

## **North Atlantic Right Whale Species Decline and Life Expectancy**

Corkeron, P.<sup>1</sup>

<sup>1</sup> *NOAA Northeast Fisheries Science Center, 166 Water Street, Woods Hole, MA 02543, USA*

*peter.corkeron@noaa.gov*

After two decades of slow, intermittent increase, the abundance of North Atlantic right whales peaked in 2010/2011 and then declined to 2016. An added concern is that female North Atlantic right whales have lower survival than males, so there are now 3 males for every 2 females of the species. The basics of population biology tell us that a species declines because deaths outnumber births. The data contained in the North Atlantic right whale Catalog provide demographic information to develop conservation solutions. Demographic analyses indicate that female North Atlantic right whales are dying too young. The current decline has resulted from this being coupled with overly-long inter-calf intervals.



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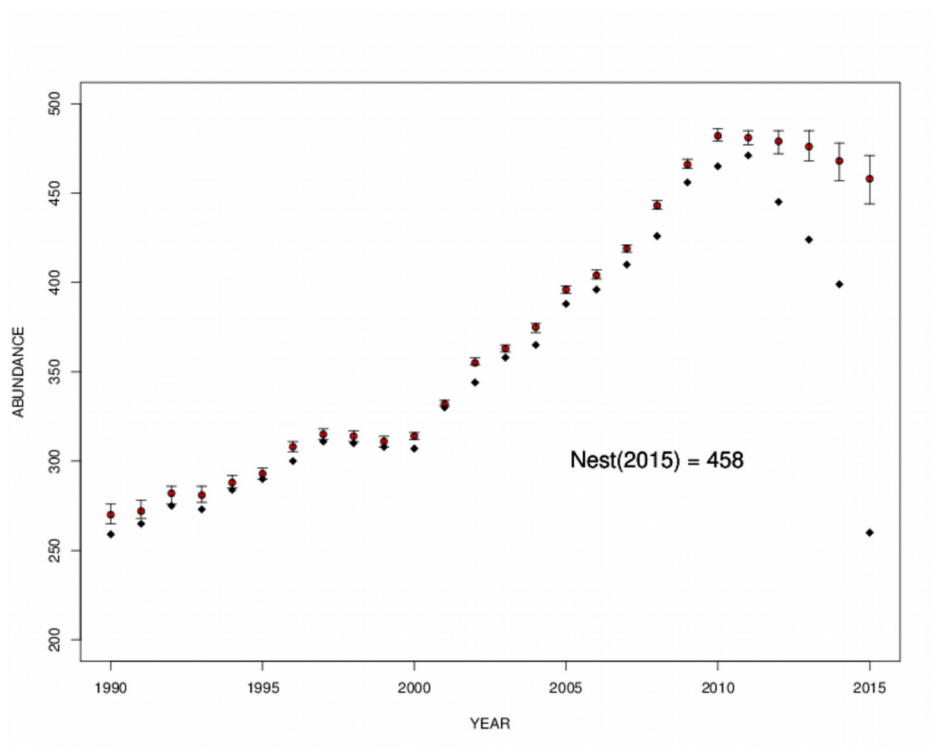
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# North Atlantic right whales: Species decline and life expectancy

**Peter Corkeron**

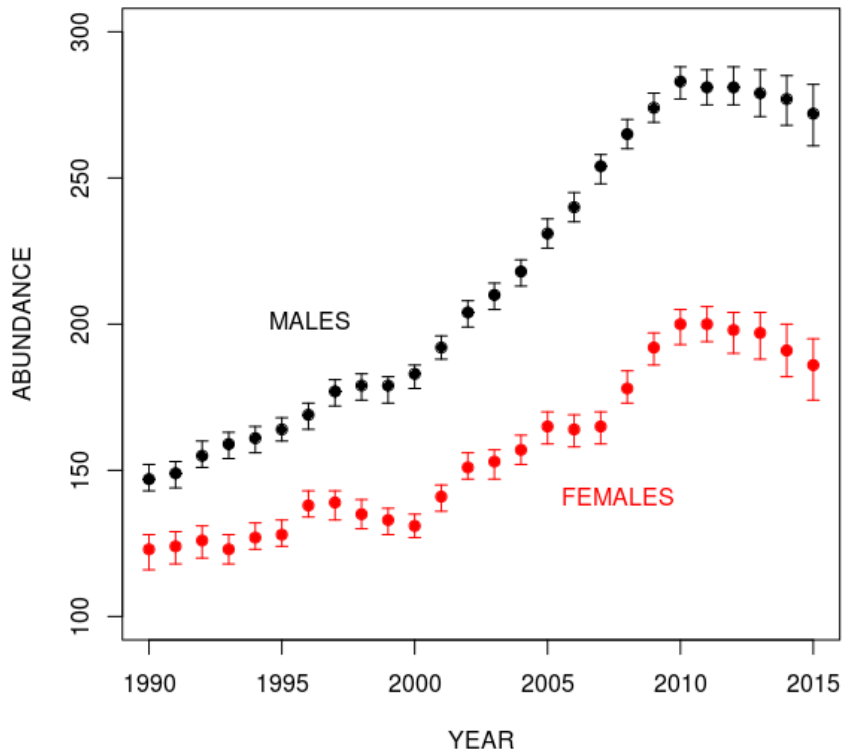
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Woods Hole**

