

SPECIES EXTINCTION



Dr. P. SANTHANAM

Assistant Professor

Marine Planktonology & Aquaculture Lab.,
Department of Marine Science, School of Marine Sciences
Bharathidasan University, Tiruchirappalli-620 024, Tamil Nadu.

E-mail: santhanam@bdu.ac.in

Website: www.mpalbdu.weebly.com

THREATS TO BIODIVERSITY

EXTINCTION

A species is extinct when no member of the species remains alive anywhere in the world

Extinct in the Wild:

The individuals of a species remain alive only in captivity or in other human-controlled situations, the species is called extinct in the wild.

Globally Extinct:

Extinct and extinct in the wild species are considered to be globally extinct

EXTINCTION

Locally extinct:

- When the species no longer found in an area it once inhabited but is still found elsewhere in the wild.

Ecologically extinct:

- It persist at such reduced numbers that its effects on the other species in its community are negligible

MASS EXTINCTION

- **Mass extinction event** is a sharp decrease in the number of species in a relatively short period of time.
- Mass extinctions affect most major taxonomic groups present at the time—birds, mammals, reptiles, amphibians, fish, invertebrates and other simpler life forms.
- Over 97% of species that ever lived are now extinct, but extinction occurs at an uneven rate.
- Based on the fossil record, the background rate of extinctions on earth is about two to five taxonomic families of marine invertebrates and vertebrates every million years.

EXTINCTION

Past Mass Extinctions

- The diversity of species found on the Earth has been increasing since life originated, rather it has been characterized by periods of high rates of speciation followed by periods of minimal change and episodes of mass extinction.
- Marine animals first arose about 600 million years ago during the **Paleozoic era**.
- New families of marine animals appeared in rapid and steady succession during the next 150 million years.

EXTINCTION

- In 200 million years, the number of families more or less constant at around 400.
- For the last 250 million years of the **Mesozoic** and **Cenozoic eras**, the diversity has steadily increased to over 700 families.
- There are five episodes of mass extinction in the fossil record, occurring at intervals ranging from 60-155 million years in length.
- These episodes occurred during the **Ordovician**, **Devonian**, **Permian**, **Triassic** and **Cretaceous periods**, could be called “**natural mass extinction**”

EXTINCTION

- The most famous is the extinction of the dinosaurs during the late Cretaceous, 65 million years ago.
- The most massive extinction took place at the end of the Permian, 250 million years ago, when 77-96% of all marine animal species are estimated to have gone extinct.
- These extinct is due to some massive perturbation such as wide spread volcanic eruptions, a collision with an asteroid, or both, caused the dramatic change in the Earths climate that resulted in the end of so many species.
- It took evolution about 50 million years to regain the number of families lost during the Permian extinction.

5 MASS EXTINCTIONS

ORDOVICIAN EVENT

440-450 Ma at the Ordovician-Silurian transition two events occurred, and together are ranked by many scientists as the second largest of the five major extinctions in Earth's history in terms of percentage of genera that went extinct. 27% of all families and 57% of all genera became extinct.

5 MASS EXTINCTIONS

DEVONIAN EXTINCTION

360-375 Ma near the Devonian-Carboniferous transition at the end of the Frasnian Age in the later part(s) of the Devonian Period. A prolonged series of extinctions eliminated about 70% of all species. This extinction event lasted perhaps as long as 20 MY, and there is evidence for a series of extinction pulses within this period. 19% of all families of life and 50% of all genera went extinct.

5 MASS EXTINCTIONS

PERMIAN EVENT

- 251 Ma at the Permian-Triassic transition, Earth's largest extinction killed 53% of marine families, 84% of marine genera, about 96% of all marine species and an estimated 70% of land species (including plants, insects, and vertebrate animals). 57% of all families and 83% of all genera went extinct.

GREAT DYING

The "Great Dying" had enormous evolutionary significance: on land it ended the dominance of mammal-like reptiles; the recovery of vertebrates took 30 million years but archosaurs and then dinosaurs to become the dominant land vertebrates; in the seas the percentage of animals that were sessile dropped from 67% to 50%. The whole late Permian was a difficult time for at least marine life-even before the "Great Dying".

5 MASS EXTINCTIONS

TRIASSIC EVENT

205 Ma at the Triassic-Jurassic transition about 20% of all marine families (55% genera) as well as most non-dinosaurian archosaurs, most therapsids, and most of the large amphibians were eliminated, although it is known from *Koolasuchus* that the Temnospondyl lineage survived until the Cretaceous in Australia. 23% of all families and 48% of all genera went extinct.

