

UAS APH-22 for Large Whale Health Assessment



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Goals

NMFS status assessments for protected whales and dolphins rely on abundance trends.

Mitigation of threats requires the health consequences to be identified before they impact population dynamics.

Our goal: use UAS tools to assess the body condition and health of whales to augment status assessments and facilitate management.

Approach

- Photogrammetry



- Blow sampling



APH-22 Hexacopter



Outreach

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Science & Environment

In pictures: Drones take whale science to new heights

30 May 2015 | Science & Environment



Gray whales can weigh more than 30,000kg

CNN U.S. + Live TV

Drone shows life and death of killer whales

Brad Lendon, CNN

Updated 9:33 PM ET, Sun October 19, 2015



Photos: Killer whales from above

4 of 6 Show Caption



Science Achievements



Journal of
**Unmanned Vehicle
Systems**

Revue des
systèmes de véhicules
télécommandés

Volume 3
2015

An NRC Research
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Une revue de
NRC Research
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www.nrcresearchpress.com

The *Journal of Unmanned Vehicle Systems* is the official journal of Unmanned Systems Canada.

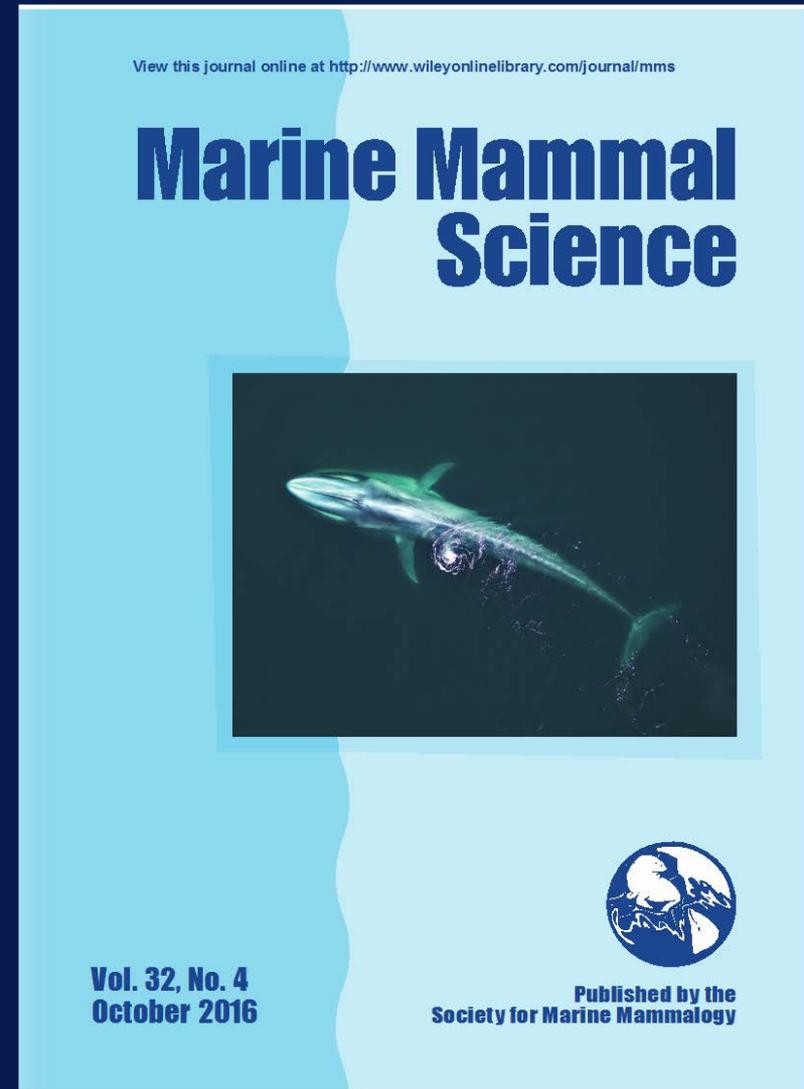
La revue des systèmes de véhicules télécommandés est la revue officielle de Systèmes Télécommandés Canada.

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La Fondation Kenneth M Molson est un commanditaire-fondateur de la revue.

