# Cambios en la Distribución y la Abundancia de Ballena gris en Laguna San Ignacio, B.C.S. México: 1978-2009.

Alejandro Gómez-Gallardo U.
Steven L. Swartz y Jorge Urbán R


Mar de Beaufort
Mar de Chukchi
RUSIA
ALASKA (E.U.A.)
Mar de Bering
Zonas de Alimentación
CANADÁ
OCÉANO PACÍFICO
ESTADO UNIDOS DE AMÉRICA
Lagunas Ojo de Liebre y Guerrero Negro
Laguna San Ignacio
Complejo Lagunar Bahía Magdalena - Bahía Almejas
Zonas de Reproducción
MÉXICO

# Background

- An intense hunting from XIX & beginning of XX centuries, depleted the population to few thousands
- Formal protection by mexican government & others by 1970´s allowed the ENP population to recover levels above 20,000
- Actually there is a small and controled by IWC hunting by skimos populations of EUA and Russia for subsistence

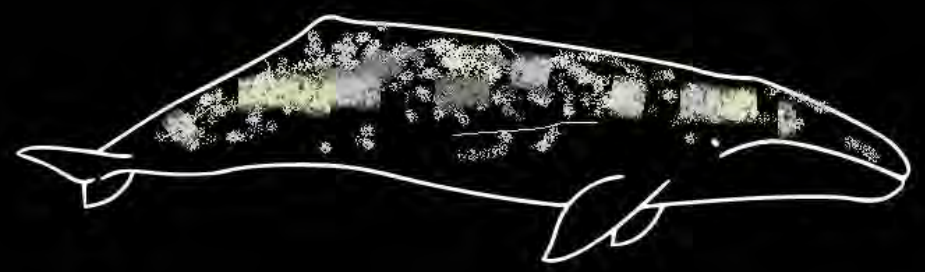
After 3 decades of growth, In 1998 the ENP gray whale population increased to its recent maximum of approximately 29,758 whales

Chukchi & Bearing seas, was the primary feeding areas

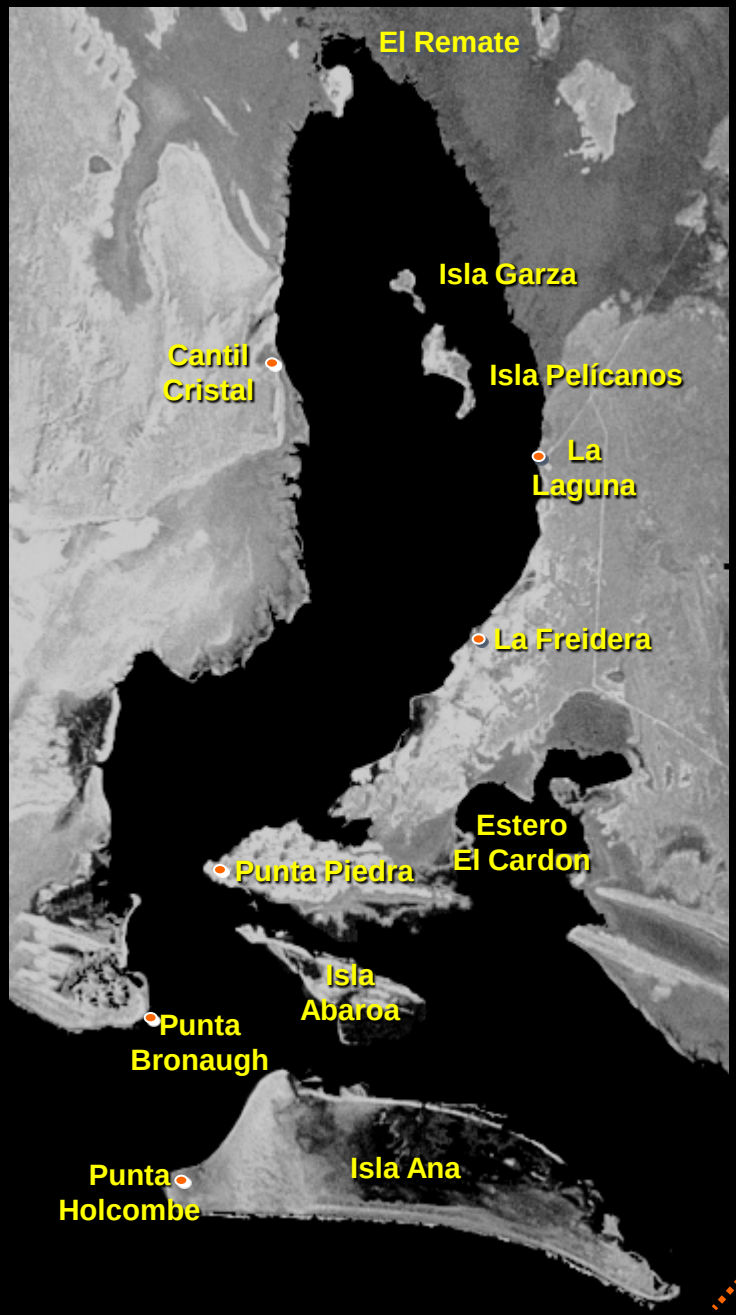
An unusual range-wide mortality event during 1999-2000, the population estimate declined to approximately 18,178 (Rugh *et al., 2005; L*eBoeuf *et al., 1999)*

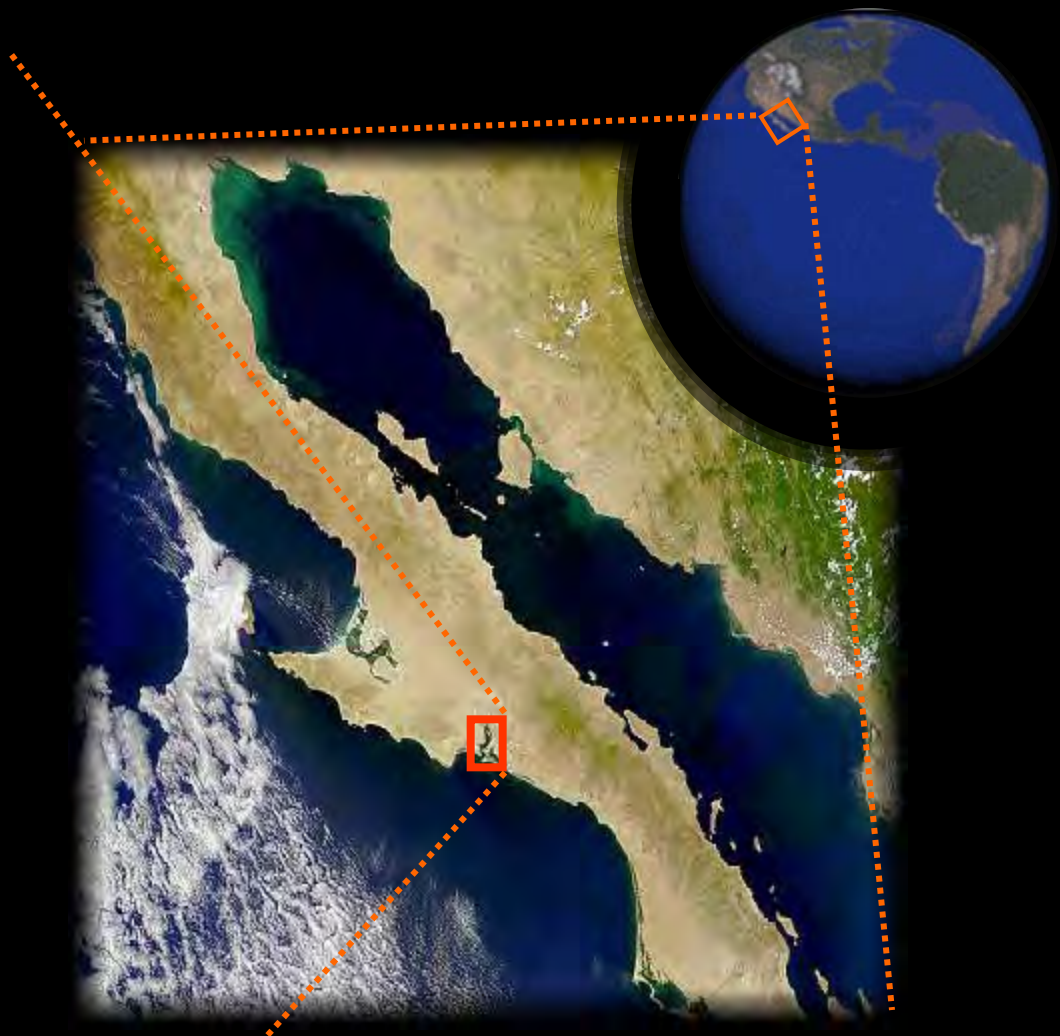
*Two main reasons for this decine:*

- *An ENSO event by 1998-99 that produces an important decrease in the productivity of the feeding areas (Urbán etl al., 2003)*
- *An increasing beyond the carrying capacity (K) of the environment (Moore et al., 2001).*