5 MASS EXTINCTIONS

CRETACEOUS EVENT(K-T extinction)

65 Ma at the Cretaceous-Paleogene transition about 17% of all families and 50% of all genera went extinct.(75% species). It ended the reign of dinosaurs and opened the way for mammals and birds to become the dominant land vertebrates.

- In the seas it reduced the percentage of sessile animals to about 33%. The K-T extinction was rather uneven-some groups of organisms became extinct, some suffered heavy losses and some appear to have been only minimally affected.

Human Caused Mass extinction

- Marine fish or coral species that have gone extinct during the last few thousand years
- Only around 12 species-3 marine mammals, 5 marine birds and 4 molluscs are known to have gone extinct in the world's vast oceans.
- The number of extinctions is almost certainly an under estimate, since marine species are not nearly as well known as terrestrial species, but it may reflect a greater resiliency of marine species in response to disturbance.
- Many marine mammals are top predators, and their loss could have a major important act on marine communities

Human Caused Mass extinction

- Some marine species are the sole species of their genus, family or even order, so the extinction of even a few species can possibly represents a serious loss to global biodiversity.
- Marine coastal waters become more polluted and species are harvested more intensely, even the vast oceans will not provide safety from extinction.
- The majority of freshwater fish extinctions have occurred in mainland areas rather than on islands because of the vastly greater number of species in mainland waters.

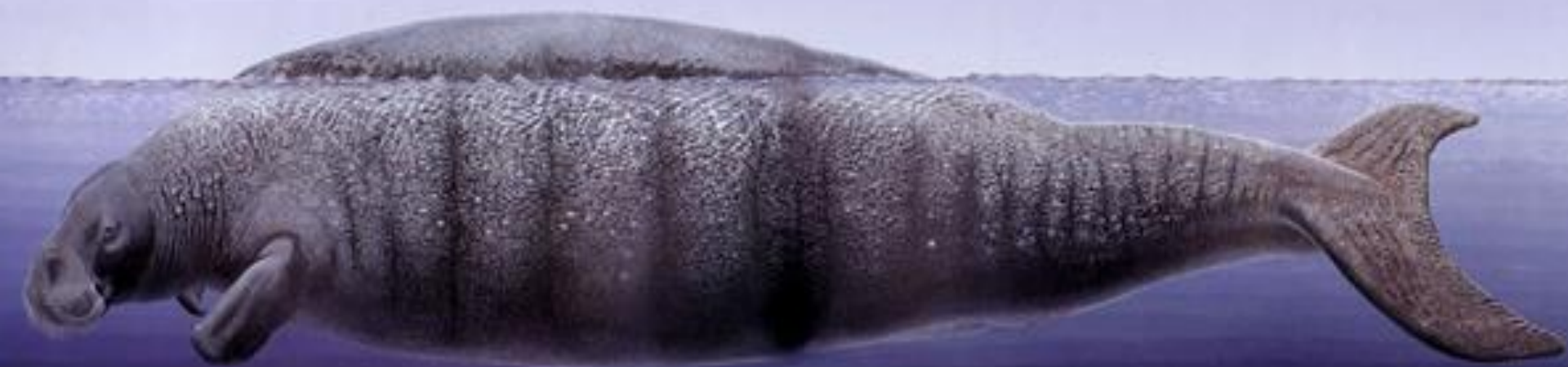
Human Caused Mass extinction

- In North America, over one-third of freshwater fish species are in danger of extinction. The fishes in California are particularly vulnerable because of the scarcity of water and its intense development.
- In California, 115 types of native fish are already extinct and 56% are in danger of extinction. Large numbers of fish and molluscs are danger of extinction in the South eastern United States of America because of dams, pollution, irrigation projects, invasion of alien species and general habitat damage.

