

**TIDES Activity 3 – Estuary Connections – Journey through Time**  
**Chaos – The Times We Can’t Predict**

These cards should be copied on yellow paper or cardstock and represent chance or random actions caused by forces beyond the control of humans (some of these events have happened throughout time, some have been inadvertently the result of human actions.)

**LARGE SHIP**  
 runs aground carrying wood chips and leaks 50,000 gallons of oil on the outer coast near the estuary mouth.

-1      -2      -1

**EARTHQUAKE**  
 along Gordo ridge complex registers 6.8 on the Richter scale causing a tsunami and major land subsidence.

-2      -2      -2

**GLOBAL TEMPERATURE**  
 increases by 1 degree celsius over the past decade causing a sea level rise of 2 inches.

-2      -1      -1

**THEORY OF**  
 interdecadal cycle of warm, dry and cool, wet decades is proven by scientists.

+1      0      +1

**VOLCANO**  
 in the High Cascade mountains erupts for over a year sending millions of tons of ash into the atmosphere.

-1      -1      -1

**OCEAN TEMPERATURE**  
 warms by 2 degrees celsius over 50 years.

-1      -1      -1

**DEMAND FOR WATER**  
 increases and leads to large scale increase in ocean desalination plants along the coast.

+1      -1      +1

**A FOREST FIRE**  
 caused by a lightning strike burns parts of 10,000 acres of steep forested hills near the bay.

-2      -1      -1

**A RED TIDE**  
 caused by a toxic algae bloom closes all shellfish harvest for two weeks during the summer.

-1      0      -1

**EL NINO**  
is particularly strong causing warm ocean conditions for several months during winter and spring.  
-1      -1      -1

**DOUBLING EFFECT**  
(This card doubles the impact of any regular card played during this round.)  
Points x 2

**OCEAN UPWELLING**  
is particularly strong for several years bringing extra nutrients to the nearshore ocean and estuary.  
+1      +1      +1

**LA NINA**  
occur over 3 consecutive years cooling ocean conditions and causing massive storms.  
-1      0      -2

**GOOD ECONOMIC**  
conditions lead to a doubling of Oregon's population both statewide and on the coast.  
+1      -1      +2

**DISEASE ATTACKS**  
Dungeness Crab populations leading to several years of low harvest and poor quality crab.  
-1      -1      -2

**A SHIPMENT OF TOXIC WASTE** imported through the bay is found to have several leaking drums on board.  
-1      -2      -1

**A NON-NATIVE CLAM** begins to reproduce in the estuary causing native populations of "Little Neck" clams to disappear.  
0      -2      +1

**DISEASE ATTACKS**  
Salmon hatcheries in several river systems destroying 90% of the hatchery stock.  
-1      0      -1

**HALVING EFFECT**  
(This card reduces the impact of any regular card played during this round by one half.)  
Points /2

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Points /2

**DOUBLING EFFECT**  
(This card doubles the impact of any regular card played during this round.)  
Points x 2

**GLOBAL TEMPERATURE** increases by 3 degrees celsius over the past century causing a sea level rise of 14 inches in the next century.

-2      -2      -2

**GLOBAL TEMPERATURE** decreases by 3 degrees celsius over the next decade causing sea level to drop by 1 foot and freezing temperatures every winter.

-1      -1      0

**A WAR WITH ASIA** leads to the development of a large naval base and ship building facility along the shore of the bay.

-1      -1      +1

**A NEW SPECIES OF BACTERIA** is discovered when it begins to cause sores on swimmers, fish, and seals in the estuary and ocean.

-1      -1      -1

**A WAR WITH ASIA** leads to attacks on a newly constructed naval base and ship building facility along the shore of the bay.

-2      -2      -2

**GENETIC ENGINEERS** develop a super fast growing species of commercially valuable kelp which is grown in 2,000 acres of the Bay.

0      -1      +1