False killer whales in Hawai‘i

Robin W. Baird
Cascadia Research Collective
www.cascadiaresearch.org

Deron Verbeck

False killer whale
(*Pseudorca crassidens*)

Killer whale
(*Orcinus orca*)

“The false killer whale receives its name from its resemblance to killer whales”

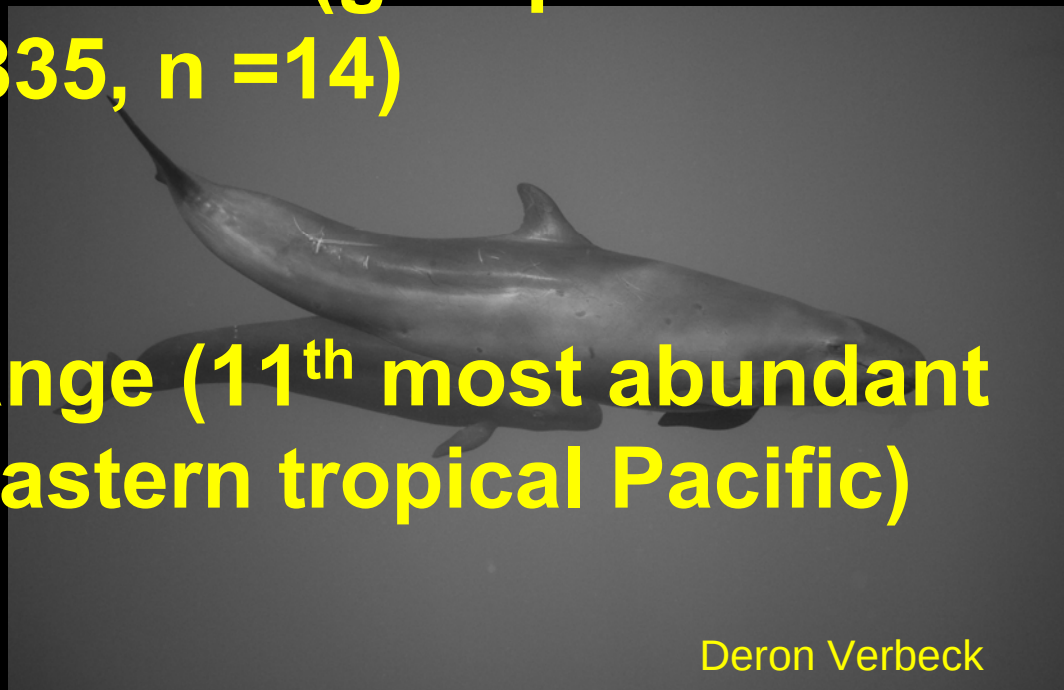
sources: marbiol.org, suite101.com, wikipedia.org, economicexpert.com, signalsofspring.net, skullsunlimited.com……

False killer whale

Killer whale

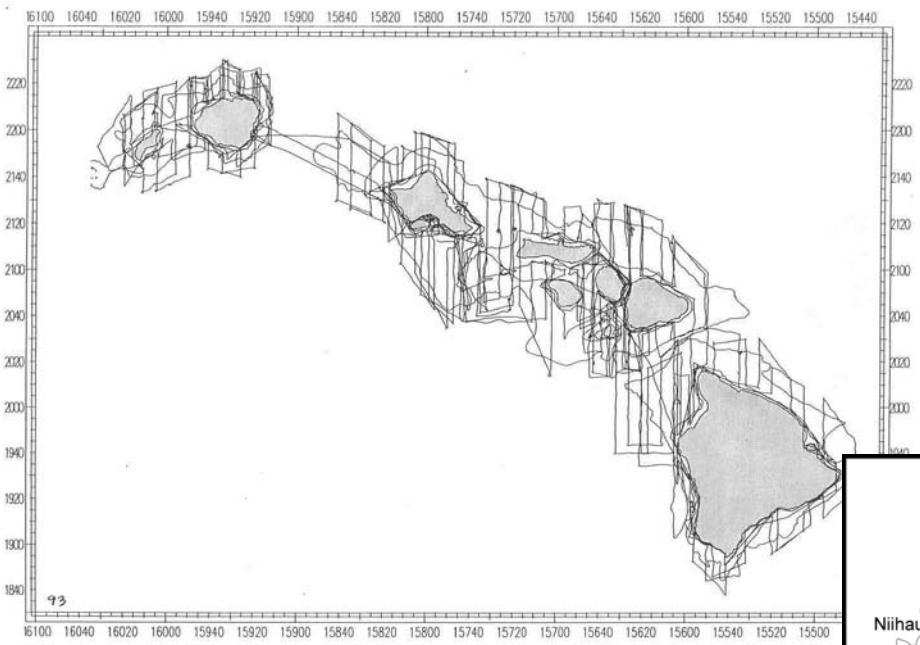
False killer whale basics

- Long-lived (50s – 60s)
- Slow to mature (~10-18 years)
- Low calving rate (one every ~6-7 years)
- Females have long post-reproductive period
- Occasionally mass strand (group size mean = 180 (range = 50 – 835, n =14)
- Primarily tropical
- Oceanic
- Rare throughout range (11th most abundant of 13 delphinids in eastern tropical Pacific)



Deron Verbeck

First population estimate available in 2000 from Mobley et al. aerial surveys 1993, 1995, 1998



Estimated 121 individuals

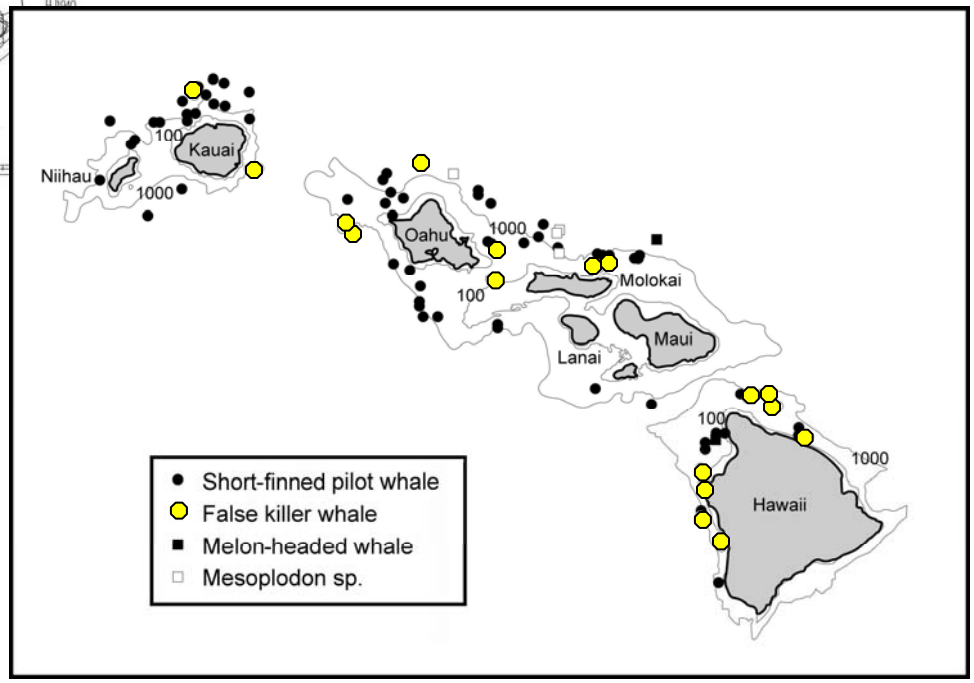


Photo-identification restricted to “distinctive” and “very distinctive” individuals with “good” or “excellent” quality photos