# NARW abundance 1990-2015



- Abundance increase  
1990-2010: 270 – 483
- Abundance decline  
2010-2015: 483 – 458
- Decline continued 2016: 451
- New model produces more reliable estimates of abundance, given current changes

# Abundance by sex



- Sex difference in mortality
- Female mortality ~150% males
- 1990: 123 females
- 2015: 186 females
- 3 times when females' numbers dipped
- With continued decline, females now getting back to ~10 years ago

# Demography at its most basic

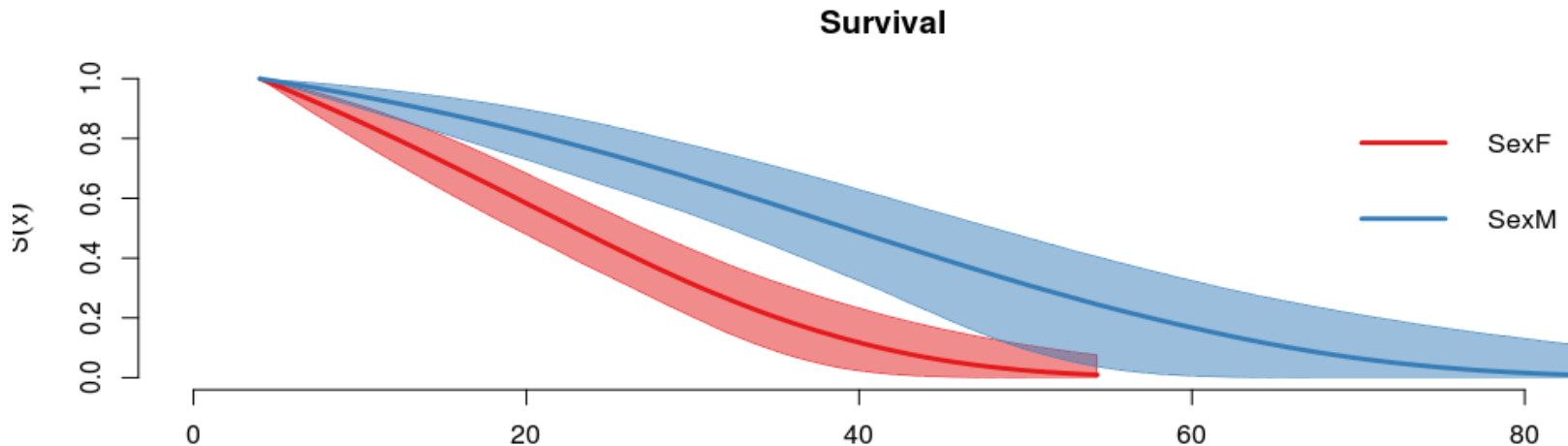
If more animals die in a year than are born in a year, a species will decline

Demography is about deaths and births....

