

# Design of an eastern tropical Pacific (ETP) dolphin survey

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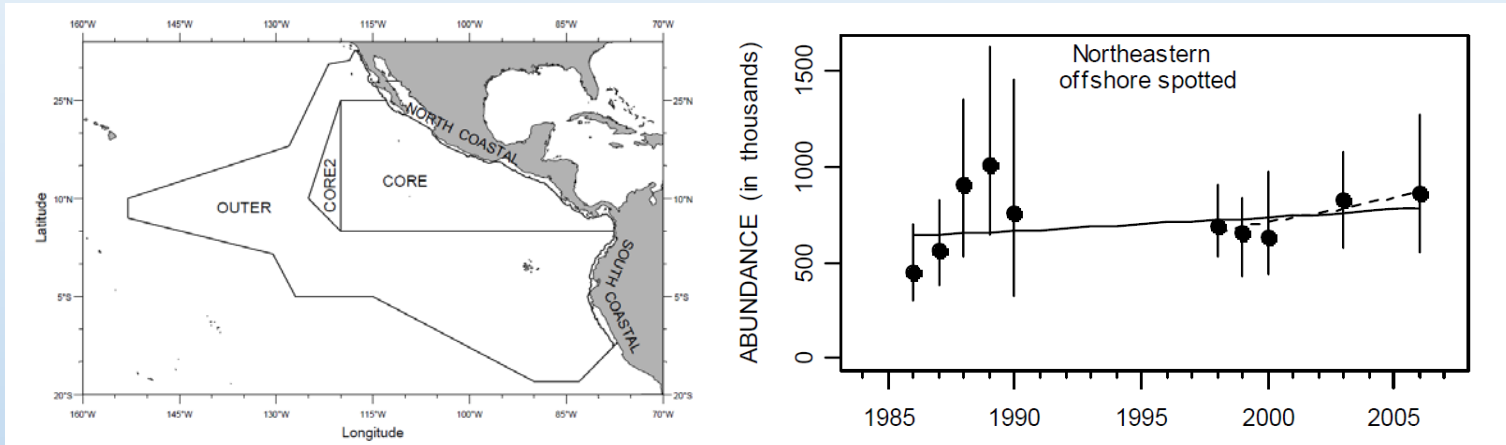


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# Previous NMFS surveys for ETP dolphin stocks

## ➤ Recent survey strata and abundance estimates



## ➤ Barlow (2015): trackline detection probability $g(0) < 1$ for Beaufort $> 0$

| Beaufort               | 0     | 1     | 2      | 3      | 4      | 5      | 6     | Weighted average |
|------------------------|-------|-------|--------|--------|--------|--------|-------|------------------|
| $g(0)$ Spotted dolphin | 1     | 0.73  | 0.53   | 0.39   | 0.28   | 0.21   | 0.15  | ~0.30            |
| Effort (km) STAR06     | 100.1 | 375.4 | 1729.8 | 3212.2 | 9375.5 | 6952.1 | 492.1 |                  |

## ➤ Effect on abundance estimate ~ 3.3 times higher

## ➤ We need to verify the $g(0)$ estimates with a field study

# Objectives, survey area and priority stocks

## 1. Estimate *relative* abundance of priority stocks

- Provides trend estimates
- Needs comparability with past surveys

## 2. Estimate *absolute* abundance of the priority stocks

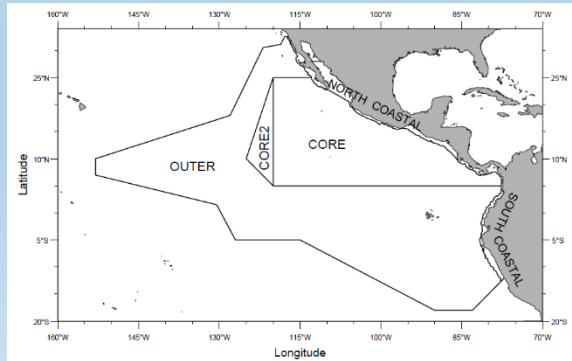
- Stock mortality limits
- Stock status
- Needs  $g(0)$  estimation

