

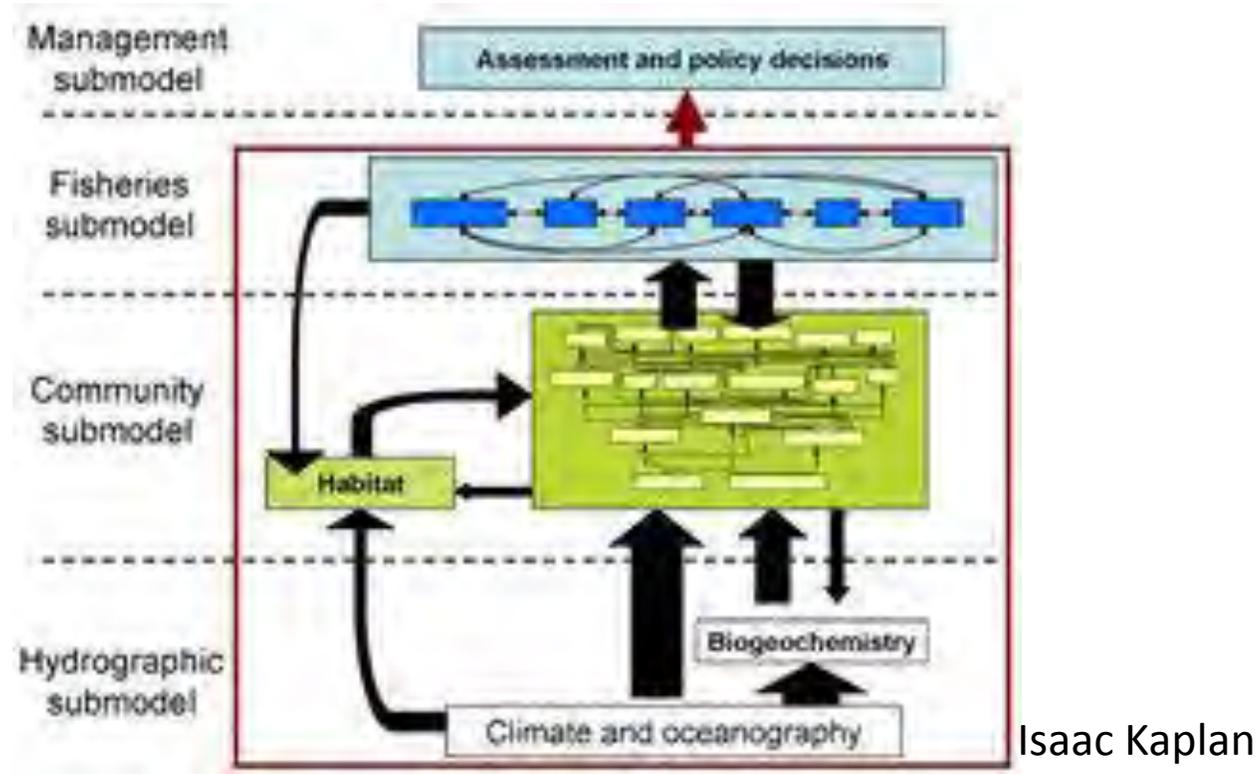
An aerial photograph of a vibrant coral reef. The reef is composed of various shades of green, yellow, and brown, indicating different types of coral and possibly some algae. A large sea turtle is visible in the center of the frame, swimming over the reef. The water is a clear, bright blue, and the overall scene is a beautiful representation of a healthy marine ecosystem.

# An integrative model of sea turtle growth based on recoveries and mark-recapture data

Brandon Chasco, Eric Ward, Larisa Avens, Lisa Goshe, Joanne McNeill, Alan Bolten, Karen Bjorndal, Selina Heppell, Melissa Snover, Tomo Eguchi, Eli Holmes, and Howard Coleman



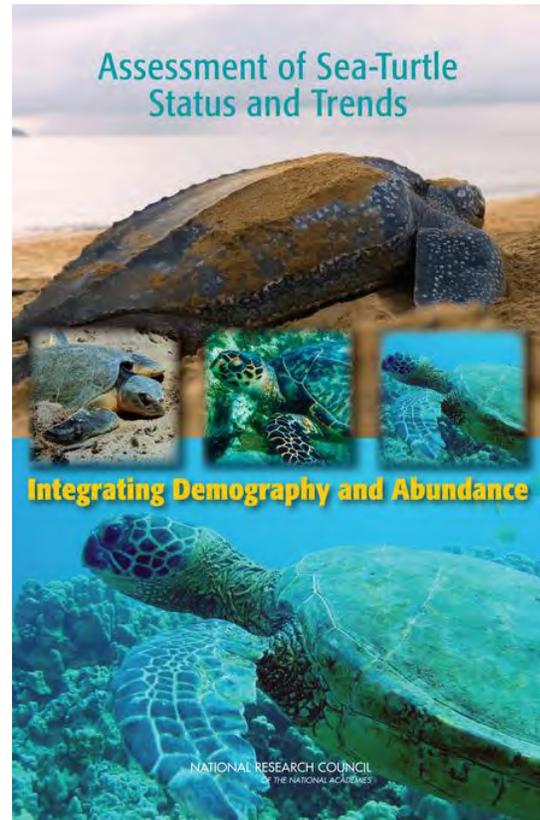
# Evolution in Fisheries and Ecological Modeling



Integrated modeling

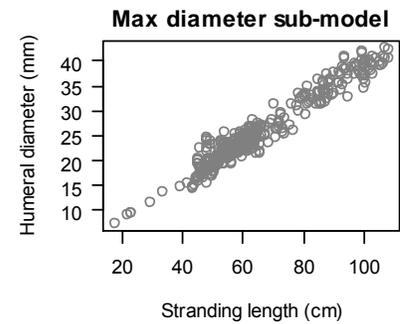
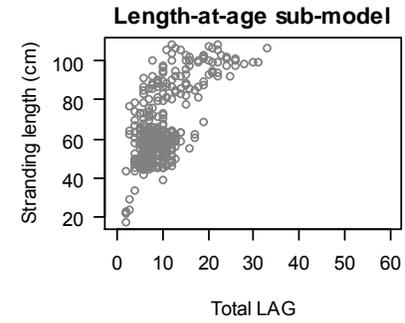
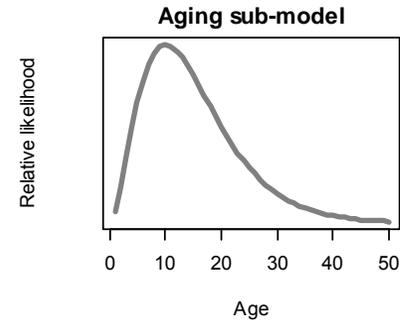
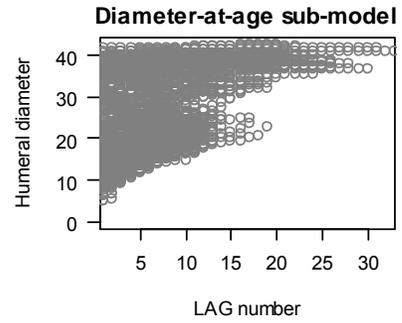
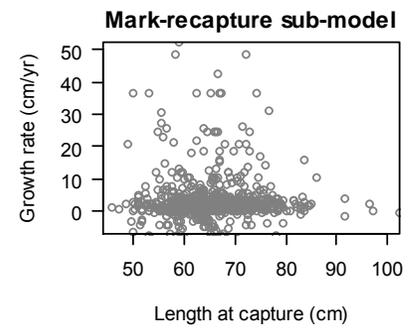
Stochastic processes

# Focus of Current Turtle Research



Integrated modeling

Stochastic processes



Integrated modeling

Stochastic processes



# Loggerhead sea turtle growth

[Input & Model](#)

[Data & Results](#)

**[Help](#)**

[About](#)

[Acknowledgements](#)

**Introduction**

[Input & Model tab](#)

[Data file formats](#)

[Data & Results tab](#)

## Welcome to the Growth Shiny app

This is a web-based Shiny application based on the Growth R package.

*Click the "About" tab for more information about the Growth package.*

Start off by uploading the data files you wish to model, using the "Input & Model" tab. When your data files have been uploaded, you can run the model from this tab as well.

*Click "Input & Model tab" under "Help" for more information. To learn about format requirement for uploaded files, click "Data file formats."*

Once the model has been calculated, the "Data & Results" tab will open. Here you can examine your input data, the equations corresponding to sub-models, and the model results for each sub-model.