# Study site

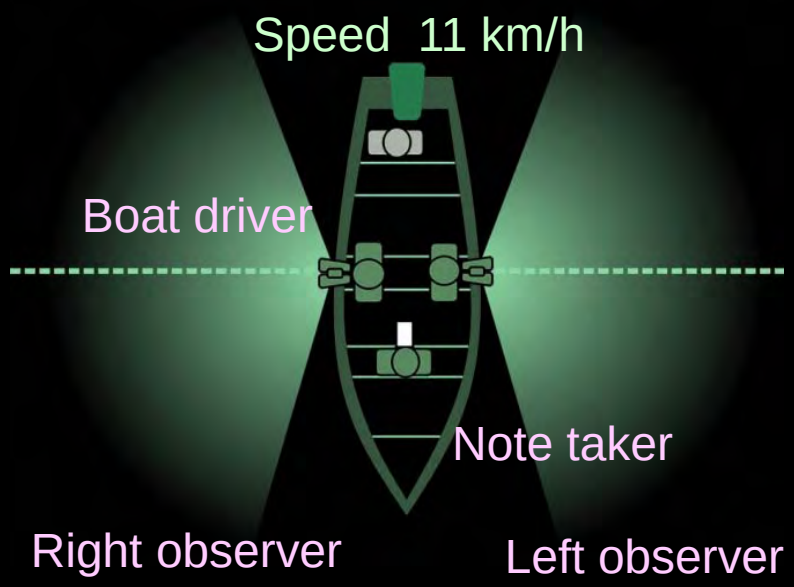


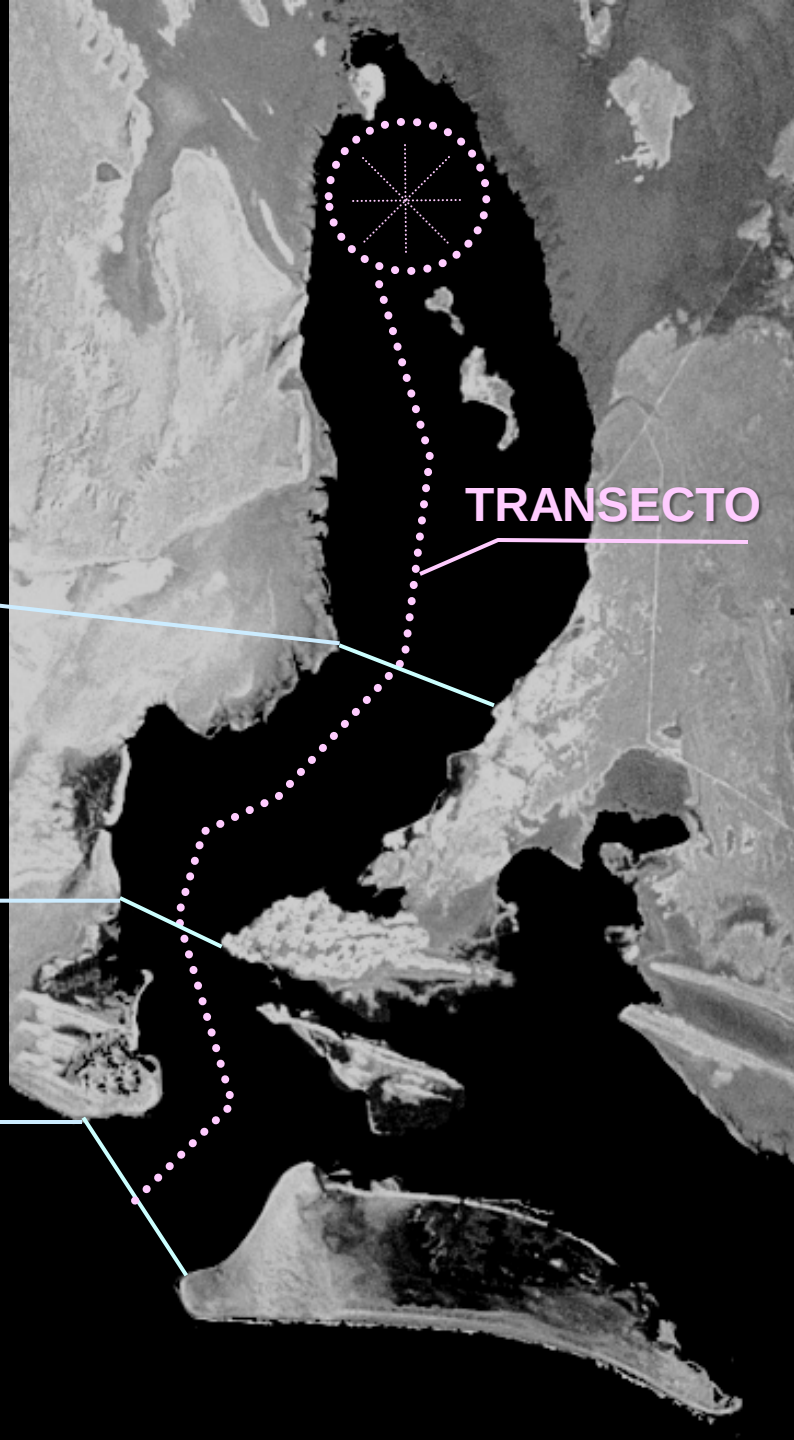



**Laguna San Ignacio**
**B.C.S. México**

# Methods

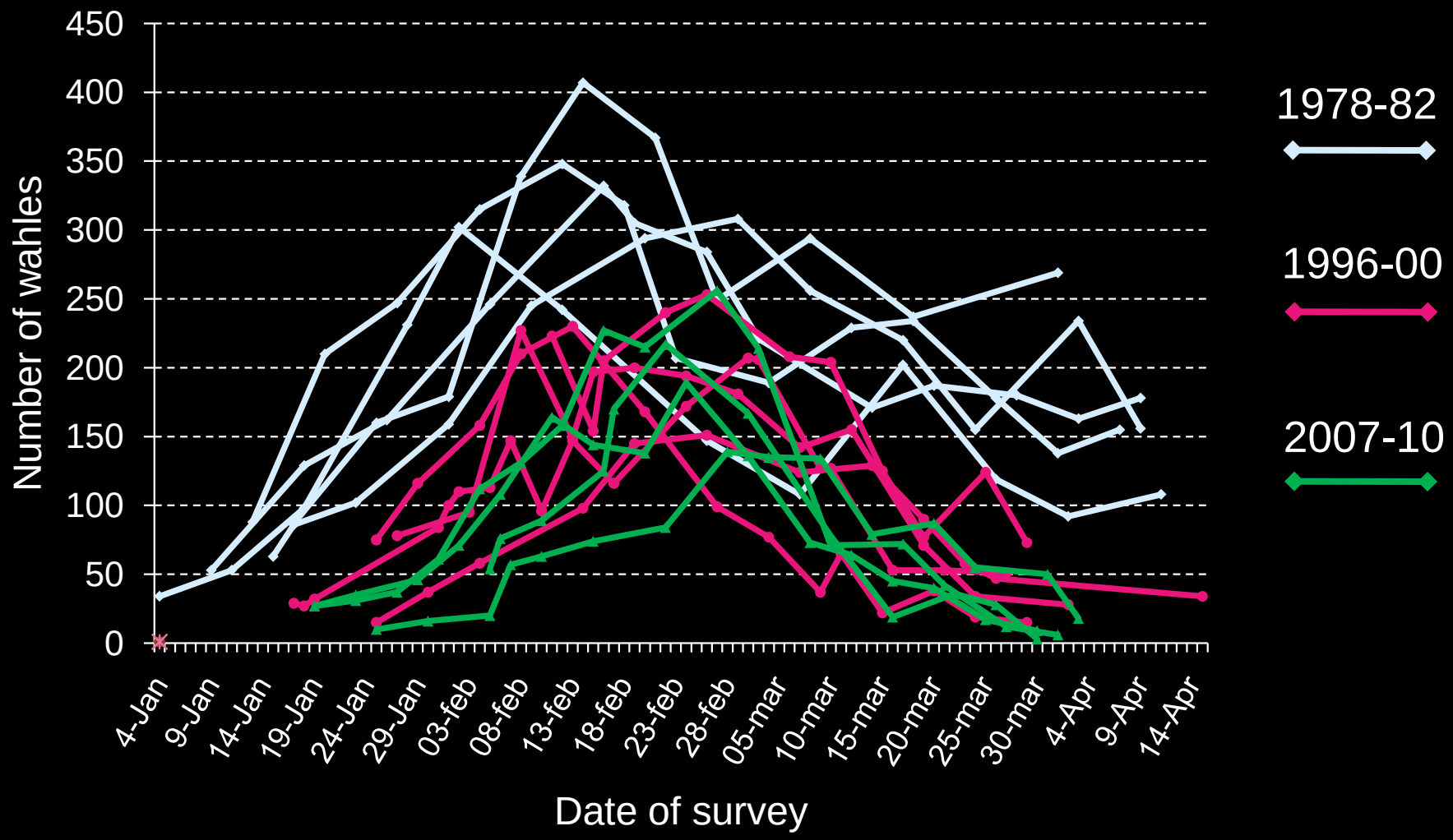
## Surveys



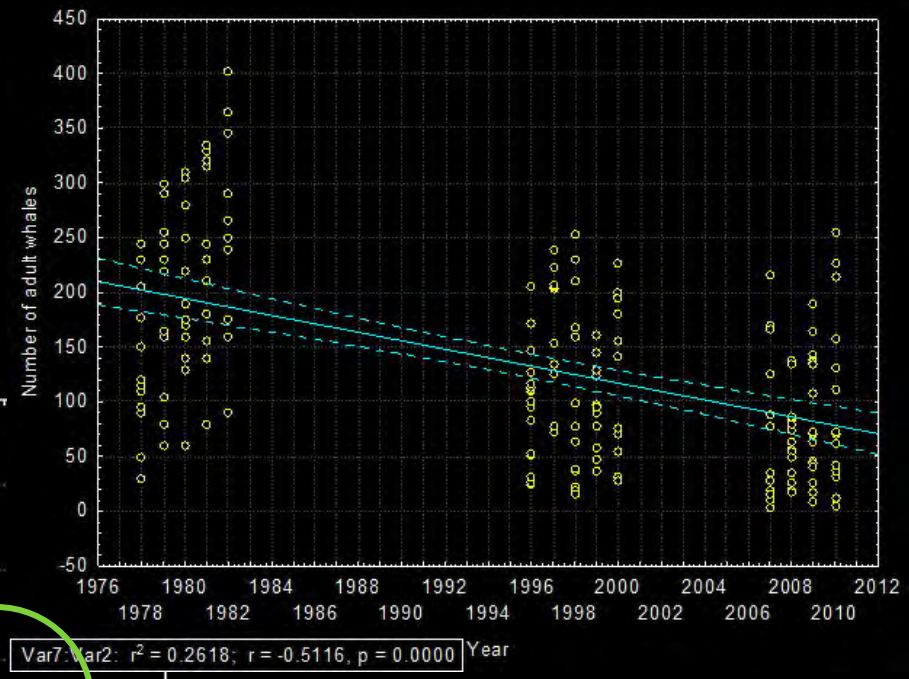
