

Four Decades of Green Turtle (*Chelonia mydas*) Strandings on Hawai'i Island (1983-2022): Identifying Causes and Assessing Trends



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Green Turtles in Hawai'i

A large group of green turtles is resting on a sandy beach. The turtles are scattered across the sand, with some closer to the water's edge and others further inland. The beach is wide and sandy, and the water is visible in the background.

- Herbivorous
- Most abundant species of turtle in Hawaiian Islands
- >90% nesting at French Frigate Shoals
- Threats
 - Humans, bycatch, debris, fibropapillomatosis, climate change
- Populations increased since late 1980s/early 1990s

Sea Turtle Strandings

- Found dead, injured, or exhibit ill health or abnormal behavior
- Natural and anthropogenic causes
- Caveat: Strandings only represent turtles that washed ashore or recovered; does not include carcasses consumed by predators, decomposed, or sunken
- Previous research did not include Hawai'i Island (Chaloupka et al. 2008)

Objectives of This Study

- To identify causes of stranding/mortality on Hawai'i Island
- To assess trends in strandings
- To determine differences between strandings in east and west Hawai'i Island

Hawai'i Island



Data Set

- June 1983 – June 2022
- NOAA Pacific Islands Fisheries Science Center
- UH Hilo Sea Turtle Stranding Response Team
- Hawaii Preparatory Academy Sea Turtle Response Program

Analysis

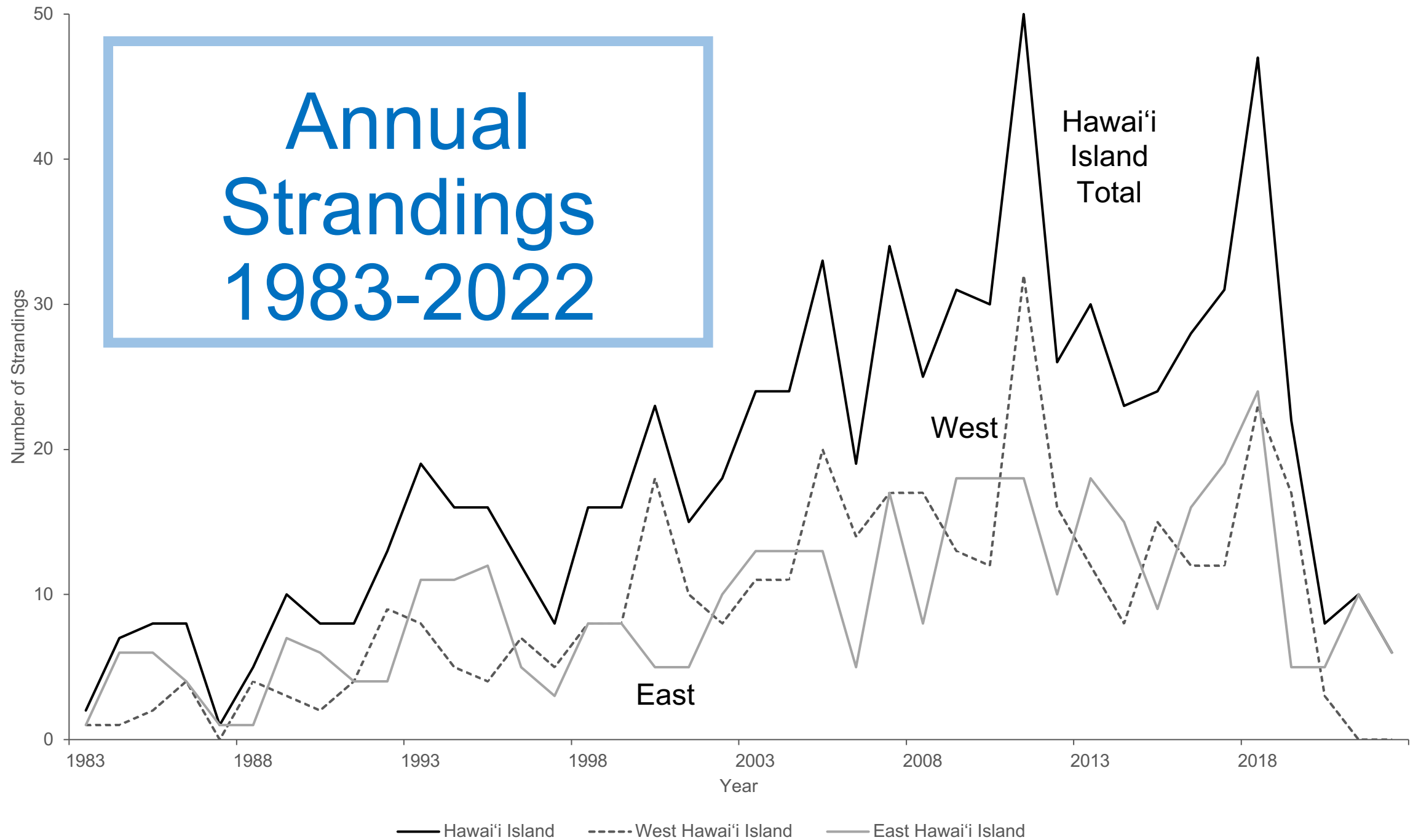
- Date, location, stranding status (alive/dead), and cause of stranding/mortality
- Gender, straight carapace length (SCL), curved carapace length (CCL), presence/absence of tumors, when info recorded
- Conversion formula used when needed:
$$\text{SCL} = 1.245 + 0.913 * \text{CCL}$$

(Chaloupka et al. 2006)