*For more information, click "Data & Results tab" under "Help".*

# Shiny interface

# Loggerhead sea turtle growth

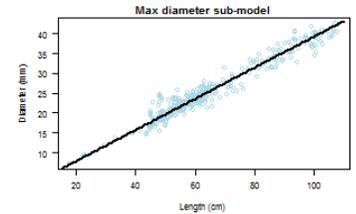
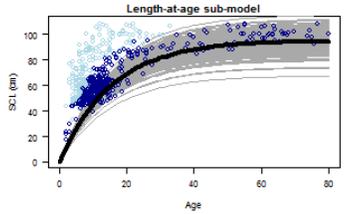
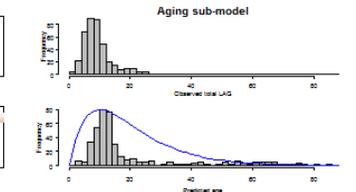
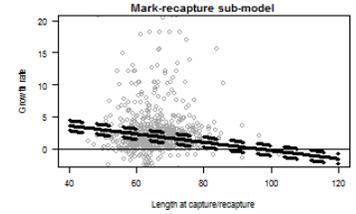
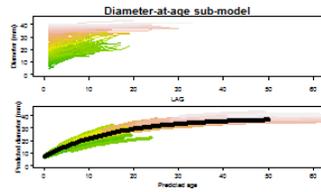
Input & Model **Data & Results** Help About Acknowledgements

Click to see data

Click to see model

Click to see results

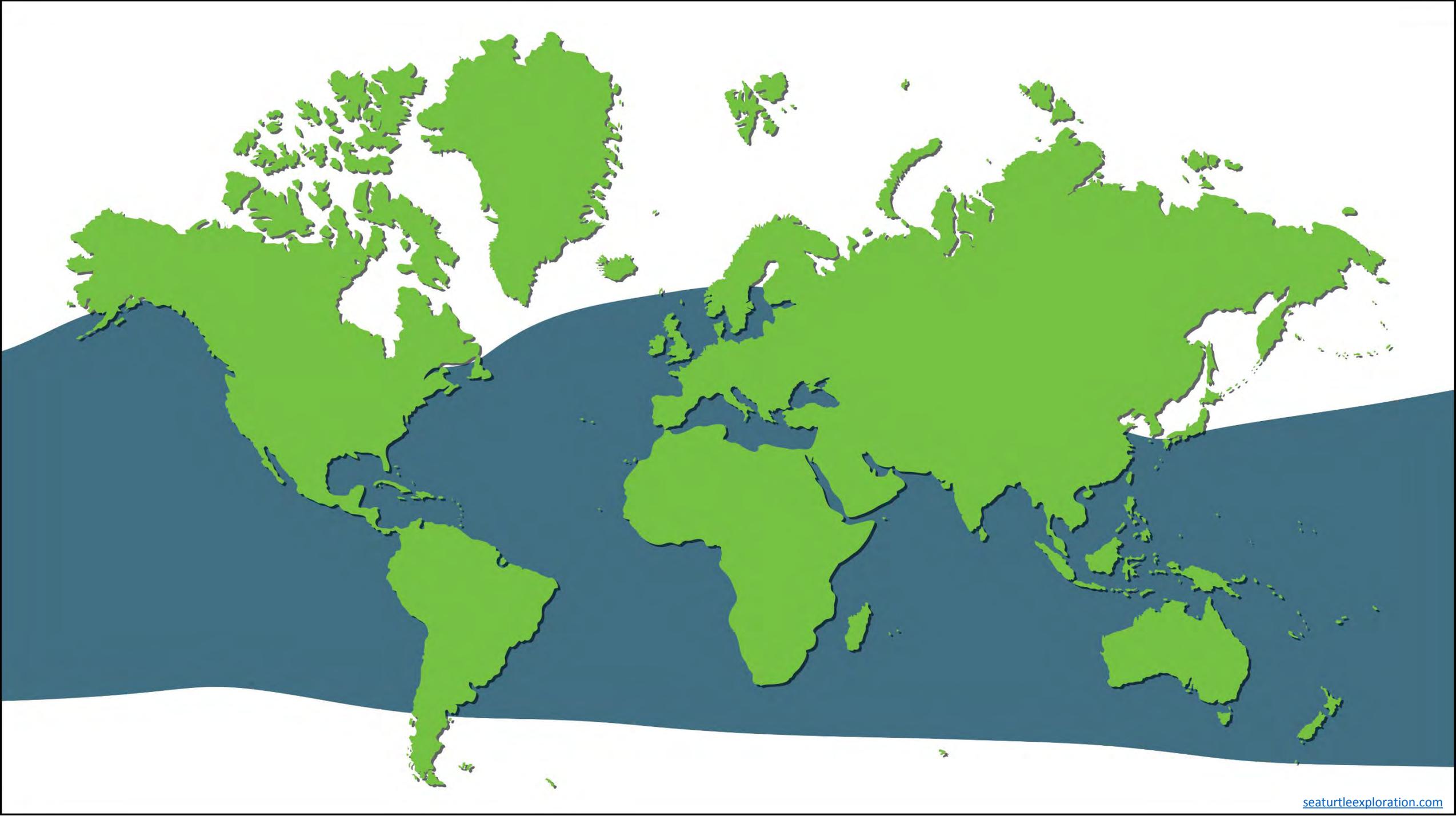
Click results plot to enlarge or download it.



Shiny interface

A sea turtle is swimming in clear blue water. The background shows a colorful coral reef with various shades of blue, green, and yellow. The text is overlaid on the upper part of the image.

An integrative model of sea turtle  
growth based on recoveries and  
mark-recapture data



