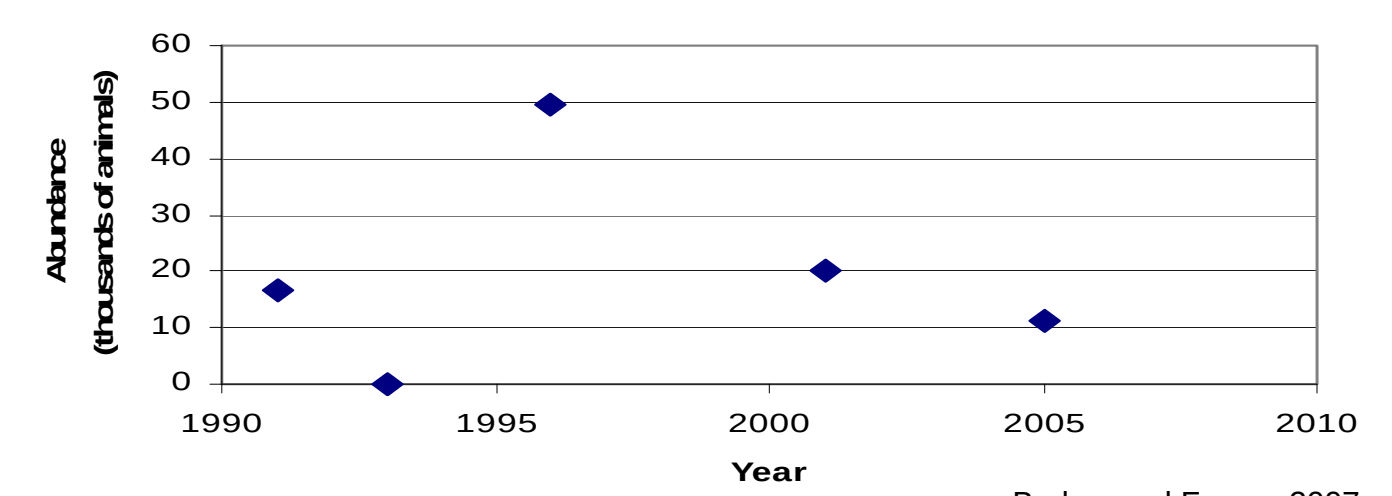
Ecosytem studies of *Delphinus* species off the Californias

Delphinus cruise: Objectives

- Identify Demographically Independent Populations (DIPs; aka ‘stocks’), and for each, estimate
  - Reproductive parameters, including pregnancy rates, calf production and breeding season
  - Abundance
  - Contaminant concentrations
  - Habitat characteristics

Delphinus

- 2 species in different habitats: coastal and pelagic
- Risk factors
  - Fishery takes
  - Habitat changes (e.g. pollution, HABs)
- Genetics suggests > 1 SCB stock
- Timing of reproduction suggests transboundary stock movement
- No estimates of reproductive parameters available
- Long-beaked common dolphin
  - Survey-to-Survey variability in abundance estimates



