

# CHAPTER 11--SUSTAINING AQUATIC BIODIVERSITY

Student: \_\_\_\_\_

1. What are cetaceans?
  - A. whales and porpoises
  - B. manatees
  - C. seals
  - D. sea lions
  - E. walruses
2. Which of the following is a baleen whale?
  - A. killer whale
  - B. sperm whale
  - C. narwhal
  - D. bottlenose dolphin
  - E. blue whale
3. Which of the following countries has a significant whaling industry and whale meat market?
  - A. United States
  - B. Australia
  - C. Great Britain
  - D. Japan
  - E. China
4. Which of the following countries is *not* observing the international moratorium on commercial whaling?
  - A. United States
  - B. Norway
  - C. Great Britain
  - D. Canada
  - E. Australia
5. The greatest marine biodiversity is located
  - A. in the sunlit region of the ocean
  - B. in the surface region of the ocean
  - C. under the polar ice caps
  - D. in the open ocean
  - E. in coral reefs

6. How much faster are coastal habitats disappearing than the tropical forests?
- A. about the same
  - B. only a little bit faster
  - C. 2-10 times faster
  - D. 15 times faster
  - E. 20 times faster
7. HIPPCO is an acronym that aids in remembering
- A. the names of extinct species
  - B. African animals that are threatened with extinction
  - C. threats to the world's biodiversity
  - D. the names of international treaties dealing with endangered species
  - E. the organizations working toward saving threatened species
8. Four of the following areas are places where 90% of all the ocean's fish spawn; one is not such an area. Choose the one that is not.
- A. coral reefs
  - B. mangrove forests
  - C. coastal wetlands
  - D. ocean bottom
  - E. rivers
9. Bioinvaders cost the United States approximately how much per hour?
- A. \$10,000
  - B. \$133,000
  - C. \$1,135,000
  - D. \$16,000,000
  - E. \$160,000,000
10. A serious problem that is faced in protecting ocean biodiversity is our lack of data on all of the following *except*
- A. how ocean ecosystems work
  - B. how increasing levels of pollution affect species
  - C. the effect of rising acidity in the oceans
  - D. the effect of increasing water temperature
  - E. the effect of hurricanes on shorelines

11. In order to increase what is known about biodiversity in the oceans, researchers intend to release which of the following?
- A. high-altitude balloons
  - B. miniature autonomous robots
  - C. specially trained dolphins
  - D. several new surface research vessels
  - E. colored dyes
12. How many of the 500 fish species called cichlids, found in African Lake Victoria, have gone extinct since 1980?
- A. 10
  - B. 50
  - C. 100
  - D. 150
  - E. 200
13. Which of the following has *not* been a contributing factor to the dramatic loss of aquatic fish species in Lake Victoria?
- A. increase in population of Nile perch
  - B. frequent blooms of algae
  - C. flooding from torrential rains
  - D. nutrients from surrounding farms and deforested land
  - E. release of untreated sewage
14. The excessive turbidity, or cloudiness, of Lake Wingra in Madison, Wisconsin, was caused by the introduction of which of the following?
- A. Nile perch
  - B. marine seaweed
  - C. catfish
  - D. water lilies
  - E. common carp
15. The first letter "P" in the acronym HIPPCO stands for
- A. perennial
  - B. population
  - C. pressure
  - D. petroleum
  - E. pesticides

16. In 2010 the UN indicates what percentage of the world's people are living along or near the ocean coasts?
- A. 80%
  - B. 60%
  - C. 50%
  - D. 40%
  - E. 20%
17. Human input of which of the following, mostly from fertilizers, has doubled since 1860 and causes eutrophication of marine and freshwater systems?
- A. carbon
  - B. hydrogen
  - C. nitrogen
  - D. oxygen
  - E. sulfur
18. A five year study of European fulmars indicated that in 2009 what percentage of the seabirds had plastic in their stomachs?
- A. 5%
  - B. 15%
  - C. 25%
  - D. 75%
  - E. 95%
19. The direct threat of climate change to marine habitat is
- A. increase in carbon storage in oceans
  - B. spread of tropical diseases
  - C. decreased salinity of water
  - D. rising sea levels
  - E. UV radiation from ozone depletion
20. Which of the following is defined as the area of ocean needed to sustain the fish consumption of an average person, a nation, or the world?
- A. fishprint
  - B. footprint
  - C. resource demand
  - D. ocean view
  - E. ocean resource footprint

21. Which of the following provides a damping effect on storm-driven waves and tsunamis, and will help reduce the impact of rising sea levels from global climate change?
- A. continental shelf
  - B. coral reefs
  - C. mangrove forests
  - D. estuaries
  - E. tidal basins
22. Which of the following has the most destructive effects on ocean-floor ecosystems?
- A. purse-seine
  - B. long-lining
  - C. trawler fishing
  - D. gill nets
  - E. drift-netting
23. When it appears that it is no longer profitable to continue fishing as a result of overfishing, the fish populations are said to be
- A. locally extinct
  - B. commercially extinct
  - C. economically extinct
  - D. biologically extinct
  - E. ecologically extinct
24. All the nations of the world are overfishing the world's global oceans, taking \_\_\_\_\_ more than the sustainable yield of fish.
- A. 10%
  - B. 28%
  - C. 42%
  - D. 57%
  - E. 75%
25. Industrialized fishing has become highly mechanized. Which of the following is *not* one of the major methods used to harvest marine fishes?
- A. trawler fishing
  - B. purse-seine fishing
  - C. rod and reel fishing
  - D. long-lining
  - E. drift-net fishing