Direct

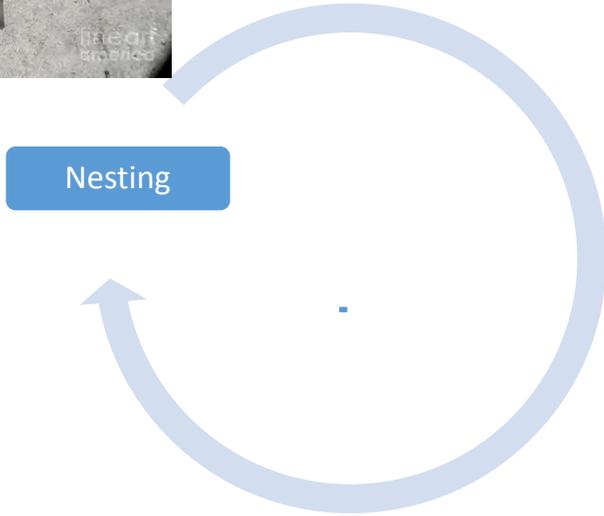


# Mortality

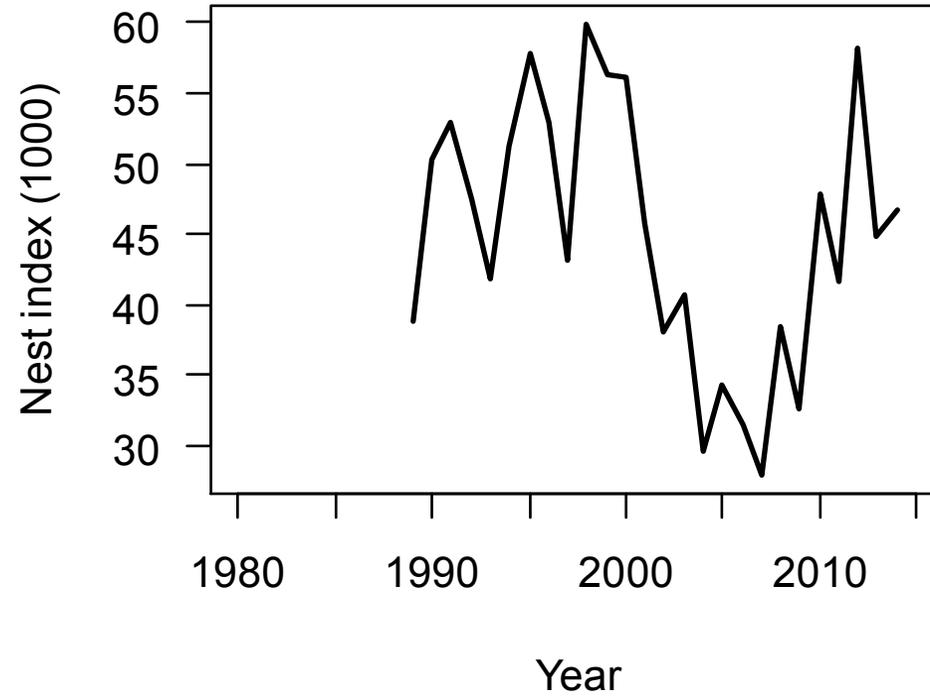
In-direct



# Adult females



# Time series of nest counts



# Adult females

# Growth and maturation



Nesting



Adult



Hatching



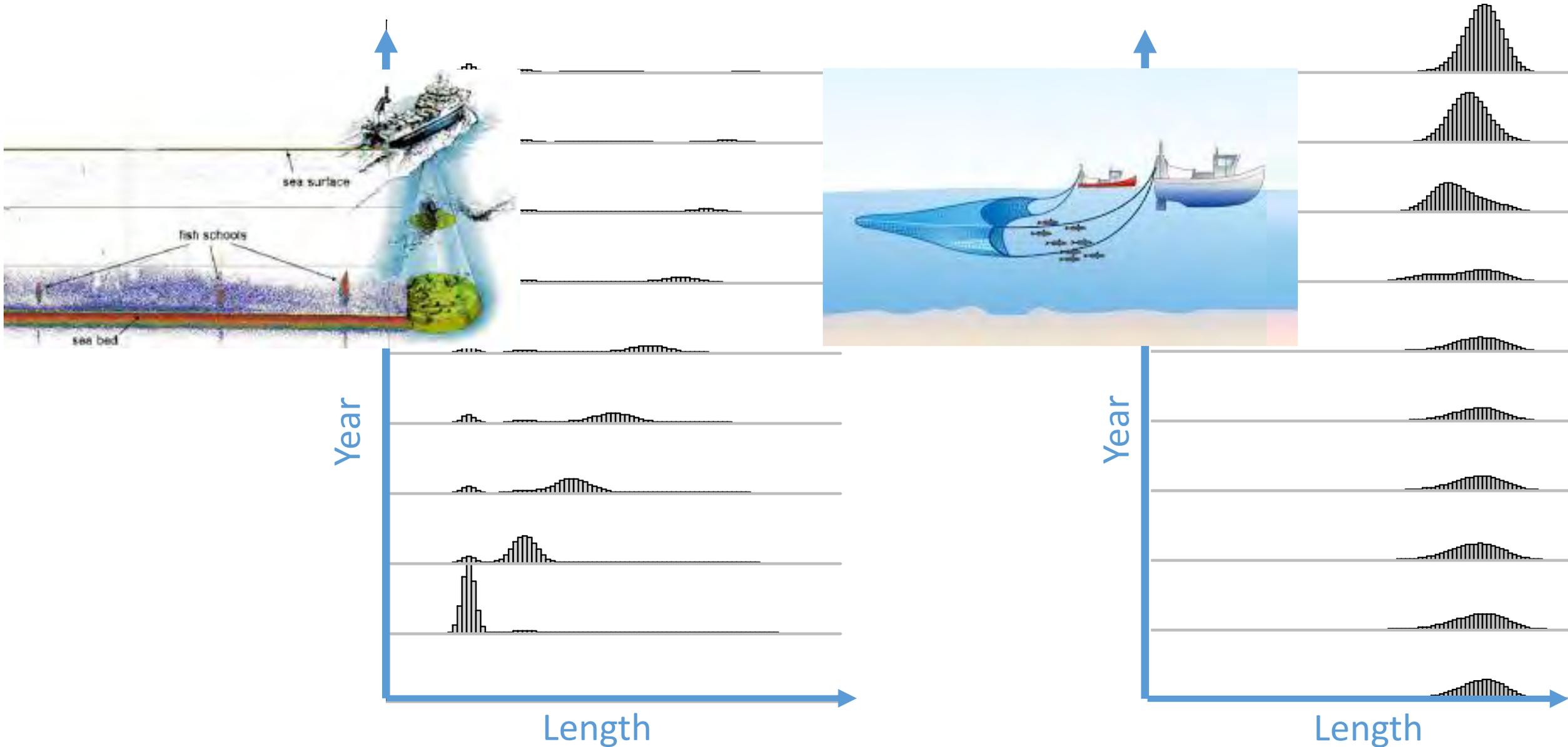
Pelagic/  
Juvenile



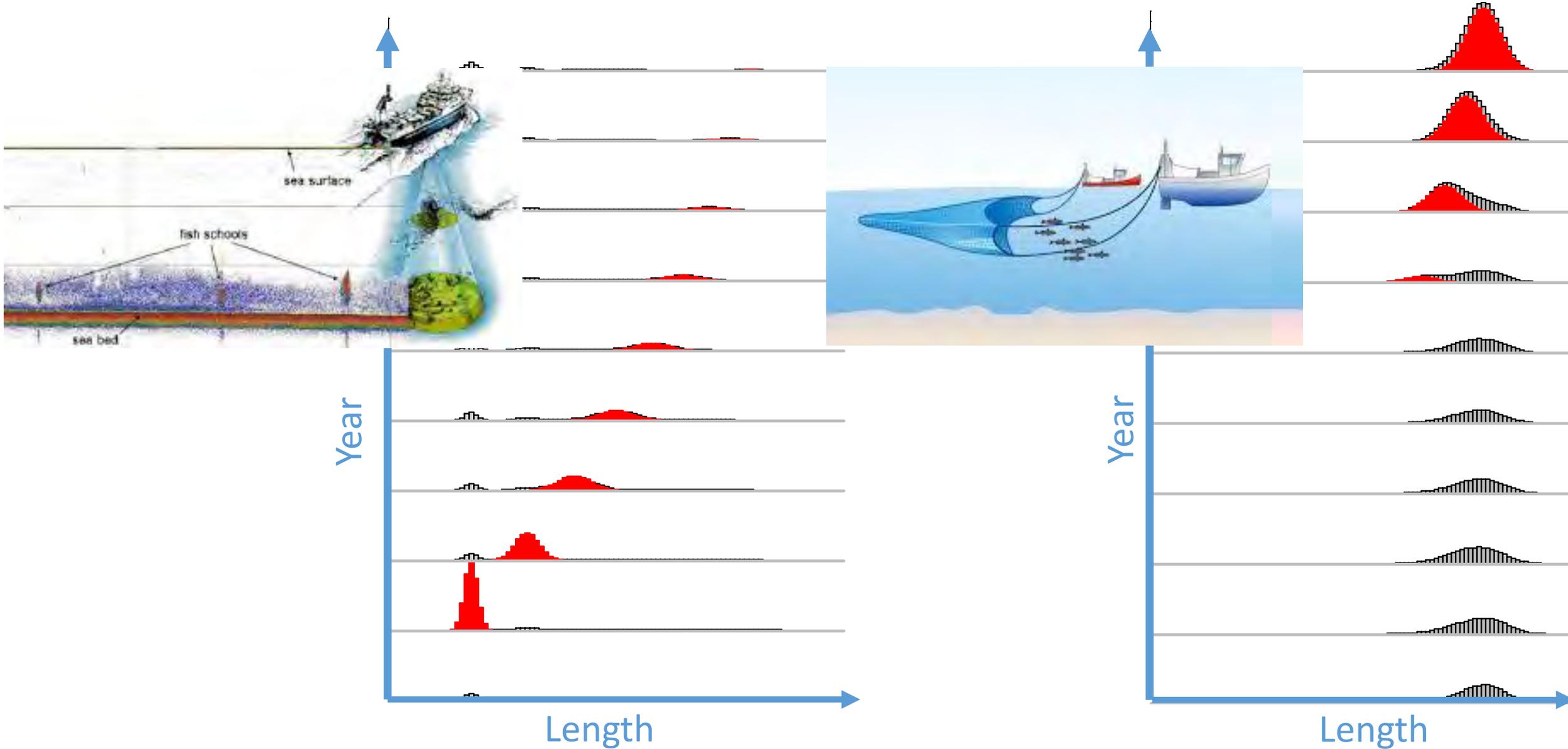
Neritic/  
Juvenile



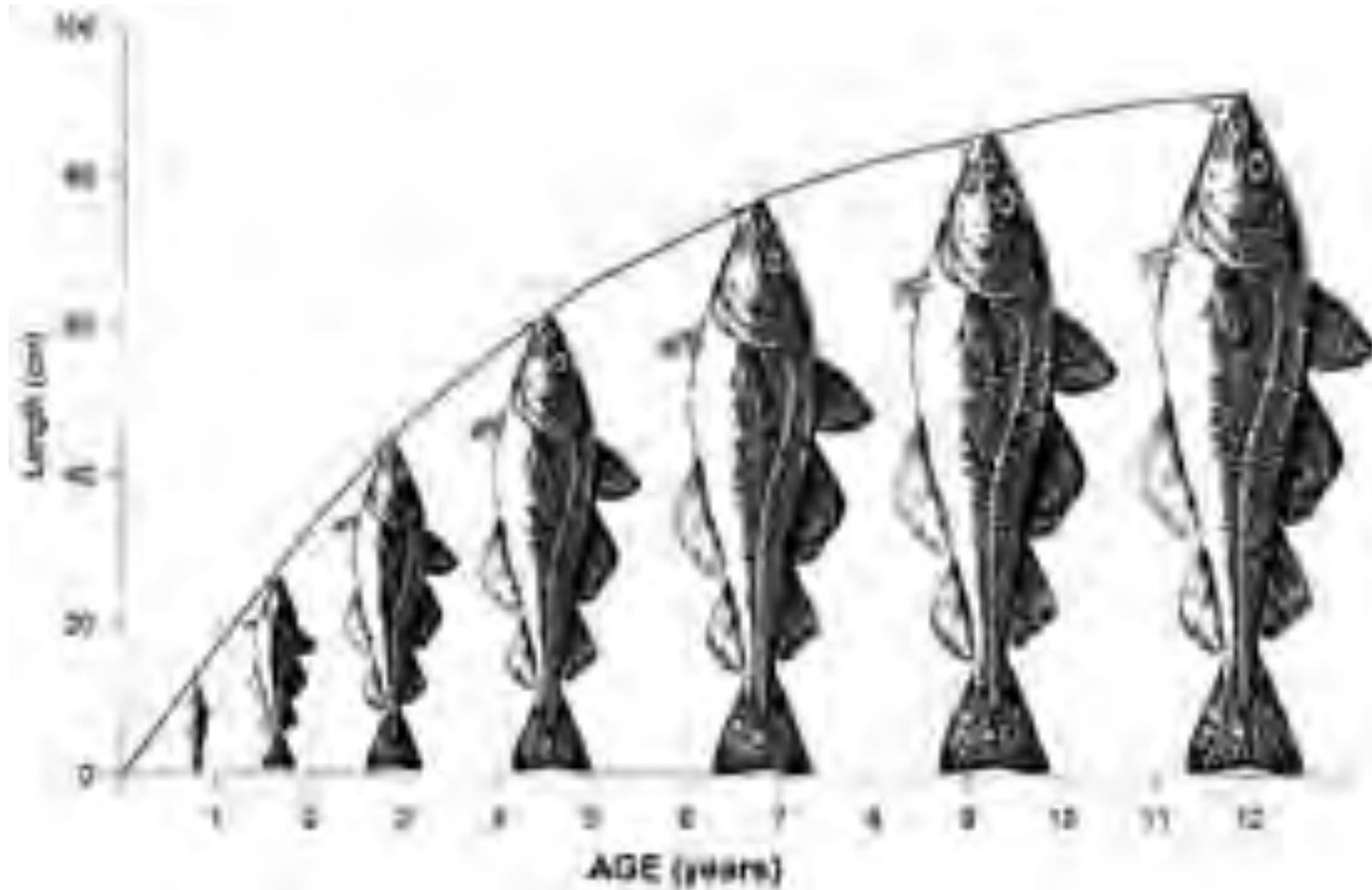
# Motivation for Current Turtle Aging Models Based on Fisheries Model



