How-To Scientific Posters

PHYS 521 Astrophysics
Ziggy Pleunis

Poster session

Preparation

- Think of the goal of your poster. Come up with a take-away message and try to decide on a one-sentence ‘tweetable’ summary.

- Think about the audience and their level; are they undergraduate students, astronomers in general, or experts in your field? While designing the poster, always keep the audience in mind, especially when tempted to use abbreviations or equations.

- Think back to scientific posters you liked (for example, look around in the corridors of the Rutherford building).

- Sketch your poster with pencil and paper!

Layout: structure

Layout: structure

- The pieces of text must be clearly connected to assist the reader in reading them with the intended order. Never create the question “where should I look next?”

- Balance figures and text symmetrically. Either with (approximate) horizontal, vertical, cross or diagonal symmetry.

- Line things up.

- Sketching the poster before starting on your computer helps a lot with this.

Layout: title

- Title is a good way to grab attention and can be more informal than the title of an article; max. ~ 10 words.

Layout: text

- Use a minimum amount of text. Use short sentences and active verbs. Rule of thumb: use maximum ~200 words.
- Most passers-by will not read all the text.
- Academic writing rules apply.
- Use correct citations. Can use numbers throughout and bibliography in an unused corner of the poster [1].

[1] Like this.

Layout: font

- Font has to be readable from 1 to 2 meters. Sans serif fonts like arial read better than serif fonts like garamond. Some sources like the combination of a sans serif font for headings and a serif fonts for text.

- For A0 or A1 posters, you can use this rule of thumb for font sizes: title in 72pt, headings in 48pt and text in 32pt. Never use text smaller than 24pt. Do not use more than 2 fonts throughout and only sparsely use **bold**, *italic* and underline; less is more!

Layout: color

- Use colors to make the poster look appealing, but not too many; can use https://color.adobe.com or http://colorbrewer2.org/ to find good color schemes.

- Make sure text is alway well readable, i.e., the contrast is good. Often a simple white background is good enough.

- Do not use green and yellow.

- 1/10 men are color-blind and can not distinguish:

  - Red from Green.

  - Blue from Purple.

Layout: figures

- Most important parts of the poster. Try to make them understandable in one glance.
- Don’t put too much information in one figure.
- Use a combination of real data and schematic drawings on a poster to get your point across.
- Use high resolution (minimum 300 dpi) so they don’t look blurry.

Logistics

- Include means of communication with the author (email, web page url). Can include QR code with links to additional material.

- Photo of the author to assist readers to connect the work presented with a face and make it easier to find the author at the conference.

- Basic list of references to assist the reader get more information on the topic.

Software

- Microsoft Powerpoint
- Apple Pages
- Adobe InDesign (expensive)
- Scribus (open-source)
- LaTeX beamer / beamerposter
- ...

Presentation

- A good poster is only half the job. After grabbing the attention of the audience comes the presentation.

- Be sure the poster has no wrinkles, and hangs straight. Can bring along some printed abstracts of your research to hand out or the poster printed on letter paper.

- The visitor dictates the time spent at the poster, not the presenter. Usually you have the attention for 3-5 minutes, so be prepared to give presentation in that time frame.

Presentation

- Think about your story, can use:
  - Context and relevance of research (introduction);
  - Goal of experiment (introduction);
  - How you did the research (method);
  - Most important results (results);
  - Conclusion

Presentation

- Think about all the visitors; if you are just explaining something and another interested person walks by, smile at them and try to include them in your explanation. You have only one chance for a first impression.

- Remember, the poster session is *the* way of introducing the outside community to you and your exciting research. Also, the poster session can lead to interesting new collaborations and ideas.

Final remarks

- “Respect your audience.”
- “Make the poster you would like to see, give the presentation you would like to hear.”
- “Explain, convince, entertain.”
- “A little bit of fun is OK, as long as 90% is serious.”

Examples for discussion

Will Manatees Still Exist in 2100?

Effect of Cold Winters and Watercraft Accidents

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1. Introduction

In Florida, the populations of West Indian Manatees, listed as endangered species in 1967, appear to be growing in recent years. At the same time, the total number of manatee deaths is increasing rapidly. Therefore, it has became more important to evaluate the long-term viability of the populations. I hypothesized that cold stress due to cold winters and accidents with watercrafts cause additional mortality, and examined the population trends during the next 100 years.

