



# Life History, Health and Condition

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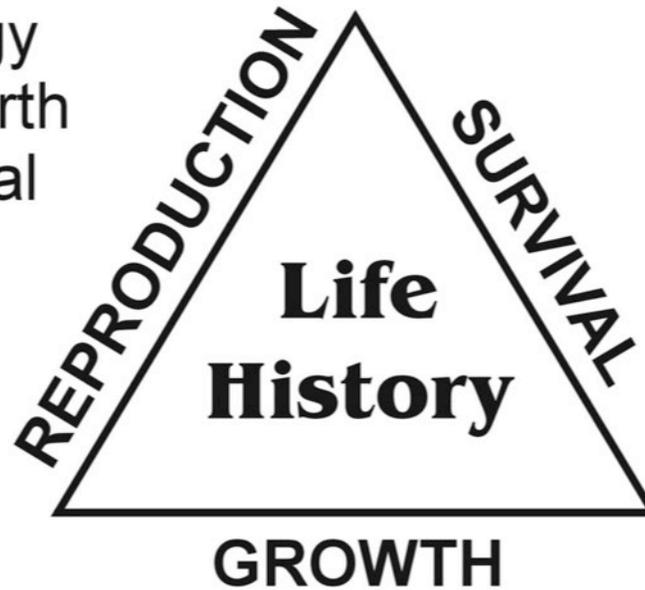
Review of NOAA Fisheries' Science on Marine Mammals & Turtles  
Southwest and Northwest Fisheries Science Centers  
27-31 July 2015  
La Jolla, CA

# Life History



# Health

- › Mating Strategy
- › Age at First Birth
- › Birthing Interval
- › Parental Care
- › Senescence



- Longevity
- Predation
- Movement Pattern
- Feeding Ecology

- Rates / Patterns of Growth
- Maximum Size or Length
- Size-at-Birth
- Morphology



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# Cetacean Health and Life History Program

- Specimen Based Studies
  - Legacy, specimen collection
  - New Techniques and Collaborations
- Innovative Approaches to Cetacean Research
  - Aerial Photography
  - Small UAS, Photogrammetry & Breath Sampling
  - Hormone Studies
- Integrative Approach to Consequences of Disturbance

# A Specimen Based Legacy



# Very Talented and Active Stranding Response Team

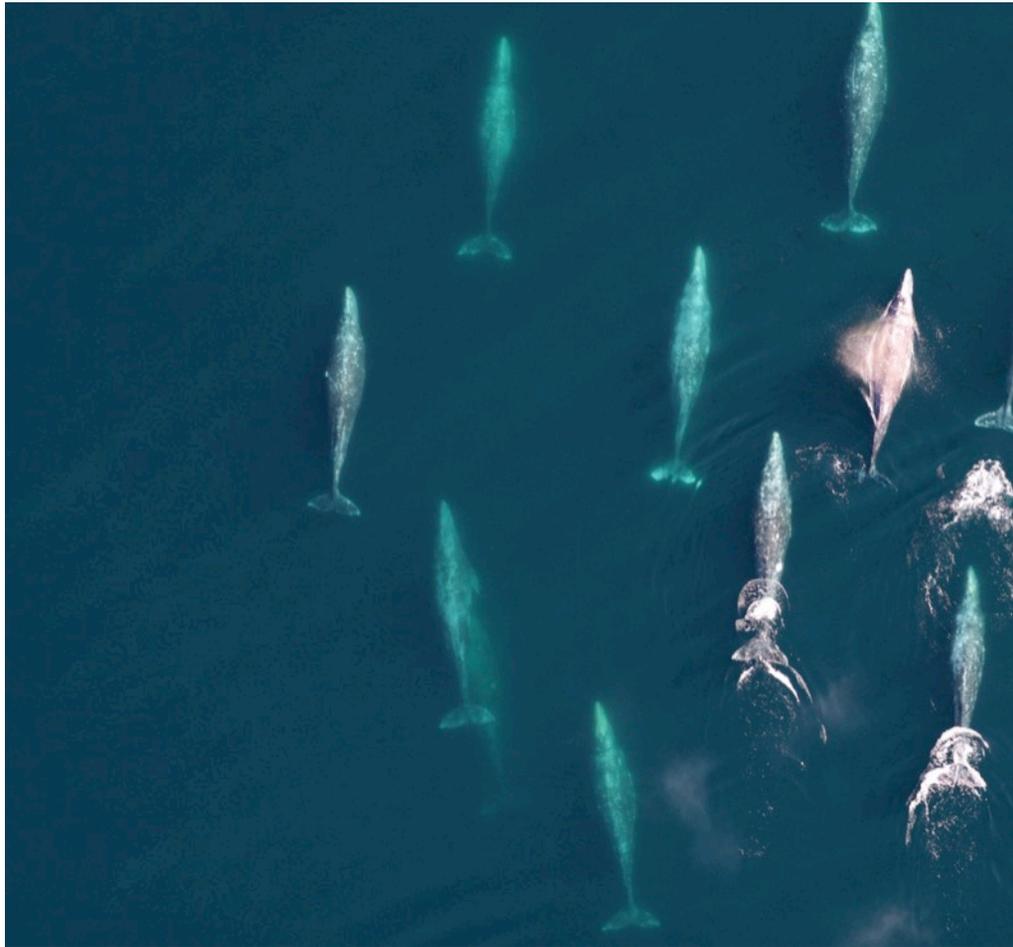
Long Time Series of Data from Stranded Specimens and Fishery Takes



