

Population Biology of Northern Elephant Seals

Population growth and demography

Richard Condit¹

with

P. Morris, D. Costa, M. Lowry, J. Reiter, B. Hatfield,
S. Allen, G. Oliver, R. Zeno, B.J. Le Boeuf

¹Smithsonian Tropical Research Institute

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Population biology



Overview

World population

- Breeding colonies
- Southern elephant seal
- Population growth

Censusing

Local population trends

- Año Nuevo growth and decline
- Piedras Blancas and Central California
- Immigration from the south

Demography

- Survival
- Lifespan

Breeding colonies



Breeding colonies

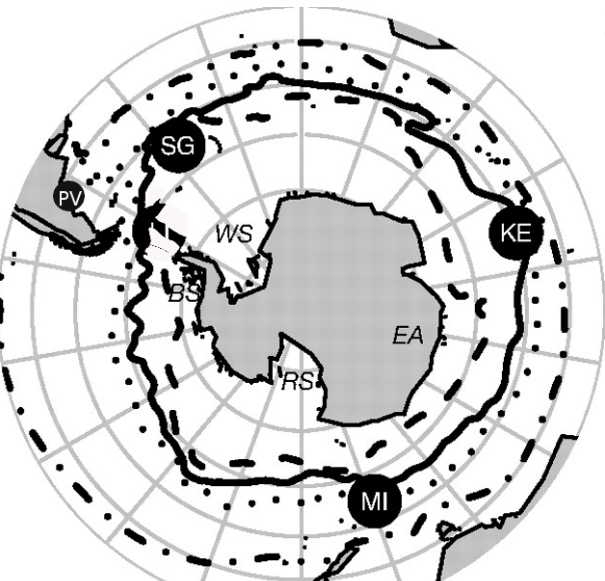


Breeding colonies

- ▶ 21 colonies, s. Baja to Vancouver I. (26° to 48° N. Lat)
- ▶ 7 have more than 2,000 pups born per year (28° to 38° N. Lat)
- ▶ the largest: 15,000 pups per year at San Miguel Island
- ▶ the origin: Guadalupe Island had all survivors in 1890

Southern elephant seals

population size = 600,000



Mainland in Patagonia



Mainland in Patagonia



Which is which?



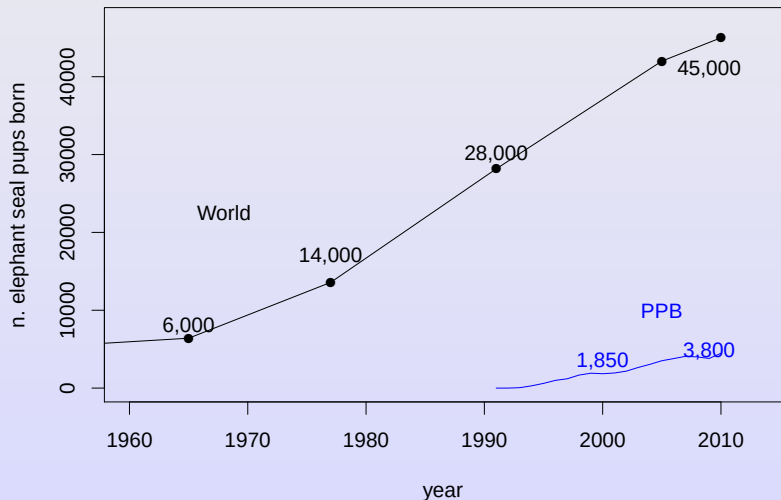
Population of all northern elephant seals

- ▶ nearly exterminated by hunting (for oil) around 1900
 - ▶ approximately 100-500 survived
 - ▶ only at Guadalupe Island, Mexico
- ▶ expanded quickly after hunting stopped
 - ▶ 6,000 pups* born per year by 1965, mostly still in Mexico
 - ▶ 40,684 born in US in 2010; Mexico uncertain at ~ 8000
 - ▶ 48,500 pups world population $\Rightarrow$ 212,000 total
 - ▶ still growing through 2010**, but rate slowed 2005-2010
 - ▶ currently $\sim 215,000 \pm 25,000$

