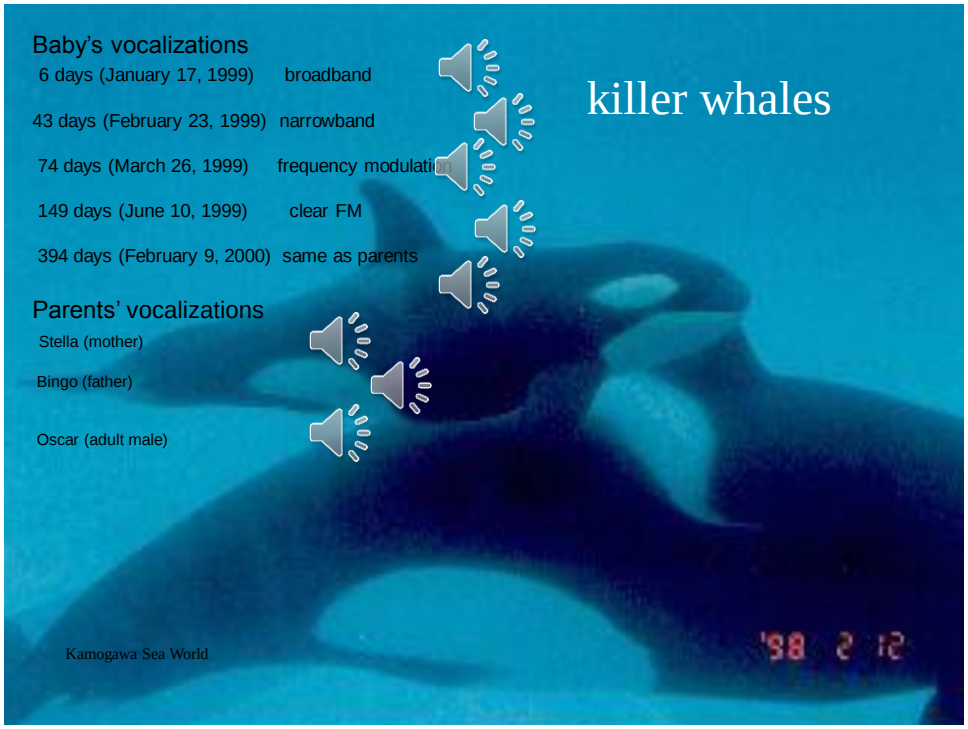
May 14, Cebu, Philippine

General underwater bioacoustics

Tomonari Akamatsu (Fisheries Research Agency, Japan)

1. Communication


2才
3才
4才
4才郁


Baby's vocalizations
6 days (January 17, 1999) broadband
43 days (February 23, 1999) narrowband
74 days (March 26, 1999) frequency modulati
149 days (June 10, 1999) clear FM
394 days (February 9, 2000) same as parents
Parents' vocalizations
Stella (mother)
Bingo (father)
Oscar (adult male)
killer whales
Kamogawa Sea World

