# Reducing impact through innovation: Innovative and less-invasive sampling methods for health and population assessment

Laura Howes, NMFS permit #18059

## Development and initial applications of a pole-mounted Tag Attachment Device – the TADpole

Photos taken under NMFS Scientific Research Permit No. 26622

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[1] Brookfield Zoo Chicago's Sarasota Dolphin Research Program
[2] Woods Hole Oceanographic Institution, [3] Cascadia Research Collective

## UAS-based deployments of suction cup attached biologging tags

MARINE MAMMAL COMMISSION
2025 Annual Meeting

Chris Zadra
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## Development of a Minimally-Invasive Blood Collection Device for Cetaceans

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Ryan P. Kelly
University of Washington

September 10, 2025

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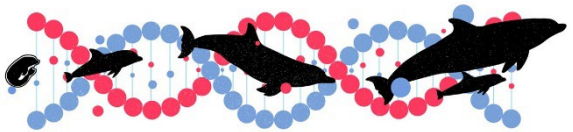
THE eDNA COLLABORATIVE



10th September 2025 Marine Mammal Commission Annual Meeting

## What can epigenetics tell us about aging and health of marine mammals?

Dr. ASHLEY BARRATCLOUGH
BVetMed, MSc WAH, MS, PhD, MRCVS

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# *Development and initial applications of a pole-mounted Tag Attachment Device – the TADpole*



**Randall S. Wells[1], Michael J. Moore[2], Thomas M. Lanagan[2], Jason Kapit[2], Aaron A. Barleycorn[1], Jason B. Allen[1], Robin W. Baird[3]**

**[1] Brookfield Zoo Chicago's Sarasota Dolphin Research Program**

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# Telemetry application to dolphins limited by attachment considerations

## Available techniques for tag attachment have benefits and draw-backs

- **Hands-on, catch-and-release tagging** (e.g., Finmount tags)
  - Tags can be secured with minimally invasive attachment;
  - Risks exist for dolphins and people from capture and handling process;
  - Logistically complex and expensive;
  - Typically limited to shallow water species, or to species for which hoop-nets can be used.
  - Can achieve attachment durations of months.

- **Remotely deployed barbed projectile tags** (e.g., LIMPET tags)
  - Simpler, less expensive than catch-and-release;
  - Can access many species in habitats where shallow water catch-and-release not possible;
  - Potential for injury to the dolphin;
  - Typically, attachment durations are less than desired.

# Thoughts behind developing the Tag Attachment Device on a pole (TADpole)

1. **Wanted to be able to tag remotely, without capture:**
    1. For research on species or in situations for which capture would be very challenging or logistically unfeasible (e.g., Commerson's dolphins);
    2. To tag compromised individuals for further monitoring or while making rescue preparations;
    3. Potentially, to tag members of large groups that may mass-strand or re-strand.
2. **Wanted an effective alternative to barbed projectile tags.**
    1. Reduce tissue trauma, thereby increasing attachment duration.
    2. Consistently deploying tags on the dorsal fin reduces risk to individuals and improves data throughput to Argos.
3. **Wanted to use well-tested, off-the-shelf tags.**
4. **Wanted to try to take advantage of natural tendency for some dolphins to bow-ride, and surface at the bow.**