26. Four of the following are reasons protecting marine biodiversity is difficult; one is not. Choose the one that is not.
- A. Human ecological footprint is expanding.
  - B. Much of the damage is not visible to most people.
  - C. Oceans lie outside the legal jurisdiction of any country
  - D. There is no understanding of what needs to be done.
  - E. People view the ocean as inexhaustible.
27. What is CITES?
- A. software for producing bibliographies
  - B. a treaty banning trade in endangered species
  - C. a treaty banning barrier island development
  - D. a treaty banning overfishing
  - E. a treaty banning gill nets
28. The leatherback sea turtle survived the asteroid that killed off the dinosaurs but may become extinct because of human activities. Which of the following is *not* a threat to these turtles?
- A. bottom trawler fishing
  - B. being hunted for meat, leather, and eggs
  - C. tourism
  - D. becoming entangled in fishing nets and traps
  - E. plastic bags
29. By law, a country's offshore fishing zone extends to \_\_\_\_ kilometers from its shores.
- A. 50
  - B. 100
  - C. 200
  - D. 300
  - E. 370
30. Which U.S. state is leading the way in establishing marine protected areas where fishing will be banned or strictly limited?
- A. Washington
  - B. Oregon
  - C. California
  - D. Florida
  - E. Texas

31. Which of the following is an example of reconciliation ecology?
- A. restoring a native coastal estuary by planting native vegetation
  - B. purchasing development rights of coastal ecosystems
  - C. negotiating land disputes among competing parties
  - D. a restaurant owner cooperating with local conservation efforts in ecotourism
  - E. passing laws regulating fishing rights
32. Many scientists and policy makers are suggesting an ecosystem approach to sustain aquatic systems. The cornerstone of this would include establishment of fully protected
- A. marine reserves
  - B. benthic zones
  - C. high seas zones
  - D. continental shelf areas
  - E. wildlife reserves
33. What percentage of the world's oceans is closed to fishing and other harmful human activities?
- A. 1%
  - B. 3%
  - C. 5%
  - D. 7%
  - E. 11%
34. Leading marine scientists suggest we need at least \_\_\_\_% of the world's oceans fully protected as marine reserves.
- A. 67
  - B. 41
  - C. 33
  - D. 35
  - E. 13
35. The traditional approach to estimating fish populations is the
- A. potential sustained yield
  - B. minimum sustained yield
  - C. commercial sustained yield
  - D. maximum sustained yield
  - E. optimum sustained yield

36. The newer approach to estimating fish populations, one which takes into account interactions between species and has more room for error, is
- A. maximum sustained yield
  - B. minimum sustained yield
  - C. commercial sustained yield
  - D. potential sustained yield
  - E. optimum sustained yield
37. Some countries use market-based systems to help control access to fisheries. One such program is the
- A. cap and trade system
  - B. total allowable catch system
  - C. co-management systems
  - D. individual transfer rights system
  - E. community-based management system
38. Consumers have a role to play in the effort to sustain aquatic biodiversity and ecosystem services, including all of the following, *except*
- A. demanding sustainable seafood
  - B. encouraging fishing subsidies
  - C. looking for labeling indicating where fish were caught
  - D. encouraging certification of sustainably caught seafood
  - E. select plant-eating species of fish raised through aquaculture
39. Despite their ecological value, the United States has lost more than \_\_\_\_ of its coastal and inland wetlands since 1900.
- A. 10%
  - B. 25%
  - C. 50%
  - D. 75%
  - E. 90%
40. Mitigation banking is supposed to accomplish what?
- A. nothing
  - B. trading wetlands for forest lands
  - C. allowing development of wetland for a fee
  - D. requiring the restoration of all wetlands
  - E. allowing destruction of wetlands if an equal wetland is created elsewhere



41. Decades of degrading the Everglades has resulted in all of the following, *except*
- A. 90% of wading birds have vanished.
  - B. Populations of vertebrates such as deer are down 75-95%.
  - C. Florida Bay, south of the everglades, has become saltier and warmer.
  - D. Lake Okeechobee has been expanded.
  - E. Algal blooms cover as much as 40% of Florida Bay.
42. The goals of the Comprehensive Everglades Restoration Plan include all of the following, *except*
- A. Restore the curving flow of the Kissimmee River.
  - B. Build a series of massive dams to stop water leaving the Everglades.
  - C. Remove 400 kilometers of canals and levees south of Lake Okeechobee.
  - D. Buy 240 square kilometers of farmland and allow it to become marsh.
  - E. Create 18 large reservoirs and underground storage areas.
43. Which of the following is a major threat to biodiversity and ecological function of the Great Lakes?
- A. invasive nonnative species
  - B. ocean sea level rise
  - C. saltwater intrusion
  - D. acidification
  - E. tourism
44. All of the following species are a threat, or a potential threat, to the Great Lakes *except*
- A. sea lamprey
  - B. zebra mussel
  - C. jellyfish
  - D. quagga mussel
  - E. Asian carp
45. Ecological Services of rivers include all of the following *except*
- A. deliver nutrient to seas to help sustain fisheries
  - B. purify water
  - C. renew and renourish wetlands
  - D. remove silt that accumulates in deltas
  - E. provide habitats for wildlife
46. Sustainable management of freshwater fishes involves all of the following, *except*
- A. supporting populations of commercial and sport fish species
  - B. supporting introduction of commercially important nonnative species
  - C. preventing over fishing
  - D. building and stocking reservoirs and farm ponds
  - E. controlling predators and parasites

