Cod and sole behaviour in an offshore wind farm

Erwin Winter, Geert Aarts, Olvin van Keeken

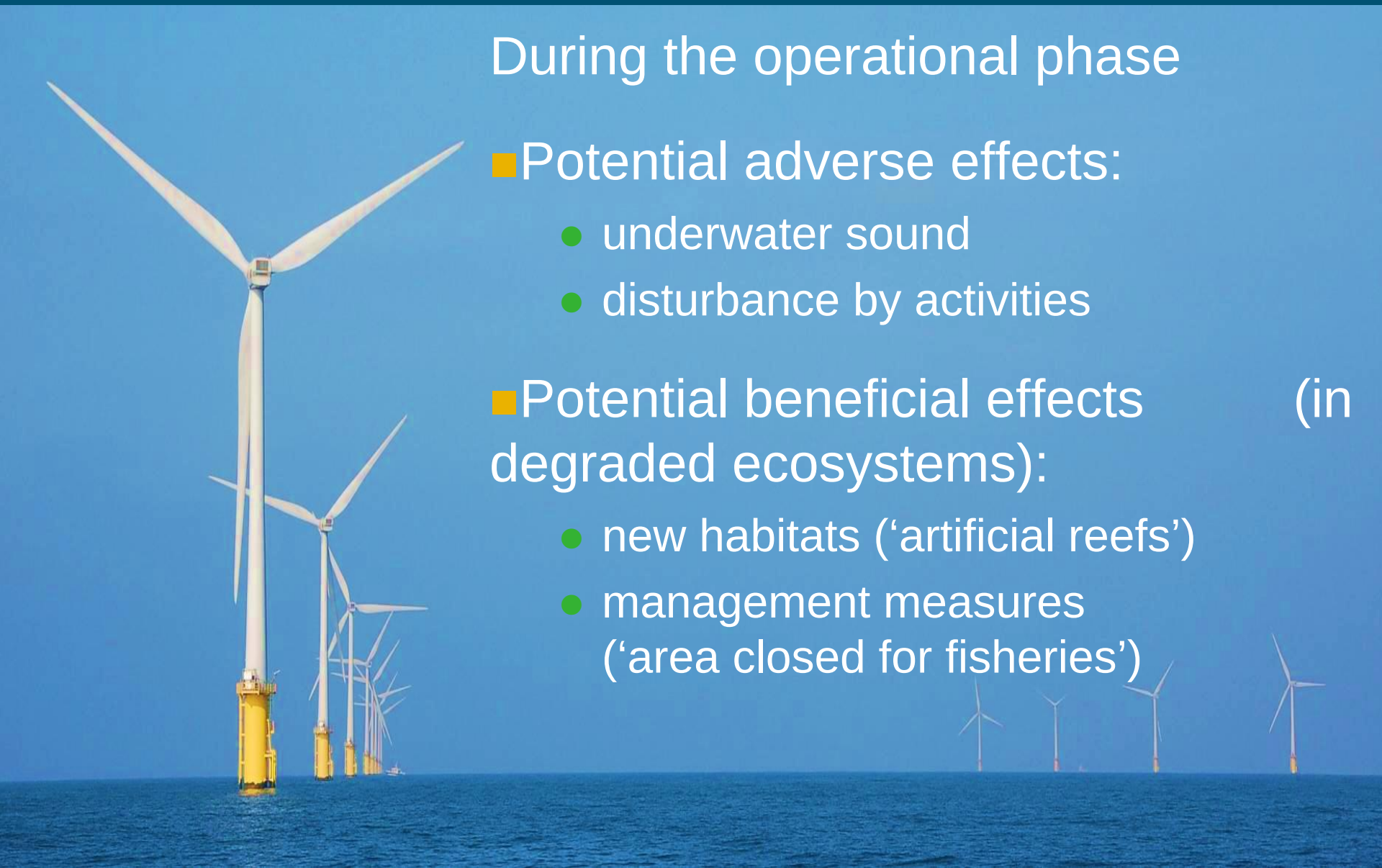
IMARES, Wageningen UR, the Netherlands

IMARES WAGENINGEN UR

NoordzeeWind

NUON Part of VATTENFALL

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’)

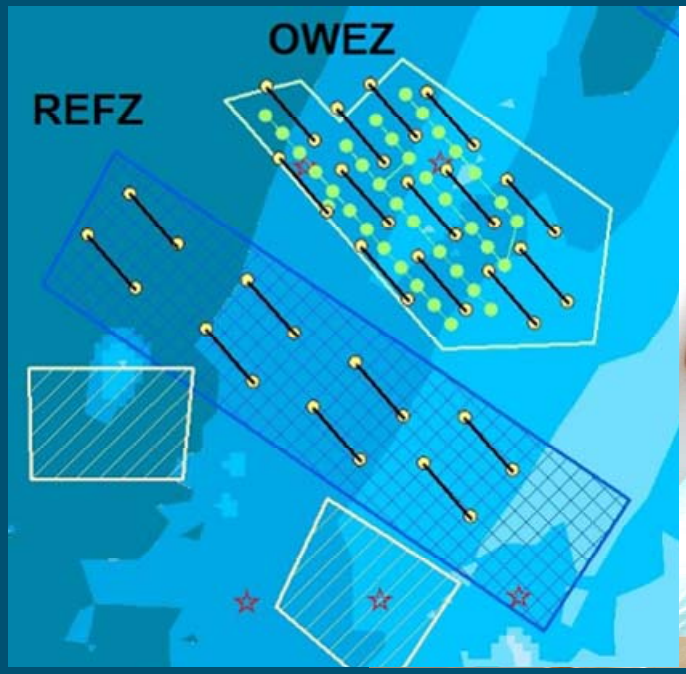
Fish species selected for this study

Sole (*Solea vulgaris*)

Atlantic cod (*Gadus morhua*)

Mark-recapture experiment sole

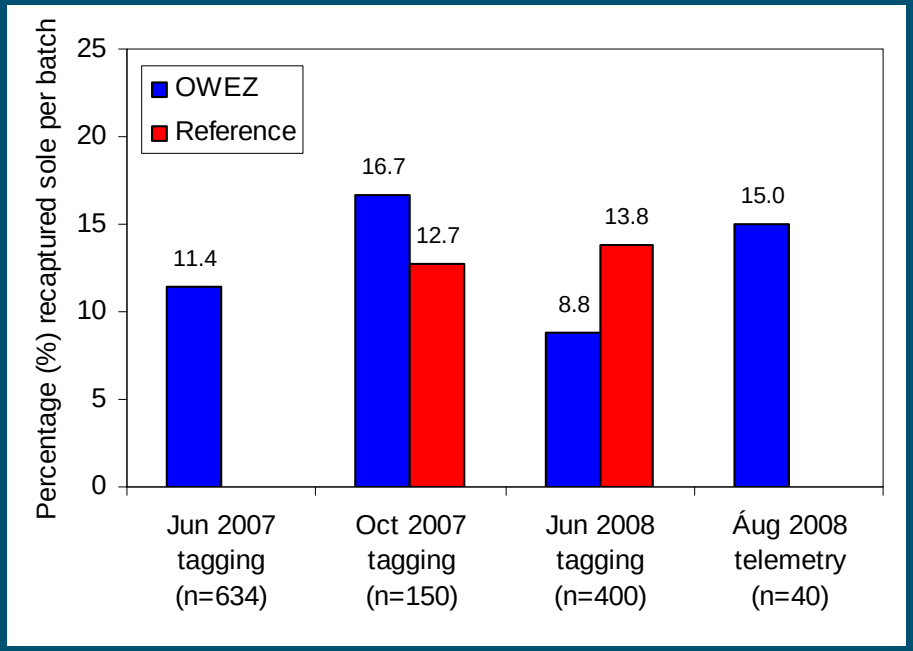
If residence time of sole in wind farm is high then tag rate return from fisheries will be lower for OWEZ than REFZ groups