HIPc138
Dec 31/88

HIPc138
Mar 3/05

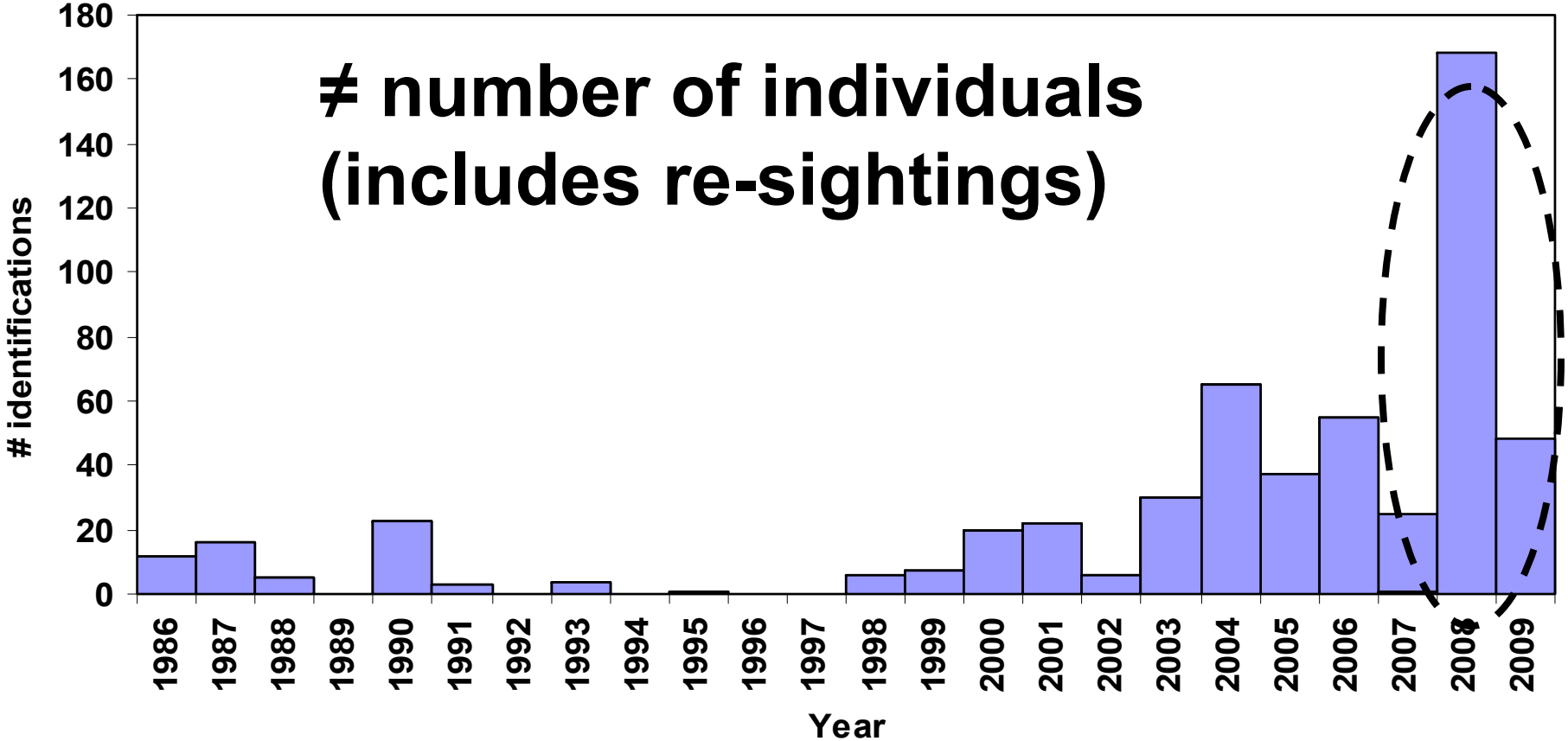
HIPc115
Feb 1/98

HIPc115
Apr 11/06

Baird et al. 2008

identifications collected each year

(distinctive/very distinctive, good or excellent photos)



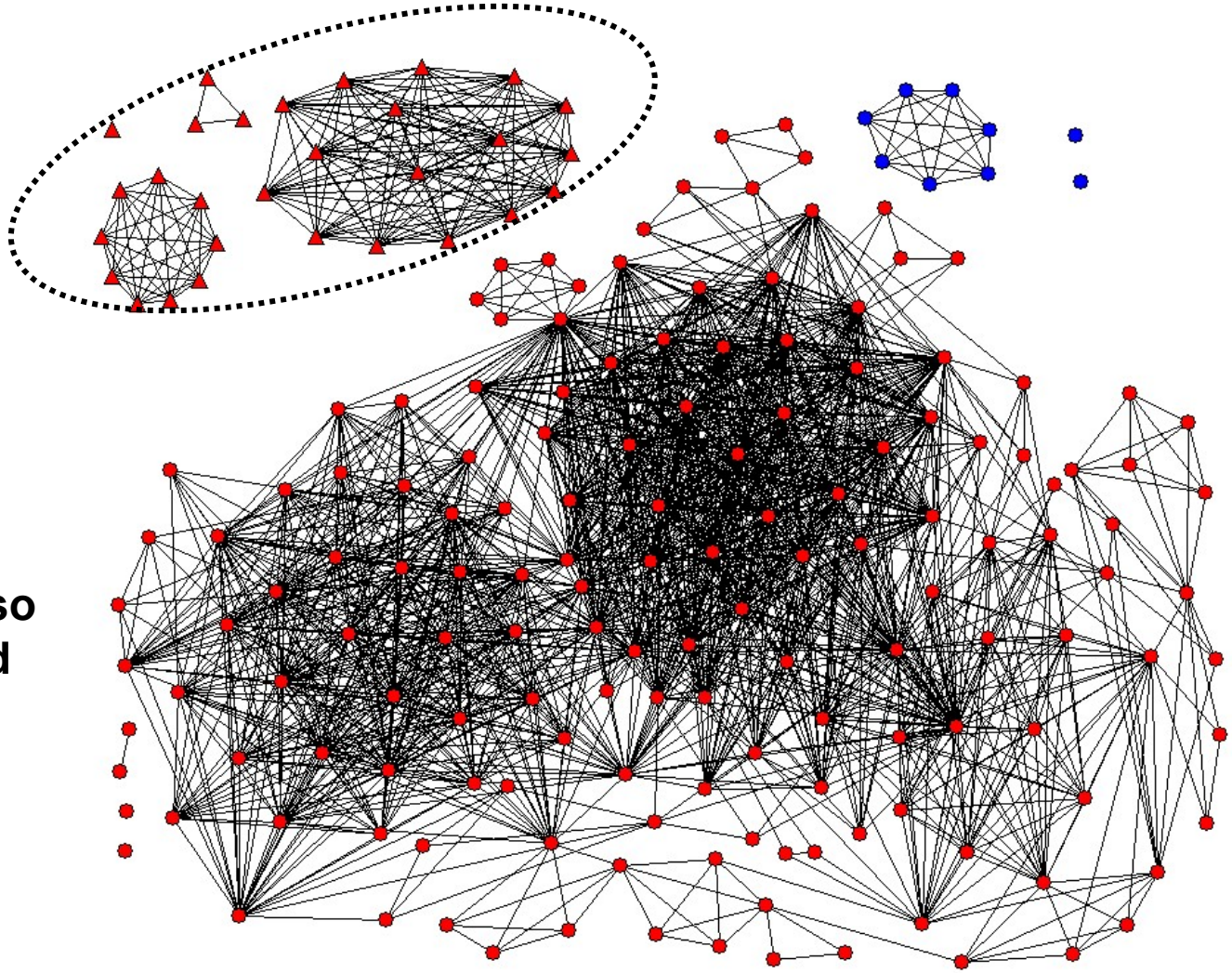
76% increase in sample size in 07/08/09 (240 additional identifications*)
Currently available: n = 553 identifications, n = 516 insular identifications
37 offshore/probable offshore identifications

*Not including October 2009 photos

Photo-identification

- Evidence of two populations (insular, pelagic)

42-120 km offshore



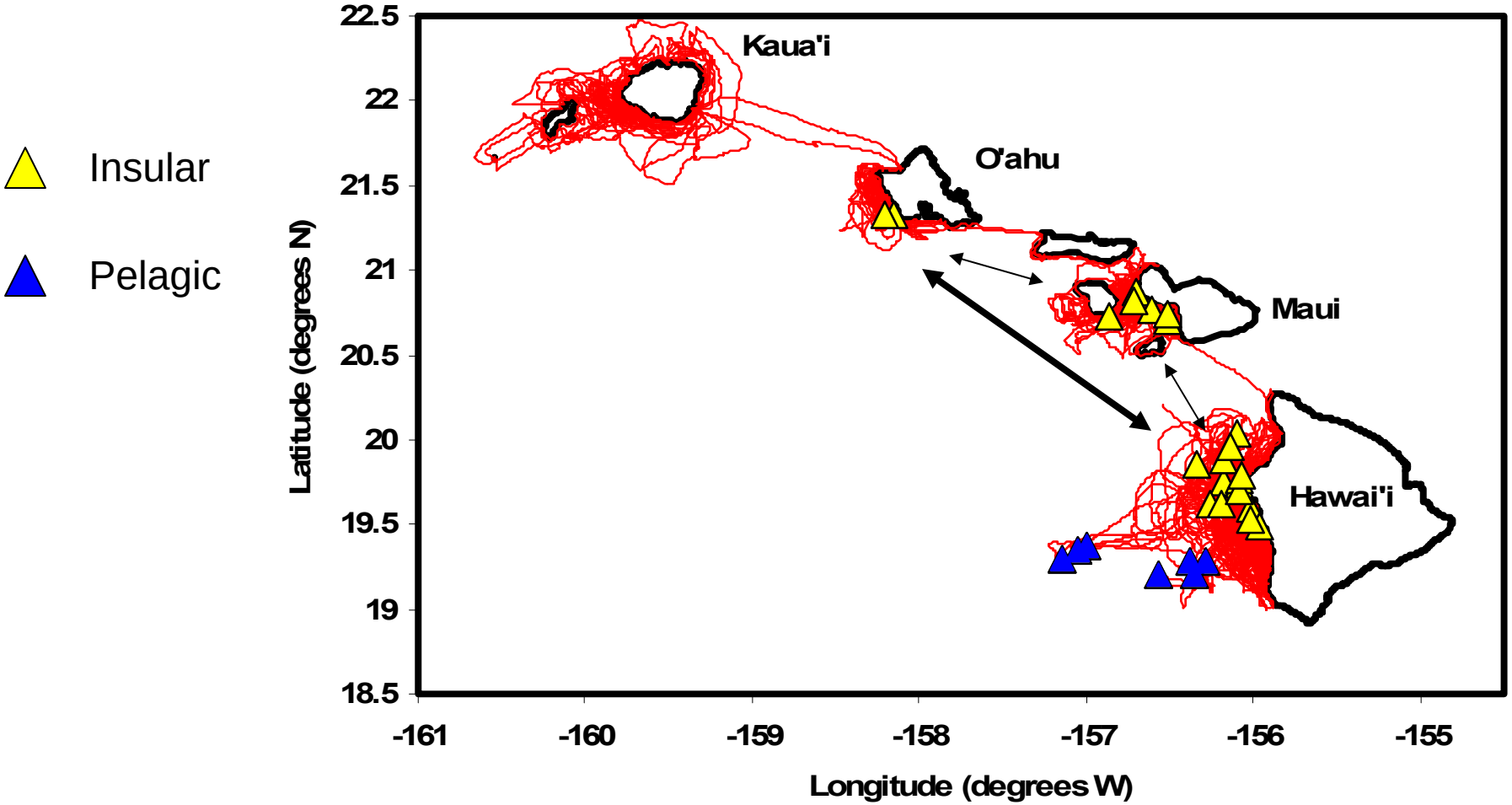
Genetic evidence also indicates insular and pelagic populations

