

Case Study for Black Coral From Hawaii

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Introduction

Phylum Cnidaria Order Antipatharia (Hexacoral)

>15 species in Hawaii (Taxonomic problems)

Fishery started in 1958 for the jewelry trade

3 species targeted by fishery – 1 dominant target

20 – 110 m depth range for targeted species

One of few black coral fisheries in Pacific

Antipathes dichotoma
25 m



Antipathes dichotoma
95 m



Antipathes grandis

65 m

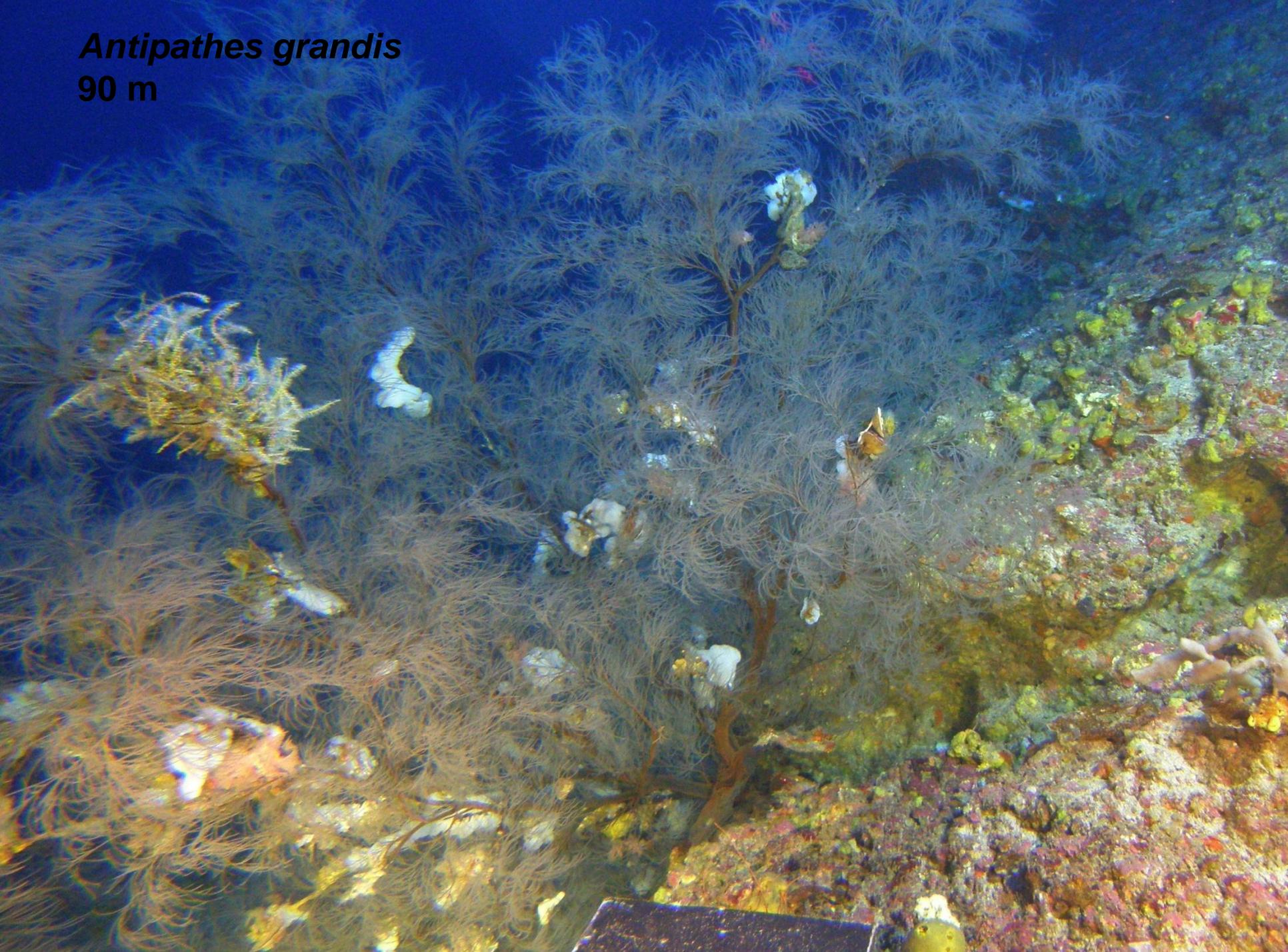


Antipathes grandis

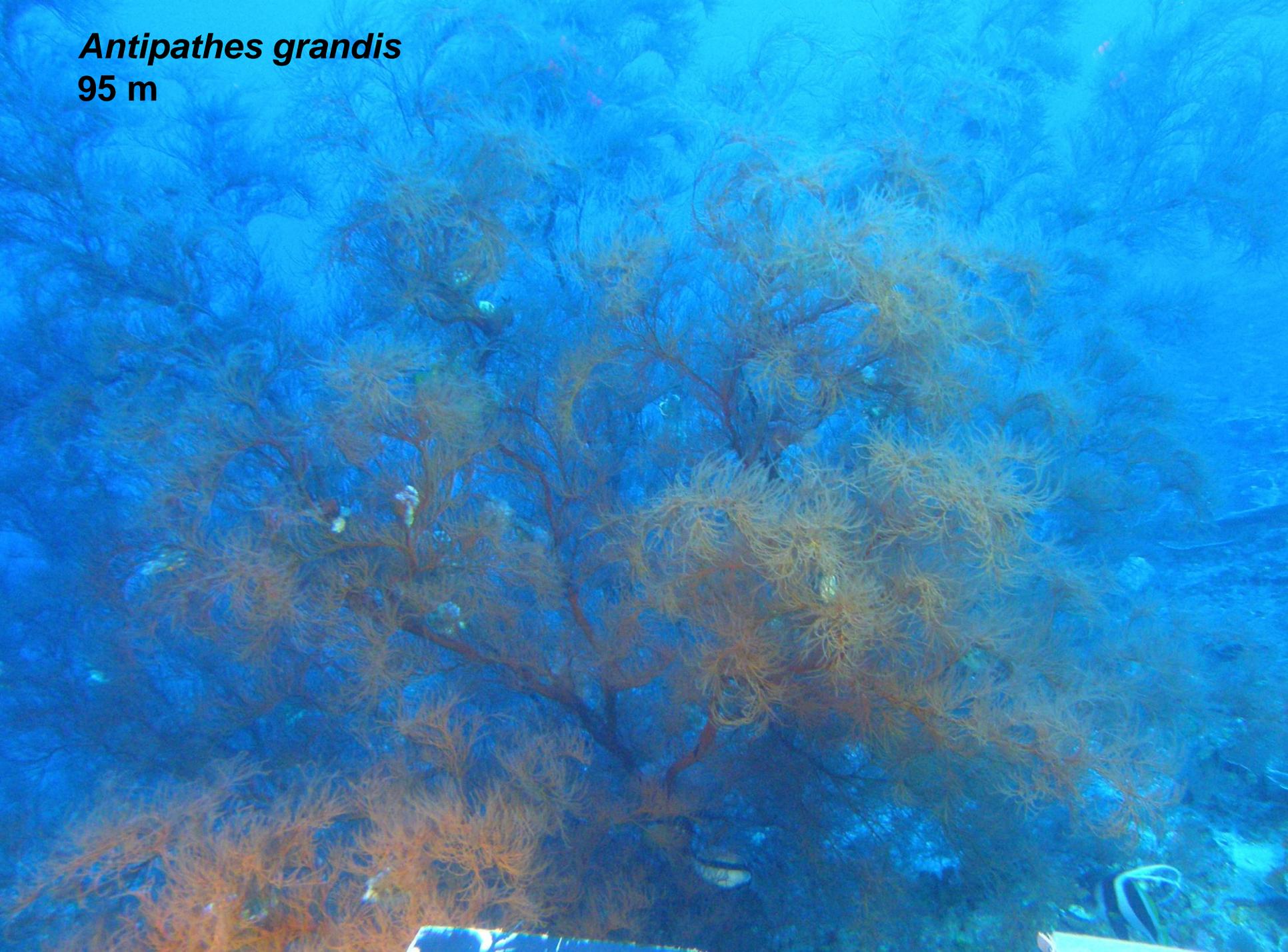
85 m



Antipathes grandis
90 m



Antipathes grandis
95 m



Myriopathes ulex
25 m



Cirrhipathes anguina

***Stichopathes* sp.**

65 m

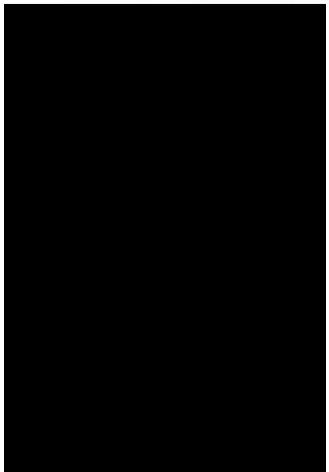
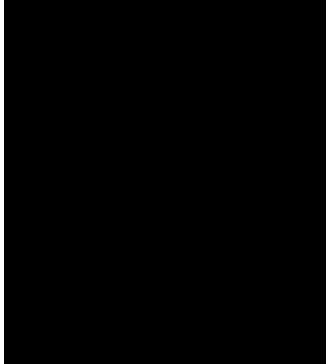


