



# Scientific Literature on Cetaceans in the Azores region: numbers and general trends.

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## INTRODUCTION

**Present work consists on:**

**review of scientific literature concerning cetacean research in the Azores, based on available references.**

**It does NOT provide a review of the present knowledge, rather aiming at a framework for a more extensive review and historical purposes.**

**Scientific literature on natural sciences, comprises scientific publications that report original empirical and theoretical work**

**Publications considered here include:**

- **articles published in peer reviewed journals**
- **proceedings from oral and written presentations at academic meetings and workshops**
- **academic thesis**
- **books on cetacean fauna**
- **government reports**
- **technical reports**
- **regular magazine articles written by acknowledge cetologists.**



## DATA ANALYZED

References were collected from citations and publications from national libraries  
University of Azores (São Miguel and Horta) + University of Algarve (Faro)  
science journals,  
on-line reference lists  
databases held by the Azorean cetologists Mónica Silva and Rui Prieto

Literature included in this work sum a total of 166 references,  
covering almost 150 years of publications.



Results are only preliminary - some references are probably  
still missing, namely from the last two decades



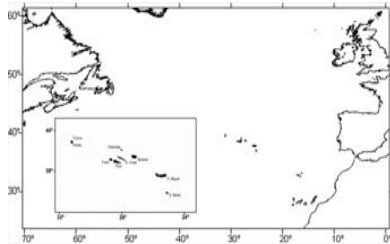
## DATA ANALYZED

**One of the first records..**

**Passage recounted in the chronicles of Gaspar Fructuoso (1922) about “things that happened in the first island of Azores” Santa Maria from 1574-75**

**(...) a few dead floating whales where chopped et sea and some pulled ashore, allowing to extract several gallons of oil and even “ambar”.**

**Allow assumption that :  
villagers had previous knowledge on the potentialities of whale  
products**



**The presence of “ambar” consists on the first  
reference of a Sperm whale in Azores.**



DATA ANALYZED

- **Part I** – Cetacean research during the whaling era, with considerations on whaling literature.

..collected for historical framing of cetacean scientific publications context up to 1980's

- **Part II** – Numbers and general trends

...references were classified according to main theme of research and plotted against time scale.



## I – Cetacean research during the whaling era

### Part I

### Cetacean Research during the whaling era, with considerations on main whaling literature.

Whaling literature is not easy to categorize as scientific relevant for cetaceans:

- early narratives of whaling voyages,
- fisheries statistical reports,
- descriptions of hunting techniques and processing methods
- books (memoirs, ethnographic interest)
- historical reviews (Serpa, 1886; Clarke, 1954; Avila, 1992).

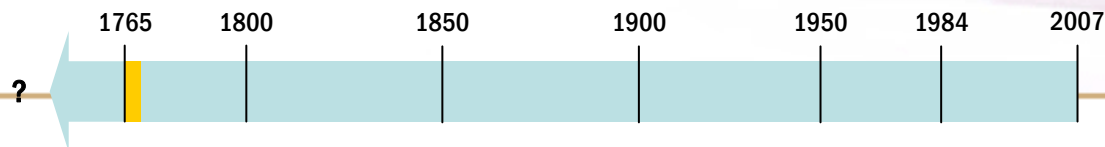
Some successful contributes to cetacean knowledge based on whaling data, are mentioned next.



## Cetacean research during the whaling era

Hunting on a commercial scale goes back to 1765,  
by New England's whaling ships venturing into new whaling grounds

The first Azorean record:  
Letter to the Portuguese minister in 1768  
by the Governor of the Azores, reporting the impressive achievements.

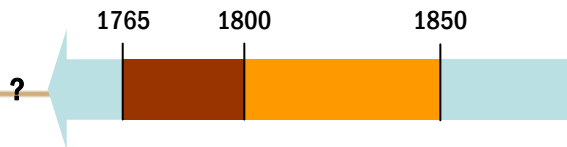


## Cetacean research during the whaling era

### First half of the XIX century

Literature resumes to several narratives from whaling voyages to the Azores and adjacent cruises that had become a customary part of the Atlantic whaling voyages,

e.g. Herman Melville in *Moby Dick* (1851) makes concrete references to the passage in the Azores by the whaling boats



## Cetacean research during the whaling era

Second half of the XIX century

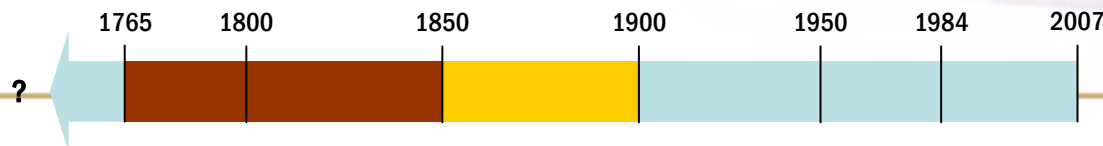
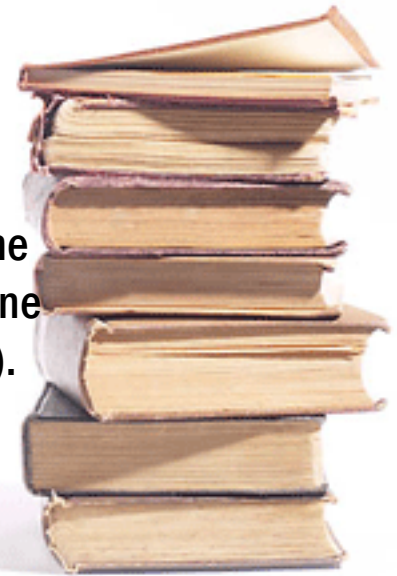


Shore whaling boat industry became established around 1850.

The spreading to different islands only is thought to have occurred near the 1880's.

1861 - Henri Drouët publishes the results of French expeditions in 1857,  
the first list of Azorean cetaceans.  
(It contains notes on empirical status of abundance.)

1888 - Prince Albert I of Monaco and naturalists on board publish the  
first anatomical descriptions of Sperm whales including one  
with the Portuguese Francisco Chaves (Pouchet and Chaves, 1890).



## Cetacean research during the whaling era

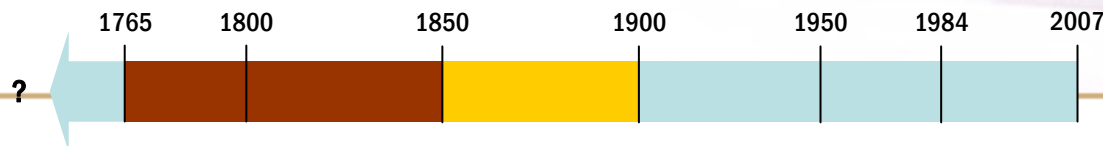
Around 1920's it ended the whaleship era.

Local boats were starting to compete for local whales and new improvements (e.g. engines, look-out radios) took the industry to its peak around the following decades

Some of the most relevant ethnographic contributions:

1946 - Francisco Figueiredo on the hunting techniques and industrial treatments (reedited in 1996 by Gonçalves).

1954 - Robert Clarke publishes the first major revision on subject in English, filling a literary gap.



## Cetacean research during the whaling era

Literature is scarce but relevant

1920 - Francisco Afonso Chaves leaves the first extensive list of cetacean species, that appears in later scientific works.

1935 - Ernesto Ferreira writes on the hunting of Giants from Azorean Seas in 1935, mixing whaling and multi species information.





DÉPEÇAGE D'UN CÉTACÉ A BORD DE LA *Princesse Alice*  
Clube autochtono de Lajeir

## Cetacean research during the whaling era

1936 - Jules Richard publishes the results “*Sur les Cétaces (..)*” by, of Prince of Monaco Campaigns .

This is a vast work with several contributors, ranging from behavior to internal organ descriptions or even parasites (1985-1929).



## Cetacean research during the whaling era

1950's - Whaling kept motivating general publications on Azorean Sperm whales.