Commerson's dolphins, Patagonia, 2007


Short-finned pilot whales, Gasparilla Island, FL, 1971 – Multiple re-strandings

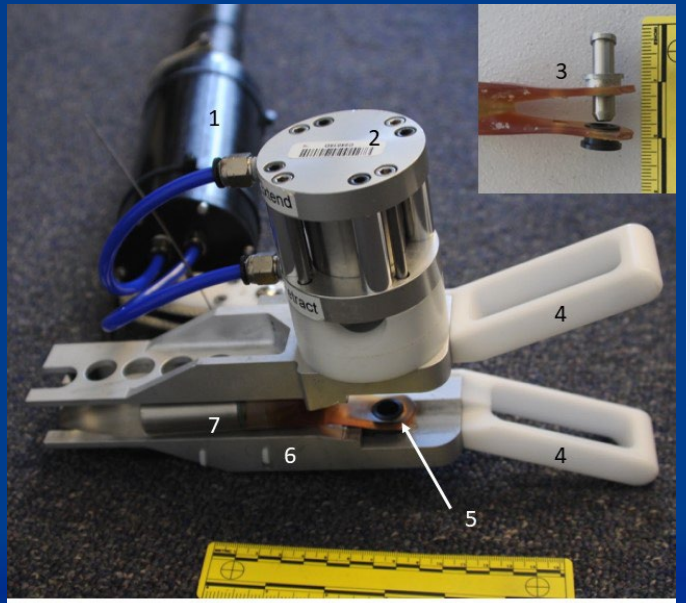

*R/V William R. Mote*, successful TADpole boat

# Concept discussions were initiated between SDRP and WHOI vet and engineers in 2014

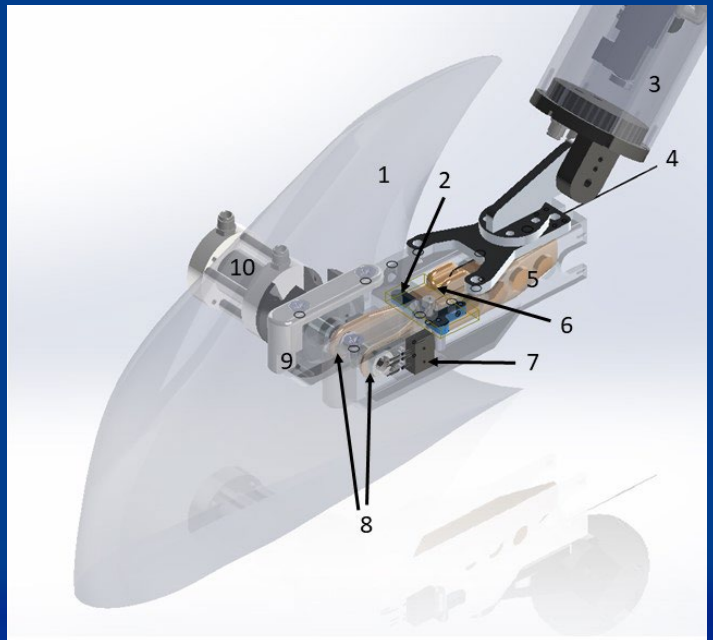
## With funding from Dolphin Quest in 2017, TADpole prototype design and testing were able to proceed

**TADpole Tagging Process:**

1. The TADpole's V-fork is placed around the trailing edge of the fin;
2. The fin edge contacts the trigger inside the V;
3. Pneumatic pressure drives the pusher to push a hollow, sharpened, SS attachment pin through an aluminum retaining ring in the right tag wing, then through the fin, coring the fin;
4. The pin is pushed through a Delrin retaining ring in the left tag wing;
5. The pusher retracts, pin/tag remain on the fin.



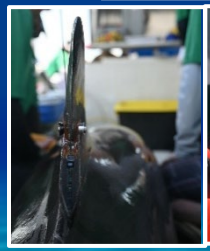

1. Valve housing
2. Pneumatic cylinder
3. Tag wings with pin through metal ring, above Delrin ring
4. Delrin guides
5. Left tag wing with Delrin ring
6. Holster
7. Tag




1. Dorsal fin
2. Trigger
3. Valve chamber
4. Antenna
5. Holster
6. Tag
7. Microswitch
8. Tag wings
9. Guide
10. Pneumatic cylinder

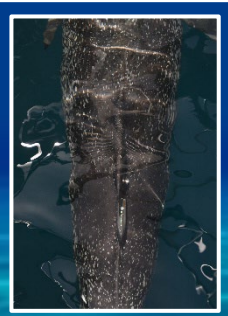
# Iterative testing and revised designs during 2018-2023

- Bench testing on carcass dorsal fins at WHOI
- Field testing of prototype
  - Hawaii, with Cascadia Research Collective
  - Offshore of Sarasota, Florida
- Examination of video showed the need for speed - rapid response times by dolphins, rolling out of tool in 30 ms, before tagging completed (evolutionary response to sharks?)
- Increased air pressure/speed – pushing engineering limits.
- Attachment tests during Sarasota Bay health assessments, with subsequent monitoring:
  - Led to changing retaining ring material, from magnesium to aluminum, for longer attachment duration.
- First successful deployment – on an Atlantic spotted dolphin in August 2023.