### Priority stocks A:

10 stocks from Gerrodette et al. (2008)

Survey area:

STAR06 area and strata



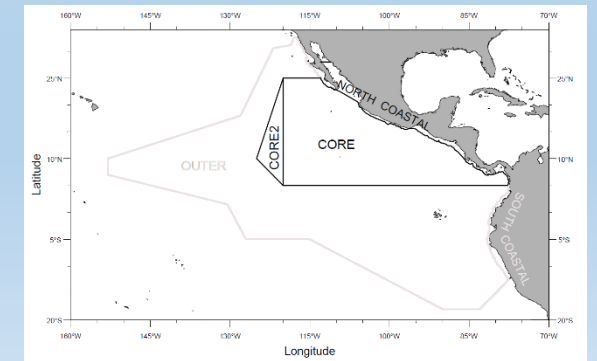
### Priority stocks B:

2 stocks listed as 'depleted' by the MMPA ([www.mmc.gov](http://www.mmc.gov))

Survey area:

CORE, CORE2 and N. COASTAL strata

(just the strata where these stocks occur)



# Trial survey

## Rationale

- Pilot survey
- Vessel calibration<sup>1</sup>
- Testing utility of drones for
  - Assessing g(0) issue<sup>2</sup>
  - School size calibration

## Length<sup>3,4</sup>

- 30 days if vessel calibration
  - 1 tuna + 1 research vessel
- 14 days if no vessel calibration
  - 1 research vessel

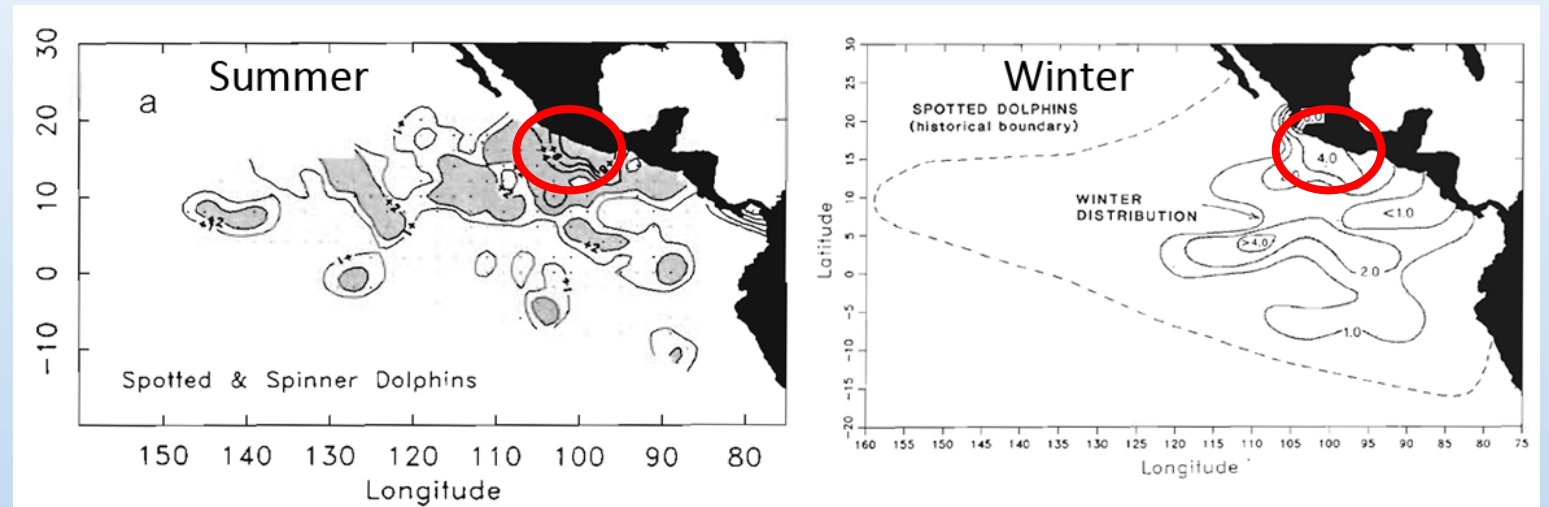
<sup>1</sup> If tuna vessels are involved in main survey