2. Objectives

- Simulate manatee population trends during the next 100 years under the assumptions that there is additional mortality due to
  1) cold stress only (temperature effect)
  2) accidents with watercrafts only (boat effect)
  3) both cold stress and accidents (combined effect)
- Investigate the relationship between the mean number of deaths due to watercraft accidents in each year and the probability of extinction within the next 100 years

3. Methods

- Model type: modified age based matrix model of female manatees
- Initial population size = 1600
- Mean boat collision deaths / year = 68 individuals
- Draw minimum temperature and the number of boat collision deaths in each year randomly from normal distribution
- Simulated 100 times for each model

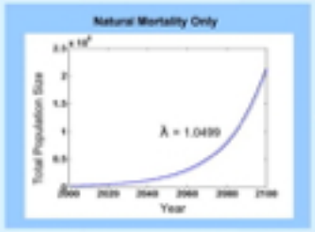
Basic Model Structure

$$\begin{pmatrix} N_0 \\ N_1 \\ N_2 \\ N_3 \\ N_4 \\ N_a \end{pmatrix}_{t+1} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & f_a \\ S_1 & 0 & 0 & 0 & 0 & 0 \\ 0 & S_2 & 0 & 0 & 0 & 0 \\ 0 & 0 & S_3 & 0 & 0 & 0 \\ 0 & 0 & 0 & S_4 & 0 & 0 \\ 0 & 0 & 0 & 0 & S_5 & S_a \end{pmatrix}_t \begin{pmatrix} N_0 \\ N_1 \\ N_2 \\ N_3 \\ N_4 \\ N_a \end{pmatrix}_t - \begin{pmatrix} B_0 \\ B_1 \\ B_2 \\ B_3 \\ B_4 \\ B_a \end{pmatrix}_t$$

where N = population size
f = fecundity
S = survival probability
= 1 – (natural mortality + additional mortality)
B = # of boat accident deaths

4. Results: Graphs of Population Trends

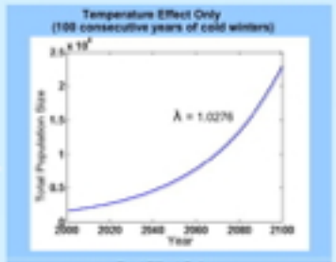
Model 1: No effect (natural mortality only)



Without additional mortality, the manatee population keeps growing

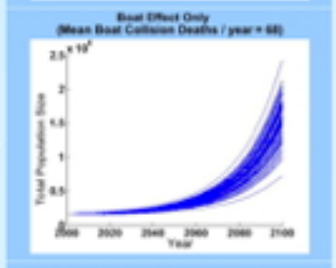
Model 2: Temperature effect

Even 100 years of consecutive cold winters do not cause the manatee population to decline



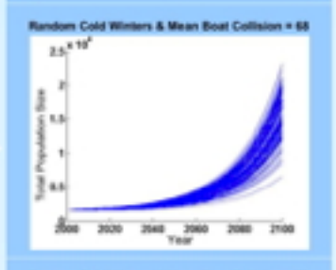
Model 3: Boat effect

A mean of 68 boat collision deaths / year causes slower population growth, but the population size still increases



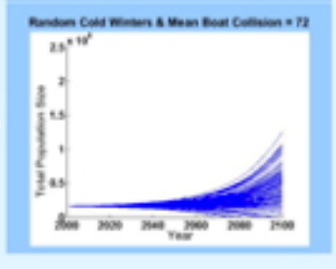
Model 4: Combined effect

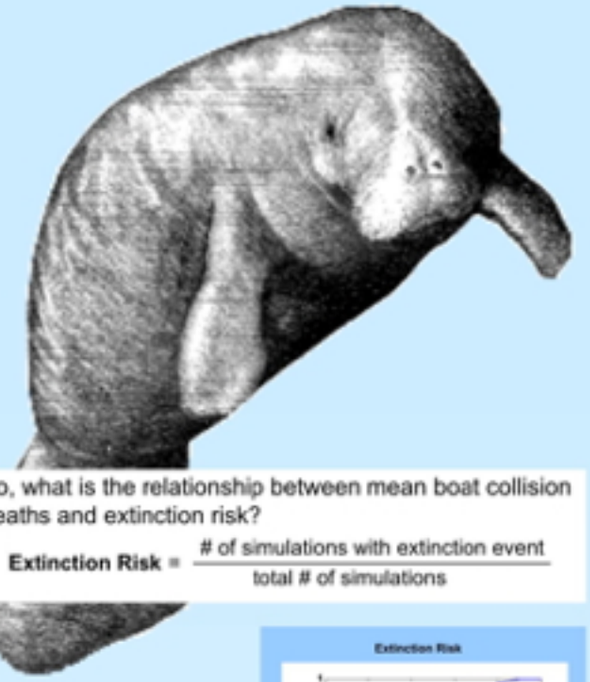
Assuming randomly occurring cold winters and a mean of 68 boat collision deaths / year, population growth became even slower, but the population size still increases