# 1st successful tag deployment, August 2023, on Atlantic spotted dolphin “Hannah”

## Subsequently, 7 more deployments to date on Atlantic spotted dolphins

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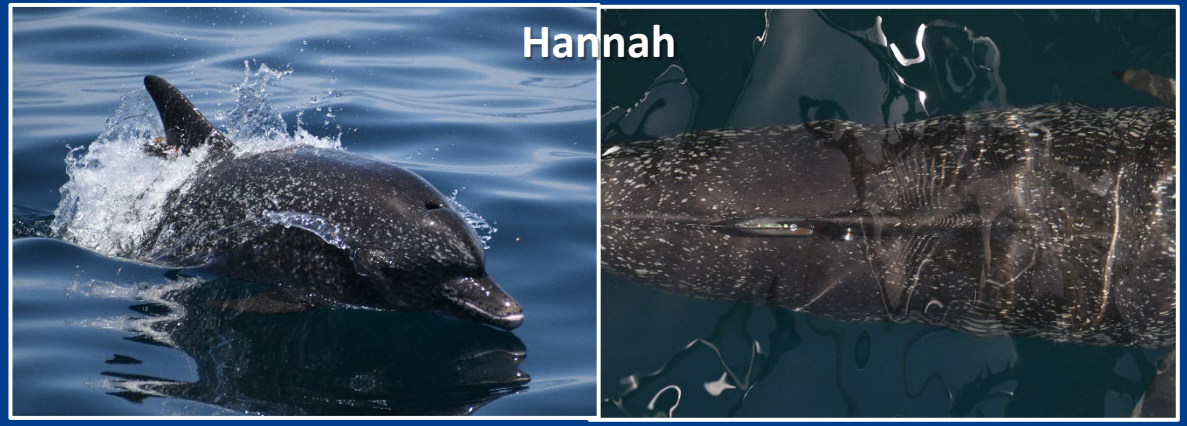
# Atlantic spotted dolphin responses to TADpoling

## Short-term active responses followed by return to normal behavior, including bowriding







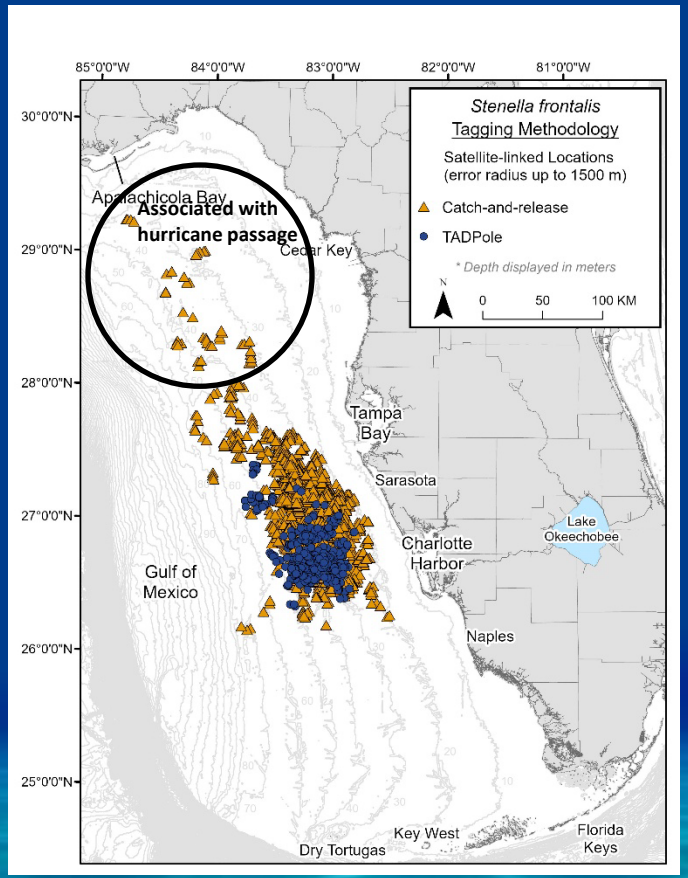
# Atlantic spotted dolphins tagged via TADpole

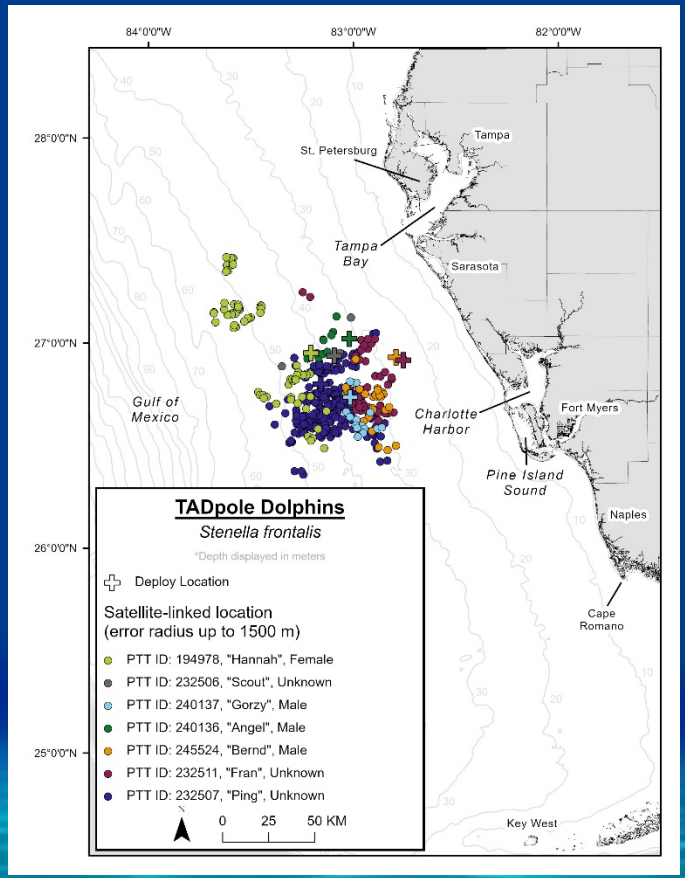
## Attachment duration is closely related to positioning on the fin