NRC
Research Press



View this journal online at <http://www.wileyonlinelibrary.com/journal/mms>

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Science

Daily News

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SCIENCESHOT



PHOTO BY MICHAEL MOORE, WOODS HOLE OCEANOGRAPHIC INSTITUTION; ACQUIRED UNDER NATIONAL MARINE FISHERIES SERVICE PERMIT 17355-01 AND NOAA CLASS G FLIGHT AUTHORIZATION 2015-ESA-4-NOAA)

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Drones give whales a breathalyzer test

Science Translational Medicine | AAAS

- Whale blow sampling featured in “Science” in 2015

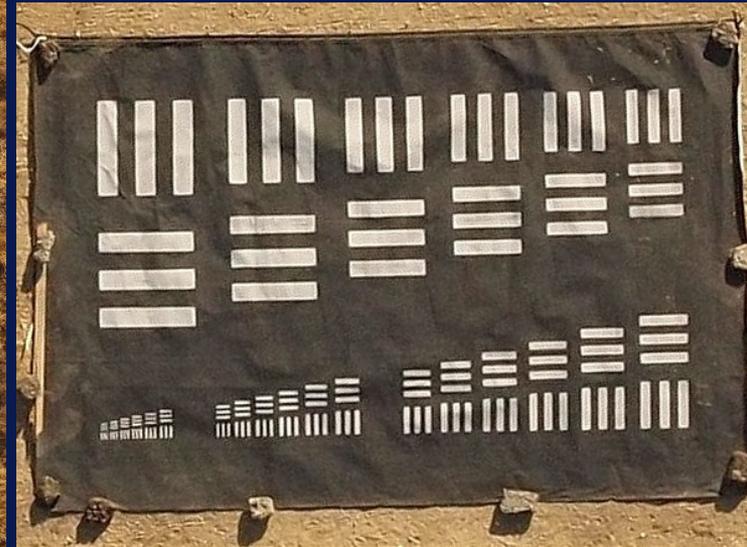
Portable



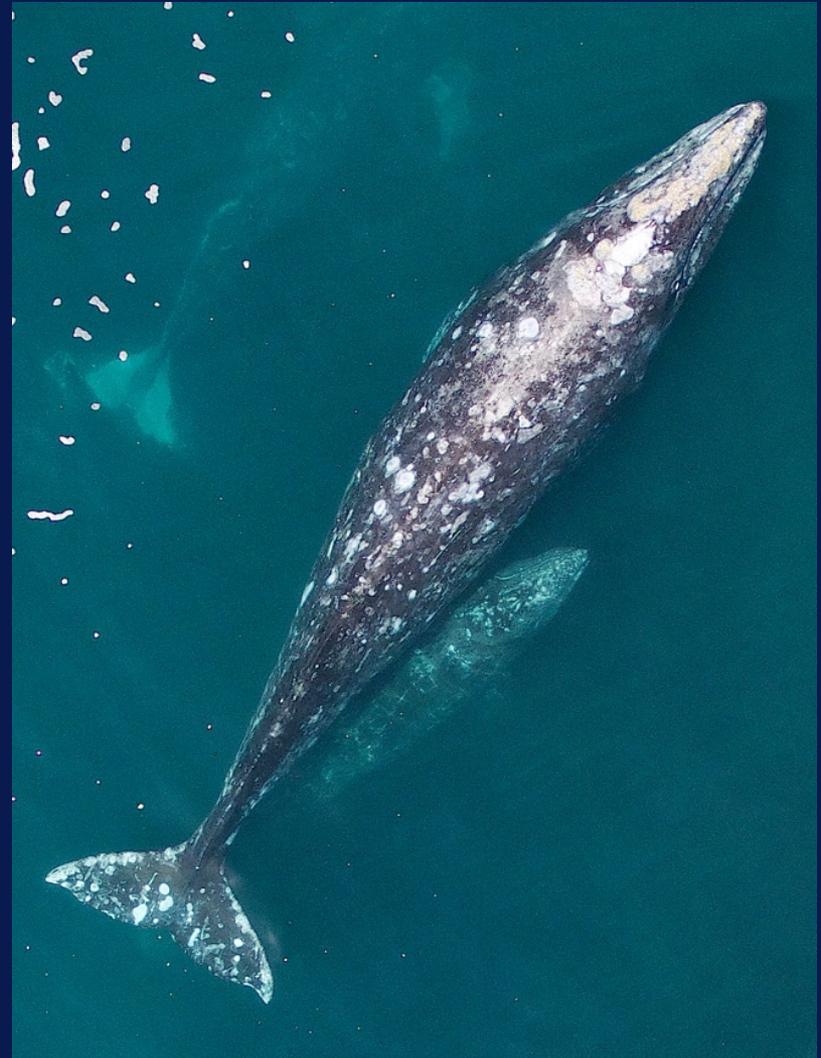


High Resolution Imagery

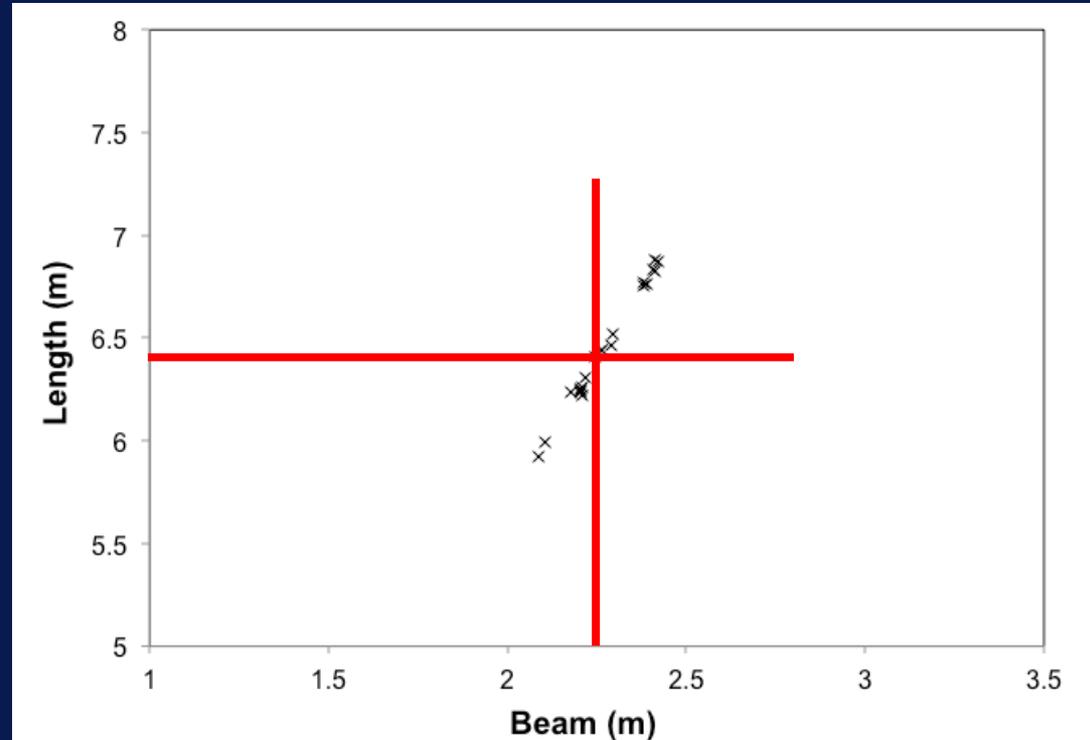
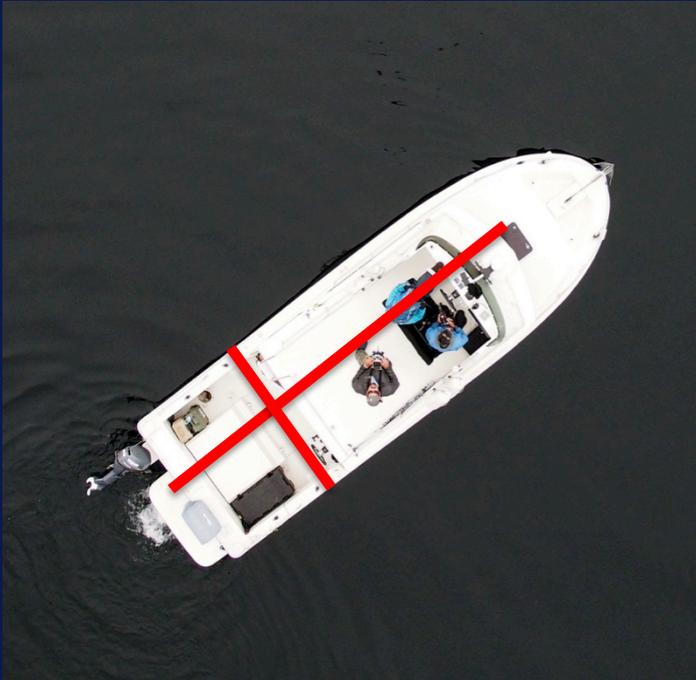
<1.8cm at 60m
<1.4cm at 30m