Oktober 2007: REFZ 150, OWEZ 150 sole tagged

June 2008: REFZ 400, OWEZ 400 sole tagged

Mark-recapture experiment sole



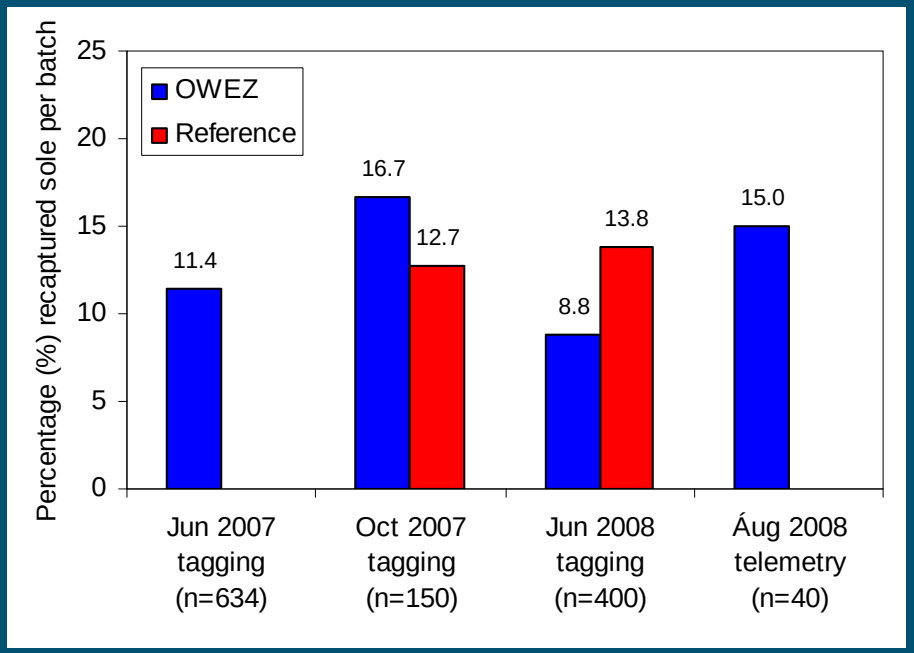
Both batches combined					
recaptured	60	74	*134*	Observed G=	1.67
not recaptured	490	476	*966*	William's correction=	1.00
totals	*550*	*550*	*1100*	p-value=	0.20

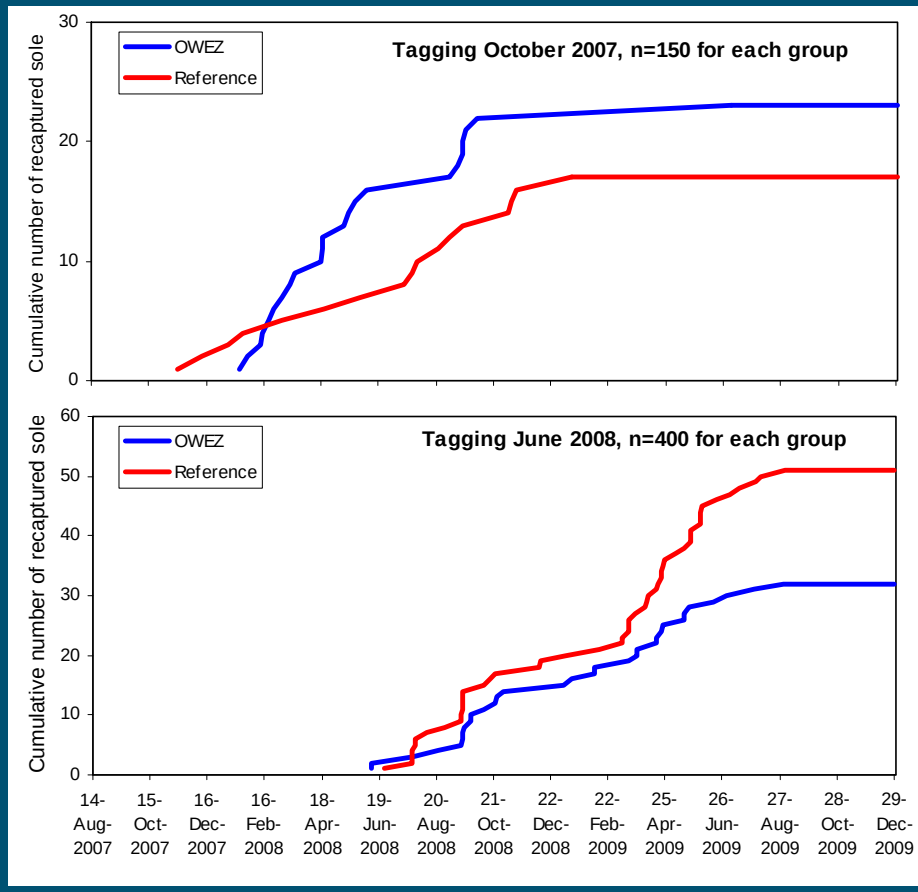
IMARES WAGENINGEN UR

NoordzeeWind

NUON Part of VATTENFALL

Mark-recapture experiment sole





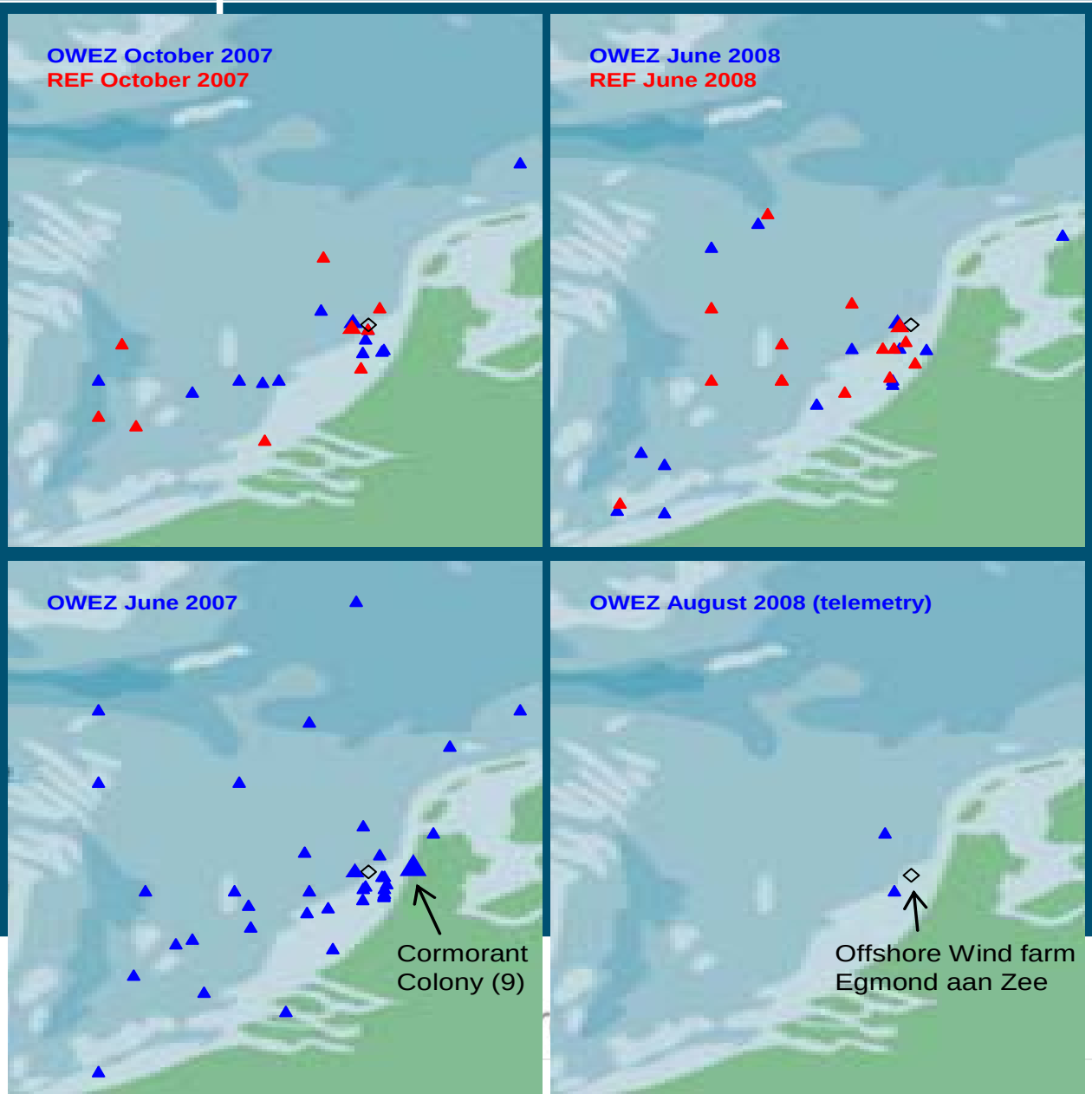
Both batches combined					
recaptured	60	74	*134*	Observed G=	1.67
not recaptured	490	476	*966*	William's correction=	1.00
totals	*550*	*550*	*1100*	p-value=	0.20