Signature whistle

 1975

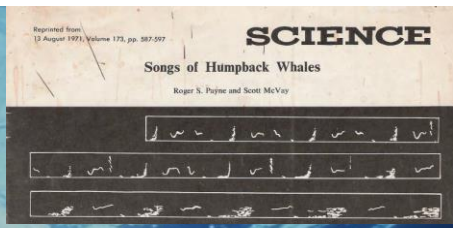
 1985

 1987

 1985

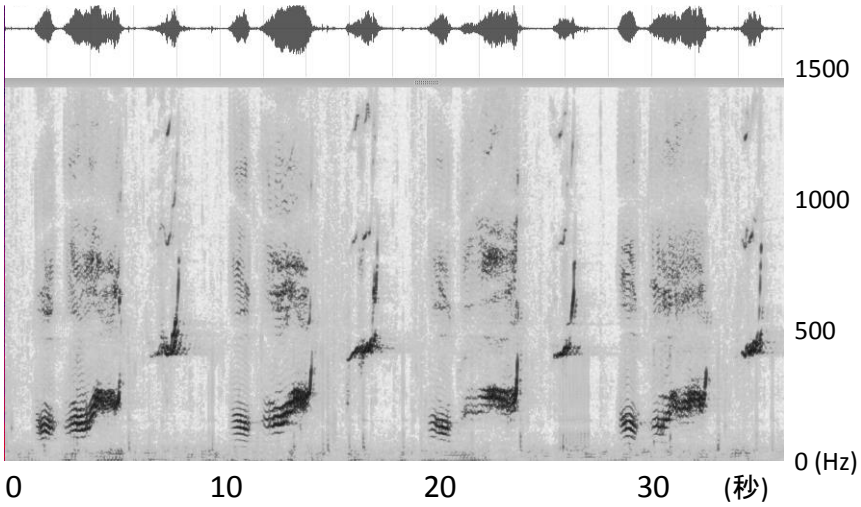
Sayigh et al. 1990

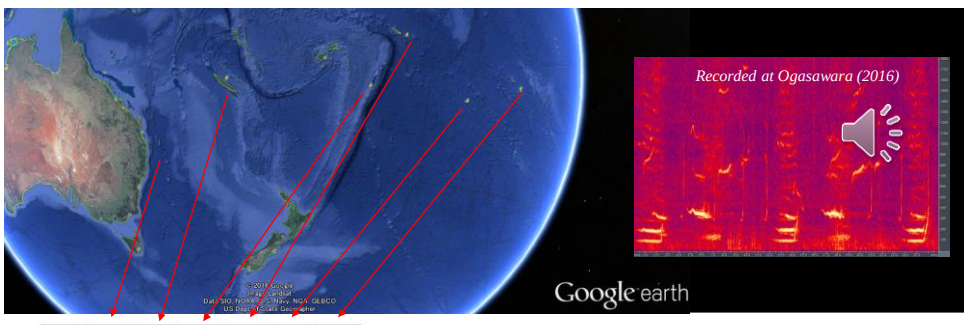
撮影:河 滇



Ship noise

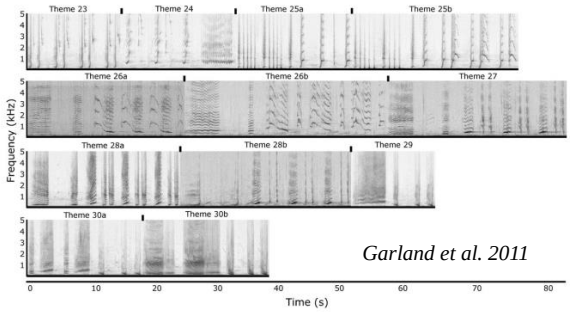
humpback whales





Year	East Australia	New Caledonia	Tonga	American Samoa	Cook Islands	French Polynesia
1998						
1999						
2000						
2001						
2002						
2003						
2004						
2005						
2006						
2007						
2008						

Spectrographs of the Blue Song Type (Themes 23–30)



Garland et al. 2011

2. Species identification

Species

YAMAHA C7X

Species

YAMAHA C7X

Species

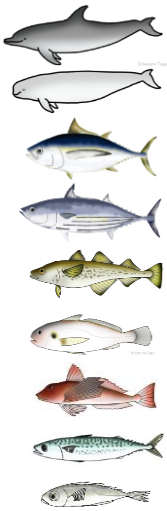
YAMAHA C7X

http://gitakencan.exblog.jp/18432085

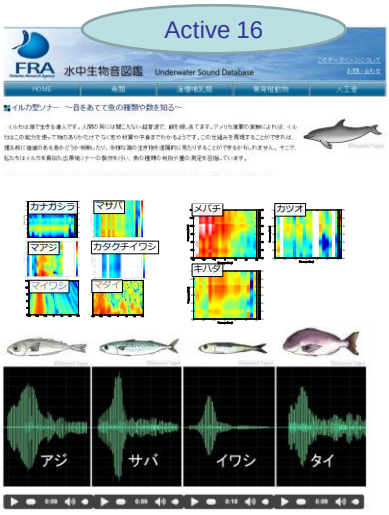
Species

Fixed hydrophone :100,000 hours (11 years)
Cable observatories : over 20 years
Towed hydrophone : 8,000 km