Resolving whale shape

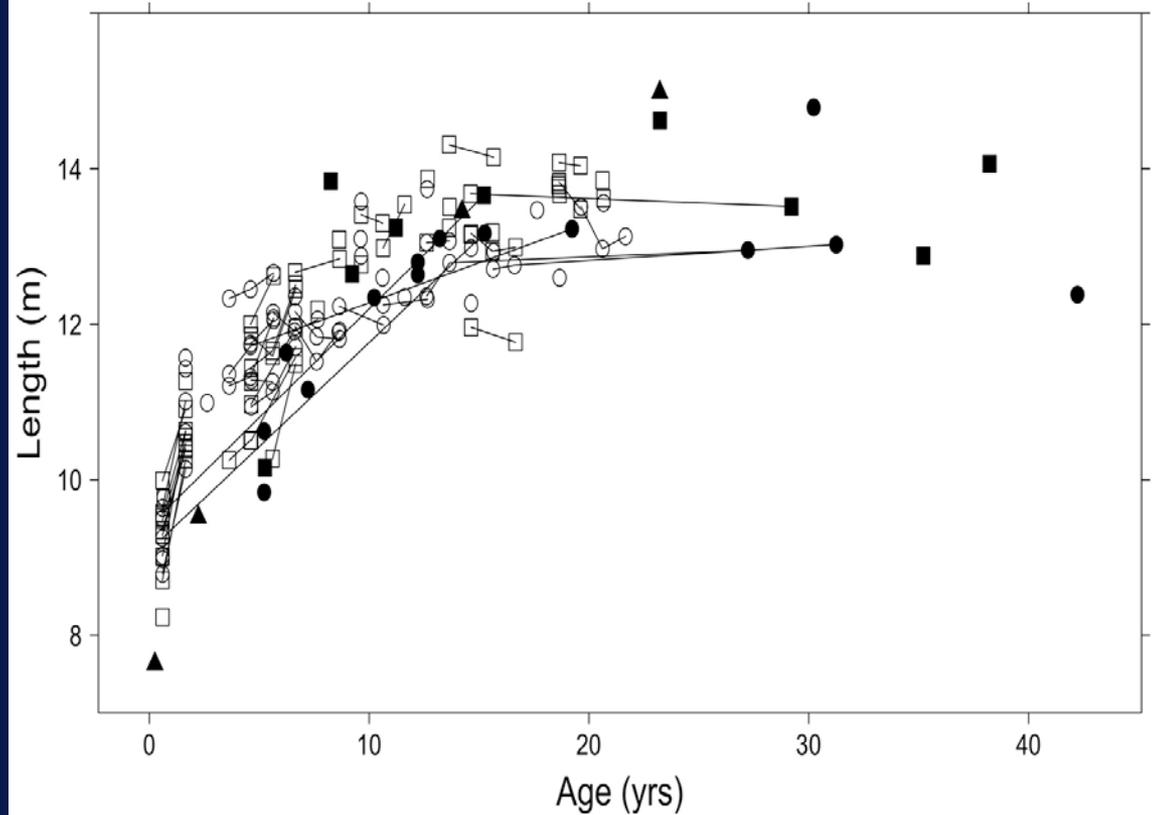
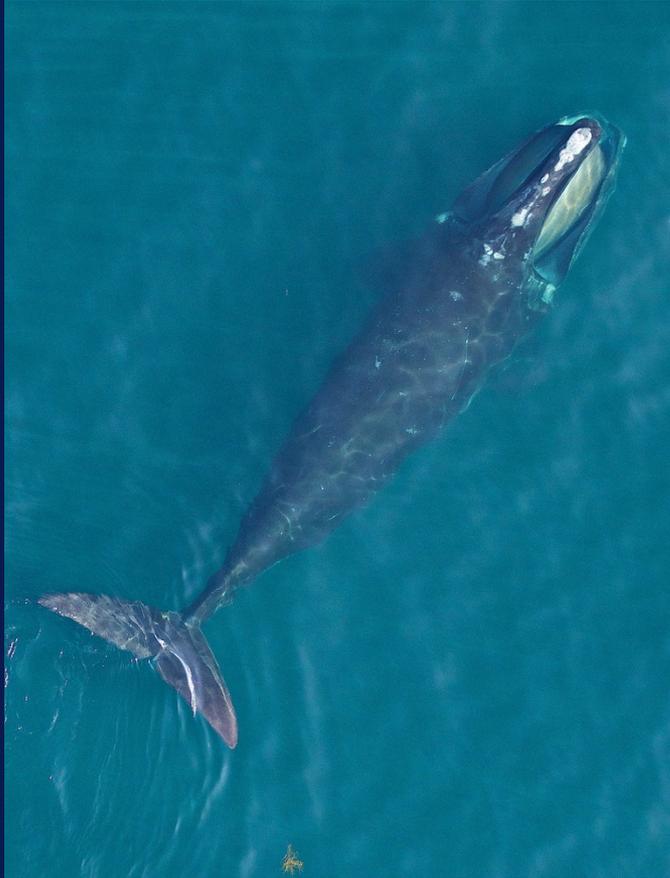