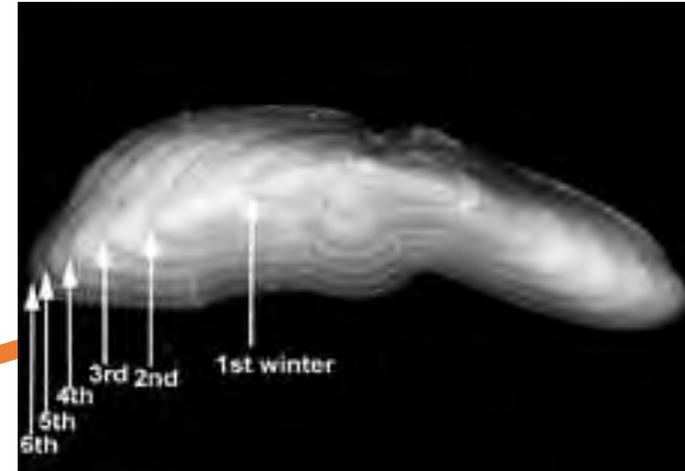
# Motivation for Current Turtle Aging Models Based on Fisheries Model

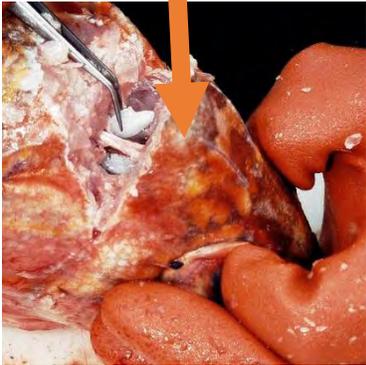
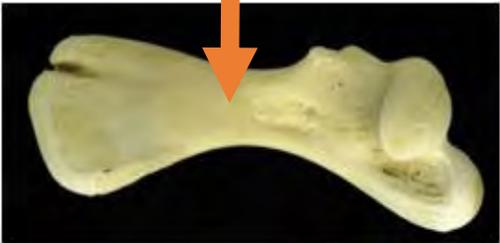
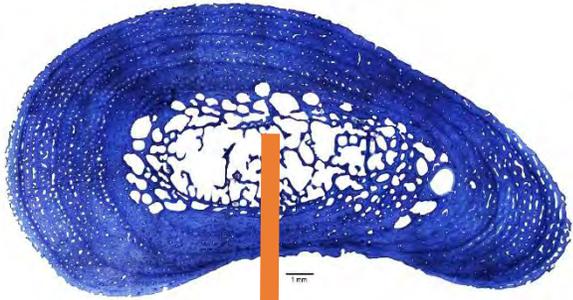


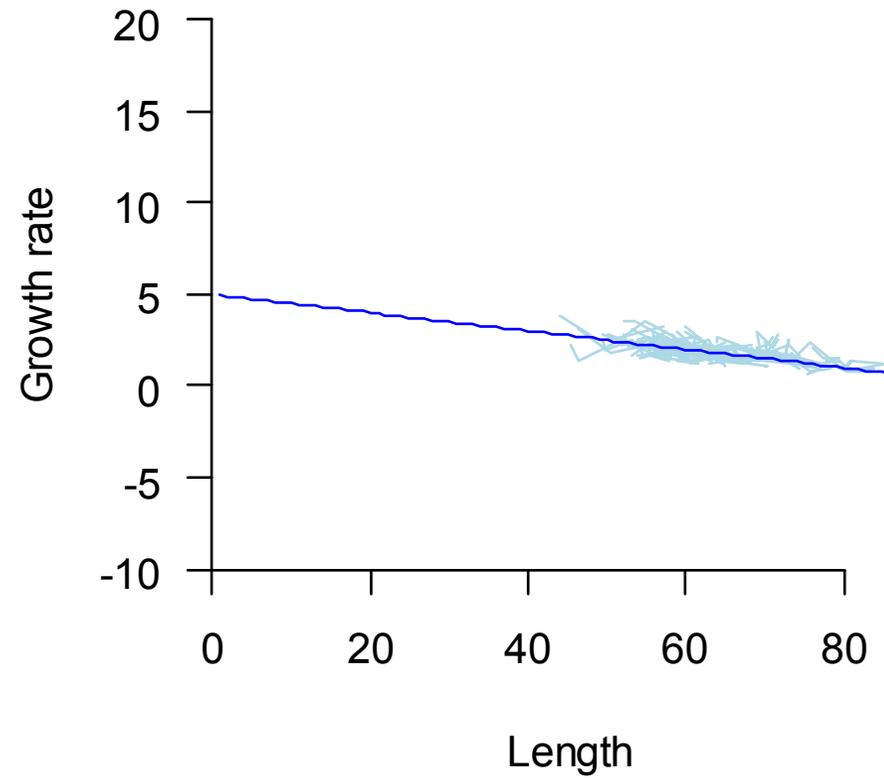
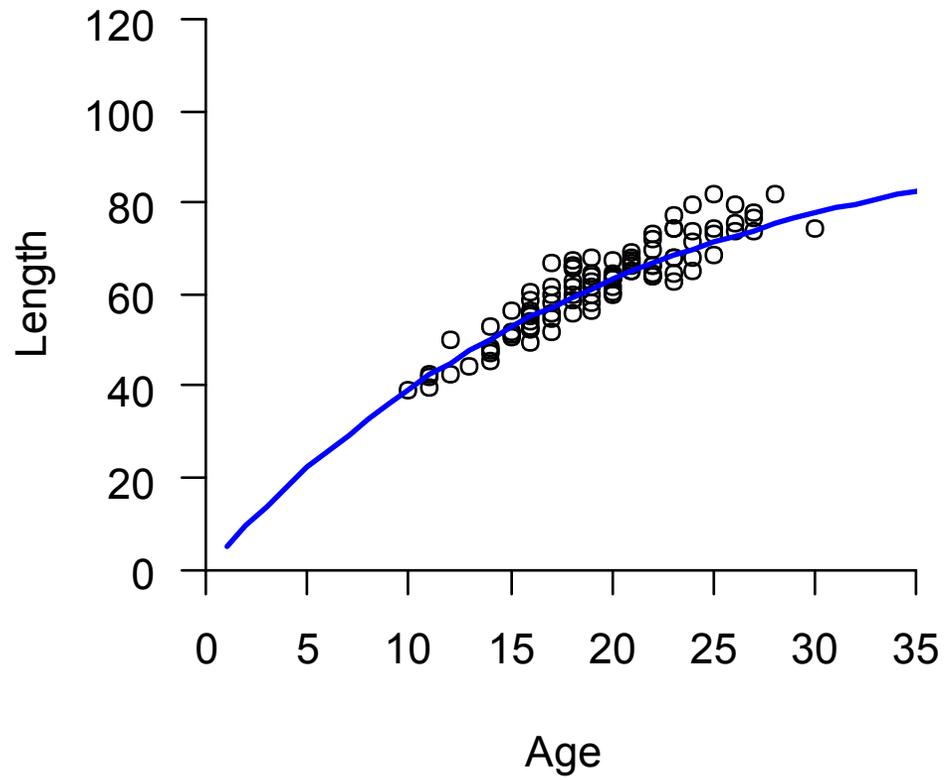
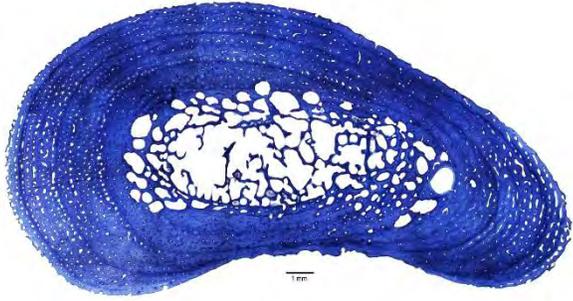
# Length-at-Age Relationships Are The Link In Integrated Fisheries Models

