Extreme synchrony in diving behavior of Cuvier's beaked whales (*Ziphius cavirostris*) off Cape Hatteras, North Carolina.

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Acknowledgements // Atlantic Behavioral Response Study

14:15 -- Rm 112 -- Brandon Southall

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Other

adult female

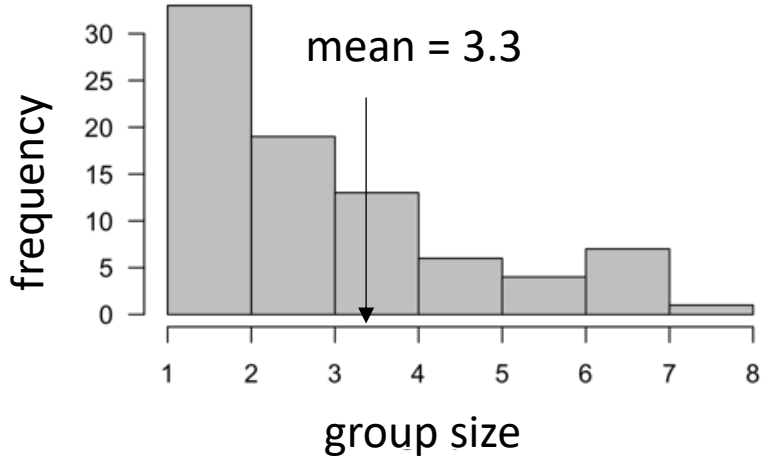
juvenile

not calves

Adult male (AM)

Prediction

Adult males should competitively exclude one another quickly



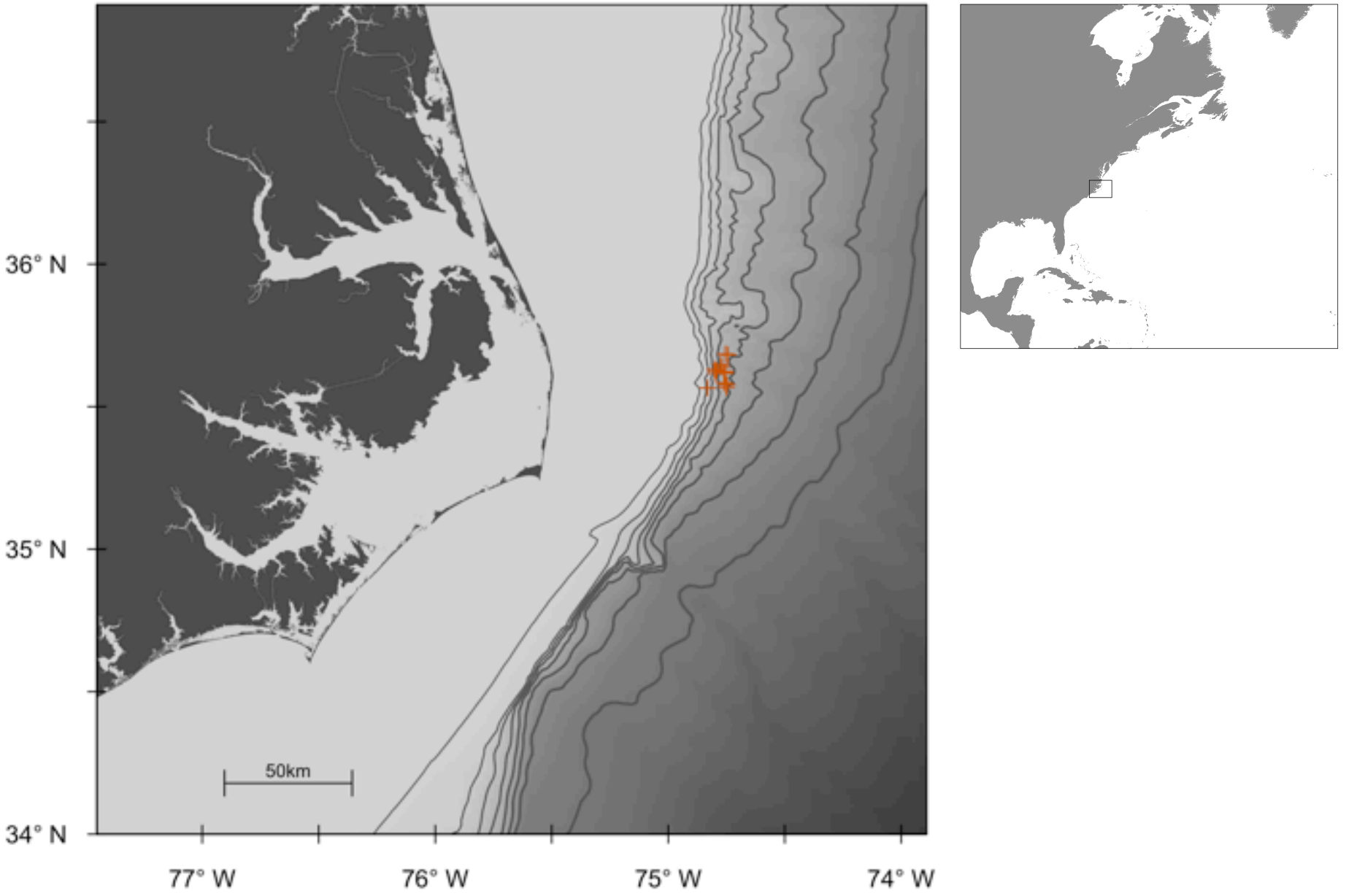
See also: McSweeney et al. 2007 *Marine Mammal Science* and Falcone et al. 2009 *Marine Biology*