Robert Clark and Figueiredo also extend their work into its Biology, probably stimulated by other (Townsend, 1935) and the general increase in Sperm whale knowledge

1974 - Portugal joined CITES

1984 - Bans completely whale hunting (1987 last whales caught)

Onward until present, but mostly on the 80's

Several ethnographic books from memories by old whalers ...  
to technical characterizations

Recent publications include revisits by iconographers and historians and some socio-economic studies with whale-watching (Neves-Graca, 2002)



## Recent numbers and trends

(preliminary results)

### Part II

#### Recent numbers and general trends – a turning point

The mid-second half of the XXth century became a turning point on cetacean research: Allen et al., (1977) pioneered this new phase.

The first academic Thesis on Sperm whales and whaling (1977), were also some of the last works to use whaling data to study Sperm whales.

It is a transition period until mid 80's

- widening studies to other species
- work on different branches of cetology (strandings data)
- while in many cases still taking advantage of fisheries data

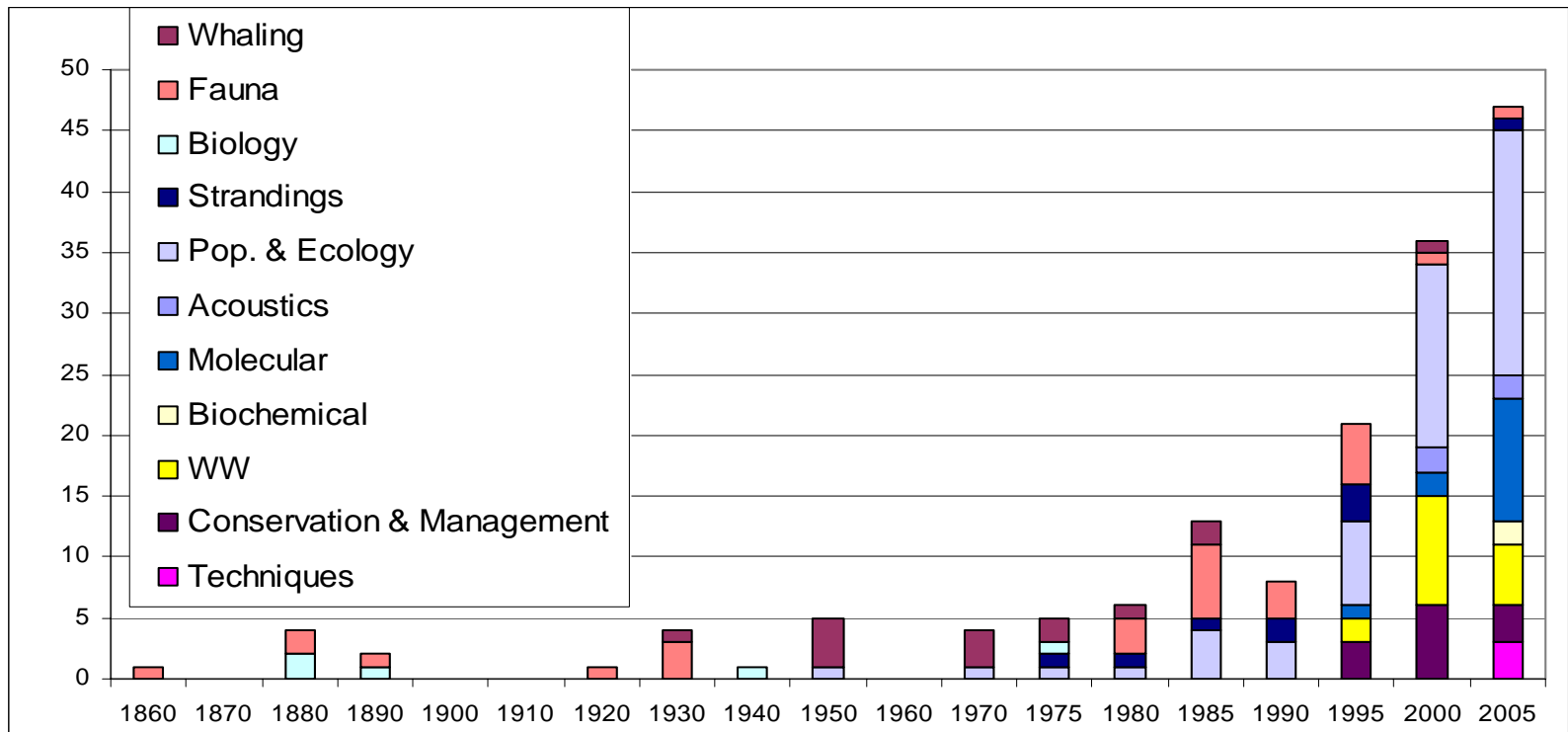


Recent numbers and trends

70's Diversification >> Exponential increase (altered time scale) (preliminary results)

A resident scientific body established in the region in this period,  
with the creation of the University of Azores in 1976.

Started collaborations with foreign Institutions such as IFAW (Cambridge) - 1978

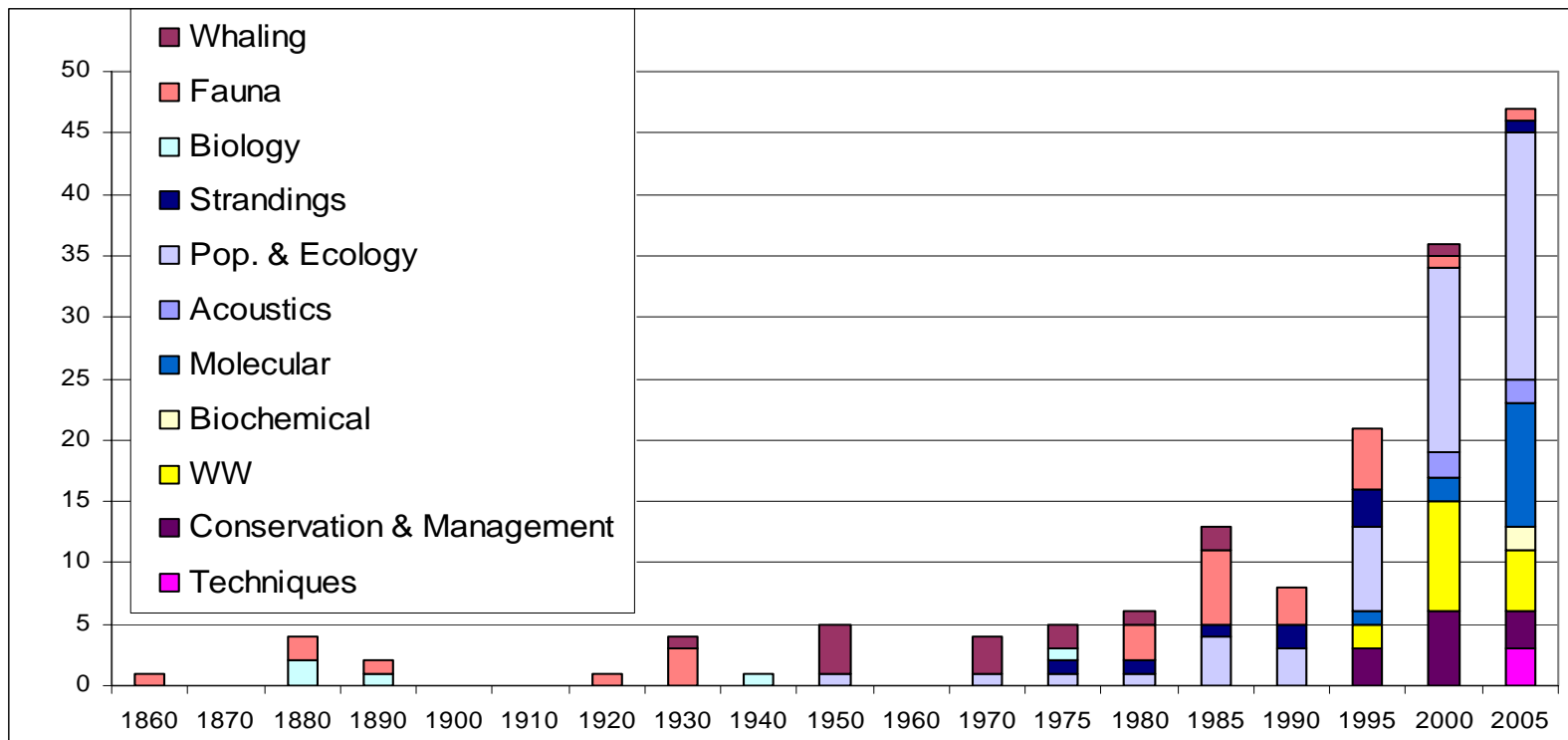


## Recent numbers and trends

(preliminary results)