BUT……

If the mean number of boat collision deaths / year becomes 72, there is a chance that the population will become extinct

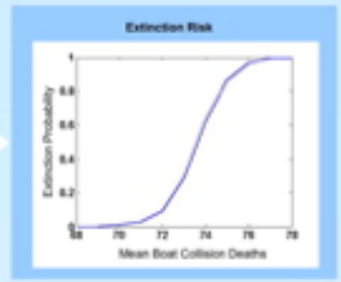




So, what is the relationship between mean boat collision deaths and extinction risk?

$$\text{Extinction Risk} = \frac{\text{\# of simulations with extinction event}}{\text{total \# of simulations}}$$

The extinction risk increases rapidly when the mean accident deaths / year exceeds 72



5. Discussion

- **Cold winters did not cause the manatee population to decline.** This result can be expected because there are thermal refuges during winter (e.g. power plant warm-water discharges) therefore, the mortality due to cold winters was very low. Developing a model that includes the effect of winter refuge loss could be interesting in future studies.
- **Current average boat collision deaths (i.e. 68 deaths / year) slowed population growth** however, did not cause the manatee population to decline.
- **Population growth became even slower when the effects were combined** (i.e. randomly occurring cold winters and mean boat collision deaths / year = 68) however, the population was still growing.
- **Increase in the mean boat collision deaths (even by a small number) could be a serious problem.** For a mean >= 78, the extinction probability became 1. The records show that the deaths due to accidents increased rapidly during last 5 years, therefore understanding the current situation of boat collision deaths is important to maintain manatee populations.

https://projects.ncsu.edu/project/posters/examples/Manatees/

Can Suburban Greenways Provide High Quality Bird Habitat?

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Christopher E. Moorman, Jamie H. Mason, Kristen E. Sinclair, Salina K. Kohut :: NC State University :: Department of Forestry & Environmental Resources
www4.ncsu.edu/~grhess/GreenwaysForWildlife

Birds of Conservation Concern in Decline

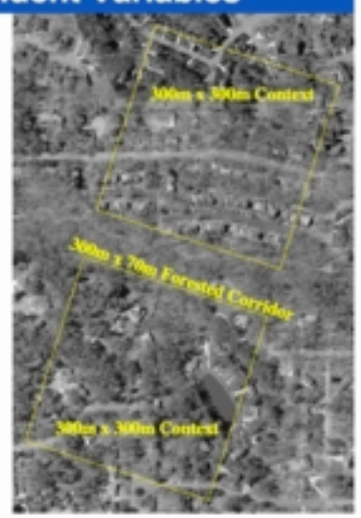
- Many bird species of conservation concern – including neotropical migrants, insectivores, and forest-interior specialists – decline with increasing human development
- Greenways might mitigate this effect
- Habitat patch size, vegetation composition & structure, and landscape context are key factors
- Standards are lacking for designing and managing suburban greenways as high quality habitat

Objective: Greenways for the Birds

- Determine how development-sensitive forest birds are affected by
  - forested corridor width
  - adjacent development intensity
  - vegetation composition & structure
- Develop recommendations for greenway designers and planners

Study Design & Independent Variables

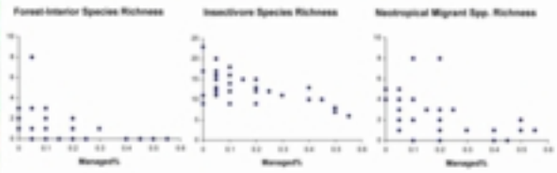
- Sampled 34 - 300m corridors in Raleigh & Cary, NC, USA
- Sampled range of
  - Forested corridor widths (20 – 1,200m)
  - Adjacent density (low density residential – office/commercial)
- Additional measures
  - Vegetation composition & structure in corridor
  - Land cover in 300m x 300m adjacent to corridor (context)

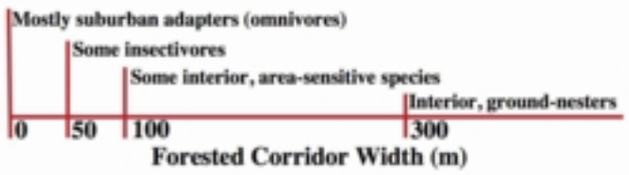


- Measured richness & abundance of
  - Breeding birds
  - Neotropical migrant birds during stopovers
  - Mammal nest predators

