MARINe:
A Long-Term Monitoring Program for Detecting Change in Rocky Intertidal Environments

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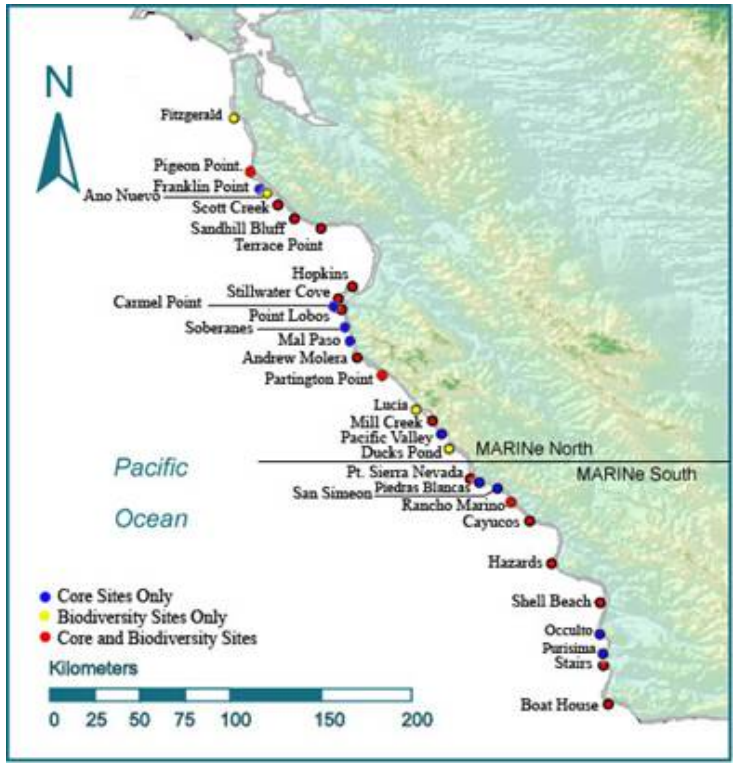
MARINe
(33 Unique Partners)