# How to study health and condition?



# Aerial Photography – Manned Platforms



# Manned

- Manned
- They are
- Safety is
- altitudes
- Generat
- Even with
- limiting
- Some th



t at low

can be

platform

# APH-22 Hexacopter from Aerial Imaging Solutions



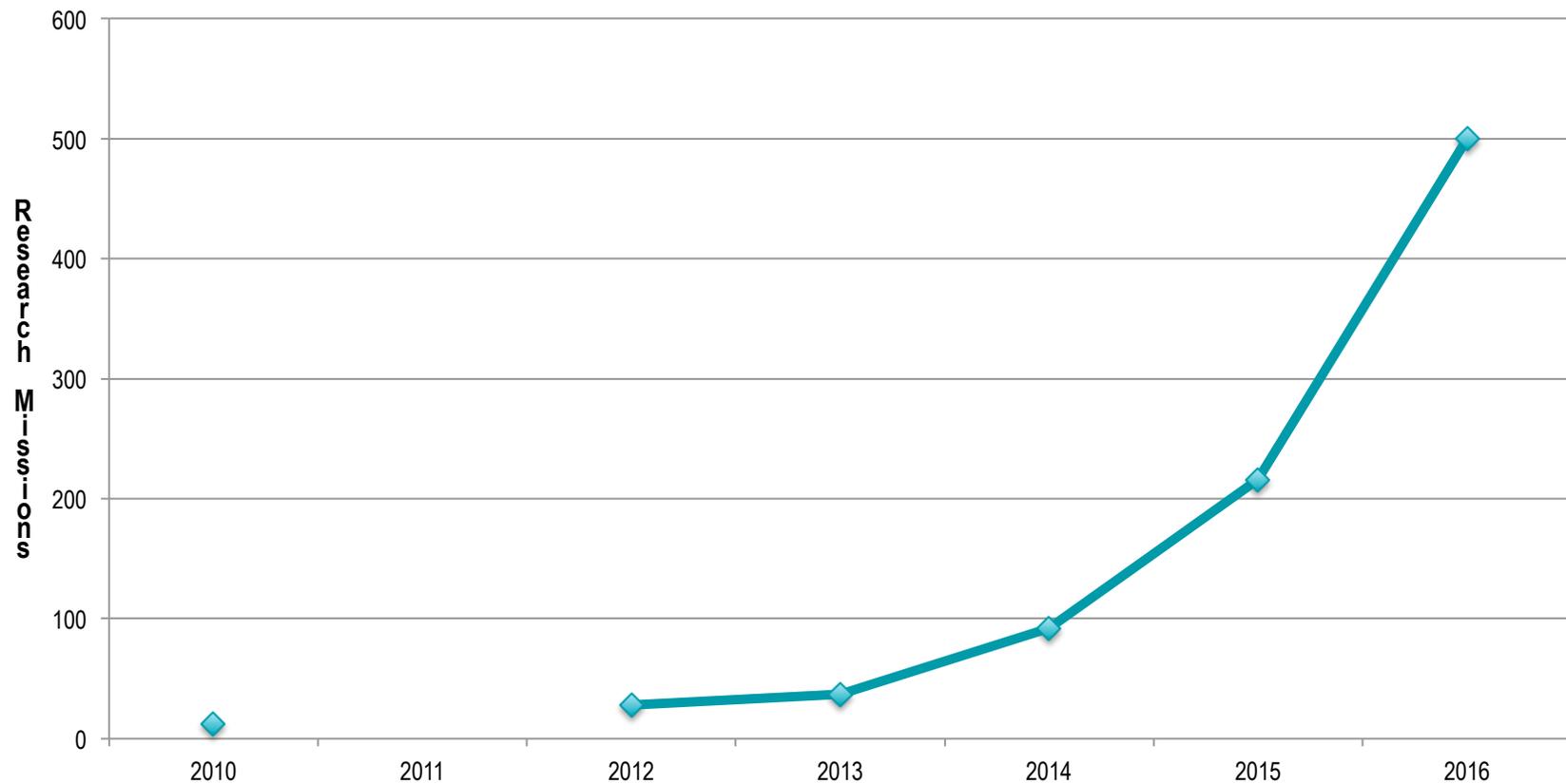


# SWFSC Small UAS Program–Hexacopter Squadron 1

- Lead within NOAA for development of small UAS systems for field sampling
- By the end of calendar year we will manage a fleet of a dozen aircraft (AOC has 9)
- Train pilots within NMFS and academic partners
- In many applications these systems are better, cheaper, safer, and cause less disturbance than manned systems