Breeding Birds of Concern More Common in Wider Greenways with Less Managed Area Surrounded by More Forest Canopy

- 8-minute, 50m point counts at center of corridor
- Revisited 4 times during breeding season





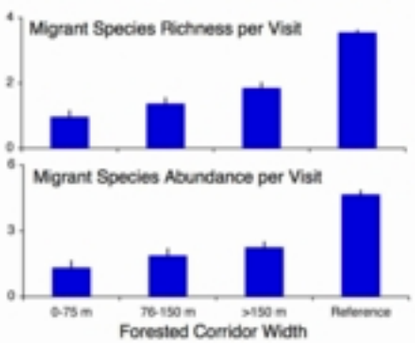
Significant Predictors for Breeder Abundance

Greenway:
(–) Managed Area
(+)Shrub Cover

Adjacent Landscape:
(+) Canopy Cover
(–) Building Density
(–) Bare Earth

Spring Neotropical Migrant Stopovers More Common in Wider Greenways with More, Taller Hardwood Trees

- 200m x 25m transects along one side of greenway path
- Revisited sites for two spring seasons and one fall season
- Width *not* significant, but trend consistent with other findings



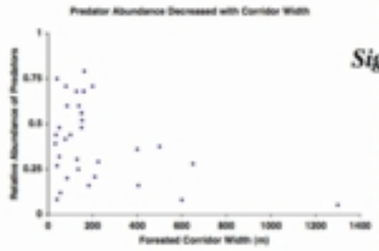
Significant Predictors for Spring Migrant Abundance

Greenway:
(+) % Hardwoods
(+) Canopy Height

Adjacent Landscape:
(–) Bare Earth

Nest Predators Less Common in Wider Greenways with Narrower Paths

- Five baited scent stations along each greenway segment
- Observed for 5 nights each



Significant Predictors for Predator Abundance

Greenway:
(–) Corridor width
(+) Trail width
(+) Mature forest
(+) Ground cover
(–) Vine cover

Adjacent Landscape:
(–) Building density

Greenways for Development-Sensitive Forest Birds Might Conflict with Intense Recreational Use

People & Managers Prefer …

- Good for walking, running, cycling, strollers, wheelchairs
- Easier to maintain, especially with higher intensity use

Forest Birds Prefer …

- Narrow path avoids splitting forested corridor
- Discourages heavy human use
- Fewer nest predators

Potential Solution: Wide Corridor, Trail Near Edge

- Make corridors at least 50m wide; wider is better
- Don't split forested corridor
  - Keep trails as narrow as possible
  - Avoid wide grassy areas along trails within forested corridor
  - Locate trails near the edge of forested corridors

https://projects.ncsu.edu/project/posters/examples/BirdsInGreenways/

NC STATE UNIVERSITY

Southern Flounder Exhibit Temperature-Dependent Sex Determination

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Introduction

Southern flounder (*Paralichthys lethostigma)* support valuable fisheries and show great promise for aquaculture. Female flounder are known to grow faster and reach larger adult sizes than males. Therefore, information on sex determination that might increase the ratio of female flounder is important for aquaculture.

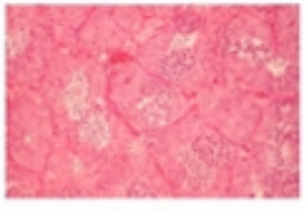
Objective

This study was conducted to determine whether southern flounder exhibit temperature-dependent sex determination (TSD), and if growth is affected by rearing temperature.

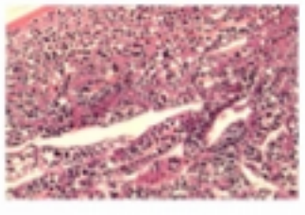
Methods

- Southern flounder broodstock were strip spawned to collect eggs and sperm for *in vitro* fertilization.
- Hatched larvae were weaned from a natural diet (rotifers/*Artemia*) to high protein pelleted feed and fed until satiation at least twice daily.
- Upon reaching a mean total length of 40 mm, the juvenile flounder were stocked at equal densities into one of three temperatures 18, 23, or 28°C for 245 days.
- Gonads were preserved and later sectioned at 2-6 microns.
- Sex-distinguishing markers were used to distinguish males (spermatogenesis) from females (oogenesis).