- ▲ **Offshore (pelagic stock)**
- ● **Nearshore - O‘ahu, 4-islands, Hawai‘i (insular stock)**
- ● **Nearshore - Kaua‘i (unknown stock)**

Social network diagram
Data from 1986-May 2009

Photo-identification

- Extensive movements among islands
- Insular population small (2000-2004 estimate = approx. 123 individuals, CV=0.73)



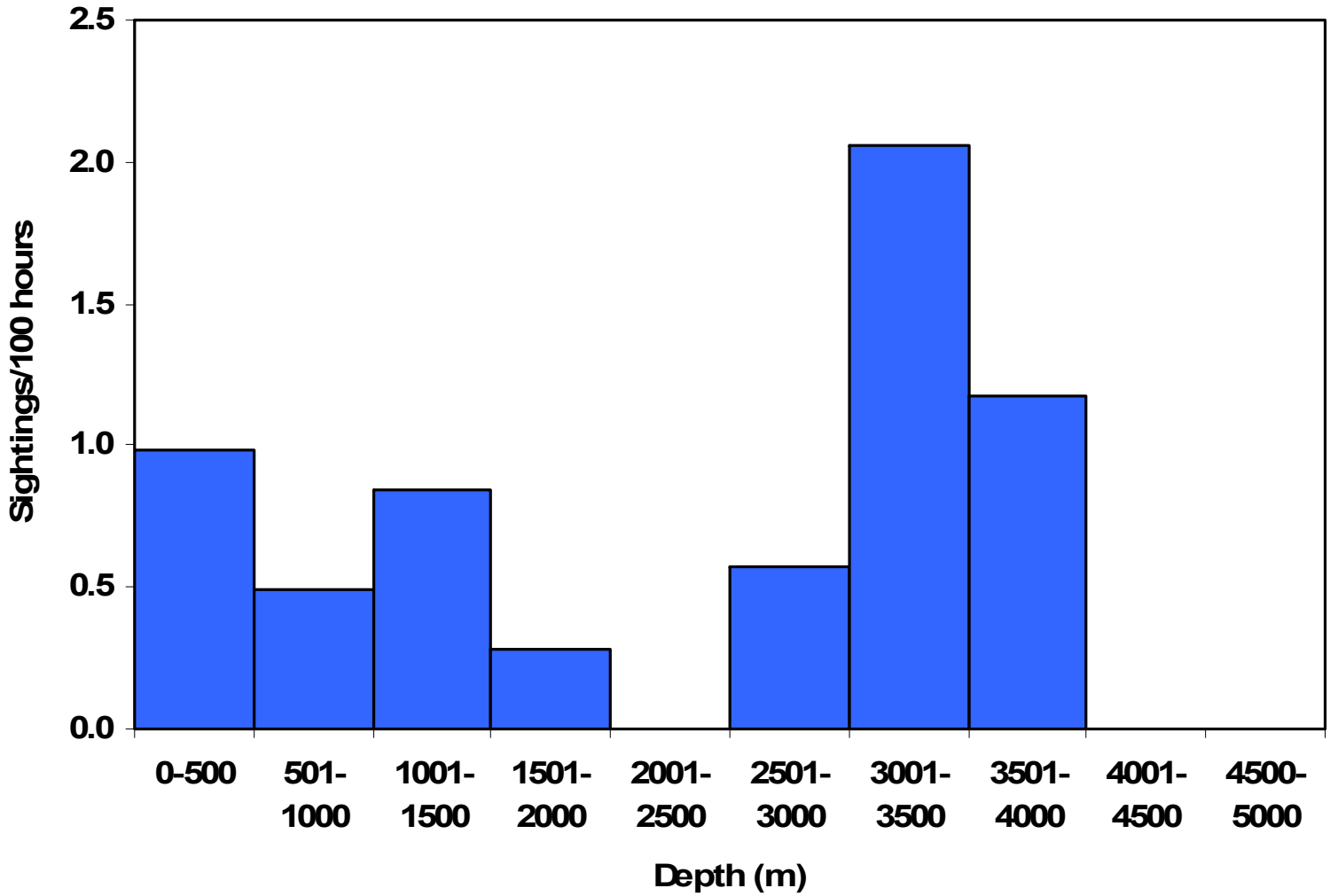
False killer whales ninth-most frequently encountered species (2.6% of sightings) in 2000-2008 boat-based surveys (3,318 hours effort)

Species	# (%) sightings	Rank
Short-finned pilot whale	268 (23.8)	1
Pantropical spotted dolphin	230 (20.4)	2
Bottlenose dolphin	141 (12.5)	3
Spinner dolphin	133 (11.8)	4
Rough-toothed dolphin	122 (10.8)	5
Dwarf sperm whale	38 (3.4)	6
Cuvier's beaked whale	34 (3.0)	7
Melon-headed whale	33 (2.9)	8
False killer whale	**29 (2.6)**	**9**
Blainville's beaked whale	26 (2.3)	10
Sperm whale	25 (2.2)	11
Striped dolphin	20 (1.8)	12
Pygmy killer whale	15 (1.3)	13
Risso's dolphin	6 (0.5)	14
Pygmy sperm whale	3 (0.3)	15
Killer whale	1 (0.1)	16
Longman's beaked whale	1 (0.1)	16
Fraser's dolphin	1 (0.1)	16
Total	1,126	

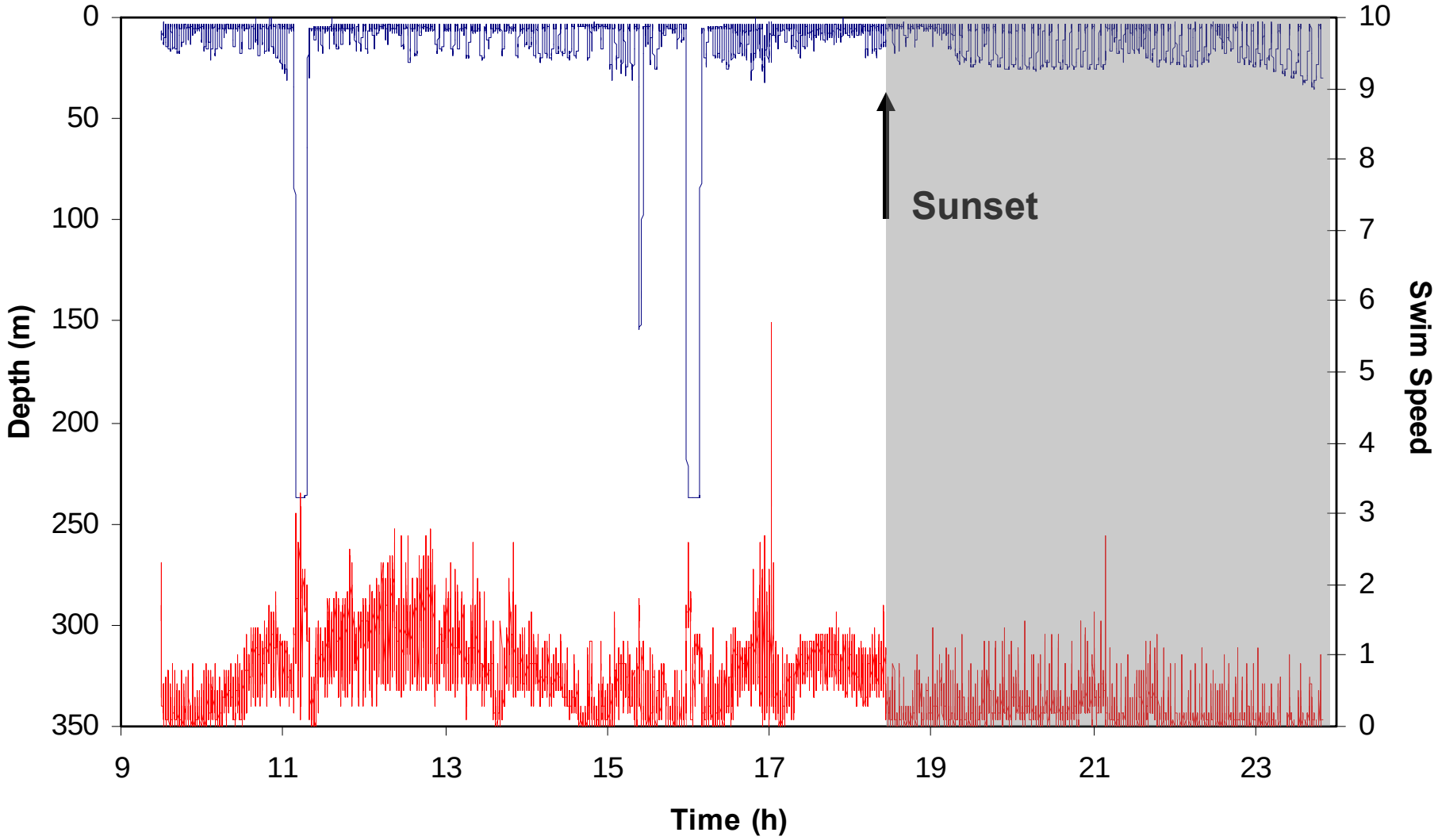
Lowest abundance estimate of 18 species of odontocetes in NMFS large-vessel survey of entire Hawaiian EEZ