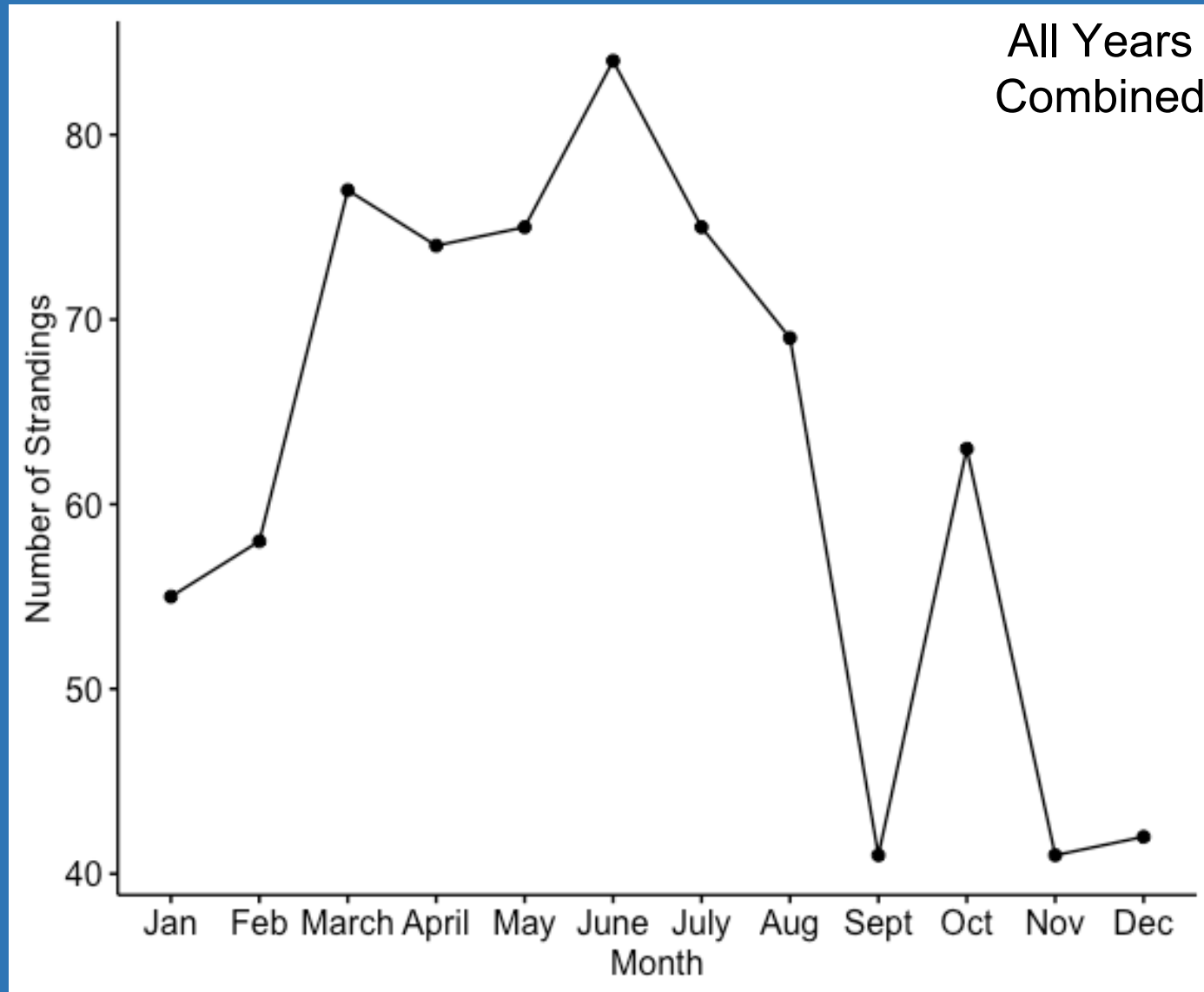
Stranding Summary

- 754 total green turtle strandings
- West Hawai'i – 376 green turtle strandings
- East Hawai'i – 378 green turtle strandings

