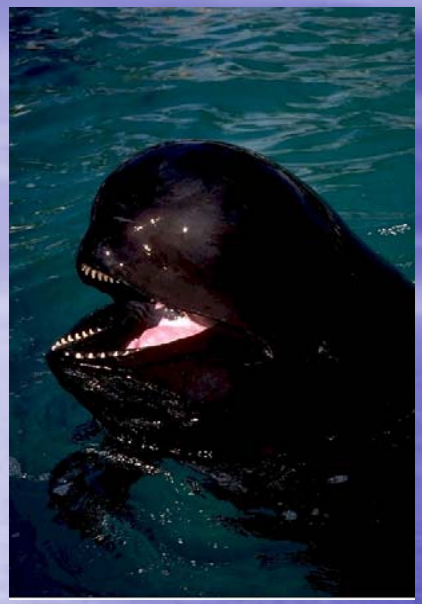
Pilot whale, common dolphin and white-sided dolphin life history, behavior and physiology characteristics

Damon Gannon
Mote Marine Lab

William McLellan
UNC Wilmington

Short-finned pilot whale (*Globicephala macrorhynchus*)
***globi*= round *cephala*= head, *macro*= large *rhynchus*= snout**



Field ID Chacteristics

Total Length= 15’ - 18’

Max Weight= 3,000 – 4,000 lbs

All black

Diffuse white anchor between fins

Large bulbous head

Very large dorsal fin

Long-finned pilot whale (*Globicephala melas*)
***globi*= round *cephala*= head, *melas*= black**

Field ID characteristics

Total Length= 16’ – 18’

Max Weight = 4,000 0 5,000 lbs

Dark black w/ white cape behind dorsal fin

Very prominent white anchor between fins

Very round head

Very long peduncle

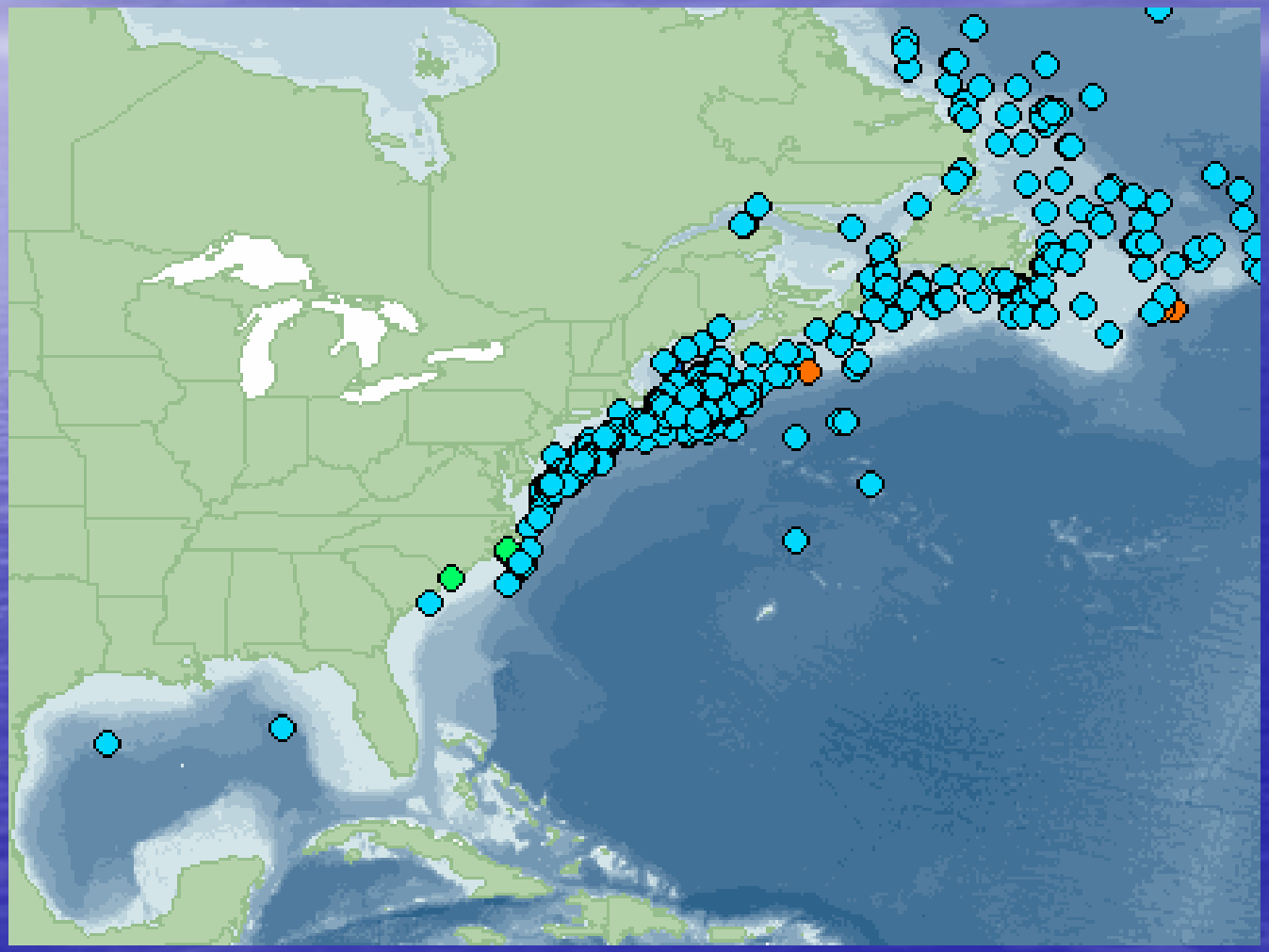
Short-finned

Long-finned

Fin length does not define species!

Significant overlap of fin length

Globicephala spp.