Baird et al. 2000-2008 survey effort

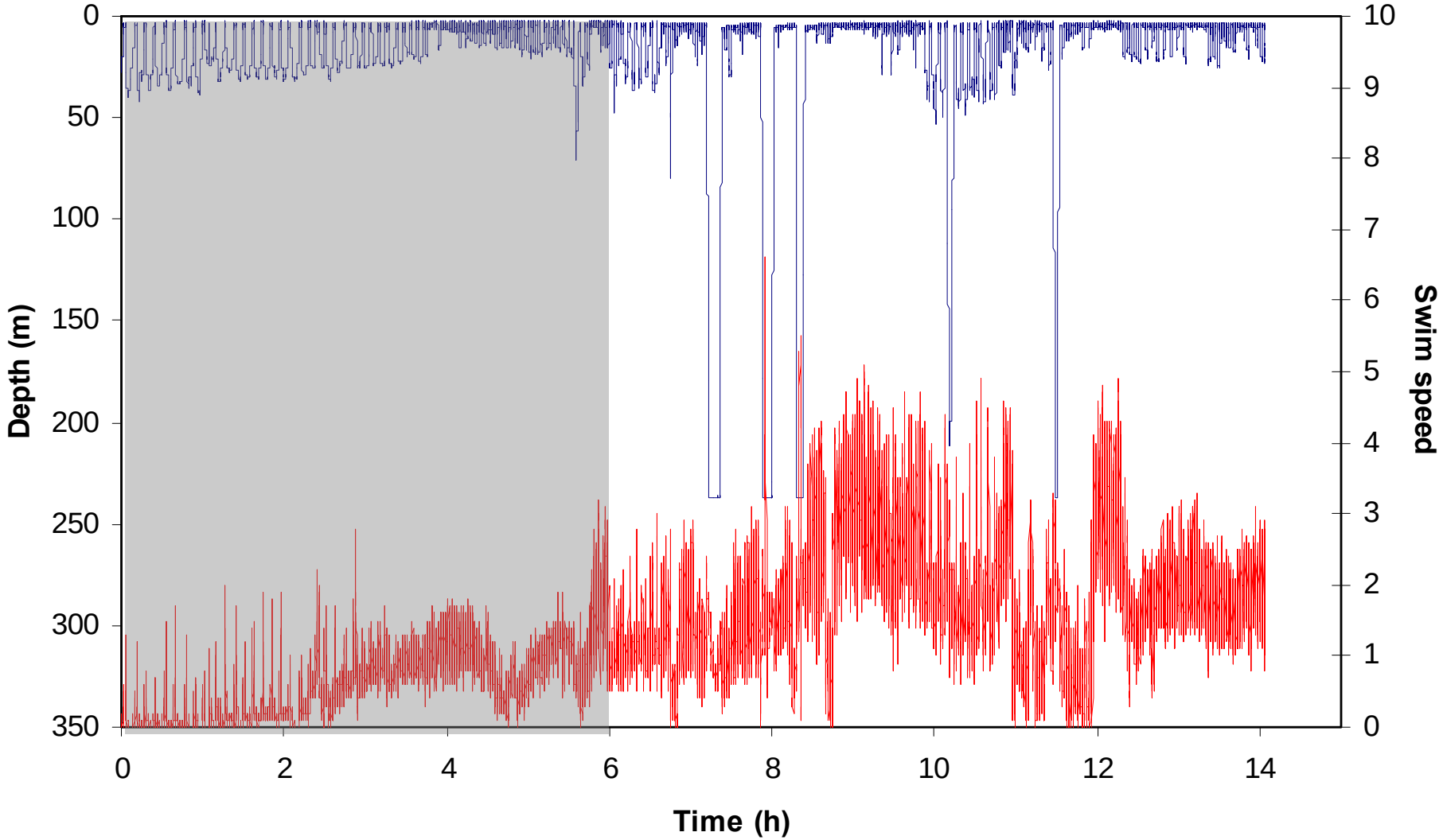
Sighting rates by depth (corrected for effort) of insular population indicate extremely broad range of habitats



Examining dive depths/night-time behavior using suction-cup attached time-depth recorders



~29 hours of dive data from insular false killer whale October 2004



- Swim speed lower at night
- Dive ‘shapes’ more regular at night
- All deep (>50 m) dives during day

What do they feed on?

- Many surface oriented prey
- Prey large (= prolonged handling)
- Frequently share prey

Deron Verbeck

What do they feed on?

Prey observed taken in Hawai‘i:

Skipjack tuna
Wahoo/Ono
Mongchong
Yellowfin tuna
Mahimahi
Threadfin jack
Swordfish

Both insular and offshore

Photos by D.J. McSweeney/R.W. Baird/D. Perrine/C. Babbitt

Mahimahi most frequently recorded. but also easy for non-specialists to ID

False killer whales satellite tagged

Period tagged	# individuals	# days span	# days locations	Population identity
Aug 2007	3	32	29	Insular
Jul 2008	7	76	76	Insular
Dec 2008	1	54	54	Insular
Oct 2009	5*	45*	45*	Insular
Apr 2008	1	15	5	Offshore

*Three still transmitting

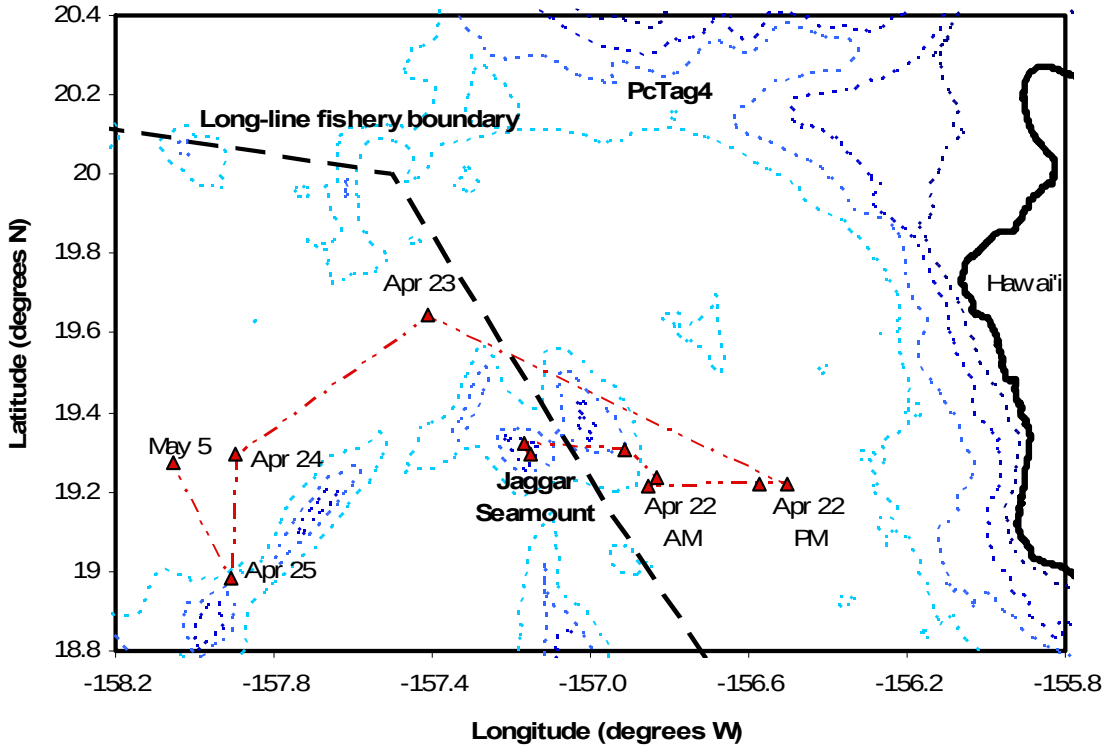
Doug Perrine

Movements of false killer whales (1 per group)