Telemetry tags (sat uplink) – Wildlife Computers SPLASH10

Depth at 5 min intervals

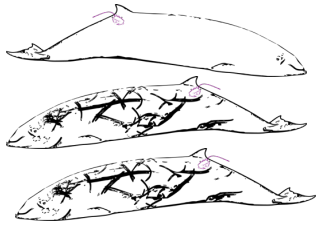
Argos positions

Data truncated

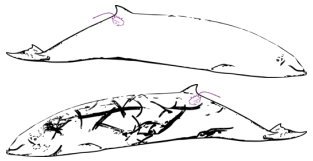


Shoreline vector courtesy of the United States Geological Survey (nos80k) and Nautral Earth (ne_10m_land). Bathymetry queried from the ETOPO1 database via R package *marmap*

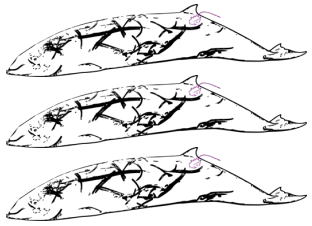
N = 1 group
AM-AM-Other



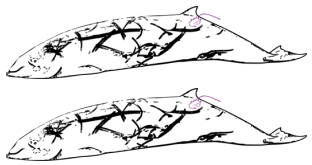
N = 4 groups
AM-Other



N = 1 group
AM-AM-AM



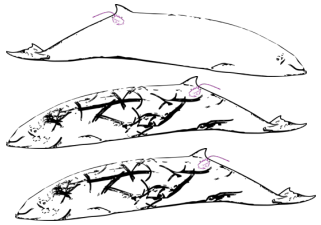
N = 4 groups
AM-AM



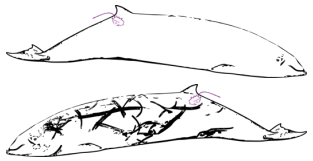