### Whaling

Studies using whaling data to improve cetacean knowledge, appeared during the first half of the nineteenth century up no near the end of the whaling period



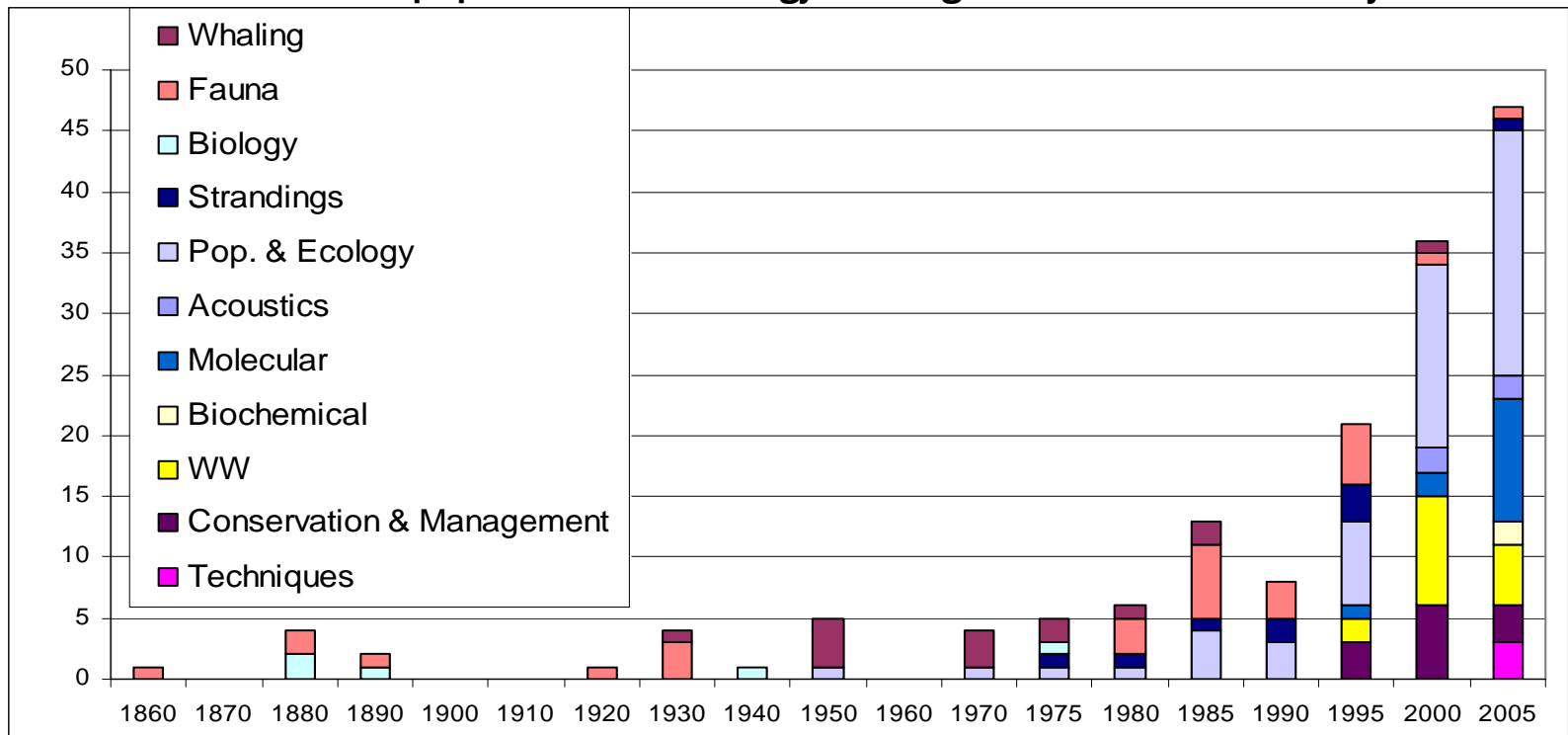
**Recent numbers and trends**

**Fauna**

(species lists; catalogues; guides; new records; check lists and reviews) (preliminary results)

Species lists are the first references, from Henri Drouet (1861) until the beginning of the XXth century with Prince Albert I results.

Follows a period of absence, with some insights into Sperm whales biology, population and ecology of using information obtained by the industry.



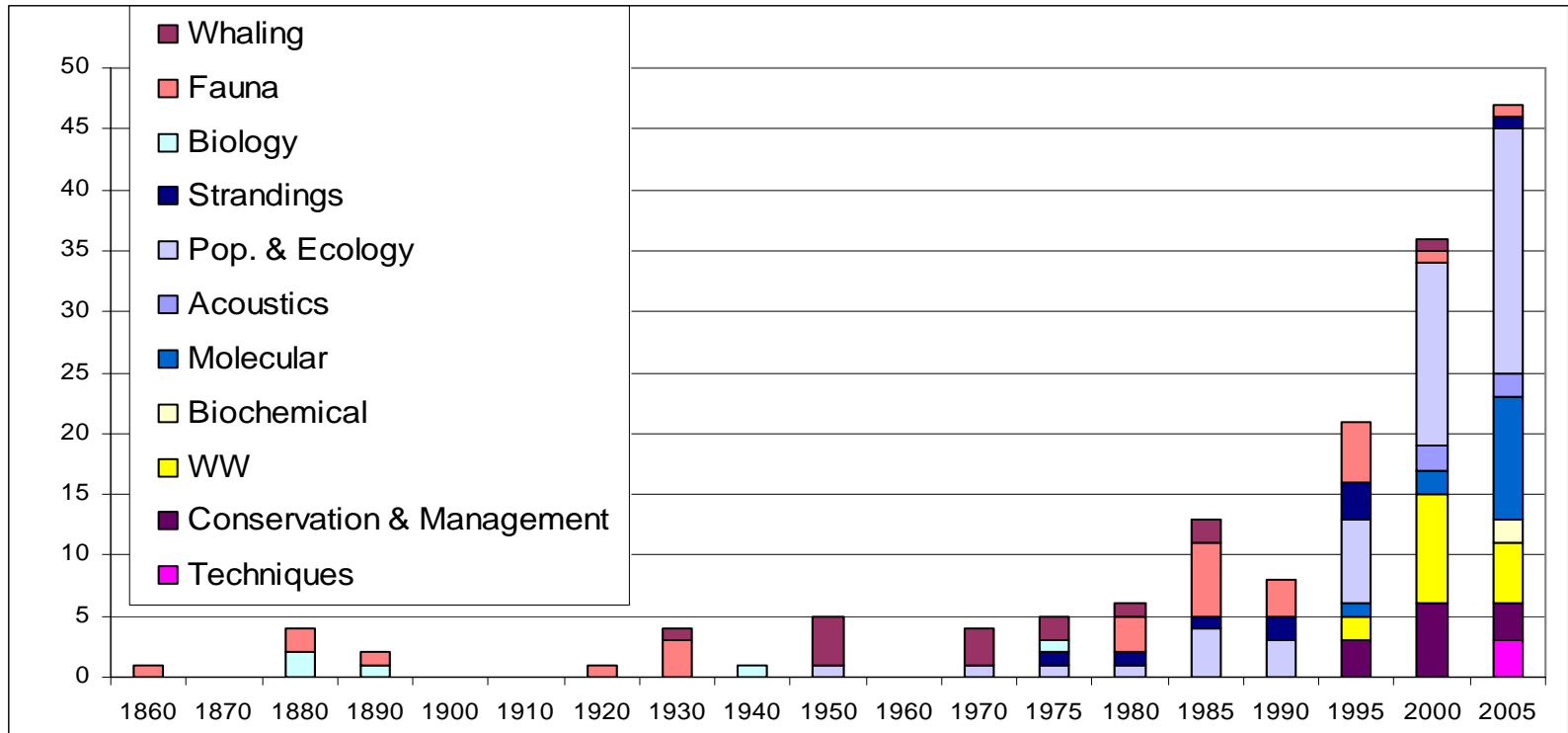
# Fauna

## Recent numbers and trends

(preliminary results)

1920 - Francisco Afonso Chaves

1935 - Ernesto Ferreira (previously mentioned).