Period tagged	Distance from shore (km) Median (range)	Depth (m) Median (range)	Minimum distance traveled (km)	Maximum distance moved from tagging location (km)
Aug 07	14.1 (1.6 – 95.9)	597 (46 – 4,833)	2,612	420.1
Jul 08	20.5 (0.9 – 83.1)	827 (46 – 4,767)	3,010	329.9
Dec 08	22.7 (2.7 – 87.3)	1,052 (94 – 4,847)	5,653	330.7
Apr 08	122.8 (62.1 – 210.0)	3,844 (1,474 – 4,747)		

Doug Perrine

Offshore false killer whale satellite tagged in April 2008



Tagged 123.8 km offshore

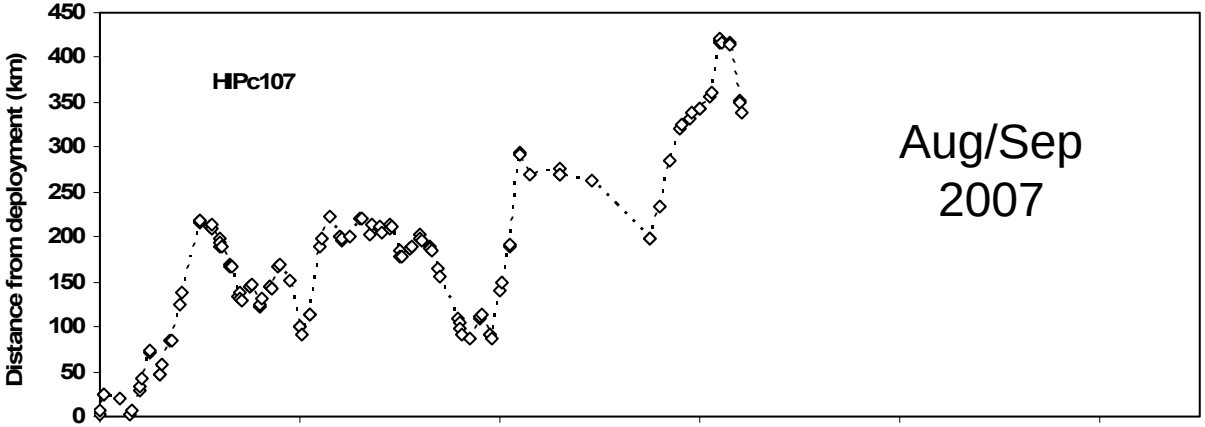
Locations on 5 days over 15 day span

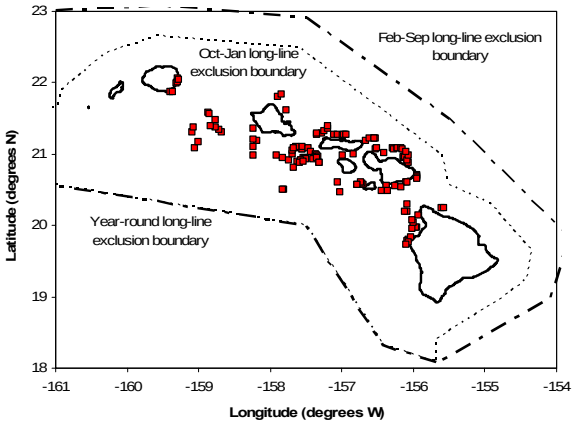
Closest point to shore 62.1 km

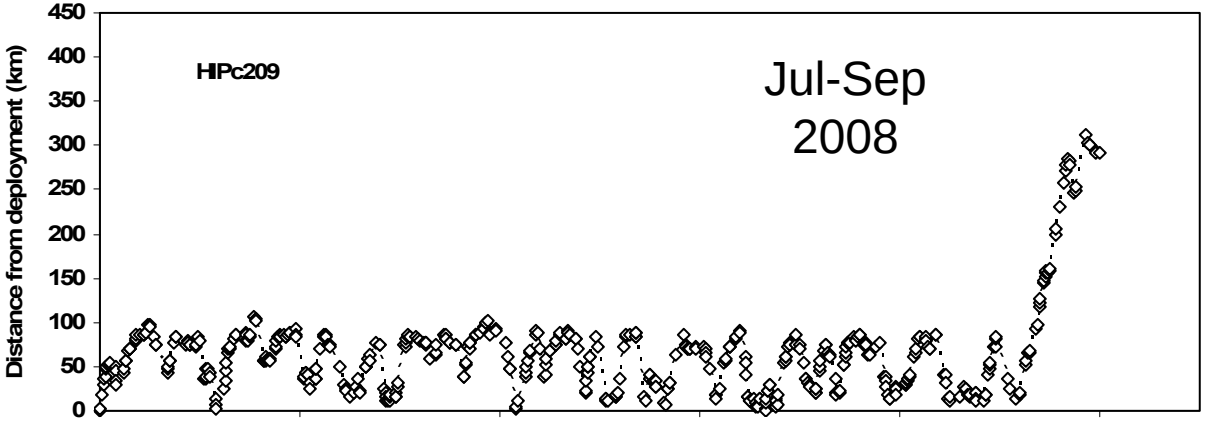
Furthest distance offshore 210 km

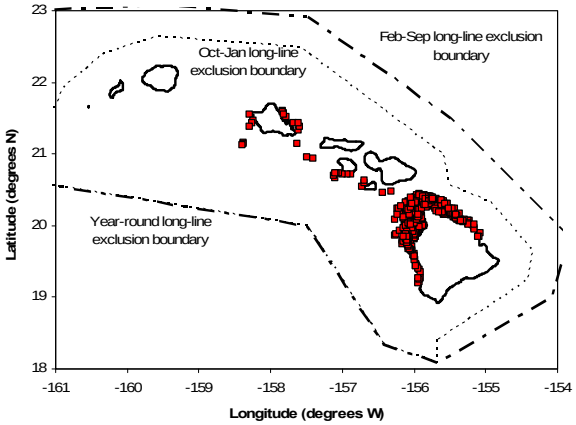
Moved inshore of longline fishery boundary

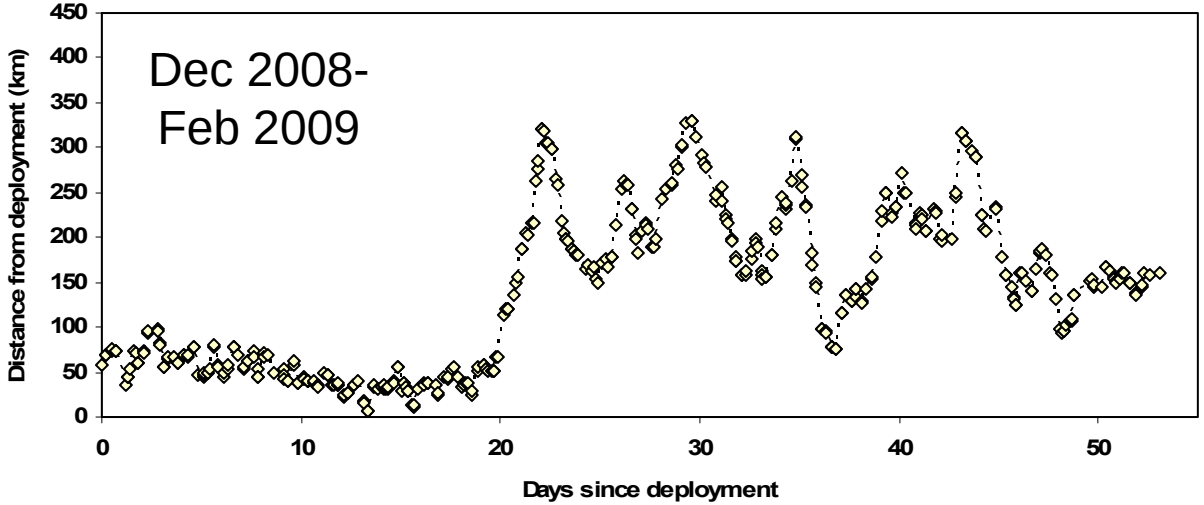
Group genetically confirmed as offshore population