Source: OBIS-SEAMAP

Short-Finned

Long-Finned

Source: OBIS-SEAMAP

Individual Movements

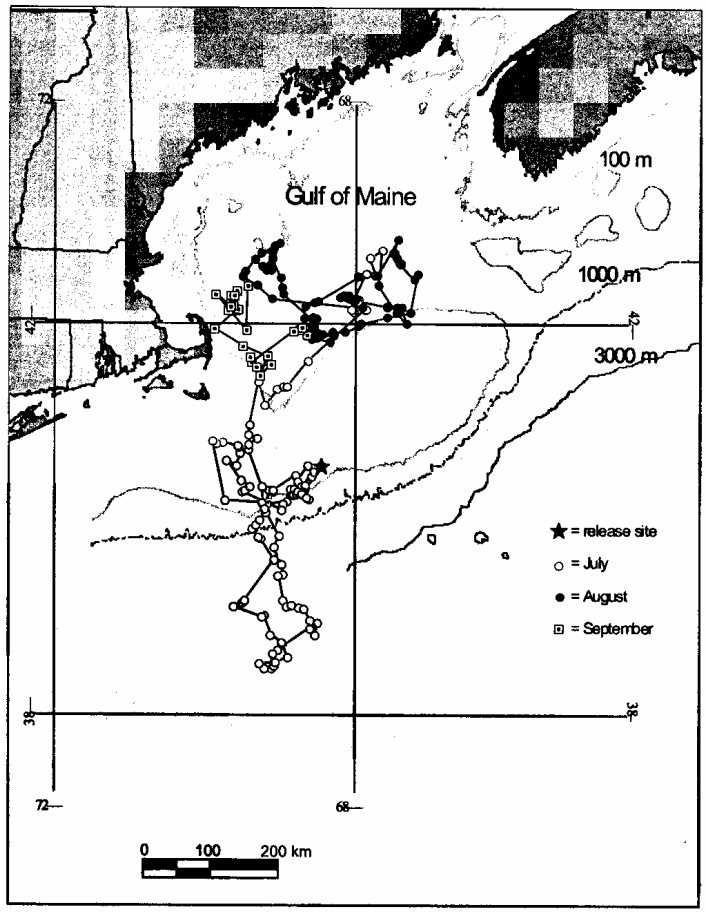


Figure 1. Satellite-acquired locations of a rehabilitated longfinned pilot whale released on 29 June 1987 and tracked for 94.5 d.

Mate, B. et al. 2005. Movements and dive habits of a satellite-monitored longfinned pilot whale (*Globicephala melas*) in the northwest Atlantic. *Marine Mammal Science* 21(1):136-144

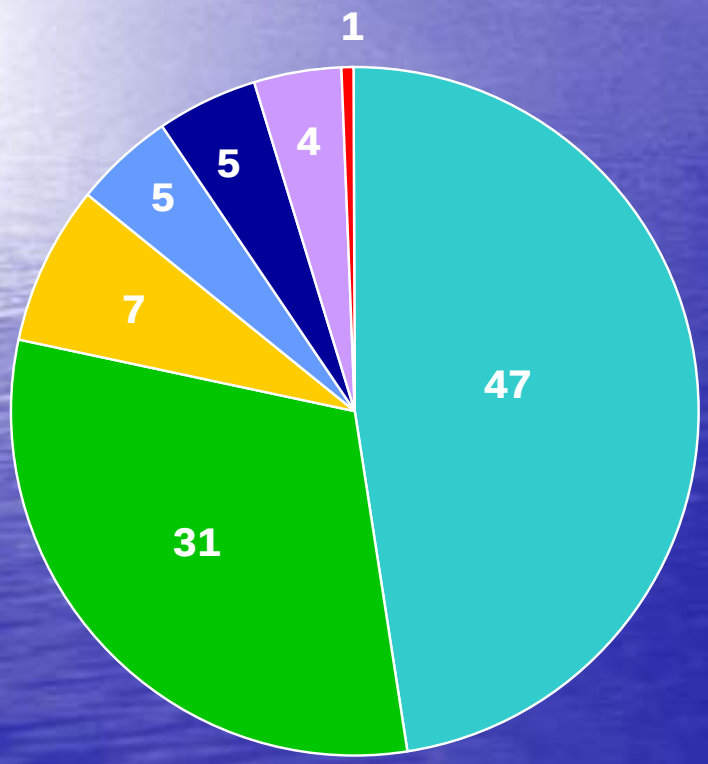
Life History

	Longevity (yr)	Reproductive Maturity (yr)	Calving Interval (yr)	Gestation (mo)	Female Repro Longevity (yr)
L-Fin	M: 46 F: 59	M: 17 F: 6-9	5	~12	40
S-Fin	M: 45 F: 62	M: 17 F: 8-9	5-8	~15	36

Food Habits

Long-Finned Pilot Whales

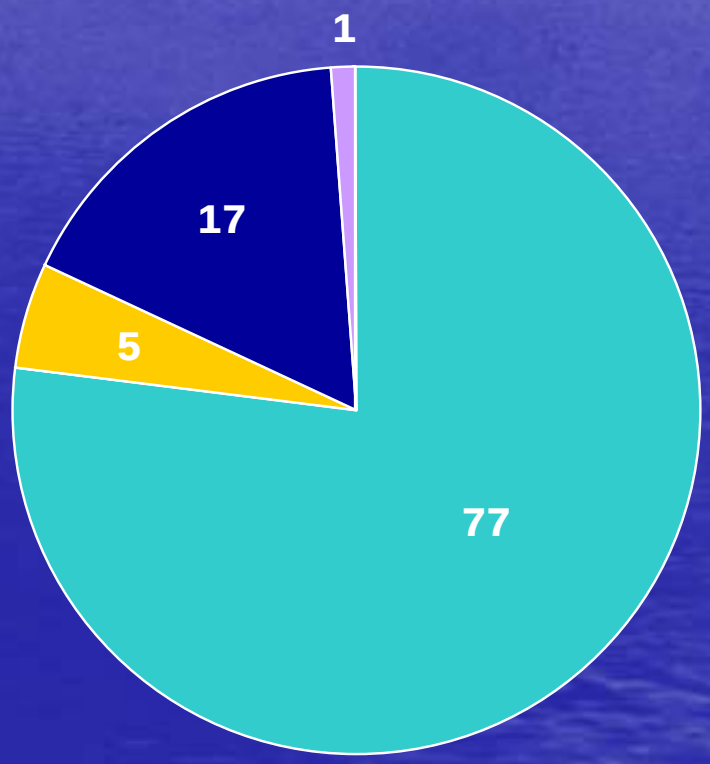
Stranded
n=8



Gannon et al. 1997
(Mar. Mamm. Sci.)

Loligo squid
Spiny Dog
Illex Squid
Atl. Herring
Atl. Mackerel
Histioteuthis
Chiroteuthis

Bycaught (DWF Mackerel Trawl)
n=30



Gannon et al. 1997
(Mar. Ecol. Prog. Ser.)

