# Satellite-tagging and photo-ID provide further evidence of multiple island-associated populations of common bottlenose dolphins in the main Hawaiian Islands

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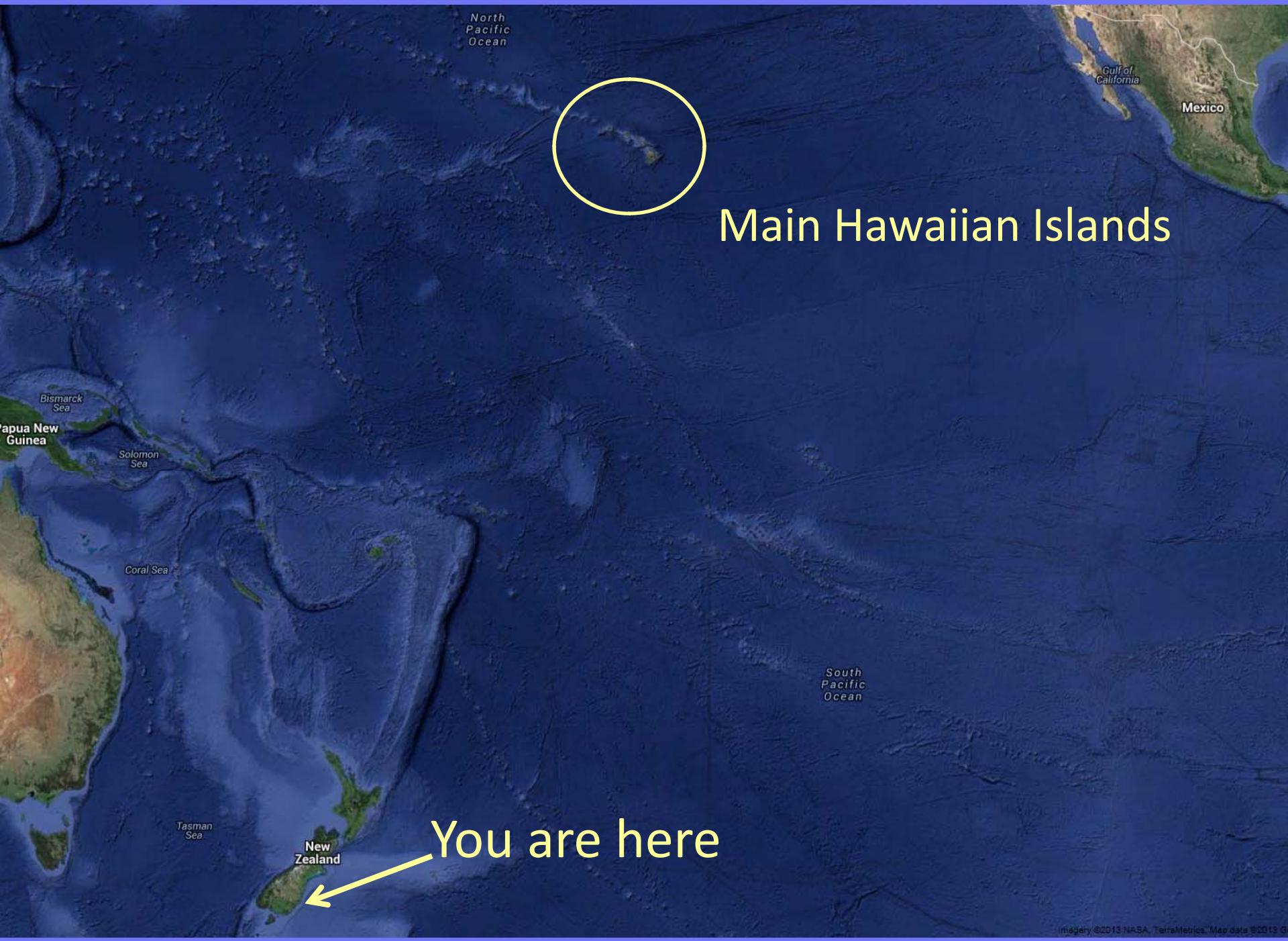
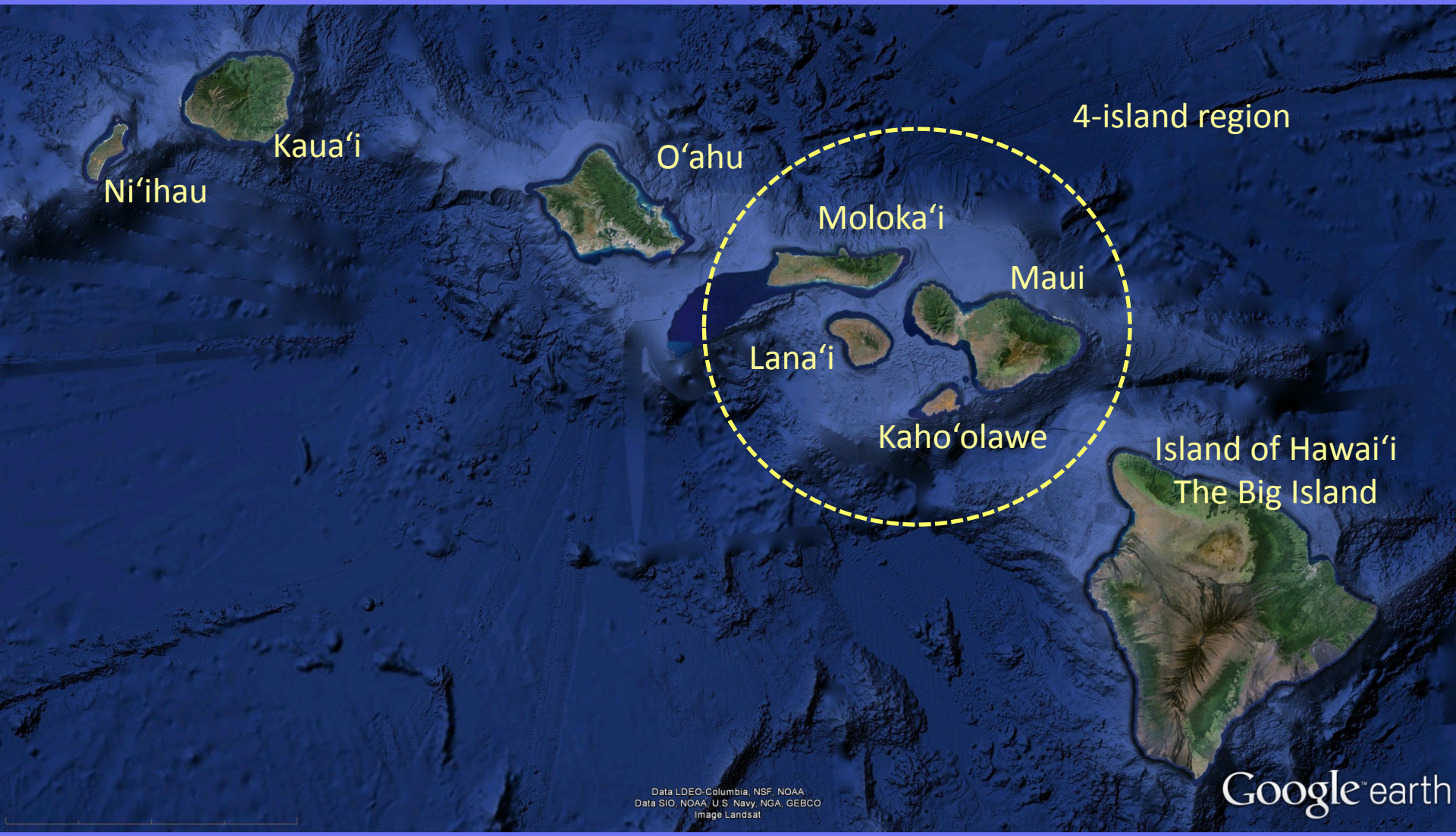
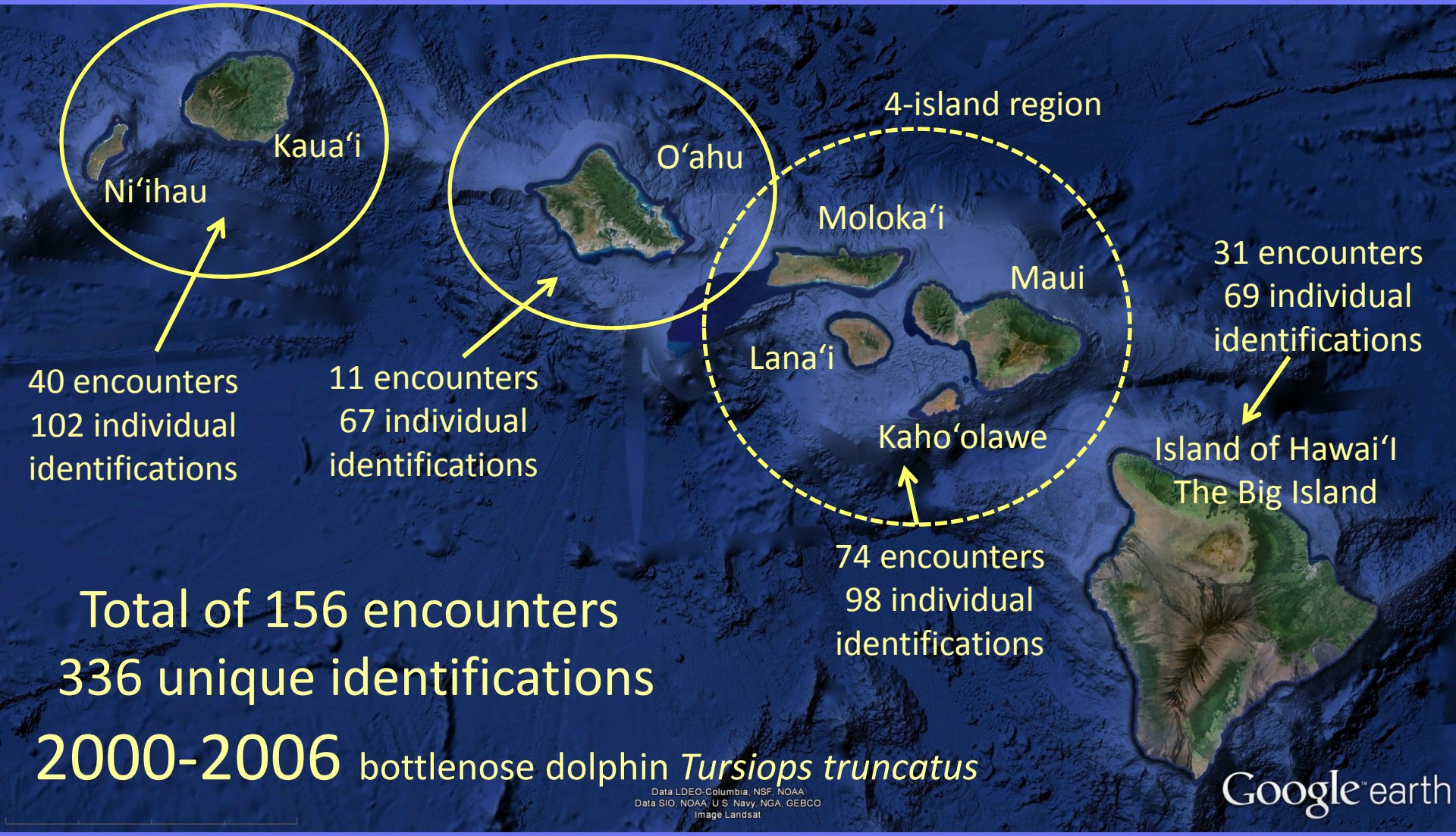