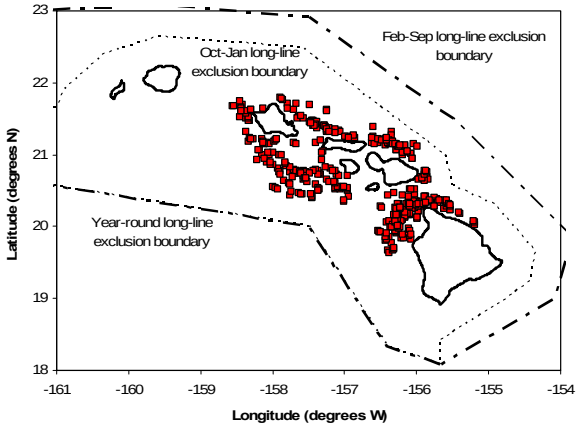

HIPc107
Aug/Sep
2007
Distance from deployment (km)
450
400
350
300
250
200
150
100
50
0


Feb-Sep long-line exclusion boundary
Oct-Jan long-line exclusion boundary
Year-round long-line exclusion boundary
Latitude (degrees N)
Longitude (degrees W)
23
22
21
20
19
18
-161
-160
-159
-158
-157
-156
-155
-154


HIPc209
Jul-Sep
2008
Distance from deployment (km)
450
400
350
300
250
200
150
100
50
0


Feb-Sep long-line exclusion boundary
Oct-Jan long-line exclusion boundary
Year-round long-line exclusion boundary
Latitude (degrees N)
Longitude (degrees W)
23
22
21
20
19
18
-161
-160
-159
-158
-157
-156
-155
-154

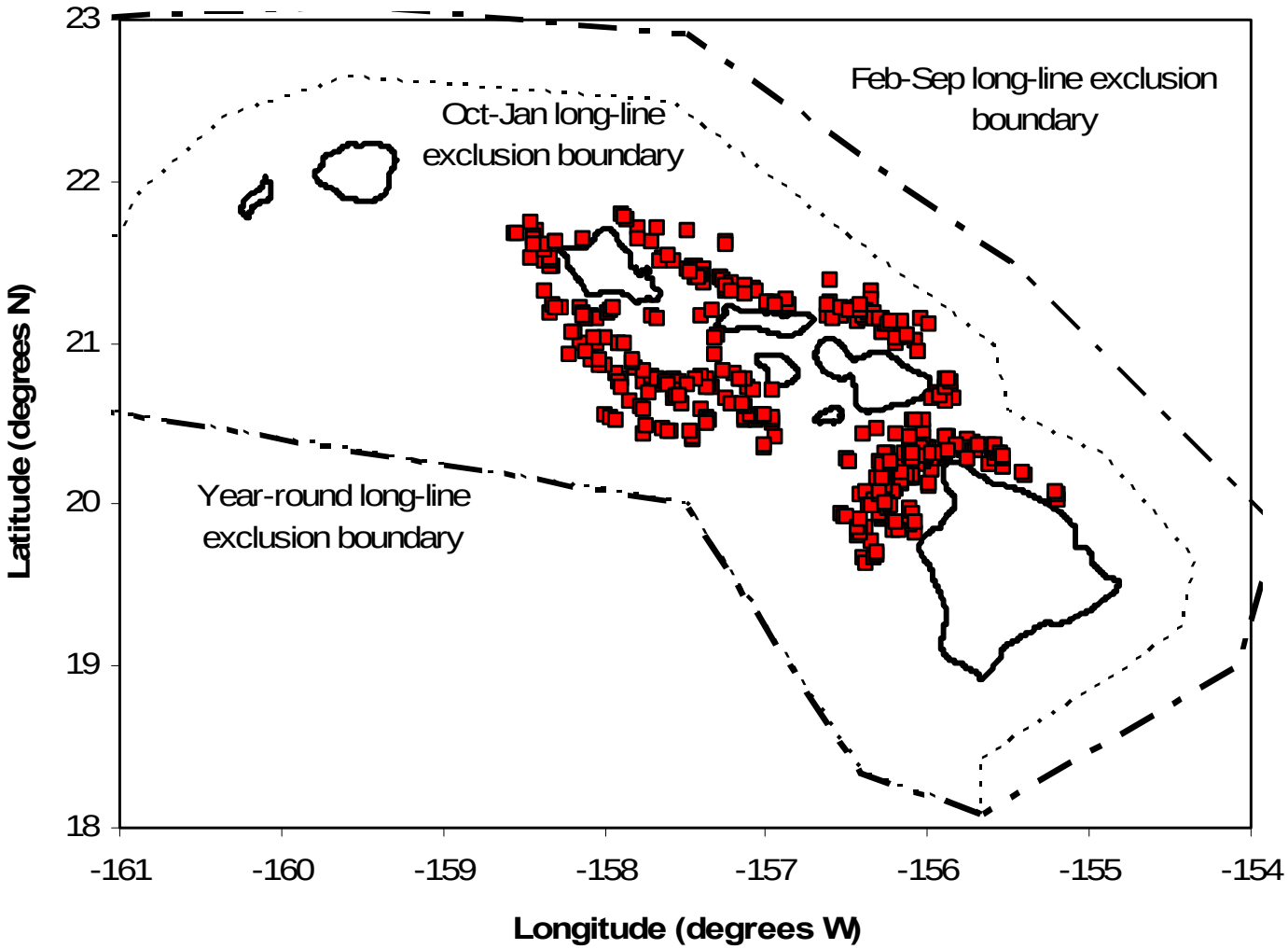

Dec 2008-
Feb 2009
Distance from deployment (km)
450
400
350
300
250
200
150
100
50
0
0
10
20
30
40
50
Days since deployment


Feb-Sep long-line exclusion boundary
Oct-Jan long-line exclusion boundary
Year-round long-line exclusion boundary
Latitude (degrees N)
Longitude (degrees W)
23
22
21
20
19
18
-161
-160
-159
-158
-157
-156
-155
-154

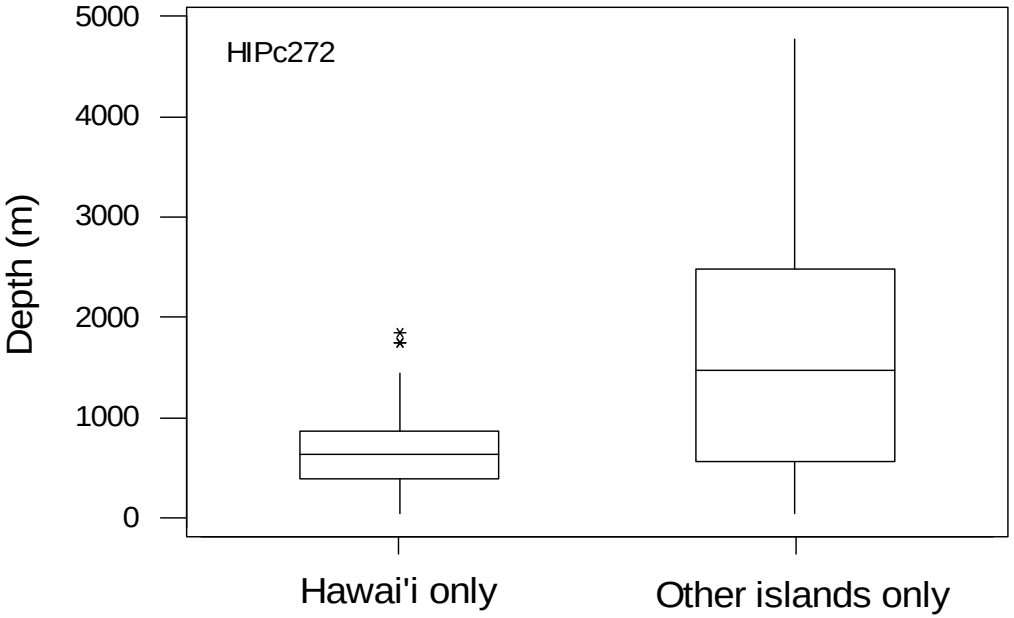
One individual, 52 days, Dec 2008-Feb 2009, each step ½ second = 12 hours

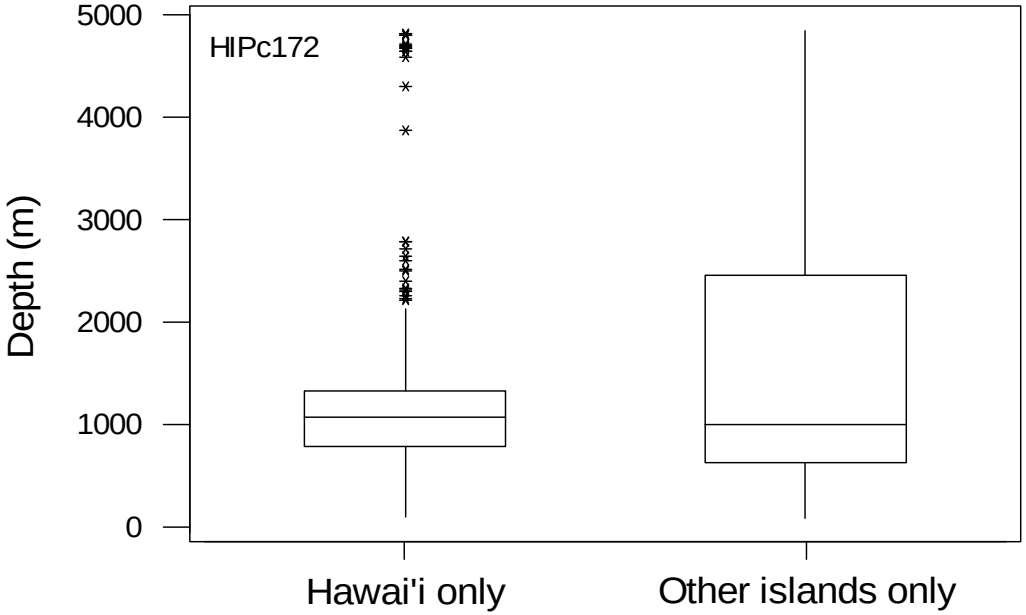
Individual tagged during longline boundary contraction moved closest to boundary (~16 km)