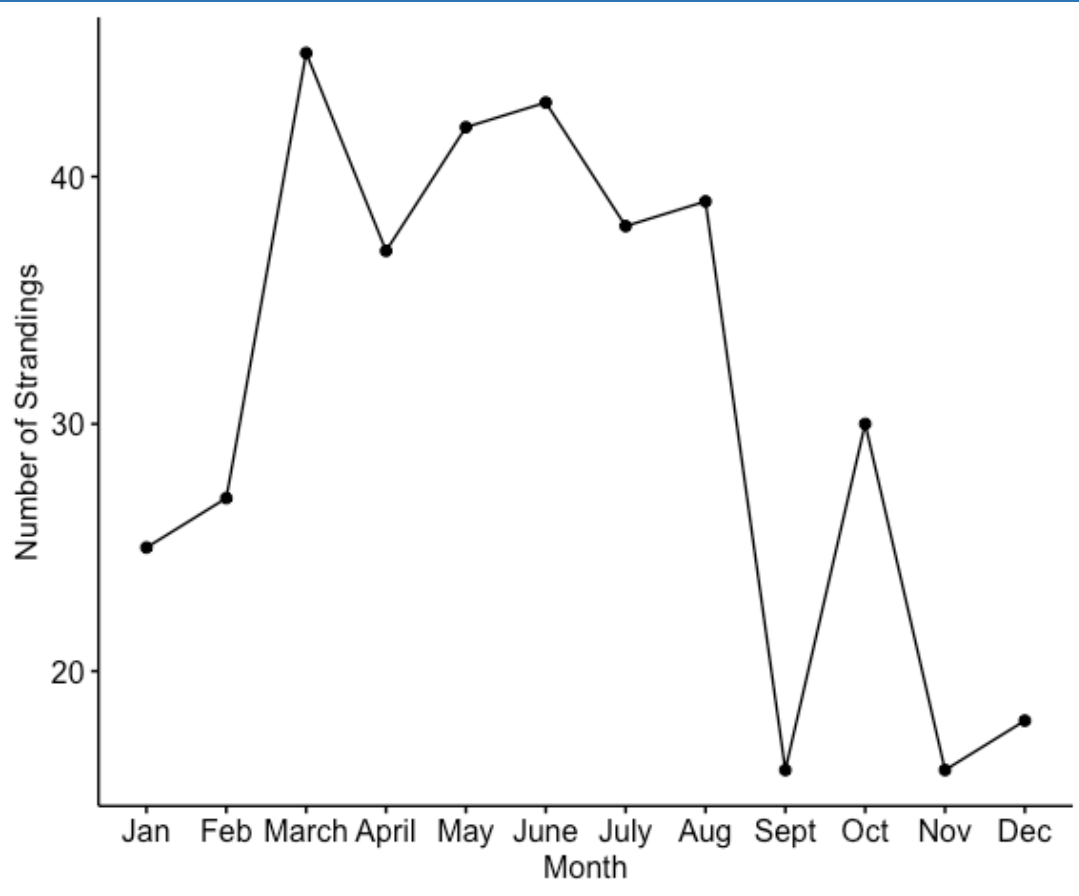
Annual Strandings 1983-2022



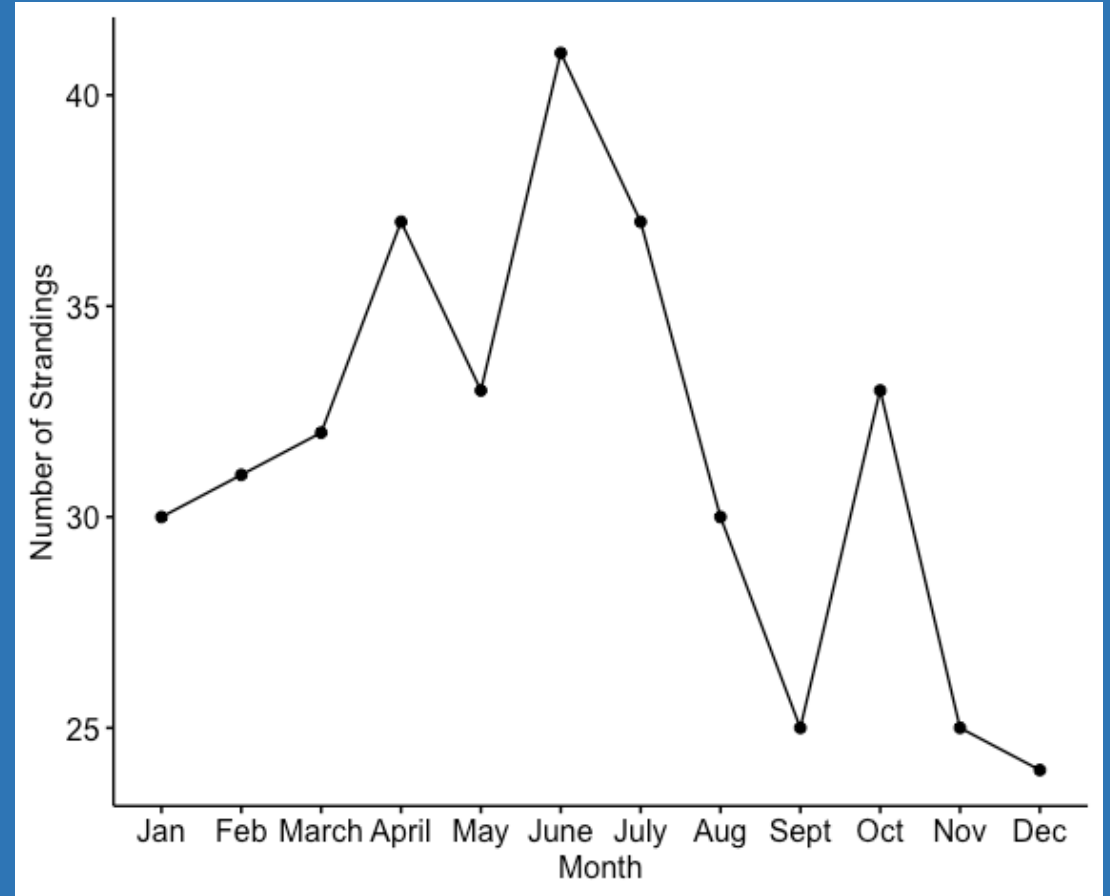
Monthly Pattern of Strandings on Hawai'i Island



