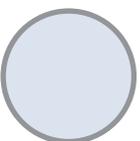
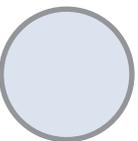
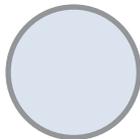
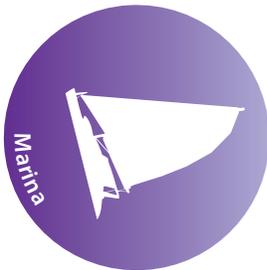
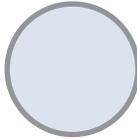
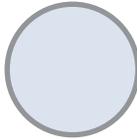


Start Here



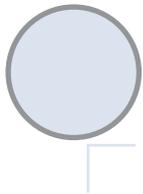
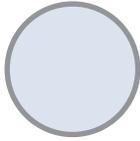
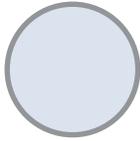
# Estuaries & Marshes



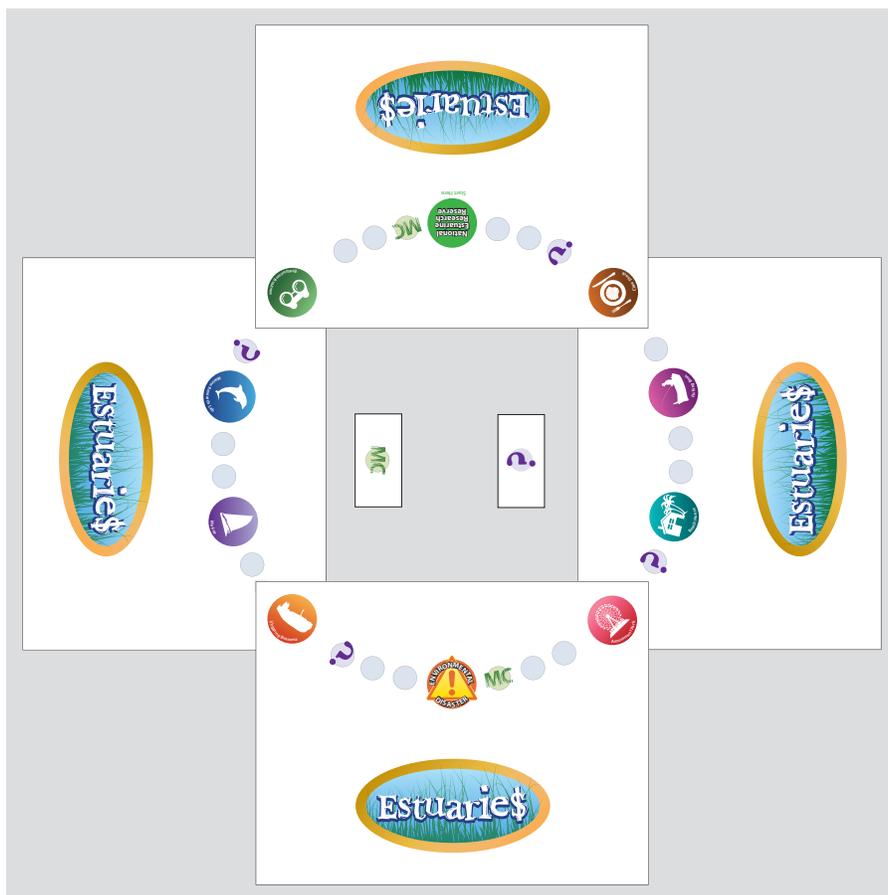
# Estuaries & Wetlands



# Estimote



Print the game board pages and arrange them like this.



M A R S H C A R D

**You've restored 5 acres of marshland!**

This restoration has helped reduce harmful effects of runoff into the estuary by keeping toxic chemicals from entering the water. Clean, clear water is very important for healthy underwater plants.



M A R S H C A R D

**15 acres of marsh cleaned up! Great job!**

You've collected lots of trash that was polluting the water. During your cleanup efforts, you spoke to TV and newspaper reporters. Now others will know how to recycle and keep trash out of the waterways.



M A R S H C A R D

The 20 acres of restored marsh has really made a difference. You've helped bring back a decreasing osprey population. Your cleanup campaign has reduced pollution in the water. Now the more abundant yellow perch are making the osprey fat and happy.



