Round: 11B

Figure 1: Abundances of Different Size Groups of Mussels
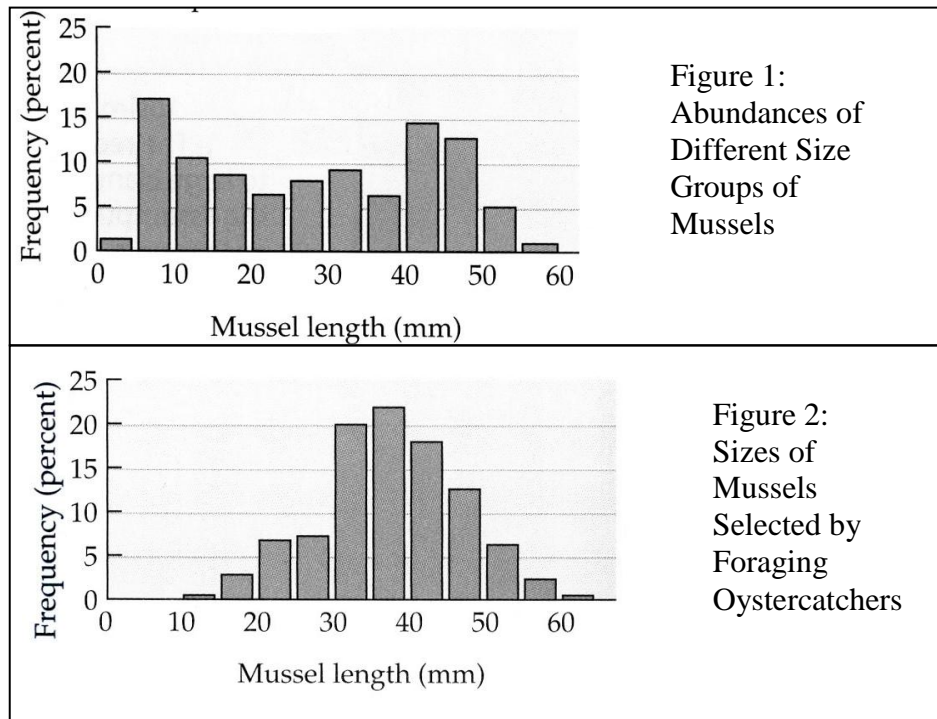
Figure 2: Sizes of Mussels Selected by Foraging Oystercatchers

1. According to Figures 1 & 2, which size mussels (or range of sizes) do the Oystercatchers select most often?
   Oystercatchers select mussels from the 30-40 mm size range most often (also accept: 30-45 OR 35-40 (2 pt)

2. Does Oystercatcher selection correspond to the mussel size that is most available? Explain.
   Oystercatcher selection does not correspond to the mussel sizes that are most available (1 pt). 5-10 mm and 40-50 mm mussels are the most abundant, not 30-40 mm (2pt).

3. Assuming the patterns above are driven by Oystercatchers maximizing caloric intake per amount of energy expended, name the theory of animal behavior to which Oystercatcher mussel selection conforms.
   Optimal foraging theory (2 pts)

4. a. Assume there is a positive relationship between mussel length and caloric value, and that there is a positive relationship between mussel length and handling time for Oystercatchers. In the area provided below, draw a graph that shows the relationship between mussel length, handling time and net energy gain for Oystercatchers on the hunt. Label your axes.
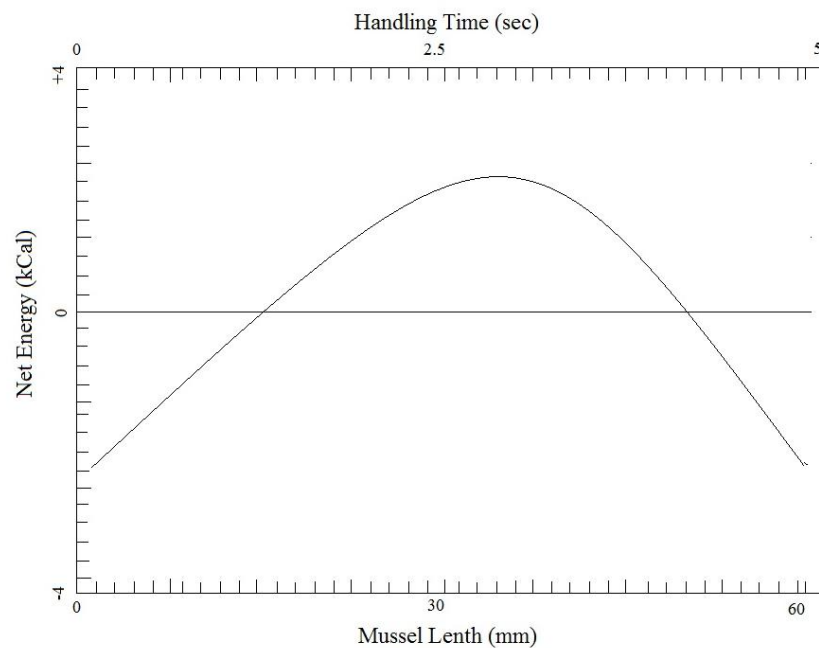
b. Explain how your graph describes the patterns viewed in Figures 1&2.
   Smaller mussels have a short handling time, but provide few calories (2 pt). Large mussels provide more calories, but have a greater handling time (2 pt), wasting more energy than they provide. Overall, the handling time and moderate caloric value of mid-sized mussels make them the most profitable for Oystercatchers (2 pt)

5. Based on the data presented, what effect does Oystercatcher predation have on mussel population structure?
   Accept EITHER of the following, 2pts:
   - Predation is leading to disruptive selection
   - Predation might be selecting for smaller and larger—but not intermediate—size mussels