47. The National Wild and Scenic River Act, passed in 1968, protects designated rivers from all of the following, except
- A. widening
  - B. straightening
  - C. dredging
  - D. damming
  - E. watershed destruction
48. Biologist E. O. Wilson proposed a list of priorities for protecting aquatic biodiversity. Which one of the following is *not* one of those priorities?
- A. complete mapping of the world's aquatic biodiversity
  - B. Identify and preserve the world's aquatic biodiversity hot spots.
  - C. Stop the melting of the arctic ice.
  - D. Protect and restore the world's lakes and river systems.
  - E. Find ways to increase incomes of people living in or near biodiversity reserves.
49. By 1975, commercial whaling had killed enough whales that 8 of 11 major species were extinct.
- True   False
50. The two types of whales are the toothed whales and the baleen whales.
- True   False
51. Since the 1986 International Whaling Commission moratorium on killing whales went into effect, no whales have been killed by the nations of the world.
- True   False
52. We have limited knowledge about both freshwater and marine biodiversity.
- True   False
53. Biodiversity is higher in the surface region of the ocean rather than the bottom region.
- True   False
54. Sea bottom habitats are the only habitats that are not being destroyed or degraded.
- True   False
55. Coastal wetland destruction in industrial countries is lower than the destruction in less-developed countries.
- True   False

56. Scientists cataloging the biodiversity of the deepest ocean zone are adding a few thousand new species each year.
- True   False
57. Plastic items dumped from ships and left as litter kill as many as 1 million seabirds and 100,000 mammals and sea turtles each year.
- True   False
58. The human demand for seafood has almost reached the level of the supply.
- True   False
59. Oceans will become more acidic as a result of the absorption of carbon dioxide and will remain so for thousands of years.
- True   False
60. Climate scientists estimate the oceans will rise between 3.2 and 5.2 feet by the year 2100.
- True   False
61. Canada's 500-year-old Atlantic cod fishery collapsed and was closed in 1992. The cod population still has not recovered, despite a total ban on fishing.
- True   False
62. Nine Pacific Northwest salmon species are listed as endangered or threatened.
- True   False
63. Marine and freshwater fishes are threatened with extinction by human activities more than any other group of species.
- True   False
64. Marine Protected Areas are the only areas in the ocean where fish are totally protected from human activities.
- True   False
65. Approximately 99.9% of the world's oceans are not effectively protected from harmful human activities.
- True   False

66. The high reproductive rate of blue whales will make it possible for the species to recover from being hunted to near extinction, if the hunting stops.
- True   False
67. In Israel, one person has restored a severely damaged coral reef in the Red Sea by building an underwater restaurant next to it.
- True   False
68. The leatherback sea turtle is the only warm-blooded sea turtle.
- True   False
69. Complex computer models for managing large marine systems have made it easy to get groups of nations to cooperate in planning and managing the large system.
- True   False
70. World governments give approximately \$30-34 billion in subsidies yearly to fishers.
- True   False
71. Restoring degraded wetlands is a relatively easy process.
- True   False
72. Creating and restoring wetlands has become a profitable business.
- True   False
73. Many land developers are trying to weaken wetland protections instituted by the Federal government.
- True   False
74. Restoration of the Everglades may take as much as 50 years to complete.
- True   False
75. The negotiated plan to restore the Everglades is now coming apart because of competing interests.
- True   False
76. Salmon populations in the Columbia River have increased by 35% since the dam system was put in place.
- True   False

77. Sustaining freshwater aquatic systems begins by realizing whatever we do on land, as well as what we do in the water, has some effect on those systems.

True False

78. Strategies for protecting the earth's precious biodiversity will not be implemented without bottom-up political pressure from individual citizens and groups.

True False

79. The \_\_\_\_\_ population is decreasing in Lake Victoria because it has reduced its food source.

\_\_\_\_\_

80. Humans have explored only about \_\_\_\_\_% of the earth's global ocean and know little about its biodiversity.

\_\_\_\_\_

81. Whales are fairly easy to kill because of their large size, and because of their need to come to the surface to \_\_\_\_\_.

\_\_\_\_\_

82. The \_\_\_\_\_ marine biodiversity occurs in coral reefs, estuaries, and on the deep-ocean floor.

\_\_\_\_\_

83. Biodiversity is generally higher in the \_\_\_\_\_ region of the ocean than in the \_\_\_\_\_ region because of the greater variety of habitats and food sources.

\_\_\_\_\_

84. Under intense pressure from humans, coastal habitats are disappearing at rates \_\_\_\_\_ times faster than the rate of tropical forest loss.

\_\_\_\_\_

85. Invasive species are blamed for about \_\_\_\_\_ of fish extinctions in the United States between 1900 and 2000.

\_\_\_\_\_

86. The UN estimates that \_\_\_\_\_% of all ocean pollution comes from land-based coastal activities.

\_\_\_\_\_

87. A 2003 study by conservation biologists estimates that \_\_\_\_\_ percent or more of large, open-ocean fishes such as tuna, swordfish, and marlin have disappeared since 1950.
- \_\_\_\_\_
88. Modern industrial fishing has caused as much as \_\_\_\_\_ % depletion of some wild fish species in only 10-15 years.
- \_\_\_\_\_
89. Most fishing fleets today come from \_\_\_\_\_ countries, especially those in Asia.
- \_\_\_\_\_
90. Almost \_\_\_\_\_ of the world's annual fish catch by weight consists of non-target species, that is, not the fish species that was intended to be caught.
- \_\_\_\_\_
91. \_\_\_\_\_ is an invasive species along the east coast of North America that was probably released from outdoor aquariums damaged by Hurricane Andrew in 1992.
- \_\_\_\_\_
92. Approximately \_\_\_\_\_ % of the world's known marine fish species and \_\_\_\_\_ % of the world's freshwater fish species face extinction in our lifetimes.
- \_\_\_\_\_
93. The town of Samana in the Dominican Republic has gone from a run-down town to a tourist hot spot because of \_\_\_\_\_.
- \_\_\_\_\_
94. On a global scale, overfishing is a concern, with at least \_\_\_\_\_ percent of global fish stocks being overexploited or depleted.
- \_\_\_\_\_
95. Sea turtle tourism brings in almost \_\_\_\_\_ more money than the sale of turtle products such as meat, leather, and eggs.
- \_\_\_\_\_
96. Marine reserves would consist of a system of large reserves on the \_\_\_\_\_ and smaller reserves in \_\_\_\_\_.
- \_\_\_\_\_