Precise altimetry



Average error <1% of known-length vessel

Quantifying whale growth



Stable flight attitude

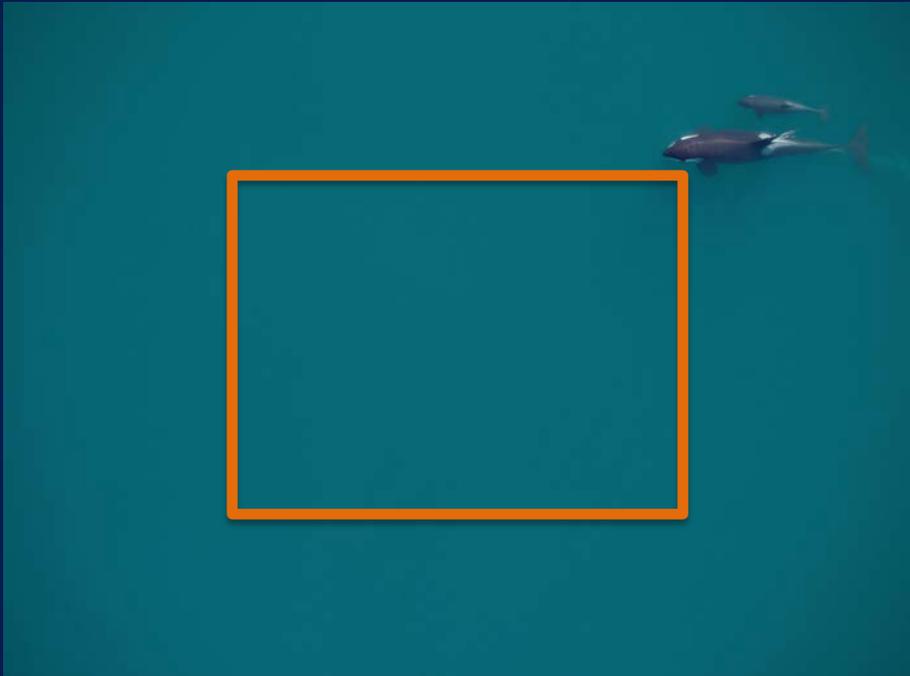