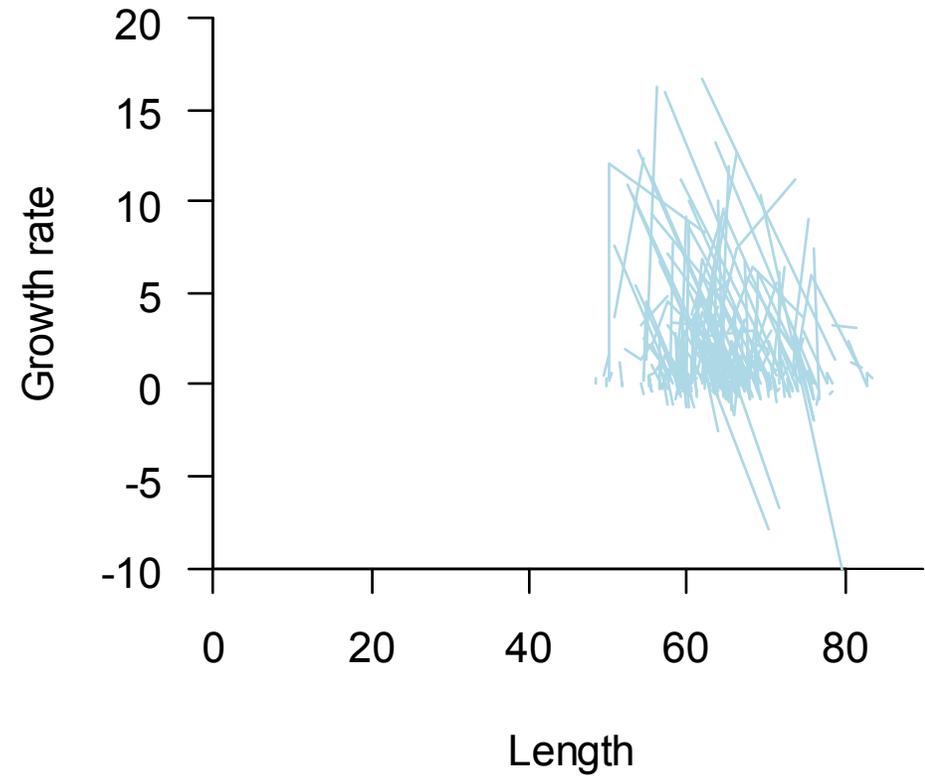
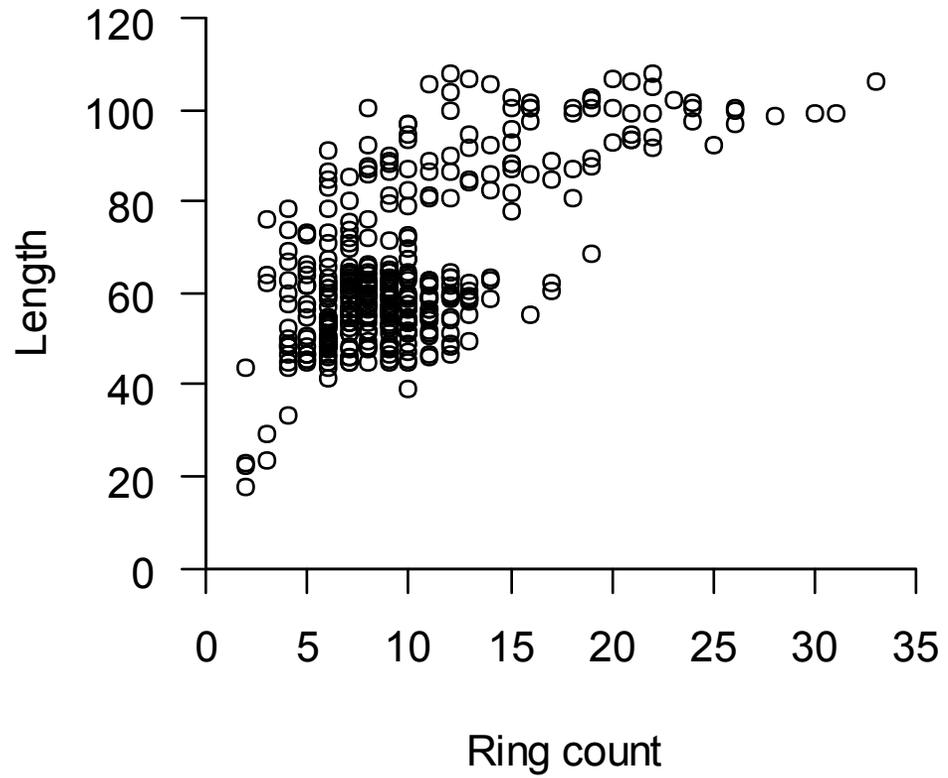
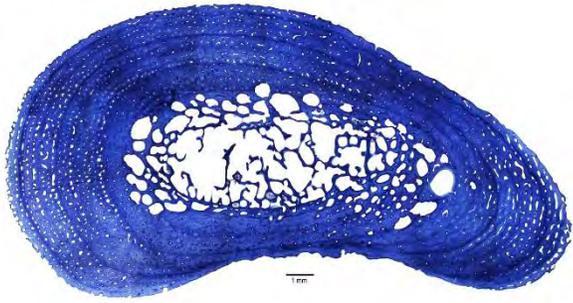