# Fauna

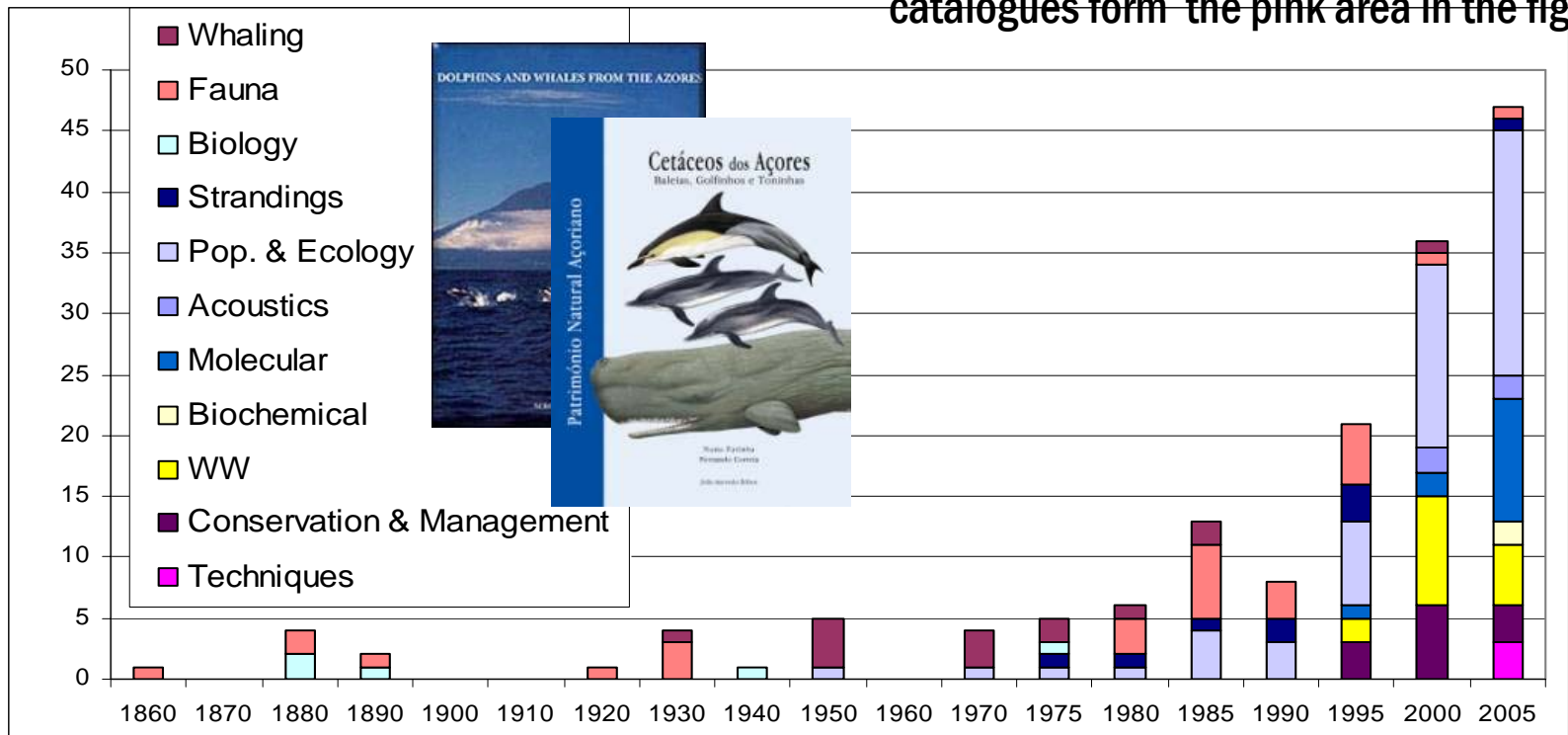
# Recent numbers and trends

(preliminary results)

1980's - Several world catalogues (books) - whaling had ended on most NA places

1981 - Robert Clarke writes a review on the literature, providing the first check-list that would be up-dated many times in the following years.

New records go to recent times (eg. *Balaenoptera eden*), together with regional catalogues form the pink area in the figure.



## Recent numbers and trends

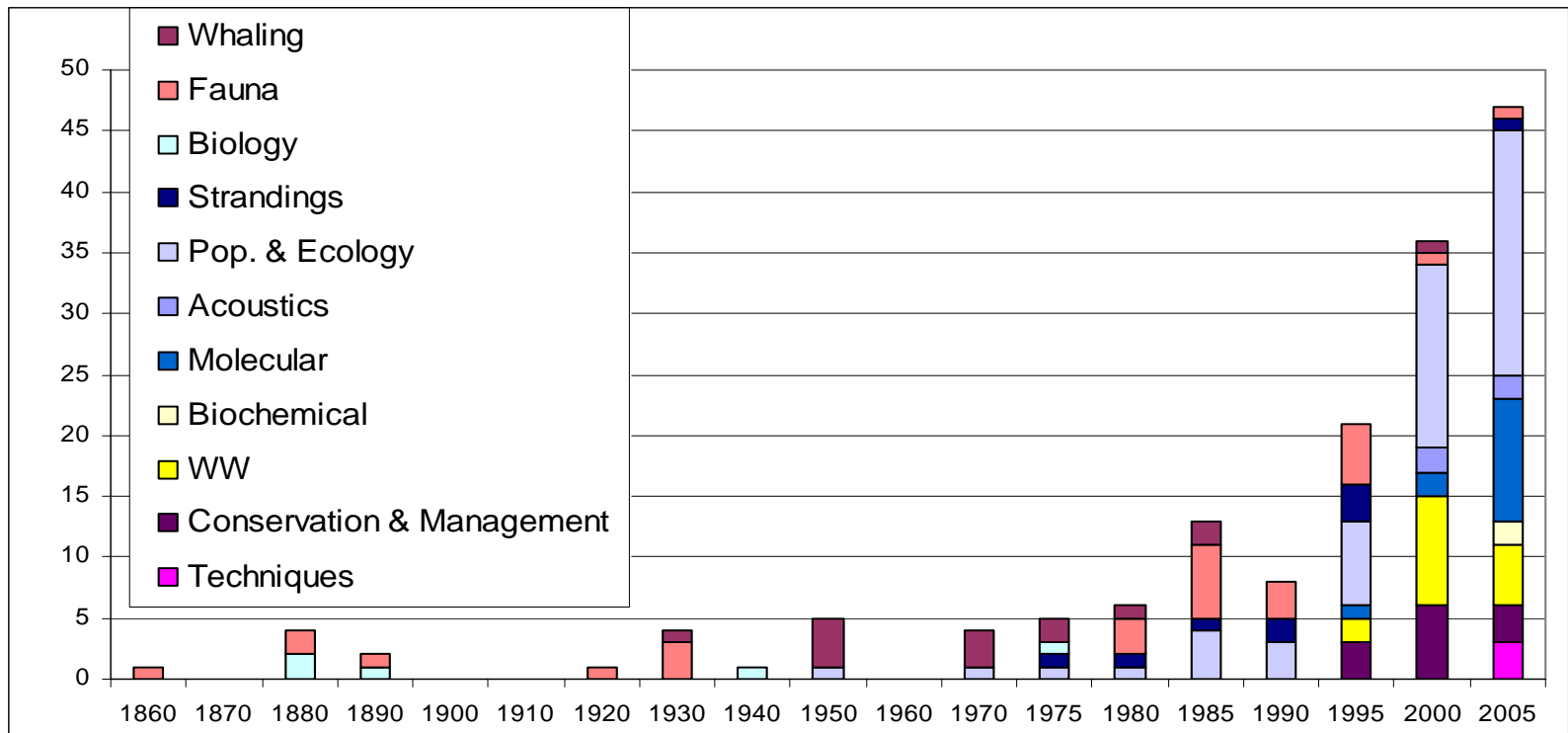
(preliminary results)

### Biology

Contributions to biology, physiology and parasites remount to the whaling period.