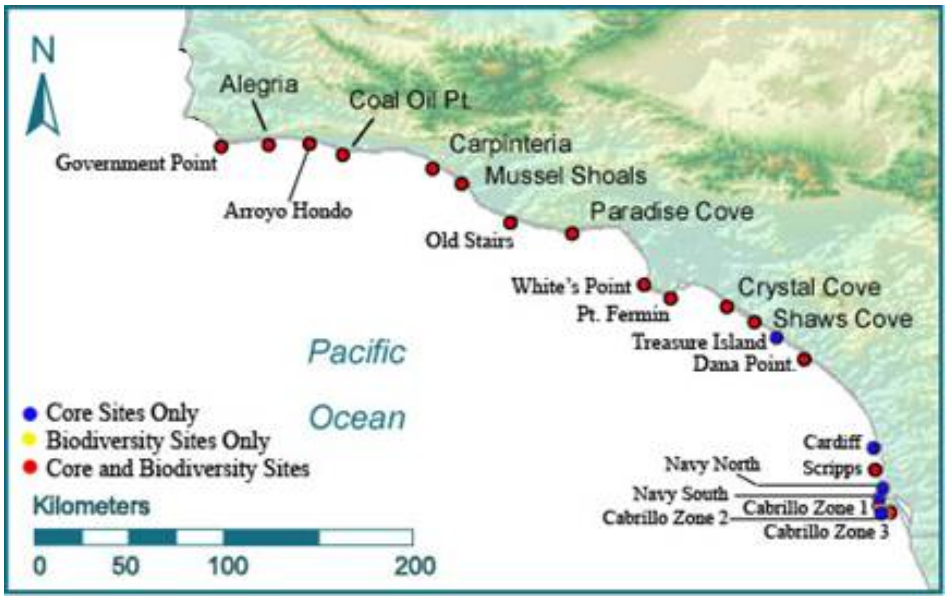
UC SANTA CRUZ

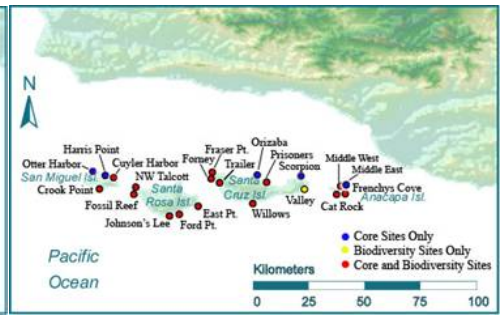
PISCO

MARINe Sites

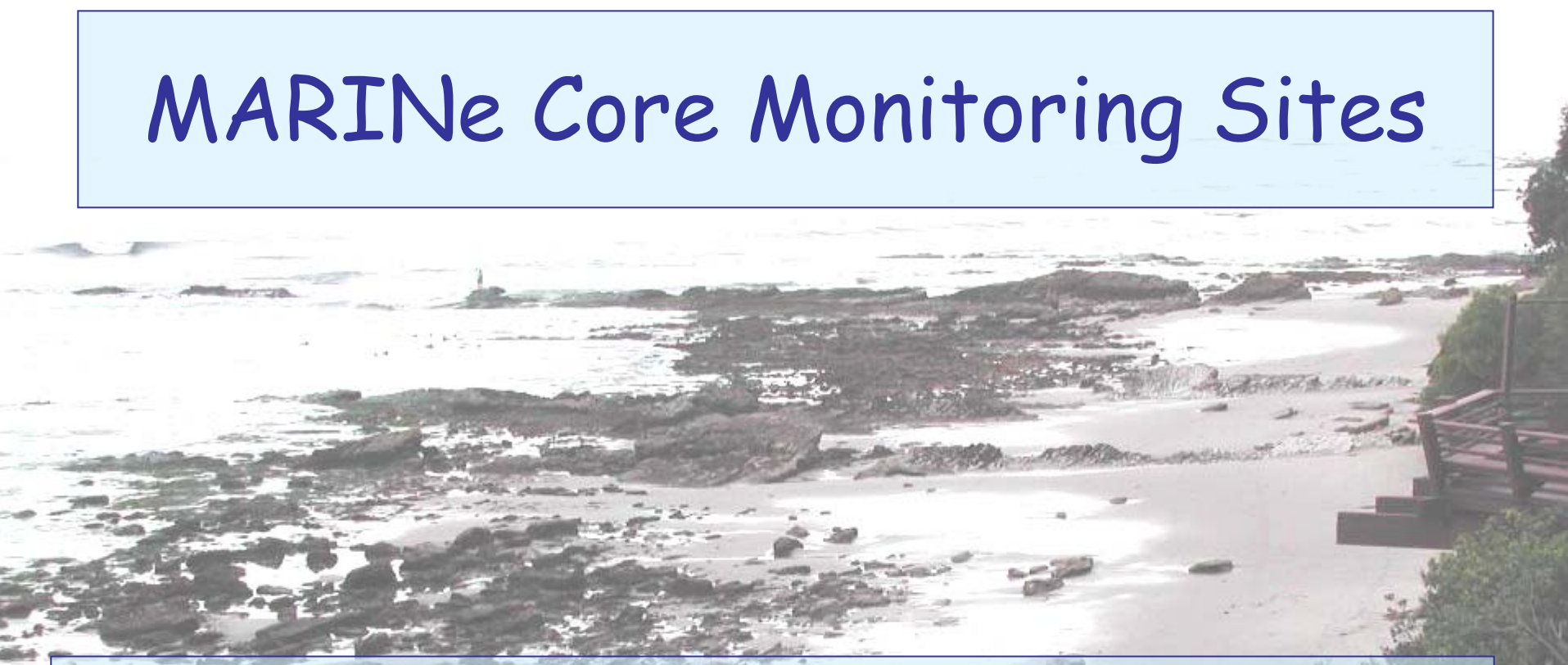
Core Monitoring Sites (n = 80)