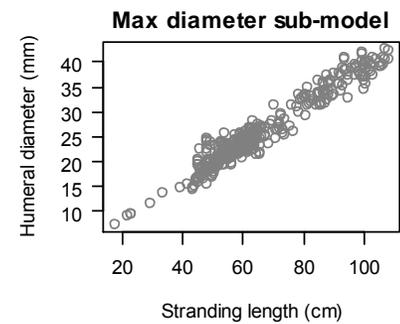
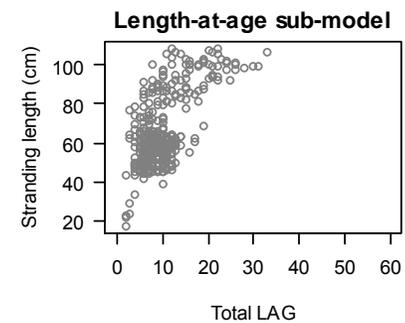
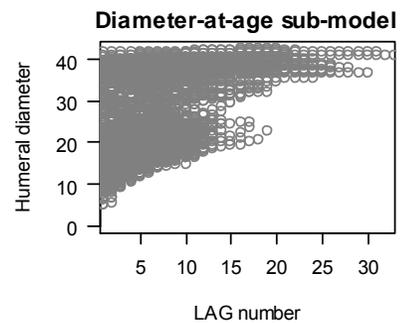
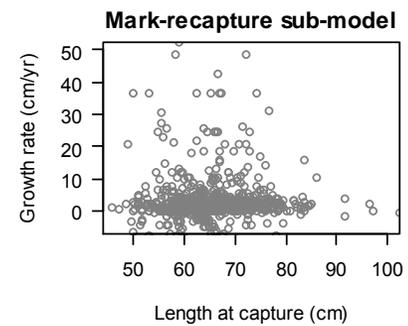
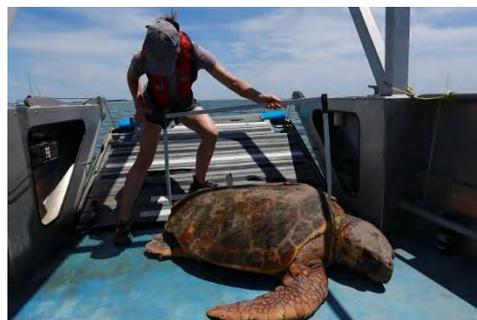
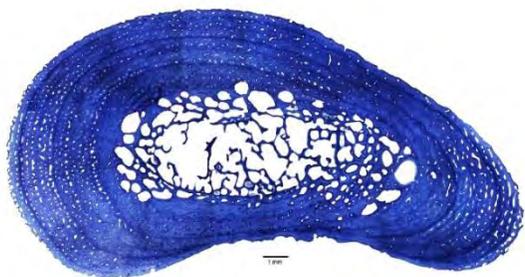
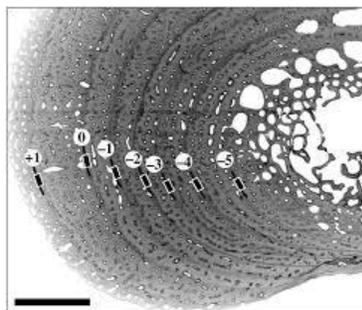
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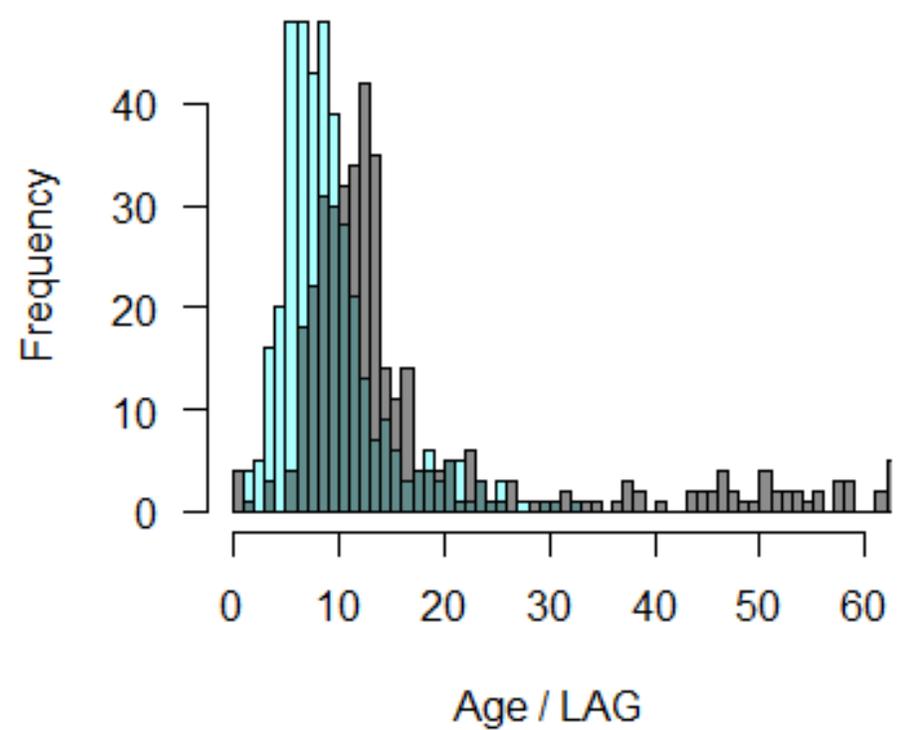
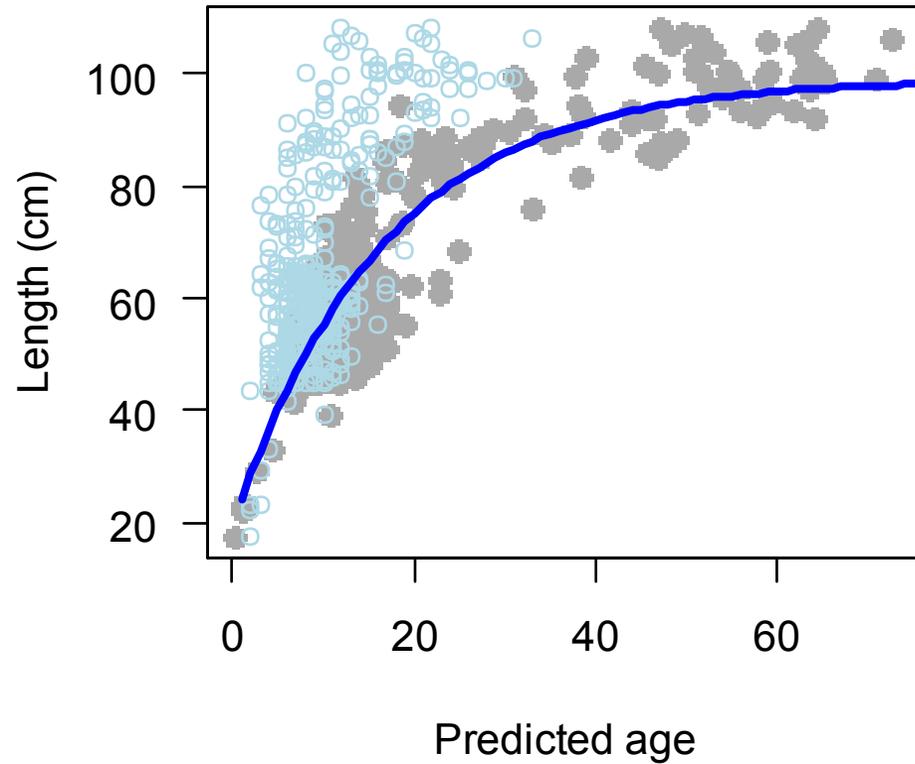




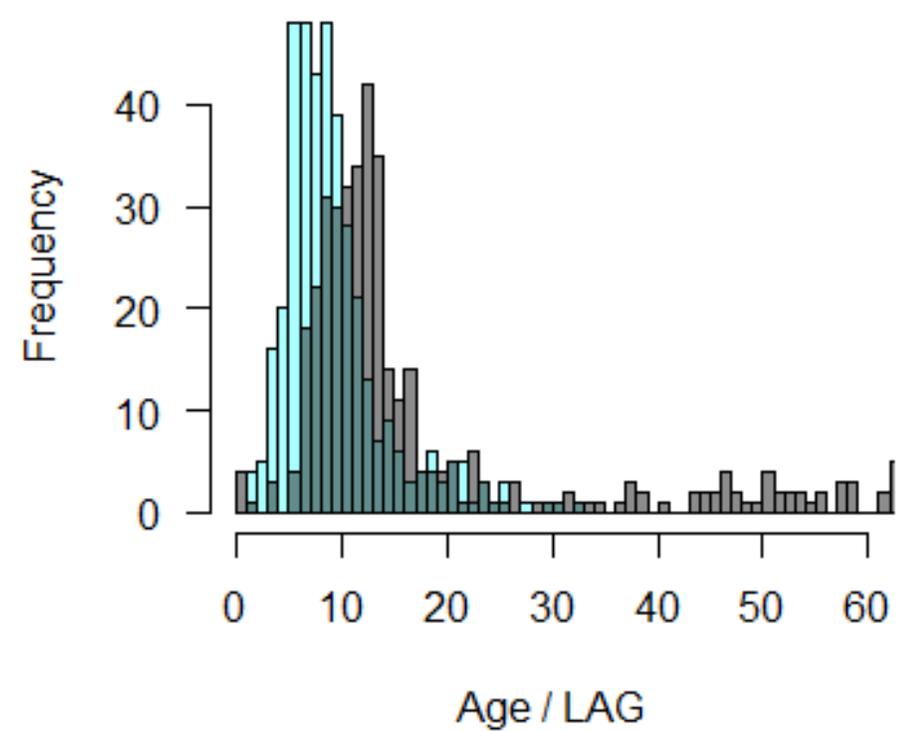
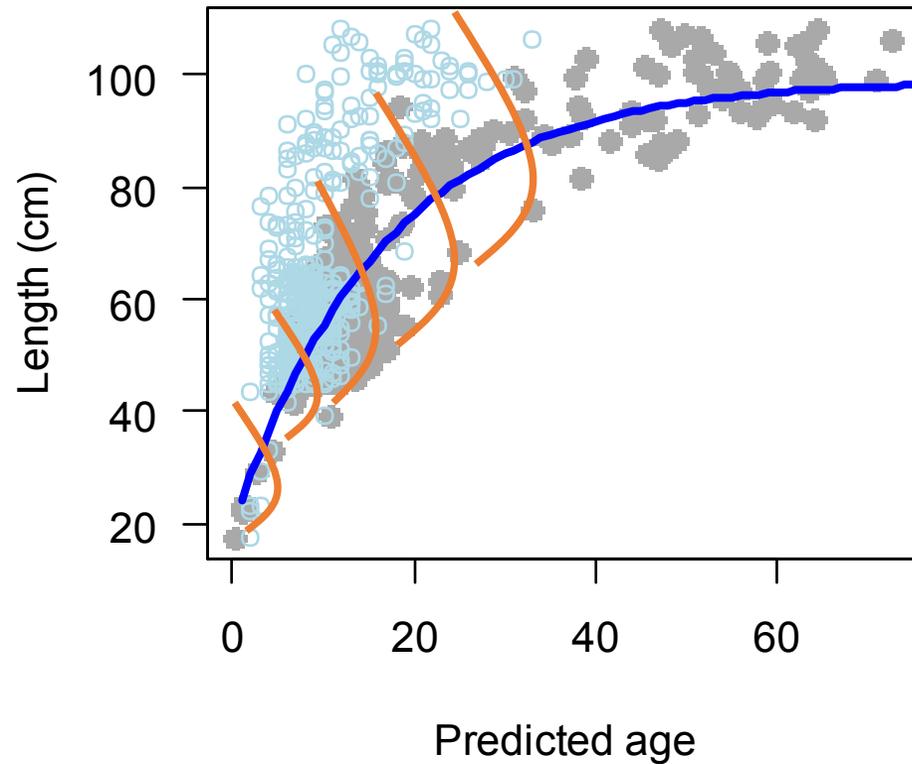