Strandings data provide present advances.

New technological instrumentation applications are nearly absent.



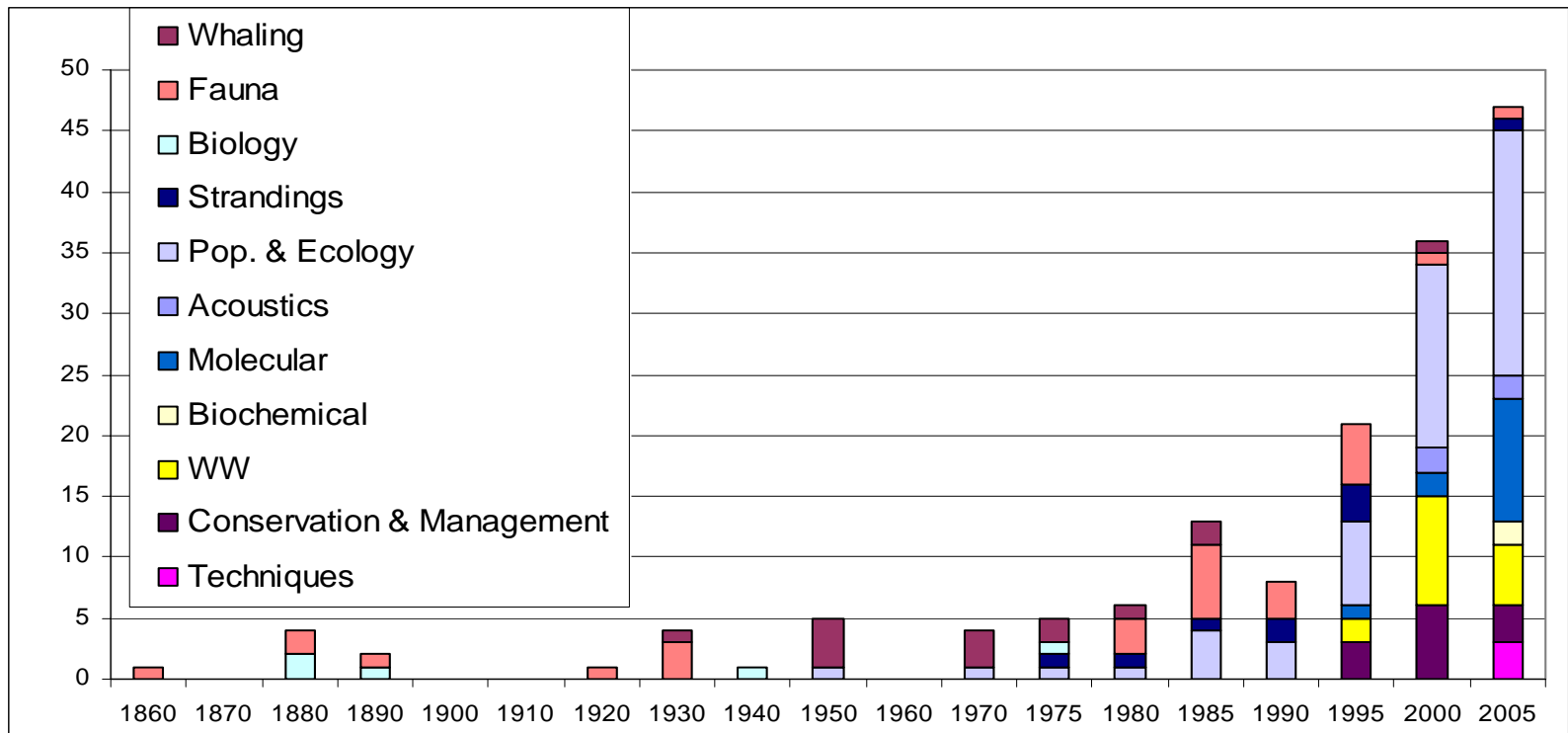
## Recent numbers and trends

(preliminary results)

### Strandings

Strandings are not frequent and reports started when the establishment of researchers.

Have been supplying data to other branches of cetology, including morphometry, relevant for taxonomy, as well as diet, pollution and by-catch studies.



## Population & Ecology

(survey, occurrence, distribution, abundance, behavior, diets)

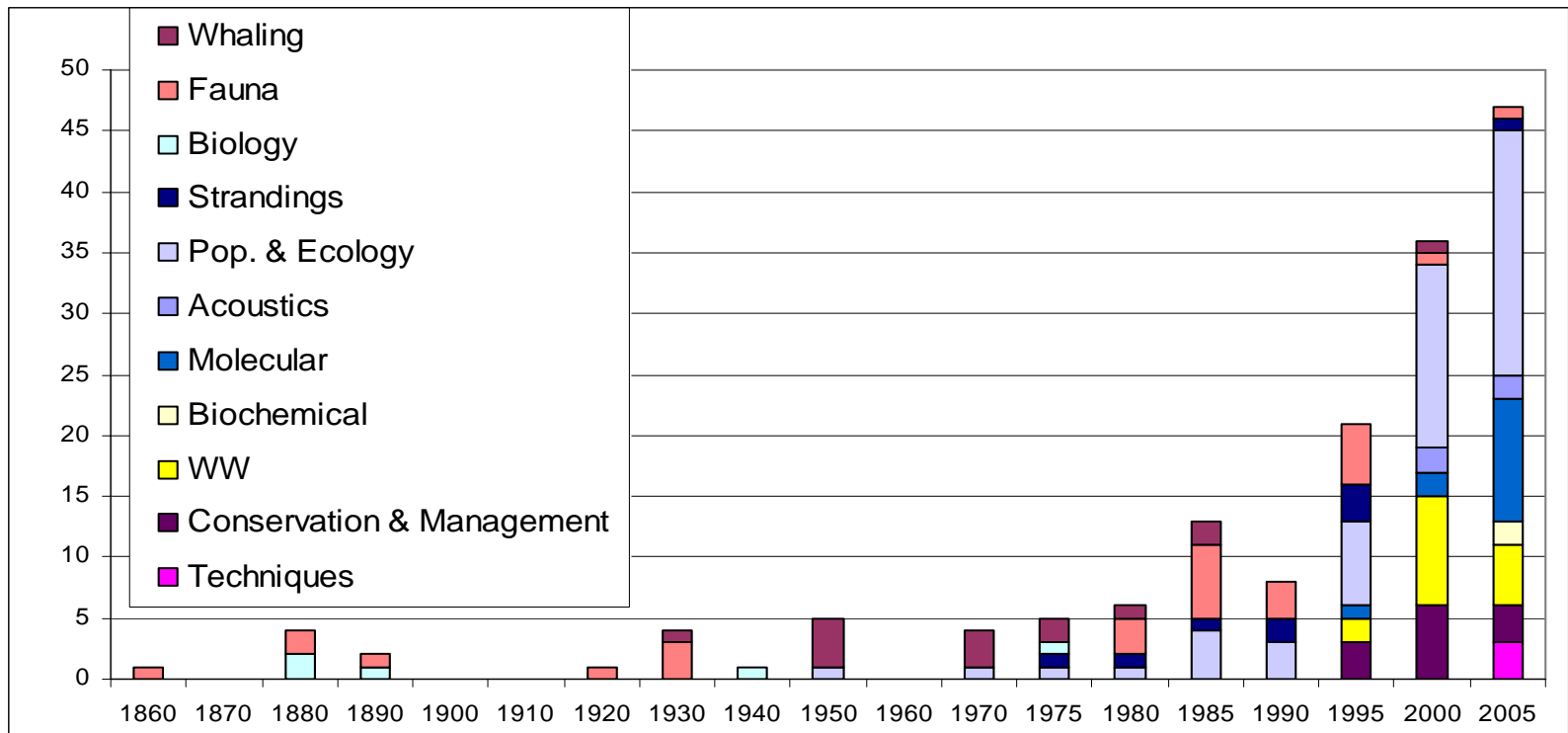
## Recent numbers and trends

(preliminary results)

“how many” and “how do” cetaceans use the Azorean waters?