Passive 52

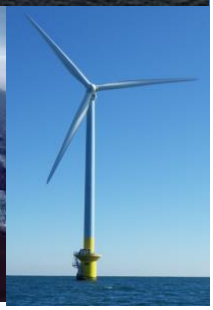


Active 16



3. Effect of noise

Noise isolation

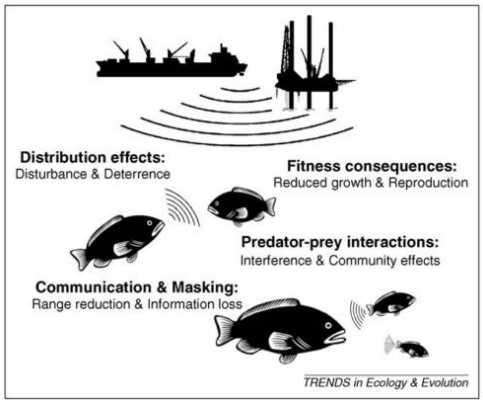


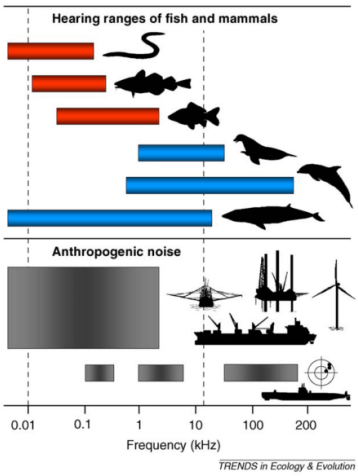
Review

Cell PRESS

A noisy spring: the impact of globally rising underwater sound levels on fish

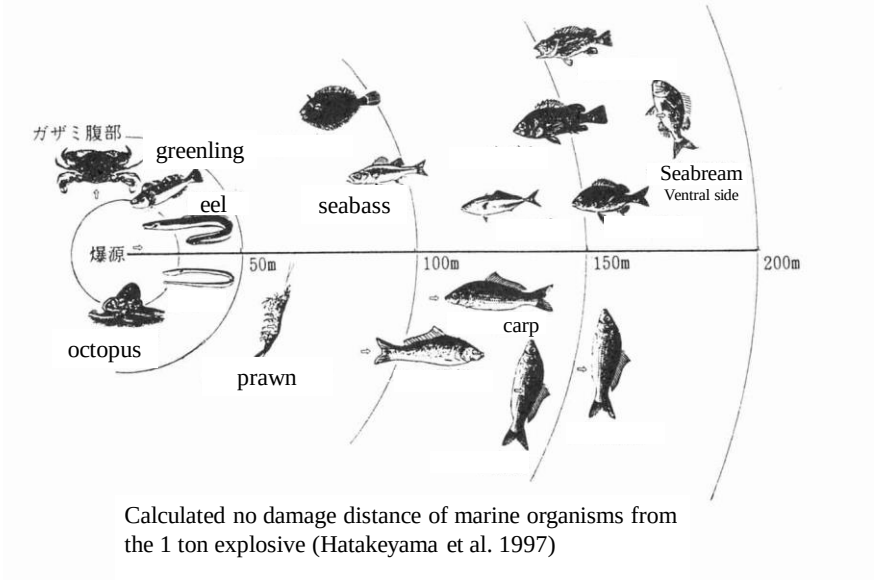
Hans Slabbekoorn[1], Niels Bouton[2], Ilse van Opzeeland[3], Aukje Coers[4], Carel ten Cate[1] and Arthur N. Popper[5]





Trends in Ecology and Evolution, *25*(7), 419–427.

Physical effect of noise



Calculated no damage distance of marine organisms from the 1 ton explosive (Hatakeyama et al. 1997)