Human Caused Mass extinction

- **Lake Victoria in East Africa**, it is surrounded by Kenya, Tanzania and Uganda, one of world's largest freshwater ecosystem until the early 1980s, it was also one of the most diverse in numbers of fish, that time it had over 400 endemic species of fish, but at present only one native species and two introduced species, all of the remaining species are threatened, endangered or extinct.
- The rapid losses are due to increase in the population of a single species of fish, the Nile Perch *Lates niloticus* which was introduced in to Lake Victoria in 1954.
- In 1980's algal blooms
- In 1990's water hyacinth (*Eichornia crassipes*)

Steller's sea cow
Hydrodamalis gigas
1768



sea mink

Neovison macrodon

1894

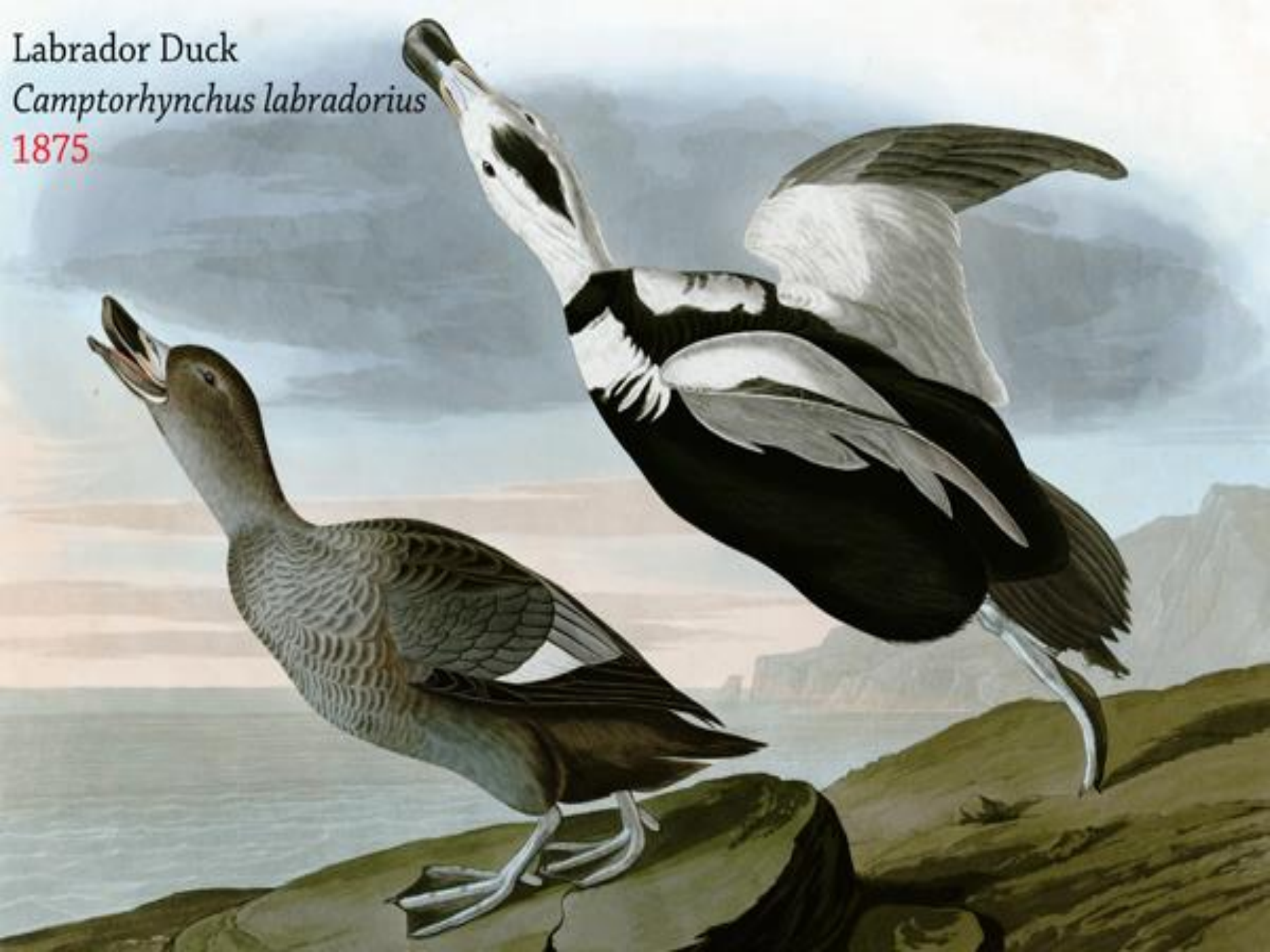


Mounted specimen of the "sea mink" from the Clark collection (Smithsonian Institution photograph, 1966).