Median = 38 days, Max = 89 days

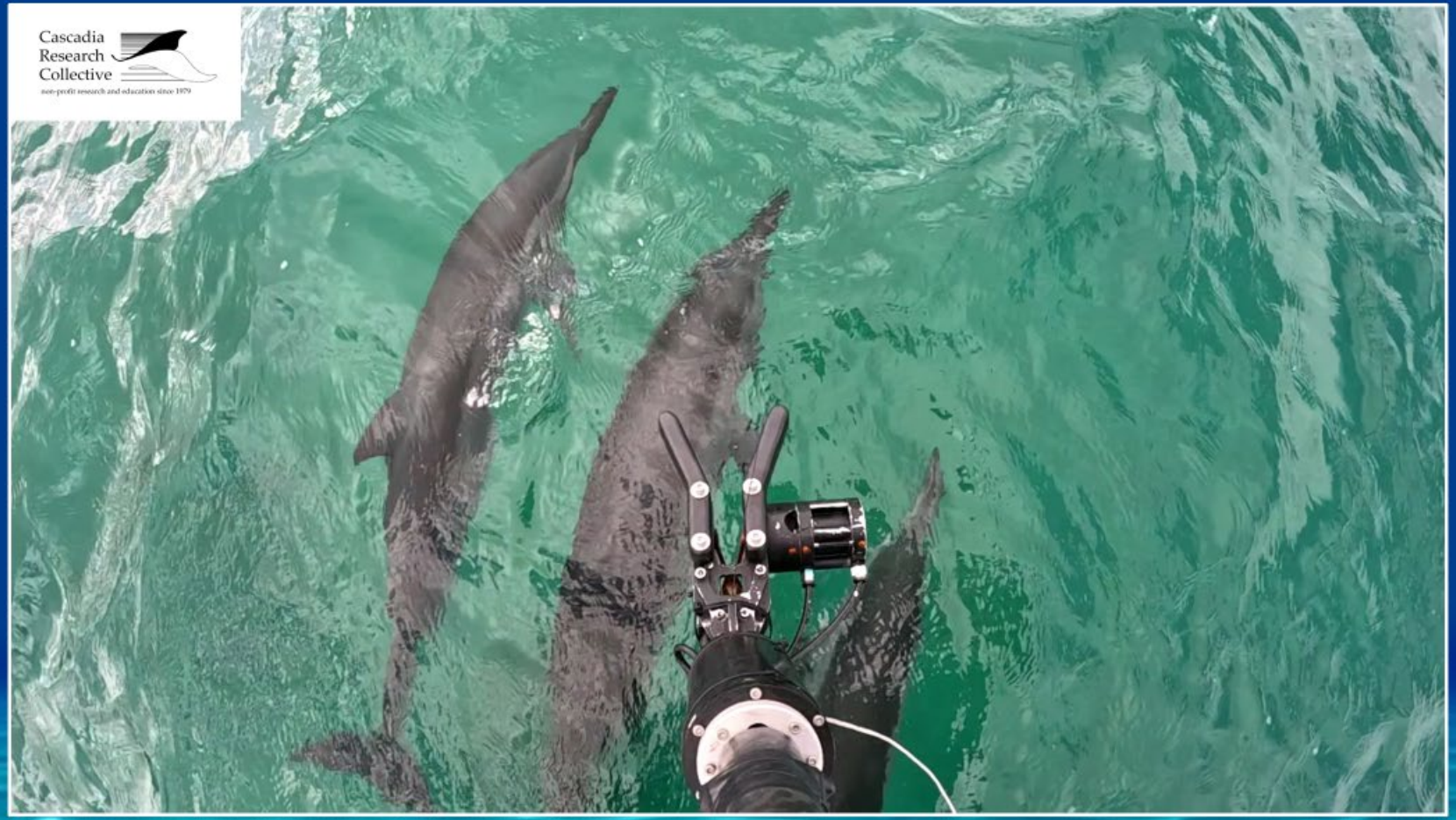
*vs.* Pantropical spotted dolphin LIMPET: Median = 13 days, Max = 21 days (Cascadia Research Collective website)