Food Habits

Short-Finned Pilot Whales

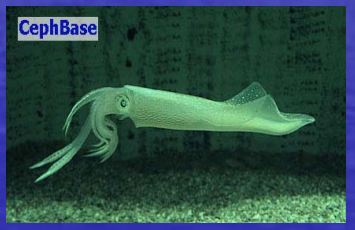
Fishes

Scopelogadus mizolepis (Big Scale)	43 %
Merluccius sp. (Silver / offshore hake)	1 %
Unknown fish	6 %

S. mizolepis

Squids

Brachioteuthis riisei (common arm squid)	10 %
Loligo sp. (Long-finned squid)	10 %
Histioteuthis reversa (reverse jewell squid)	7 %
Taonius pavo	5 %
Chiroteuthis spp. (Long-armed squid)	3 %
Abraliopsis	3 %
Mastigoteuthis sp.	1 %
Histioteuthis arcturi	1 %
Lepidoteuthis grimaldii (Grimaldi scaled squid	1 %
Ommastrephidae (Short-finned squid)	1 %
Unknown Squid	8 %

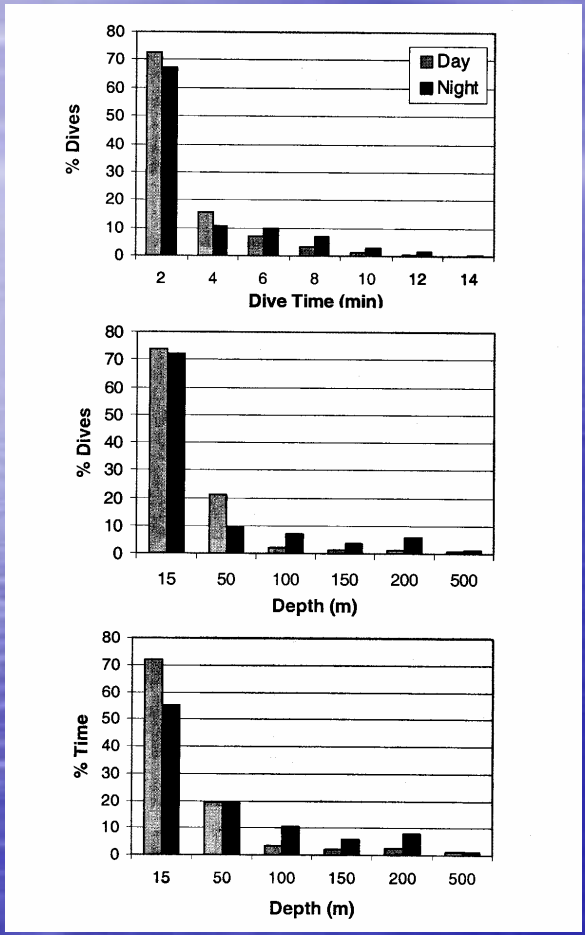


Loligo

H. reversa

Source: Jordan et al., in review

Diving

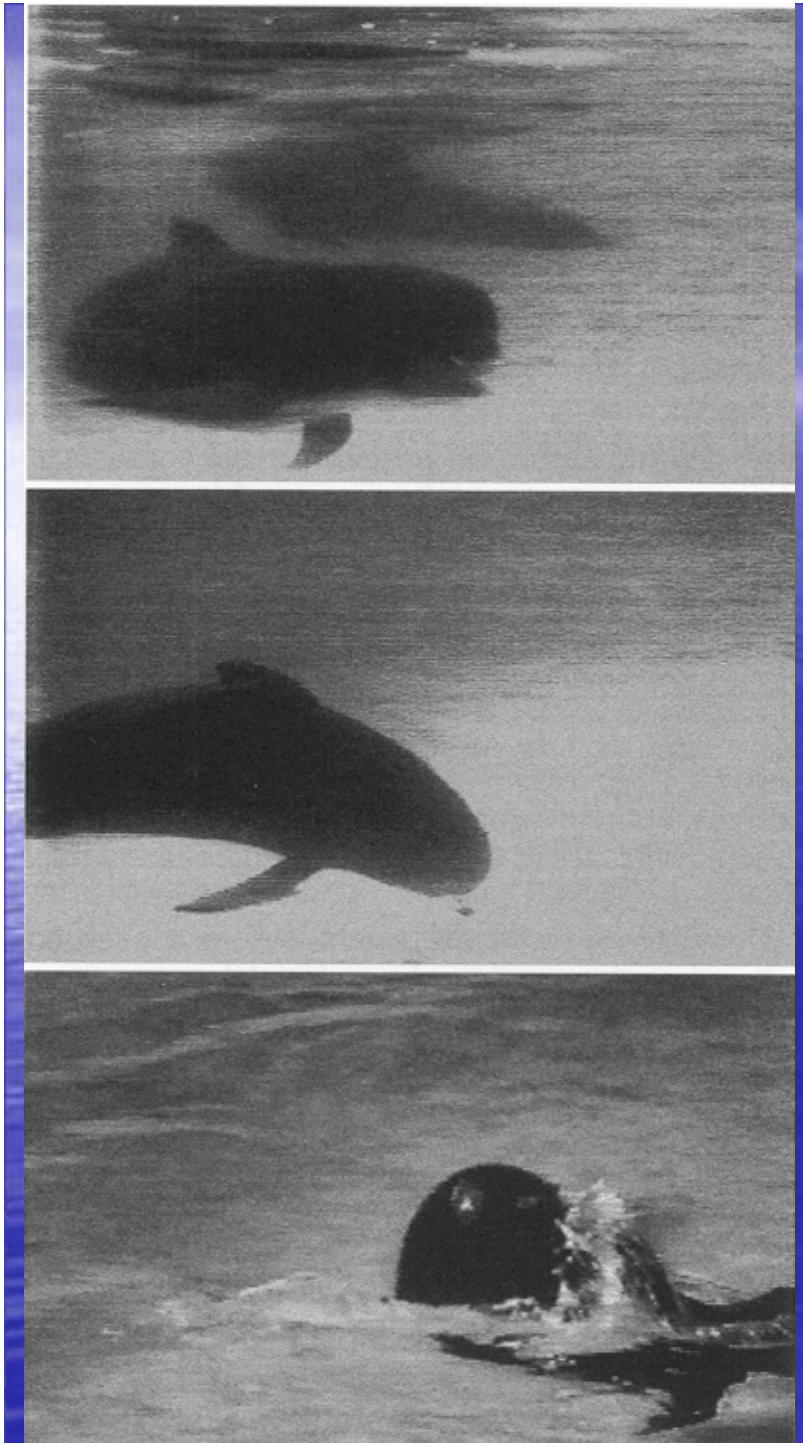


Nowojchik, R. et al. 2003.Movements and dive behavior of two stranded, rehabilitated long-finned pilot whales (*Globicephala melas*) in the northwest Atlantic. *Marine Mammal Science* 19(1):232-239.