UAS PO Contributions



Increased efficiency

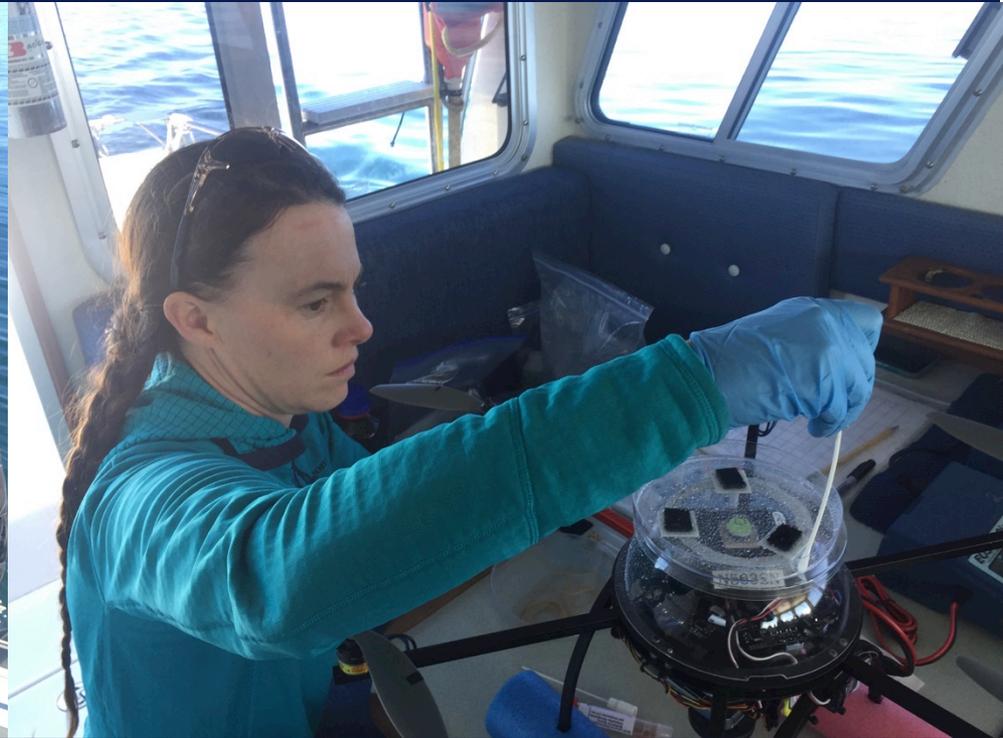
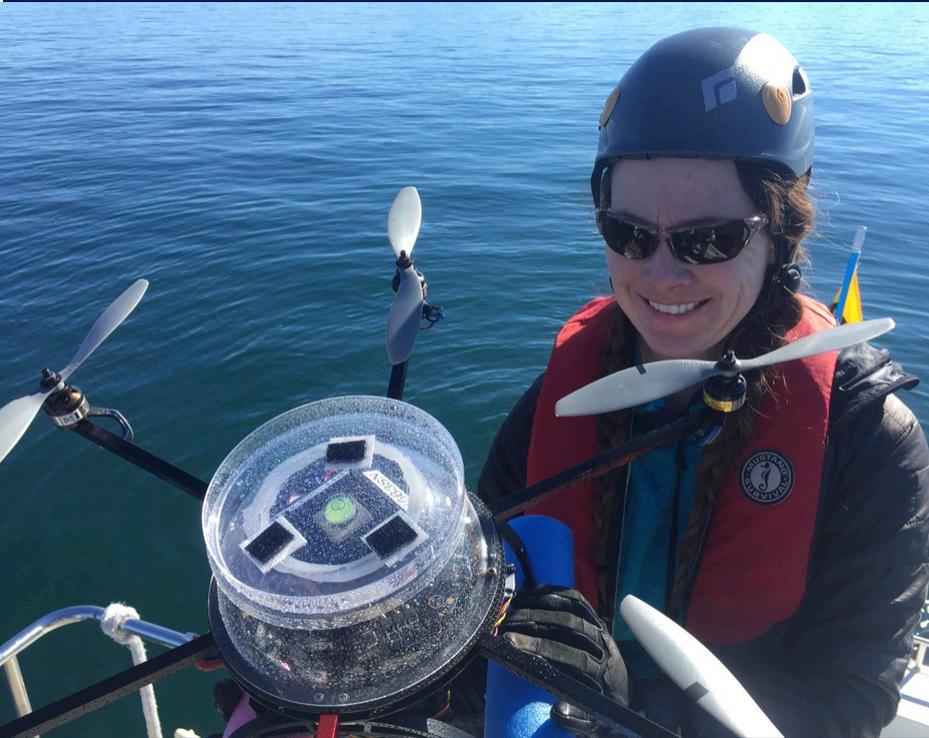
Without Gimbal ~ 64%



