

## Study Guide for 2<sup>nd</sup> Exam BISC204

In this handout we have put together some questions to think about as you study for the second exam, organized by lecture. This list of questions is *not comprehensive*, and we suggest you review all of your lecture notes, looking to the textbook and other suggested materials for clarification when needed. For the exam, we will also expect you to think about the connections between concepts presented in different lectures and with material covered by the first exam.

### Foraging Ecology

- 1) Name some adaptations that predators have to find, capture, and digest their prey. Give some specific examples.
- 2) Name some adaptations of prey to avoid being captured and eaten by predators. Give some specific examples.
- 3) Provide an overview of optimal foraging theory (OFT) as it pertains to diet selection by predators.
  - a. Why are the predictions of OFT relevant to understanding community dynamics?
- 4) Describe risk sensitive foraging.
  - a. From the experiments we discussed in lecture, what ‘trade-offs’ do prey face and how do they change in the presence of different predators and resources?
  - b. What are the ways that risk sensitive foraging affects species ecology?
- 5) Describe the differences between *Mullerian* and *Batesian* mimicry. Give some examples.

### Predation

- 1) How would you incorporate the effect of predators into an exponential model of a prey species population’s growth? Be able to write out the equation and explain what the terms mean in words. Now do the same for how you would incorporate the effect of prey abundance into an exponential model for a predator population’s growth.
- 2) Describe the three key components of the predation process and how they affect the functional response of a predator. Be able to explain ecologically why a predator might exhibit a Type I, II, or III functional response.
- 3) Which type of functional response implies the strongest regulation of prey by a predator?
  - a. Why?

## Competition

- 1) Design an experiment or study to determine whether two species of geckos that coexist on a small island compete with each other.
  - a. What would you measure as the response variable?
  - b. How would you know if the effect of competition was equal?
- 2) Describe the difference between the concepts of the “fundamental” and “realized” niche.

## Community Structure

- 1) You collect the following data describing the diet composition of the major species in a pond food web. The prey categories are listed in the first column, and their daily contributions (in micrograms per individual consumer) to the diets of each consumer are given in each row. For example, *Daphnia* consume 17 micrograms of diatoms per day.

	Consumers			
Prey	Daphnia	Bosmina	Copepods	Rotifers
Bluegreen algae	1	0	0	0
Diatoms	17	2	15	0
Green algae	1	0	0	0
Purple algae	5	1	0	5

- a) Can you draw a connectivity food web for this community? If not, explain why. If yes, draw it.
  - b) Can you draw an energy flow food web for this community? If not, explain why. If yes, draw it.
  - c) Can you draw a functional food web for this community? If not, explain why. If yes, draw it.
- 2) Describe what *omnivory* is and discuss its prevalence in nature. Give some examples.
  - 3) What information do you need to construct *dominance hierarchies*?

- 4) Describe what is meant by the term *trophic cascade*.
  - a. How would you know if a particular interaction between a consumer and prey might lead to a trophic cascade?
- 5) What characterizes a *keystone species*? Be able to describe examples of keystone species, and why they are different from most species in food webs.

### **Other types of interactions**

- 1) Describe the different types of positive interactions we discussed in class, and in particular the differences between *trophic*, *defensive*, and *dispersive mutualisms*.
- 2) What is the difference between *direct* and *indirect* effects in a food web?
  - a. Describe some positive indirect effects that we've discussed.

### **From Nicola Smith's lecture on the ecology of fear and invasive lionfish:**

- 1) What are some of the ways prey can respond to the presence of predators? Hypothesize a cost for each category of response.
- 2) What is meant by the term *biotic resistance*? Explain how species diversity can influence the ability for introduced species to invade new areas.
- 3) Did Nicola and her colleagues find evidence for a 'fear-based trophic cascade'? What evidence supported their conclusion?