Monthly Pattern



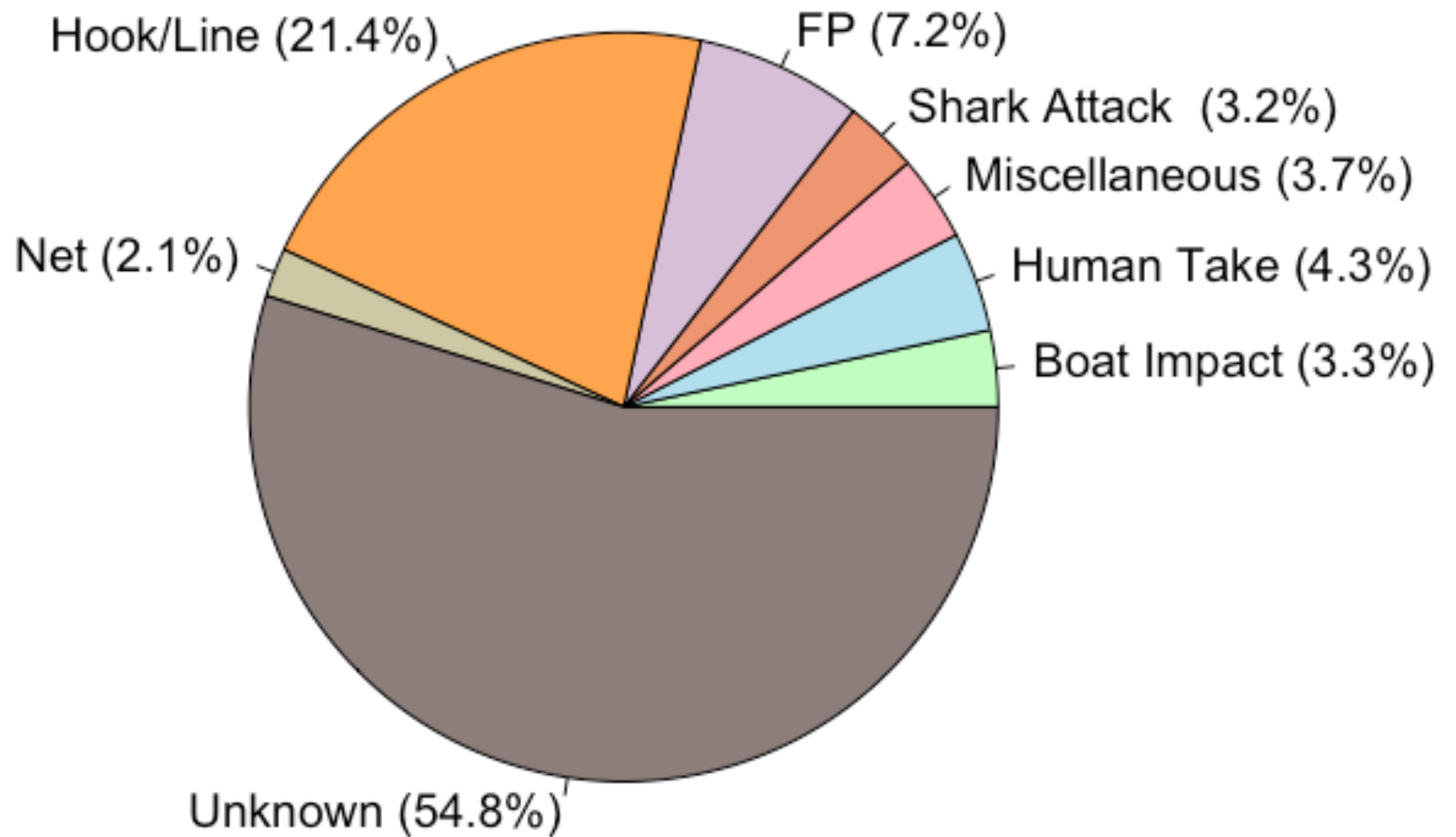
West Hawai'i



East Hawai'i

Causes of Stranding/Mortality

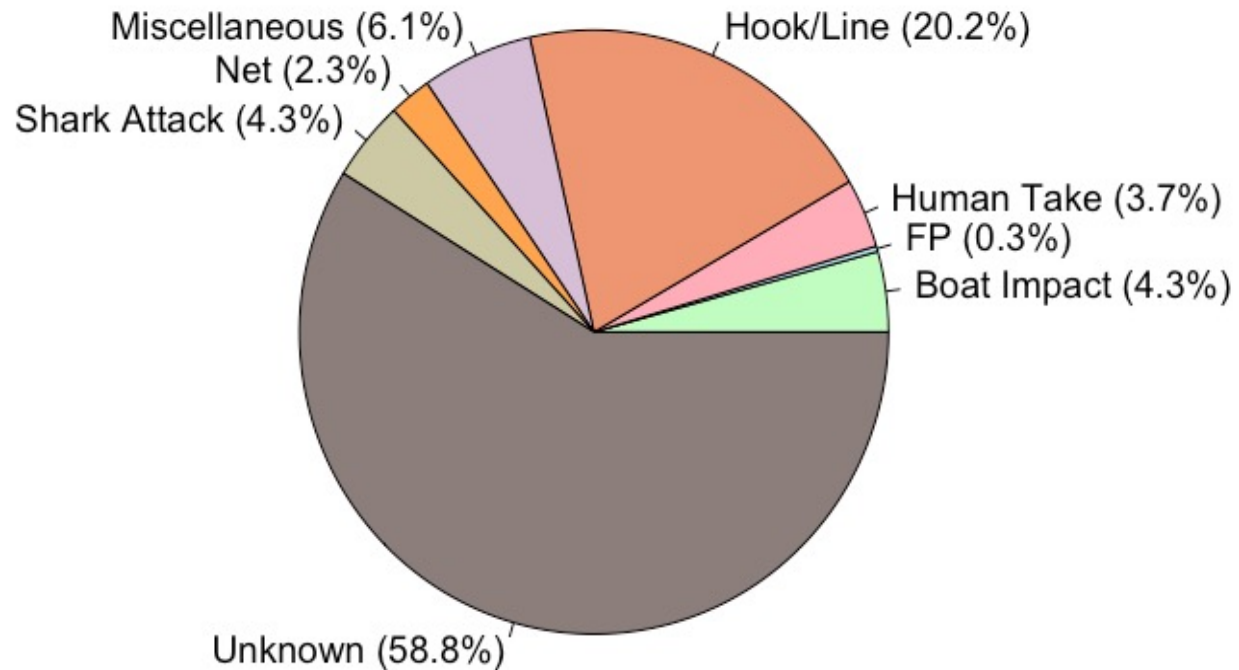
$\chi^2 = 1397$
 $p = < 2.2 \times 10^{-16}$



