

## HISTORY IN THE ROCKS – Mudurup Rocks and the Ice Age.

James Hutton c.1785 – “**Uniformitarianism**”. What we see around us today is the result of gradual process that have been going on for millions of years, and are still going on this very day.

**eg. Bubble Sand** – visible in the making today; fossilised in the limestone from before the last ice age.

Ice Ages: **Pleistocene Ice Age** (the last Glacial Epoch)  
Began 2.5 million years ago, still going (interglacial now).  
4 main phases (glacials) and interglacials.  
Human evolution during this time (Tool-users – eg *Homo* spp).

### **Ice ages cause global sea-level fluctuations**

Seawater locked up in ice sheets at poles and northern continents (depends on summer snow-melt).

#### BEFORE THE PLEISTOCENE:

There were several glacial epochs, hundreds of millions of years ago, with warm periods in between. Between the glacial epochs there were warm periods with no ice on the poles – “Greenhouse Earth”:

Sea level >200m ABOVE present level

All Swan Coastal Plain flooded – coastline at Darling Scarp.

#### LATE PLEISTOCENE:

200 000 years ago – sea level 50m ABOVE present level.

– followed by “bumpy” lowering of sea level – beach sand blown inland and forms dunes.

These dunes cemented by action of rain, forming limestone ridges – eg Kings Park & coastal dunes.

20 000 yrs ago (last ice maximum) – sea level 120m BELOW present – so coastline beyond Rottnest.

From 18 000 to 6 000 years ago, 3 major flooding events as sea level rose unevenly at end of ice age. (Human culture at this time – v. late Paleolithic & Mesolithic & into early Neolithic with farming & pottery) eg. “flood” at 6 000 years ago – up to 3m above present, producing exposed wave-cut platforms.

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### **Coastal formations (process now occurring)**

LOOK FOR THESE HAPPENING NOW:

Bubble-sand, wave cross-bedding, coastal dunes, erosion, wave-cut platforms, beach rock, etc.

### **Evidence of same processes in the past** (This illustrates uniformitarianism.)

IN THE CLIFF, LOOK FOR: *Note: These are in reverse chronological order.*

- **Top 2.7m layer:** Cross-bedding in fossil sand-dune layer with fossil roots.
- **Middle layer 2.6m:** Flatter bedding layers in fossil beach sand with shells and bubble-sand.
- **Bottom layer 0.6m:** Cross-bedding in shallow marine deposits. Fine-grained with shells.

ALSO ON CLIFF: Solution-pipes and fossil roots.

Wave-cut platform high above present sea-level – evidence of higher sea-level (vis.from base of groyne).

UNDER FOOT: Beach-rock, pot-holes in old wave-cut platform, fossil roots and solution-pipes.

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### **References:**

BREARLEY, Anne 2005 :Ernest Hodgkin’s Swanland... UWA Press, Perth.

DEPT OF CONSERVATION & ENVIRONMENT Coastal Management in WA Bulletin #49, Perth.

DIXON, Kingsley 2011: Coastal Plants – a Guide to ...Perth Region CSIRO, Collingwood, Vic.

GOZZARD, JR 2007: Geology & Landforms of the Perth Region Dept. of Industry & Resources, Perth.

SEDDON, George 1972: Sense of Place UWA Press, Perth.

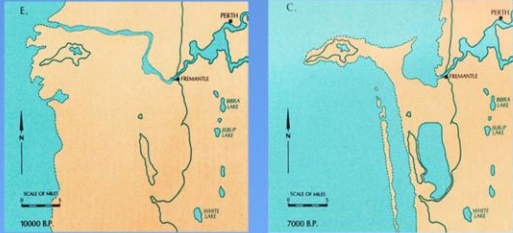
SEMENIUK, Vic: various articles – eg publications of Royal Society, Perth.