Dec 2008 –
Feb 2009



Individuals use different habitats off different islands





D. Perrine/SeaPics.com

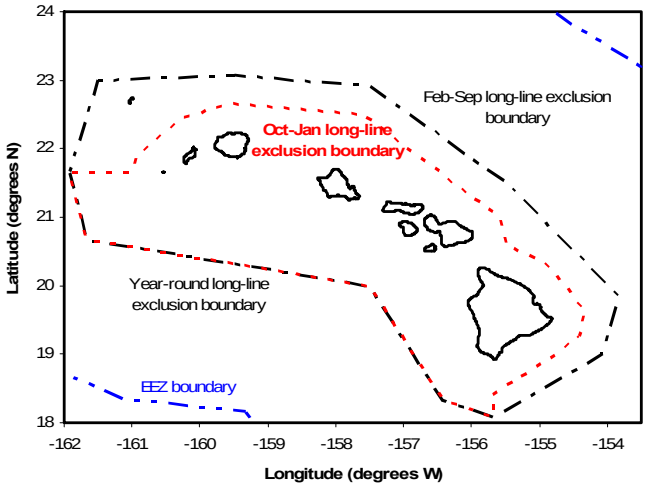
The longline boundary contracts on the windward side, so do they use windward and leeward sides of the islands differently?

Leeward (west) sides

- 58% of time
- Median depth = 674 m
- Median distance from shore = 14.0 km

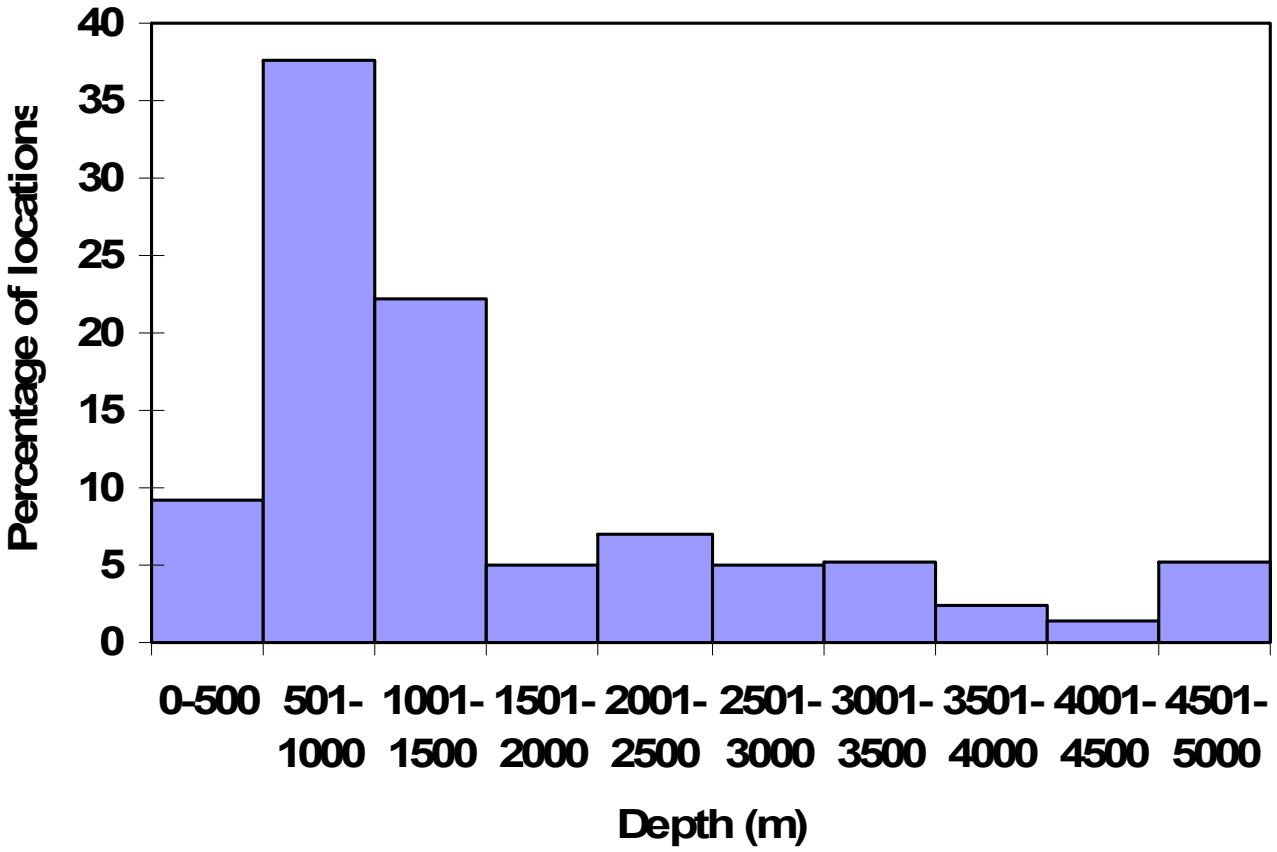
Windward (east) sides

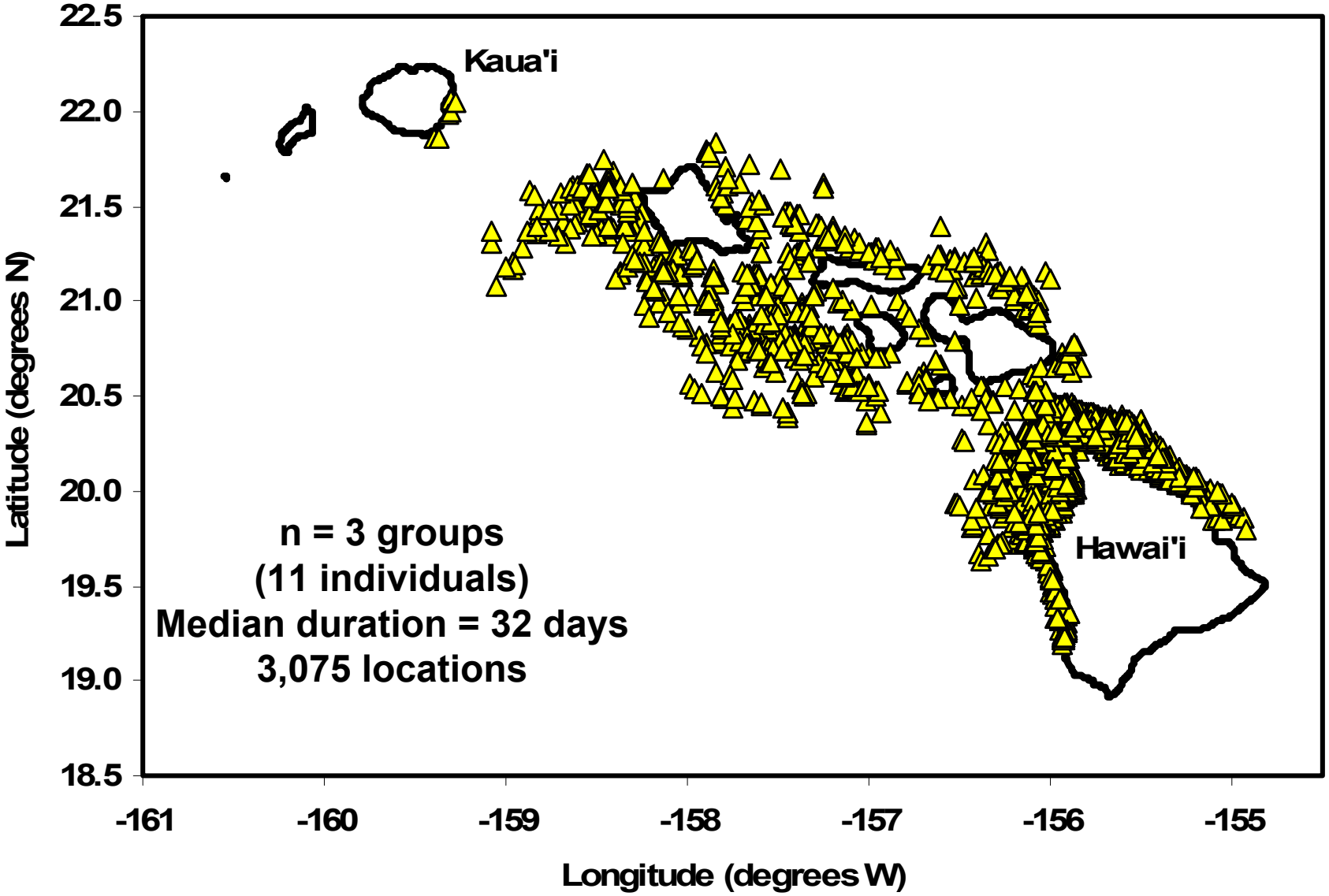
- 42% of time
- Median depth = 608 m
- Median distance from shore = 11.1 km