# Applications and Opportunities

## UAS (Hexacopter) Missions



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# Breath Sampling

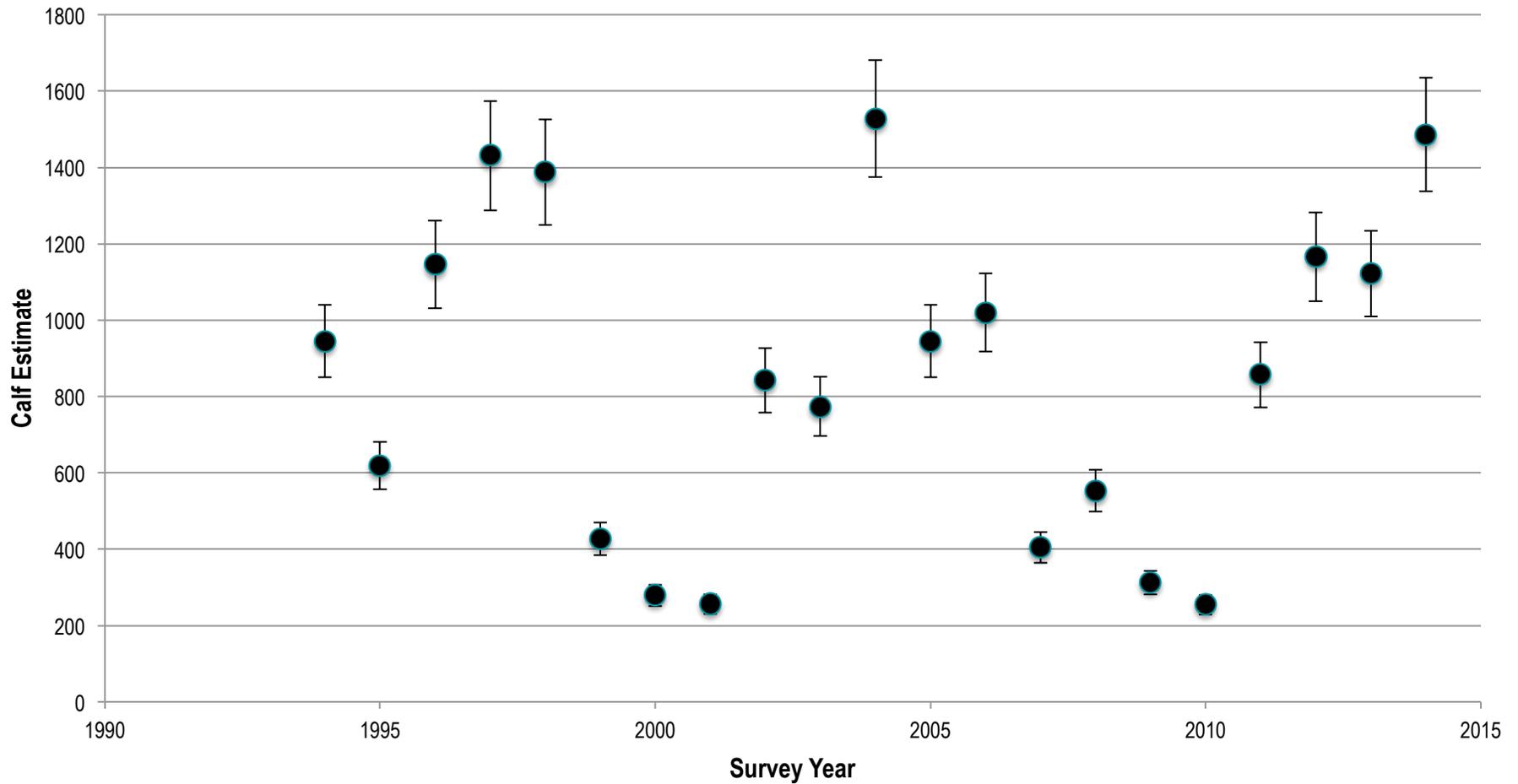


# Gray Whale Calf Survey – Piedras Blancas, CA



# Total Calf Estimates 1994-2014

## Estimates of Northbound Calves



# Shore-based Counts + Hexacopter

- How do environmental factors impact condition of reproductive female gray whales
- What age/size class of females are most impacted by resource
- How is growth/size/potential survival of calf related to size/shape of mom
- Does calf growth rate vary with environmental conditions

# Innovation- blubber hormones: indicators of reproduction and health

The challenge has been to assess reproduction and health/condition from free-ranging cetaceans. Traditional biological samples used for health assessment are next to impossible to acquire from the vast majority of animals.

Fortunately we have dart biopsies; they are the most commonly collected biological sample obtained from wild cetaceans all over the world.

A decade ago our program developed methods to extract and measure the lipophilic hormones from the blubber attached biopsies. We remain the only lab anywhere that does this routinely.

We use these hormone measurements to diagnosis pregnancy, to determine maturity state, to assess physiological stress activity, and to help evaluate nutritive condition. And there's more to come.

## Blubber Hormone Extraction:

Blubber Biopsy



Fatty Acids

Steroid Hormones



