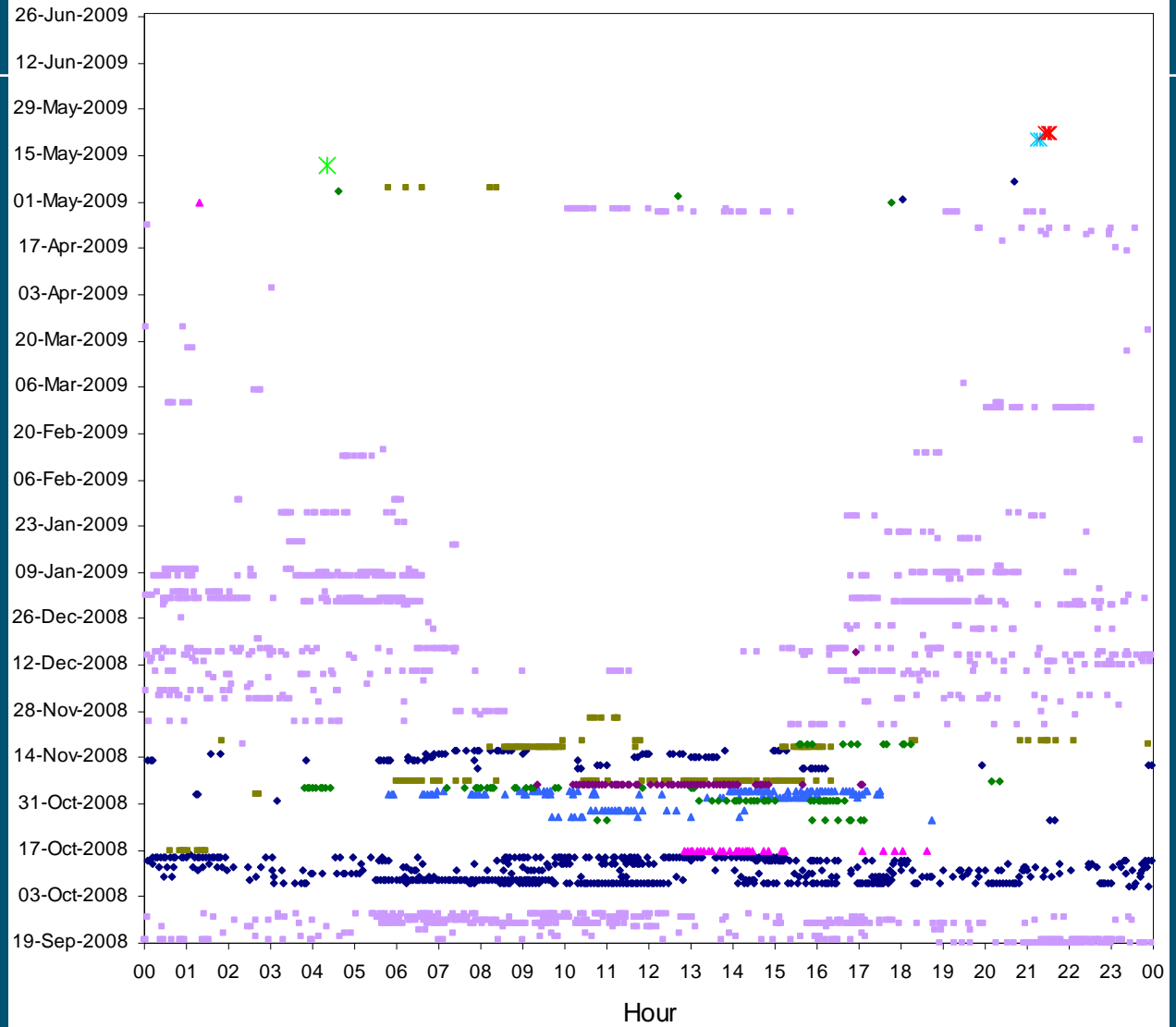
# Cod using wind farm as habitat



# Individual diurnal patterns

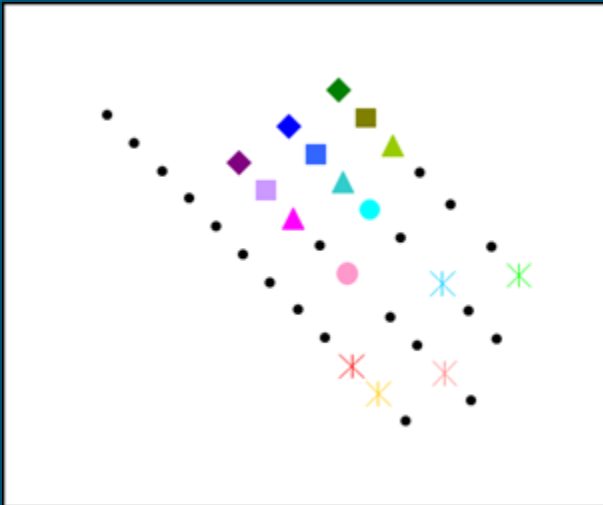


Cod 51312, 38 cm: WT20, 29, 28, 19, 36, 35, 21, 30, 24, 3