Foraging Behavior:
Long-Finned Pilot Whales

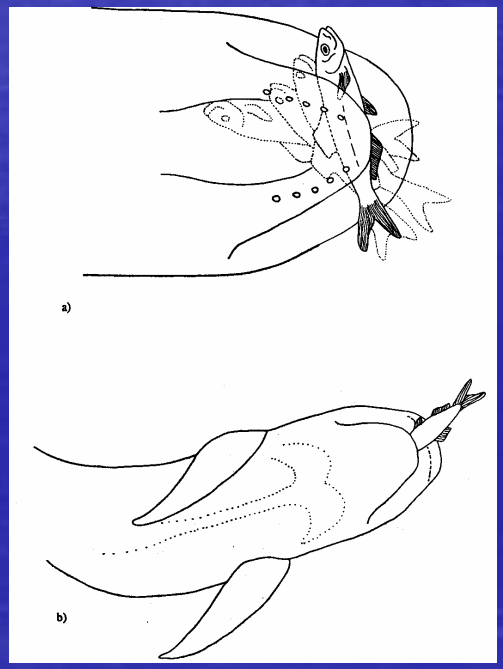
- Appear to feed mostly at night
- Dive to depths of at least 650 m (~2,100 ft)

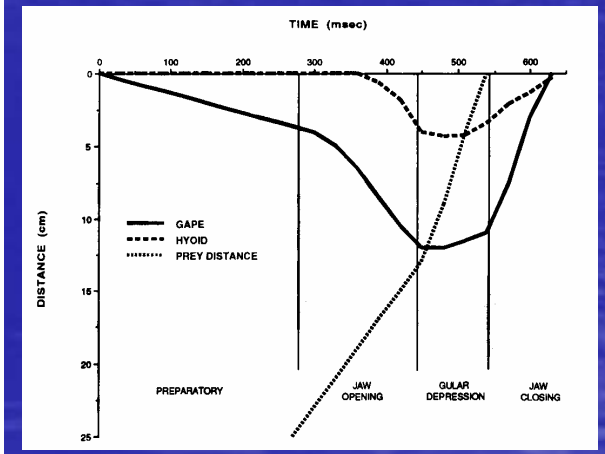
References: Gannon 1995, Gannon et al. 1997 (Mar. Ecol. Prog. Ser.), Baird et al. 2002 (Mar. Ecol. Prog. Ser.)



Long-finned pilot whales demonstrated to use suction to capture prey

- Captive animals (rehabilitation at NEA)
- Kinematic study from video-records
- 1st quantitative study of suction feeding





Werth, A. 2000. *Mar. Mam. Sci*. 16(2):299-314.

Feeding Mechanics

- Suction feeding (Werth 2000, Mar. Mamm. Sci.)
- Normally Swallow Prey Whole

Pilot whales suck!

Common Dolphin

Field ID Chacteristics

Total Length= 6 - 7”

