

## BIOL/ECON 140 Final Exam Study Guide

The final exam is cumulative, so this study guide supplements the previous ones. You should be familiar with the material from all of them. In addition to the readings in the SRP and Field, you should be familiar with the material from Montgomery and ancillary readings.

### **Ecosystem Services** (Goulder & Kennedy 1997, Field Ch. 9, and associated lectures)

What are the four categories of ecosystem services as defined by the Millennium Ecosystem Assessment? What are some examples of each? To which of these do we typically attempt to attribute value in economic assessments? Which types of services are most easily assigned value in economic analyses? How do ecosystem services relate to “externalities” in the way markets often set prices, especially when public resources are involved? Are all species likely to be important in affecting ecosystem goods and services? How are biologists starting to measure ecosystem services? In restoring salmon and salmon habitat, what types of ecosystem services might also benefit?

What are main types of ecosystem values that economists describe? What are the differences between use and non-use benefits? How do these relate to active and passive resource values? What are the two main types of use values? What are three types of non-use values? How do these different types of economic ecosystem values relate to the different types of ecosystem services described above? What are different strategies for valuing the different types of ecosystem services? What are some criteria that might affect people’s valuation of different species? What are some ways that markets and/or governments can fail in properly valuing these services? What examples of these failures does Montgomery cite in “The King of Fish” for Europe, eastern North America, and the Pacific Northwest? What types of costs are necessary to count in benefit/cost analyses involving salmon restoration, ecosystem services, and other natural resource issues? What distributional issues often arise in benefit/cost analysis involving ecosystem services or other public resources?

See the discussion questions at the end of Chapter 9 of Field.

### **Additional questions on hatcheries, from the field trip**

What fish are they raising and managing at the Skookum hatchery? What goals are the managers trying to accomplish with respect to salmon recovery and benefits? How do these tie in with the hatchery management strategies we discussed in class before the second midterm?

### **Adaptive management and financing**

How does adaptive management differ from how management decisions have often been applied in the past? How does this contrast with what Montgomery calls “maladaptive management”? What are four key steps in the feedback cycle of adaptive management? What does society need to determine before implementing adaptive management? What roles do ecology and economics play in this process? What are the four main types of monitoring and how do they fit into the adaptive management framework? Why is the decision-making component of adaptive management so complicated in the case of salmon? What is MAMA? What are “benchmarks” and how are they used in MAMA? Are the goals, benchmarks, actions, and responsible

authorities clearly defined for all the various components of salmon recovery in Puget Sound? How much is salmon recovery estimated to cost under the SRP? Where is the money supposed to come from? Are all the costs covered under the current version of the plan?

Montgomery raises the question of “the sixth H” in salmon recovery. Given historical and current developments in salmon recovery efforts, what do you think it will be? Be able to support your position with well-reasoned arguments and examples.