* total population = $4.4 \times$ number born

** see Lowry et al, Aquatic Mammals 2014

World population trend



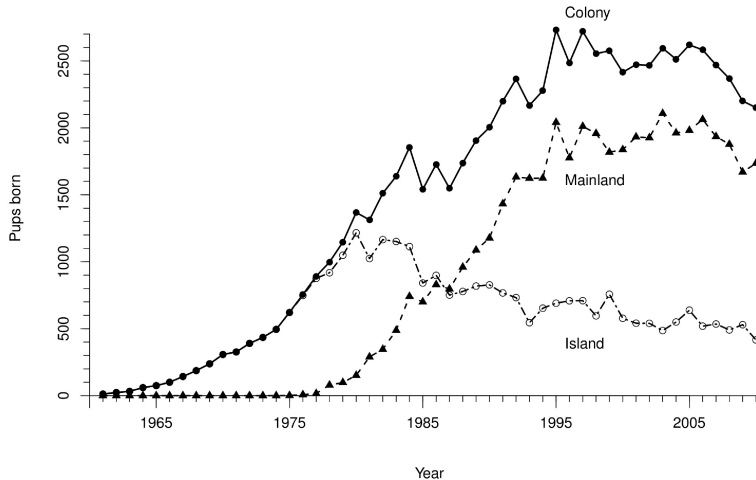
Censusing elephant seals



Censusing elephant seals



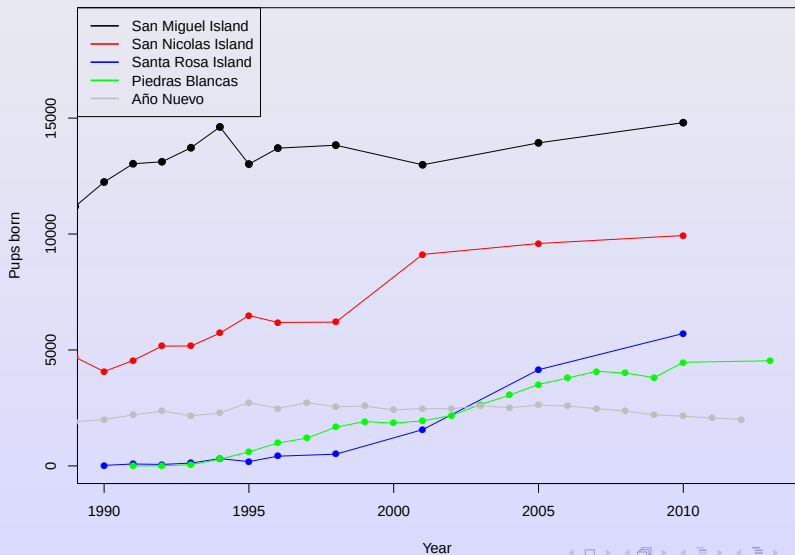
Año Nuevo Population



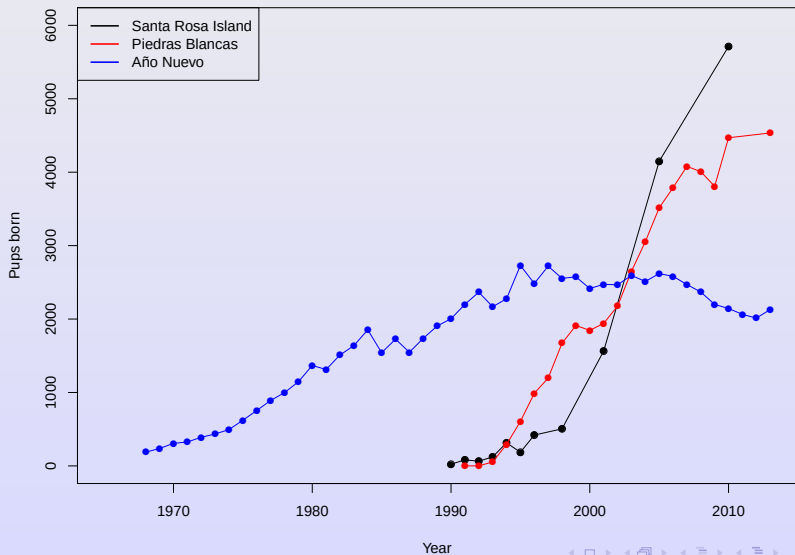
Año Nuevo Population

- ▶ Breeding first known on the island in 1961 (11 pups born)
- ▶ First pup born on the mainland in 1975
- ▶ Colony grew until 1995 when 2,500 pups were born
- ▶ No further growth through 2005
- ▶ Reduction since 2005