n = 754

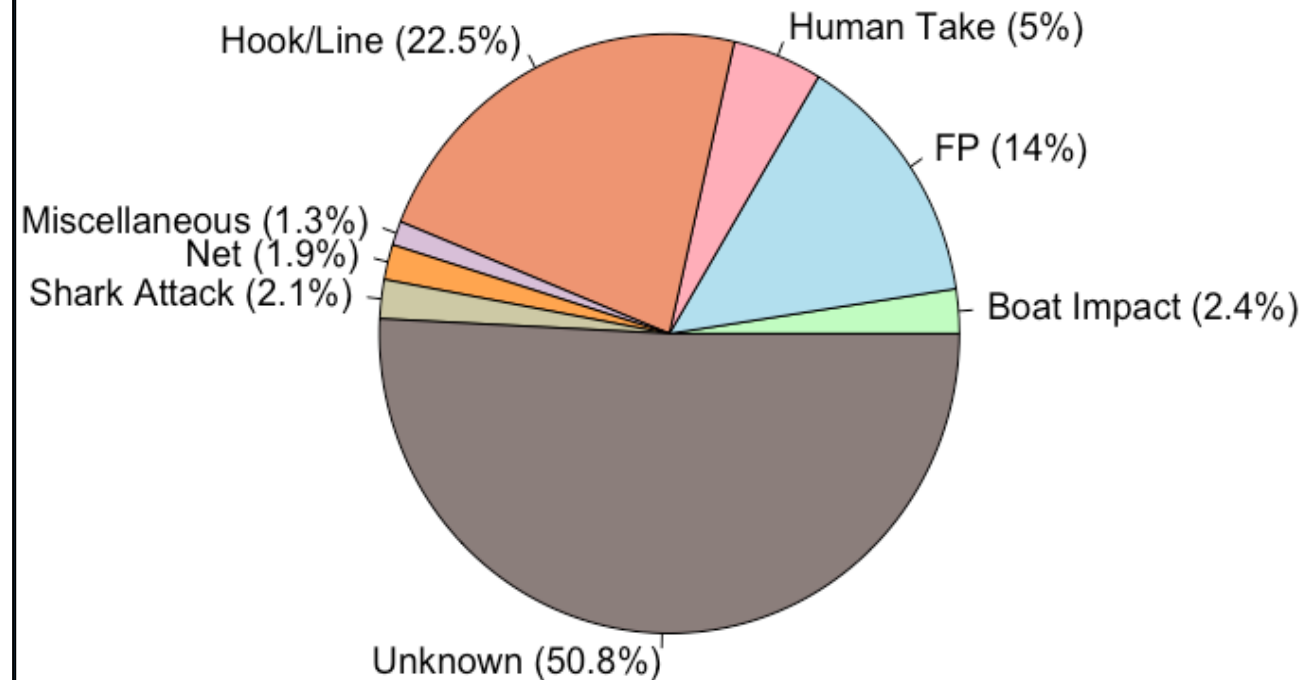
Causes of Stranding/Mortality

West Hawai'i



n = 376

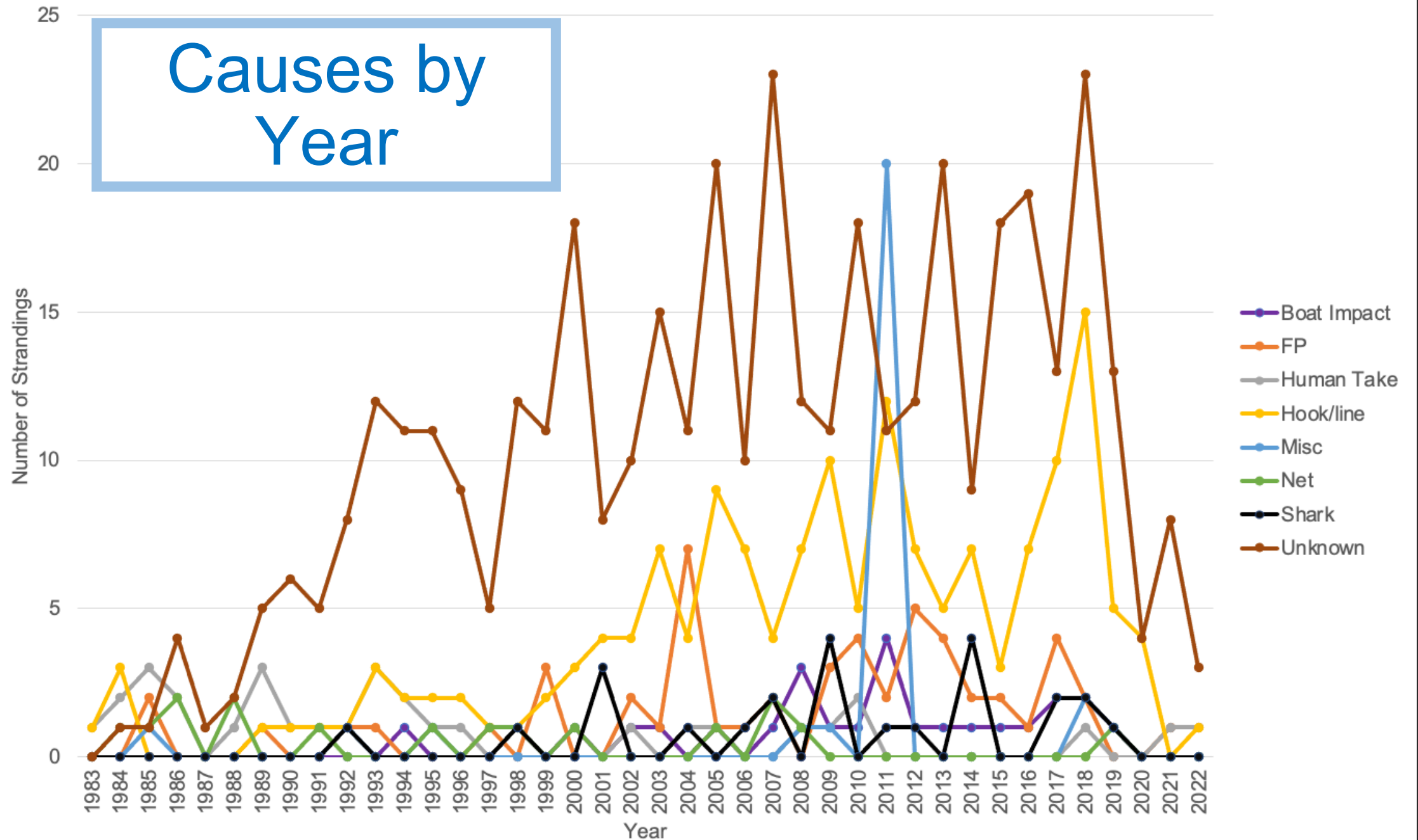
East Hawai'i



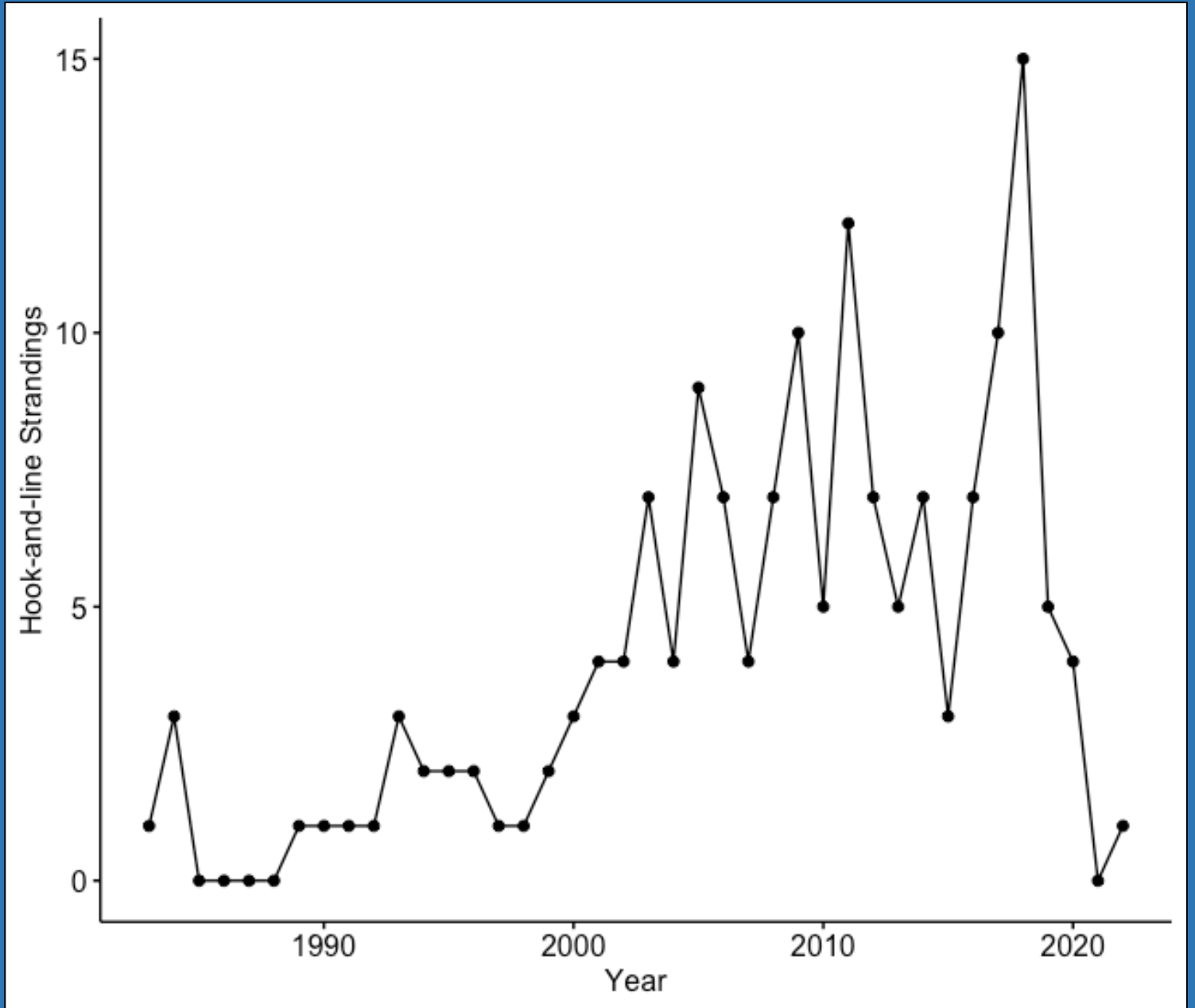
n = 378

$$X^2 = 69.8 \quad p = 1.6 \times 10^{-12}$$

Causes by Year



Hook-and-line Strandings