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*Mike Gregson. April 2013*

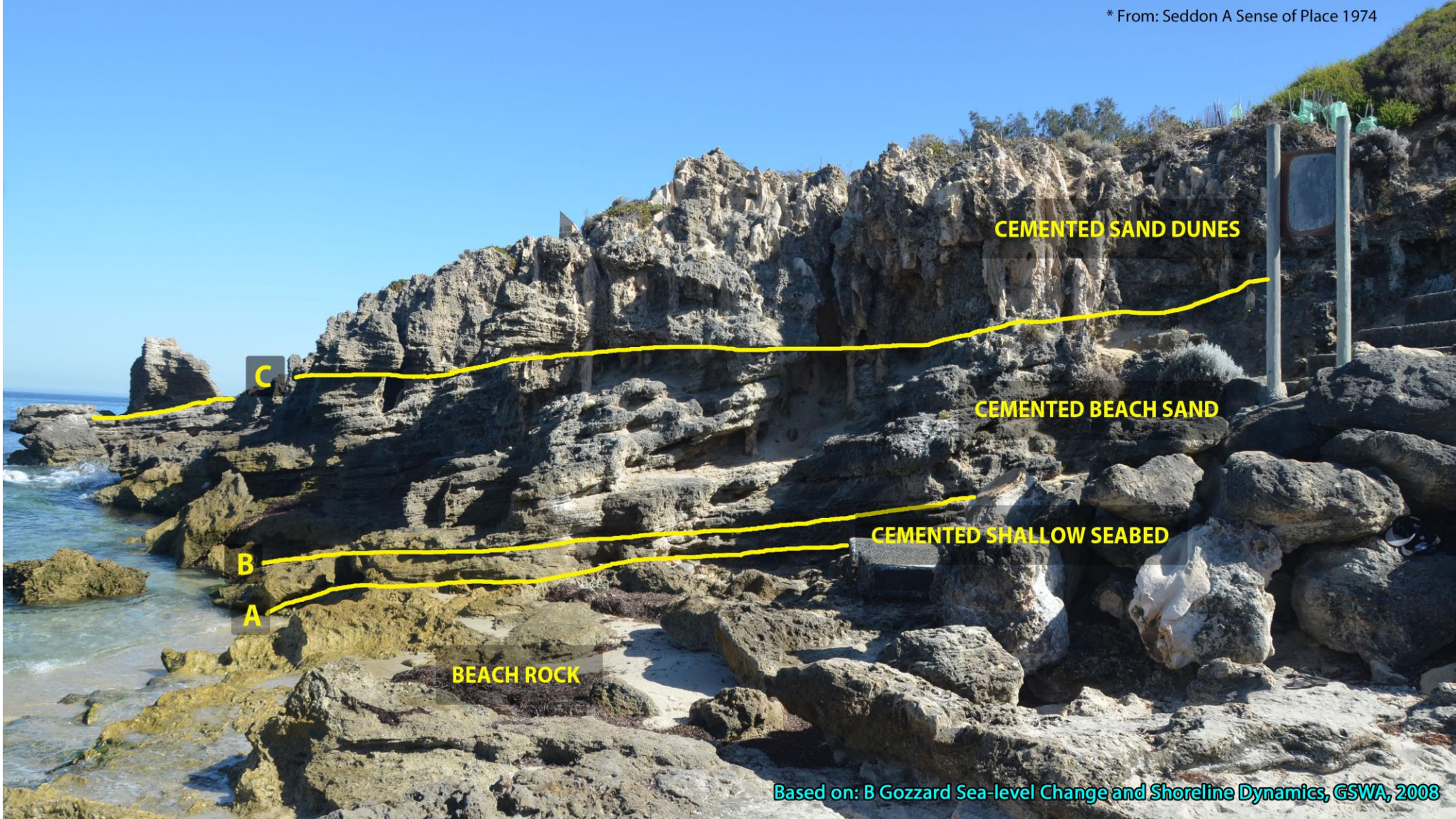
# FOSSIL LAYERS AT MUDURUP ROCKS, COTTESLOE FORMED DURING CHANGING SEA LEVELS



10,000 yrs ago

7,000 yrs ago\*

\* From: Seddon A Sense of Place 1974



Based on: B Gozzard Sea-level Change and Shoreline Dynamics, GSWA, 2008