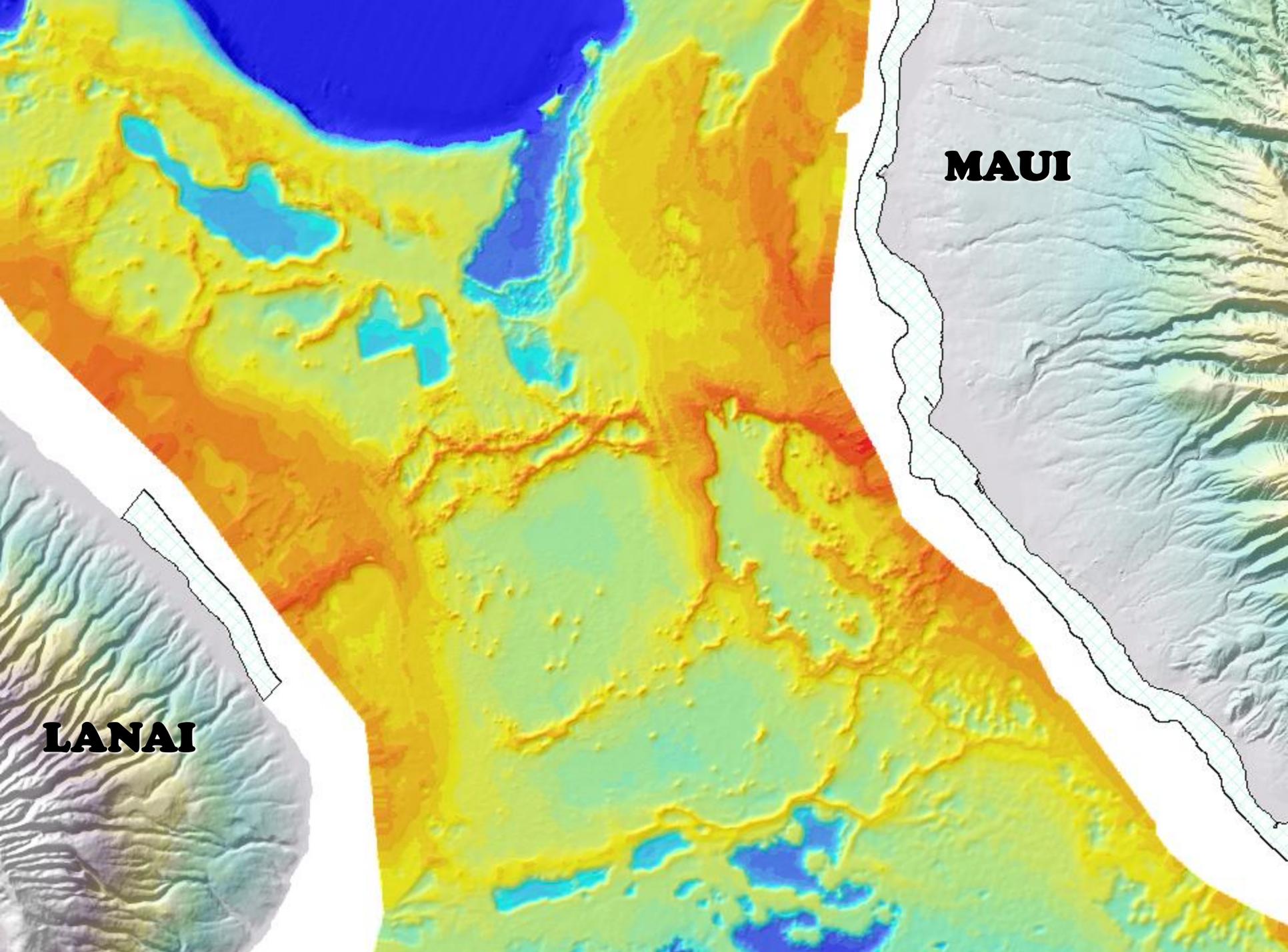






0.
1.





LANAI

MAUI

Key numbers to remember:

**Maturity estimated to be
10.5 to 12 years = 67-77 cm height**

Yearly growth = 6.42 cm/year

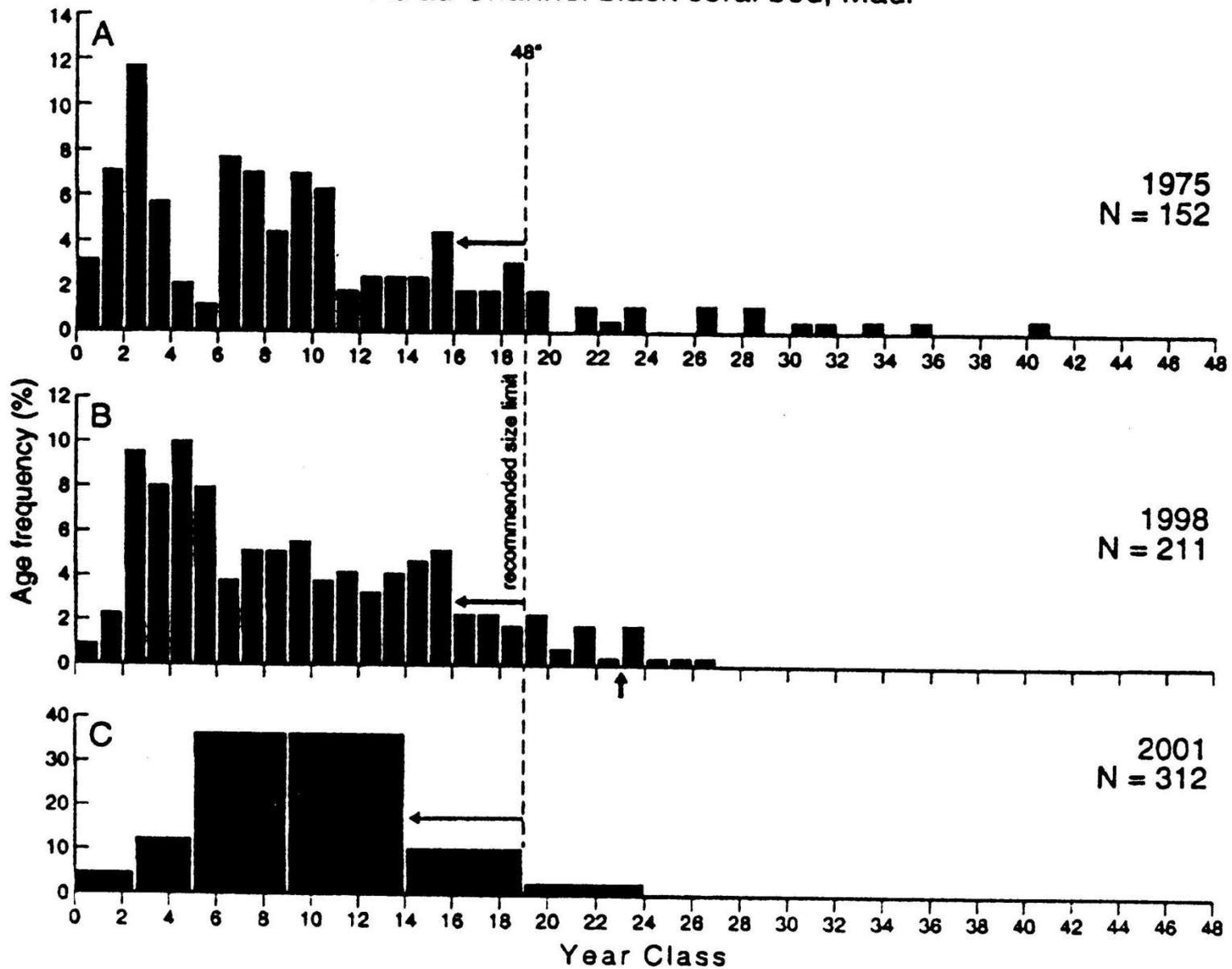
36" height = $\frac{3}{4}$ " Base Diameter