# Movements of Atlantic spotted dolphins tagged with the TADpole are comparable to those tagged during catch-and-release operations in the same area, same period

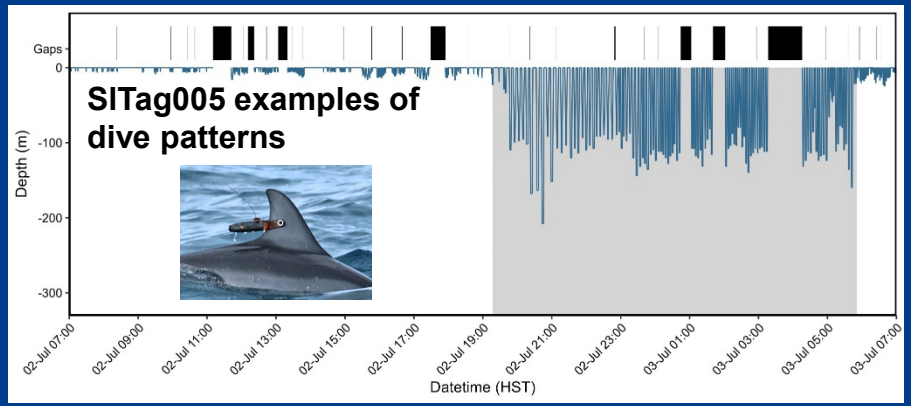


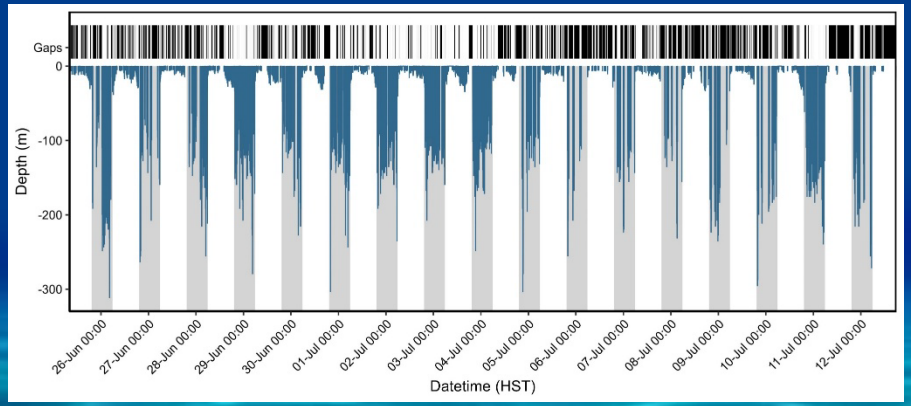



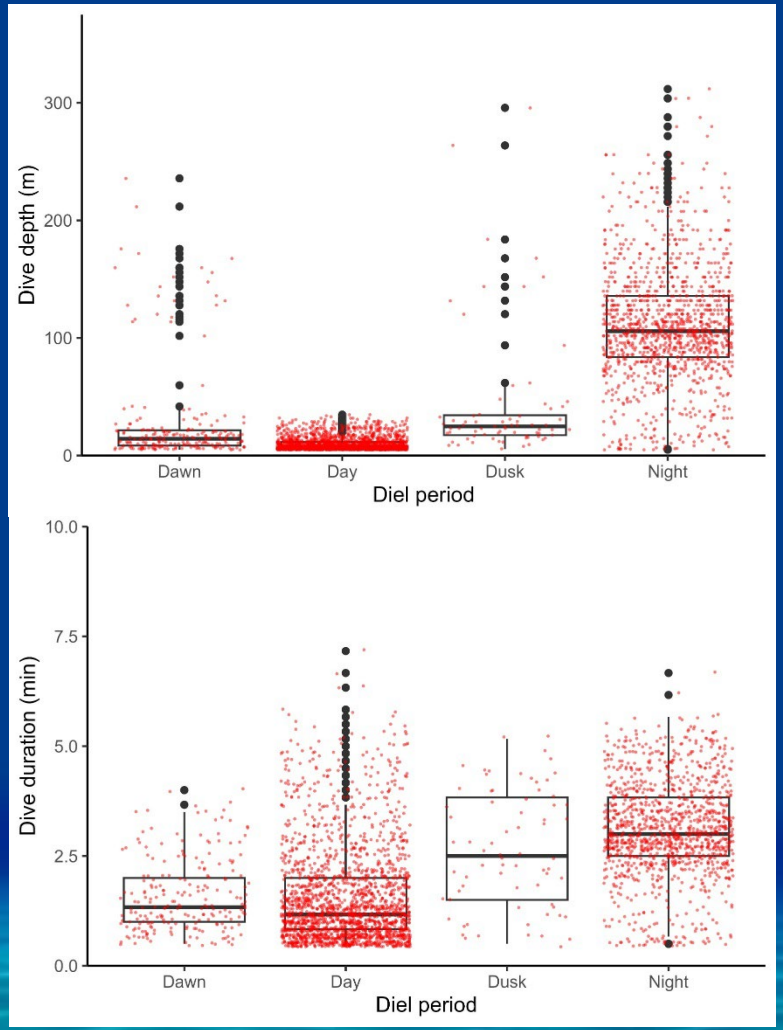
# In June 2025, with a grant from Dolphin Quest to Robin Baird of Cascadia Research Collective, we took the TADpole to O'ahu and were able to tag 9 Hawaiian spinner dolphins