97. High-latitude oceans may be reaching an acidity \_\_\_\_\_, which poses a serious threat to sea life, and may serve as an early warning about a problem that may become more widespread in the future.
- \_\_\_\_\_
98. The first step in protecting and sustaining the world's marine fisheries is to make the best possible estimates of their fish and shellfish \_\_\_\_\_.
- \_\_\_\_\_
99. Many fishery and environmental scientists are interested in the \_\_\_\_\_, which means sharply reducing fish harvests and closing some overfished areas until they recover and we have more information.
- \_\_\_\_\_
100. The \_\_\_\_\_ system includes coastal communities and the government working together to manage fisheries.
- \_\_\_\_\_
101. Some fisheries biologists and managers have begun using the \_\_\_\_\_ to replace the maximum sustained yield.
- \_\_\_\_\_
102. Consumers have a role to play in sustaining aquatic biodiversity by demanding \_\_\_\_\_.
- \_\_\_\_\_
103. As a result of changes in and around the Everglades, it is now less than \_\_\_\_\_ its original size and much of it has dried out.
- \_\_\_\_\_
104. Wetlands serve as important reservoirs of \_\_\_\_\_ that provide ecological and economic services.
- \_\_\_\_\_
105. A United States federal policy known as \_\_\_\_\_ allows destruction of existing wetlands as long as an equal area of the same type of wetland is created or restored.
- \_\_\_\_\_

106. Since the dams were built on the Columbia River, the wild Pacific salmon population has dropped by \_\_\_\_\_% .

\_\_\_\_\_

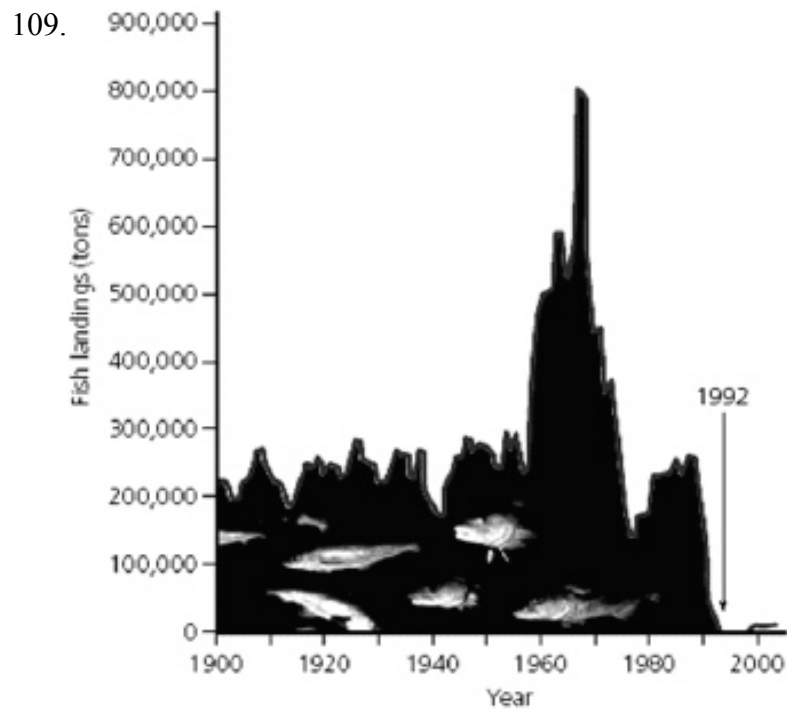
107. Since 1980, the federal government has spent more than \_\_\_\_\_ in efforts to save the salmon in the Columbia River, without success.

\_\_\_\_\_

108. One strategy to protect the earth's biodiversity will cost approximately \_\_\_\_\_, which is the equivalent to a tax of one penny per cup of coffee consumed in the world each year.