Histological Analysis

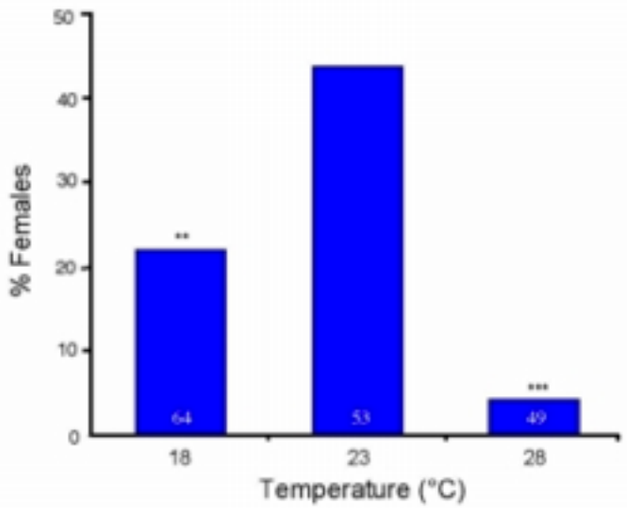


Male Differentiation



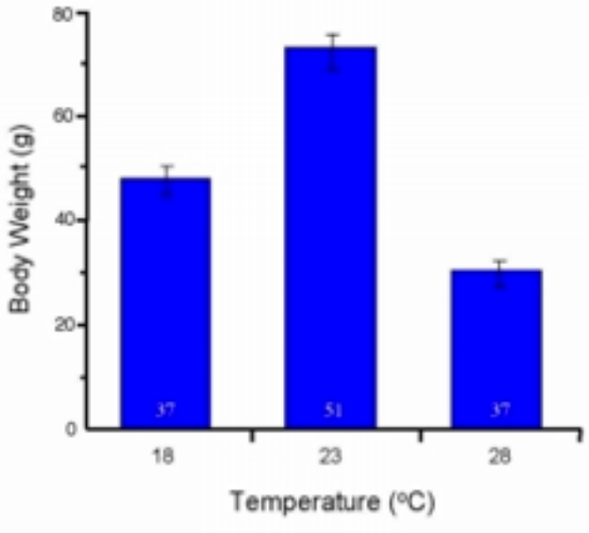
Female Differentiation

Temperature Affects Sex Determination

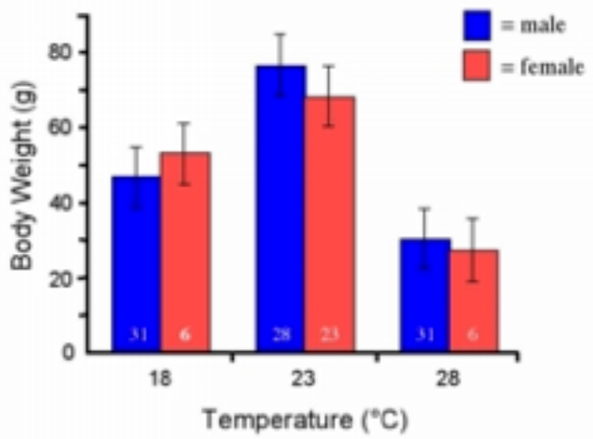


(**P < 0.01 and ***P < 0.001 represent significant deviations from a 1:1 male:female sex ratio)

Rearing Temperature Affects Growth



Growth Does Not Differ by Sex



Results

- Sex was discernible in most fish greater than 120 mm long.
- High (28°C) temperature produced 4% females.
- Low (18°C) temperature produced 22% females.
- Mid-range (23°C) temperature produced 44% females.
- Fish raised at high or low temperatures showed reduced growth compared to those at the mid-range temperature.
- Up to 245 days, no differences in growth existed between sexes.

Conclusions

- These findings indicate that sex determination in southern flounder is temperature-sensitive and temperature has a profound effect on growth.
- A mid-range rearing temperature (23°C) appears to maximize the number of females and promote better growth in young southern flounder.
- Although adult females are known to grow larger than males, no difference in growth between sexes occurred in age-0 (< 1 year) southern flounder.

Acknowledgements

The authors acknowledge the Saltonstall-Kennedy Program of the National Marine Fisheries Service and the University of North Carolina Sea Grant College Program for funding this research. Special thanks to Lea Ware and Beth Shimps for help with the work.

https://projects.ncsu.edu/project/posters/examples/Flounder/

Resources

- *Designing conference posters*, Colin Purrington https://colinpurrington.com/tips/poster-design; with Powerpoint templates at https://colinpurrington.com/tips/poster-design/templates

- *The scientist's guide to poster design*, Katie Everson http://www.kmeverson.org/academic-poster-design.html

- *Creating effective poster presentations*, George Hess, Kathryn Tosney, Leon Liegel https://projects.ncsu.edu/project/posters/