Issued from the early 70’s represents in the last decade half of the published literature.

e.g.: visual sensus, foto-ID, acoustics and GIS for distribution, abundance & habitat use.



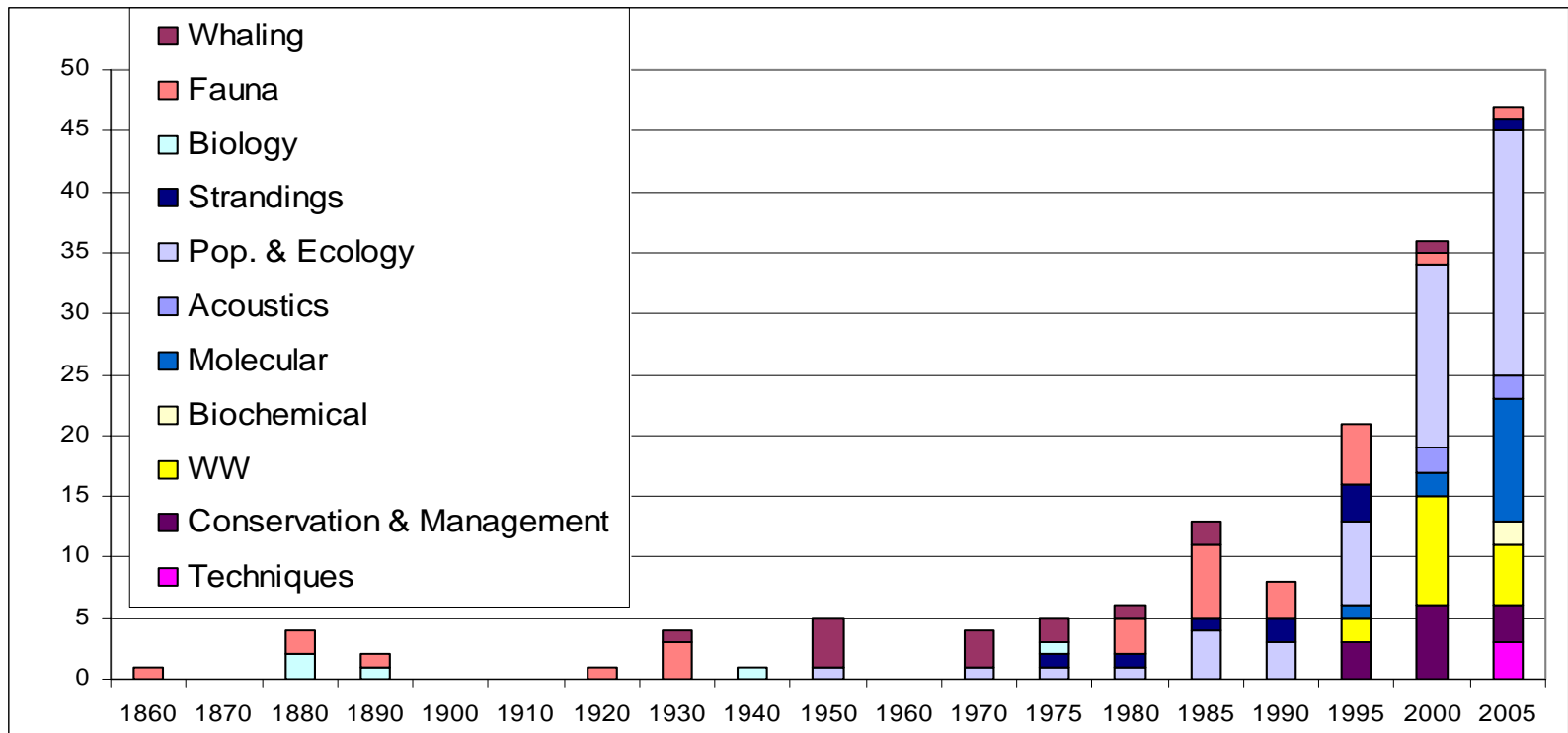
## Recent numbers and trends

(preliminary results)

### Acoustics

Applied since late 1980's and slowly growing presence in cetacean literature. Applications from abundance estimates, stock identification (sperm whales) to behavior in the wild

-> Population & Ecology type of studies.



## Recent numbers and trends

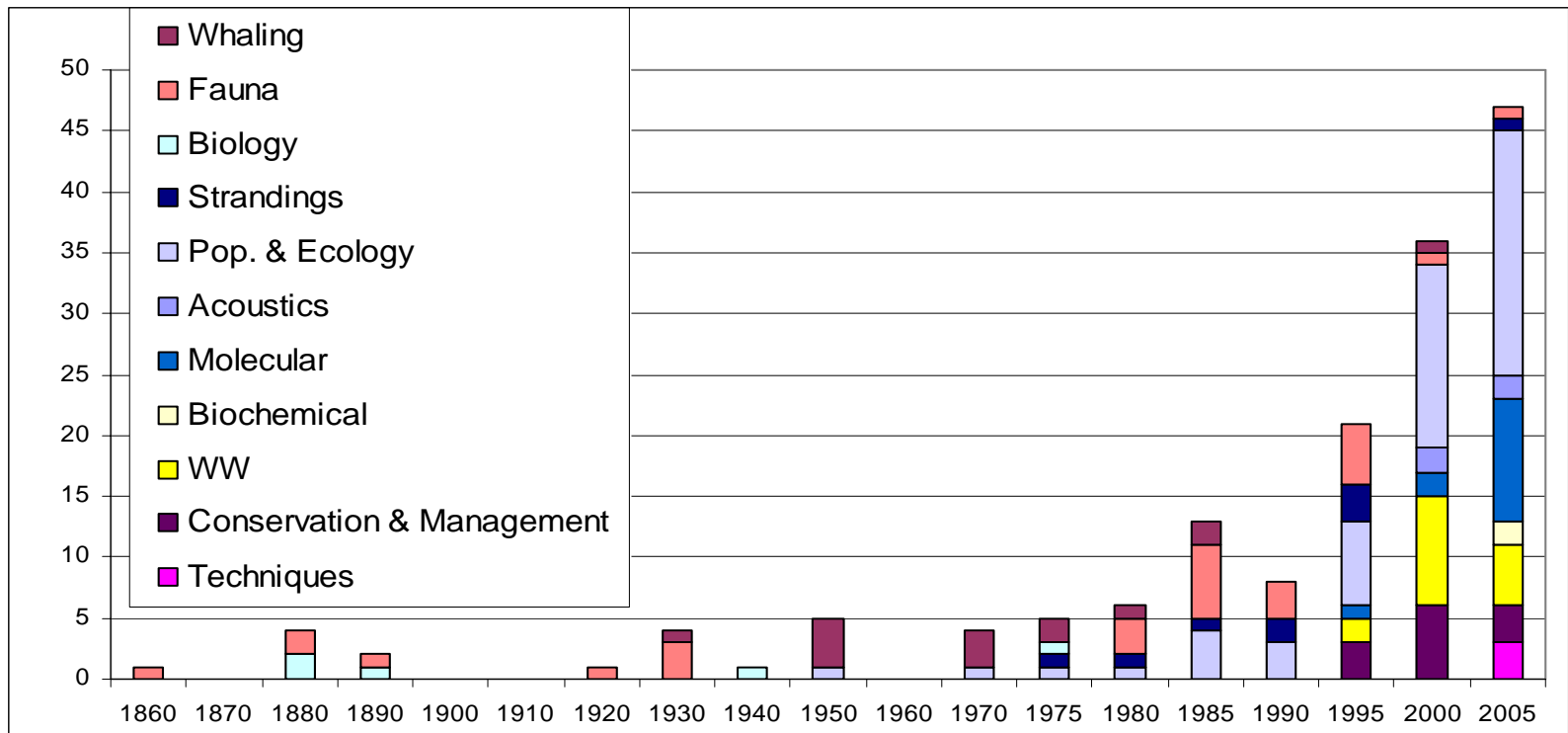
(preliminary results)

### Molecular applications

Truly XXIth century research tool.