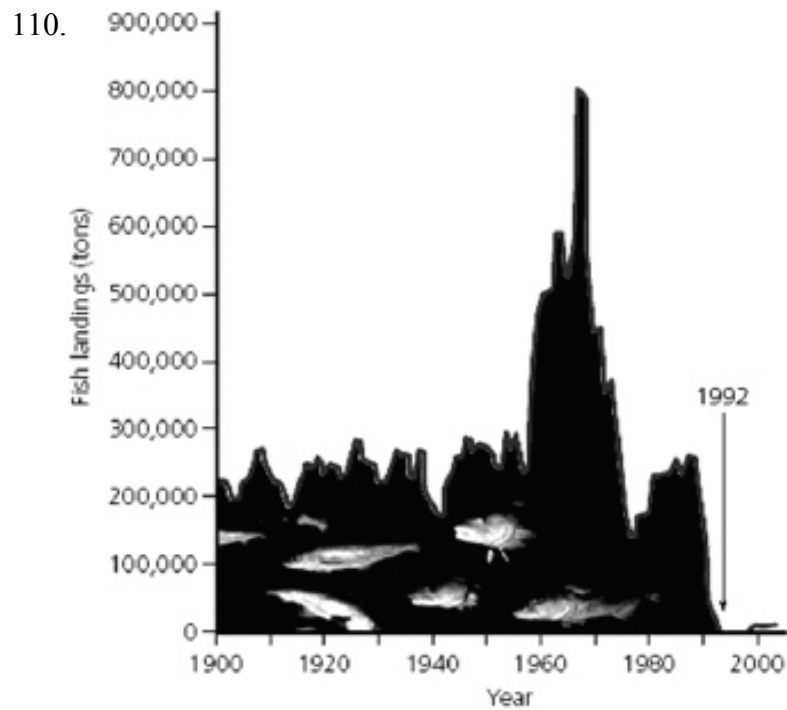
\_\_\_\_\_





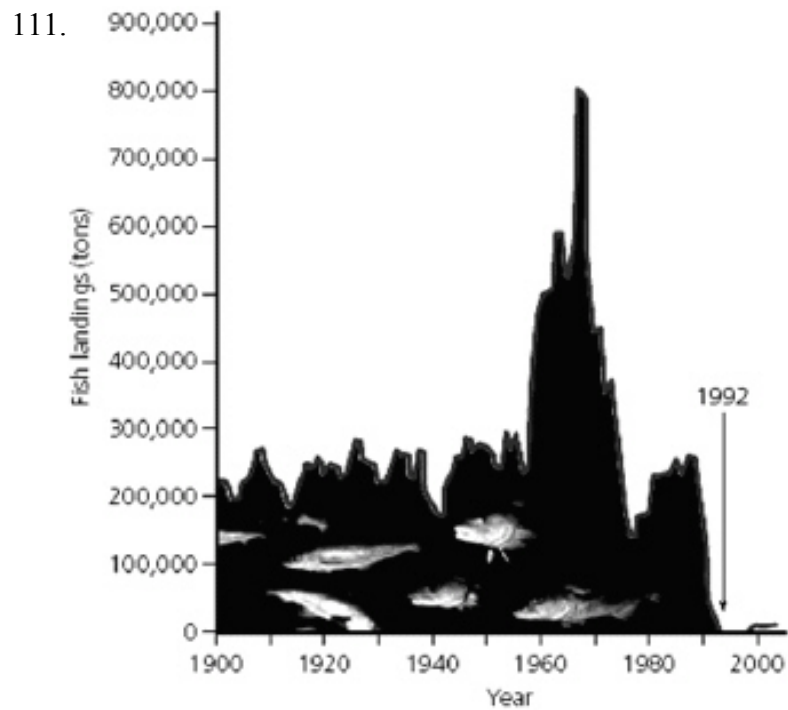
Use the Figure above to answer the following question(s).

At approximately what year did the cod fishery reach its maximum catch?



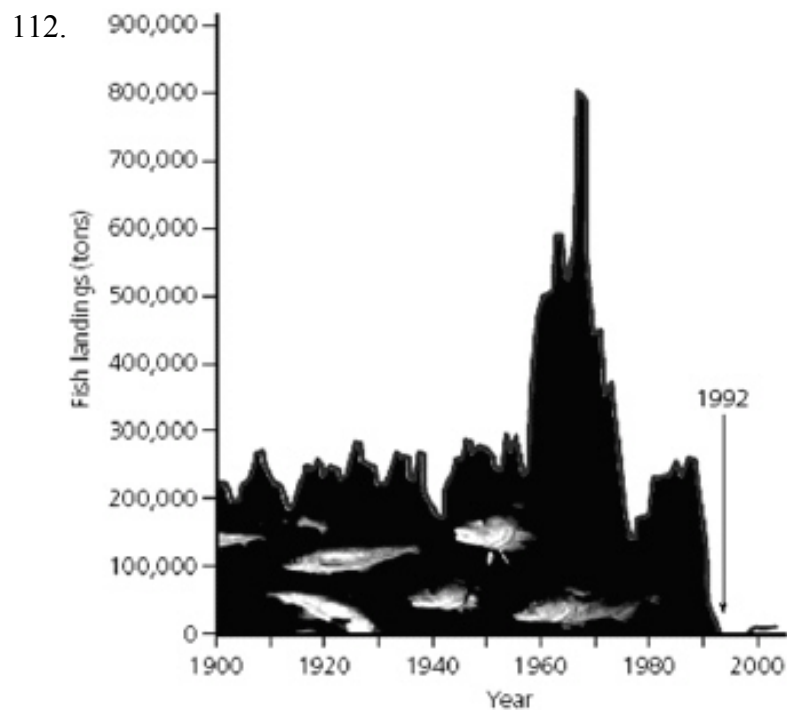
Use the Figure above to answer the following question(s).

What was the size of the catch in that year?



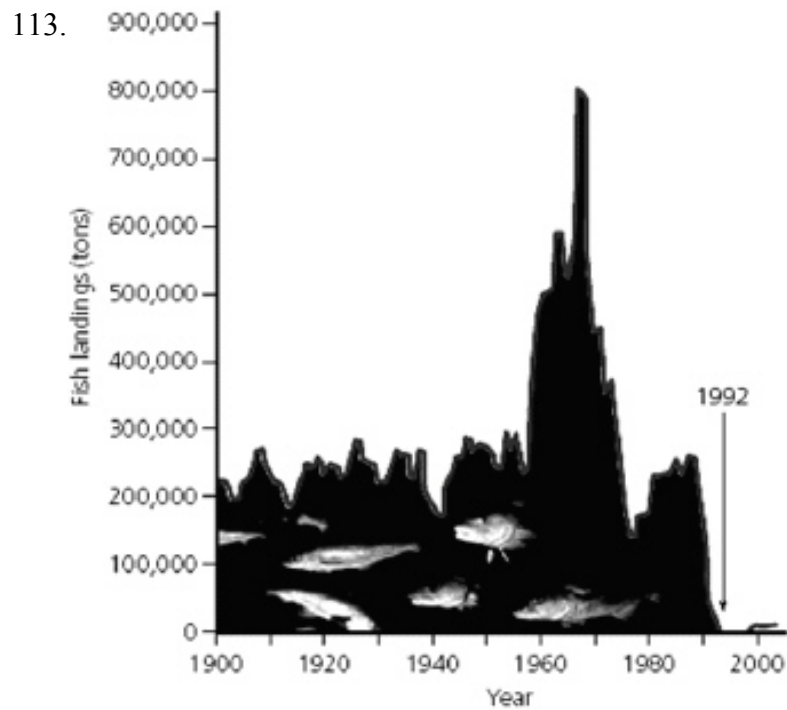
Use the Figure above to answer the following question(s).