MARINe Core Monitoring Sites



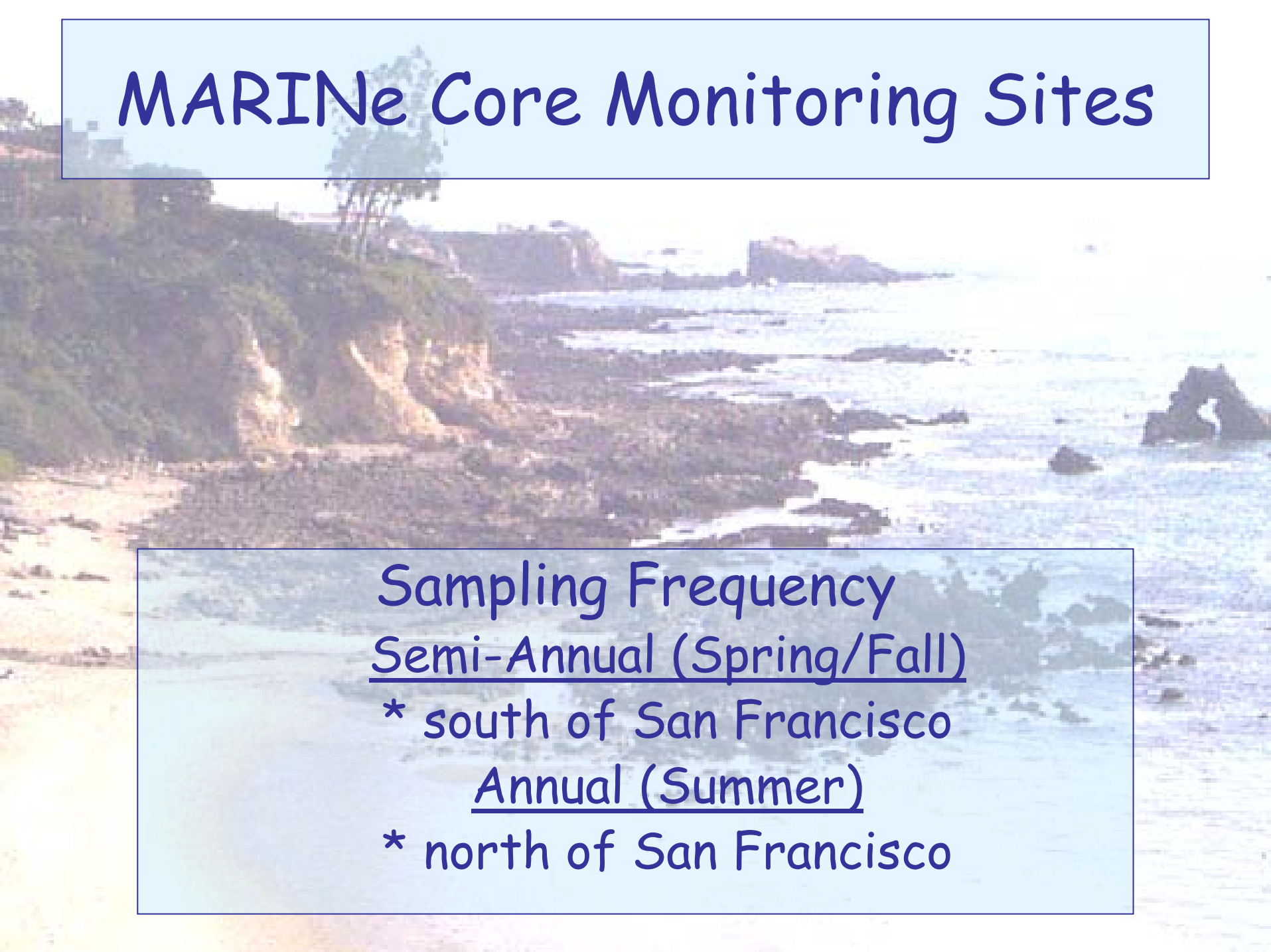
MARINe South (San Luis Obispo – San Diego Counties)

- 57 sites: 34 mainland + 23 island
- 3 sites target abalone only
- Longest monitoring period = 23 yrs (since 1982)

MARINe North (Del Norte – Monterey Counties)

- 23 sites
- 8 sites target abalone only
- Longest monitoring period = 6 yrs

MARINe Core Monitoring Sites



Sampling Frequency

Semi-Annual (Spring/Fall)

* south of San Francisco

Annual (Summer)

* north of San Francisco

Multi-Agency Rocky Intertidal Network

Core Monitoring Program: South

34 mainland sites
23 island sites

Species Monitored

- Target species (13):
  - Anemones--*Anthopleura elegantissima/sola*
  - Barnacles--*Pollicipes polymerus*
    Tetraclita rubescens
    Chthamalus dalli/fissus/Balanus glandula
  - Black abalone--*Haliotis cracherodii*
  - Owl limpets--*Lottia gigantea*
  - California mussels--*Mytilus californianus*
  - Seastars--*Pisaster ochraceus*
  - Boa Kelp--*Egregia menziesii*
  - Rockweed--*Hesperophycus californicus*
    Silvetia compressa
  - Turfweed--*Endocladia muricata*
  - Surfgrass--*Phyllospadix scouleri/torreyi*
- Core species: found in plots and transects in association with Target species
- Optional species