<sup>2</sup> If objective 2 and/or if tuna vessels are involved in main survey

<sup>3</sup> + 5-day transits to and from San Diego

<sup>4</sup> Costs in US\$ 1,000:     4,332.82 (30-day trial, no costs for tuna vessel included)  
                              2,157.82 (14-day trial)

Area: highest expected encounter rates



Summer and winter distributions of spotted and spinner dolphins in the ETP (Reilly 1990).

|   | Design 1   | Design 2                          | Design 3 option 1           | Design 3 option 2            |
|---|--|-----------------------------------|-----------------------------|------------------------------|
| Vessels main survey (both research)               | 2  | 2                                 | 1                           | 2                            |
| Assess absolute abundance                         | Yes  | No                                | Yes                         | Yes                          |
| Drones for g(0)                                   | Yes  | No                                | Yes                         | Yes                          |
| Drones for school size calibration                | Yes  | Yes                               | Yes                         | Yes                          |
| Study area  | All STAR06 strata                                      | All STAR06 strata                 | CORE, CORE2, N. COASTAL     | CORE, CORE2, N. COASTAL      |
| Priority stocks                                   | 10 stocks  | 10 stocks                         | 2 depleted stocks           | 2 depleted stocks            |
| Coverage in CORE, CORE2 and N. COASTAL            | Same as previous surveys                               | Same as previous surveys          | Same as previous surveys    | Better than previous surveys |
| Coverage in OUTER and S. COASTAL                  | Poor<br>Unless increase in effort                      | Poor<br>Unless increase in effort | Nil                         | Nil                          |
| Expected precision                                | Same as previous surveys                               | Same as previous surveys          | Same as previous surveys    | Better than previous surveys |
| Possible to detect movement between strata        | Small chance   | Very small chance                 | No chance                   | No chance                    |
| Potential for bias                                | Minor for 2 depleted stocks<br>Considerable for others | Considerable for all 10 stocks    | Minor for 2 depleted stocks | Minor for 2 depleted stocks  |
| <sup>1,2</sup> Total trial survey (in US\$ 1,000) |  |                                   |                             |                              |
| 1 research vessel                                 | 2,157.82 <sup>1</sup>                                  | 2,157.82 <sup>1</sup>             | 2,157.82 <sup>1</sup>       | 2,157.82 <sup>1</sup>        |
| 1 in-kind research vessel                         | 1,401.48 <sup>2</sup>                                  | 1,401.48 <sup>2</sup>             | 1,401.48 <sup>2</sup>       | 1,401.48 <sup>2</sup>        |
| <sup>1,2</sup> Total main survey (in US\$ 1,000)  |  |                                   |                             |                              |
| No in-kind vessels                                | 15,380.75 <sup>1</sup>                                 | [needs to be assessed]            | 7,079.31 <sup>1</sup>       | 15,380.75 <sup>1</sup>       |
| 1 in-kind vessel                                  | 10,611.06 <sup>1,2</sup>                               |                                   | 4,280.18 <sup>2</sup>       | 10,611.06 <sup>1,2</sup>     |
| 2 in-kind vessels                                 | 7,641.09 <sup>2</sup>                                  |                                   | --                          | 7,641.09 <sup>2</sup>        |

<sup>1</sup>Costs are based on quotes for Ocean Starr (1<sup>st</sup> vessel) and Ocean Titan (2<sup>nd</sup> vessel) unless in-kind | <sup>2</sup>No costs associated with in-kind vessels are included

# References

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