IMARES WAGENINGEN UR

NoordzeeWind

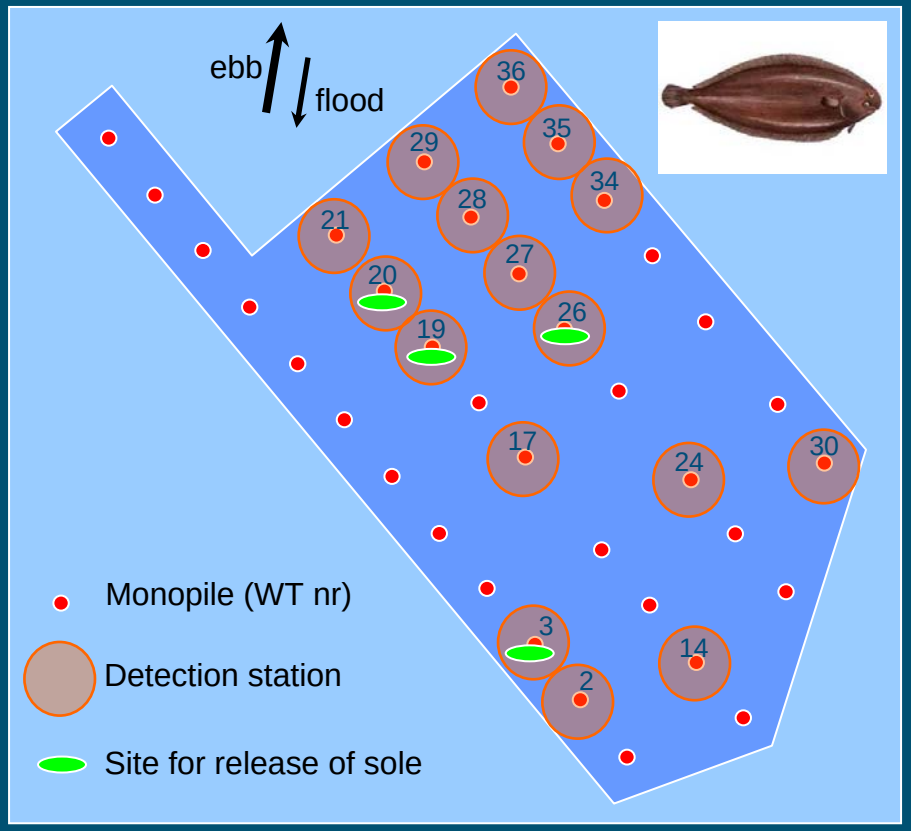
NUON Part of VATTENFALL

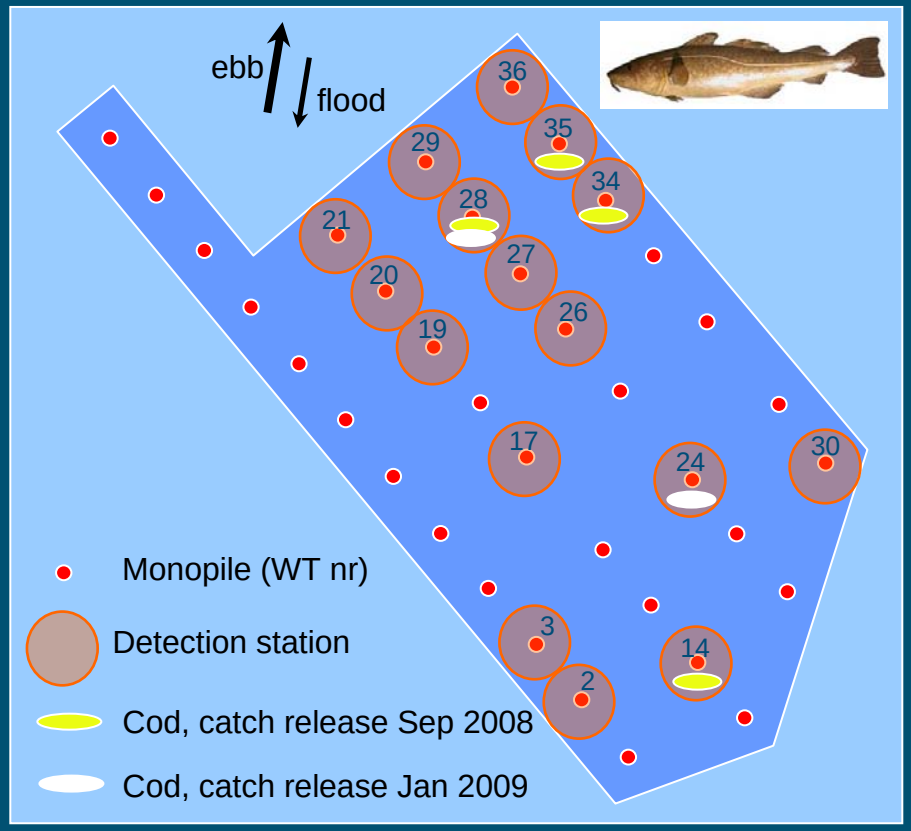
Mark-recapture experiment sole



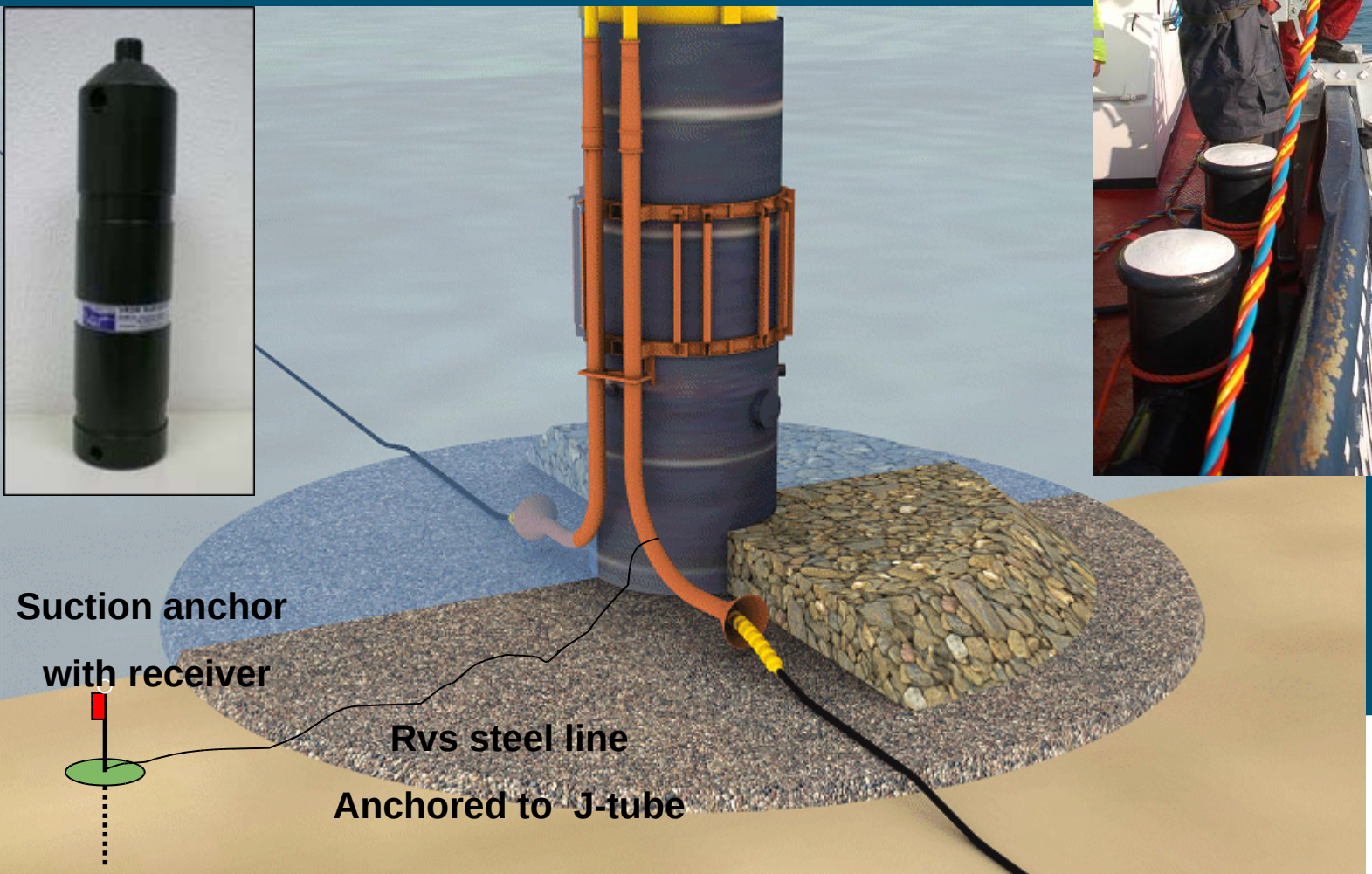
IMARES
WAGENINGEN UR

Telemetric experimental set-up

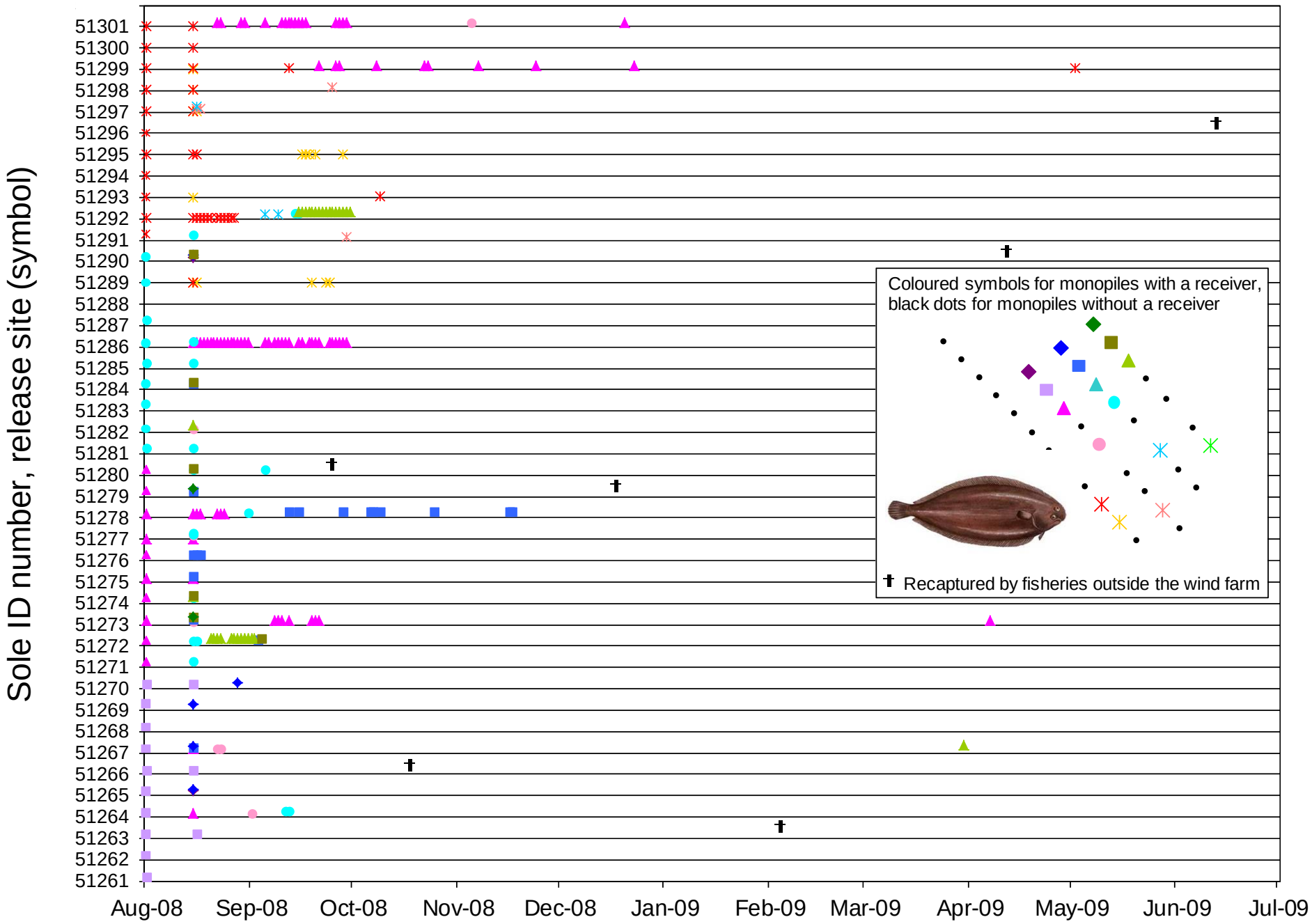




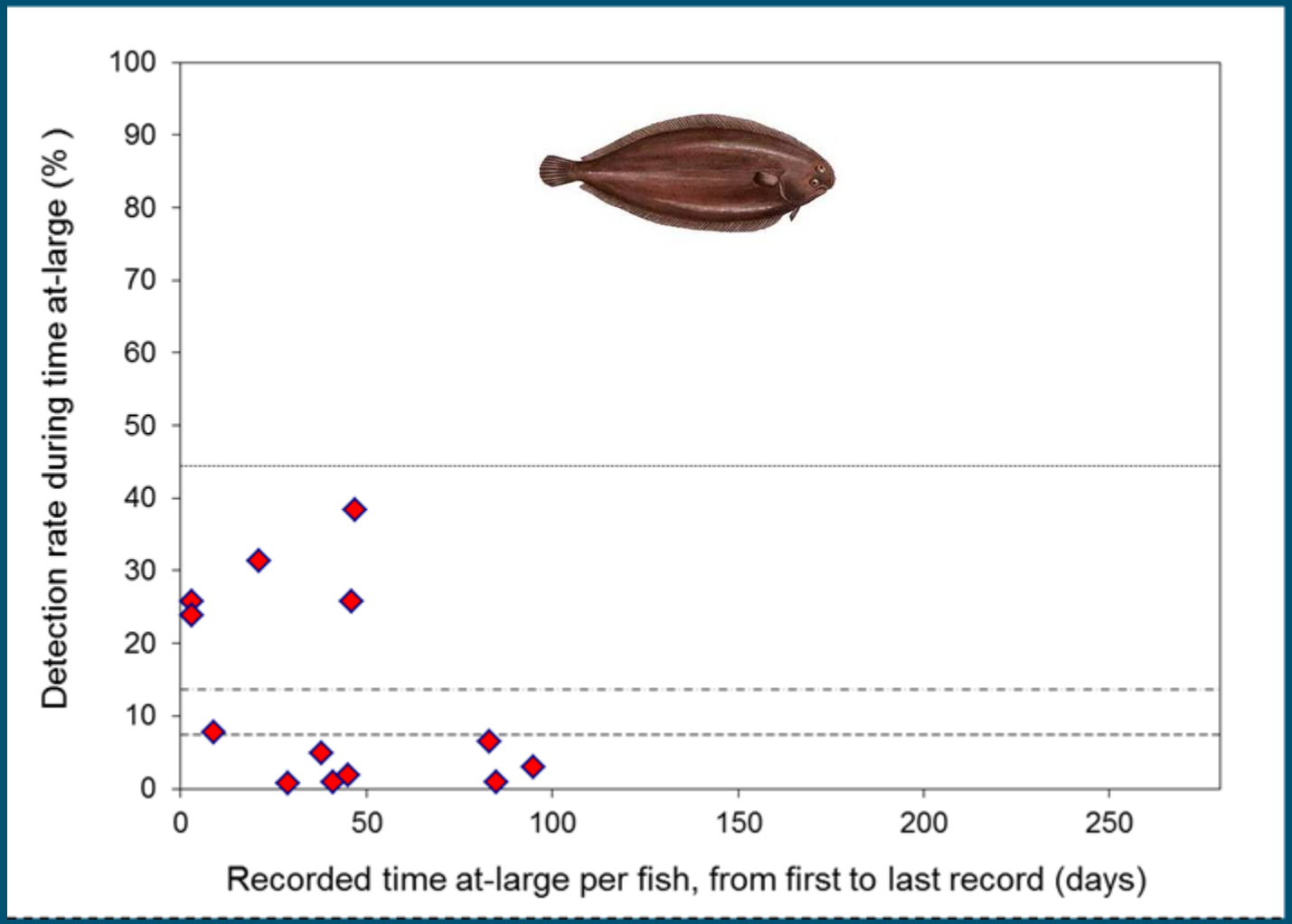
Building the receiver network



NUON
Part of
VATTENFALL


Sole ID number, release site (symbol)
51301
51300
51299
51298
51297
51296
51295
51294
51293
51292
51291
51290
51289
51288
51287
51286
51285
51284
51283
51282
51281
51280
51279
51278
51277
51276
51275
51274
51273
51272
51271
51270
51269
51268
51267
51266
51265
51264
51263
51262
51261
Aug-08
Sep-08
Oct-08
Nov-08
Dec-08
Jan-09
Feb-09
Mar-09
Apr-09
May-09
Jun-09
Jul-09
Coloured symbols for monopiles with a receiver, black dots for monopiles without a receiver
Recaptured by fisheries outside the wind farm