Main focus: Taxonomy, genetics and social structure and habitat of Sperm whales and small delphinid populations.

Probably the literature with the most increase in recent years.

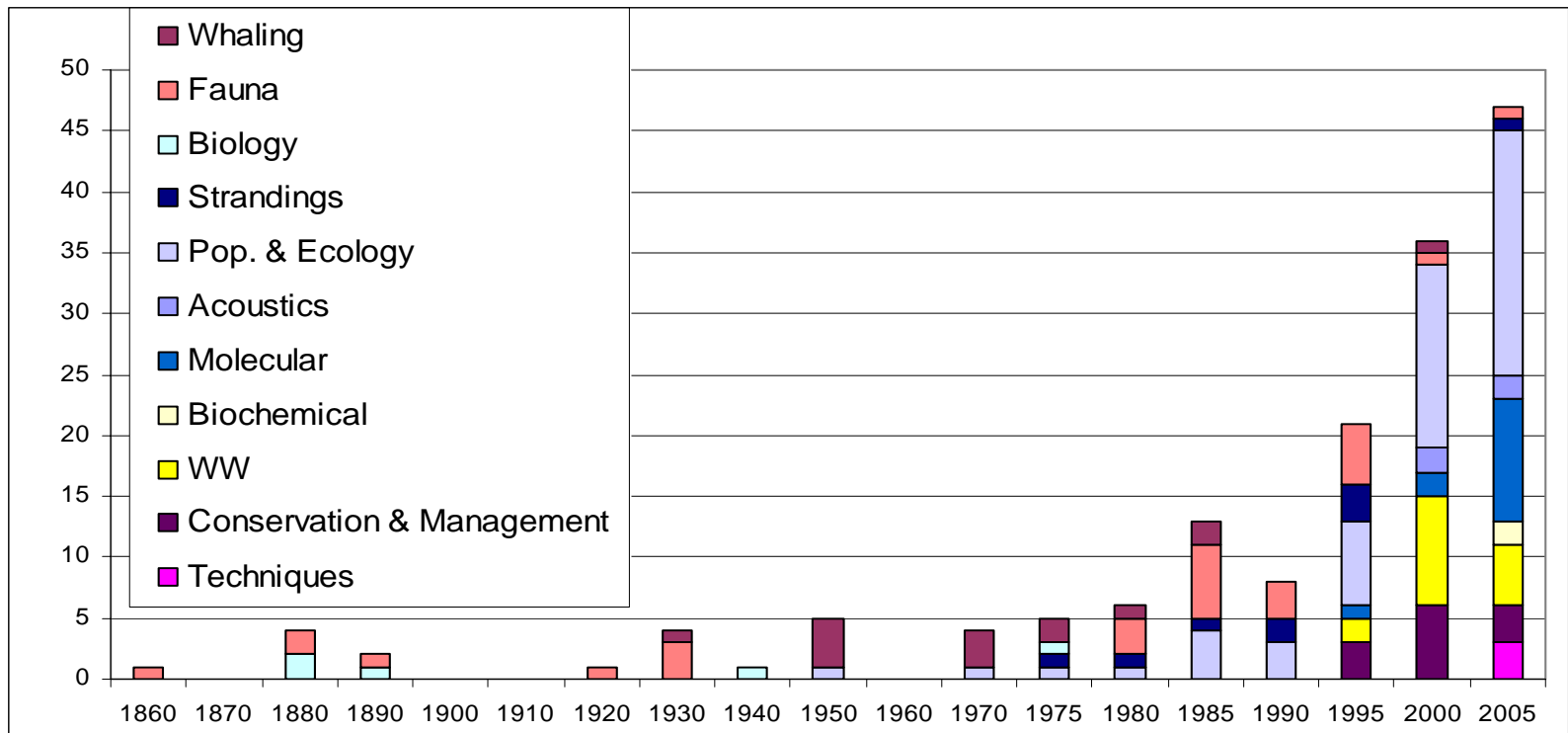


## Recent numbers and trends

(preliminary results)

### Biochemical methods

New method using blubber biopsy,  
research is focusing on potentialities for ecological studies



## Recent numbers and trends

(preliminary results)

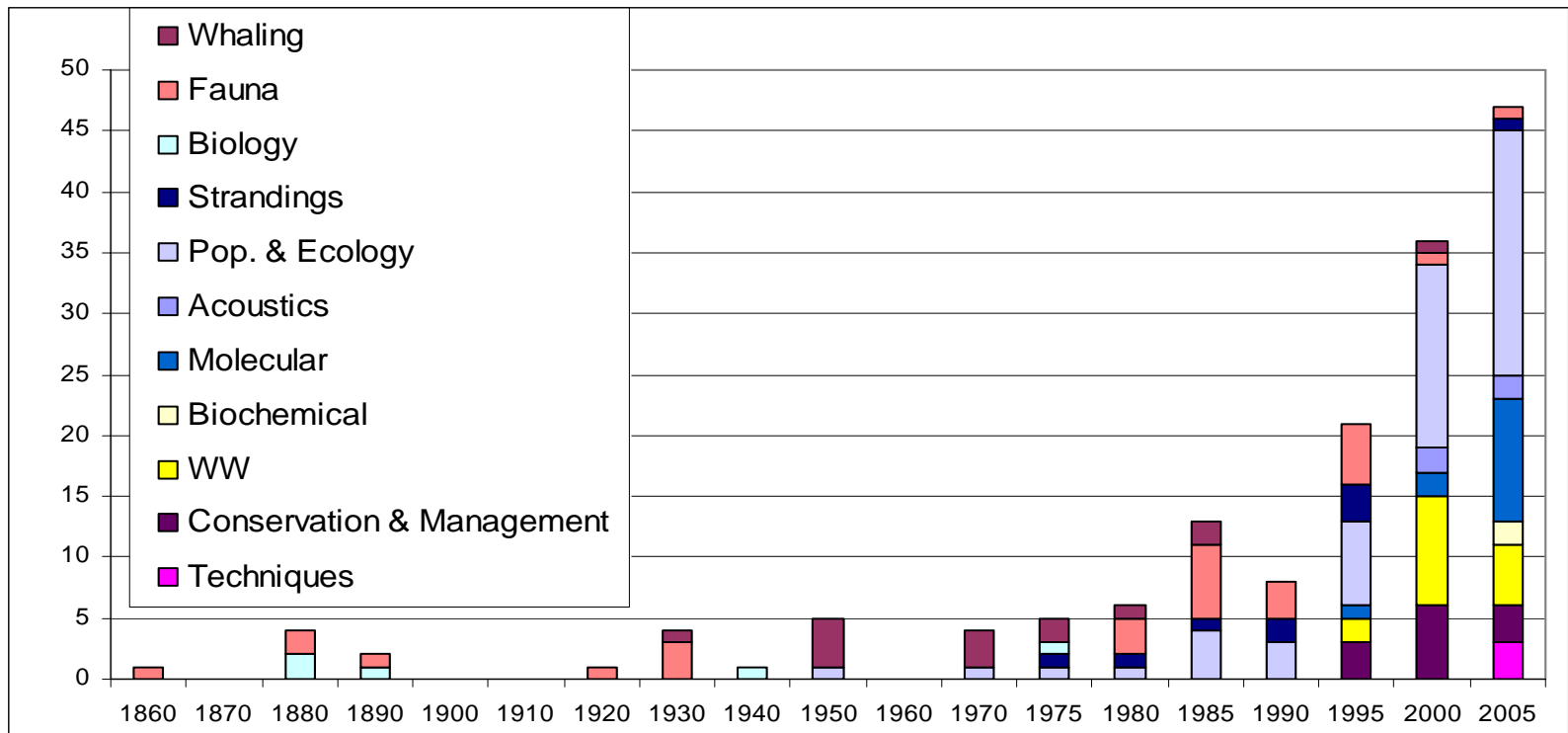
### Whale-watching (WW)

Since 1997 reports mainly concern impact (behavior, acoustics)

with regard to regulations

Studies of socio-economic context have been equally important.