North Pacific Ocean
Gulf of California
Mexico
Main Hawaiian Islands
Bismarck Sea
Papua New Guinea
Solomon Sea
Coral Sea
South Pacific Ocean
Tasman Sea
New Zealand
You are here

# Main Hawaiian Islands



# Background

## Photo-identification




Baird *et al*. 2009

# Background

## Photo-identification

- No evidence of movement of individuals among these areas
- Inter-island movement rates are < 1% per year

# Background

## Genetics

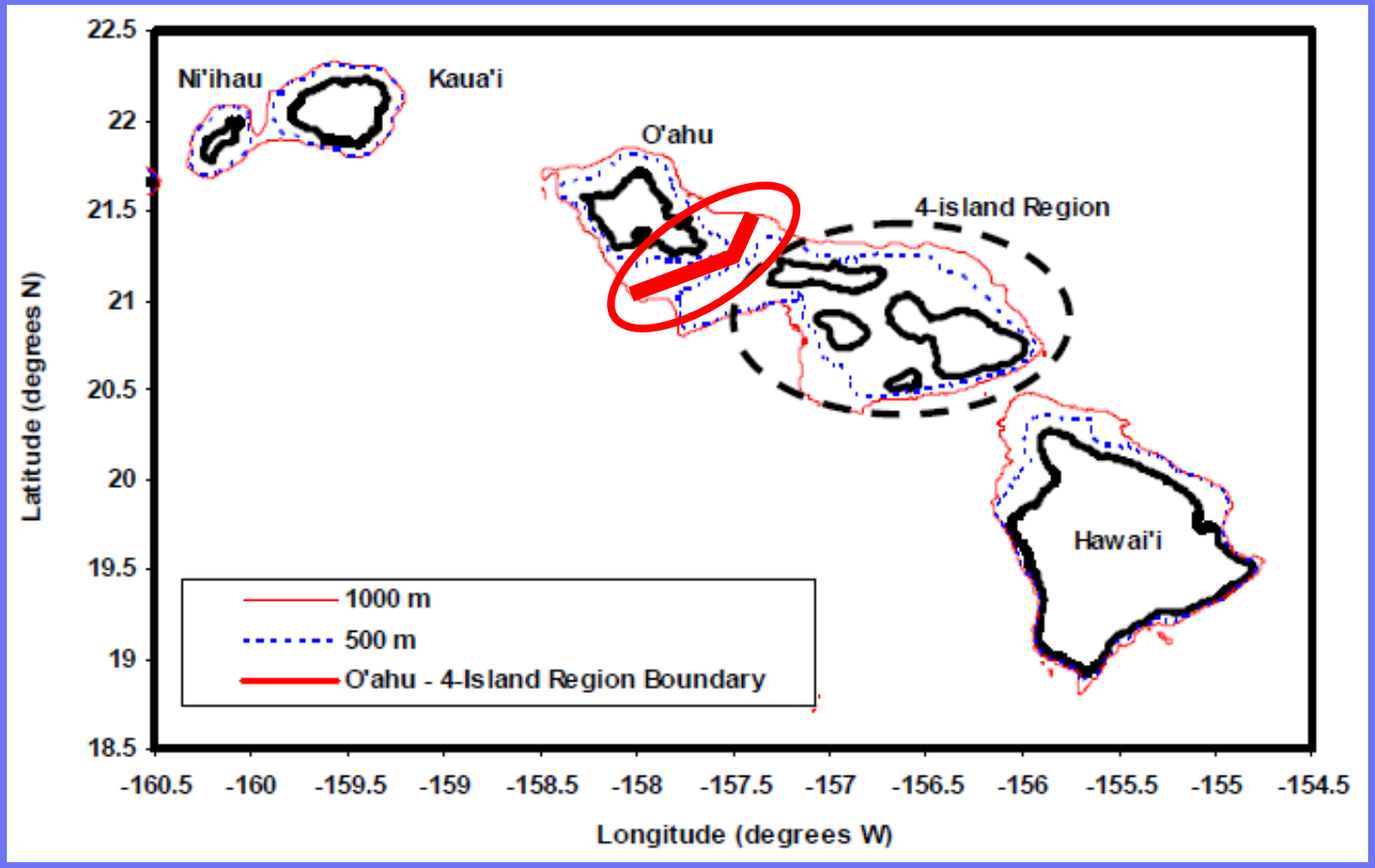
- 55 groups sampled
- 147 initial samples
  - 130 mtDNA
  - 127 microsatellites


