Summary for Glacier Bay Area

- We documented a 59% decrease in whale numbers since 2013
- Calving and juvenile survival are in a sharp and continuing decline.
- Site fidelity interrupted in 68% of “regularly sighted” whales
- More whales appear to be in poor body condition.

For Glacier Bay annual reports and details: www.nps.gov/glba
Question #1: Is the Problem Just in Glacier Bay?

And are there data to address that question?

Answer: Yes, in some places
Gulf of Alaska Humpback Whale Data Sources

1968 – 2018: humpback whale photo-ID

Jurasz family photo collection starting in 1968

Glacier Bay National Park 1985-present
Chris Gabriele NPS, Janet Neilson NPS

SEAK long term shared database – 1986-present
NPS, Jan Straley UAS, Scott Baker OSU

SPLASH - Structure of Populations and Levels of Abundance and Status of Humpbacks –NP Basin wide study 2004-2006 A cast of thousands

John Moran NOAA, NPS, Andy Szabo AWF, Heidi Pearson & Jan Straley UAS

Synchronous surveys by all research groups for two weeks in Aug 2016, 2017 & 2018

- Humpback whale ESA Post-Delisting Monitoring Plan calls for 10 years of monitoring “as funds are available”.
SPLISH 
\textit{Synchronous surveys by 5 research groups for two weeks in Aug 2016, 2017 \\ & 2018}

Maps courtesy of John Moran

\textbf{SPLISH Synchronous surveys by 5 research groups for two weeks in Aug 2016, 2017 \\ & 2018}

\begin{tabular}{|c|c|c|}
\hline
\textbf{Year} & \textbf{Survey Distance (nm)} & \textbf{Effort Time (hr)} \\
\hline
2016 & 1,609* & 195 \\
2017 & 1858* & 224 \\
2018 & 1318 * & 173 \\
\hline
\end{tabular}

SPLISH Synchronous surveys by 5 research groups for two weeks in Aug 2016, 2017 & 2018


### Preliminary SPLISH Findings 2016-2018

#### Table: Whales Sighted During SPLISH 2016-2018

<table>
<thead>
<tr>
<th>Year</th>
<th>Whales</th>
<th>Calves</th>
<th>Effort</th>
<th>Whales Per Hour</th>
<th>% Calves</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>405</td>
<td>2</td>
<td>195</td>
<td>2.08</td>
<td>0.5%</td>
</tr>
<tr>
<td>2017</td>
<td>319</td>
<td>2</td>
<td>224</td>
<td>1.43</td>
<td>0.6%</td>
</tr>
<tr>
<td>2018</td>
<td>164</td>
<td>0</td>
<td>173</td>
<td>0.95</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

#### Overall Results:
- Low whale counts
- Few calves
- Skinny whales
- 2 males and 1 female from GB-IS found in Chatham Strait in 2017

Whale #944 Icy Strait, 9/20/2018 (NPS photo)
Skinny Whales-Northern Southeast Alaska

Sept 4 2016
Sitka Sound

D. Miller
photographer

March 22, 2018
Sitka Sound

J. Straley
photog.
Question #2: In Search of the “Missing” Whales: Did They Re-locate?

Whale #516, a.k.a. “Garfunkle”

Glacier Bay National Park
Lost and Found “Missing” Whales

Circulated photo PDF to research groups, tour vessels
Gearing up to match catalogs with
British Columbia researchers
Sent over 9,000 fluke ID images to HappyWhale.com
Question #3: Carrying Capacity: Did humpbacks eat themselves out of house and home?

Maybe... but at all levels of the marine food web, things are out of whack.

This points to larger ecological changes driving the declines.
What Exactly IS Carrying Capacity?

Seems clear that the ability of the ecosystem to sustain the existing whale population has diminished.

The effects we have seen correspond with the 2013-2016 marine heatwave and lasted beyond it.

We can infer that changing ocean conditions can change carrying capacity rapidly.
Alaska News Reel:
Lots of Marine Ecosystem Changes In Recent Years
SE Alaska Herring Fishery Recent History

Herring are a dominant humpback whale prey item.

Many SE Alaska gillnet fisheries out of business past several years.

Only one sac roe fishery exists in the Gulf of Alaska: **Sitka Sound**

2018: fishery closed early, 8,300 tons short of quota.

2019: No harvest; fish not of marketable size.
Fish we caught in 2018 had lower weight at length than those caught in 2001 and 2002.


Reduced prey quality may help explain poor whale body condition and reproductive success.

Graphs courtesy of Yumi Arimitsu, USGS
“Skinny” zooplankton

Mean zooplankton lipid content was high in 2014 and decreased ~3-fold in 2015 (Fergusson et al. 2017)

Prey quality, not just quantity, is important!

Images from:
www.sfos.uaf.edu/directory/faculty/hopcroft/index.html
Summary for Studied Alaska Areas

- We documented a 59% decrease in whale numbers since 2013
- Calving and juvenile survival are in a sharp and continuing decline.
- Site fidelity interrupted in 68% of “regularly sighted” whales
- More whales appear to be in poor body condition.
- Available data indicate similar findings on humpback whales throughout SE Alaska and Prince William Sound.
- Some evidence of whales relocating within SE Alaska, but not enough to explain all the “missing” whales.
- In Icy Strait and elsewhere evidence suggests whale prey species in poor condition in recent years.
Closing Thoughts: Tools To Address The Issues

- Support long term population monitoring and integration of physical science data.
- Ensure that Post-Delisting Monitoring Plan is carried out for 10 years as promised.
- Look closely at “Response Triggers” in Post-Delisting Plan.
- Acknowledge that DPS’s mix on feeding grounds. Err on the side of caution in Critical Habitat designation for ESA-listed stocks.
If substantial information indicates that any delisted DPS is experiencing decreases in calf production, juvenile or adult abundance, population growth rate...

“NMFS will convene an ad hoc team of experts to decide whether

• monitoring should be extended
• intensive review or studies needed to examine mechanisms
• initiate a status review
• recommend an emergency listing”

We will never have have perfect knowledge, but do we have enough to make good decisions?
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Vanselow, & Emily Warchol

Humpback whale photos in this presentation were taken under
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