Response variables

Duration of synchronous diving
Degree of synchrony

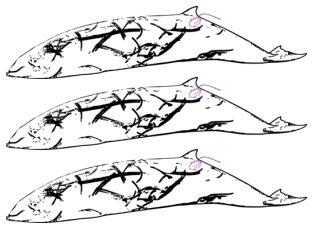
N = 1 group
AM-AM-Other



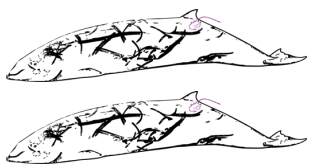
N = 4 groups
AM-Other

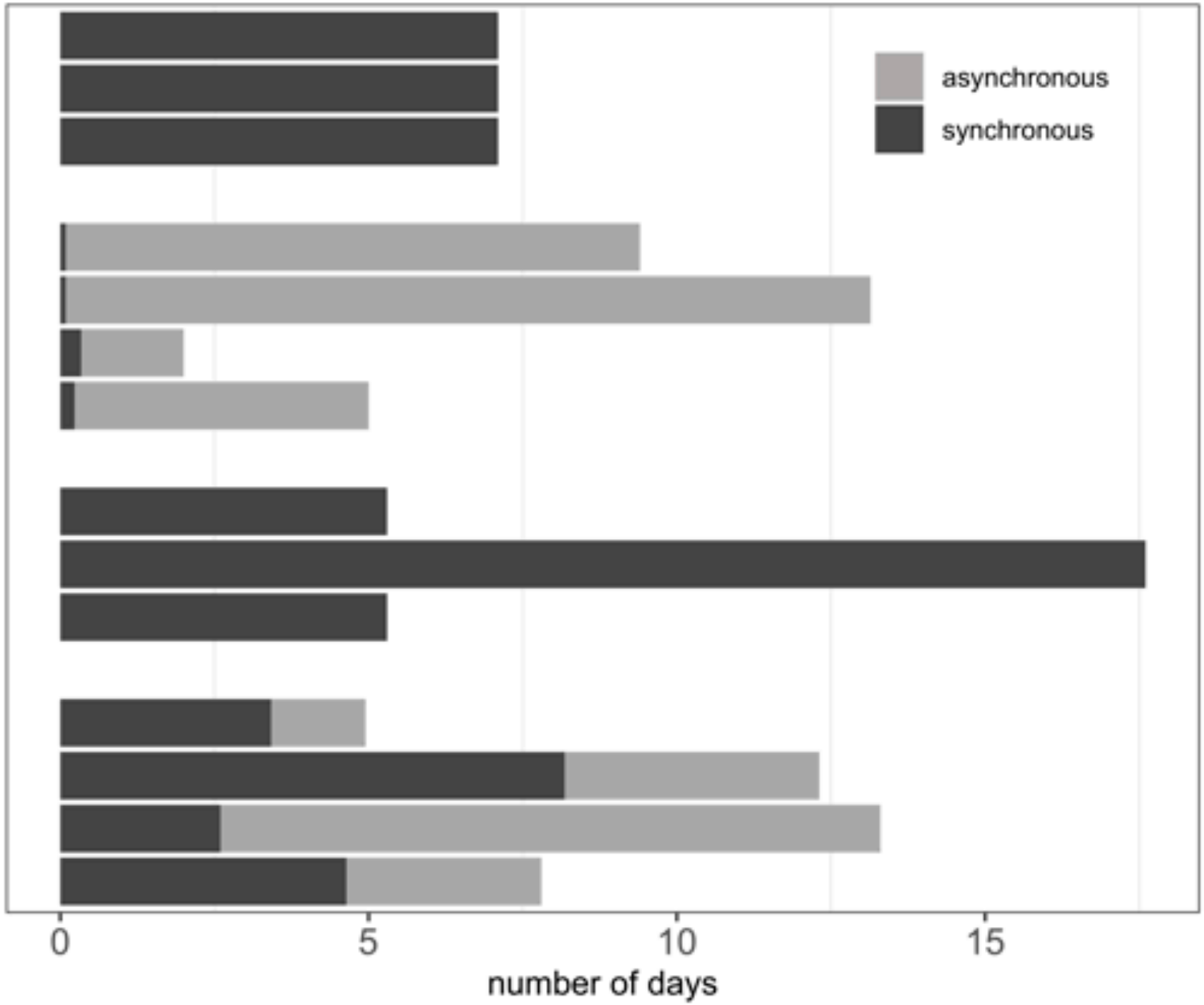


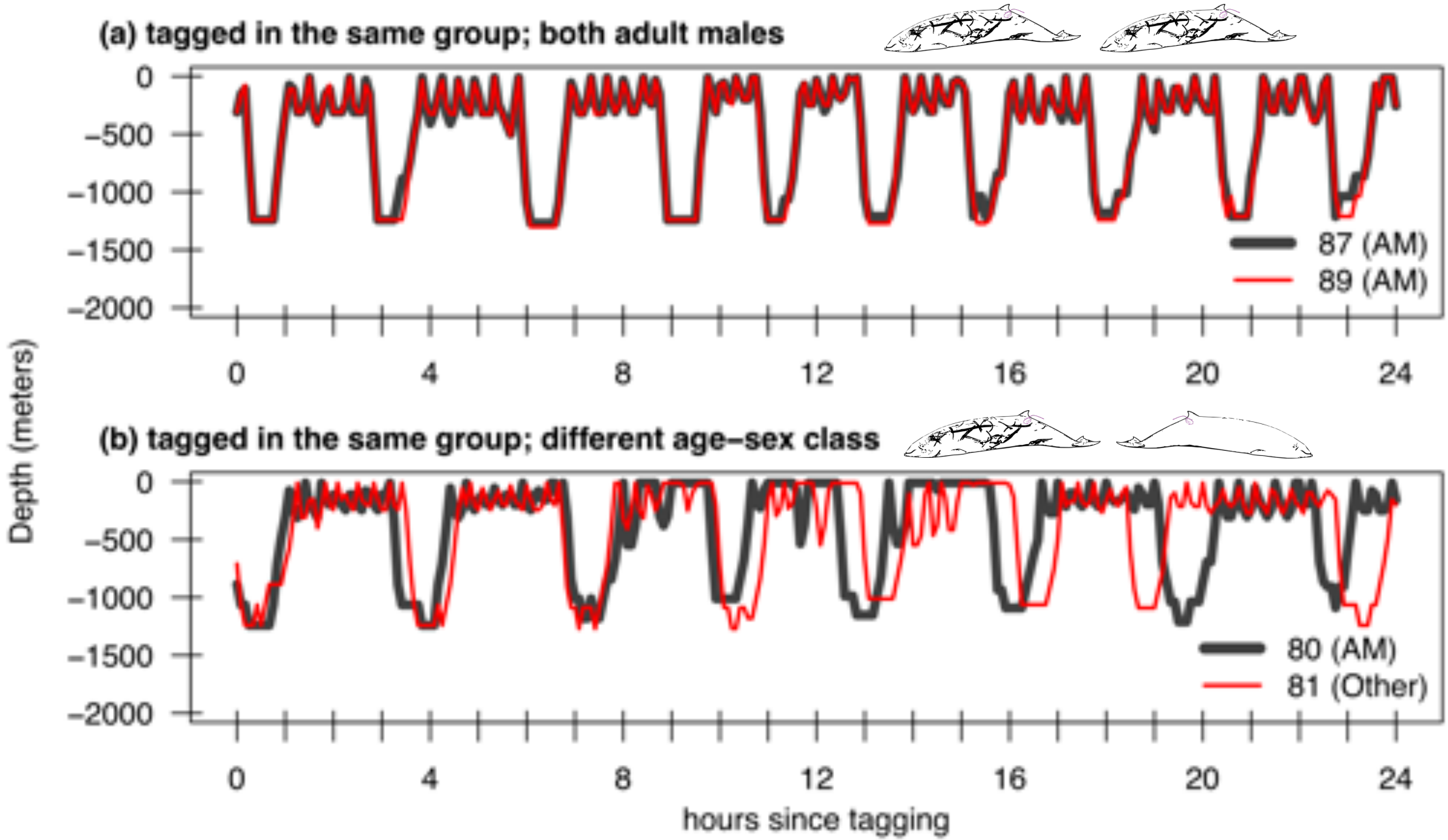
N = 1 group
AM-AM-AM