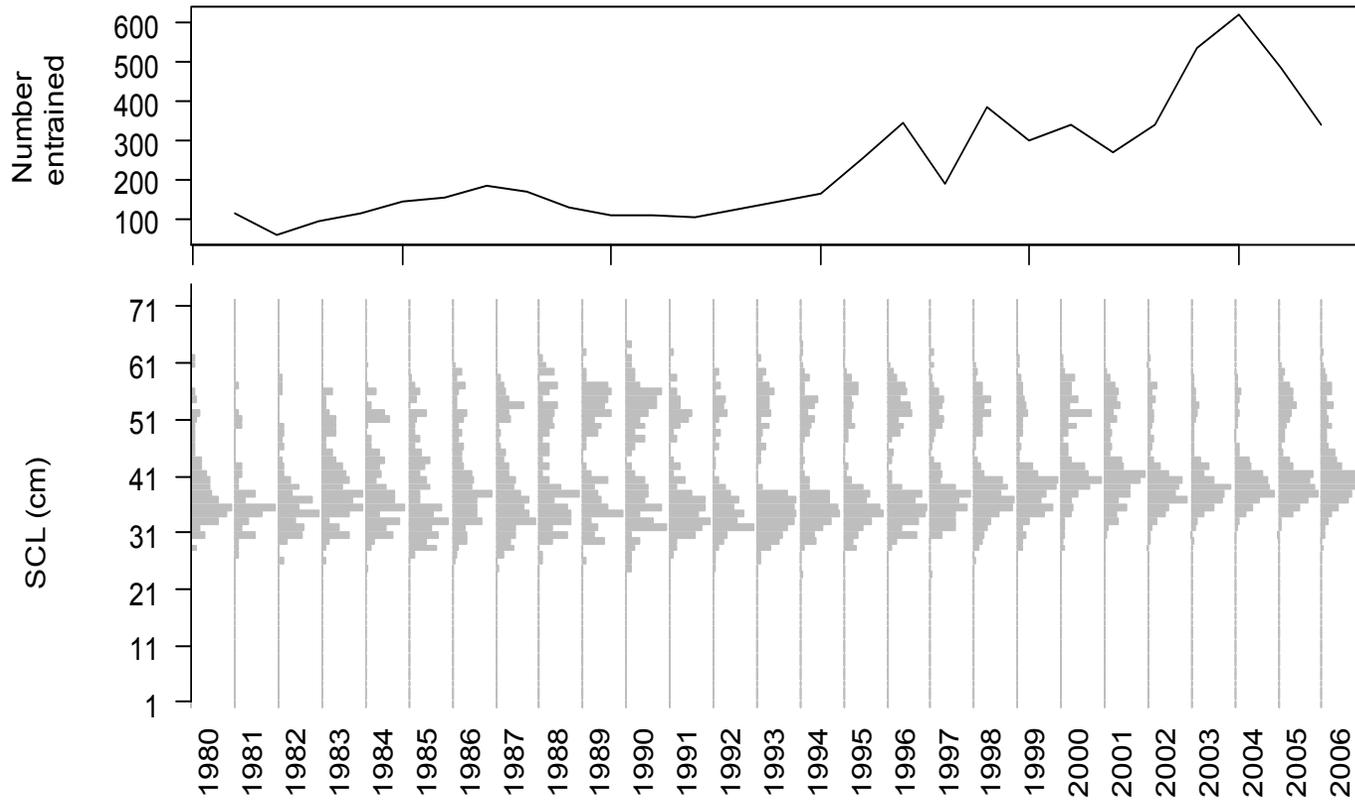
# Estimating The Length-at-Age Relationship And The True Age



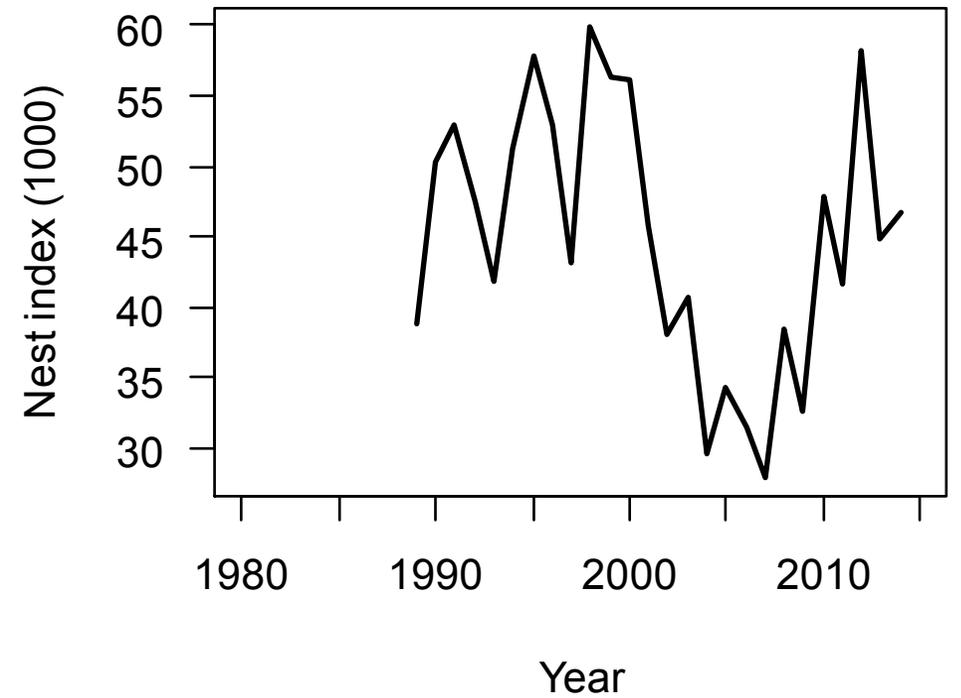
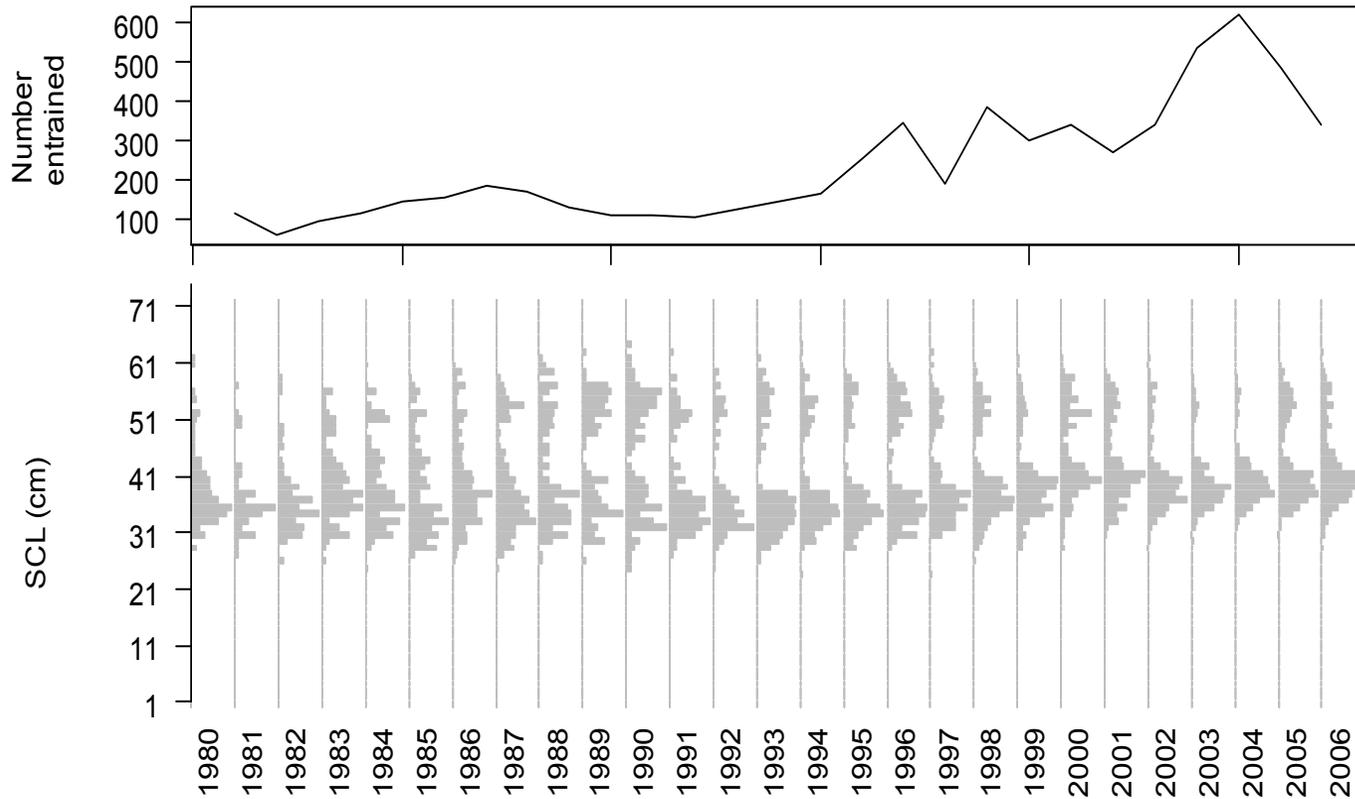
# Estimating The Length-at-Age Relationship And The True Age