Sampling Methods

Sampled Spring and Fall each year

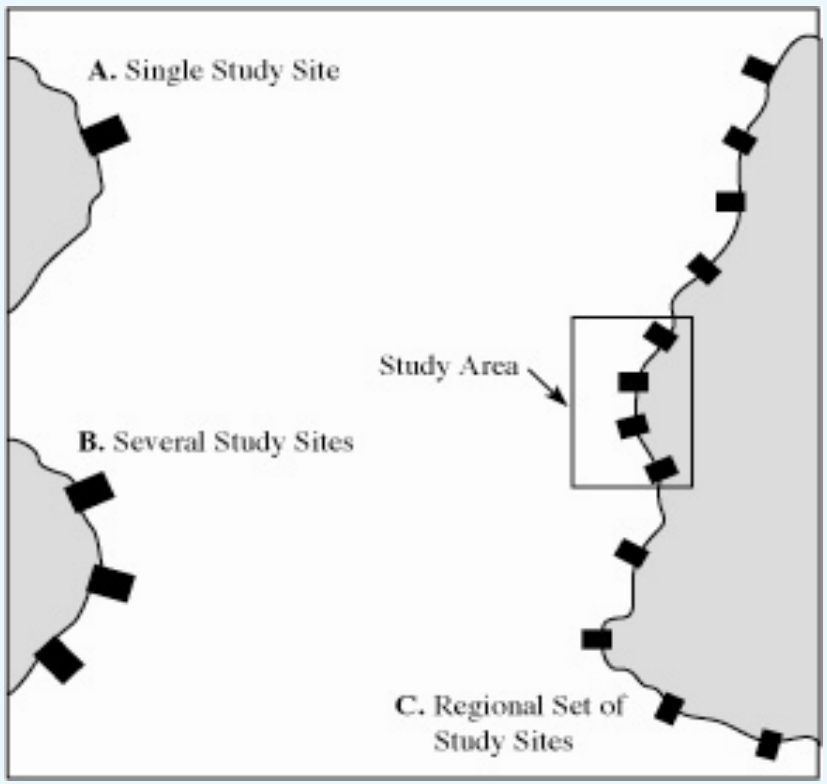
Fixed Photoplots

Mussels, barnacles, rockweed, anemones, turf algae

Sampling Methods
Sampled Spring and Fall each year

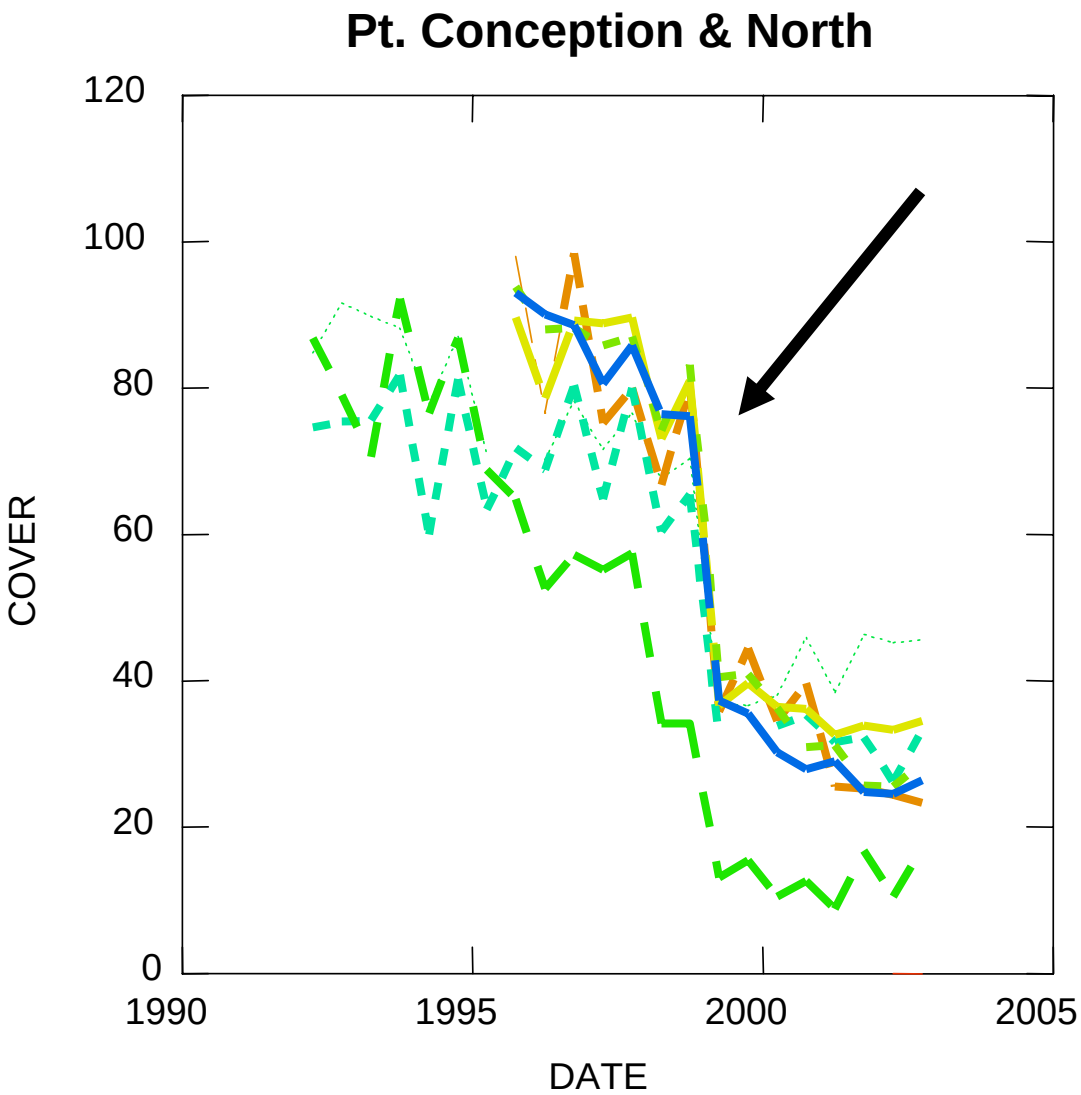
- Fixed Circular Plots
  - Owl limpets
- Band Transects & Irregular plots
  - Seastars, abalone
- Line Transects
  - Surfgrass