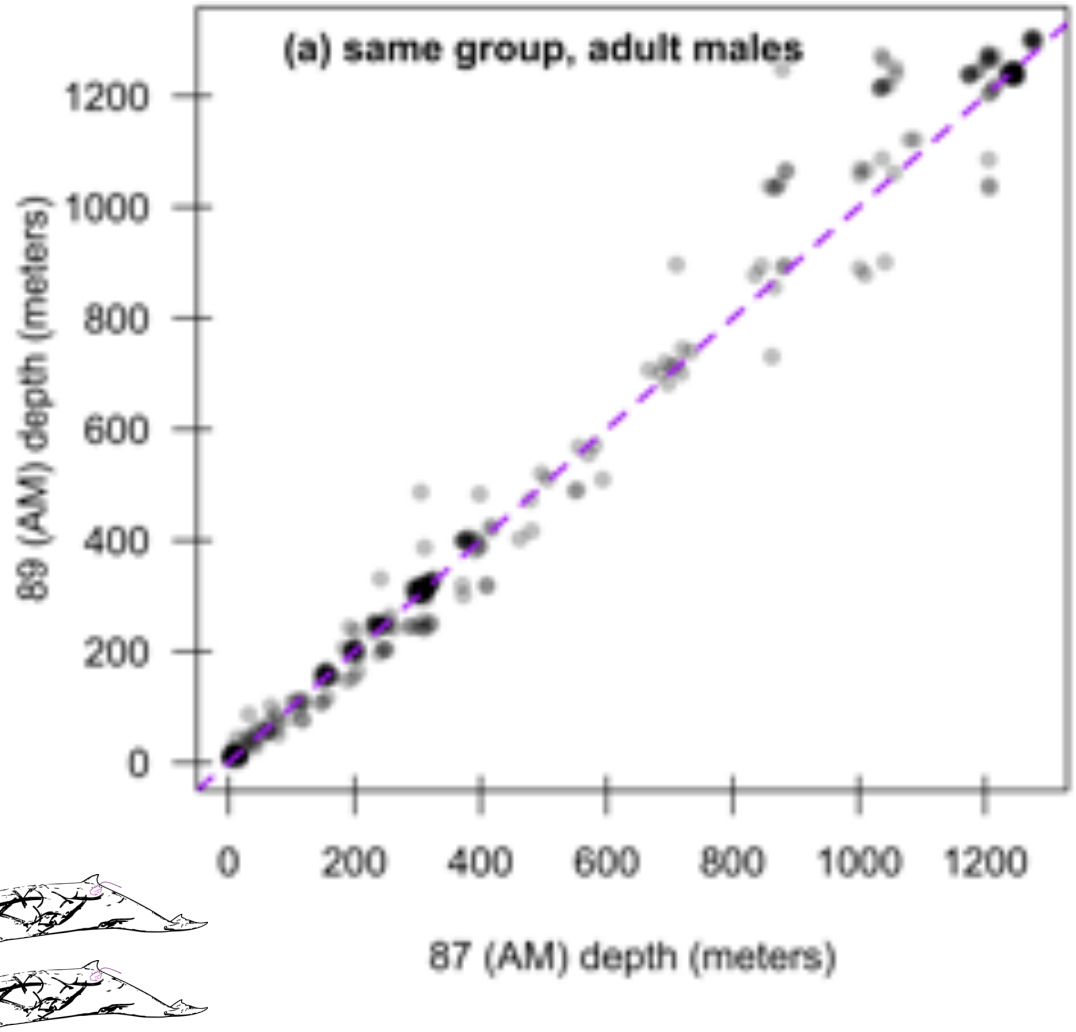


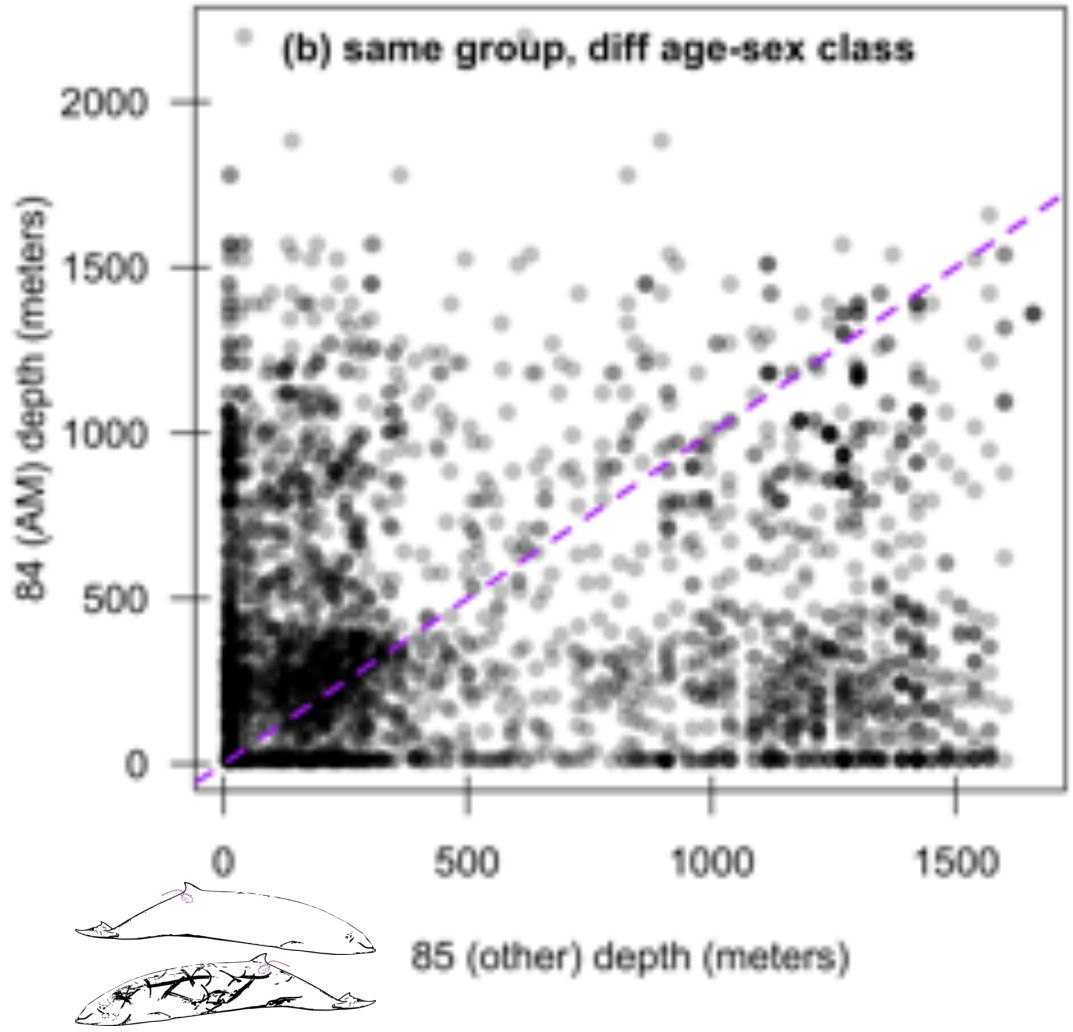
N = 4 groups
AM-AM






(a) tagged in the same group; both adult males
0
−500
−1000
−1500
−2000
87 (AM)
89 (AM)
0
4
8
12
16
20
24
(b) tagged in the same group; different age−sex class
Depth (meters)
0
−500
−1000
−1500
−2000
80 (AM)
81 (Other)
0
4
8
12
16
20
24
hours since tagging


(a) same group, adult males
89 (AM) depth (meters)
87 (AM) depth (meters)
0
200
400
600
800
1000
1200


(b) same group, diff age-sex class
84 (AM) depth (meters)
85 (other) depth (meters)
0
500
1000
1500
2000

Predator defense

e.g., Aguilar de Soto et al. *BioRxiv.* 2018.