PROCC. U.S. NAT. MUS. VOL. 122

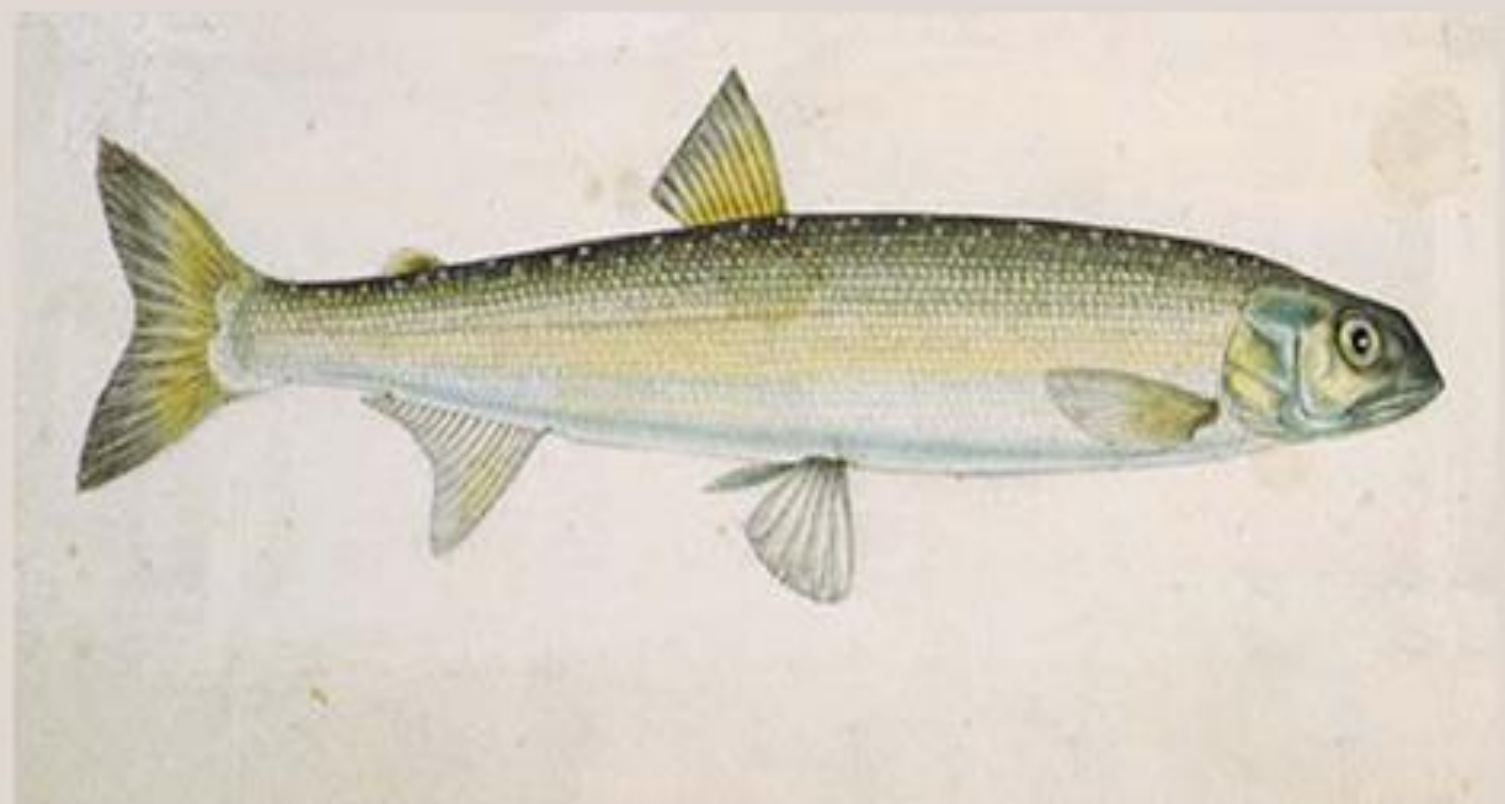
MANVILLE—PLATE 1

Labrador Duck
Camptorhynchus labradorius
1875



New Zealand grayling
Prototroctes oxyrhynchus

1923



Caribbean monk seal
Neomonachus tropicalis
1952





J. C. Kousser, M.A.

M. H. H. H. H. H.

PUFFINUS ELEGANS

Periwinkle

Littoraria flammea

1840

No image available



Ammonites



Basilosaurus



Cephalaspis



Liopleurodon



CAUSES FOR EXTINCTION

Flood basalt events

Hydrogen sulfide emissions

Sea-level falls

Oceanic overturn

Impact events

Gamma ray burst

Global cooling

Continental drift

Global warming

Plate tectonics

Clathrate gun hypothesis

Other hypotheses

Anoxic events