# Another photoID resight model

Right whales and bowhead whales – longevity

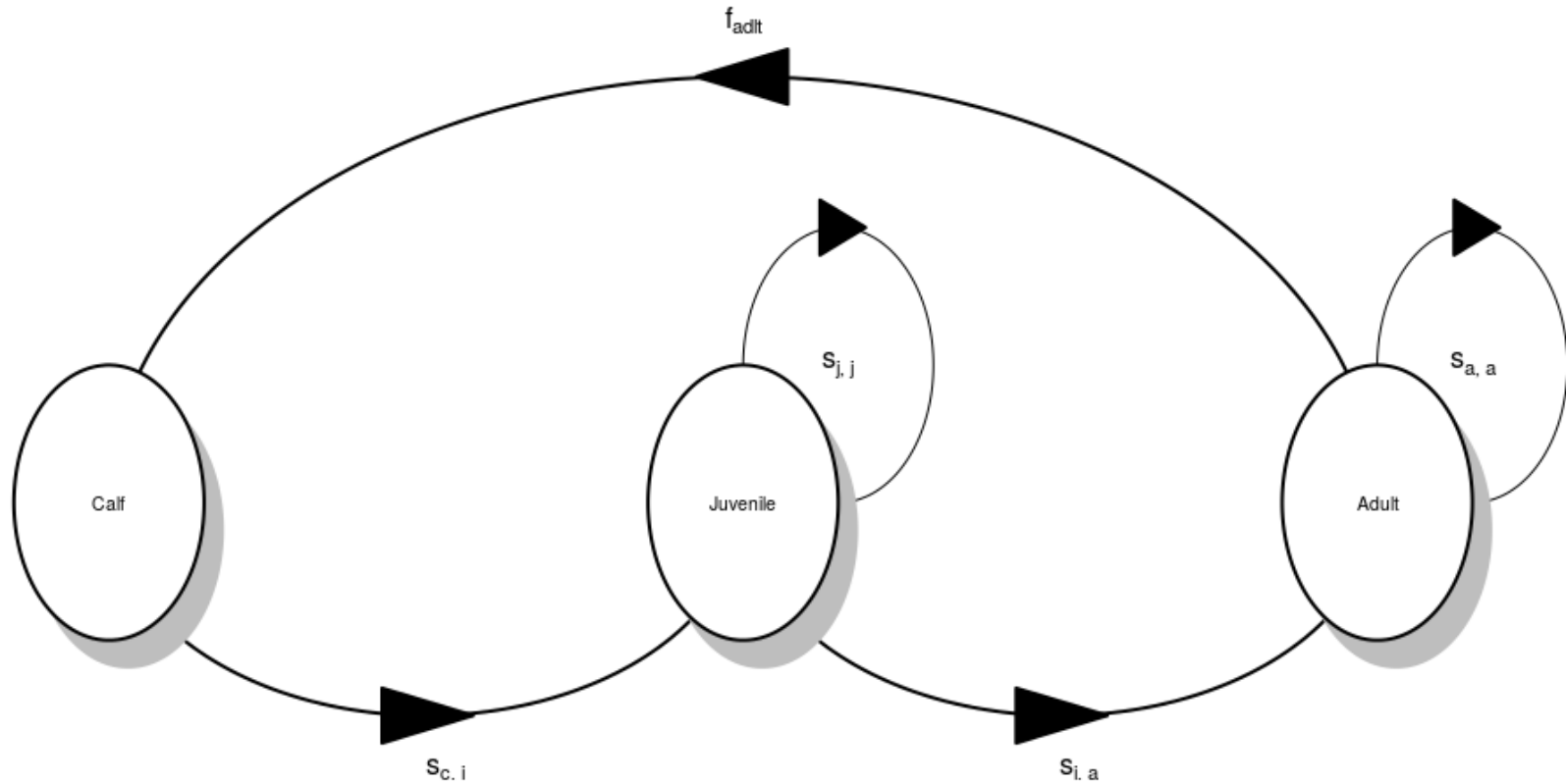
- Bowhead whale: **211**
- North Atlantic right whale: EG 1045 was at least **69** when *she* died



# Female mortality

- Males' annual mortality is:
  - ~70% that of females
  - Similar to that of female SRW in SA
- Females all dead by ~50
- Most dead by 30
- EG 1045's lifespan is past the outer limit of uncertainty in the model
  - She died early in this analysis (~1995)
  - She didn't die of old age – shipstrike

# Life cycle for female NARW





# Matrix model: results

- Intrinsic rate of increase 2.6%/year
- Adult female survival most important contributor to increase
- In 2015 there should have been:
  - 186 females
  - ~105 adult females
  - 11 female calves born each year (i.e. 22 calves)
- Life expectancy @ birth: 27-28 years

# Models: conclusions

- Agreement in life span
- Females' lives are too short for a balaenid
  - Less than half of known maximum longevity
- SA female SRW mortality similar to male NARW
  - (authors state mortality biased high)
- Provides perspective on calving
  - Dead females don't have calves
- How many adult females in this species?
  - 458 whales sounds okay(ish)
  - 105 adult females? Not so much

# Females: survival and calving

- Most females die between 20 & 30
- Mature at ~9, first calf @ ~10
- So: they must have a 10-20 year reproductive life
  - 1 calf every 3-4 years = 3-6 calves
  - But one calf every 5-7 years = 2-4 calves
- And only  $\frac{1}{2}$  of all calves are female