M A R S H C A R D

**25 acres of marsh restored! Way to go!**

With clean water, large beds of underwater grasses, healthy fish and birds, and abundant harvestable seafood, the economy dependant on this estuary will be much stronger than it was before.

**ENVIRONMENTAL DISASTER!**

**Dead Zone**

Water temperatures rise in your estuary. The dissolved oxygen levels in the water drop and many fish die. Pay \$200 local tax for cleanup. Go to the Environmental Disaster square.



**ENVIRONMENTAL DISASTER!**

**Oil Spill**

A large oil tanker hits a rock and spills oil in the bay outside the estuary. Thousands of birds and other animals become covered in oil. Pay \$200 to fund an animal care facility. Go to the Environmental Disaster square.



**ENVIRONMENTAL DISASTER!**

**Drought**

With less fresh water flowing into the estuary from the watersheds, the estuary water salinity rises and nutrient levels fall. Animal and plant populations suffer. Pay \$200 local tax for cleanup. Go to the Environmental Disaster square.



**ENVIRONMENTAL DISASTER!**

**Hurricane**

You've survived the hurricane but the estuary has taken a hit. Pay \$200 for barrier island restoration. Go to the Environmental Disaster square.



**Clam Shack**

A family of tourists, visiting the beautiful estuary, goes to your clam shack for dinner. If you own the clam shack, collect \$100.



**Clam Shack**

A red tide event has closed down your shellfish harvesting area. Clams are not edible now. If you own the clam shack, pay \$300 for clean clams from the research lab's aquaculture facility.



**Fishing Boat**

A healthy estuary means a bountiful catch this year. If you own the fishing boat, you made \$200.



**Fishing Boat**

There are too many fishing boats out this year and the catches of fish are down, possibly from overfishing. Pay \$200 for fuel fees to the bank.



**Ecotourism Business**

A rare bird sighting and gorgeous views attract tourists to take kayak tours. If you own the ecotourism business, you made good profits this year. Collect \$200.



**Ecotourism Business**

Unseasonably rainy weather means no kayaking. If you own the ecotourism business, pay \$150 for lost business.



## Marine Research Lab

You discover the cure for a type of cancer in a type of marine algae! If you own the lab, get \$500 for Nobel Prize in Medicine.



## Marine Research Lab

A hurricane brushes the coast near the lab and causes damage from wind and flooding. If you own the lab, pay \$250 for repairs.



## Marina

The marina brings tourists and recreational fisherman to your town. If you own the marina, you make \$150 selling bait.



## Marina

Marshland was lost when the marina was built. If you own the marina, pay \$300 for marsh restoration.



## Amusement Park

The amusement park hosts an Estuary Day event to bring awareness of estuaries to the public. If you own the amusement park, you made \$100 in donations to help keep the estuary clean.



## Amusement Park

Runoff from the amusement park's parking lot contains oils that can pollute. If you own the amusement park, pay \$150 to replant trees and build a drainage pond to catch runoff and reduce pollution.



## Beach House

The views from the beach house inspire you to organize a beach clean-up with your friends. Collect \$50 thank you from the city for your efforts.



## Beach House

Rising sea level threatens coastal homes. If you own the beach house, it must be moved back 100 feet. Pay \$350 to move your house.



## Shipping Company

Switching to biofuels on super tankers provides a tax break. If you own the shipping company, get \$250 tax break.



## Shipping Company

Dumping ballast water can release unwanted invasive species. Pay \$100 fine if you own the shipping company.





## Ecotourism Business

Congratulations on the purchase of your "Bay Time" ecotourism business. According to one study by the Fisheries Center of the University of British Columbia, whale watching alone could generate two billion dollars per year and create 19,000 jobs worldwide.



## Clam Shack

Oh boy! You're now the owner of the "Happy as a Clam" clam shack! Your restaurant will offer classy but casual dining for all seafood lovers in the area. It's important to serve sustainable seafood on your dinner tables to ensure healthy, plentiful harvests and full bellies.



## Beach House

Congratulations on the purchase of your new island beach house. With the estuary and marshes on one side and the ocean on the other, the view from your house is incredible. When you are not using the house, you will be able to easily rent it for top dollar to island visitors.