A few recent use data from whale-watching for research purposes.



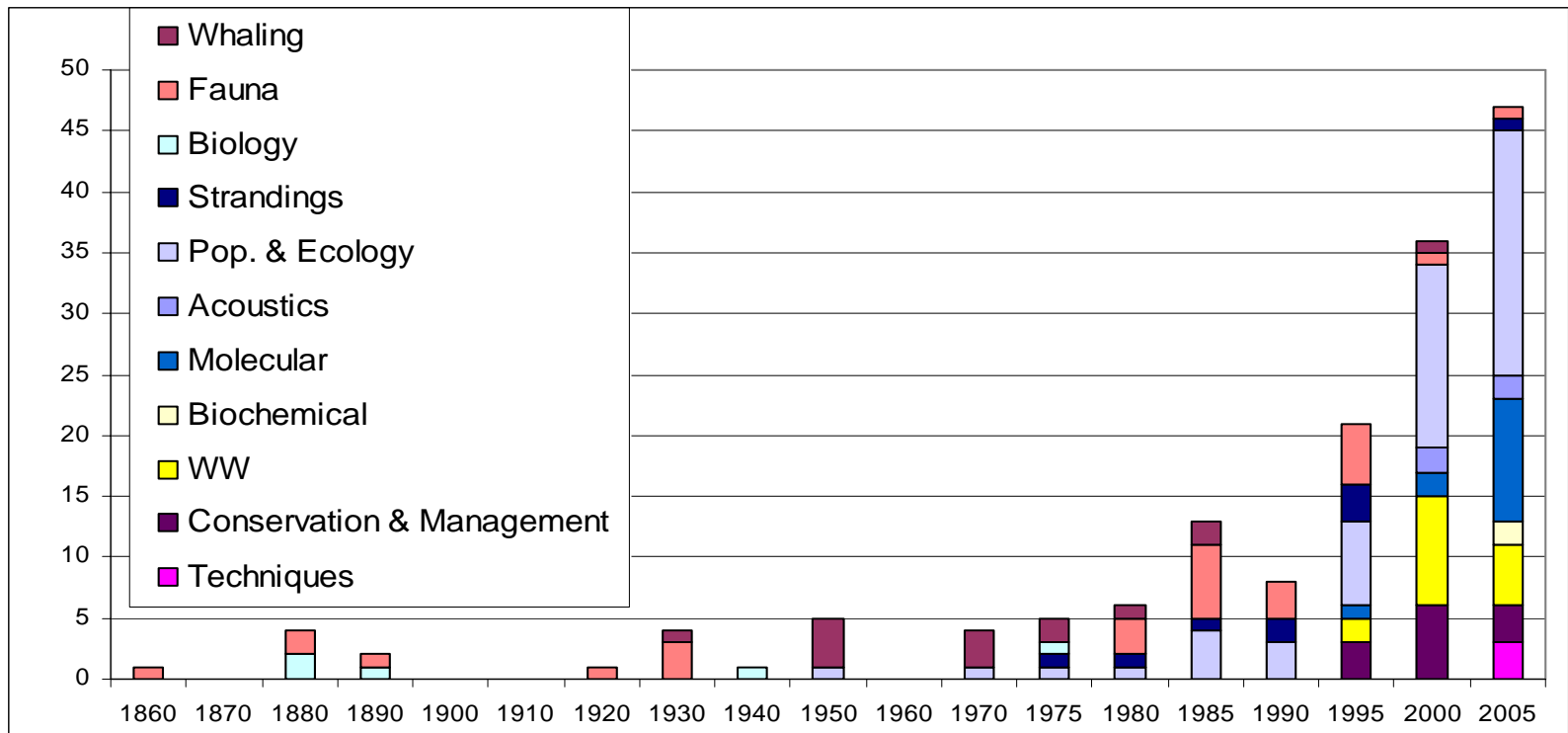
## Recent numbers and trends

(preliminary results)

### Conservation & Management (fisheries interactions, MPA's, reviews)

Most references relate to interaction with fisheries since 1995.

Marine conservation site proposals and reviews can be found.

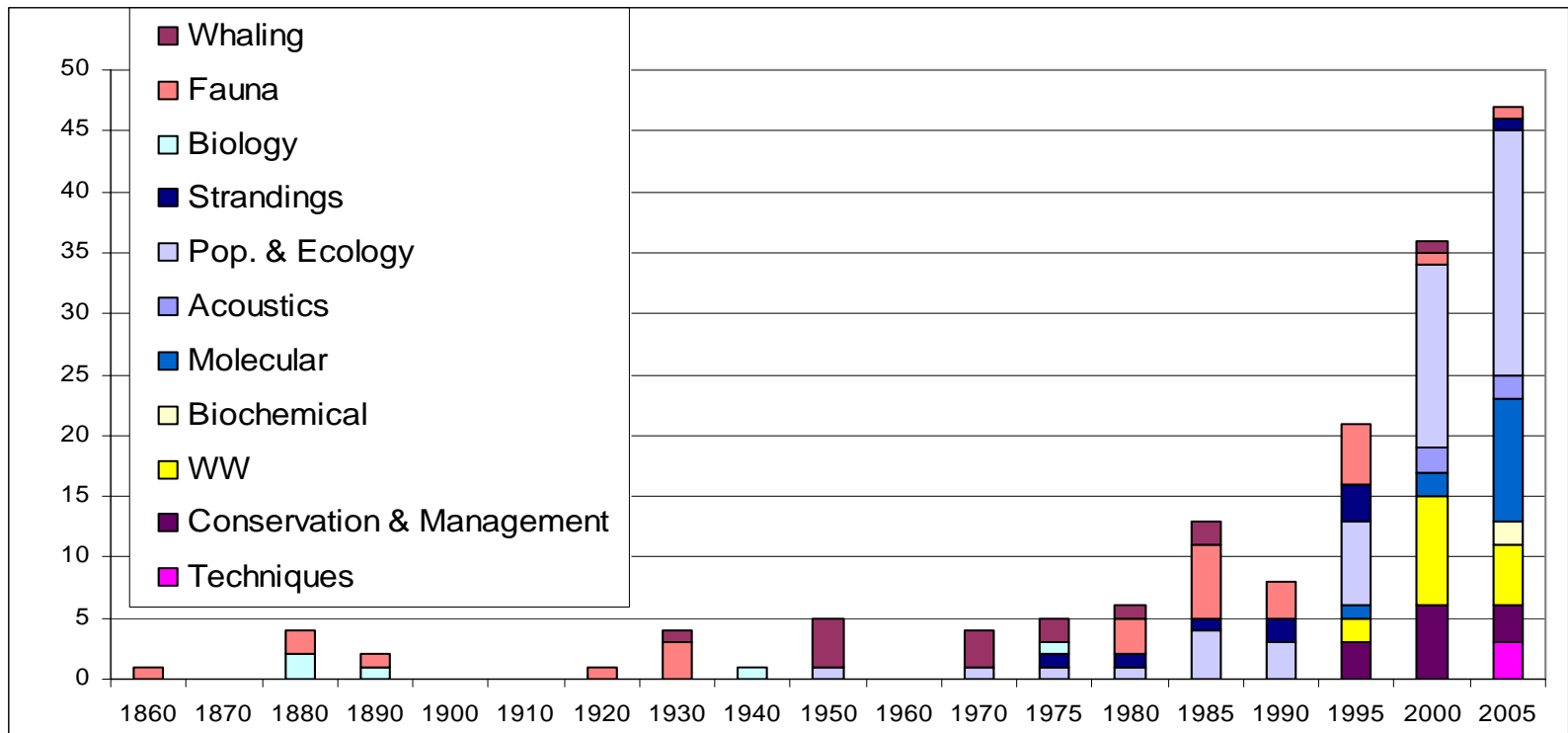


## Recent numbers and trends

(preliminary results)

### Technics.

Studies on research techniques such as photo-identification, molecular and GIS have been published in recent years, a clear sign of a growing research body.



# Time for questions...



## Acknowledgments:

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