



Apr 4th, 4:00 PM - 4:15 PM

Is silence golden? The recovery rationale for yielding—and enforcing—the maritime right-of-way to Southern Resident killer whales and their access to prey

Todd Hass

Puget Sound Partnership, United States, todd.hass@psp.wa.gov

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Hass, Todd, "Is silence golden? The recovery rationale for yielding—and enforcing—the maritime right-of-way to Southern Resident killer whales and their access to prey" (2018). *Salish Sea Ecosystem Conference*. 93.

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Is silence golden? The recovery rationale for yielding—and enforcing—the maritime right-of-way to Southern Resident Killer Whales (SRKW) and their access to prey

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The screenshot shows the 'Puget Sound Vital Signs' website interface. The header includes the logo and navigation links for 'VITAL SIGNS', 'RECOVERY ATLAS', and 'REPORT CARD'. The main content area is titled 'Orcas' and features a pink header bar. Below the title, there is a text block stating: 'Southern Resident Killer Whales once numbered around 200 whales, but in the past decade the population has totaled fewer than 90 individuals.' Below this text, it says 'Indicator Lead: Ken Balcomb, Center for Whale Research'. At the bottom of the text block, there are two links: 'View Report Card' and 'Download PDF from the latest State of the Sound report'. To the right of the text is a photograph of an orca's dorsal fin in the water. Above the photo, it says 'Data last updated on March 19, 2018' and 'Photo Credit: Michael Ford'. The Puget Sound Partnership logo is visible in the top right corner of the screenshot.

- Current status of law and enforcement
- Can we distinguish between effects of vessels: noise vs physical presence?
- The concept of ecological “interference competition”
 - Evidence in other cetaceans and NRKWs
 - 2-D and 3-D habitat considerations
- When *especially* should vessels yield the right-of-way?

Good news: Washington State Supplemental Operating Budget 2018

- By law, SRKW already have a 200 (400) yard right-of-way...
- \$76,000 for Fiscal Year (FY) 2018 and \$472,000 for FY 2019 are provided solely for WDFW to **increase enforcement** of vessel traffic near orca whales

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Distinguishing the adverse effects of vessel *noise* from those of *physical disturbance* is now customary

- In the Executive Order announcement for SRKW recovery, Governor Inslee divided key threats from vessels as related to noise *and* physical disturbance
- When categorizing vessel impacts in their Population Viability Analysis, Lacy et al. (2017) described noise separately from physical disturbance in at least 9 of 29 instances; analyses minimally quantify the latter

Can we distinguish physical influence of vessels from noise?

- Impacts of ship strikes, spills are obvious
- Changes to SRKW behavior, activity and energy budgets are most subtle, and harder to separate from effects of underwater noise
- Begging the question, would a near-silent fleet necessarily solve the problem?

In light of these challenges, I submitted this abstract as a 'placeholder' - unfortunately no others came in...

So this presentation is a follow up to the issue Dr. Lance Barret-Lennard emphasized at fall SSRW Symposium

Q: Is ecological "interference competition" happening – does physical presence of boats (recreational, fishing, whale-watching, etc.) restrict SRKW access to prey, and if so under what conditions?

What is interference competition?

- Interference competition occurs when certain individuals restrict or prevent access of others to a resource (like prey or space)

Studies of other cetaceans suggest...