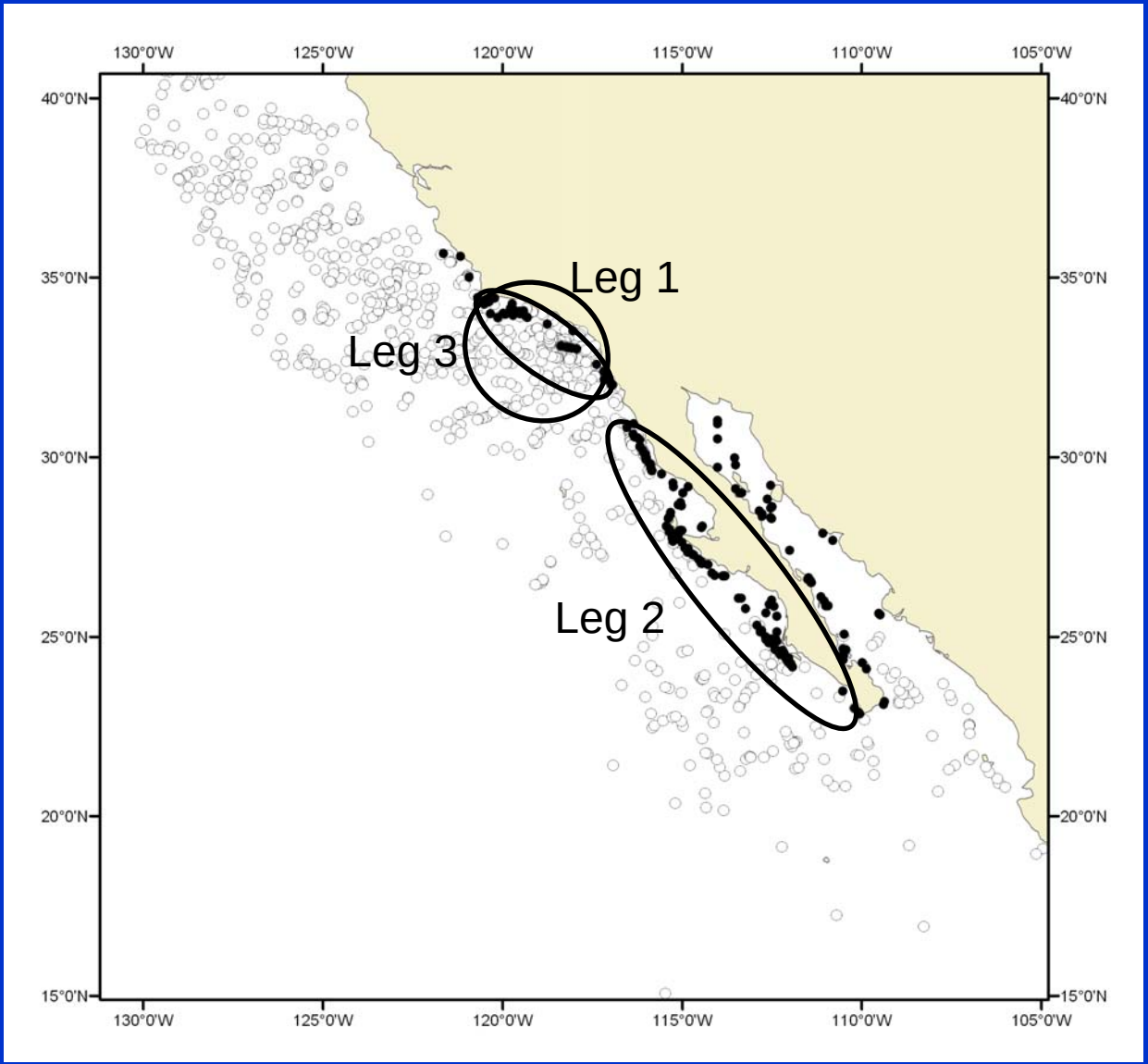
Barlow and Forney 2007

Ship and plane time

- R/V McArthur II
  - ~90 sea days
  - 7 Sept – 6 Dec

- NOAA Twin Otter
  - 80 hours
  - Begin 15 Sept

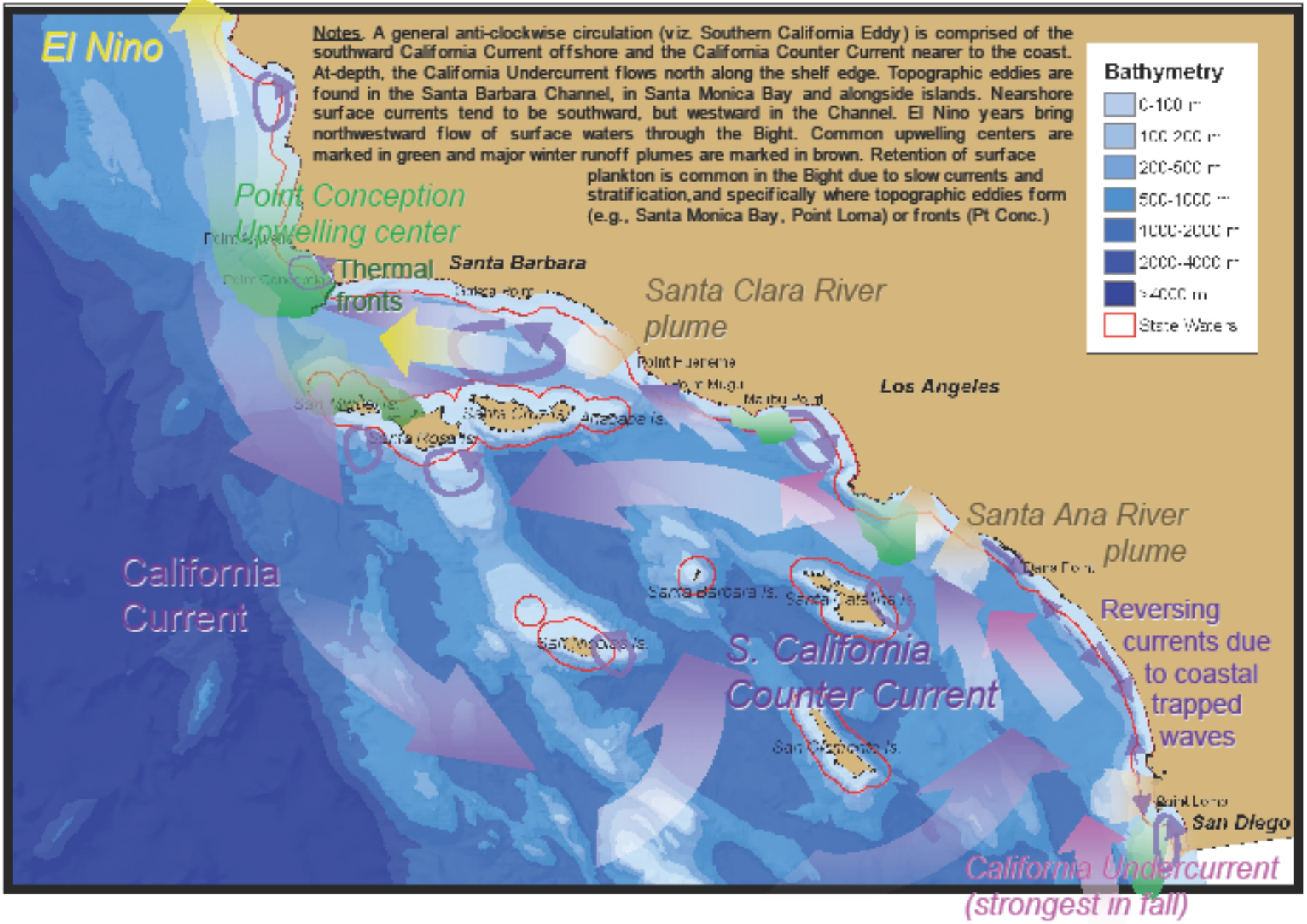
SWFSC Research Cruise Sightings of *Delphinus delphis* and *D. capensis*