## Marine Research Lab

After making millions in software engineering, you finally decided to purchase the marine lab you visited on a third grade field trip. You are wise to realize that many valuable products have been developed by studying marine animals and plants, including antimicrobial and anti-inflammatory drugs from ocean sponges.



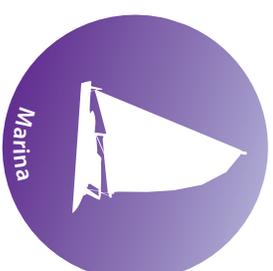
## Fishing Boat

Now that you've purchased your own charter fishing boat, you can enjoy the freedom of the open sea while making a living. It's great being able to share what you love to do with others who are willing to pay for the opportunity! Charter fishing is big business in coastal communities who have healthy estuaries.



## Amusement Park

Step right up ladies and gentlemen! The hottest, new attraction to hit the beach this year will be YOUR boardwalk, equipped with roller coaster rides, funnel cake stands, and carnival games. Families will be able to have a great time, all while enjoying the beautiful outdoors. Just remind them to use the recycle bins you've provided!



## Marina

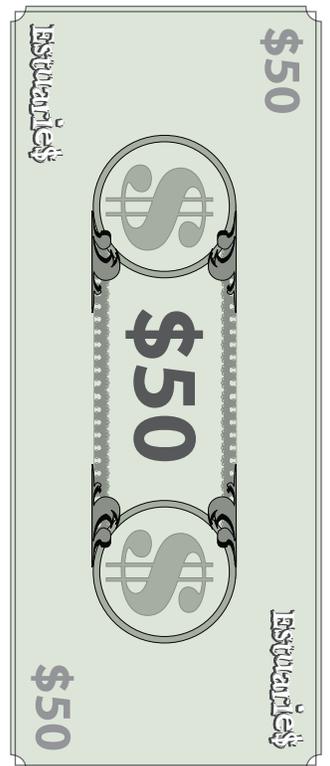
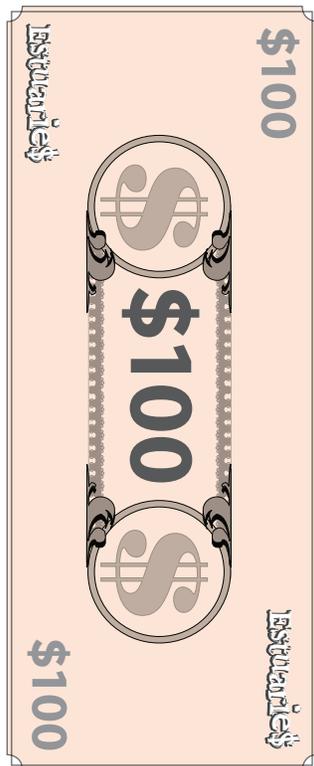
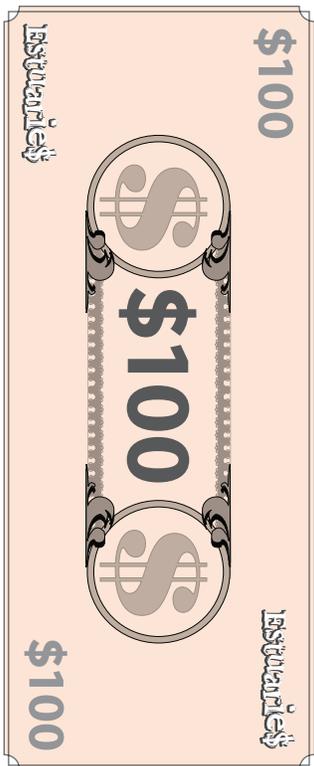
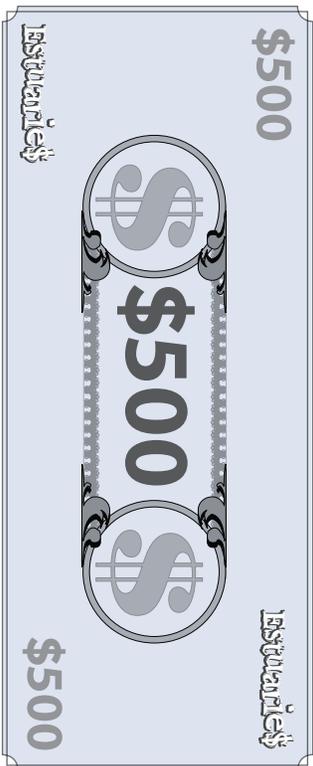
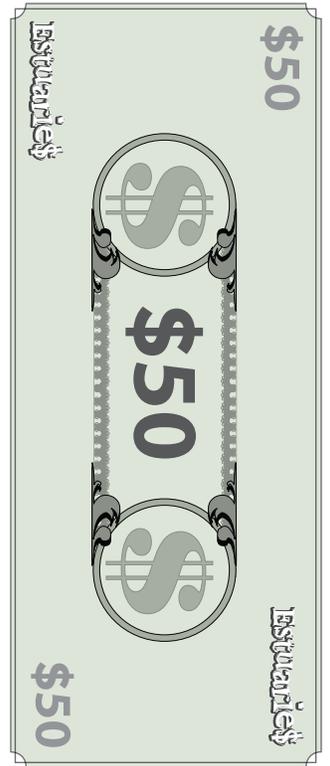
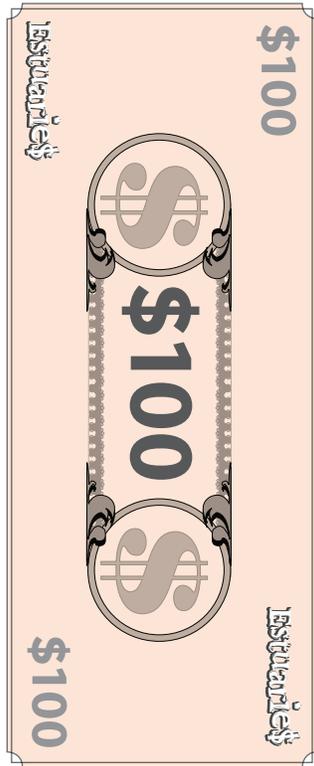
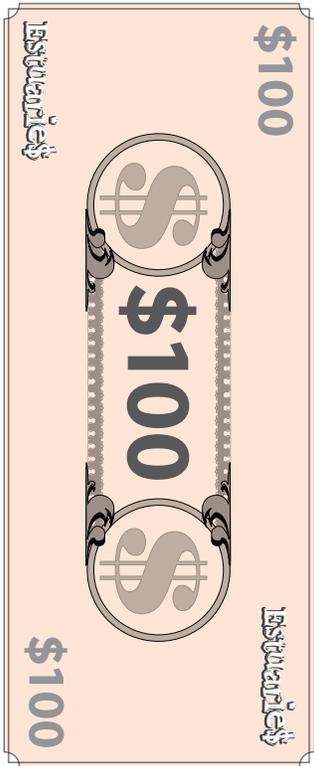
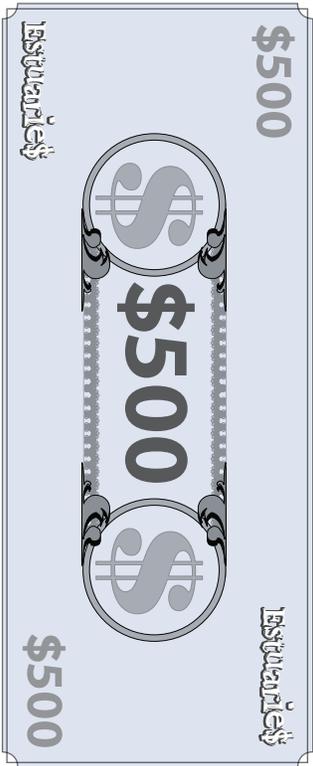
Congratulations on the purchase of the "Big Fish" marina. Fishing for redfish and spotted sea trout in the estuary is amazing and all of the rental-boats, bait, snacks, and fishing tackle that anglers need will be purchased from your marina store.



## Shipping Business

Much like Christopher Columbus sailing the seas, bringing goods from an exciting new world, your shipping business helps import and export goods from your estuary. Your business will expand the economy and world trade. Just watch out for sneaky invasive species hiding in your cargo or ballast!