90 cm = 1.9 cm = 14 years

48" height = 1" Base Diameter

120 cm = 2.5 cm = 19 years

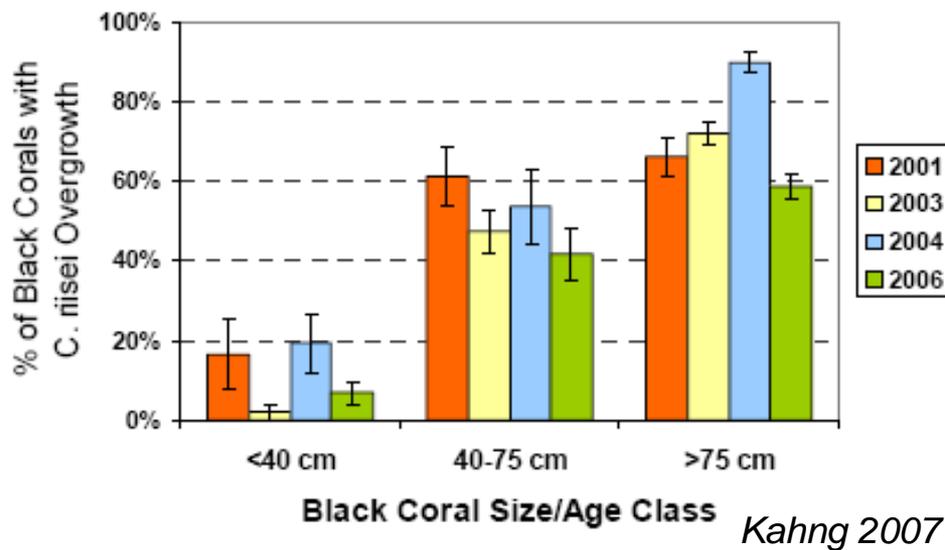
Au'au Channel black coral bed, Maui



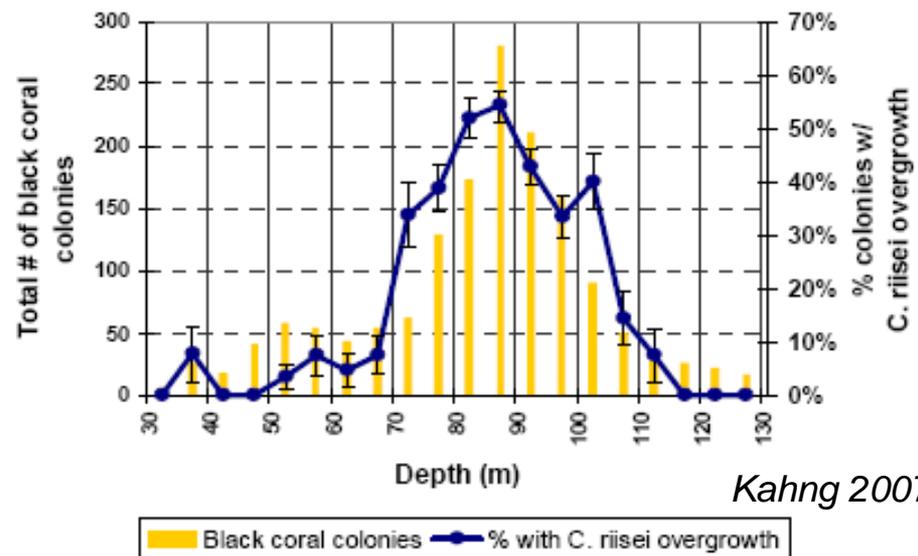
Grigg 2004



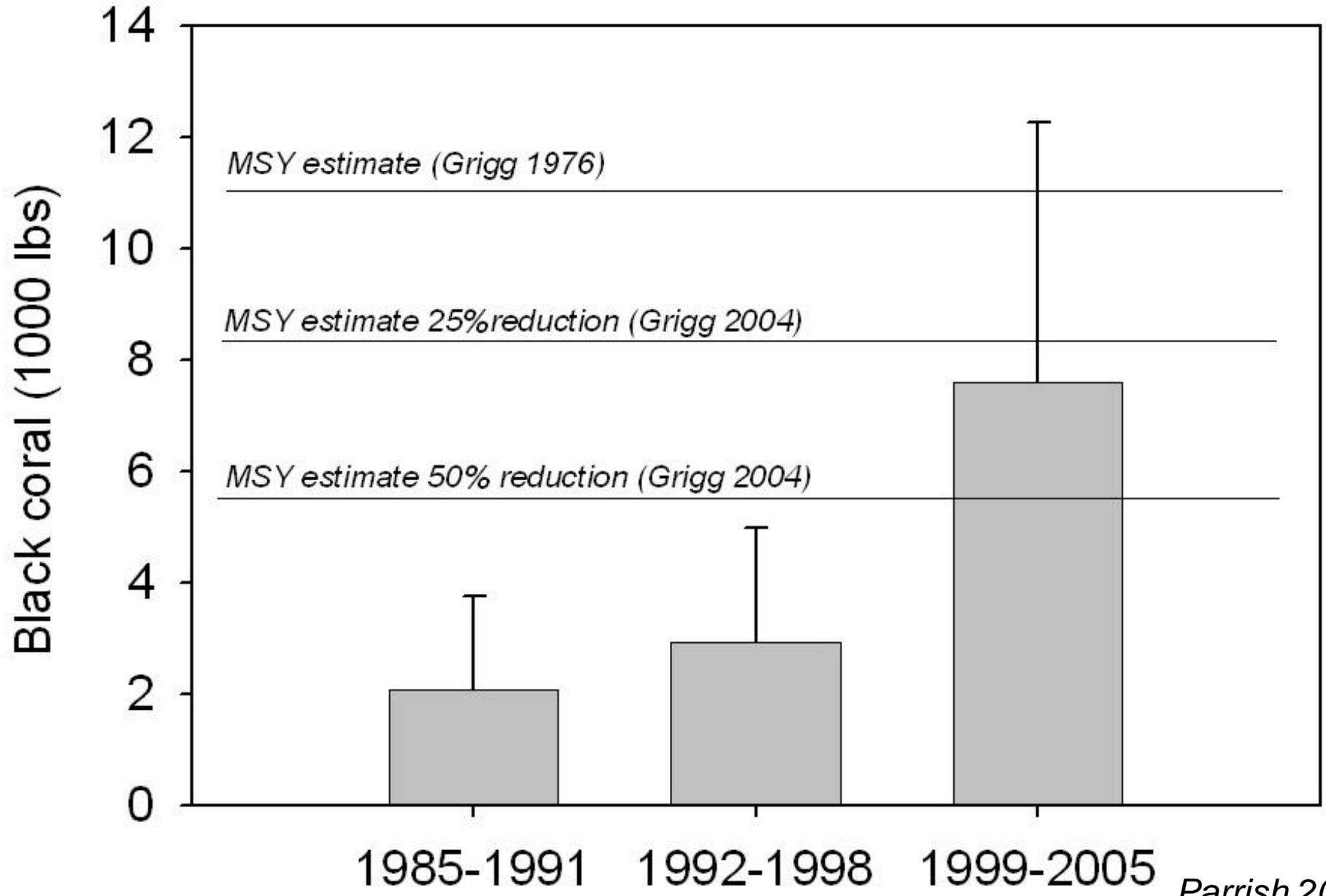
2001-2006 Keyhole Pinnacle Area



2001, 2004, 2006 Au'au Channel



Mean annual black coral landings (w/sd)



Threats to Resource

Carijoa invasion below 70 m

Harvesting pressure above 70 m

Potential drop in recruitment

Data Collection Method:

Grigg 1975 and 1998

**Divers using single tank with air
Measure colonies with 1.2 meter rod
Bottom time ranged 10 to 13 minutes**



Grigg 2001

**Submersible with 2 observers
Use laser to measure colonies**



DAR 2004

**Divers using mixed gas SCUBA
Measure colonies with 1.2 meter rod
Bottom time ranged 25 to 30 minutes**



Assumptions of Age Frequency Analysis

Constant survival/mortality

Constant recruitment for all age groups

Sample is representative of whole population

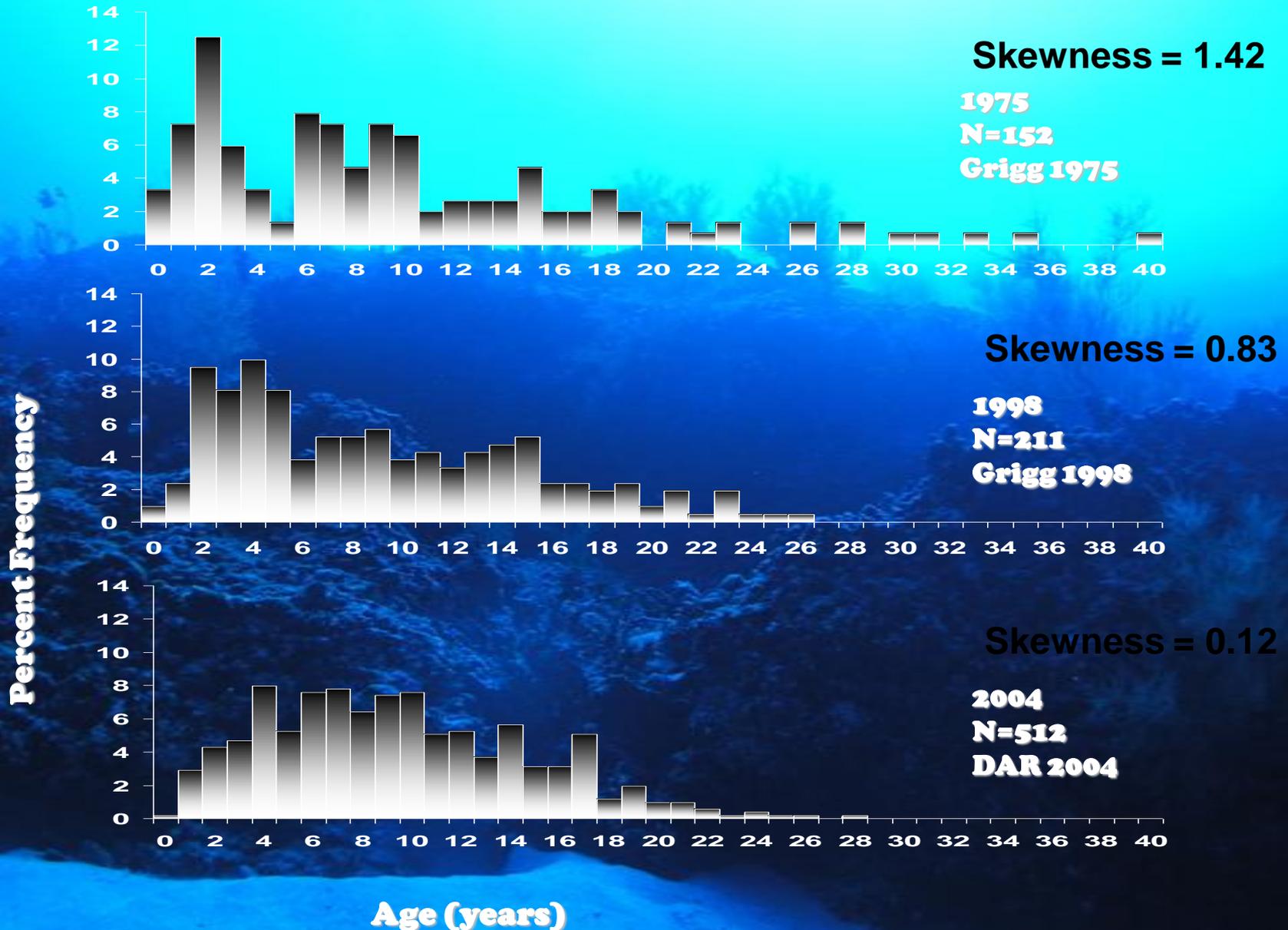
Regression Analysis:

Ages 0 and 1 were dropped

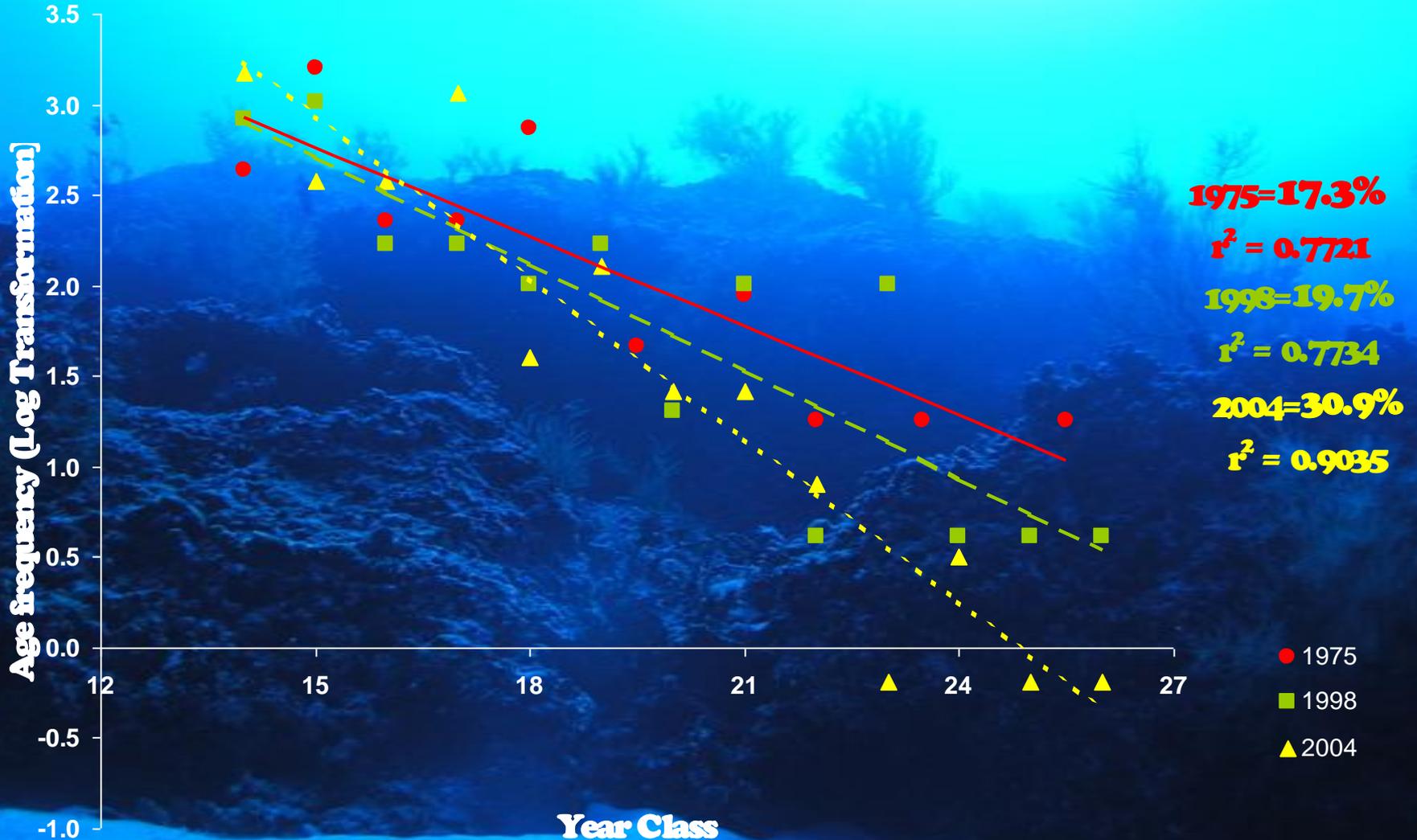
If an age class is missing individuals, that age class was averaged across 2 years