Population in California

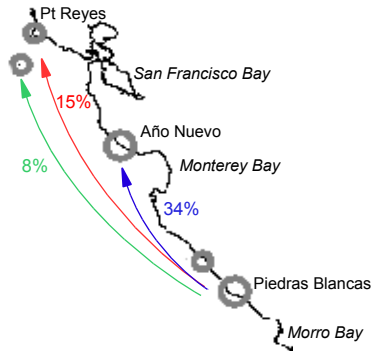


Population in California



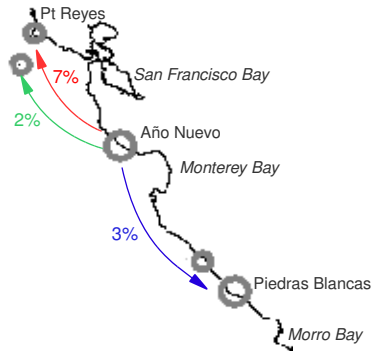
Dispersal and immigration

Breeding dispersal
Females born at Piedras Blancas
(1998-2000 cohorts, N=101)

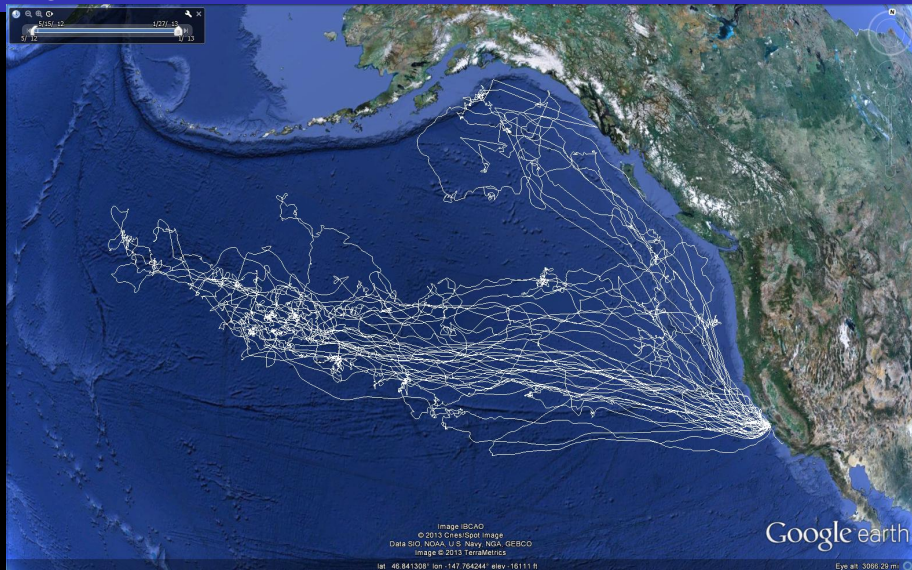


Dispersal and immigration

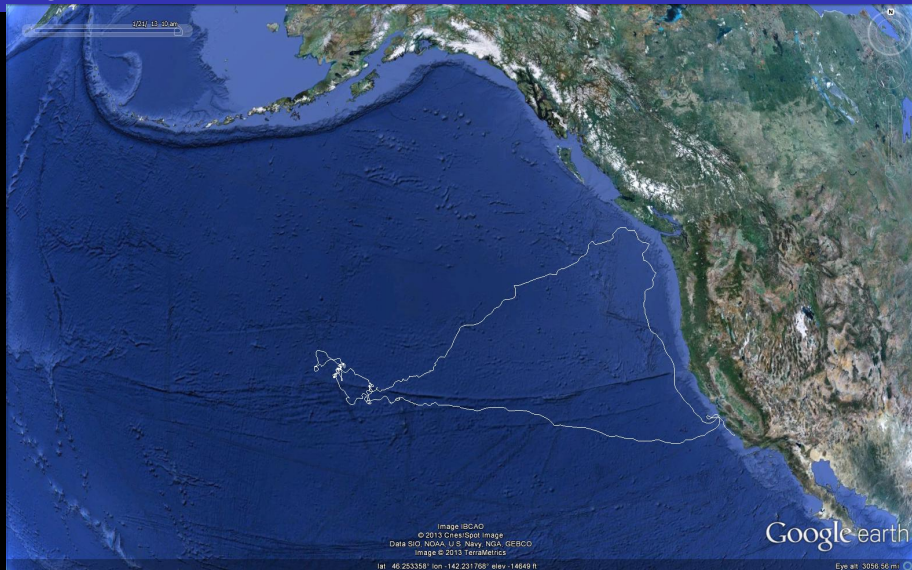
Breeding dispersal
Females born at Año Nuevo
(1998-2000 cohorts, N=111)