# Results

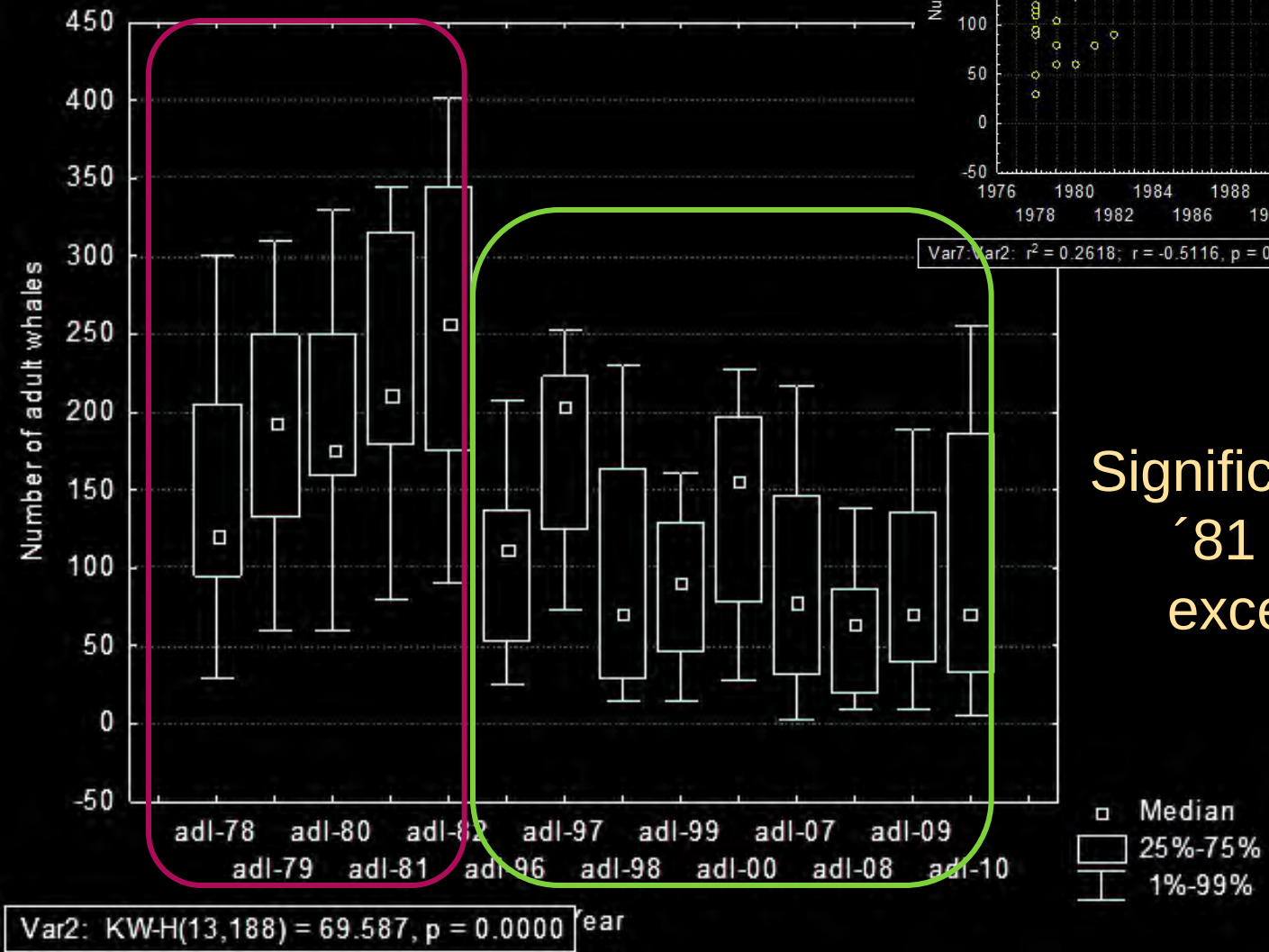
## Adult whales



# Results

## Adult whales

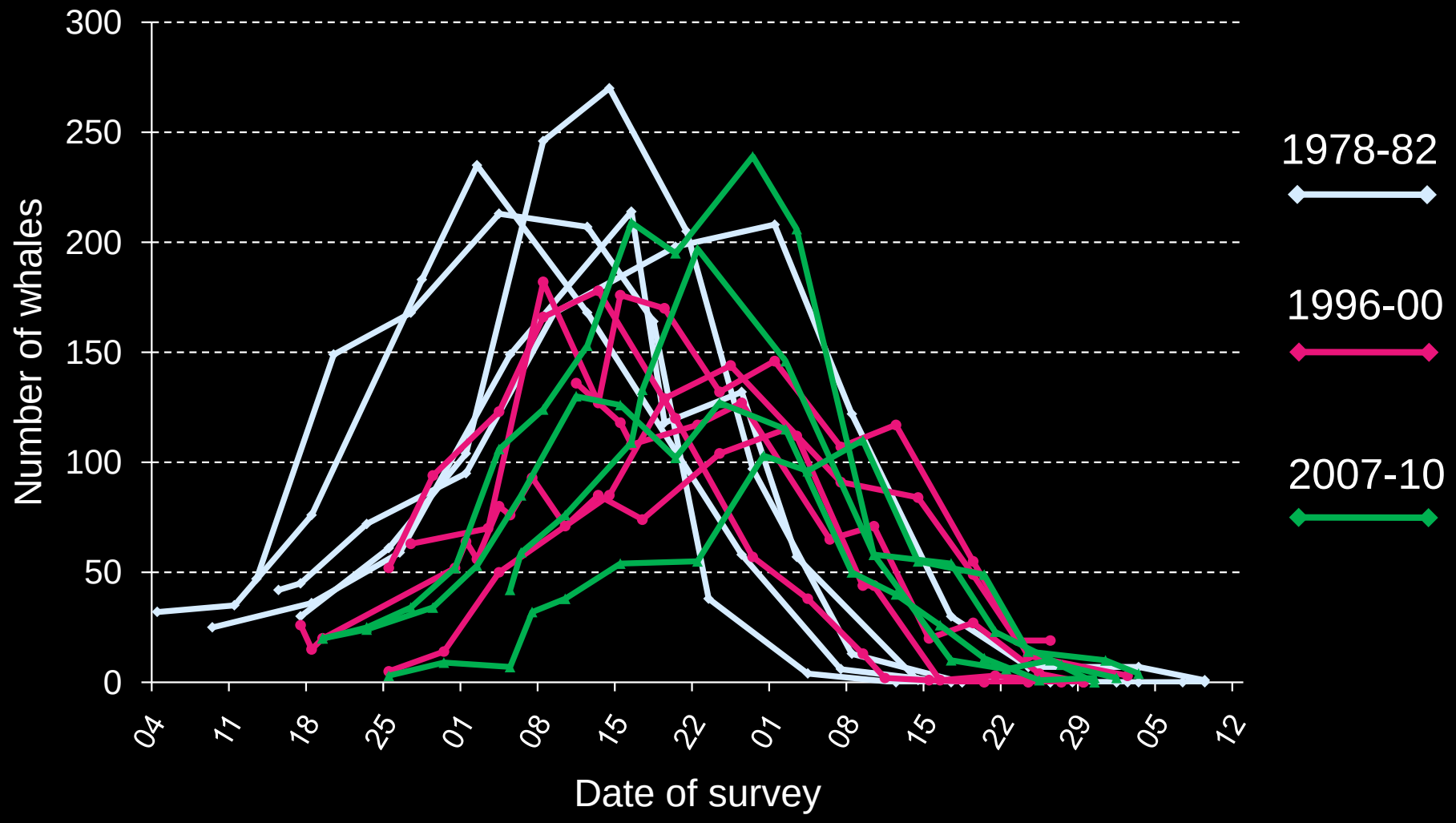



Significant differences:
´81 & ´82 *vs* rest
except ´97 & ´00

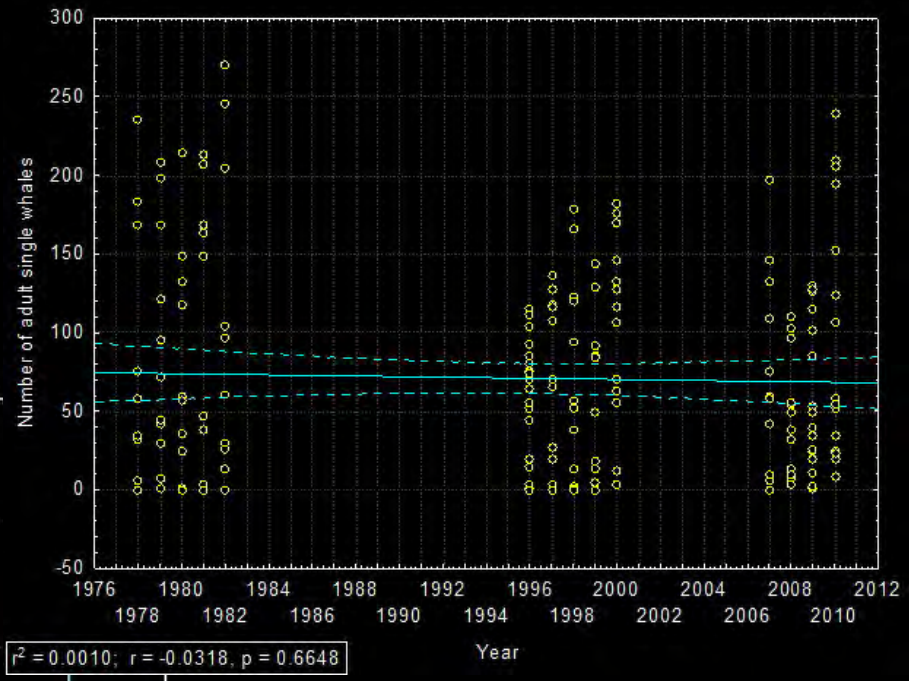
# Results

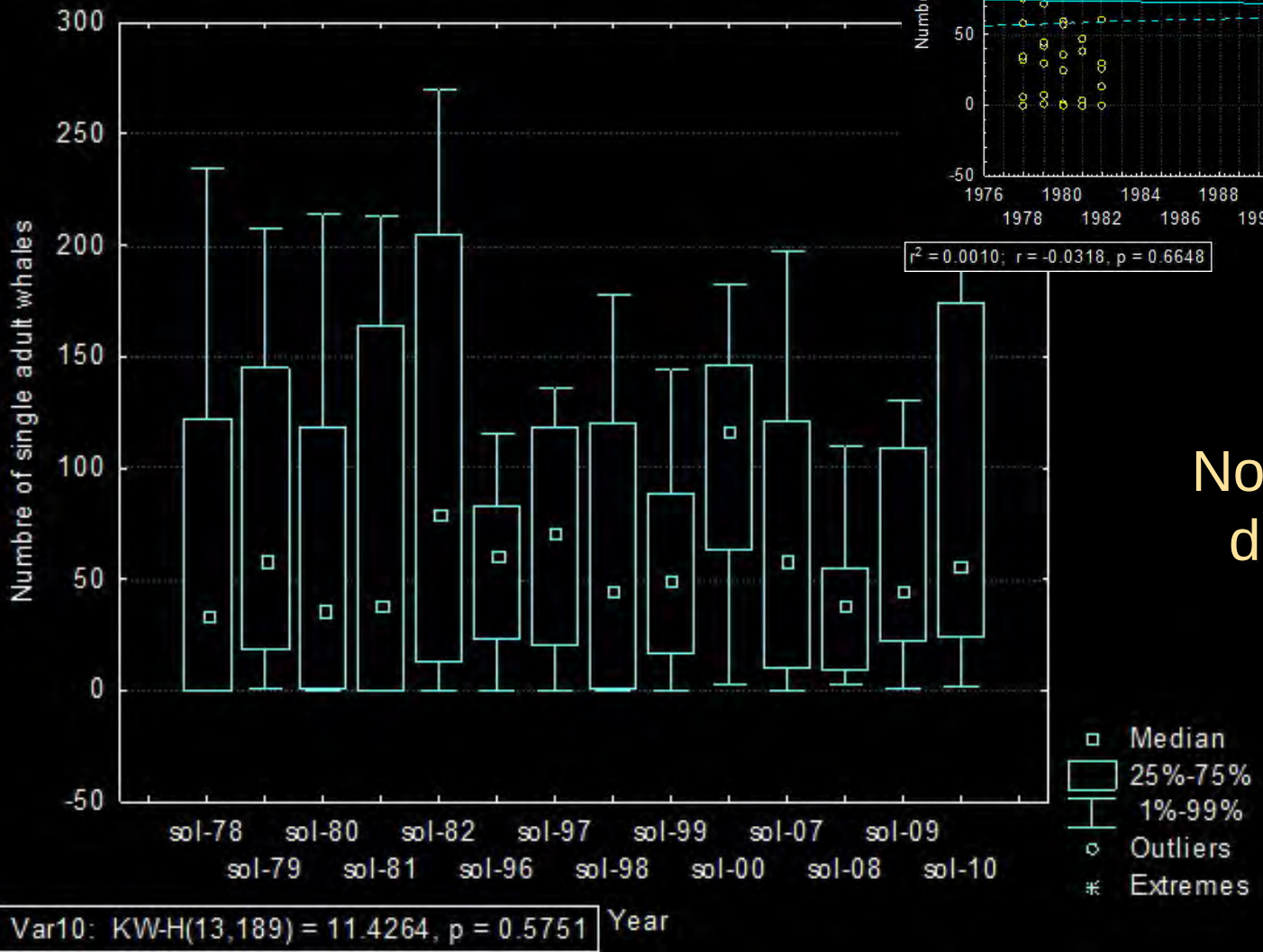