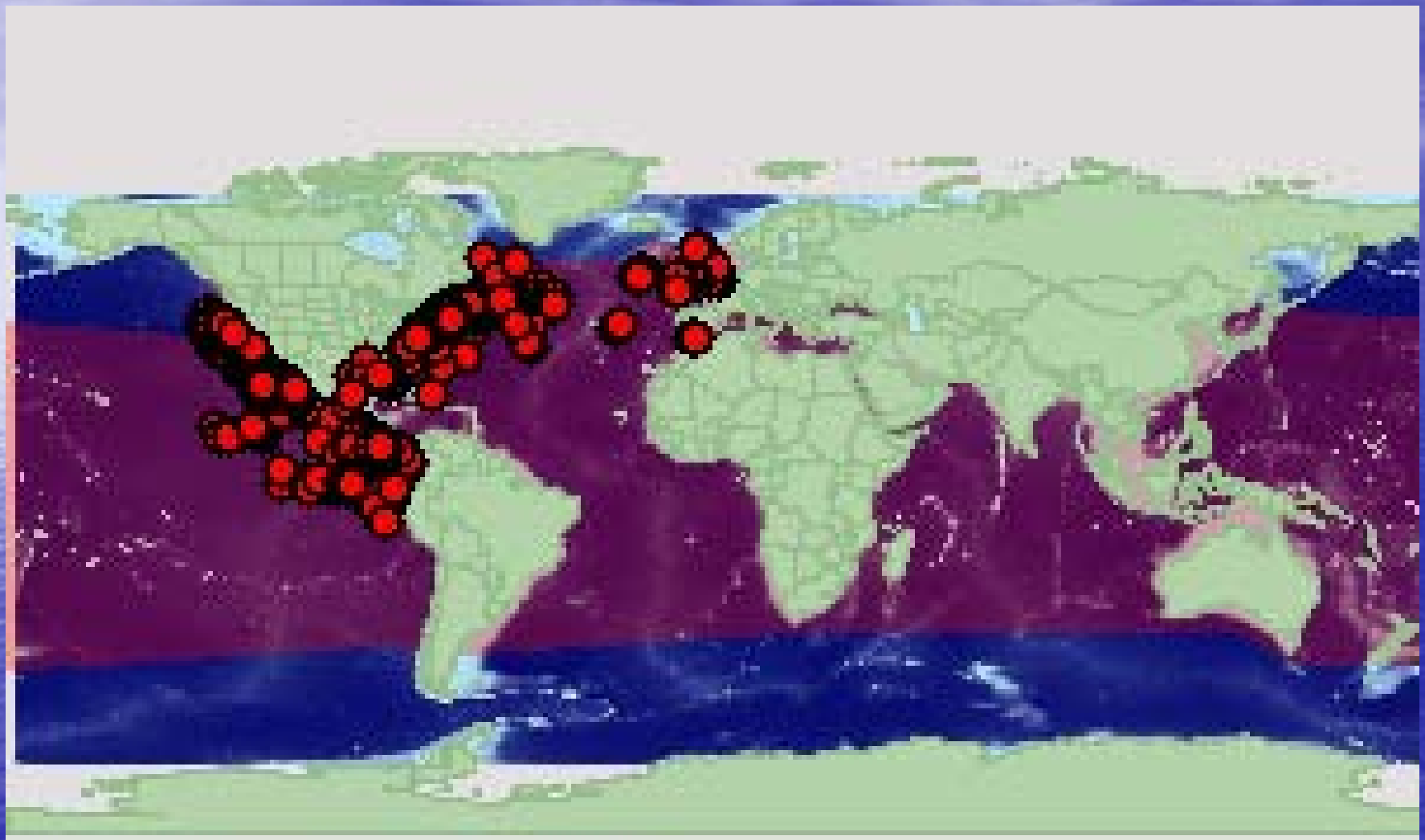
Max Weight= 200 lbs

Long beak

Between 40-55 teeth per row

Hourglass color pattern on side

Common Dolphin



Source: OBIS-SEAMAP

Common Dolphin

Life History

Longevity (yr)	Reproductive Maturity (yr)	Calving Interval (yr)	Gestation (mo)	Female Repro Longevity (yr)
25-30	8-9.5	2+	11-12	?

Westgate, 2006

Common Dolphin

Food Habits

Broad Diet: small, pelagic, associated with deep scattering layer

Fish: Mackerels, herrings, silver hake, sternoptychids (pearlsides), myctophids (lanternfishes...many species), paralepids (barracudinas), scomberesocids (sauries), stomiids (dragonfishes & viperfishes)

Cephalopods: Loligo spp., Illex spp., Sepiola, Alloteuthis, Brachioteuthids, Chiroteuthids

Crustaceans: Acanthephyra (peaked shrimps), Pasiphaea (glass shrimps), Meganyctiphanes norvegica (northern krill)

Stomias boa, scaly dragonfish

Chauliodus sloani, viperfish

Pasiphaea, glass shrimp

Atlantic white-sided dolphin (*Lagenorhynchus acutus)*
***Lageno =* bottle *rhynchus =* beak, *acutus =* pointed**

White-Sided Dolphin

Field ID Chacteristics

Total Length= 8’

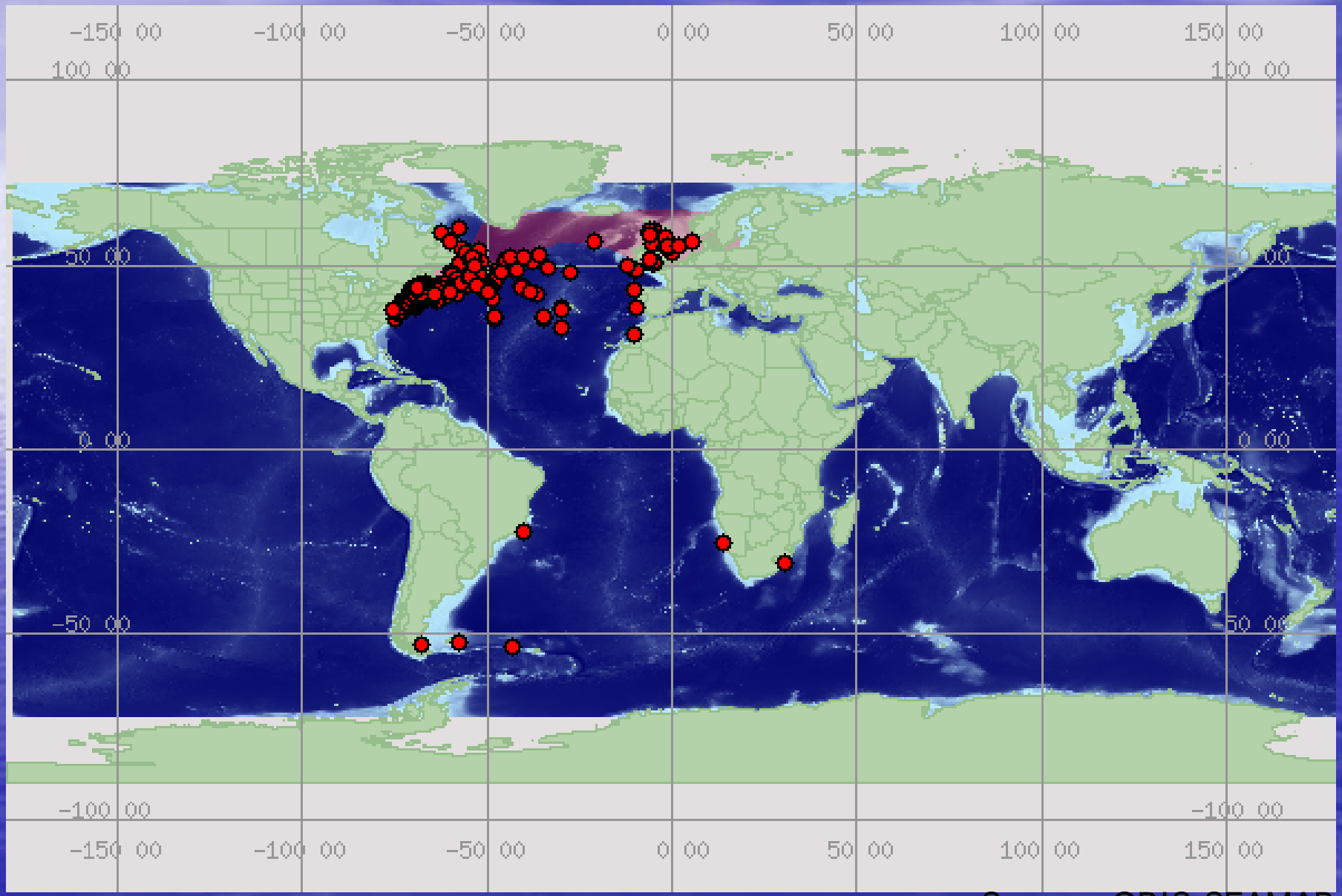
Max Weight= 600 lbs

Blunt beak

Less than 40 teeth per row

Both white and yellow stripe on side

White-Sided Dolphin



Source: OBIS-SEAMAP

White-Sided Dolphin

Life History

Longevity (yr)	Reproductive Maturity (yr)	Calving Interval (yr)	Gestation (mo)	Female Repro Longevity (yr)
	6-12	?	10-12	

White-Sided Dolphin

Food Habits

Broad Diet: demersal & pelagic schooling prey

Fish: Atlantic herring, Atlantic mackerel, silver hake, sand lance (sand eels), cod, pollock

Cephalopods: Loligo, Illex

Question for TRT:

- Are animals just in the wrong place at the wrong time or are they attracted to the trawls?