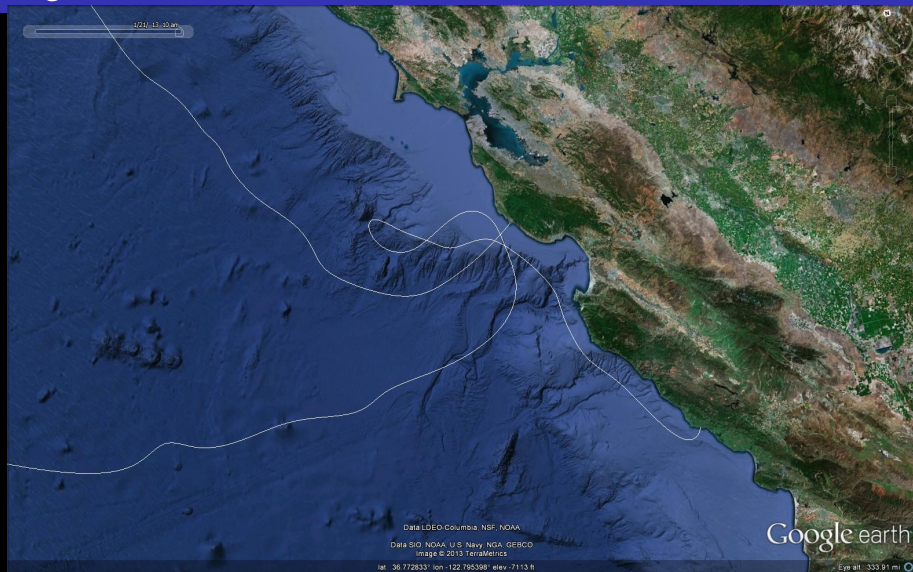
Migration



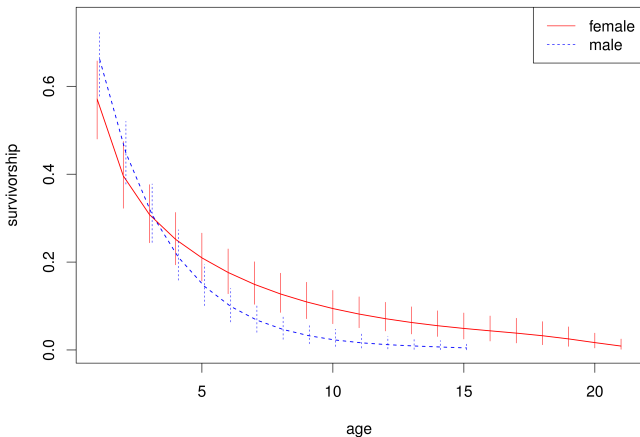
Migration



Migration

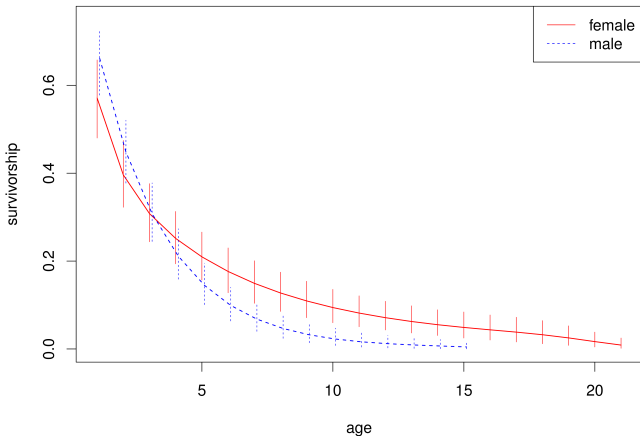


Female survivorship



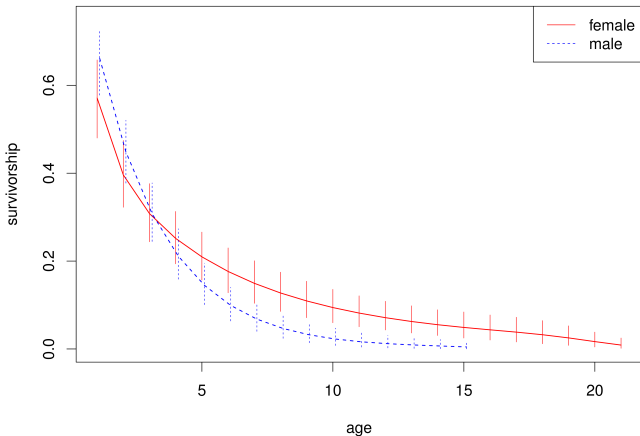
Female survivorship

183 females permanently branded as pups in 1986-87



Female survivorship

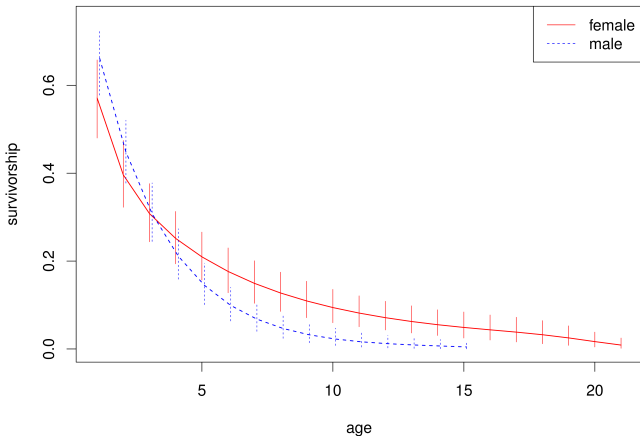