The Value of Regional Monitoring Programs



MARINe is a Regional Monitoring Program

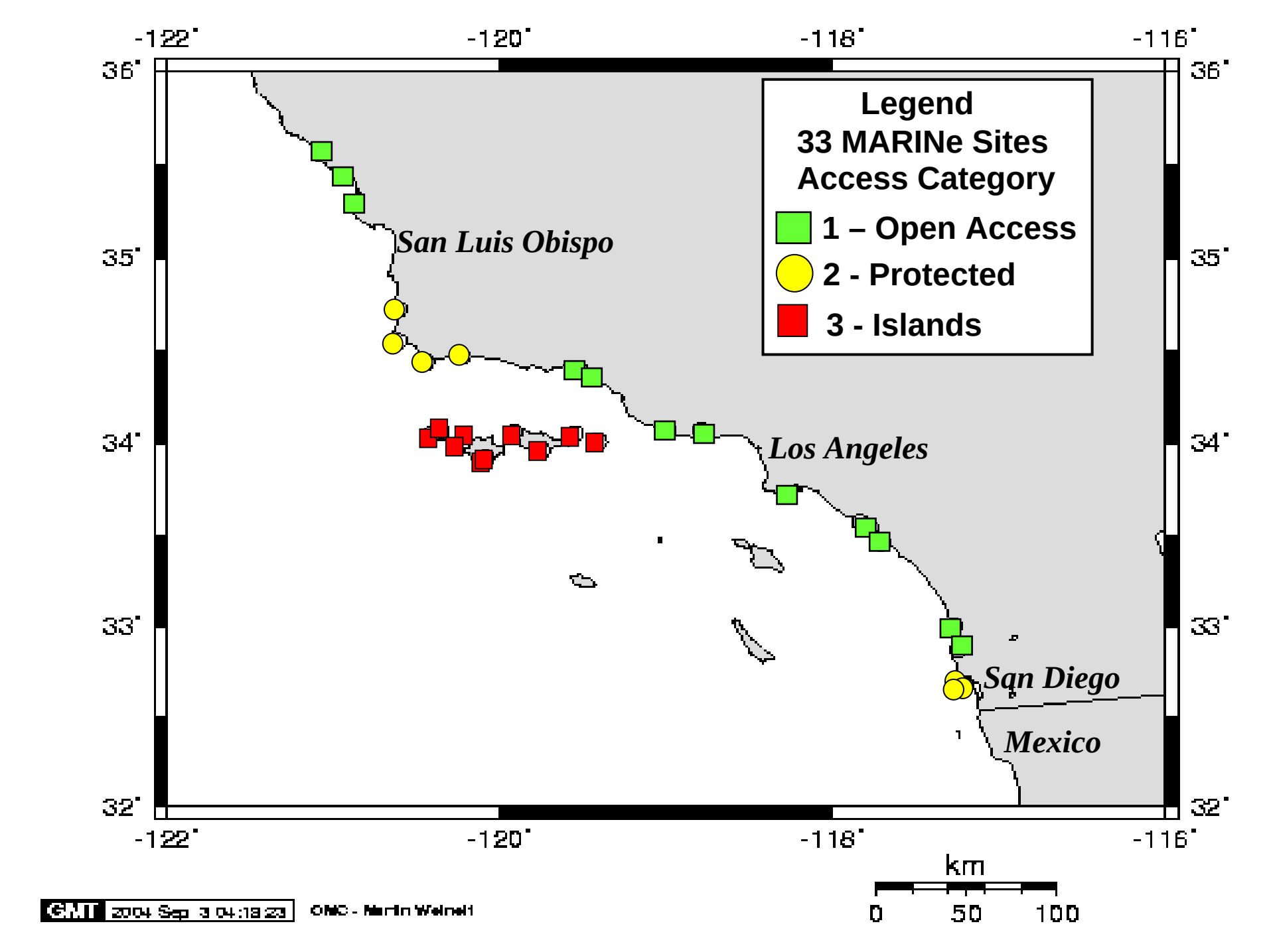