- If they target the trawls, what cues do they use to locate the gear?

- If they are targeting the trawls, at what point do they interact with the gear?

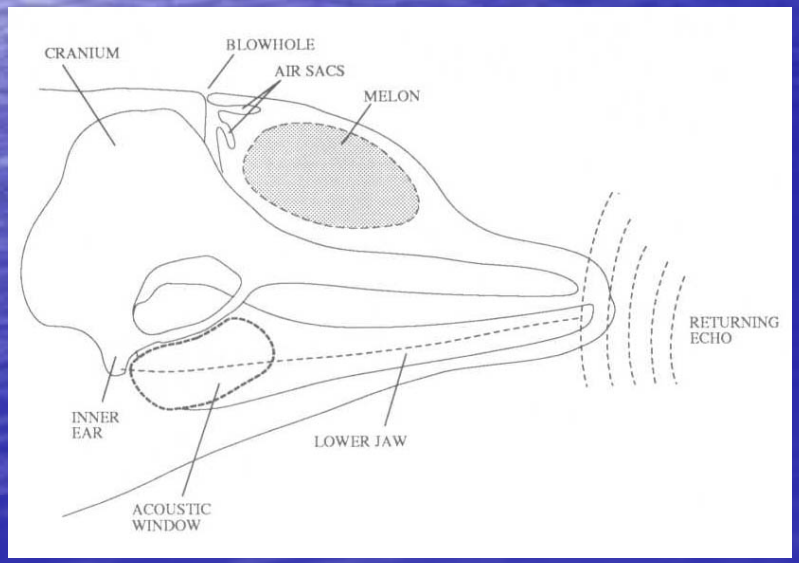
Note: 4 different species, so answers may not be simple.

Echolocation

Comprised of three distinct processes:

- Sound production
- Sound reception
- Signal processing

Sound Production



Bottlenose dolphin

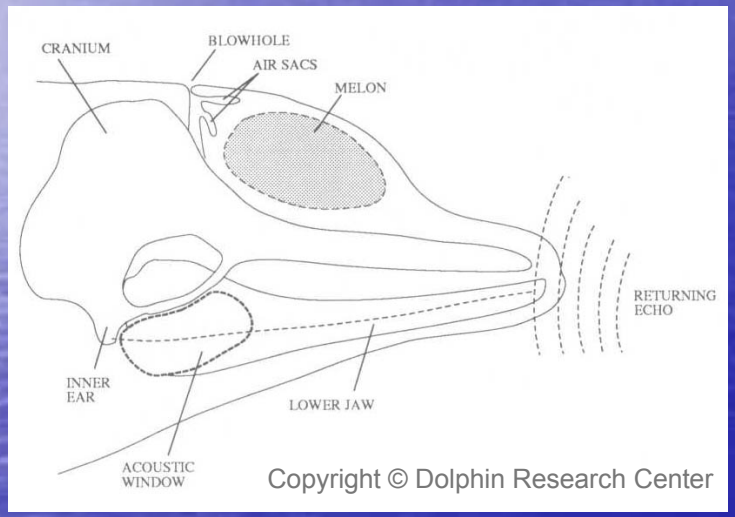
No Vocal Chords

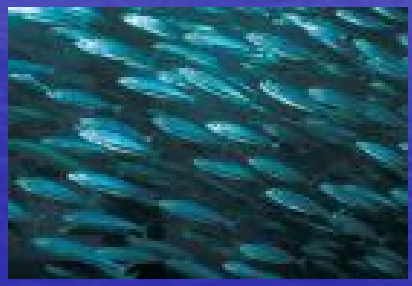
No External ears

How do they produce, and/or receive sounds?

Sound Production and Reception

Toothed whales produce high frequency sounds on top of their head at the blowhole and travel through the “melon”





They receive sound through the lower jaw and is directed to the ears by fat channels that have similar properties of water