# Females: the take home message

Female North Atlantic right whales are dying too young

They're not calving often enough while they're alive

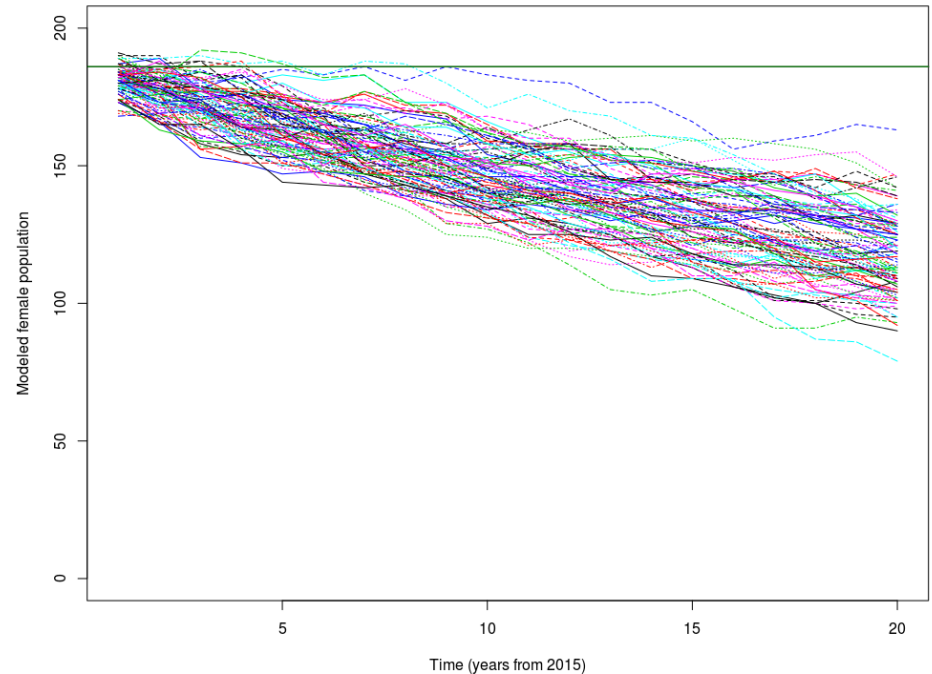
# Carcasses and trajectory post-2015

Carcasses give a **minimum** number of deaths

**NOT** the *actual* number of deaths

# Why does this matter?

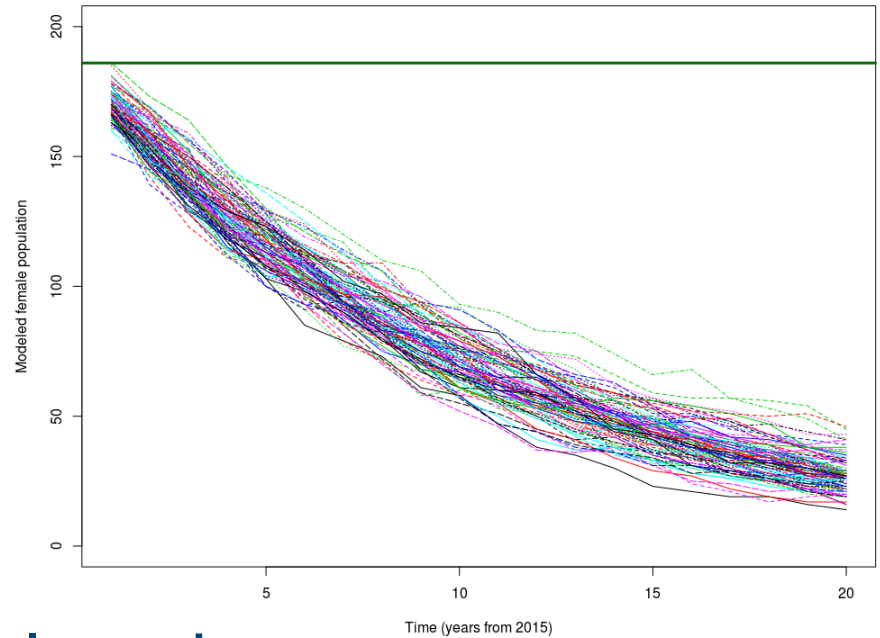
- Project matrix model forward 20 years



- Estimate mortality based on carcasses seen == whales that died

# Why does this matter?

- Estimate mortality based on carcasses seen < whales that died



- See Richard Pace's talk later in the conference for details on estimating actual mortality

# 2017....

- 2017 - for certain at least 15 whales died
  - 3x the number of calves born
- When will we know how many died in 2017?
  - 2017 numbers in 12 months from now?
- What assumptions are people comfortable with to manage activities in spring/summer 2018
  - before the 2017 abundance estimate is available?



# Final message

~105 adult female NARW in 2015

Likely less now

Females don't have calves frequently enough

Females die too young

This species can be saved

But needs immediate action

# Acknowledgments

- Consortium for such an amazing job of data collation and sharing over so long
  - creating and maintaining that unique culture
- New England Aquarium staff for answering questions so fast, especially Philip Hamilton
- The NEFSC Large Whale Team:
  - Richard Pace for his model
  - Allison Henry for SI/M
- Mark Baumgartner / Heather Pettis for the invite
- Gen Davis for fixing my presentation