Silvetia % Cover

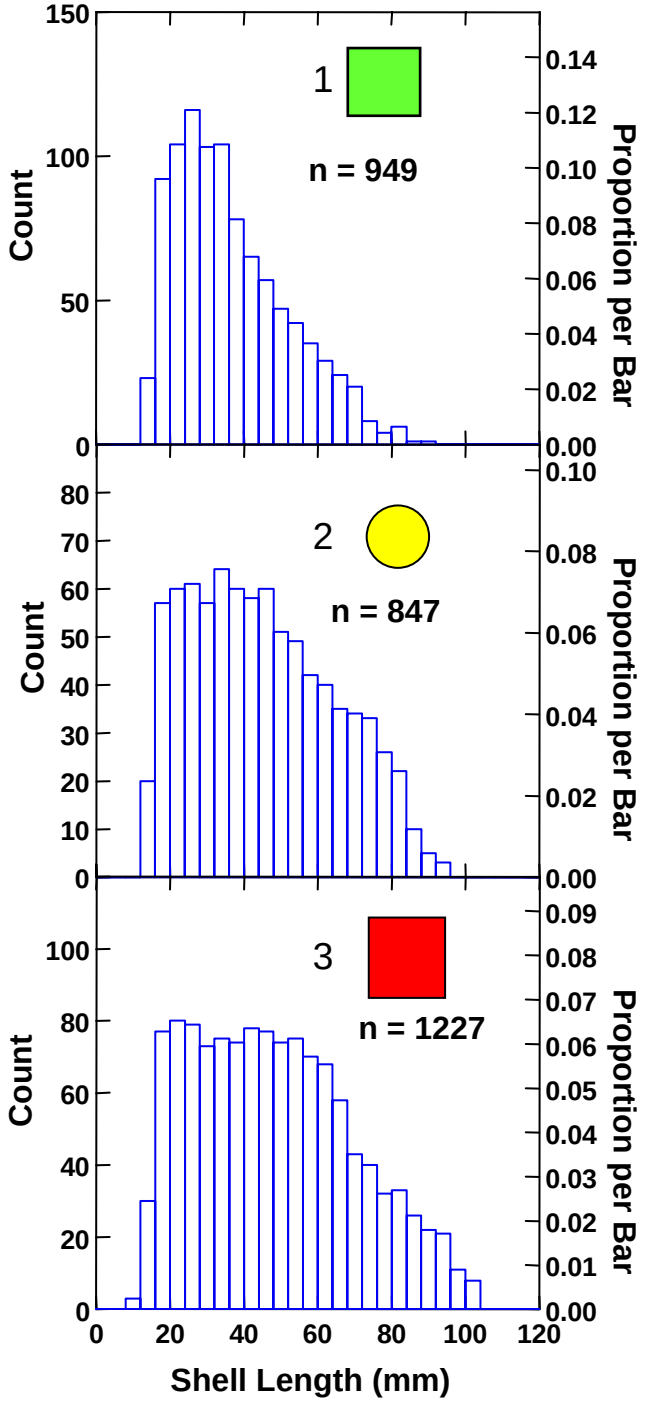


ALEG
BOA
CAY
GPT
HAZ
OCC
PSN
SHB
STA

Lottia gigantea (Owl Limpet)