Sole using wind farm as habitat

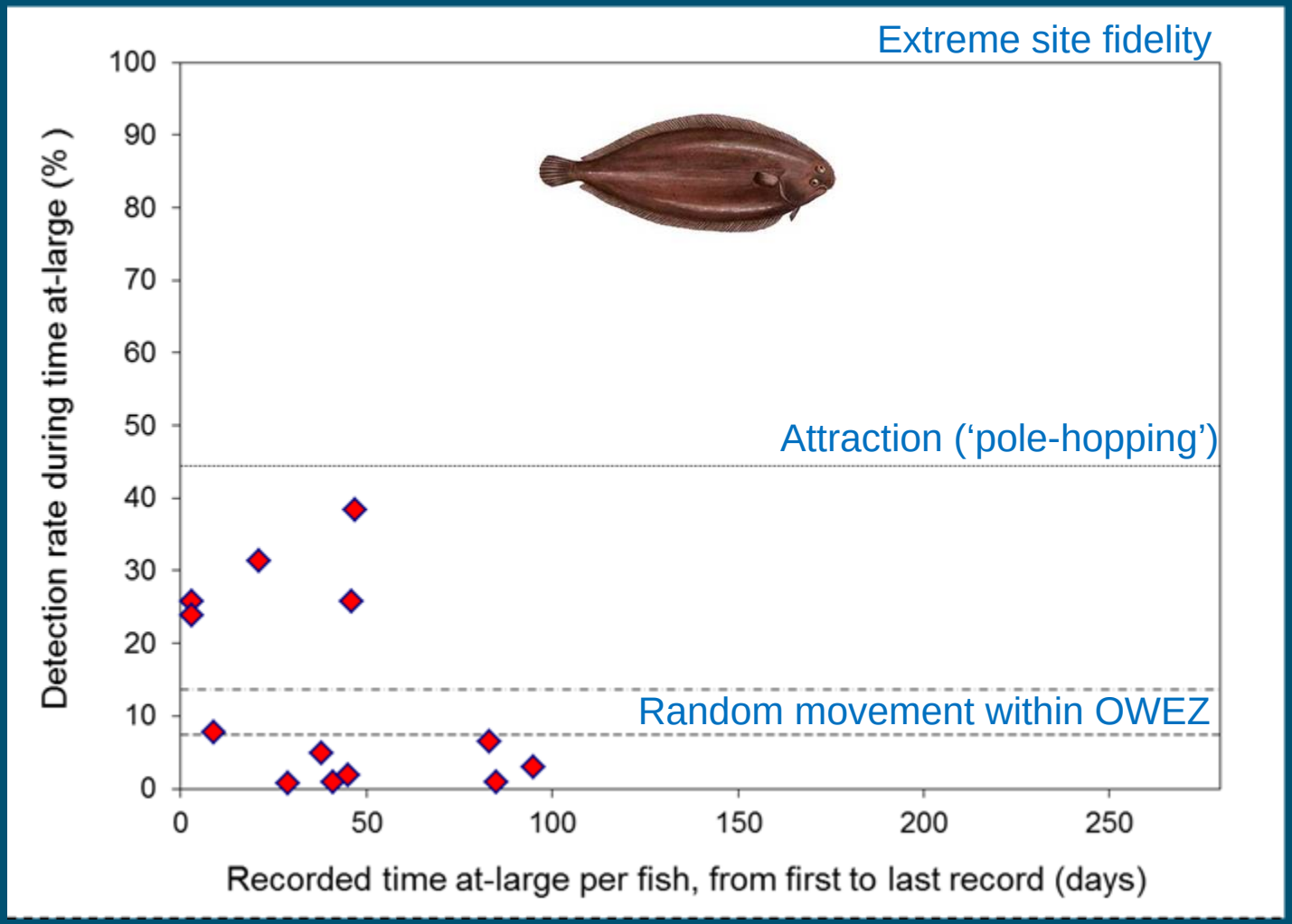


IMARES WAGENINGEN UR

NoordzeeWind

NUON Part of VATTENFALL

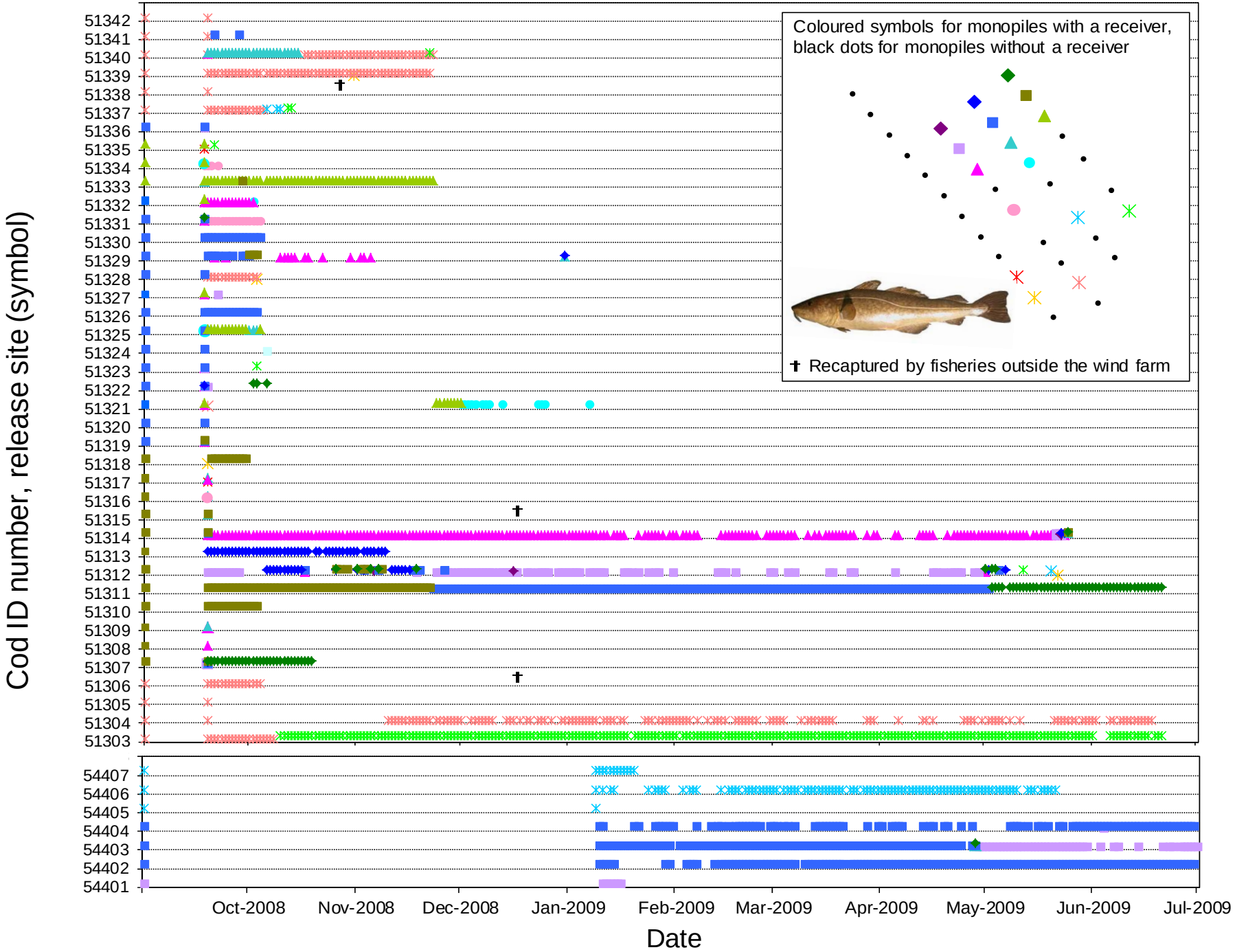
Sole using wind farm as habitat



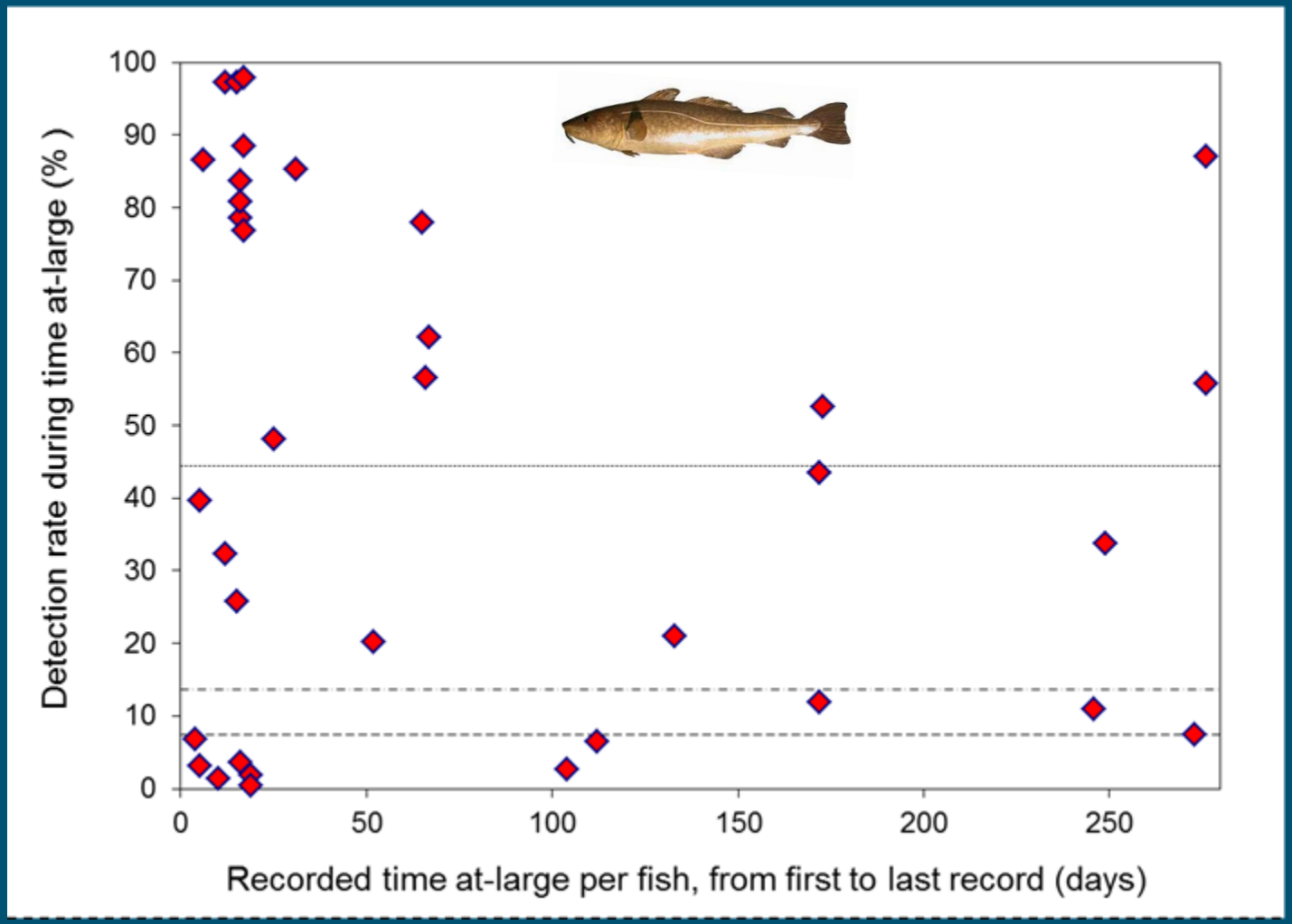
IMARES WAGENINGEN UR

NoordzeeWind

NUON Part of VATTENFALL


Coloured symbols for monopiles with a receiver, black dots for monopiles without a receiver
Recaptured by fisheries outside the wind farm
Cod ID number, release site (symbol)
51342
51341
51340
51339
51338
51337
51336
51335
51334
51333
51332
51331
51330
51329
51328
51327
51326
51325
51324
51323
51322
51321
51320
51319
51318
51317
51316
51315
51314
51313
51312
51311
51310
51309
51308
51307
51306
51305
51304
51303
54407
54406
54405
54404
54403
54402
54401
Oct-2008
Nov-2008
Dec-2008
Jan-2009
Feb-2009
Mar-2009
Apr-2009
May-2009
Jun-2009
Jul-2009
Date