Size Classes

486 turtles

Straight Carapace Length

Min: 19.8 cm

Max: 99 cm

Overall Average: 54.8 cm

West Average: 51.3 cm

East Average: 58.8 cm

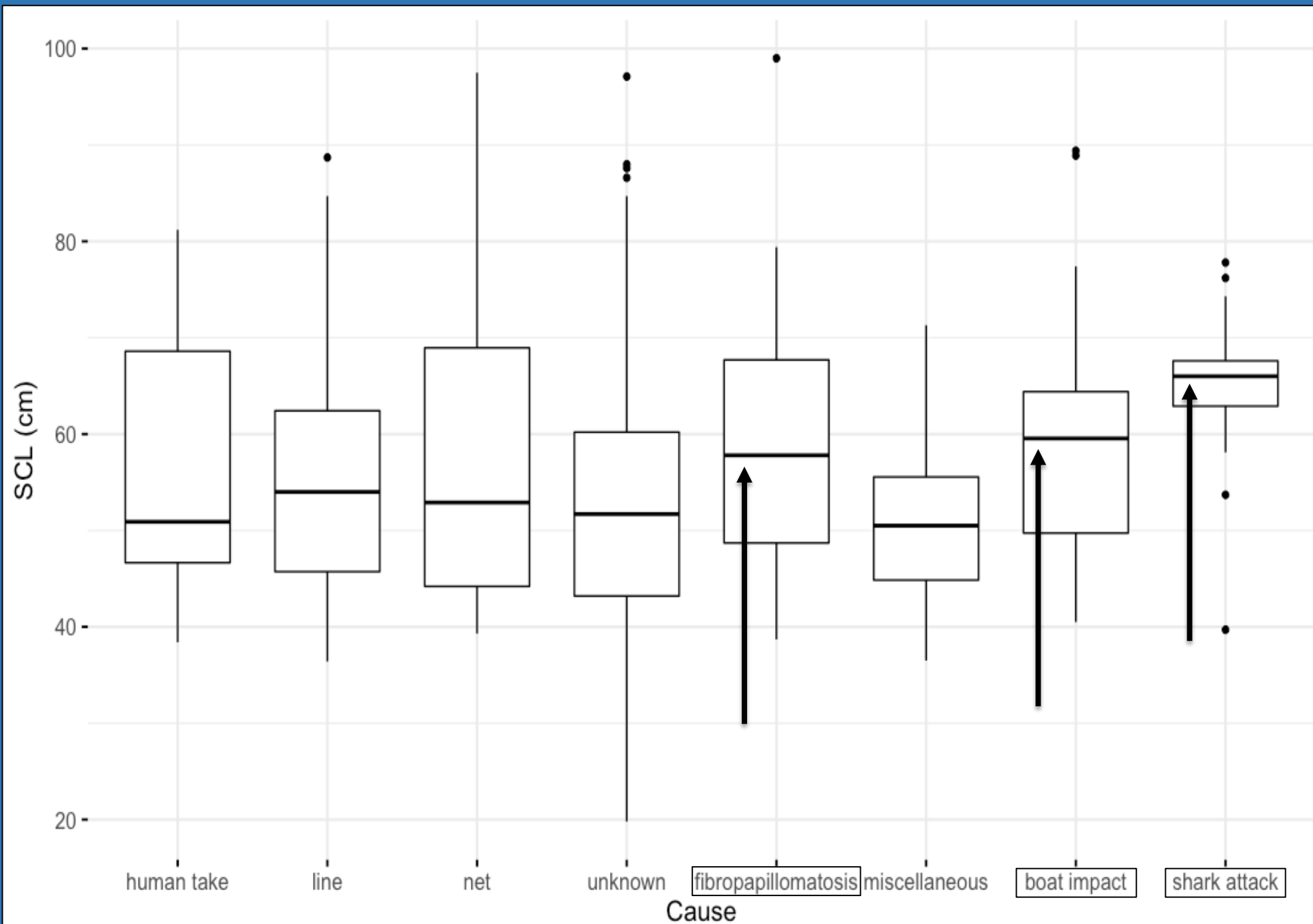


Juveniles (post-hatchling – 65 cm SCL): 381 turtles

Subadults (65 – 81 cm SCL): 88 turtles