lethal effect of noise

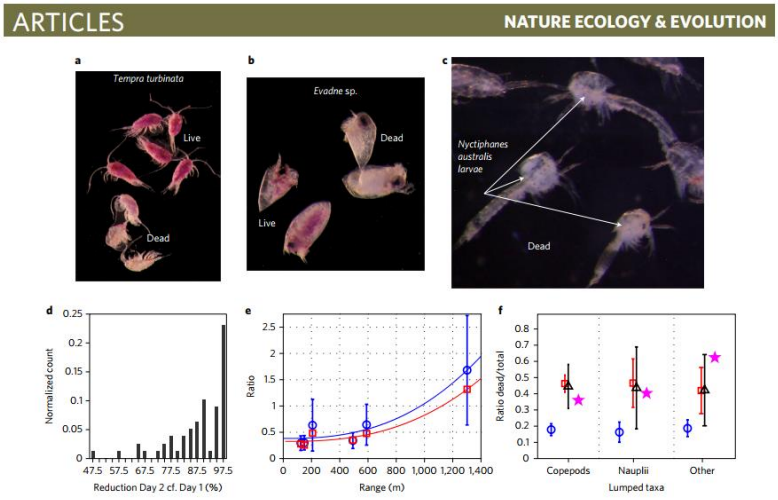


Figure 3 | Zooplankton vital staining images, and ratios of zooplankton abundance and dead to total plankton counted. a–c, Image of copepod (*Temora turbinata*, Temoridae; **a**), cladoceran (*Evadane* sp., Podanidae; **b**) and krill larvae (*Nyctiphanes australis*, Euphausiidae; **c**). **d**, Distribution for control samples of the percentage reduction in abundance of all net tows on Day 2 compared with Day 1. **e**, Ratio of exposed/control abundance for copepods and cladocerans with range from DTASL showing mean (circles), median (squares), and power fit to mean (blue) and median (red) values ($r^2 = 0.92$ and 0.96, respectively). **f**, Ratio of dead/total animals counted for copepods, nauplii and other zooplankton, with means of controls (blue circles), and 71–150 m (red squares), 451–547 m (black triangles) and 1,248 m (magenta stars) from DTASL. Error bars are 95% confidence limits. Live and dead animals are shown in the vital staining images.

McCauley, Robert D., et al. " *Nature Ecology & Evolution* 1 (2017): s41559-017.

Very basics of environmental impact assessment

Senario 1
No comparison

Survey 1	Before	During	After
impact		few	
control			

Senario 2
Change only in impact zone

Survey 2	Before	During	After
impact	many	few	many
control			

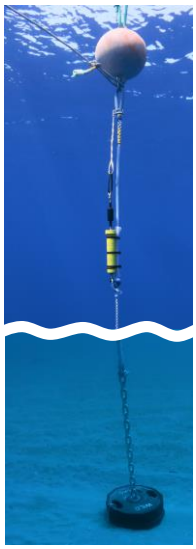
Senario 3A
Natural change

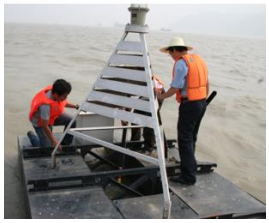
Survey 3A	Before	During	After
impact	many	few	many
control	many	few	many