Cod using wind farm as habitat

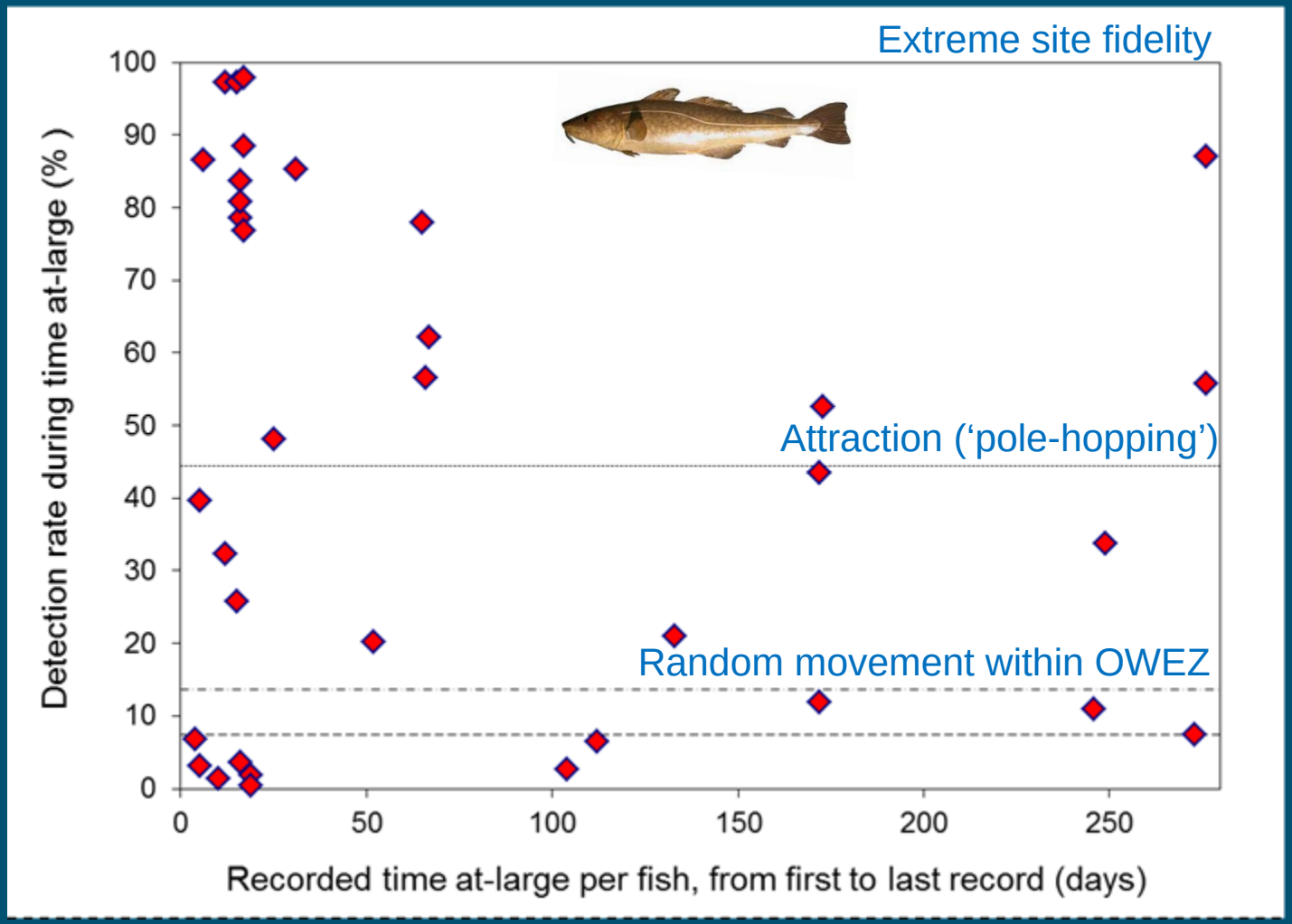


IMARES WAGENINGEN UR

NoordzeeWind

NUON Part of VATTENFALL

Cod using wind farm as habitat

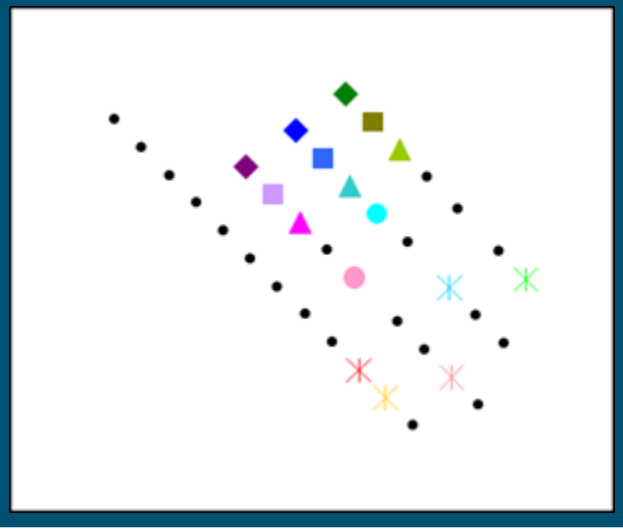


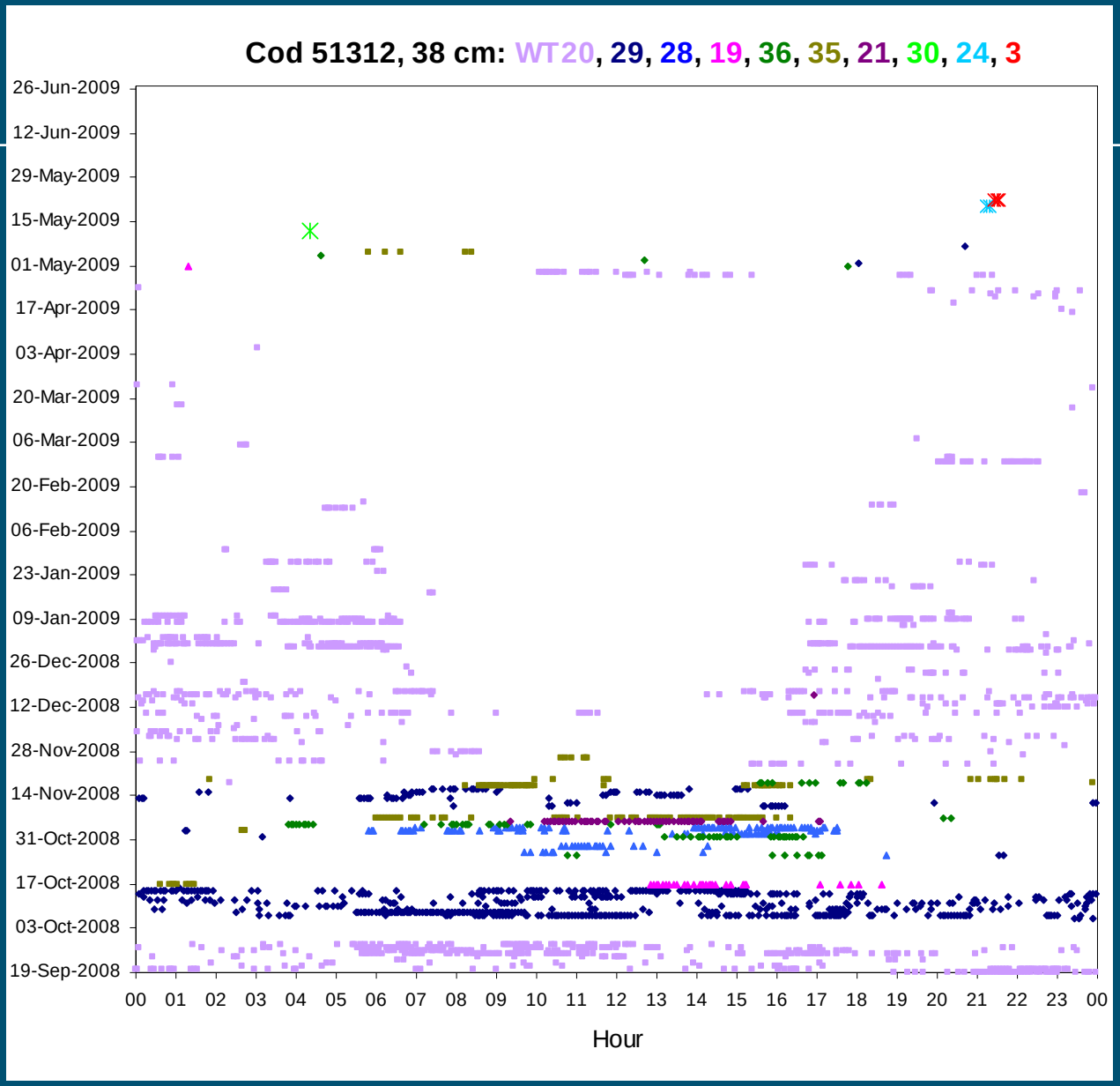
IMARES WAGENINGEN UR

NoordzeeWind

NUON Part of VATTENFALL

Individual diurnal patterns



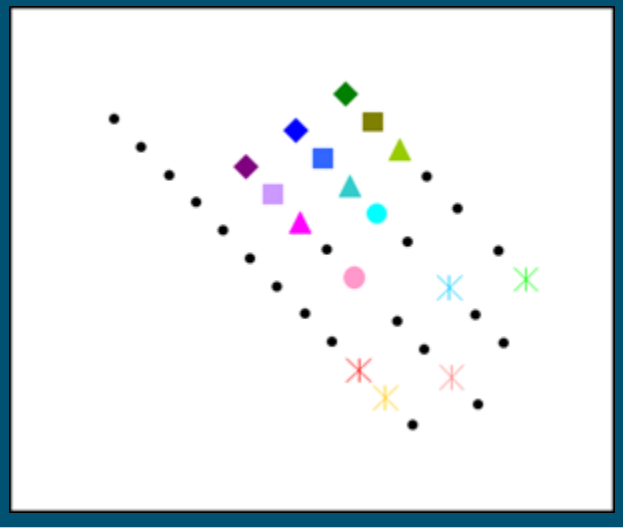