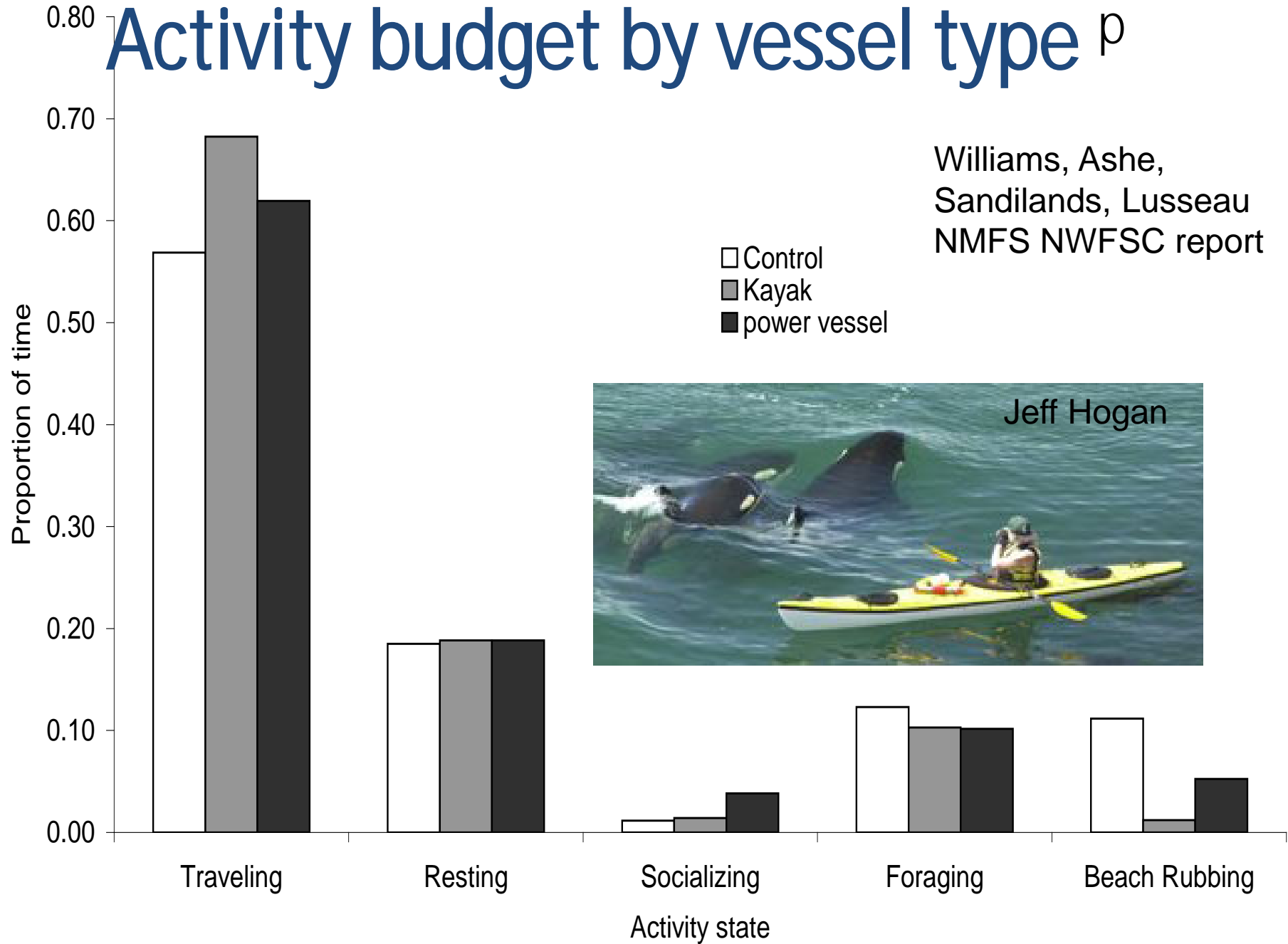
- Pirotta et al. (2015) demonstrated that boat physical presence, and not just noise, disturbs the behavior of Bottlenose Dolphins
- And differences between sites and years suggested that challenging foraging conditions (reduced patch quality, prey availability, etc.) may exacerbate the adverse effects of boats
- Spinner dolphins in Hawaii are chronically displaced from a key resting area during (preferred) daytime hours which may reduce time spent in 'deep' sleep and weaken cognition (Tyne 2015)

Using the behavior of Northern Resident Killer Whales as a proxy* ...