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# Links with Mandates, Needs of Regulatory Partners

- NW Region & MMPA
  - Response to strandings and analysis of samples
  - Assessments of ENP and PCFG Gray Whales and coastal bottlenose dolphins
  - Assessments of nutritive and reproductive condition of Southern Resident Killer Whales and relationship to salmon runs
  - Lead contact for Region regarding Makah wavier request
  - Chair, NMFS Task Force on Gray Whale population structure
  - Contaminant studies focused on how body burden is related to vulnerability to a range of impacts
  - Lead for hormone studies investigating stress and reproductive failures associated with DWH
  - Climate Change (gray whales, bottlenose dolphins, strandings)

# Strengths

- A team with a breadth of technical and analytical skills
- Long time series (specimen and data)
- Long term collaborative relationships
- Laboratory and ship facilities
- Leadership

# Challenges

- Continue to excel in development of technologies (soft \$)
- Provide opportunities to staff
- Continue time series (specimen collection and field sampling)
- Balance pursuit of funds against science mandates
- Bureaucratic overhead (FAA)
- Small boat support

# Strategies

- Focus more on local studies from small boats
- Use new technologies to reduce costs (UAS, thermal sensors)
- Integrate core methodologies
- Work collaboratively on populations with photo ID data
- Expand local collaborators/customers (Navy, State, Academic)



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