With Gimbal: = 91%



Increased efficiency



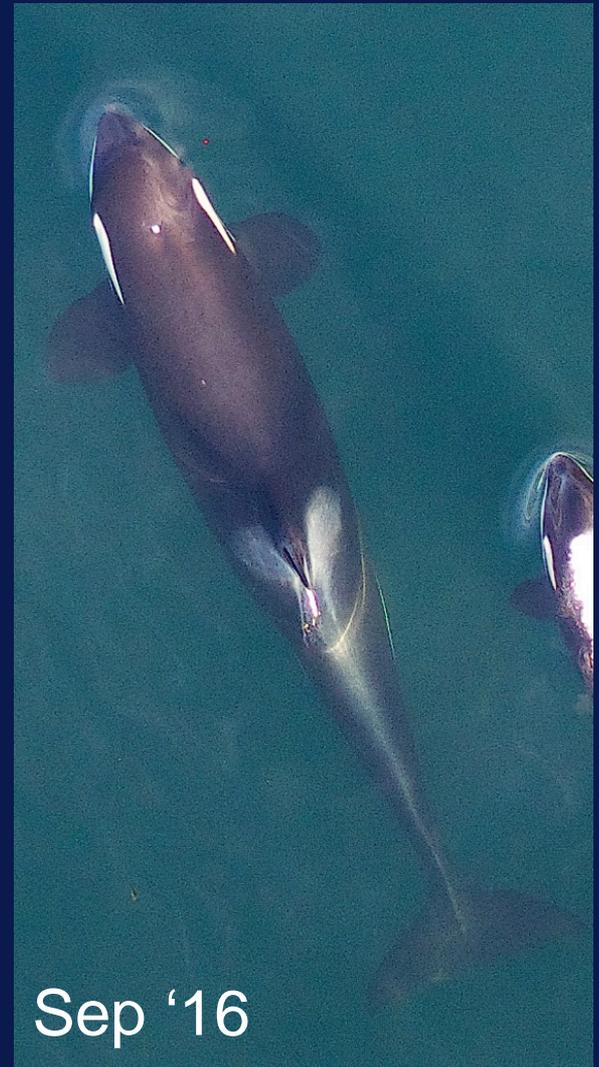
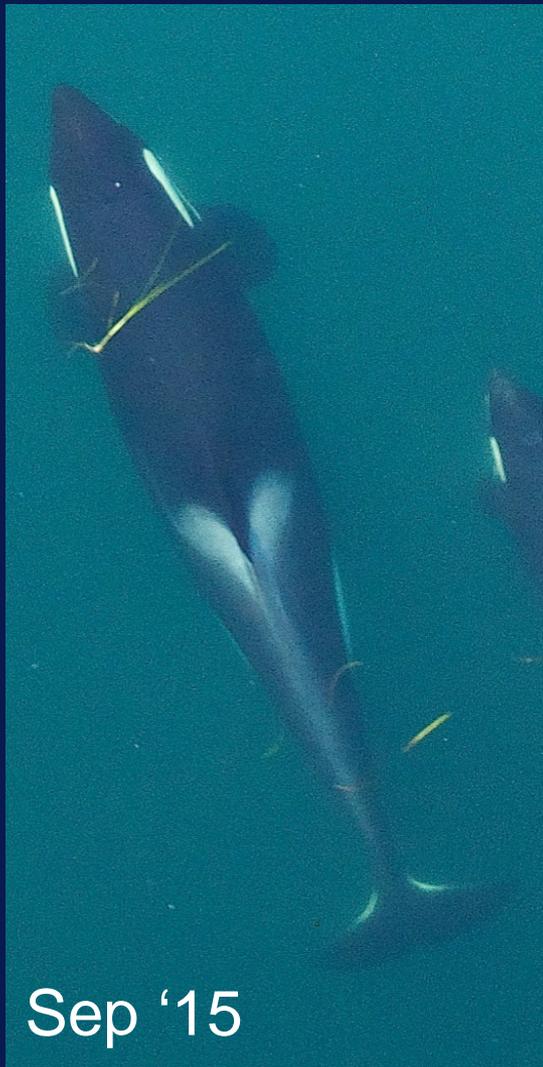
TRL Levels

RFP APH-22 Systems Development

- Gimbal Camera Mount
 - Beginning TRL 5
 - Current TRL 9
- Blow Sampling System
 - Beginning TRL 4
 - Current TRL 7
- Laser Altimeter
 - Beginning TRL 3
 - Current TRL 8

- GOAL TO REACH TRL 9 BY END OF FY17

Future: continuity



Future: extending missions



Collaborations

NOAA Fisheries: SWFSC, NWFSC, NEFSC, PIFSC, AFSC

Vancouver Aquarium

Woods Hole Oceanographic Institution

SR3: SeaLife Response, Rehab and Research

Aerial Imaging Solutions

NOAA AOC & OMAO

NMFS Office of Science and Technology

NOAA UAS Program