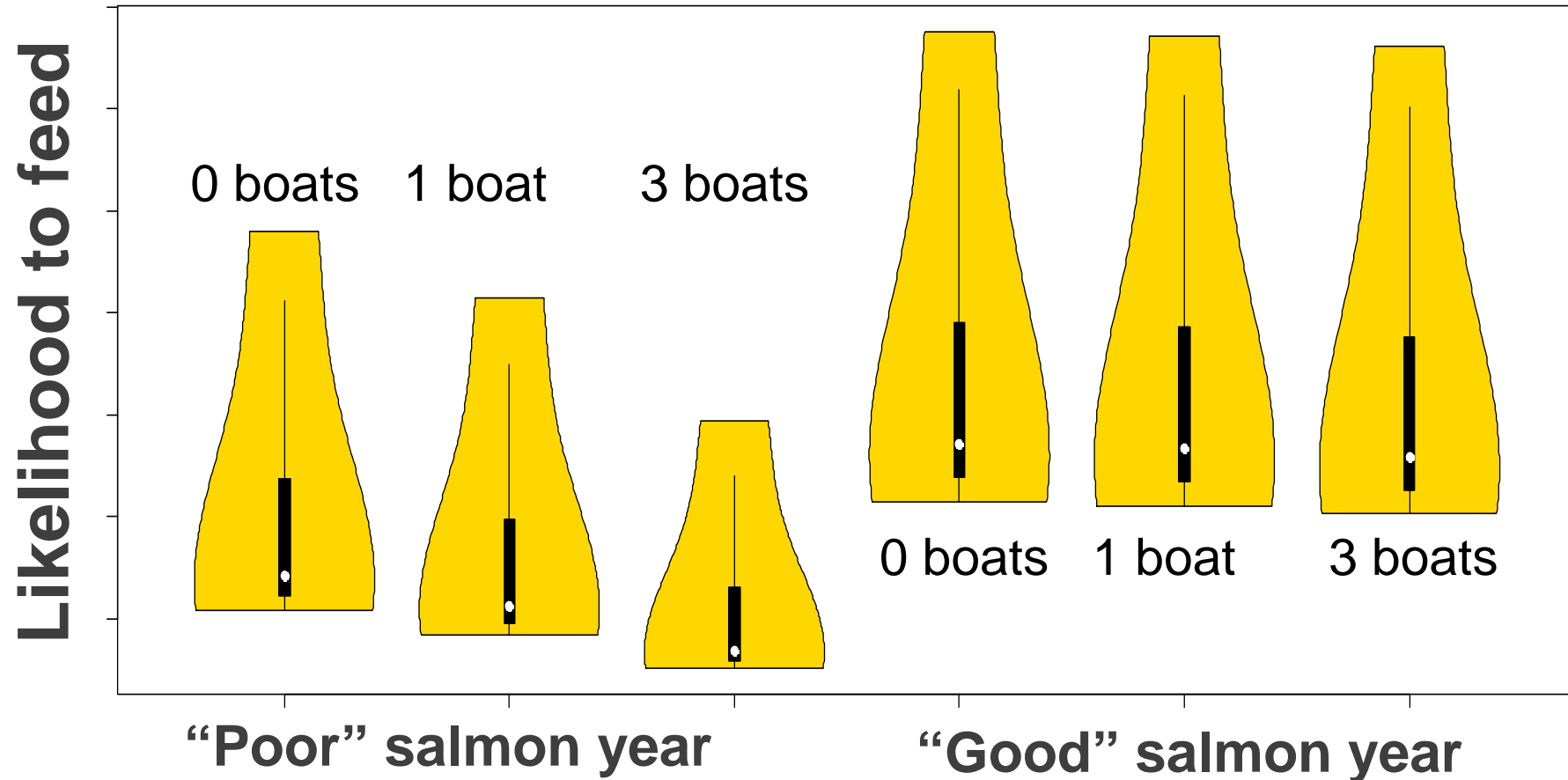
- Williams et al. (2011)^p found that even **kayaks** (essentially silent) evoked evasive, energetically expensive “outpace” responses and reduced foraging time
- Furthermore, finding in 2015 that such effects appeared to worsen during periods of low Chinook salmon abundance

*Note that research on SRKWs suggests that they are rather more tolerant of boats than their northern counterparts

Activity budget by vessel type ^p



Salmon affects whales' resilience to disturbance ^q



What aspects of spatial habitat in the marine environment are important to cetaceans and SRKW—and prone to competition with people?

- Submarine canyons and steep topography are often important habitats for toothed whales and dolphins (Moors-Murphy 2014)
 - ∨ Thus Presence of boats could potentially interfere with SRKW access to areas with “steep relief” (ie west of San Juans) and/or impair prey pursuits (like coordinated driver/barrier hunting by Bottlenose Dolphins and lions)

What aspects of spatial habitat in the marine environment are important to cetaceans and SRKW—and prone to competition with people?

- Thinking 2D (surface) vs 3-D (water column)
 - ✓ Crowds of boats and fishing lines could inhibit maneuverability of SRKW and success of near-surface chases/captures
 - ✓ However, Chinook are found (and caught) deeper in the water column than other salmon species
 - ✓ Anecdotes that Chum may seek shelter behind boats

Evidence of SRKW habitat associations with bathymetric and other physical variables is, however – mixed

Negative

- Hoelzel (1993), no correlations between bathymetry and fast non-directional behaviors (i.e., prey pursuits) with southern resident killer whales
- Lucas (2009) did not see evidence of SRKWs selecting for benthic characteristics when feeding

Affirmative

- Hauser (2006) found that SRKWs selected core areas with slightly deeper waters and steeper bathymetry than is available in north Puget Sound
- Noting that: “Potentially, depth, distance from shore, or slope affect how prey distribute within this region, such that **SRKW may be responding to prey rather than actual physical structure.**”

So, when are the potential effects of physical disturbance (boat presence) on SRKWs worthy of mitigation?

- Precautionary principle suggests drawing inferences from other dolphins, especially NRKWs—as we conserve SRKWs
- In a parallel comparison of “good” and “bad” Chinook years, Dr. John Ford (2005) showed that when the Pacific Salmon Commission Abundance Index for Chinook fell below 1.0 (about 40% of the years in his 25-year dataset), the mortality of SRKWs increases
- If we factor in the adverse noise-masking effects of boats and ships on SRKWs—we may want to especially consider whether to **amplify mitigation** measures (approach distance & speed; rationing boat numbers or time-of-day; enforcement; fishing restrictions; prey augmentation) in **lean** prey years