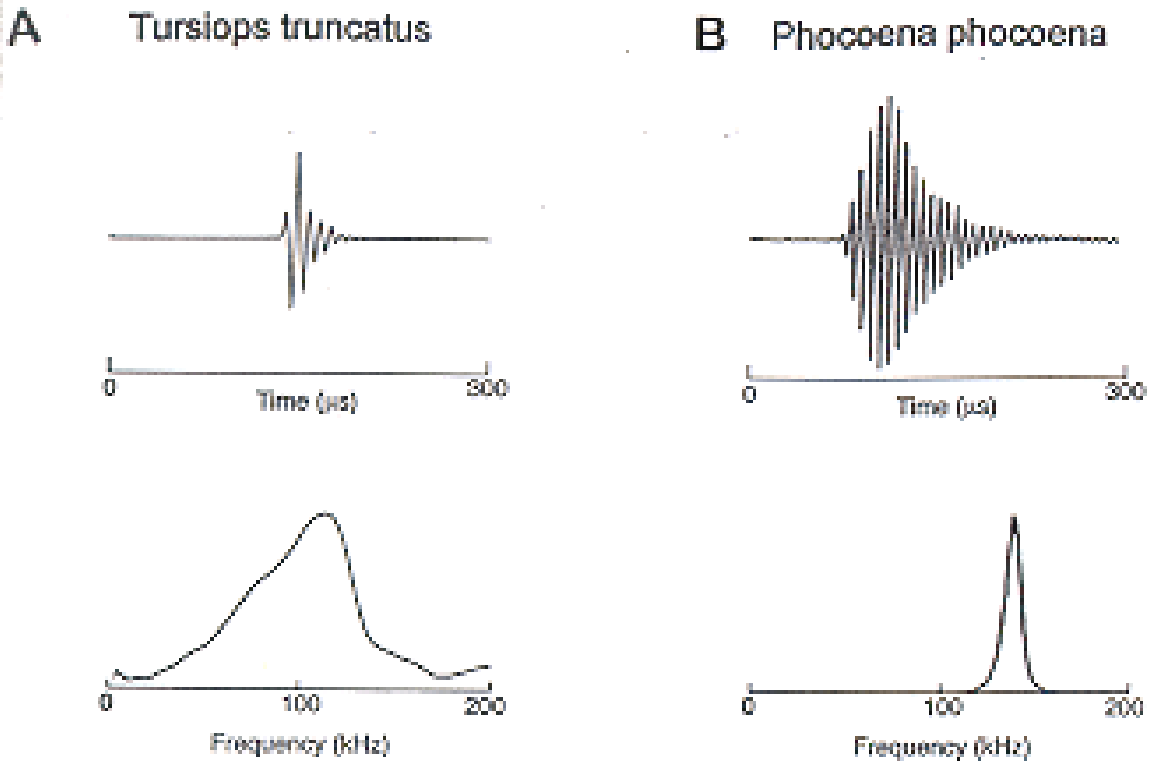


Figure 7-2. (A) Waveform and frequency spectrum of the echolocation click of a bottlenose dolphin (*Tursiops truncatus*). (From Au 1993.) (B) Waveform and frequency spectrum of the echolocation click of a harbor porpoise (*Phocoena phocoena*). (From Kamminga and Wiersma 1981.)

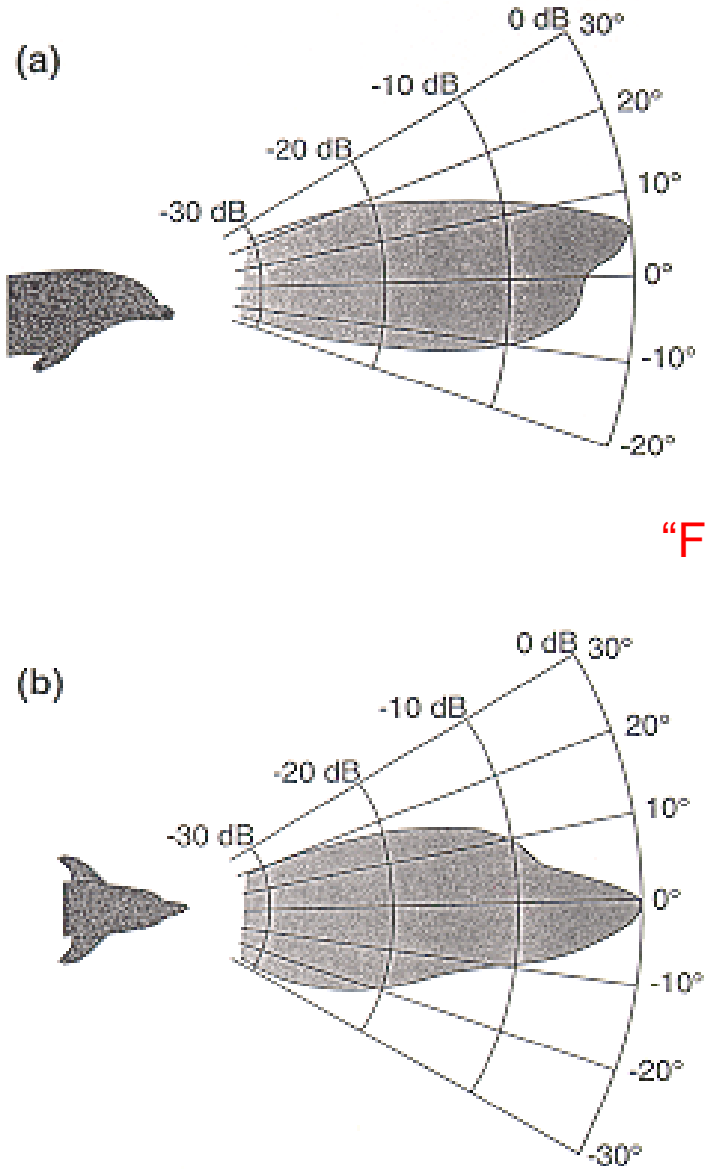
Target Detection

Diameter of target must be > 1 wavelength

$$\lambda = c/f$$

Wavelength (meters) = **Speed of sound** (m/sec) ÷ **Frequency** (Hz or Cycles/sec)

S-Fin Pilot Whale: λ = 1530 m/s / 60000 cyc/s = 0.025 m



"Flashlight Beam"

Figure 10.10. Focused transmission beam patterns of three different bottlenose dolphins in the vertical (a) and horizontal (b) planes. (Redrawn from Au, 1993.)