Machi Yoshida / Naturaliste Charters

Cooperative foraging

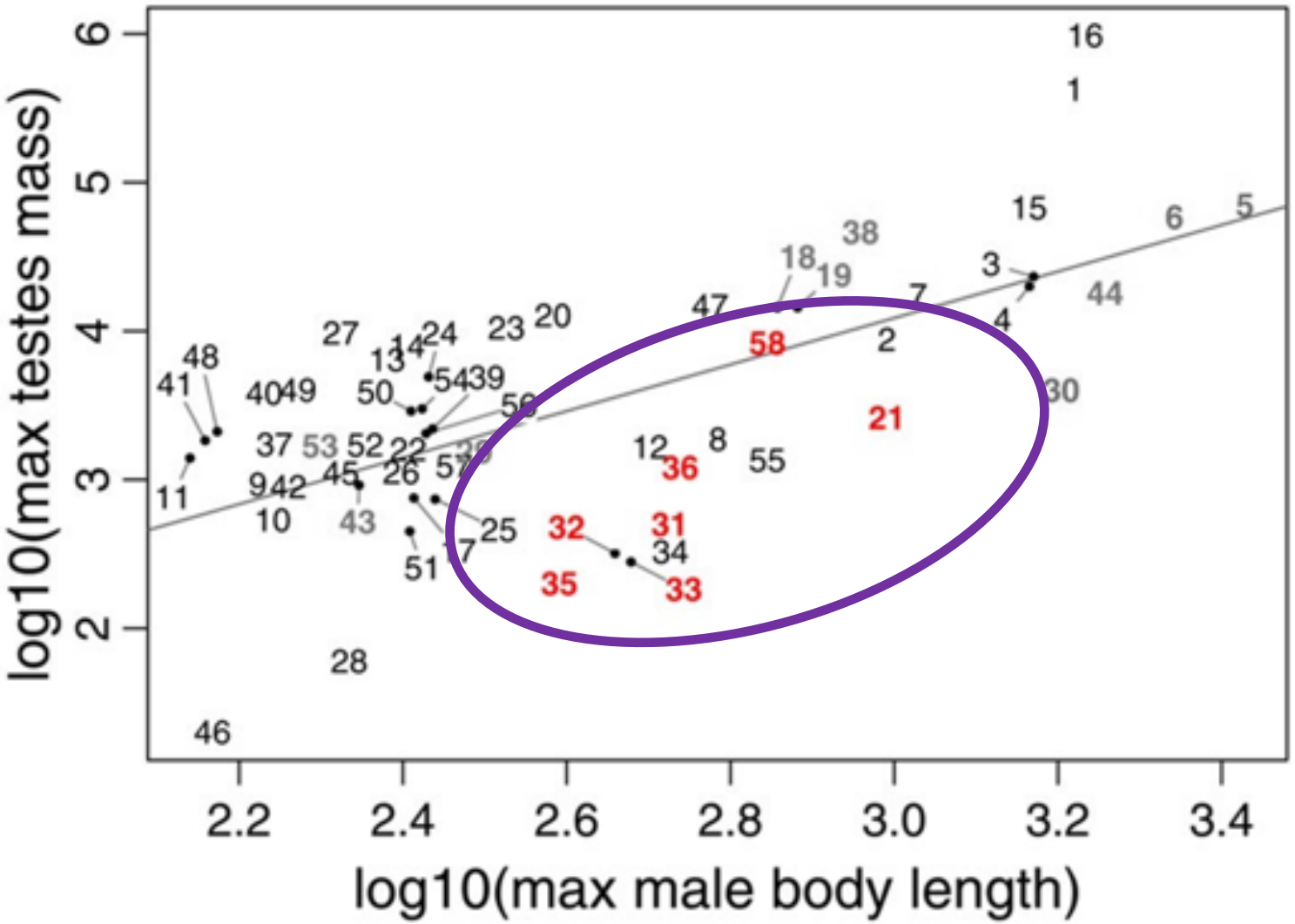
Eavesdropping

e.g., Götz et al. *Biology Letters.* 2005.

