Food item index:

Survey of fish and crustacean species found on a Galveston Bay, Texas, oyster reef. Each type of animal is listed with the most common food items that each animal utilizes.

	Species	Food Items
Fishes	Inland silverside *Menidia beryllina*	Zooplankton
	Gulf toadfish *Opsanus beta*	Crustaceans (shrimp, crabs, amphipods, copepods), occasionally small fishes and mollusks (snails, clams, squid)
	Pinfish *Lagodon rhomboides*	Crustaceans (shrimp, crabs, amphipods, copepods), occasionally worms and small fishes
	Naked goby *Gobiosoma spp.*	Worms and small crustaceans (amphipods, copepods); also attracted to injured or dead oysters
	Atlantic croaker *Micropogonias undulatus*	Worms, crustaceans (shrimp, crabs, amphipods, copepods) and fishes
Crustaceans	Green porcelain crab *Petrolisthes aramtus*	Filter-feeder – plankton or detritus
	Grass shrimp *Palaemonetes sp.*	Filter feeder – plankton or detritus
	Shrimp *Penaeus spp.*	Detritus and algae; very small snails and juvenile fish, worms, and various small crustaceans (shrimp, amphipods, copepods)
	Snapping shrimp *Alpheus heterochaelis*	Worms, small crustaceans (shrimp, crabs, amphipods, copepods) and even small fish such as pearlfish and gobies
	Depressed mud crab *Eurypanopeus depressus*	Detritus and algae
	Mud shrimp *Upogebia sp.*	unconfirmed
	Blue crab *Callinectes sapidus*	thin-shelled bivalves like oysters and mussels, other crustaceans (crabs, shrimp), fish, marine worms, plants.

Species count in Galveston Bay Habitats

May 2000 - Data collected in Galveston Bay, Texas, shows the average number of individuals of each species.

	Species	Oyster Reef	Marsh Edge	Shallow Muddy Bottom
		Average # of individuals counted over a 10 day period		
Fishes	Inland silverside *Menidia beryllina*	7.00	0.27	0.22
	Gulf toadfish *Opsanus beta*	7.54	0.00	0.00
	Pinfish *Lagodon rhomboides*	2.81	1.69	0.38
	Naked goby *Gobiosoma bosc*	3.23	0.00	0.00
	Darter goby *Gobionellus boleosoma*	0.00	0.00	0.00
	Atlantic croaker *Micropogonias undulatus*	0.00	0.00	0.00
	Bay anchovy *Anchoa mitchillli*	0.04	0.00	0.13
Crustaceans	Green porcelain crab *Petrolisthes aramtus*	41.38	0.08	0.06
	Grass shrimp *Palaemonetes sp.*	32.65	42.65	0.32
	Brown shrimp *Farfantepenaeus aztecus*	7.82	14.14	0.92
	Snapping shrimp *Alpheus heterochaelis*	15.54	0.08	0.00
	White shrimp *Litopenaeus setiferus*	0.00	0.00	0.00
	Pink shrimp *Farfantepenaeus duorarum*	0.00	0.00	0.00
	Depressed mud crab *Eurypanopeus depressus*	9.35	0.00	0.00
	Mud shrimp *Upogebia sp.*	0.00	0.00	0.00
	Blue crab *Callinectes sapidus*	1.00	1.35	0.22

Species count in Galveston Bay Habitats

November 2000 - Data collected in Galveston Bay, Texas, shows the average number of individuals of each species.

	Species	Oyster Reef	Marsh Edge	Shallow Muddy Bottom
		Average # of individuals counted over a 10 day period		
Fishes	Inland silverside *Menidia beryllina*	0.00	0.77	0.04
	Gulf toadfish *Opsanus beta*	0.00	0.00	0.00
	Pinfish *Lagodon rhomboides*	0.00	0.00	0.00
	Naked goby *Gobiosoma bosc*	2.35	0.12	0.00
	Darter goby *Gobionellus boleosoma*	2.77	4.31	0.50
	Atlantic croaker *Micropogonias undulatus*	1.62	0.00	1.15
	Bay anchovy *Anchoa mitchillli*	0.92	0.00	3.35
Crustaceans	Green porcelain crab *Petrolisthes aramtus*	0.00	0.00	0.00
	Grass shrimp *Palaemonetes sp.*	10.19	53.81	0.00
	Brown shrimp *Farfantepenaeus aztecus*	0.71	4.69	0.05
	Snapping shrimp *Alpheus heterochaelis*	5.65	0.08	0.00
	White shrimp *Litopenaeus setiferus*	0.54	1.70	0.12
	Pink shrimp *Farfantepenaeus duorarum*	0.95	1.49	0.19
	Depressed mud crab *Eurypanopeus depressus*	0.00	0.00	0.00
	Mud shrimp *Upogebia sp.*	6.31	0.00	0.00
	Blue crab *Callinectes sapidus*	5.73	19.31	1.23

Species Abundance & Richness

Using data adapted from a survey by Stunz et al. (2010), examine the species of fish and crustaceans that live within three distinct habitats in Galveston Bay in Texas: oyster (*Crassostrea virginica*) reef, marshgrass (*Spartina alterniflora)* edge, and sandy/mud bottom. The study collected animals from three habitats in the Galveston Bay estuary by sampling each habitat for ten days each season. The data shown in the charts is an average of the number of individuals of each species they found in each sample.

1. Calculate the species **richness** for each habitat and month.
   Species richness is a measure of how many different **species** are living in a given habitat or ecosystem. Calculate this by counting the number of different types of animals the scientists collected at each site during each month and record your results in the table below.

Species Richness

	May 2000	November 2000
Oyster Reef		
Marsh Edge		
Shallow Muddy Bottom		

2. Calculate the **abundance** of species in each habitat and month.
   Abundance is measure of how many individual animals are living within a given habitat or ecosystem. Calculate this by adding the total number of all animals found in a given month and habitat. Record your results in the table below.

Abundance

	May 2000	November 2000
Oyster Reef		
Marsh Edge		
Shallow Muddy Bottom		

Evaluating Ecological Data

Using graph paper or graphing tools in Microsoft Excel or another program, create bar graphs for both species **richness** and **abundance** using the data that you created above.

Using your graphs and the data you created answer the following questions.

1. Throughout the study we saw changes in both species richness and abundance. What does species richness mean in a habitat? Why do you think this is important?

2. What does abundance mean within a habitat? Why do you think this is important?

3. Looking at your graphs, the species richness did not change from May to November for the oyster reef but the species abundance changed dramatically. What do you think may lead to this type of change? How does this help to differentiate between species richness and abundance?

4. In both the marsh edge and the shallow muddy bottom, we saw greater abundance and richness in November than in May. What are possible causes or reasons to explain this?

5. Which of the three habitats are most likely to be home to a diverse range of species? Support your opinion with evidence.

   Which was the least favorable habitat for animals? Support your opinion with evidence.