Adults (=> 81 cm SCL): 19 turtles

Cause of Stranding/ Mortality in Relation to Size



Gender

- 154 male (20.5%)
- 145 female (19.3%)
- 453 unknown (60.2%)



FP Tumors

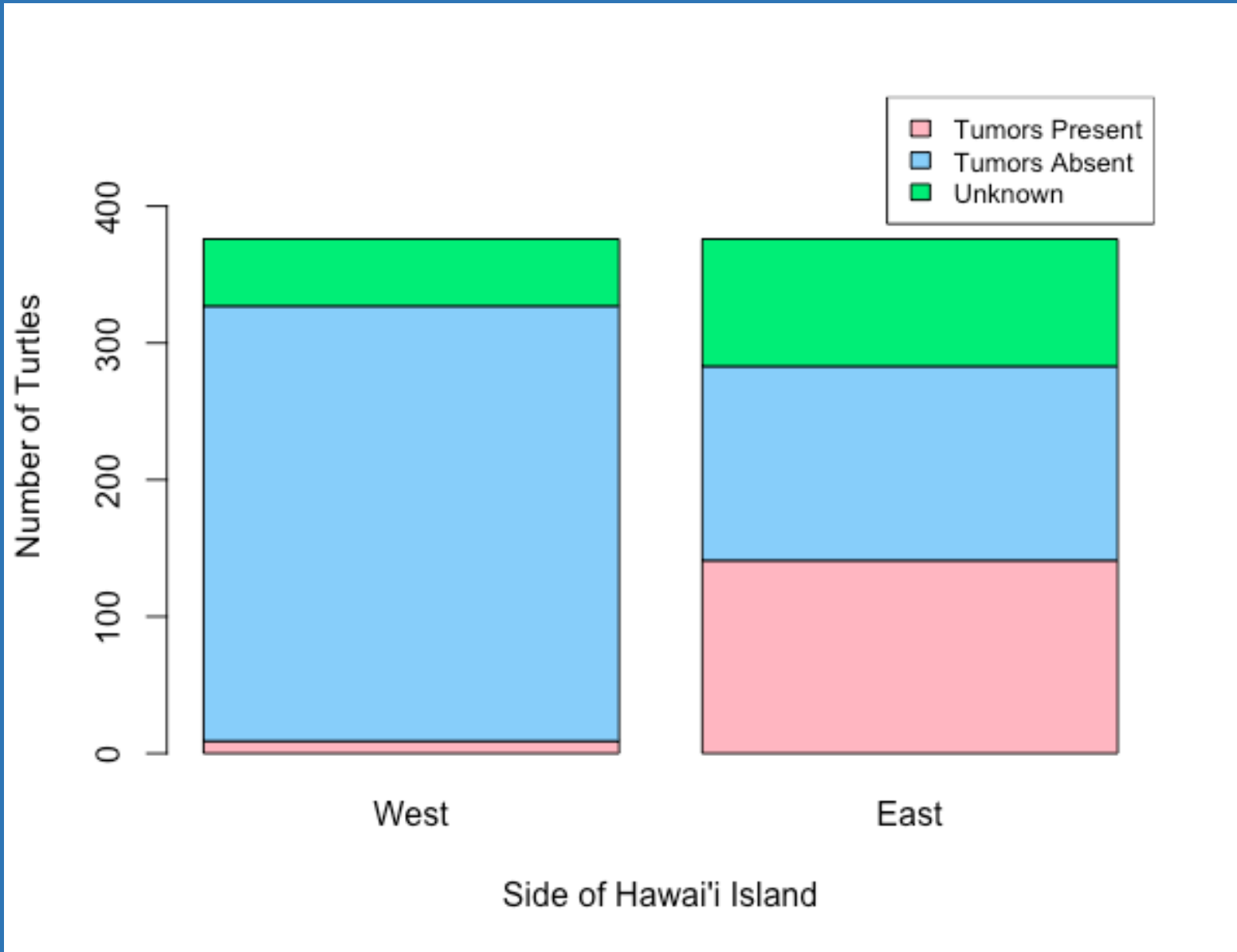
- 460 tumors absent (61%)
- 150 tumors present (19.9%)
- 144 unknown (19.1%)