- Found significant genetic differentiation suggesting limited movement between strata
- Demographically distinct resident populations

Martien *et al*. 2011

# Background

- NMFS - Marine Mammal Stock Assessment (SARS)
- 2011 - recognized four island associated stocks




Carretta, J.V., E. Oleson, D.W. Weller, A.R. Lang, K.A. Forney, J. Baker, B. Hanson, K. Martien, M.M. Muto, M.S. Lowry, J. Barlow, D. Lynch, L. Carswell, R.L. Brownell Jr., D.K. Mattila, and M.C. Hill. 2013. U.S. Pacific marine mammal stock assessments: 2012. NOAA Technical Memorandum NMFS-SWFSC-504.

# Background

- Spatial biases in sampling effort that comes with small boat surveys

(c) Dan J. McSweeney


- Movements outside the study area?

# Methods

- 2007-2013 additional 7 years photo-identification data
- Deployed 10 satellite tags on individuals from 3 of the 4 stocks
- Looked at association patterns

# Methods

## Photo-identification

- The best photo of each individual within an encounter was assigned a quality rating:
  1. poor
  2. fair
  3. good
  4. excellent

# Methods

## Photo-identification

- Each individual was assigned one of four "distinctiveness" categories:
  1. Not distinctive – usually neonates or small calves
  2. Slightly distinctive – one or two small notches
  3. Distinctive – multiple notches
  4. Very distinctive – multiple notches, distinctive fin shape or fin disfigurement

# Methods

## Photo-identification

– 3. Distinctive – multiple notches

# Methods

## Photo-identification

- 4. Very distinctive – multiple notches, distinctive fin shape or fin disfigurement

# Methods

## Satellite tagging

- 10 GPS location tags – Kaua‘i, Lana‘i and Hawai‘i

# Methods

## Satellite tagging

- Low Impact Minimally Percutaneous External-electronics Transmitter (LIMPET)

# Results

## Photo-identification

- 2000-2013 photo-identification catalog
  - -1130 identifications
    - 567 from 2007 to 2013
  - -509 distinctive individuals
    - 173 from 2007 to 2013