## Single whales



# Results

## Single whales

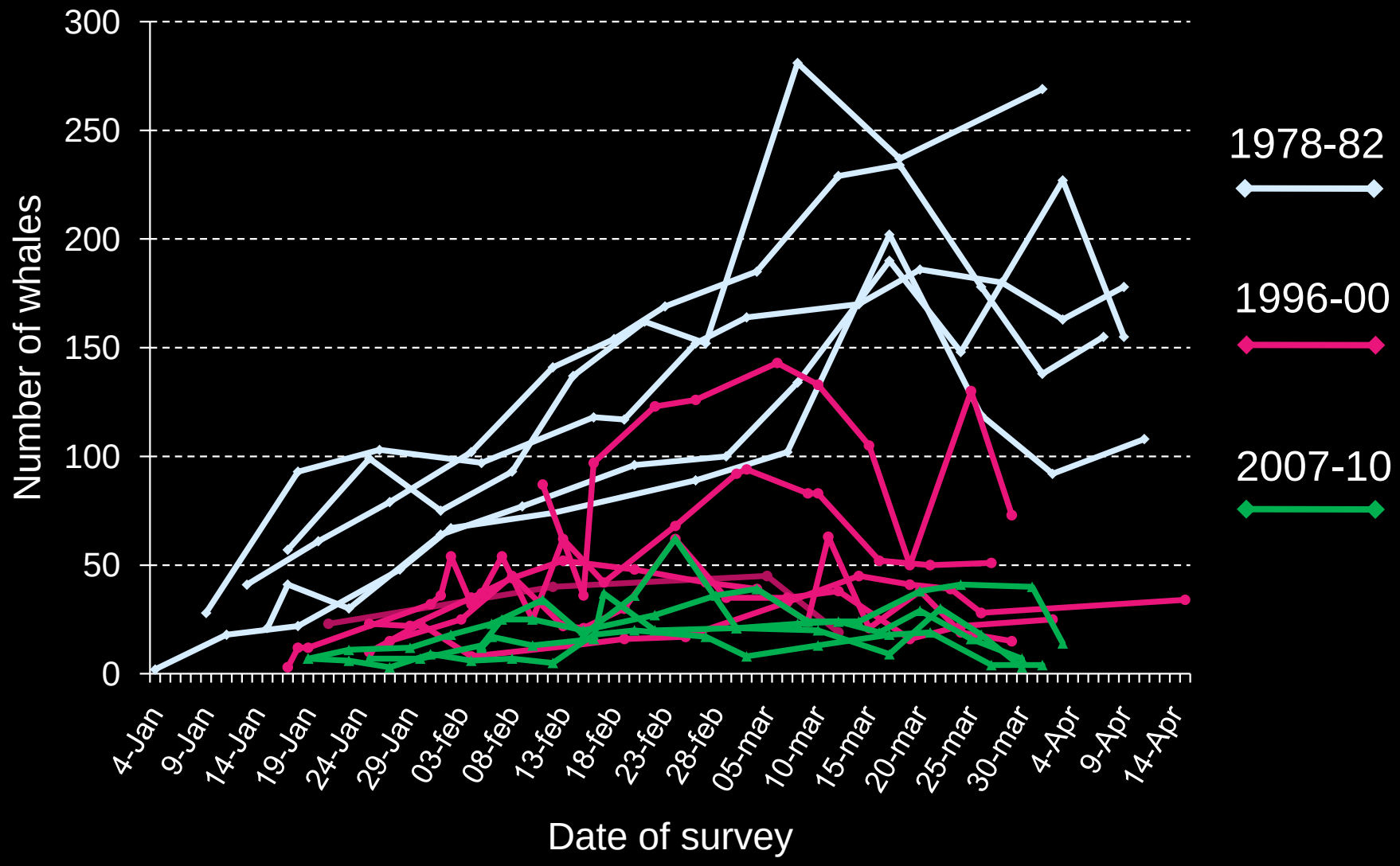



No Significant differences

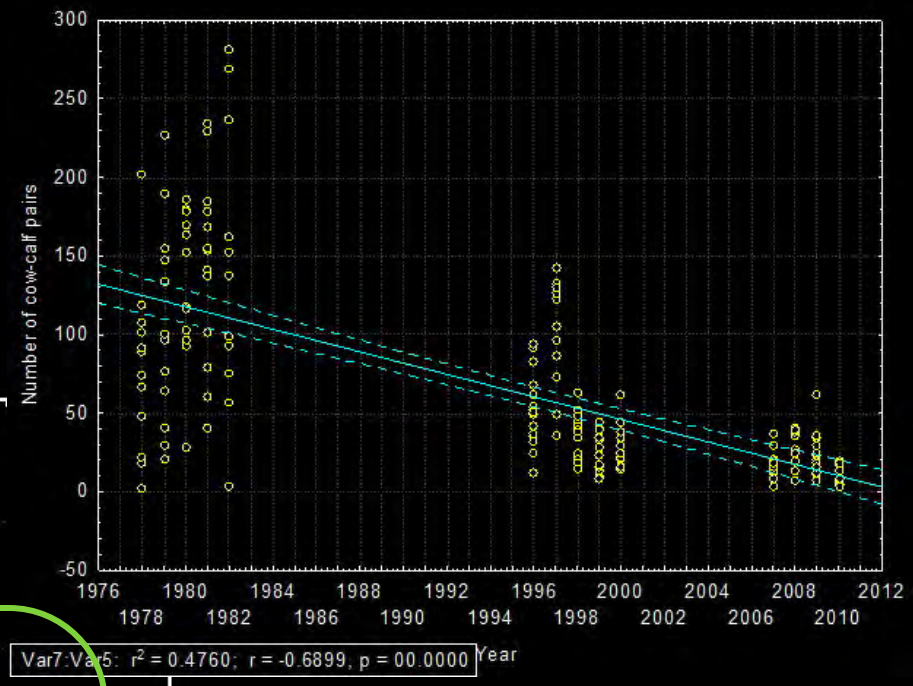
# Results

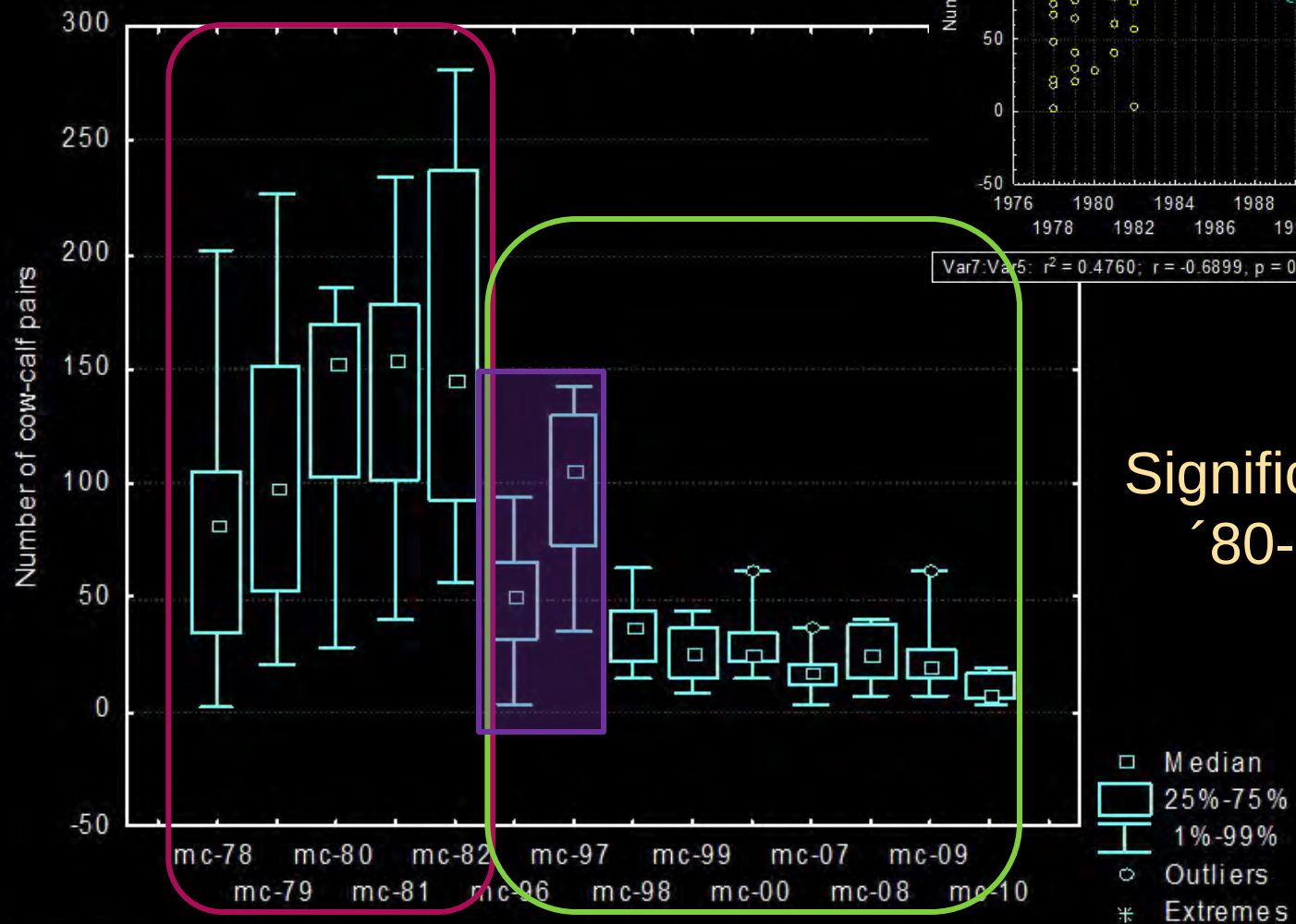
## Cow-calf pairs



# Results

## Cow-calf pairs