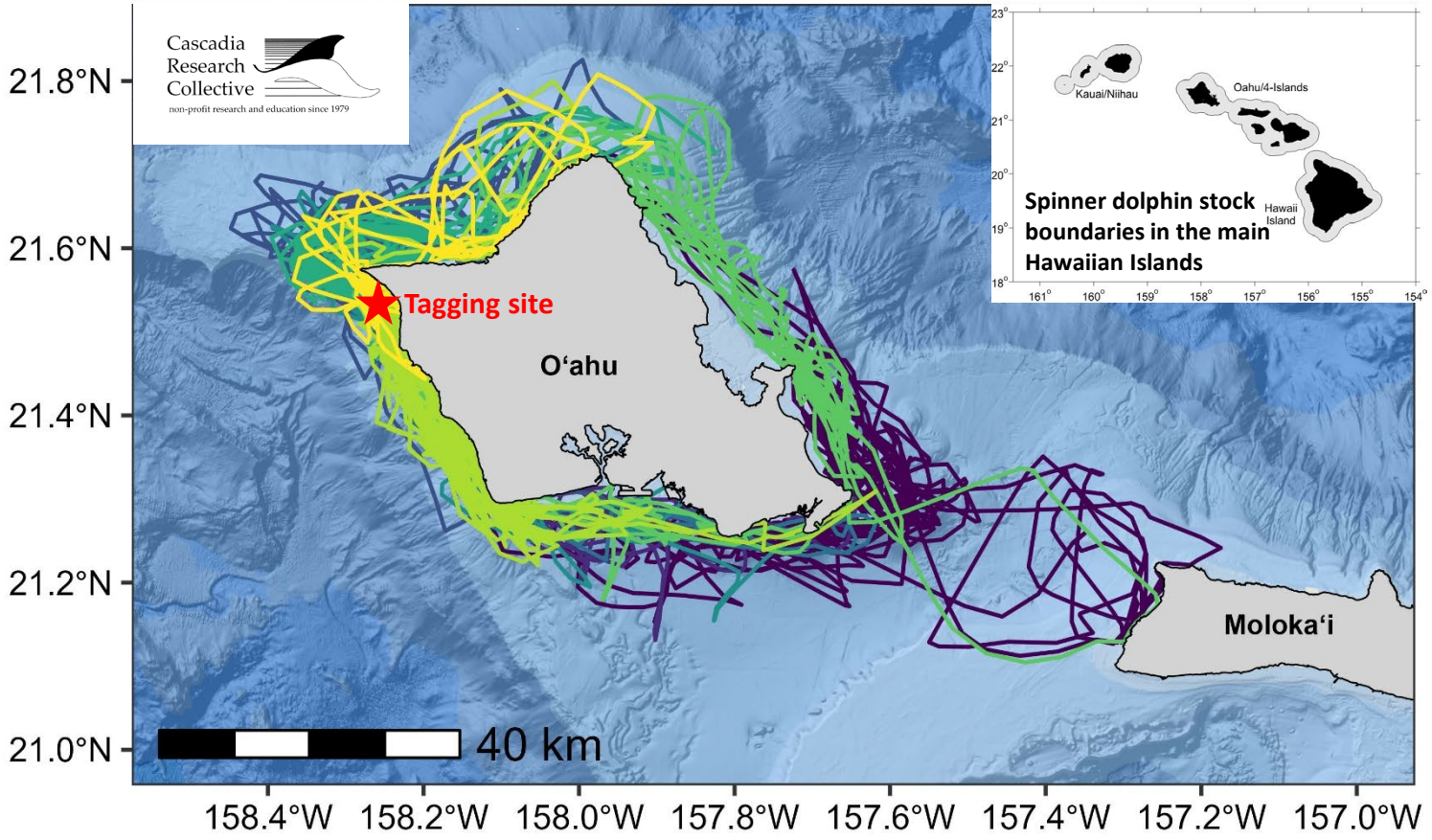
# Diurnal dive patterns



# Circum-island and inter-island movements within stock range




**Dolphins**

- SITag001
- SITag002
- SITag003
- SITag004
- SITag005
- SITag006
- SITag007
- SITag008
- SITag009