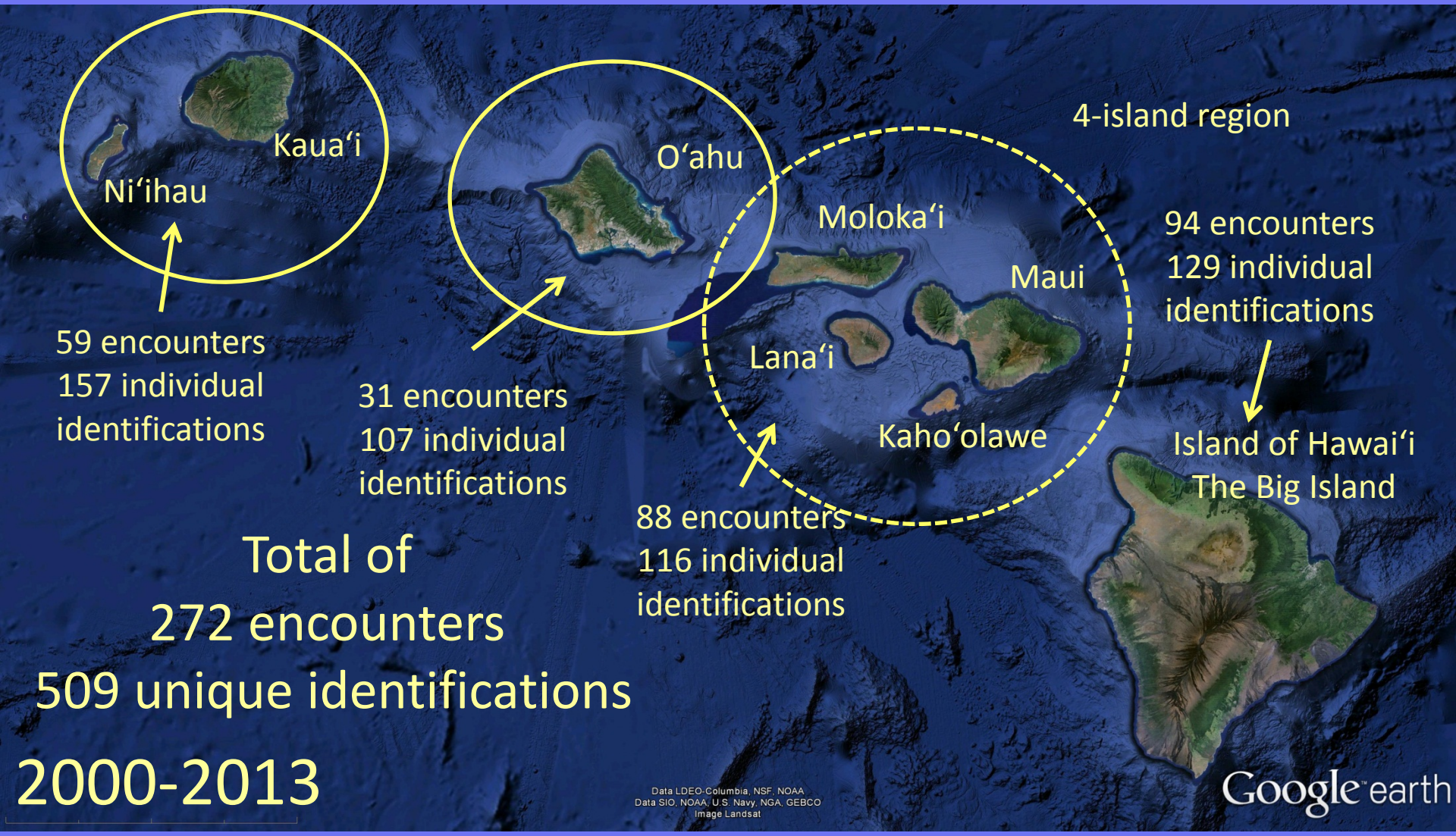






# Results

## Photo-identification



# Results

## Photo-identification

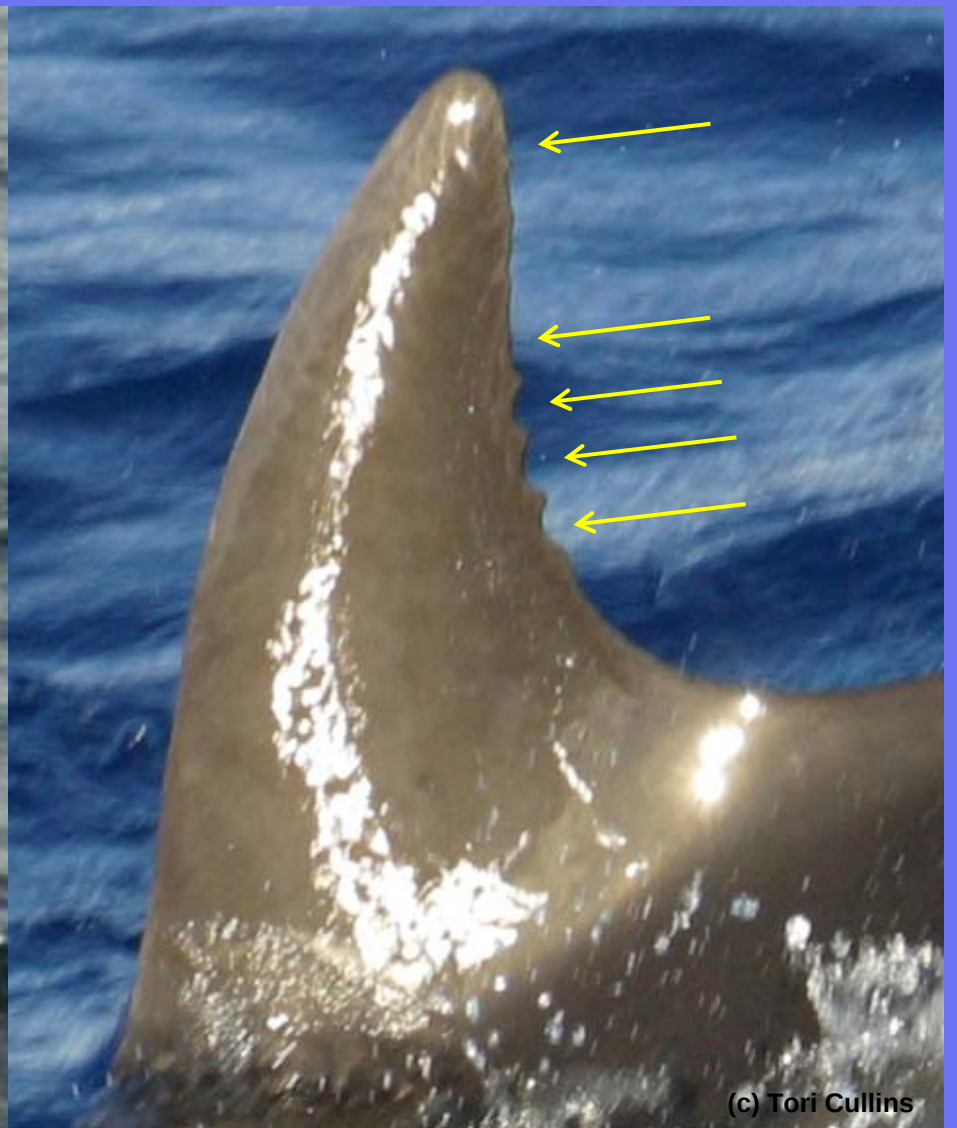
- All but 2 out of 509 stayed within their stock boundary