183 females permanently branded as pups in 1986-87



► age 1: 97 survive

Female survivorship

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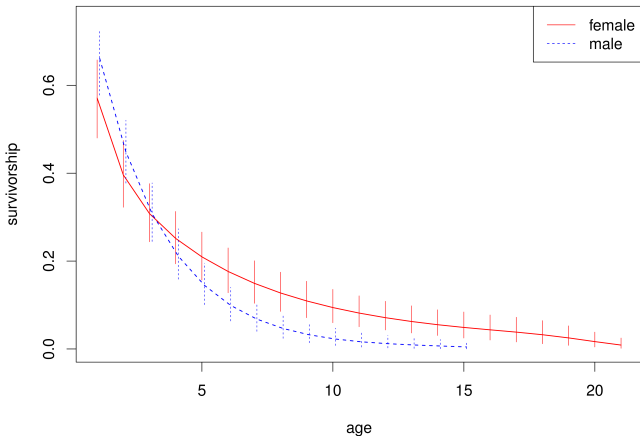


► age 1: 97 survive

► age 4: 36 survive

Female survivorship

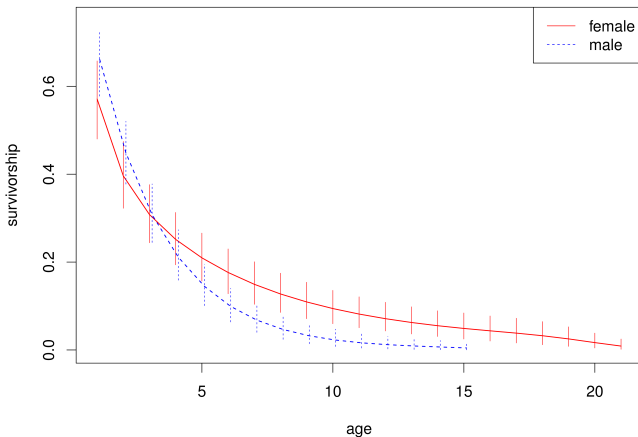
183 females permanently branded as pups in 1986-87