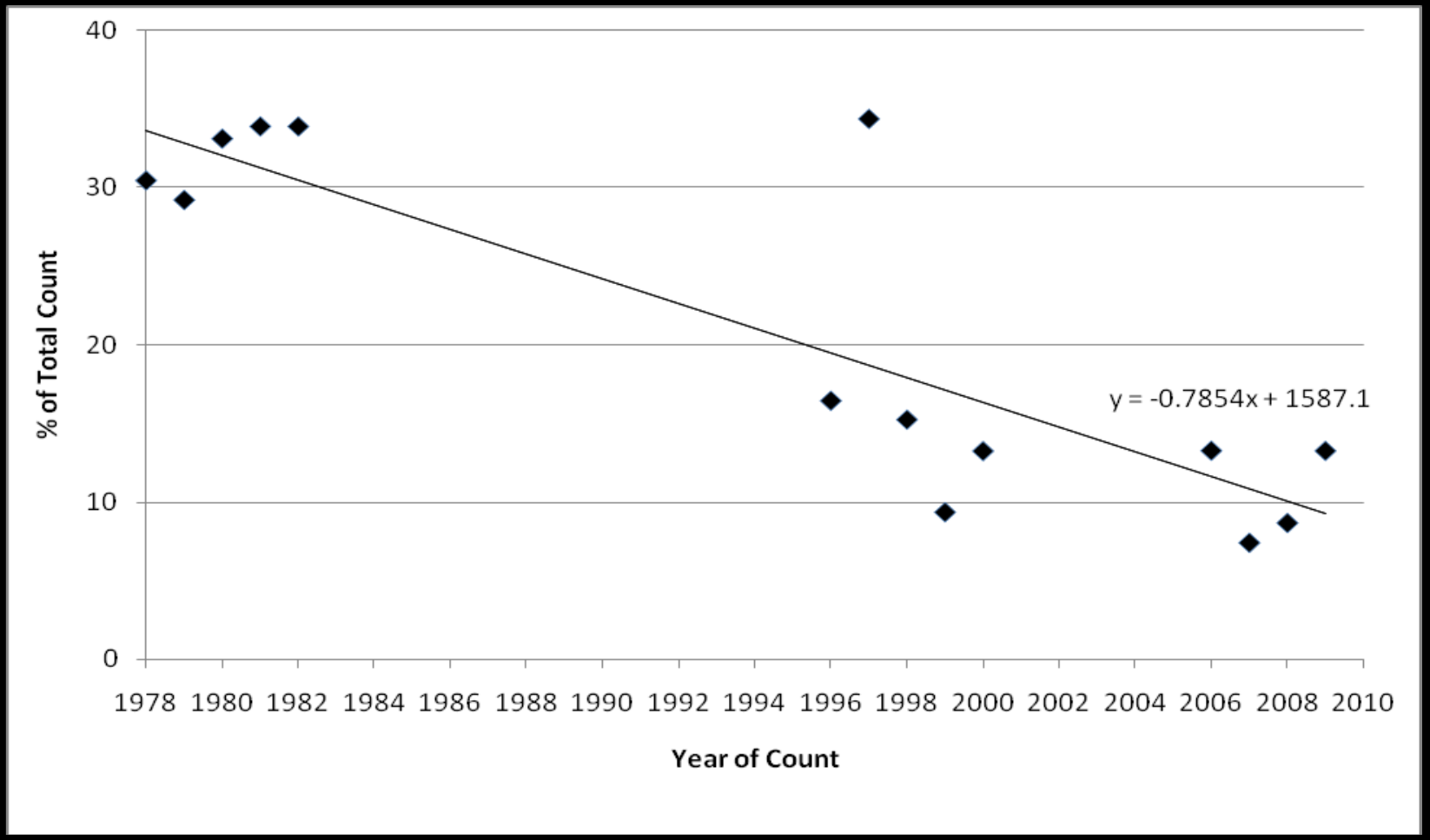



Significant differences:
´80-´82 *vs* ´98-´10

# Results

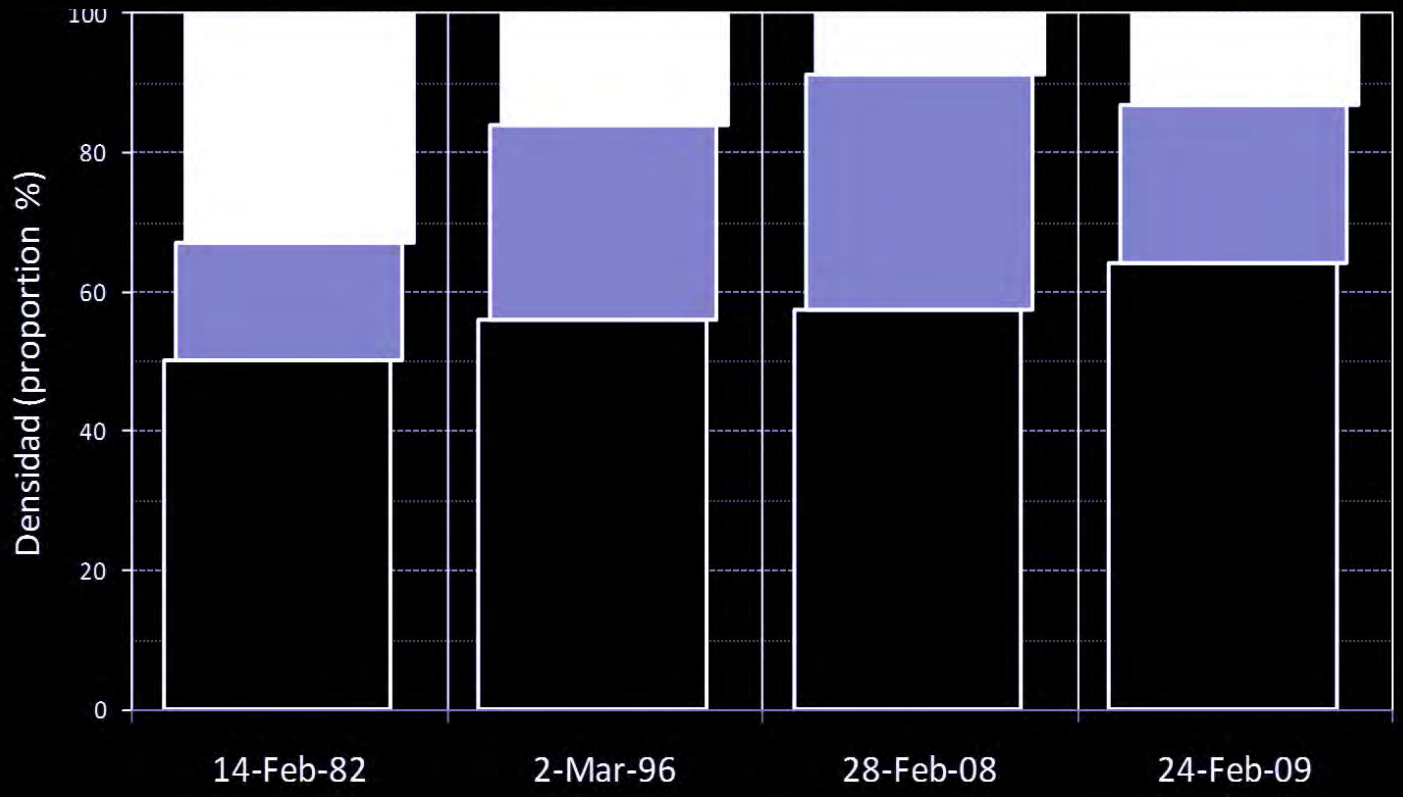
Whales counted in the upper lagoon and north-end areas during surveys conducted in 1978-1984, 1996-2000, and 2006-2009



# Results

## Distribution of adult whales

| Zona | Superficie | Densidad de ballenas | | | |
|---|---|---|---|---|---|
| Superior | 46.6 km$^2$ | 3.0 | 0.7 | 0.25 | 0.5 |
| Media | 22.9 km$^2$ | 2.9 | 2.4 | 2.05 | 1.9 |
| Inferior | 17.5 km$^2$ | 11.5 | 6.7 | 4.50 | 6.9 |