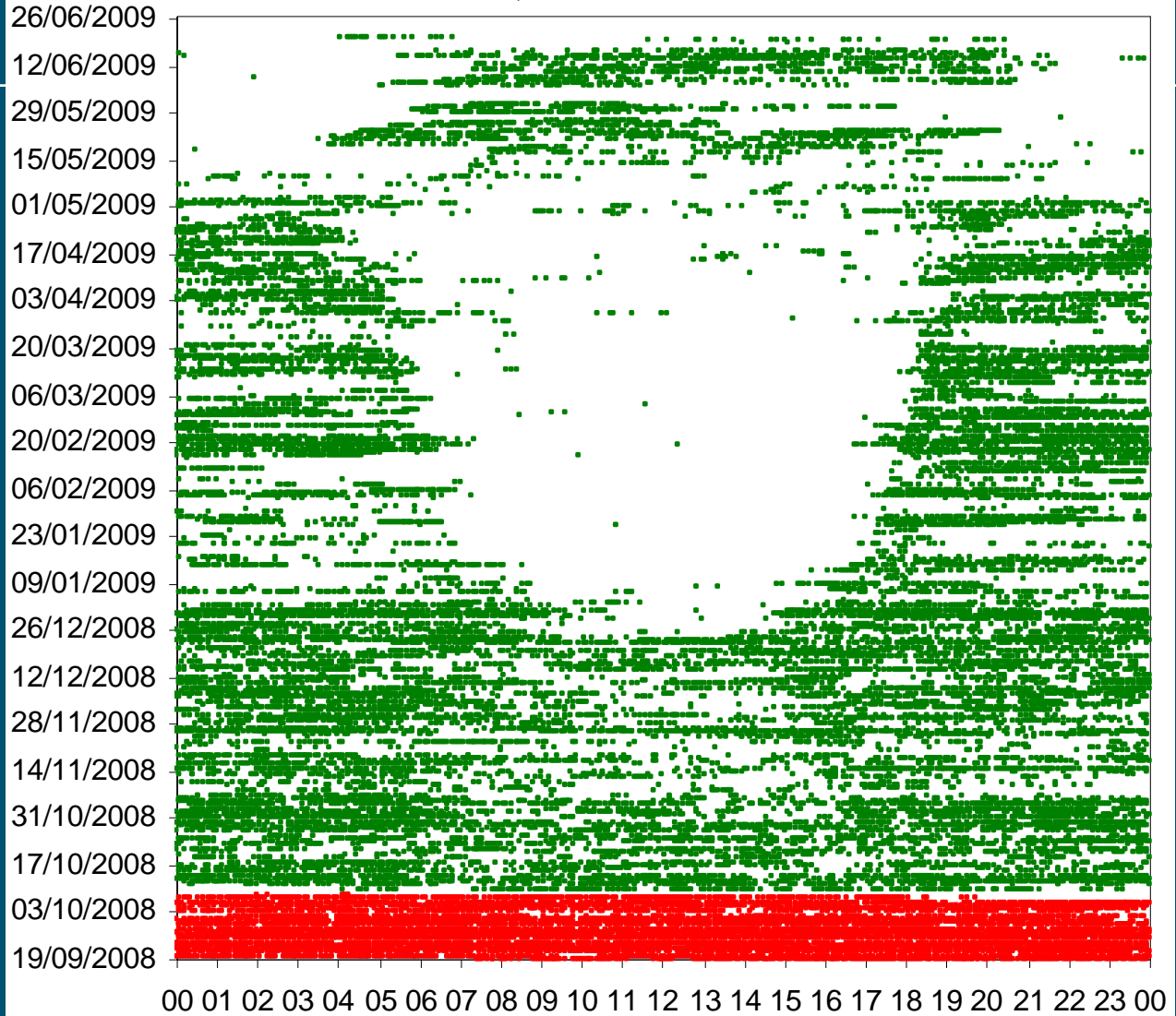




# Individual diurnal patterns



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

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