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LAGUNAS OJO DE LIEBRE Y GUERRERO NEGRO
LAGUNA SAN IGNACIO
COMPLEJO LAGUNAR
BAHÍA MAGDALENA - BAHIÁ ALMEJAS
MÉXICO
ESTADO UNIDOS DE AMÉRICA

ZONAS DE ALIMENTACIÓN
ZONAS DE REPRODUCCIÓN
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 in 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; LeBoeuf et al., 1999).

Two main reasons for this decline:
- An ENSO event by 1998-99 that produces an important decrease in the productivity of the feeding areas (Urbán et 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

Boat driver

Note taker

Right observer

Left observer

Speed 11 km/h

UPPER ZONE

MIDDLE ZONE

LOWER ZONE

TRANSECTO
Results

Adult whales

Number of whales

Date of survey

1978-82

1996-00

2007-10
Results

Adult whales

Significant differences:
'81 & '82 vs rest except '97 & '00
Results

Single whales

No Significant differences

\[ r^2 = 0.0010, r = 0.0318, p = 0.6648 \]

\[ \text{Var10: KWH}(13, 189) = 11.4264, p = 0.5751 \]
Results

Cow-calf pairs

Number of whales

Date of survey

1978-82
1996-00
2007-10
Results

Cow-calf pairs

Significant differences: ‘80-’82 vs ’98-’10
Results

## Results

### Distribution of adult whales

<table>
<thead>
<tr>
<th>Zona</th>
<th>Superficie</th>
<th>Densidad de ballenas</th>
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<tbody>
<tr>
<td>Superior</td>
<td>46.6 km²</td>
<td>3.0</td>
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<tr>
<td></td>
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<td>0.7</td>
</tr>
<tr>
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<td>0.25</td>
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<td></td>
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<td>0.5</td>
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<td>Media</td>
<td>22.9 km²</td>
<td>2.9</td>
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<tr>
<td></td>
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<td>2.05</td>
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<td></td>
<td>1.9</td>
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<tr>
<td>Inferior</td>
<td>17.5 km²</td>
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<td>6.7</td>
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<td>4.50</td>
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<tr>
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<td>6.9</td>
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</table>

![Graph showing distribution of adult whales over time](image-url)

- **14-Feb-82**: 60% density
- **2-Mar-96**: 60% density
- **28-Feb-08**: 80% density
- **24-Feb-09**: 80% density
Results

Delay of abundance peaks

7 to 12 days

Number of whales

Date of Survey

1978-82

1996-00

2007-10
Discussion

- The apparent recovery 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

![Graph showing the number of calves over the years with a linear regression line and an R² value of 0.809.]

• 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.
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