- ▶ age 1: 97 survive
- ▶ age 4: 36 survive
- ▶ age 9: 17 survive

Female survivorship

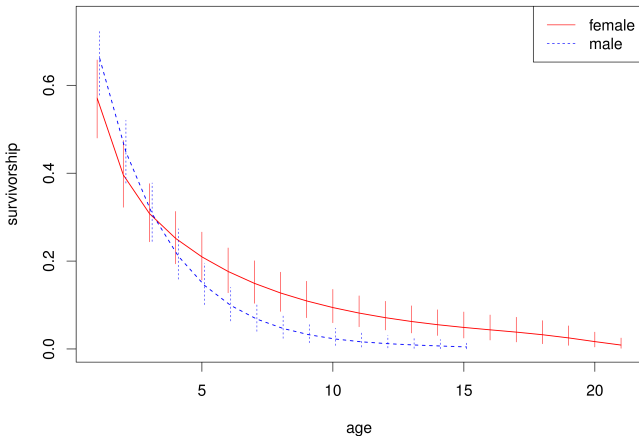
183 females permanently branded as pups in 1986-87



- ▶ age 1: 97 survive
- ▶ age 4: 36 survive
- ▶ age 9: 17 survive
- ▶ age 15: 8 survive

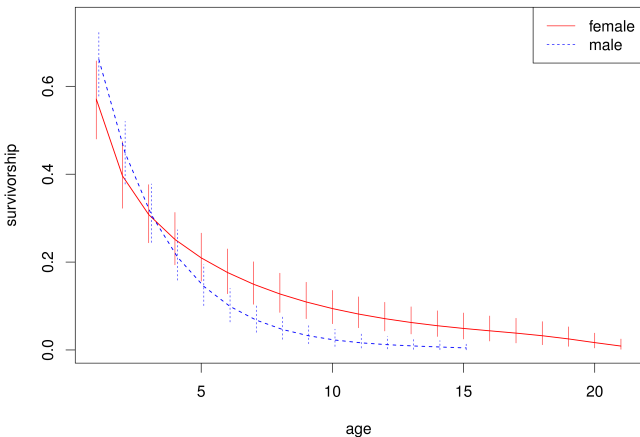
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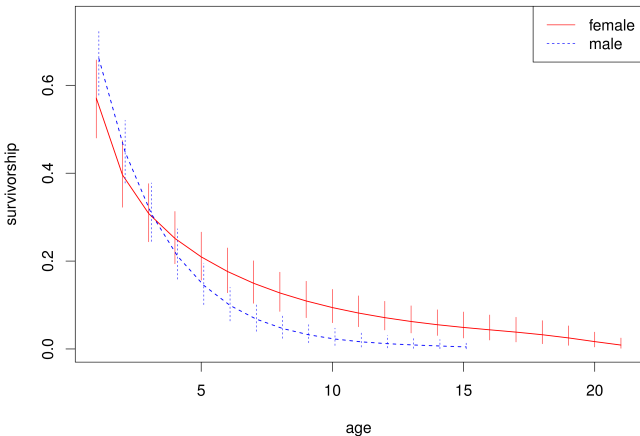
- ▶ age 1: 97 survive
- ▶ age 4: 36 survive
- ▶ age 9: 17 survive
- ▶ age 15: 8 survive
- ▶ age 21: last dies