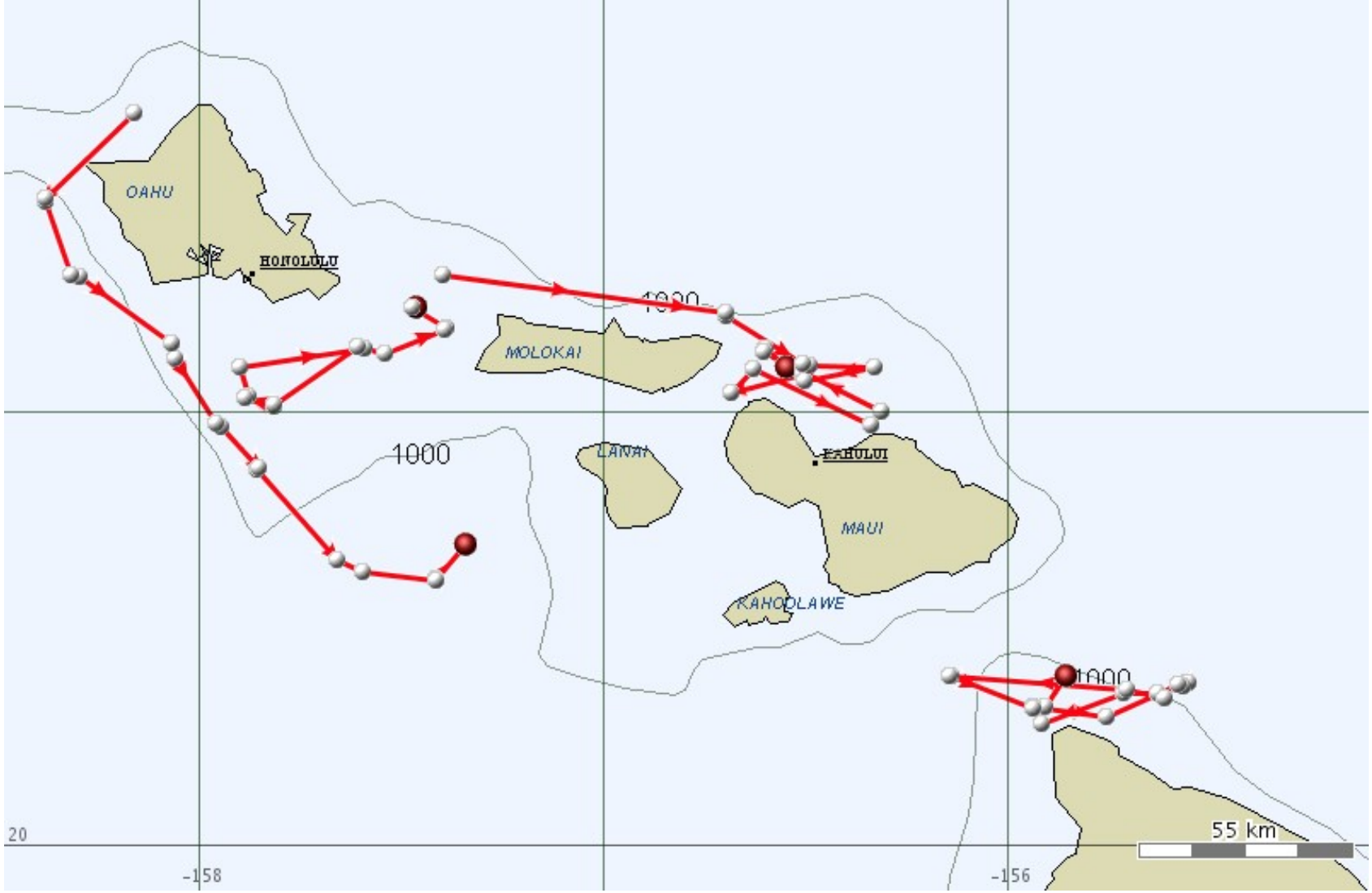


Sighting rates by depth (corrected for effort) indicate extremely broad range of habitats

52 days
405 locations




Kaua'i
Hawai'i
n = 3 groups
(11 individuals)
Median duration = 32 days
3,075 locations
22.5
22.0
21.5
21.0
20.5
20.0
19.5
19.0
18.5
Latitude (degrees N)
-161
-160
-159
-158
-157
-156
-155
Longitude (degrees W)



October 2009

5 individuals tagged off O‘ahu, 5 different days, 3 still transmitting

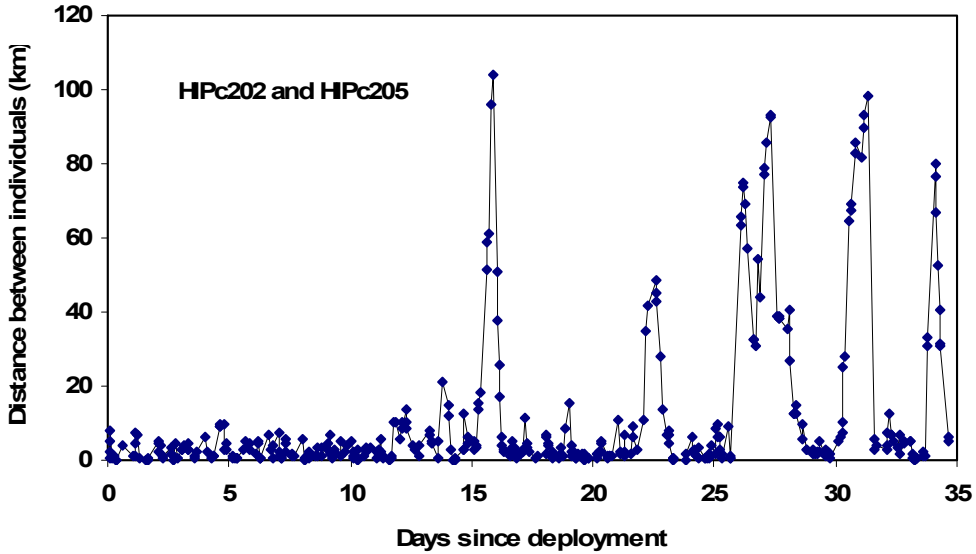
link by association to insular population

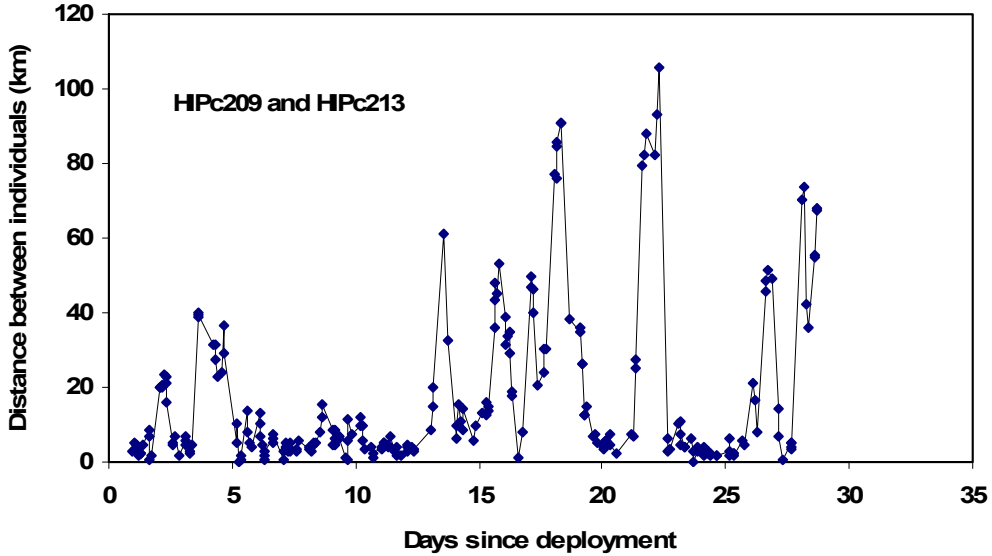
~1.5 days of movements through November 4, 2 AM HST

Acting as four different groups

October 2009
10 days of movements 3 individuals
9 days of movements 1 individual
8 days of movements 1 individual

Five individuals, 10 days, all locations each step +/- 6 minutes of each other





Individuals within groups spread as far as 100+ kilometers and re-join over periods of days

False killer whales are cooperative hunters that share prey and converge on captured prey