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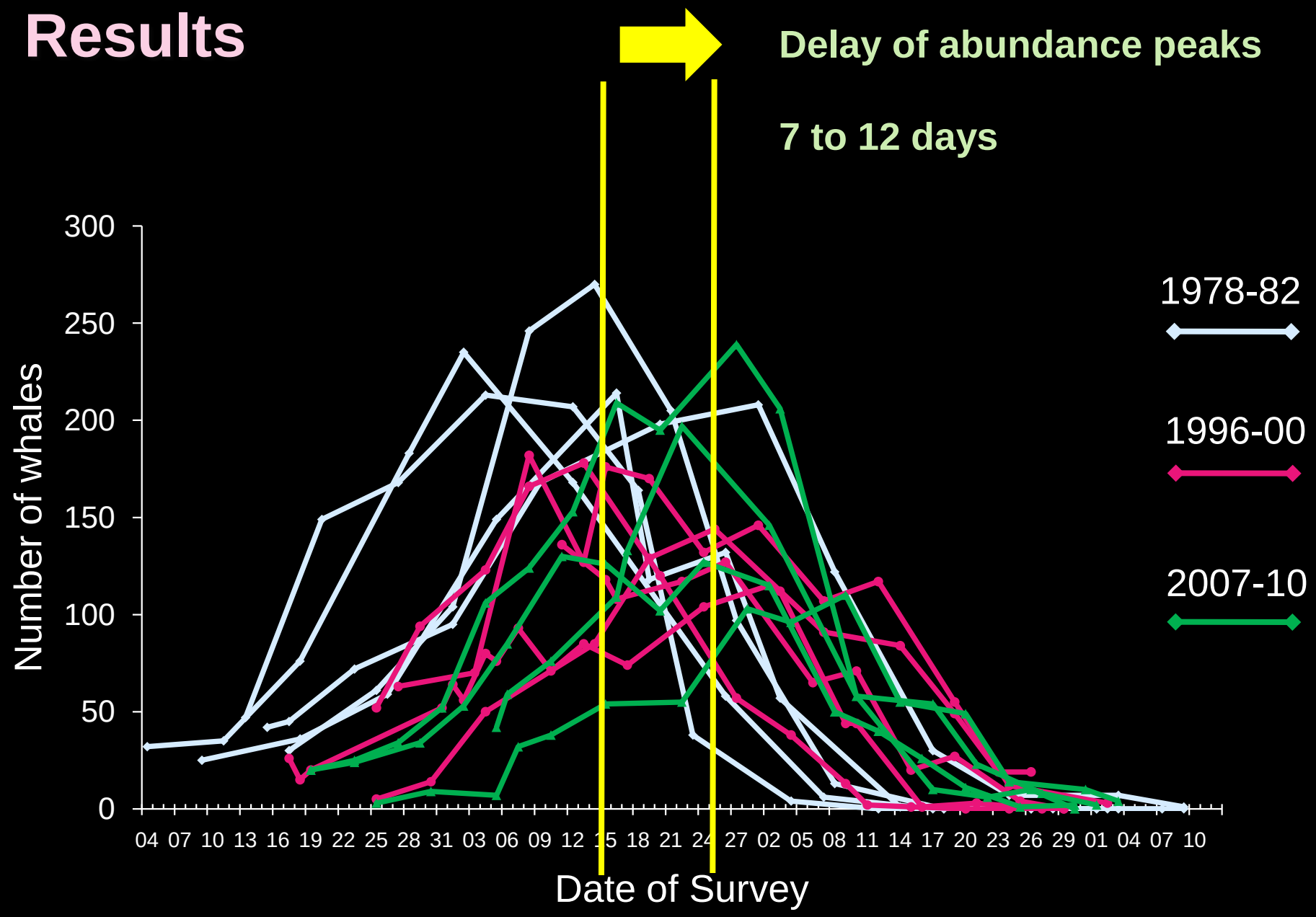
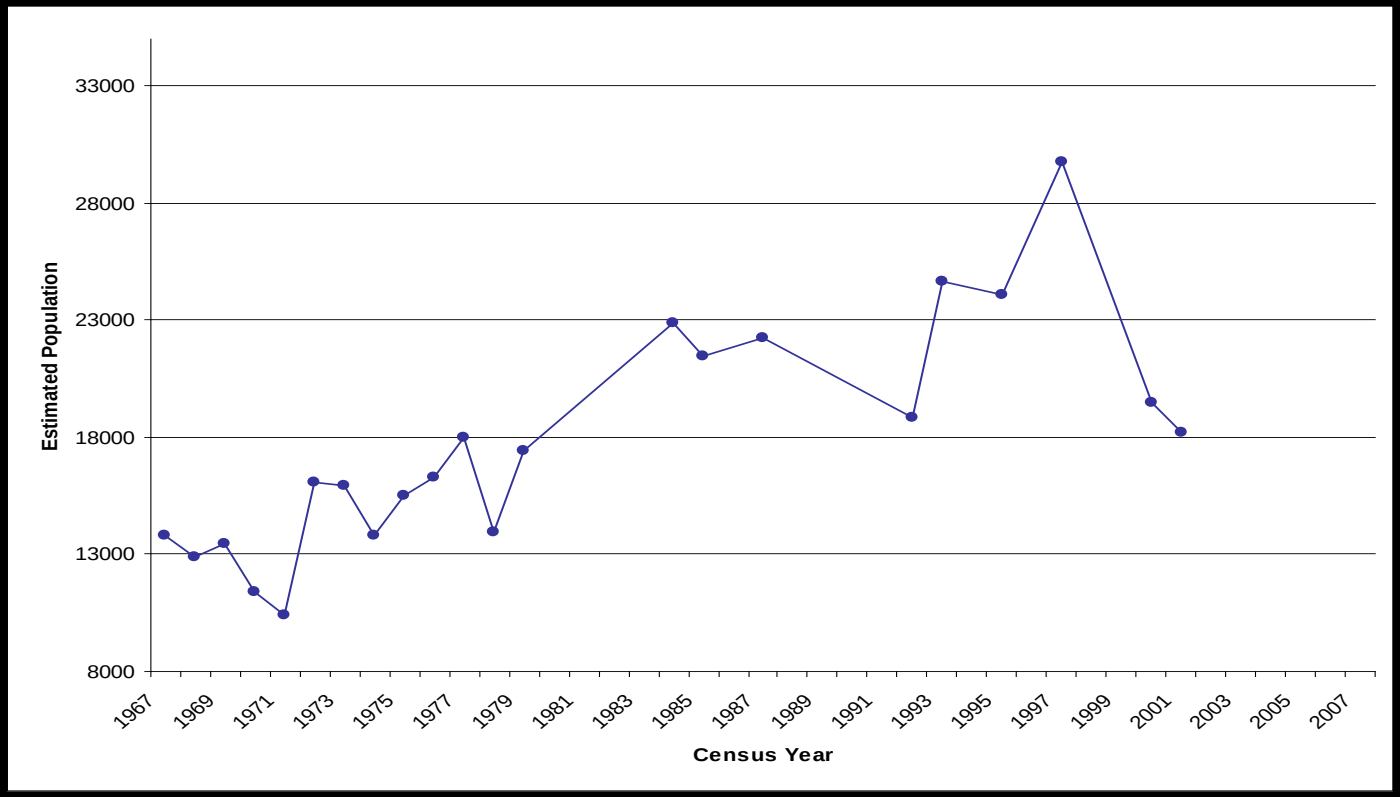

Delay of abundance peaks
7 to 12 days
Number of whales
300
250
200
150
100
50
0
04 07 10 13 16 19 22 25 28 31 03 06 09 12 15 18 21 24 27 02 05 08 11 14 17 20 23 26 29 01 04 07 10
Date of Survey
1978-82
1996-00
2007-10

# Discussion

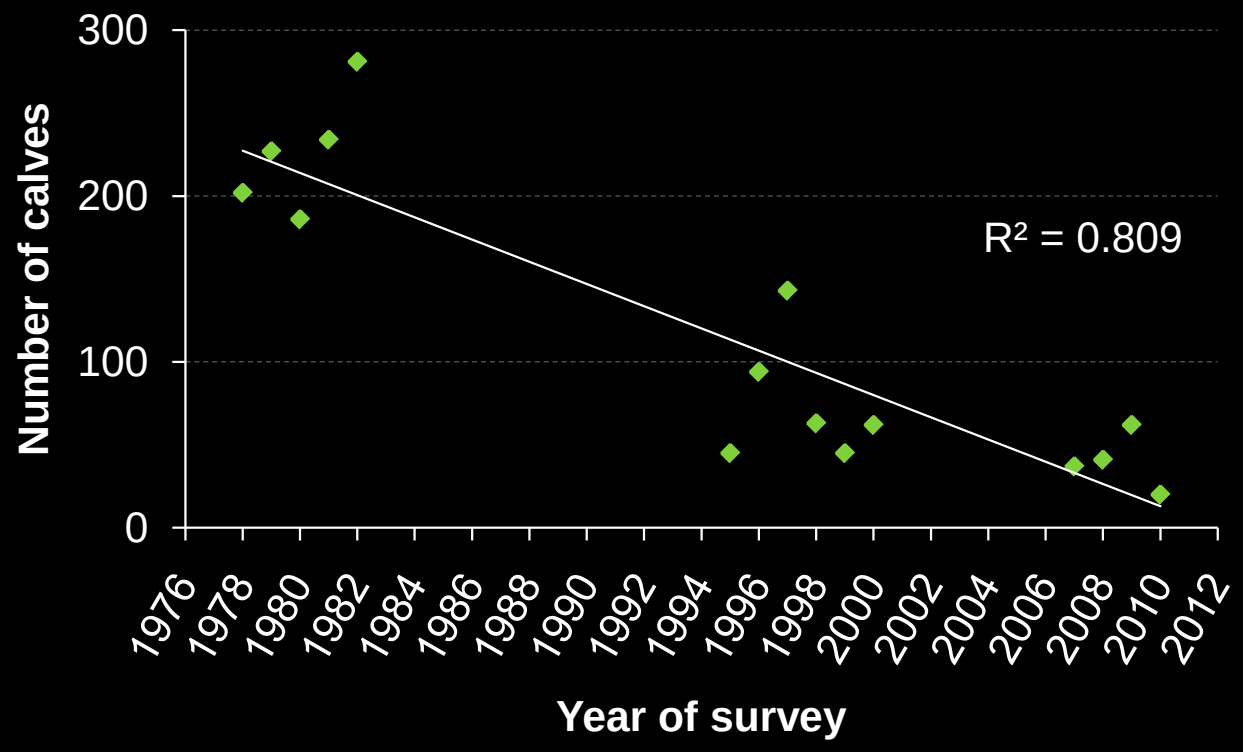
- The apparent recover of the ENP gray whale population was not well registered and the trend of the population is negative for the last years



- The distribution of the whales in the feeding areas has changed, less at Chirikov Basin

- More dense summer aggregations of gray whales around Kodiak Island are monitoring by Moore *et al*. (2007)

- The presence at the calving lagoons is irregular and the main trend is a decrease of the calves




- Low gray whale calf counts in Laguna San Ignacio and during their northward spring migration could indicate a reduction in the reproductive potential of the population. Perryman et al. (2002)

# Conclusions

ENP gray whale population is now responding in several ways to environmental changes & possible over utilization and decline of its primary food resources, and the potential influence of human activities to these responses:

- Decreased abundance since the mid-1990s
- Reduction in the production of calves
- Changes in the timing of migration and distribution of ENP gray whales on the winter breeding range.

# Thanks to

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ECOTURISMO KUYIMA

SEMARNAT