Male survivorship



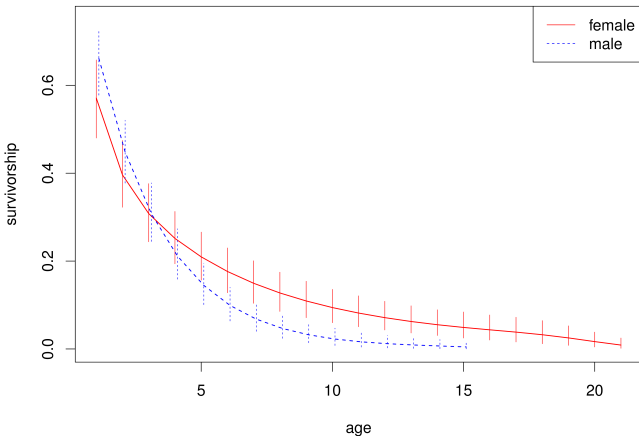
Male survivorship

189 males permanently branded as pups in 1986-87



Male survivorship

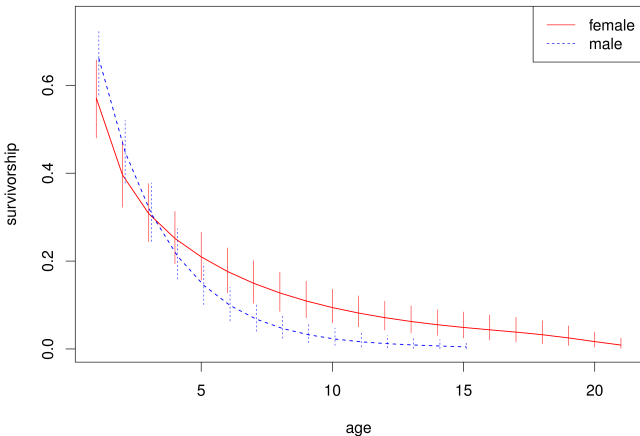
189 males permanently branded as pups in 1986-87



► age 1: 119 survive

Male survivorship

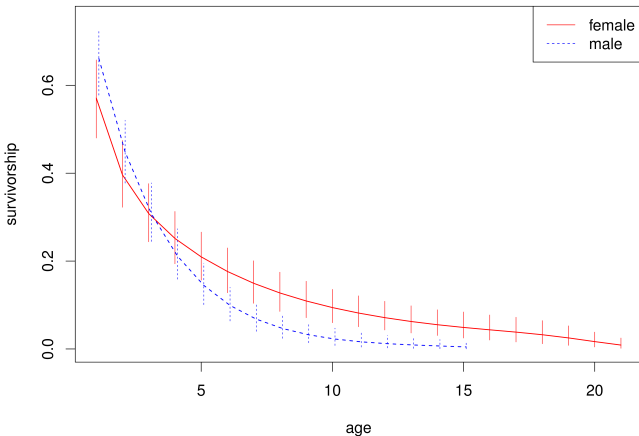
189 males permanently branded as pups in 1986-87



- ▶ age 1: 119 survive
- ▶ age 4: 33 survive

Male survivorship

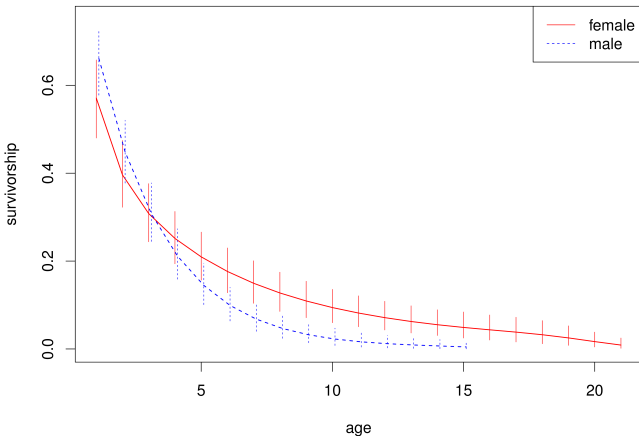
189 males permanently branded as pups in 1986-87



- ▶ age 1: 119 survive
- ▶ age 4: 33 survive
- ▶ age 9: 7 survive

Male survivorship

189 males permanently branded as pups in 1986-87



- ▶ age 1: 119 survive
- ▶ age 4: 33 survive
- ▶ age 9: 7 survive
- ▶ age 15: last dies

Demography

- ▶ Low juvenile survival at Año Nuevo: 40% die in first year
- ▶ High adult female survival at Año Nuevo: 13% die each year
- ▶ Oldest female known: 23 years
- ▶ Oldest male known: 15 years
- ▶ Fecundity nearly 1 pup per yr: 5-15% of females 'skip'
- ▶ High immigration from south sustains Año Nuevo

22-year old elephant seal female

19 Jan 2012, Big Midden So.



Review

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