Alliances

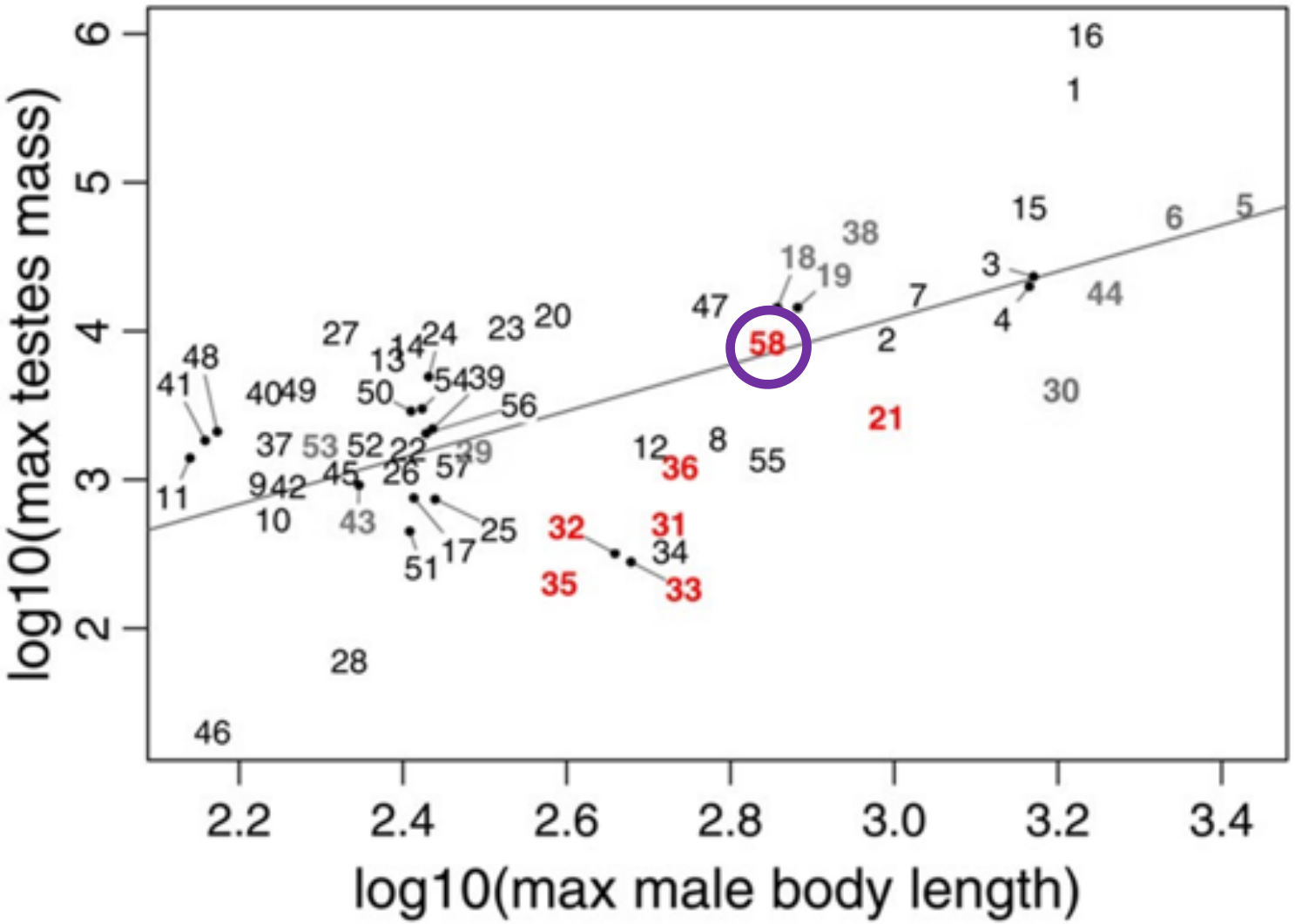
Ermack et al. *Journal of* Mammaology. 2017.

Extended competitive bouts



Ziphiidae

Dines et al. *Evolution.* 2015.
Illustrations: *NOAA Fisheries*



Ziphiidae

Ziphius cavirostris

Dines et al. *Evolution.* 2015.
Illustrations: *NOAA Fisheries*

predictions

repeated interactions

do not acquire scars during synchrony

may be related

shared reproductive success

Alliances

Extended competitive bouts

predictions

long time required to switch groups

unrelated

acquire scars during synchrony

‘winners’ have higher reproductive success

Adult males interacted longer than expected
Very high levels of synchrony

Future Work

Test predictions
Add resolution in Other age-sex class
Female bonds

Modified from Dalebout et al. *Marine Mammal Science.* 2002.

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