- Large and easy to catch and long history of collection by humans
- Humans select larger Owl Limpets
- Recent studies (Kido & Murray 2003; Roy et. al 2003; Lindberg et. al 1998; Pombo & Escofet 1996) show reduced sizes at local sites where humans are numerous


-122°
-120°
-118°
-116°
36°
35°
34°
33°
32°
Legend
33 MARINe Sites
Access Category
1 – Open Access
2 - Protected
3 - Islands
San Luis Obispo
Los Angeles
San Diego
Mexico
km
0
50
100
GMT 2004 Sep 3 04:18:23
OMC - Martin Wehnelt



Smaller mean, median, and maximum Limpet sizes in open access sites

Hypotheses

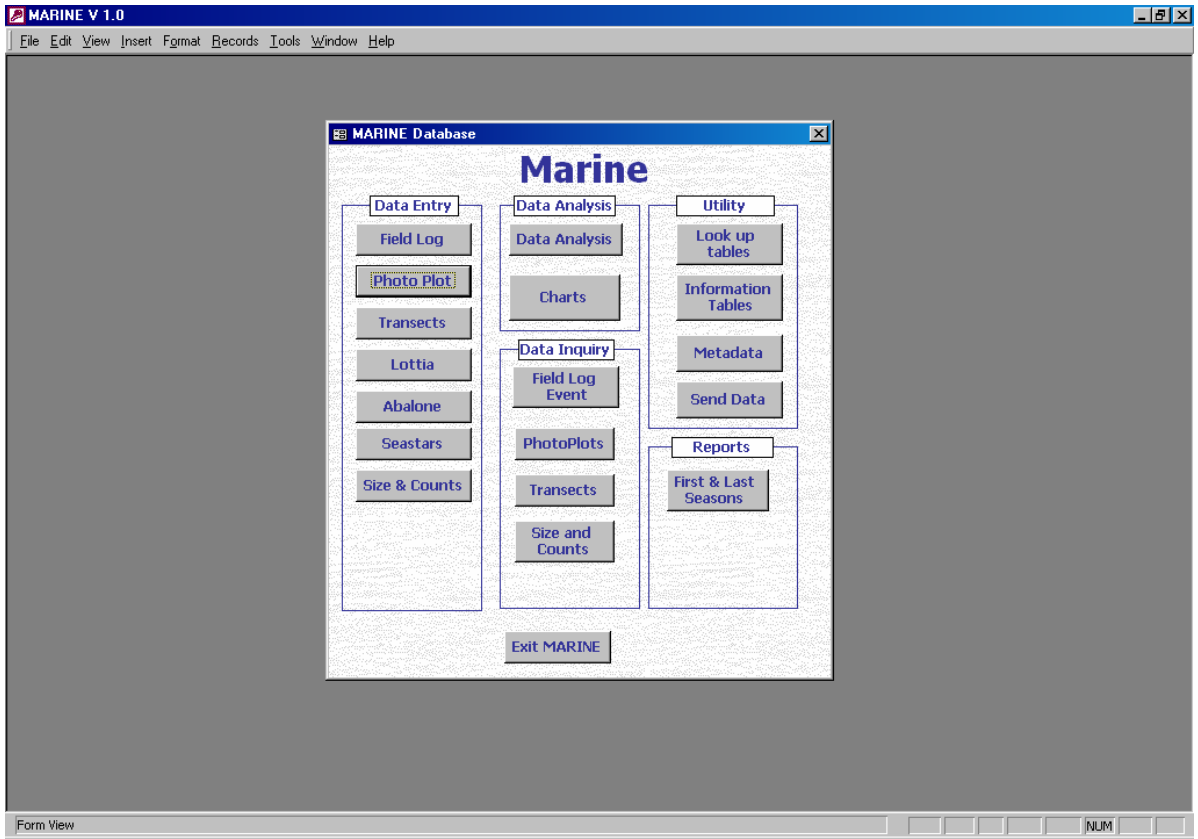
Ho: Humans are taking the large limpets wherever they can