What happened immediately after the maximum catch?



Use the Figure above to answer the following question(s).

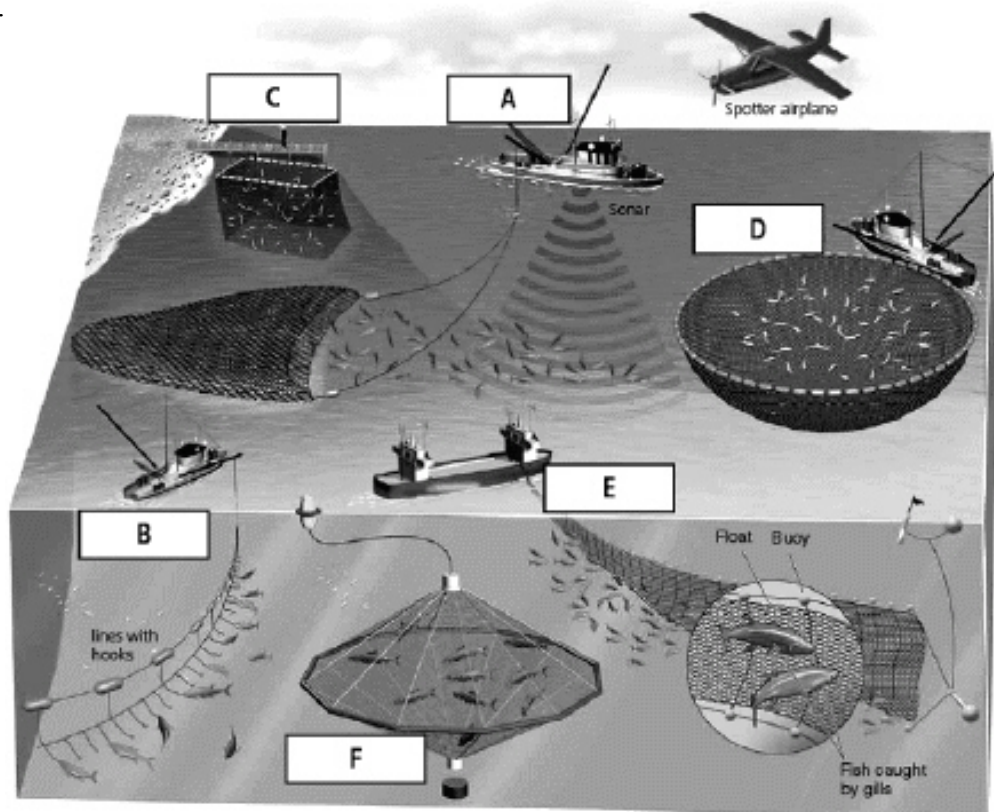
In approximately what year did the catch begin to rise again?



Use the Figure above to answer the following question(s).

What happened in 1992?

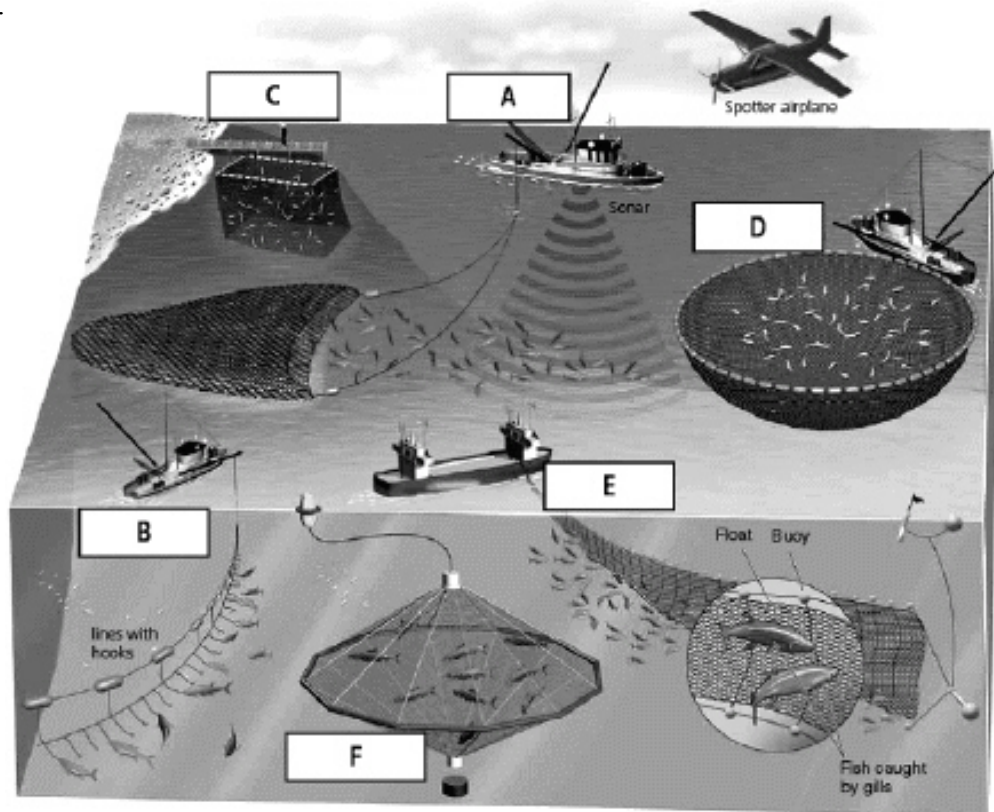
114.