# The Turtle Length Composition Data/Survey



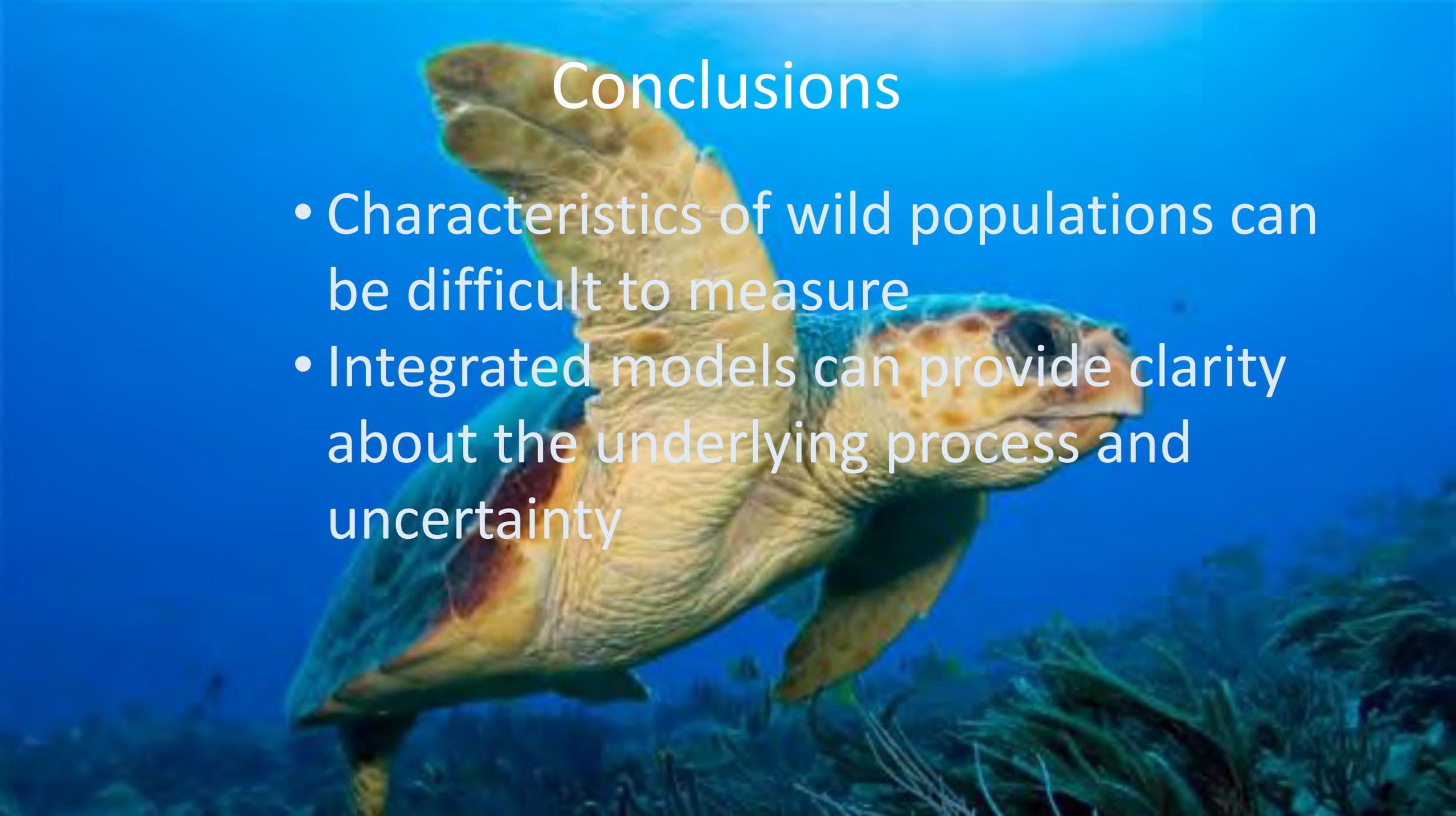
# The Turtle Length Composition Data/Survey



# Conclusions

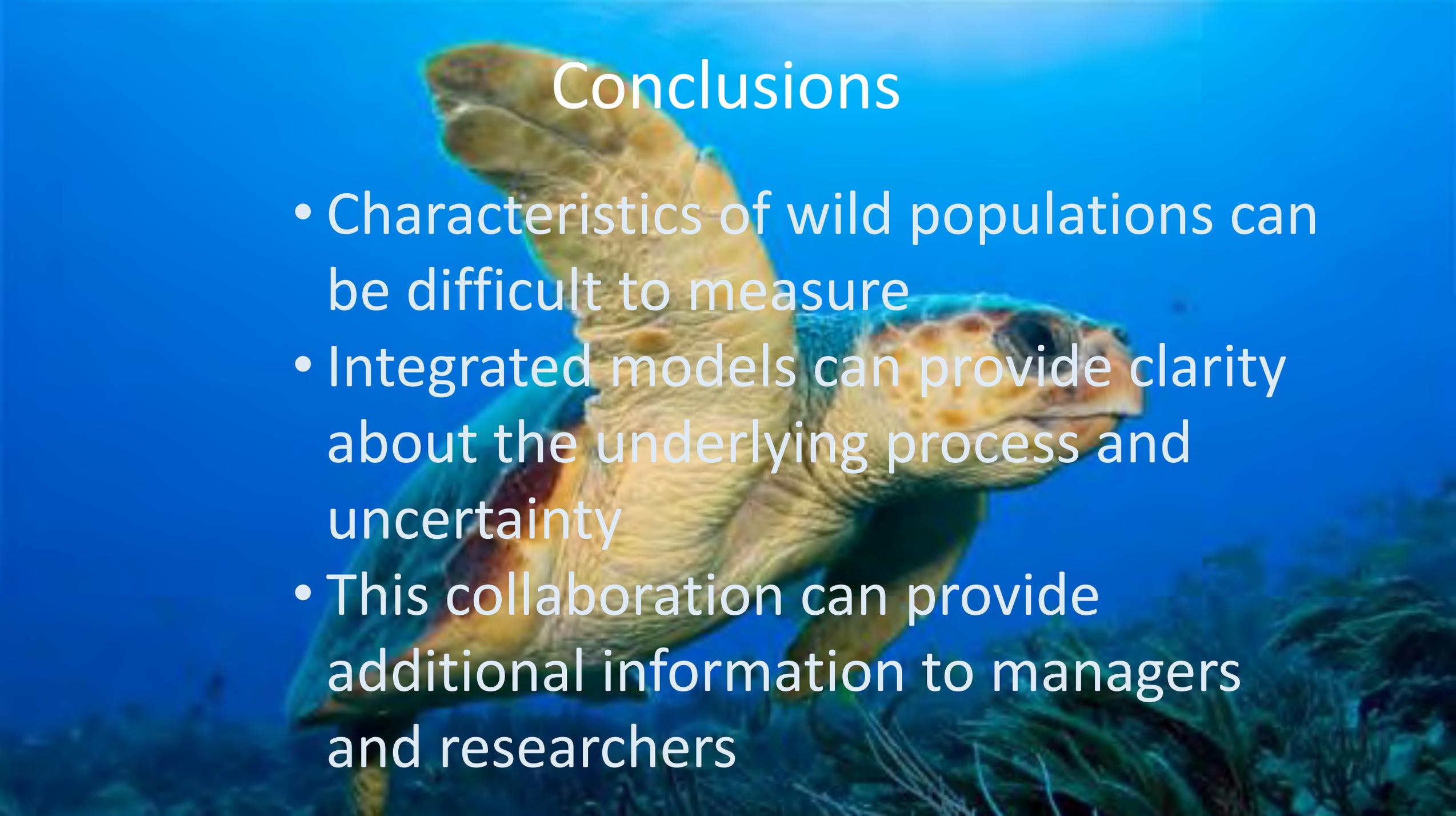
- Characteristics of wild populations can be difficult to measure

# Conclusions

A sea turtle is shown swimming in clear blue water. The turtle's head is on the right, and its body extends towards the left. The background is a deep blue, and there are some green, feathery plants or coral in the lower right corner.

- Characteristics of wild populations can be difficult to measure
- Integrated models can provide clarity about the underlying process and uncertainty

# Conclusions



- Characteristics of wild populations can be difficult to measure
- Integrated models can provide clarity about the underlying process and uncertainty
- This collaboration can provide additional information to managers and researchers



## Next steps

- Incorporate stable isotope data
- We want to incorporate juvenile length based indices in the tool
  - Fishery dependent
  - Fishery independent

Questions?