North Latitude

West Longitude

Circulation in the Southern California Bight



Projects & PIs

- Abundance
  - Jim Carretta
- Ecosystem
  - Jessica Redfern
- Population Structure
  - Eric Archer
- Reproduction
  - Nick Kellar (molecular)
  - Wayne Perryman (photogrammetry)
- Health and contaminants
  - Dave Weller
- Outreach and education
  - Siri Hakala

Abundance Estimation: Jim Carretta

- Line transect
- Visual sightings

Ecosystem studies: Jessica Redfern

- Physical oceanography
  - New equipment: Underway CTD
  - HAB sampling: *Pseudo-nitzchia* spp.
- Mid-trophic sampling
  - IKMT & Bongo net tows
  - Squid jigging: *Dosidicus gigas*
- Sea birds

Stock structure and reproduction

- Biopsy samples

Stock structure: Eric Archer

- Objective
  - To identify stocks (DIPs)
- Methods
  - Standard molecular genetic markers and analytical techniques
- Sampling goals
  - Ensure species distributions are represented
  - Increase sample sizes for putative stocks

Reproduction: Nick Kellar

- Objective
  - To estimate pregnancy rates
- Methods
  - Use hormone assays to identify pregnant females
- Sampling goals
  - Collect 500 samples/*Delphinus* species
  - Collect data to address potential sampling biases
    - Stage class bias: compare length distributions
      - Tandem plane/ship sampling of 10 schools
      - Solo plane/ship sampling of 10 schools
    - Sampling platform bias: compare sex ratios and pregnancy rates
      - Tandem small boat/ship sampling
        - » Paired sampling; alternate starting platform
        - » 150 samples per platform

Aerial Photogrammetry: Wayne Perryman

- Goals:
  - Calibrate shipboard observer estimates of group size (n = 12-15 schools)
  - Confirm species identifications using length measurements of *Delphinus*
  - Establish reliable cues for species identification from the air
  - Estimate reproductive parameters

Aerial Photogrammetry

- Estimate:
  - Calf production
  - Breeding season
  - Average length at disassociation (weaning)
- Examine relationship between school size and school structure (length distribution, % calves)

Digital Imaging System

Concept → SBIR grant → Reality

Measurements of Dolphins on the Bow

- Equipment: Canon 1Ds MK II camera with 24 mm lens
- Measure dolphins near surface and parallel to the surface.
- Measure each dolphin in several frames.

Stem of ship in image will be used to determine scale of the photograph (camera to water distance/focal length of lens)

Health and contaminants: Dave Weller

- Compare with *Tursiops* study
- Inshore/offshore gradients
- Correlate with reproduction

Outreach and education: Siri Hakala

- Classroom lectures and activities
- Wiki site with weekly postings
- Ship tours

http://swfsc.nmfs.noaa.gov/PRD/
Cornelia Oedekoven