Use the Figure above to answer the following question(s).

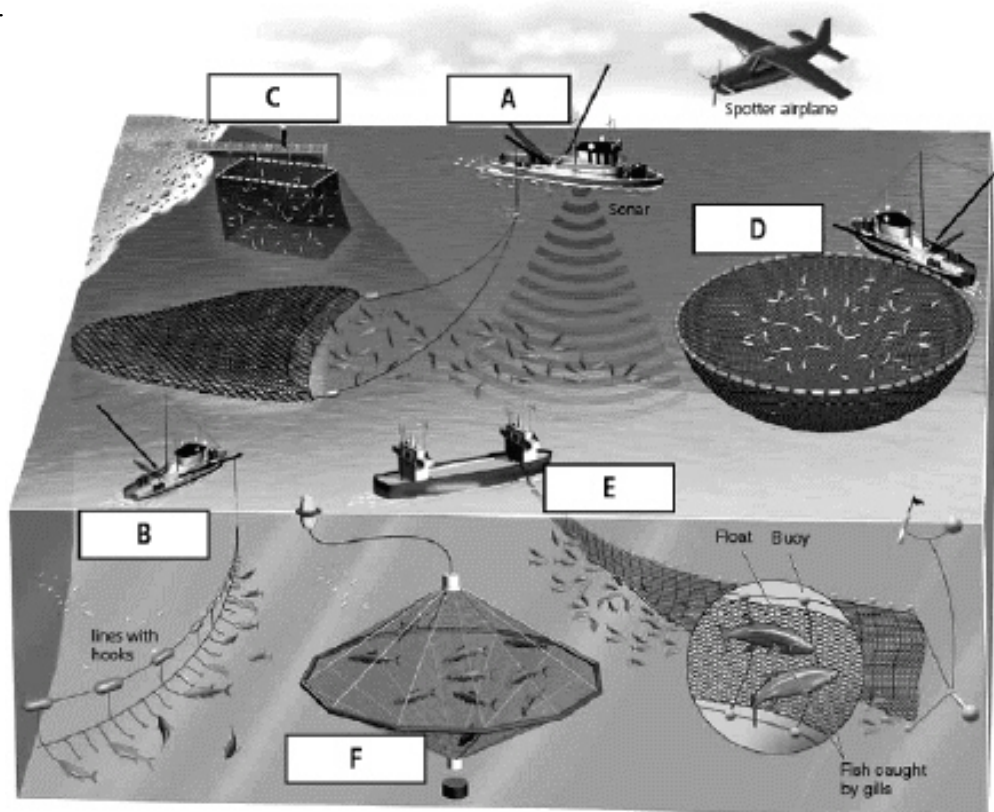
Which letter indicates trawl fishing?

115.



Use the Figure above to answer the following question(s).

Which letter indicates drift netting?

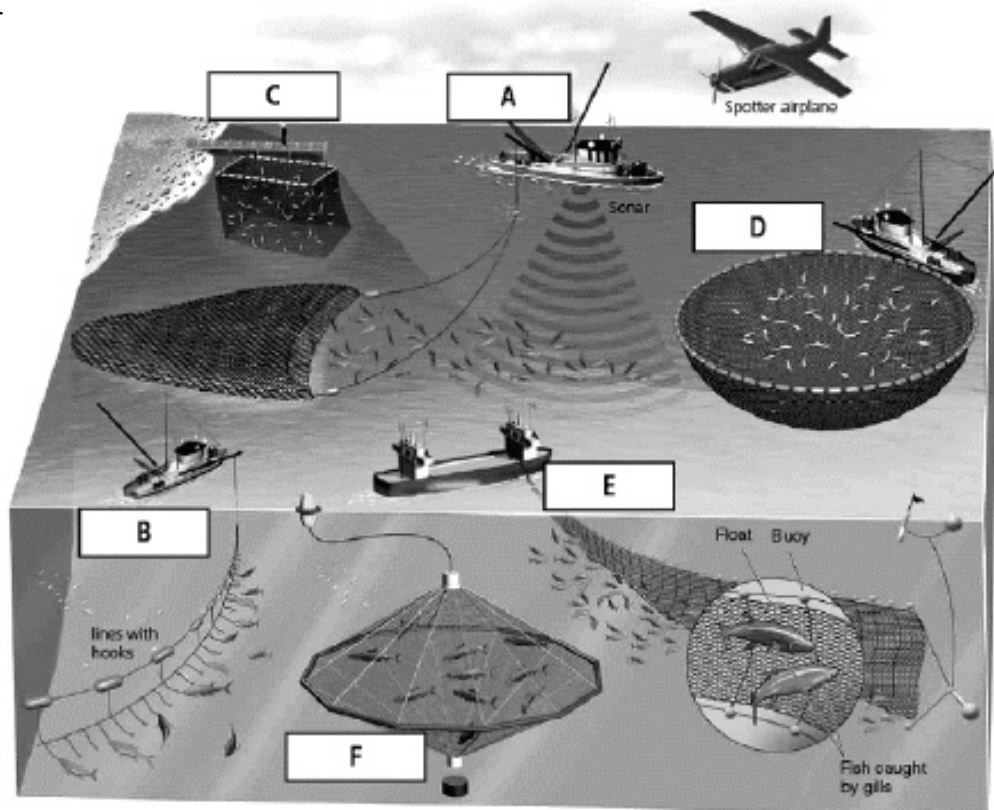


Use the Figure above to answer the following question(s).