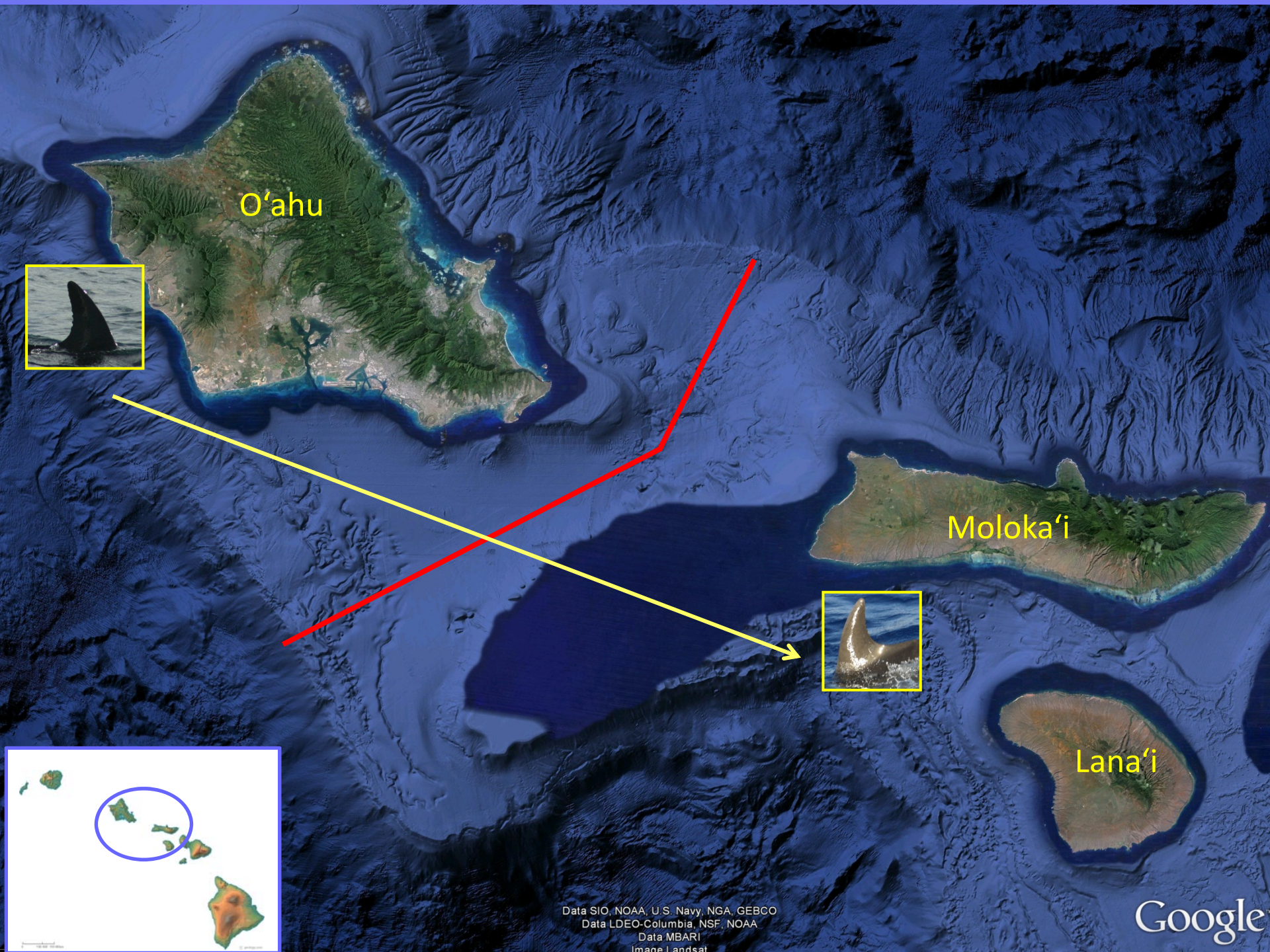
HITt546


# HITt518

30 June 2006 Oahu

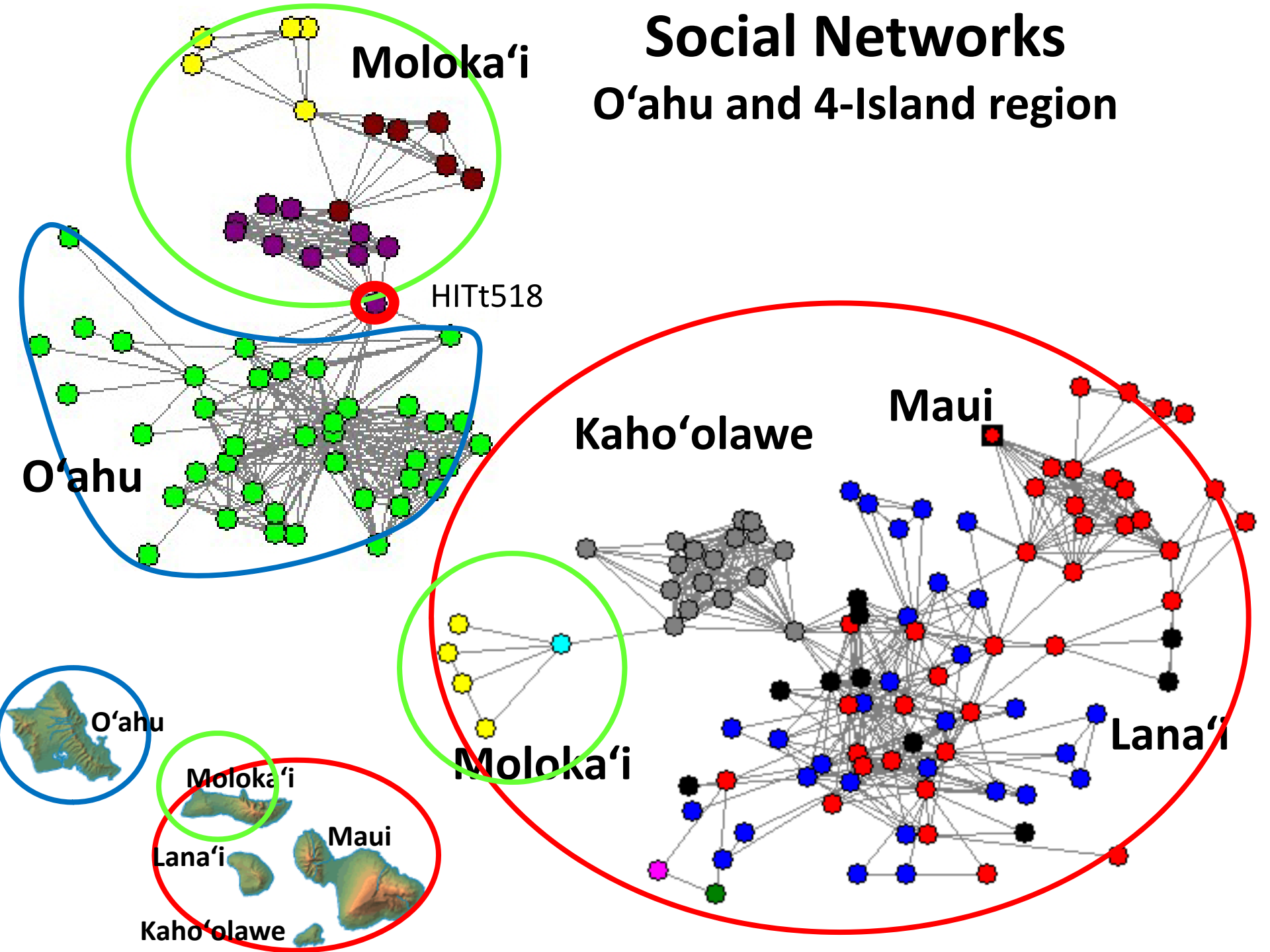

27 May 2007 Moloka'i




O‘ahu
Moloka‘i
Lana‘i
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Data LDEO-Columbia, NSF, NOAA
Data MBARI
Image Landsat
Google