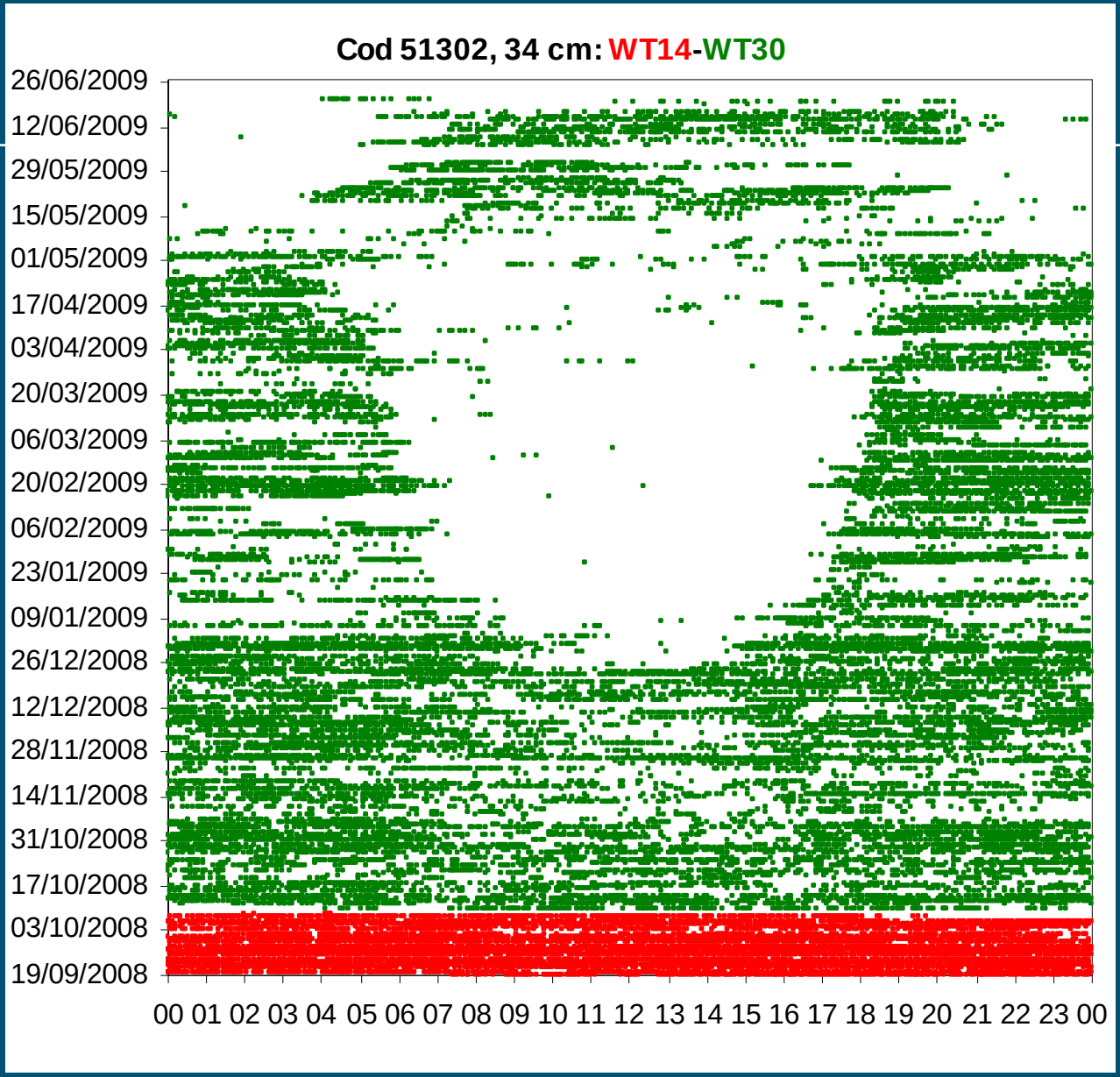
IMARES WAGENINGEN UR

NoordzeeWind

NUON Part of VATTENFALL

Individual diurnal patterns





IMARES WAGENINGEN UR

NoordzeeWind

NUON Part of VATTENFALL

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/side 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

IMARES WAGENINGEN UR

NoordzeeWind

NUON Part of VATTENFALL