Print four copies of this page, plus one additional copy for each player.



**CLIMATE CHANGE DISASTER!**

**Dead Zone**

Water temperatures rise in your estuary. The dissolved oxygen levels in the water drop and many fish die. Pay \$200 to help with the fish kill clean-up efforts. Go to the Environmental Disaster square.



**CLIMATE CHANGE DISASTER!**

**Saltwater Intrusion**

The sea level has been rising for many years in your community, but today the saltwater has intruded on the aquifer where the community gets its drinking water. Pay \$200 to explore other drinking water sources. Go to the Environmental Disaster square.



**CLIMATE CHANGE DISASTER!**

**Drought**

Climate change has caused a long-term decrease in precipitation in your watershed. With less fresh water flowing into the estuary, the water quality and nutrient cycling becomes poor. Animal and plant populations suffer without the freshwater inflow. Pay \$200 local tax for cleanup. Go to the Environmental Disaster square.



**CLIMATE CHANGE DISASTER!**

**Hurricane**

**Increased severe coastal storm events are a common indicator of climate change.**

You've survived the hurricane but the estuary has taken a hit. Pay \$200 for barrier island habitat restoration. Go to the Environmental Disaster square.



**Clam Shack**

The clam shack delivery truck is converted to run on bio-fuel from the shack's deep fryer. If you own the clam shack, collect \$250 for your net savings on gasoline.



**Clam Shack**

Climate change has been causing more frequent harmful algae blooms over the 45 years your clam shack has been open. Today there is another bloom making the clams not edible. If you own the clam shack, pay \$300 to owner of the marine research lab to purchase clean clams from their aquaculture facility.



**Fishing Boat**

Climate change has gradually increased the temperature of the estuary over time, allowing for new fish species to extend their range from southern waters. If you own the fishing boat, you start catching these fish and make \$250 in profits.



**Fishing Boat**

Climate change is causing increases in the number of jellyfish in your fishing grounds. The jellyfish are eating all of the copepods the striped bass you are fishing rely on. Pay \$200 for extra fuel so that you can travel to new fishing areas to find healthy striped bass populations.



**Ecotourism Business**

As the climate in your estuary becomes warmer it enables a rare southern species of bird to extend its range into your area. If you own the ecotourism business, you make good profits from the additional tourists flocking to your area. Collect \$200.



**Ecotourism Business**

Climate change is causing an increase in precipitation in your estuary. Tourists don't want to go kayaking on rainy days. If you own the ecotourism business, pay \$150 for lost business.



## Marine Research Lab

Your research on climate change catches the eye of the city officials. They give you a research grant to study shoreline change, to help them develop a science-based plan for sustainable shoreline development. Collect \$350.



## Marine Research Lab

Climate change has caused a change in coastal currents, resulting in rapid erosion of one of your research field sites. If you own the lab, pay \$150 to move your research site and purchase new research equipment for the field.



## Marina

The marina considers rising sea levels and more frequent coastal storm events when expanding and building new docks. If you own the marina, you save in long term maintenance costs. Collect \$200.



## Marina

Important marshland habitat was lost when the marina was expanded. If you own the marina, pay \$250 for marsh restoration.



## Amusement Park

The amusement park becomes the first park completely powered by alternative energy. If you own the amusement park, you get \$250 tax break.



## Amusement Park

Climate change is causing more frequent coastal storms in your area. If you own the amusement park, pay \$150 for increased winter maintenance costs.



## Beach House

Instead of installing a seawall, you enhance the natural shoreline habitat on your beachfront property by placing a living shoreline of native plants, stones and other organic material. Save on post storm event maintenance costs. Collect \$100.



## Beach House

Rising sea level threatens coastal homes. If you own the beach house, it must be moved back 100 feet. Pay \$350 to move your house.



## Shipping Company

Reducing the speed of ships decreases greenhouse gas emissions and fuel costs. If you own the shipping company, collect \$250 in fuel savings for reducing your ships' speed by 20%.



## Shipping Company

Climate change is causing changes in how coastal currents carry and deposit sediments. These currents have increased the deposition rate of sediments in channels so much so that shipping channel has to be dredged twice a year instead of once a year. Pay \$100 dredging tax if you own the shipping company.