$$X^2 = 259.9$$
$$p = <2.2 \times 10^{-16}$$

Geographic Patterns of Tumor Presence

$\chi^2 = 198.2$
 $p = < 2.2 \times 10^{-16}$

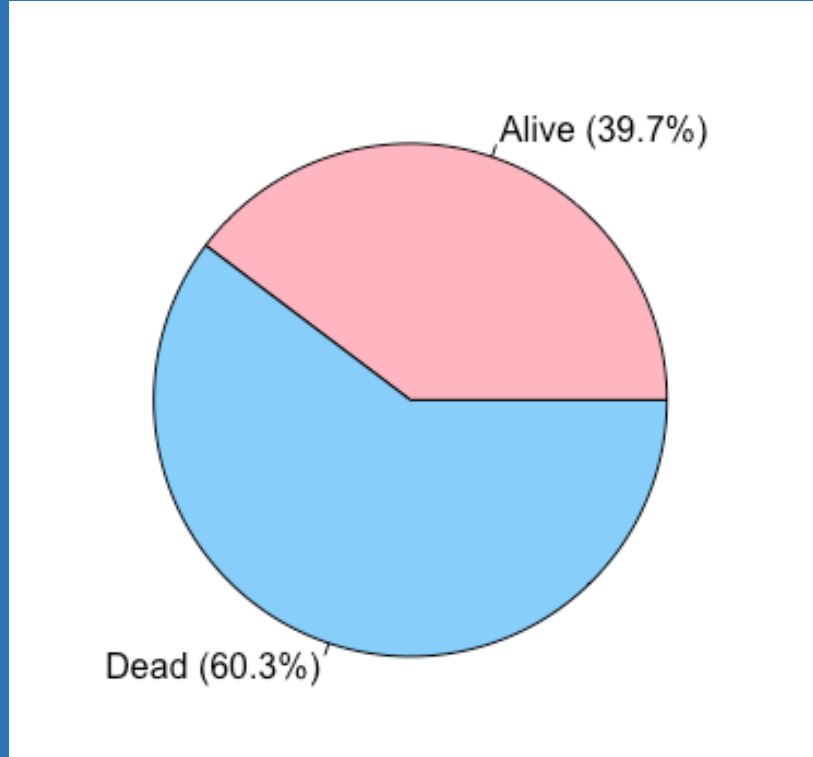


Stranding Status

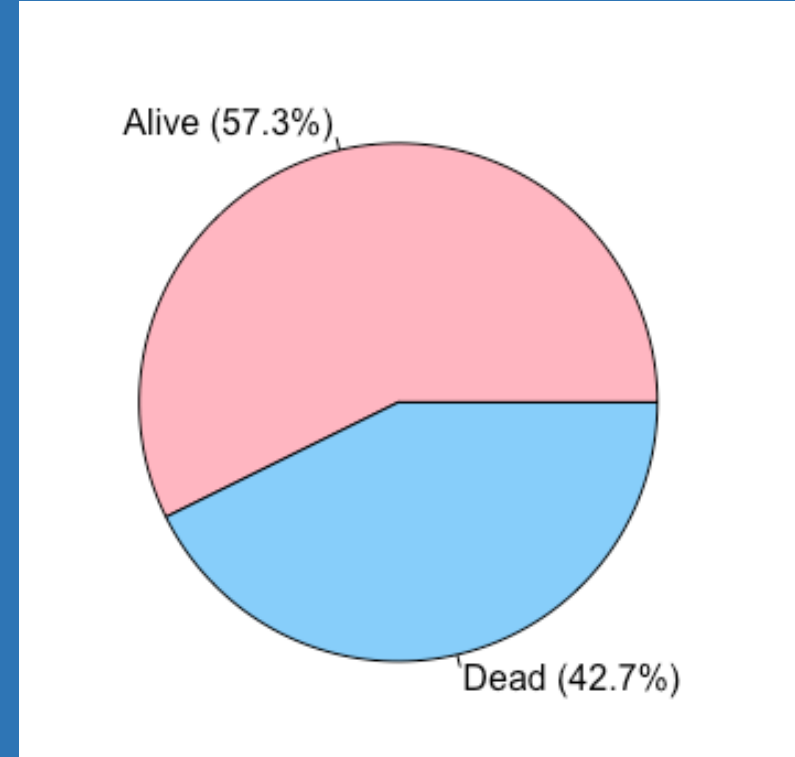
- 359 stranded alive (47.6%)
 - Causes with more alive than dead: FP, hook-and-line, miscellaneous
- 381 stranded dead (50.5%)
 - Causes with more dead than alive: boat impact, human take, shark attack, unknown
- 14 no status reported (1.9%)



Stranding Status by Location



West Hawai'i



East Hawai'i

Thanks go to:

- George Balazs, retired NOAA
- Karla McDermid, UH Hilo
- Summer Martin, NOAA, Marine Turtle Biology & Assessment Program, Honolulu
- Brittany Clemans - NOAA Affiliate
- Jen Sims & Volunteers, UH Hilo MOP Sea Turtle Stranding Response Team
- Marc Rice, Laura Jim, & Students, Hawaii Preparatory Academy, Sea Turtle Research Program
- Megan Lamson, Department of Land and Natural Resources
- Rebecca Ostertag, UH Hilo





Thanks for listening!
Any questions?