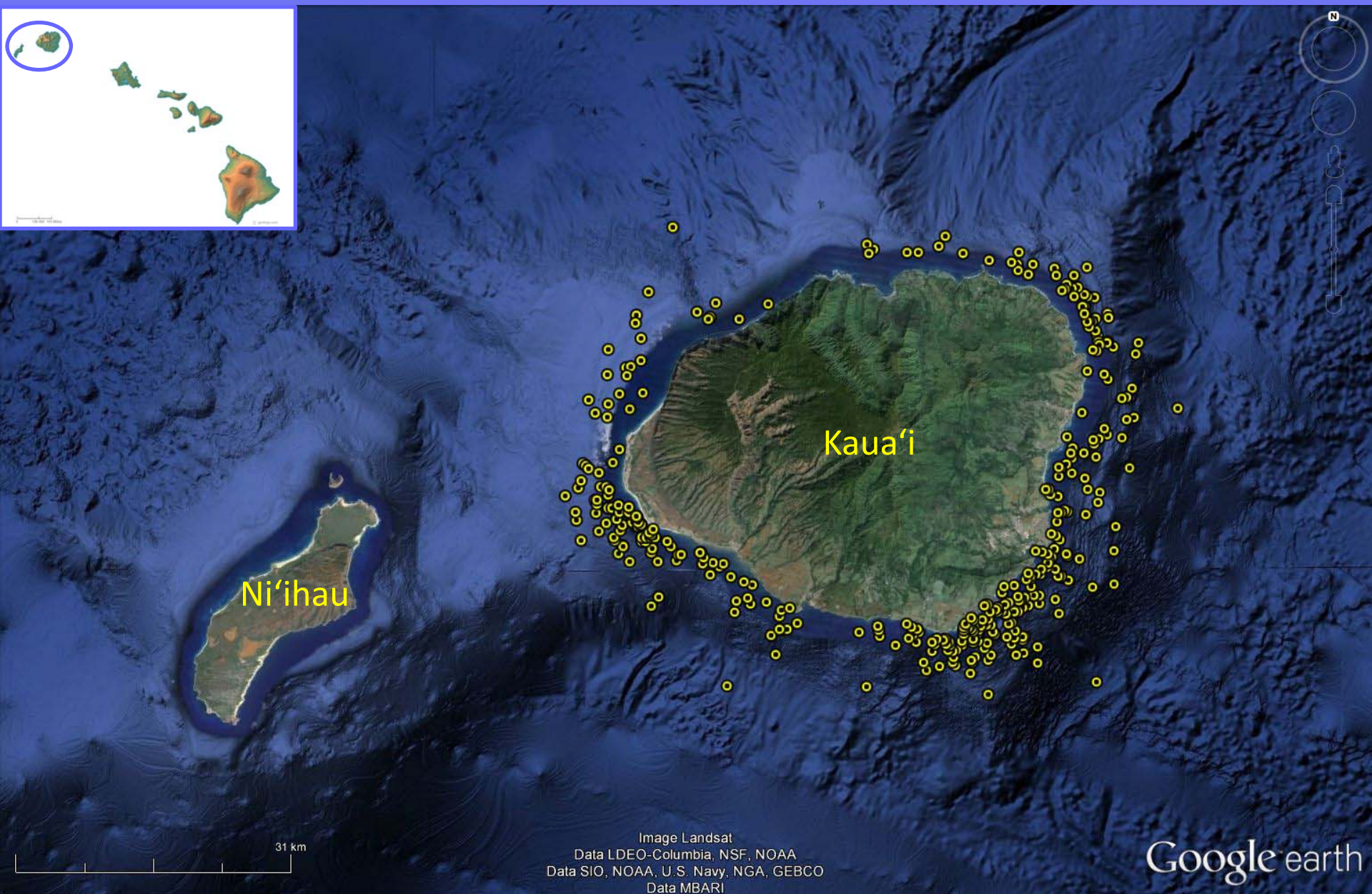
# Social Networks

## O‘ahu and 4-Island region



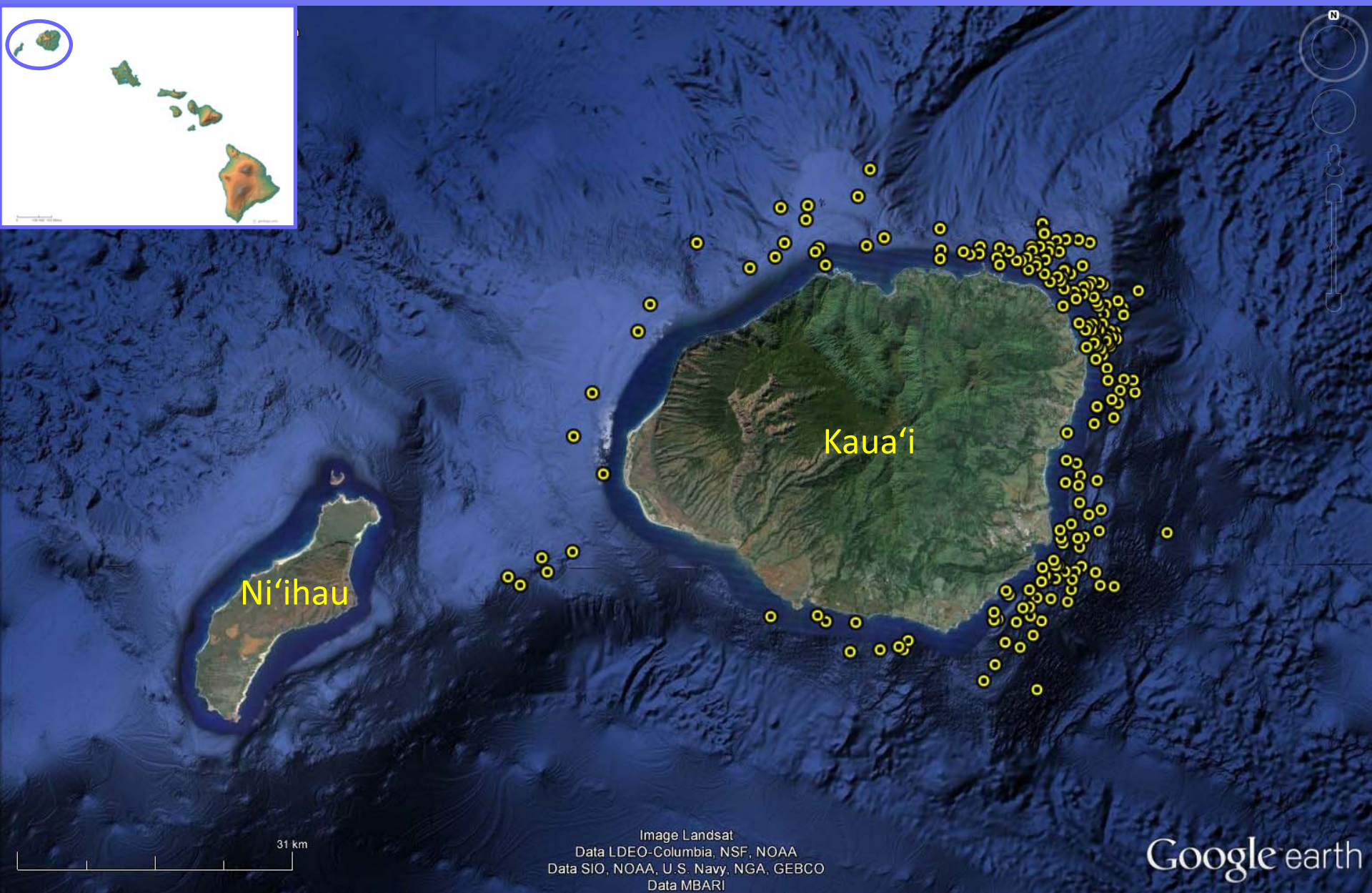
# Results

Tag 2
34 days



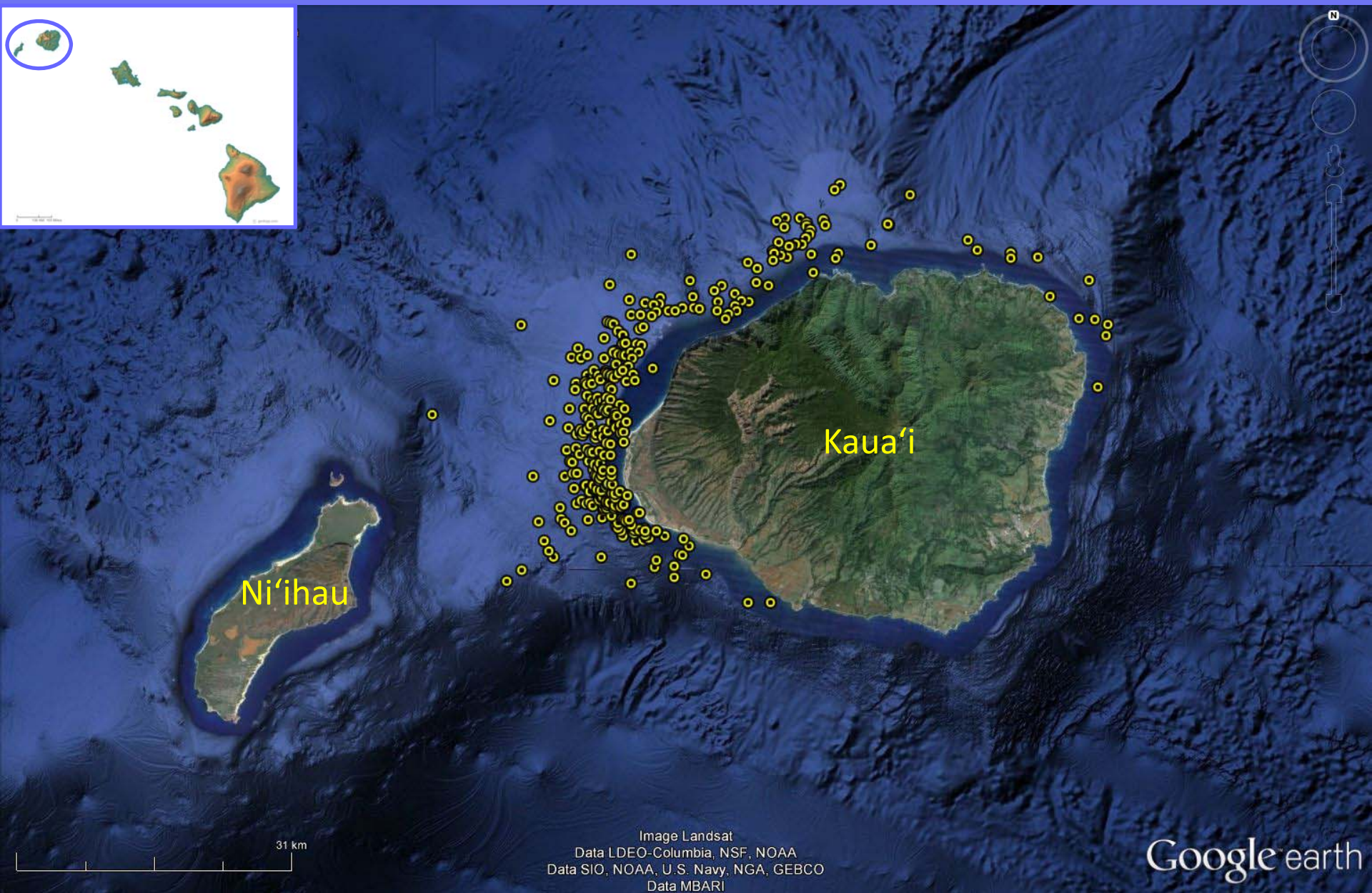
# Results

Tag 4
15 days



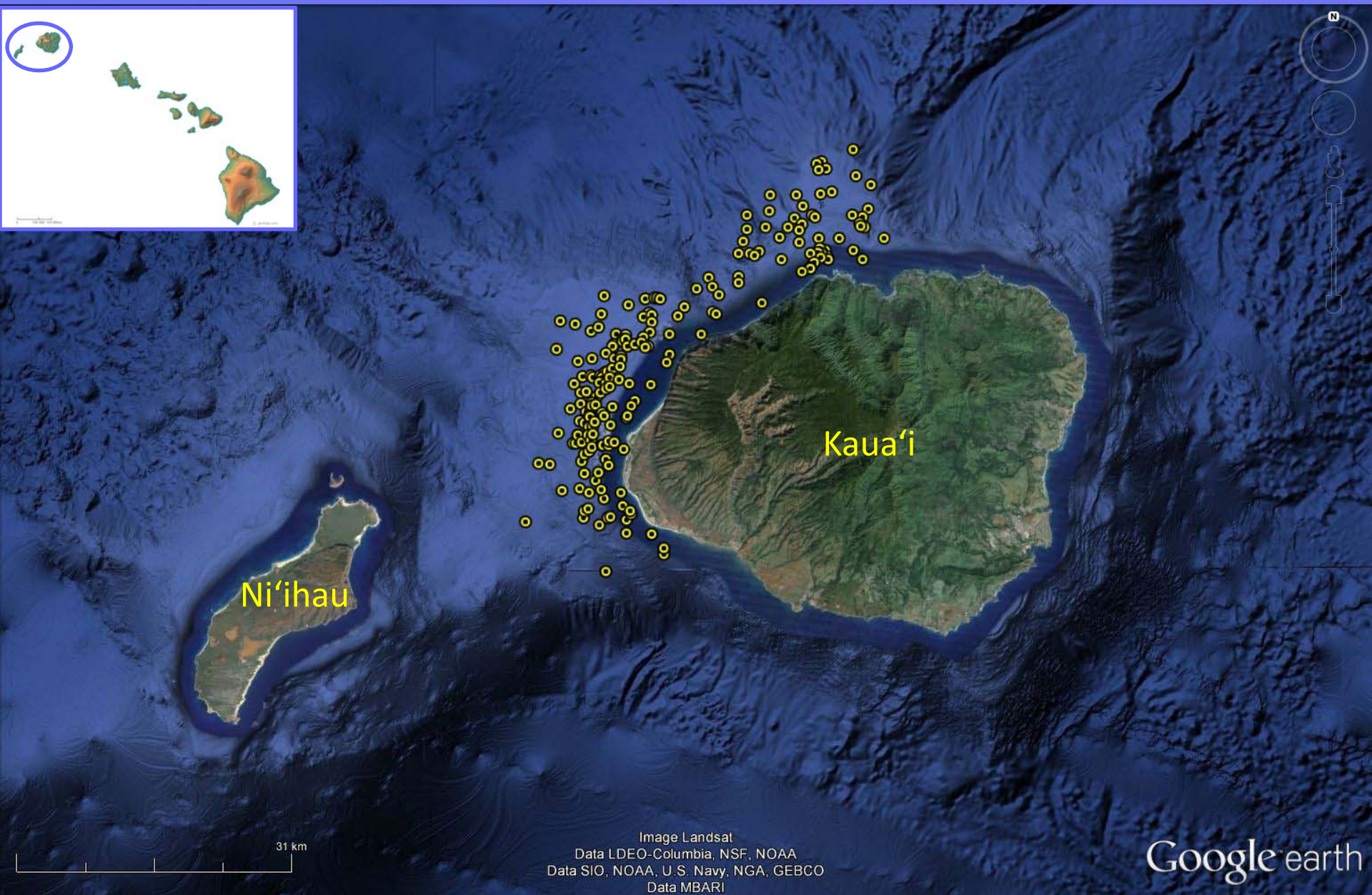
# Results

Tag 5
24 days



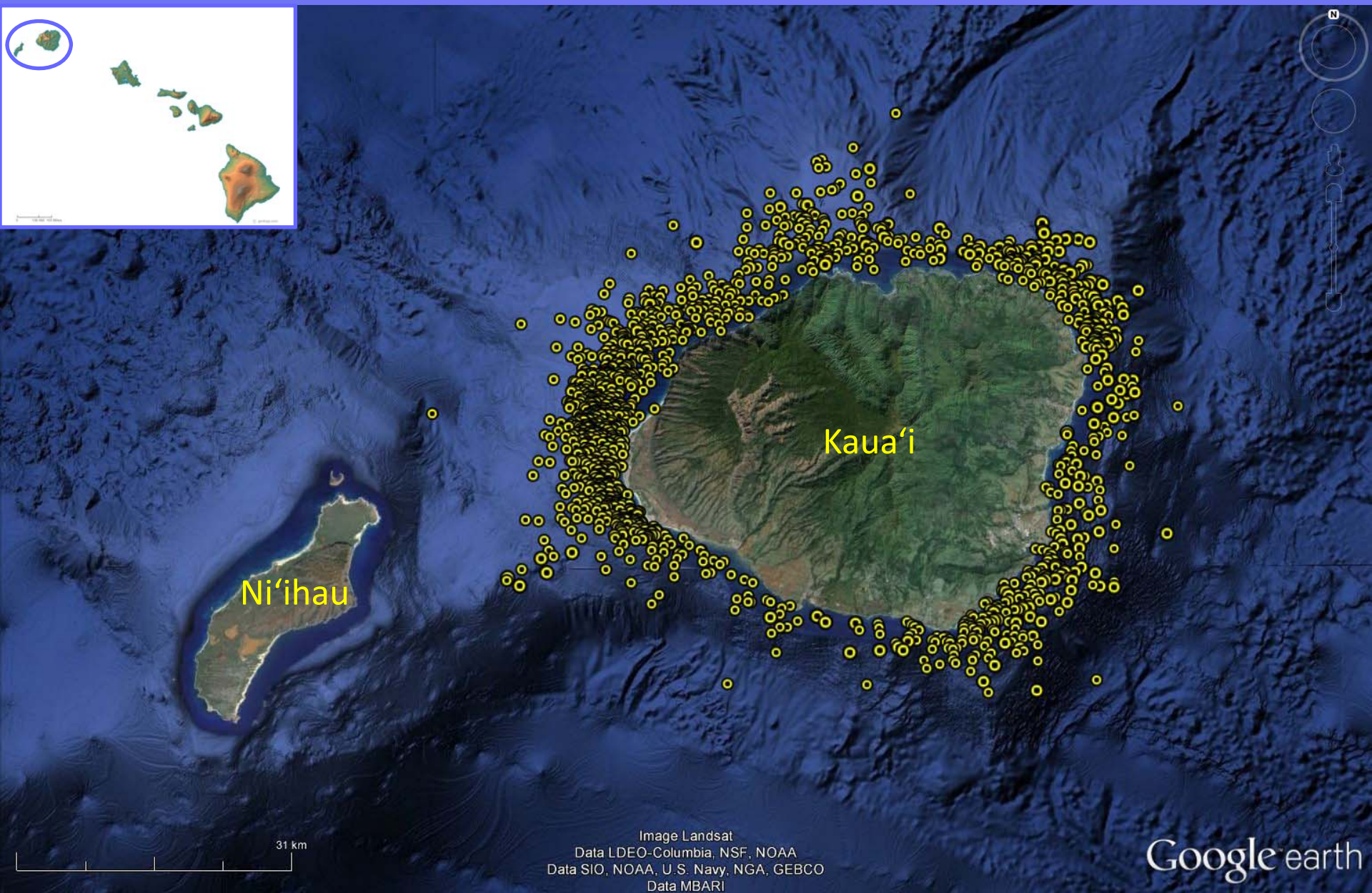
# Results

Tag 8
18 days



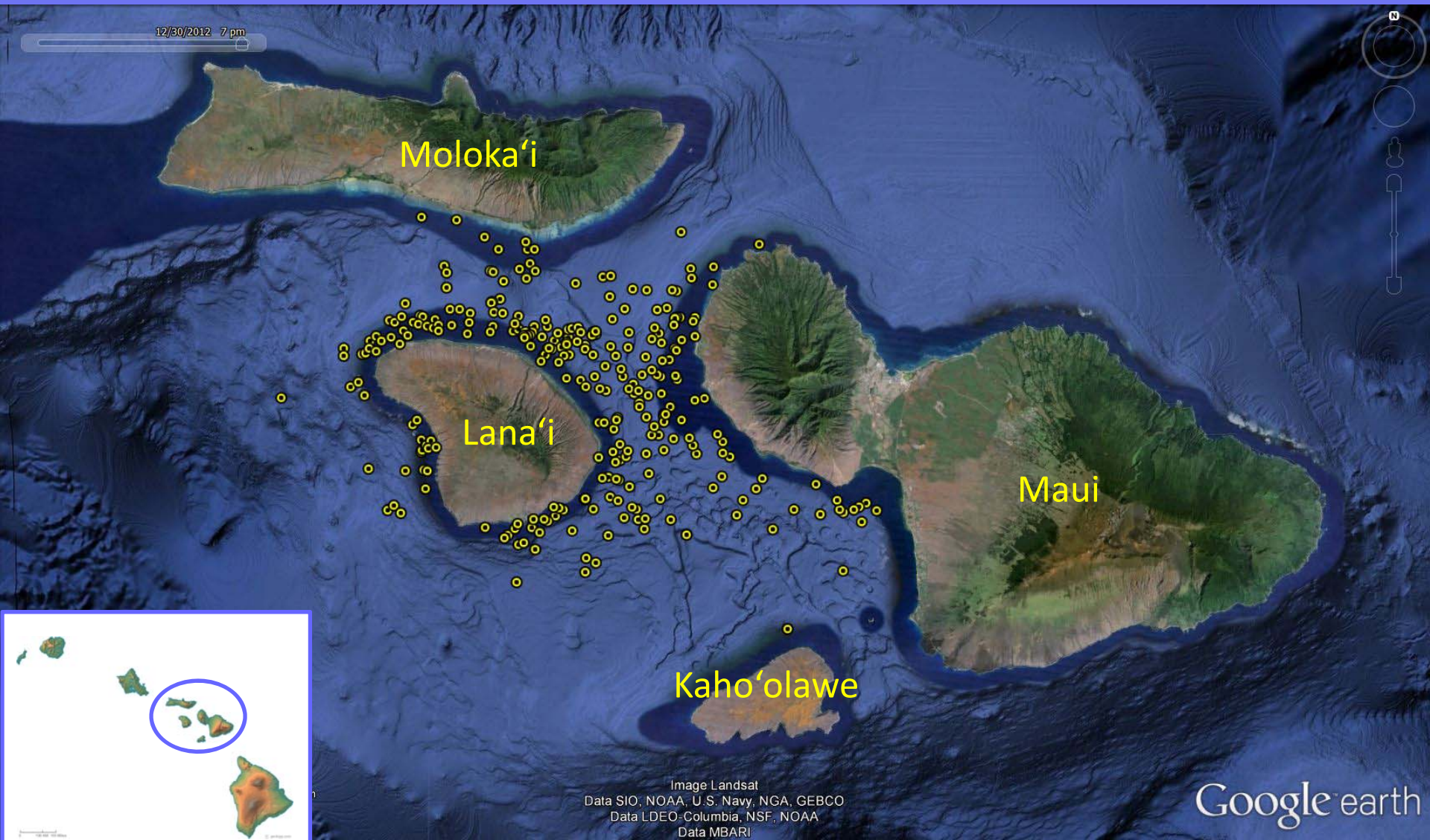
# Results

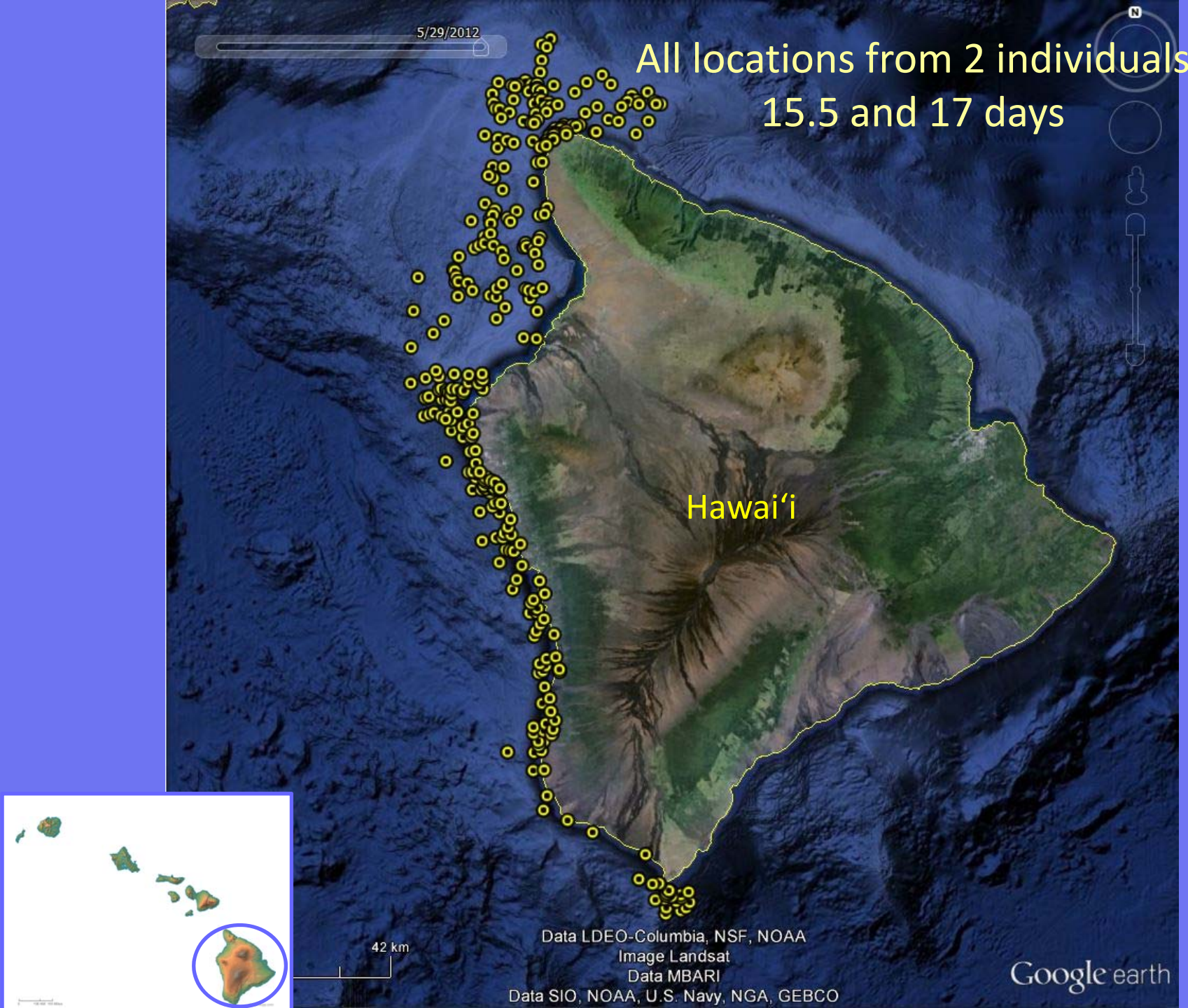
All locations from 6 individuals



# Results - Tagging

All locations from 2 individuals
17 and 9 days




5/29/2012
All locations from 2 individuals
15.5 and 17 days
Hawai‘i
42 km
Data LDEO-Columbia, NSF, NOAA
Image Landsat
Data MBARI
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google earth

# Results

9 tags

| | Range | Average |
|---|---|---|
| Cumulative distance moved (km) | 464.2 - 2016.6 | 1208.7 |
| Median distance from deployment location (km) | 9.6 - 39.5 | 21.1 |
| Maximum distance from deployment location (km) | 38.6 - 61.4 | 48.6 |
| Median distance from shore (km) | 2.5 - 8.5 | 4.1 |
| Maxium distance from shore (km) | 10.7 - 25.6 | 15.3 |
| Median depth (m) | 64 - 433 | 177 |

# Results

## Tagging

- Stayed within stock boundaries
- Used both leeward and windward sides of islands

# Discussion

- Results support earlier assessment of limited movements among island areas
- The existence of multiple island-associated populations

# Discussion

- Future work extending coverage to 4-island region, particularly off Moloka‘i
- Deploying tags off east side of Hawai‘i