Which letter indicates purse seining?



117.



Use the Figure above to answer the following question(s).

Which letter indicates longlining?

118. Whales and humans are both air-breathing mammals and are generally understood to be intelligent. Whales have become iconic as a symbol of the relationship between humans and nature. Choose one of the following questions to answer.
- a. Should the high regard many people have for whales give the whales a special status when it comes to being hunted? Explain.
  - b. Should the fact that whales are intelligent mammals play a role in deciding whether whales should be hunted? Explain.
  - c. Is it appropriate in the 21<sup>st</sup> Century to allow exceptions to bans on hunting for cultural and/or religious reasons? Explain.
119. What part should subsidies play, if any, in the effort to reach sustainable fishing?
120. The Florida Everglades Case Study points out the problems associated with competing interests. In this case, the needs of a rapidly growing urban population compete with the needs of a massive, complex ecosystem. As the human population continues to grow, competition will grow. Is it important for an ecosystem such as the everglades to be restored given the cost and potential impact on the needs of the human population? Explain.

121. The Columbia River has 119 dams and a fish problem. If you were the person in charge of determining what to do, what would you decide? Would you seek to free up the river in favor of the fish, or would you make a few accommodations for the fish and leave the dams in place? Explain.
122. Respond to E. O. Wilson's proposed priorities for protecting the world's remaining ecosystems and species. Do they seem appropriate and possible? Should they be put in place? Who should be in charge of seeing they come to pass?

# CHAPTER 11--SUSTAINING AQUATIC BIODIVERSITY

## Key

1. A
2. E
3. D
4. B
5. E
6. C
7. C
8. D
9. D
10. E
11. B
12. E
13. C
14. E
15. B
16. A
17. C
18. E
19. D
20. A
21. C
22. C
23. B
24. D
25. C
26. D
27. B
28. C
29. E

- 30. C
- 31. D
- 32. A
- 33. A
- 34. C
- 35. D
- 36. E
- 37. D
- 38. B
- 39. C
- 40. E
- 41. D
- 42. B
- 43. A
- 44. C
- 45. D
- 46. B
- 47. E
- 48. C
- 49. FALSE
- 50. TRUE
- 51. FALSE
- 52. TRUE
- 53. TRUE
- 54. FALSE
- 55. FALSE
- 56. TRUE
- 57. TRUE
- 58. FALSE
- 59. TRUE
- 60. TRUE
- 61. TRUE
- 62. TRUE
- 63. TRUE

- 64. FALSE
- 65. TRUE
- 66. FALSE
- 67. TRUE
- 68. TRUE
- 69. FALSE
- 70. TRUE
- 71. FALSE
- 72. TRUE
- 73. TRUE
- 74. TRUE
- 75. TRUE
- 76. FALSE
- 77. TRUE
- 78. TRUE
- 79. Nile perch
- 80. 5
- 81. breathe
- 82. greatest
- 83. bottom; surface
- 84. 2-10
- 85. two-thirds
- 86. 80
- 87. 90 *or* ninety
- 88. 80
- 89. less-developed
- 90. one-third
- 91. Lionfish
- 92. 37; 71
- 93. whale watching
- 94. 63 *or* sixty-three
- 95. three times
- 96. high seas; coastal zones
- 97. tipping point

98. populations
99. precautionary principle
100. co-management
101. optimal sustainable yield
102. sustainable seafood
103. one-half
104. aquatic biodiversity
105. mitigation banking
106. 94
107. \$3 billion
108. \$30 billion
109. about 1968 (+/- 1 or 2 years)
110. 800,000 tons
111. rapid decline or collapse
112. 1978-1979
113. the cod fishing collapsed, falling to zero catch
114. A
115. E
116. D
117. B
118. The intent is to identify the components of decision making when the situation is complex. Insights might include: the appropriate role, if any, of culture and religion in decision making; the role of perceived animal intelligence in determining the organism's treatment; the nature of perception of species as a component in decision making; etc.
119. (page 266) Subsidies are a hot topic in international relationships, especially over trade issues. Subsidies can be important in sustaining certain industries, but subsidies can also give an unfair advantage to one group over another. Because the subsidies are given to an industry involved in the process of degrading a natural resource, it may be inappropriate to continue those subsidies. It may be more appropriate for those who rely on the subsidies to be provided with alternative ways of making a living, or for the subsidies to be used to find alternative ways of making a living from the oceans.
120. (pages 267-270) The intent of these questions is to highlight the value of resources and services provided by nature. If the student views the relationship merely as one species or ecosystem versus humans, most would choose humans. It is only when the value to humans of what is provided by nature is included can a more accurate comparison be made.
121. (page 272) The intent of these questions is to highlight the value of resources and services provided by nature. If the student views the relationship merely as one species or ecosystem versus humans, most would choose humans. In this case some may be troubled by the cost of infrastructure that would have to be altered or removed.
122. (pages 273-274) Wilson's proposal seems reasonable and doable until one considers who would be put in charge of accomplishing the tasks. There seems to be considerable distrust of and disillusionment with government. This may well be intensified by the idea of some supra-governmental agency, as from the United Nations. The result may be an acceptance of the proposals without any notion of how to get them accomplished. The intent, then, is to begin the process of thinking how that might come to pass.