# Multi-day tracks for Spinners SlTag001, SlTag002, SlTag003

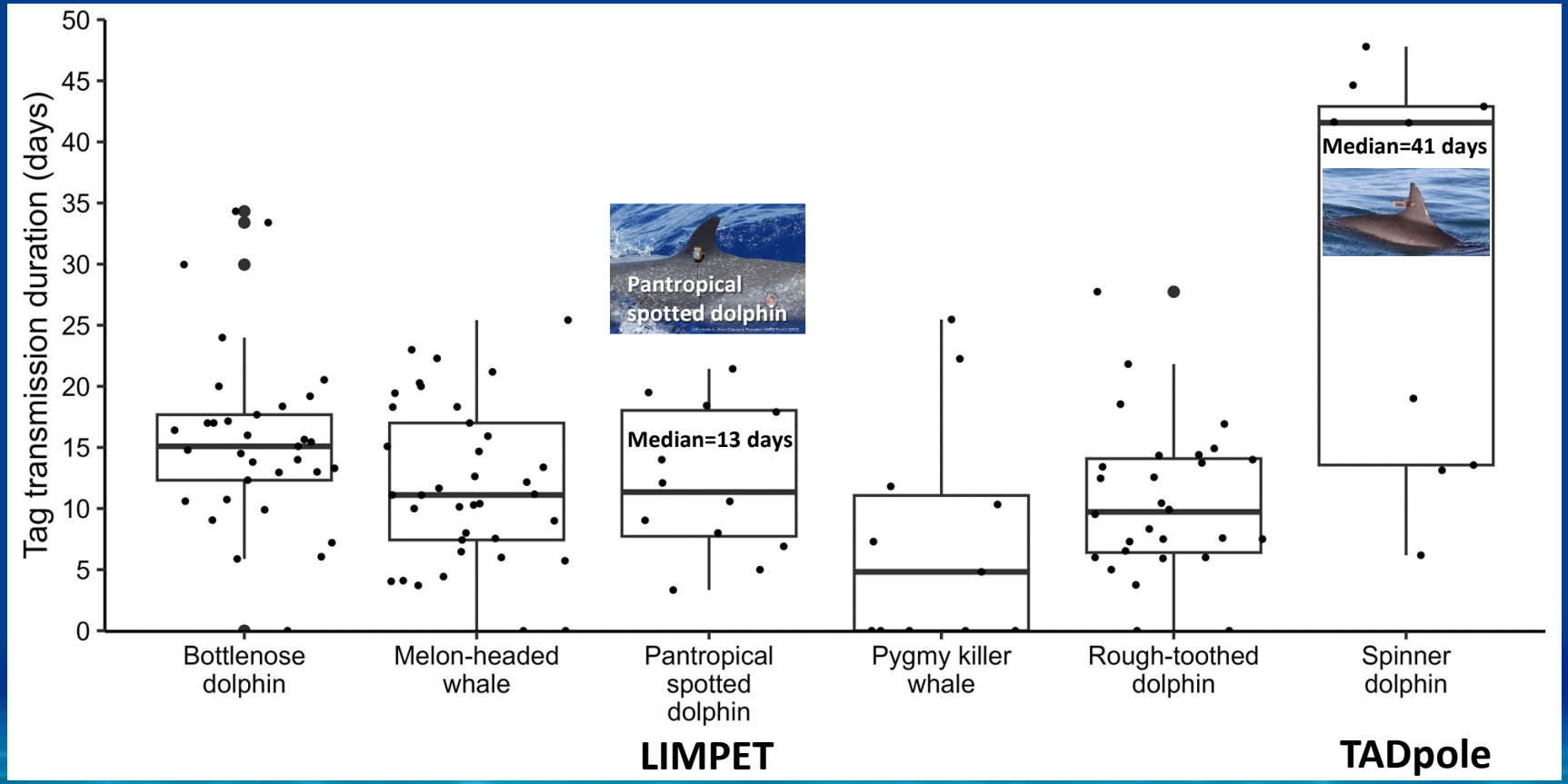
## Day vs. Night

2025-06-20 11:03:00


Cascadia Research Collective

non-profit research and education since 1979

# Comparison of transmission durations for remotely deployed tags in Hawai'i: LIMPET vs. TADpole




*From*: https://cascadiaresearch.org/hawaii/hawaiian-odontocete-species/ *Deployment image courtesy of Robin Baird, Cascadia Research Collective*