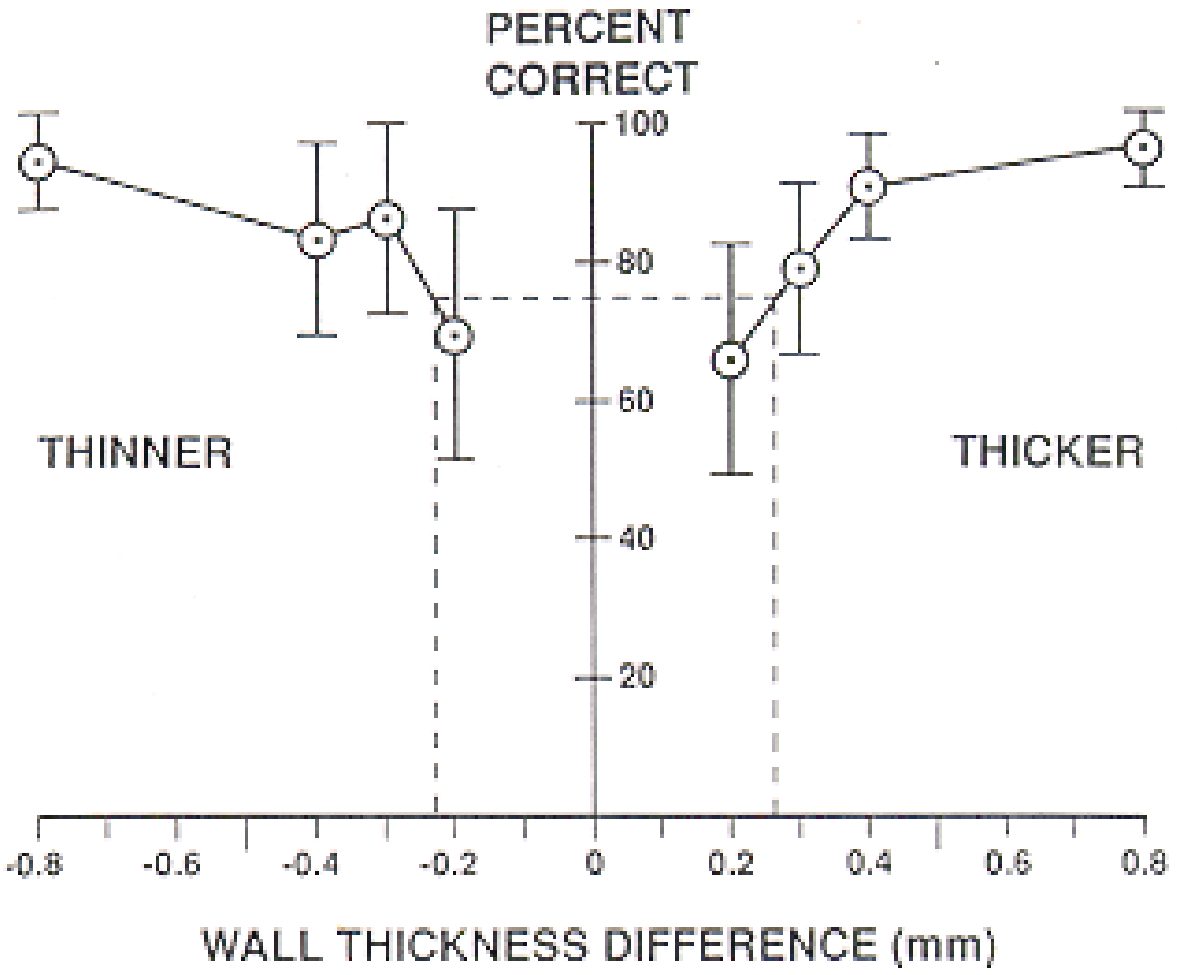
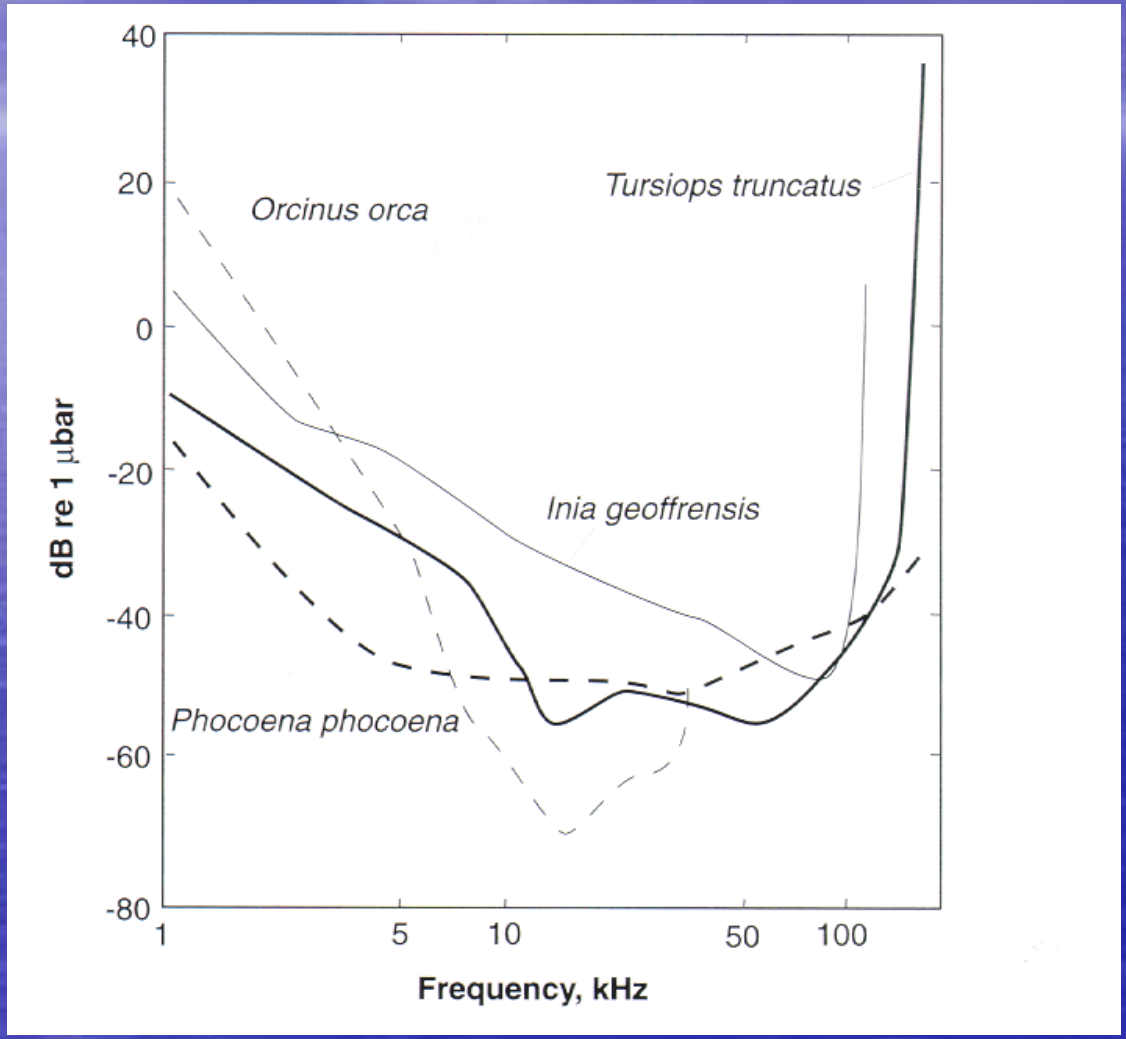


Figure 9.24. Dolphin wall thickness discrimination performance as a function of wall thickness difference. (From Au and Pawloski 1992.)

Passive Listening vs. Echolocation

- Costs of Echolocation
  - Metabolic
  - Ecological (alerting competitors, predators, prey)
- Passive Listening
  - Killer whales (Barrett-Lennard et al. 1996)
  - Bottlenose dolphins (Gannon et al. 2005)

Hearing


40
20
0
-20
-40
-60
-80
dB re 1 µbar
Orcinus orca
Tursiops truncatus
Inia geoffrensis
Phocoena phocoena
1
5
10
50
100
Frequency, kHz