Regressions were carried out only across age classes for which there was reasonably continuous data (i.e. no more than 2 years without any individuals)

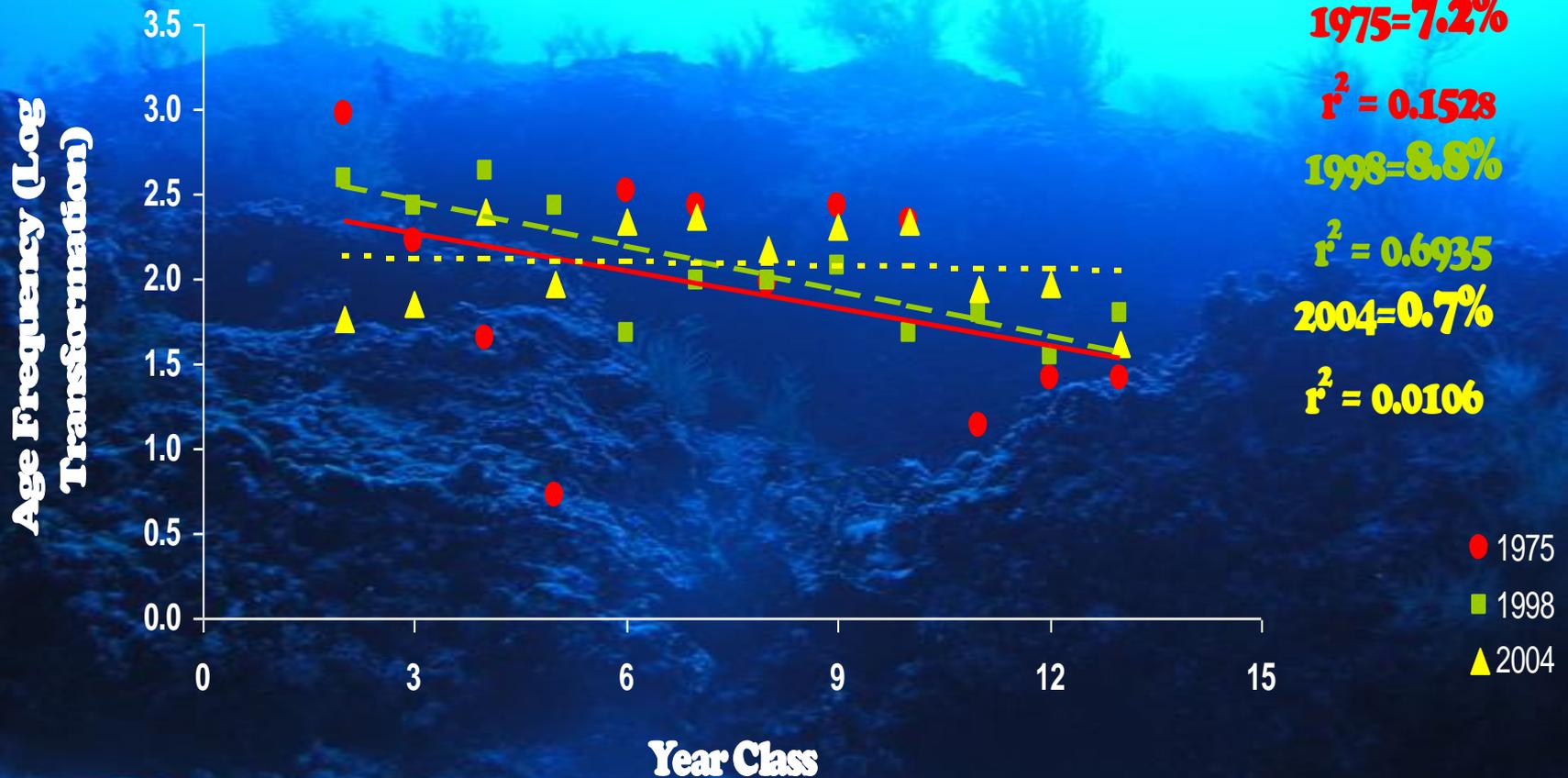
Age Frequency Distribution



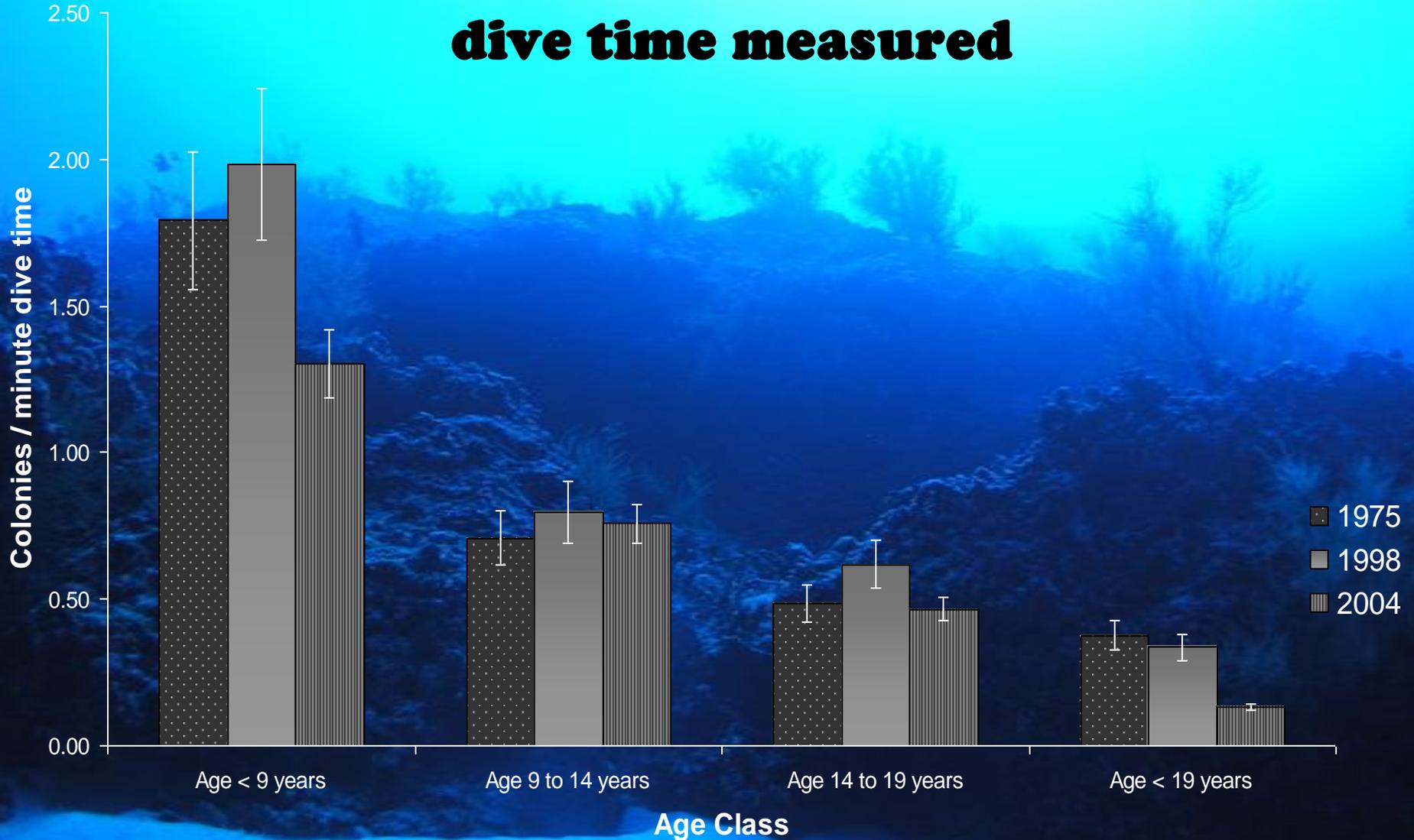
Regression of Post-Harvest Age Frequency Distribution



Regression of Pre-Harvest Age Frequency Distribution



Colonies per minute dive time measured



Current Regulations:

**State of Hawaii – Minimum size of $\frac{3}{4}$ " base diameter
(in process of increasing to 1" base diameter)**

Commercial Marine Fishing License

**Planning on adding Total Allowable Catch
(TAC) and closed areas**

**Federal – Minimum size of 1" base diameter or 48"
height**

Harvest Quota of 5000 kg/ 2 years

Pacific Precious Coral Permit

U.S. Fish and Wildlife Service

International Affairs Program

- **Scientific Authority**
- **Management Authority**
- **International Conservation**

Black Coral NDF

Black coral exports in the U.S.

- **Industry is small (3 or fewer operators)**
- **Exports limited to specimens from Hawaii**

Black Coral NDF

DSA uses the following

- **Licensing & reporting requirements**
- **Minimum size limit**
- **Maximum sustainable yield**
- **Industry information**
- **Practical harvest limitations**

Black Coral NDF

Industry Information - Applicants report

- **Weight of unworked black coral purchased (new applicant - on hand; established applicant - since last permit)**
- **Amount of unworked stockpiled coral**
- **Number of weight of processed specimens**

Black Coral NDF

Practical Harvest Limits

- **SCUBA depth is limited**
- **Areas beyond SCUBA depth serves as de facto refugia**

Black Coral NDF

- **Information confidence**
- **Min. size and MSY based on peer-reviewed science**
- **Research is ongoing**
- **Industry self-reporting difficult to verify receipts to specimens**
- **Concept of deep water refugia reasonable although never confirmed**
- **Voluntary size limits after 2005 not verifiable**

Black Coral NDF

Main Problems/Recommendations

- **Consult with experts to obtain latest info and correctly interpret it**
- **Stay abreast of management and regulatory changes**
- **Application form - specific to coral/seahorses**
- **Understand the trade - trade data and products in trade**

Black Coral NDF

Recommendations

- **DSA uses templates for findings (see sample)**
- **different ones for plants and animals**
- **New NDF for each export**
- **Permit conditions**
- **Keep electronic copy**
- **Legal acquisition - DMA**