Senario 3B
Effect of impact

Survey 3B	Before	During	After
impact	many	few	many
control	many	many	many

Fixed acoustic monitoring platforms

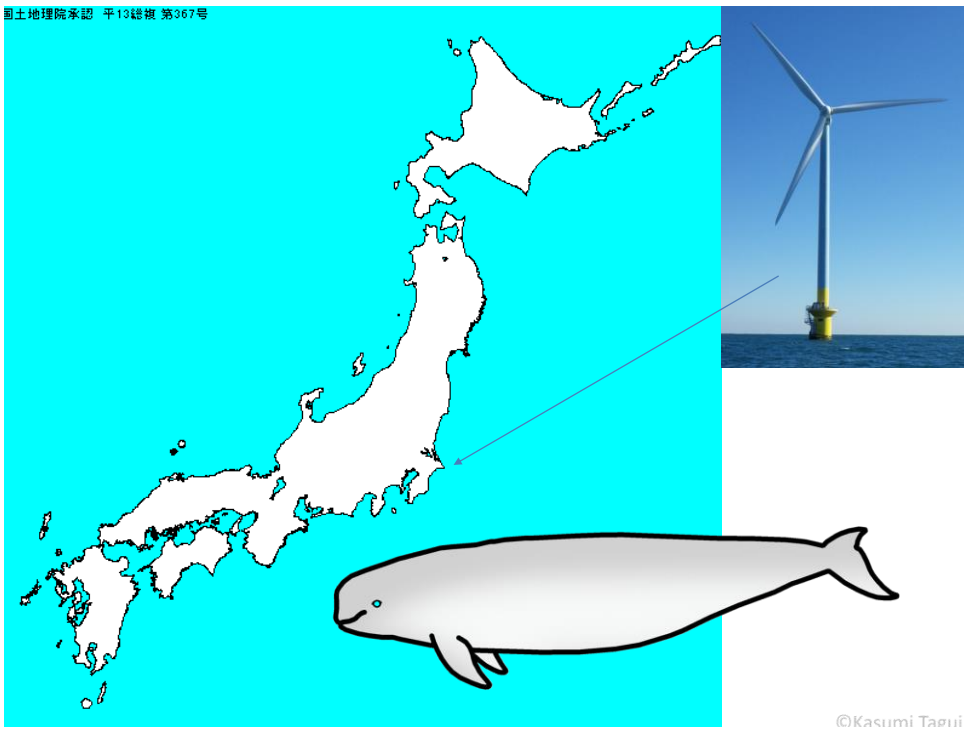




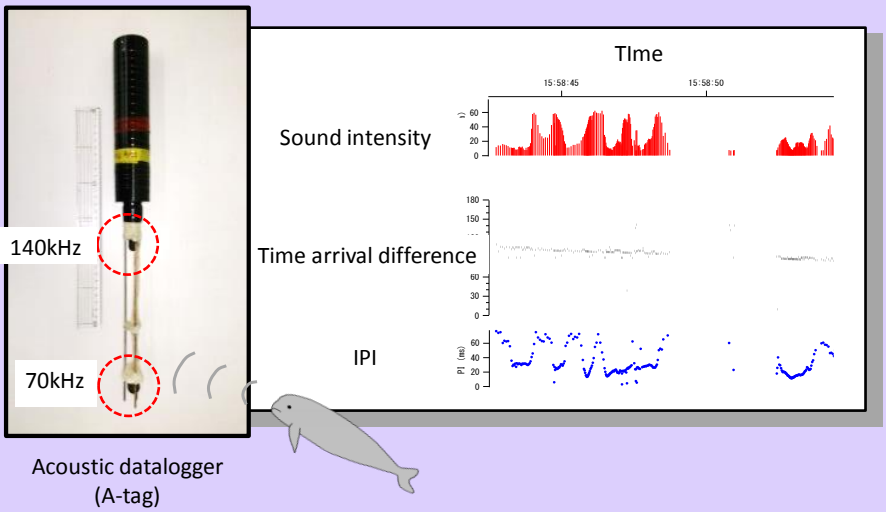
Advantages
- simple deployment
- available anywhere
- silent

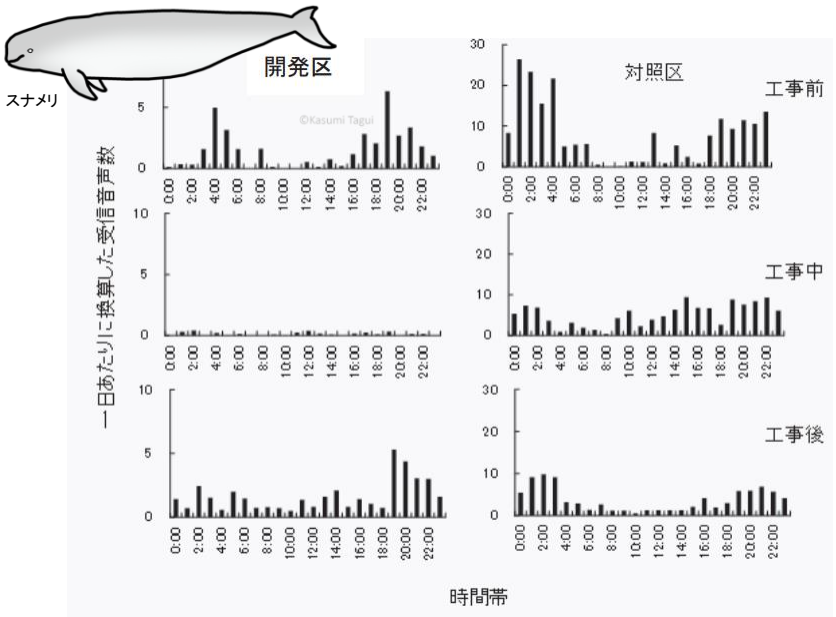
Disadvantages
- mooring noise
- orientation
- permissions

Tips
- submerge all
- use existing buoys



Acoustic datalogger (A-tag)





「着床式洋上風力発電導入ガイドブック」の別冊である「着床式洋上風力発電の環境影響評価手法に関する基礎資料」365ページ