# Considerations for using the TADpole

- It is still a work in progress - we continue to try to perfect the tool and technique.
- To date, we have only successfully tagged two species. It is not necessarily a good fit for all dolphins/situations. Bottlenose have yet to be good candidates off Sarasota – we need to test it with more species, at different sites.
- To date, it has only been done from 3 boats – we need to try from a variety of vessels, with and without pulpits.
- Increased probability of success with:
  - Bow-riding dolphins that surface slowly and predictably in the appropriate position and at the appropriate distance below the bow.
  - Calm seas with minimum vertical movement of the pulpit.
  - Stable tagging platform, minimal distance above the water's surface.
  - Long, strong arms.
  - Experience. To date, only 4 people have tagged with it.
- Potential collaborators who think this might be useful for their situation should send us photos of the potential tagging vessel and video of their bow-riding dolphins.

# TADpole has demonstrated additional conservation value, also used to tag Great White and Whale sharks

Moore et al. Animal Biotelemetry (2024) 12:6
https://doi.org/10.1186/s40317-024-00364-3

Animal Biotelemetry

METHODOLOGY Open Access

## Development of single-pin, un-barbed, pole-tagging of free-swimming dolphins and sharks with satellite-linked transmitters

Michael J. Moore[1*], Thomas M. Lanagan[2], Randall S. Wells[3], Jason Kapit[2], Aaron A. Barleycorn[3], Jason B. Allen[3], Robin W. Baird[4], Camrin D. Braun[1], Gregory B. Skomal[5] and Simon R. Thorrold[1]

**Abstract**

**Background** To tag large marine vertebrates, without the need to catch them, avoiding using barbs for tag retention, and precisely controlling tag location, the remote Tag Attachment Device on a pole (TADpole) was developed. This allows single-pin tags (Finmount, Wildlife Computers) to be attached to the dorsal fins of free-swimming large marine vertebrates.

**Results** TADpole comprises a pole-mounted holster that carries a tag. It uses compressed air, and a micro-controller, to rapidly insert a stainless-steel pin through a corrodible metal retaining ring in the first tag attachment wing, the animal's dorsal fin, and then a press fit Delrin retaining ring in the tag wing on the other side of the fin. Tagging only occurs when the trailing edge of the dorsal fin touches a trigger bar in the holster, ensuring optimal pin placement. It was developed using fins from cadavers, then trialed on briefly restrained coastal dolphins that could be followed in successive days and weeks, and then on free-swimming animals in the field. The latter showed very short touch/response intervals and highlighted the need for several iterative revisions of the pneumatic system. This resulted in reducing the total time from triggering to tag application to ~ 20 ms. Subsequent efforts expanded the TADpole's applicability to sharks. One free-swimming Atlantic spotted dolphin, two white sharks, and one whale shark were then tagged using the TADpole.

**Conclusions** Being able to tag free-swimming dolphins and sharks remotely and precisely with satellite-linked telemetry devices may contribute to solving conservation challenges. Sharks were easier to tag than dolphins. Dolphin touch-to-response times were 28 ms or less. Delphinid skin has unique polymodal axon bundles that project into the epidermis, perhaps a factor in their uniquely fast response, which is 10 × faster than humans. Their primary reaction to tagging is to abduct the flippers and roll the fin out of the TADpole holster. This device has the potential to deliver high-quality tag data from large vertebrates with dorsal fins without the stress and logistics associated with catch-and-release, and without the trauma of tags that use barbs for retention. It also collects a dorsal fin biopsy core.

**Keywords** Tags, SPOT, SPLASH, Touch response interval, White shark, Whale shark, Dolphin, Tag attachment

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*Photos courtesy Atlantic White Shark Conservancy, Mass. Division of Marine Fisheries*


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NOAA RESTORE
National Marine Mammal Foundation
Mote Scientific Foundation
Anonymous donors to Brookfield Zoo Chicago
Cascadia Research Collective
Dolphin Biology Research Institute

We also want to acknowledge the help of:

- Many staff and volunteers who participated in field efforts
- Tag animations by Danny Barrios
- Michaela Kratofil assistance with location data processing

**For more information or to obtain a copy of the publication, visit:**
***sarasotadolphin.org***

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