Ha1: Oystercatchers

Ha2: Visitor (Trampling) impact

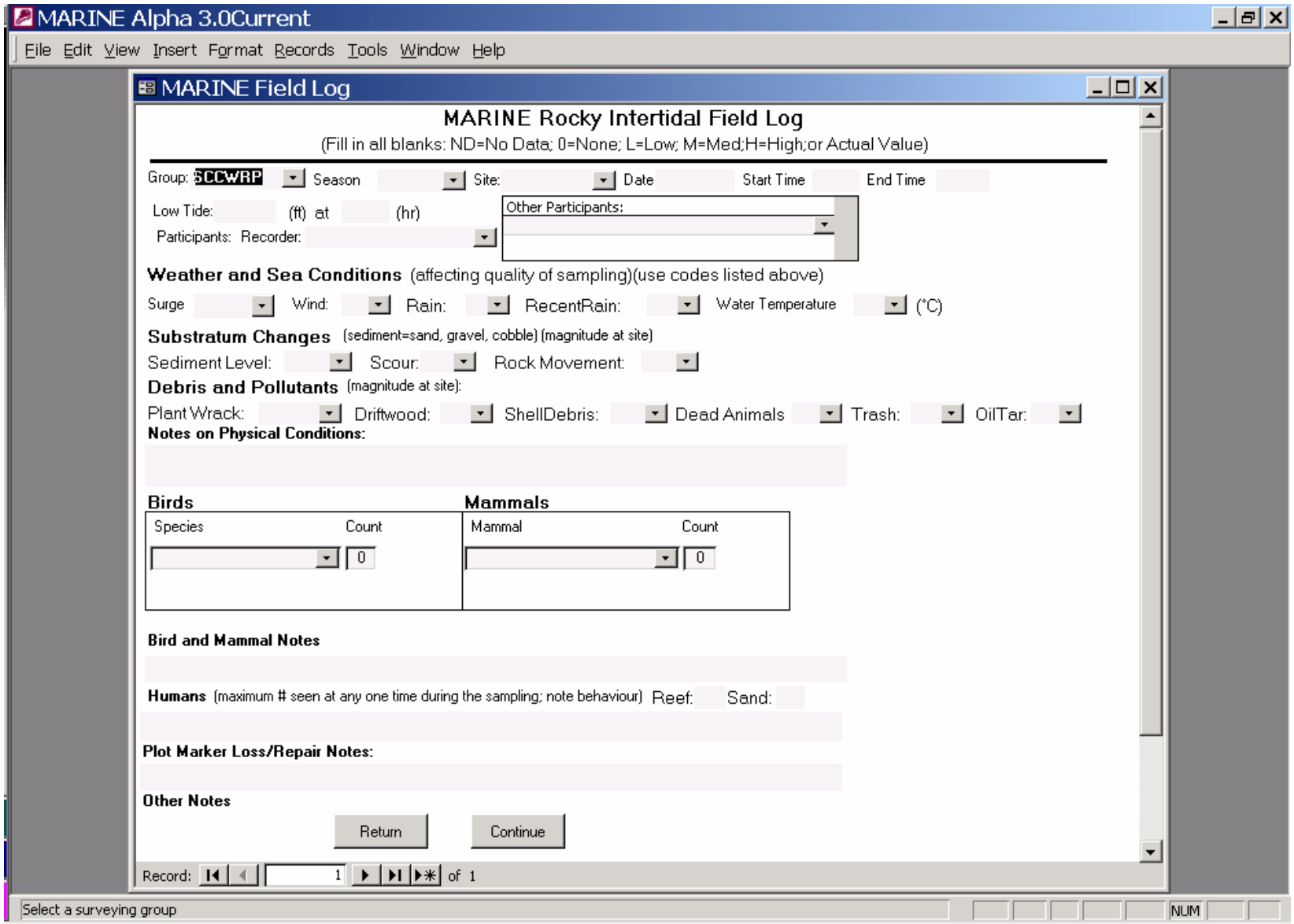
Ha3: Natural Geographic clines in size

MARINe Database



- Microsoft Access database by SCCWRP in 2003-2004
  - Relational database for core monitoring data
    - Currently contains ~ 1 million records
      - Photo database planned

MARINe Field Logs



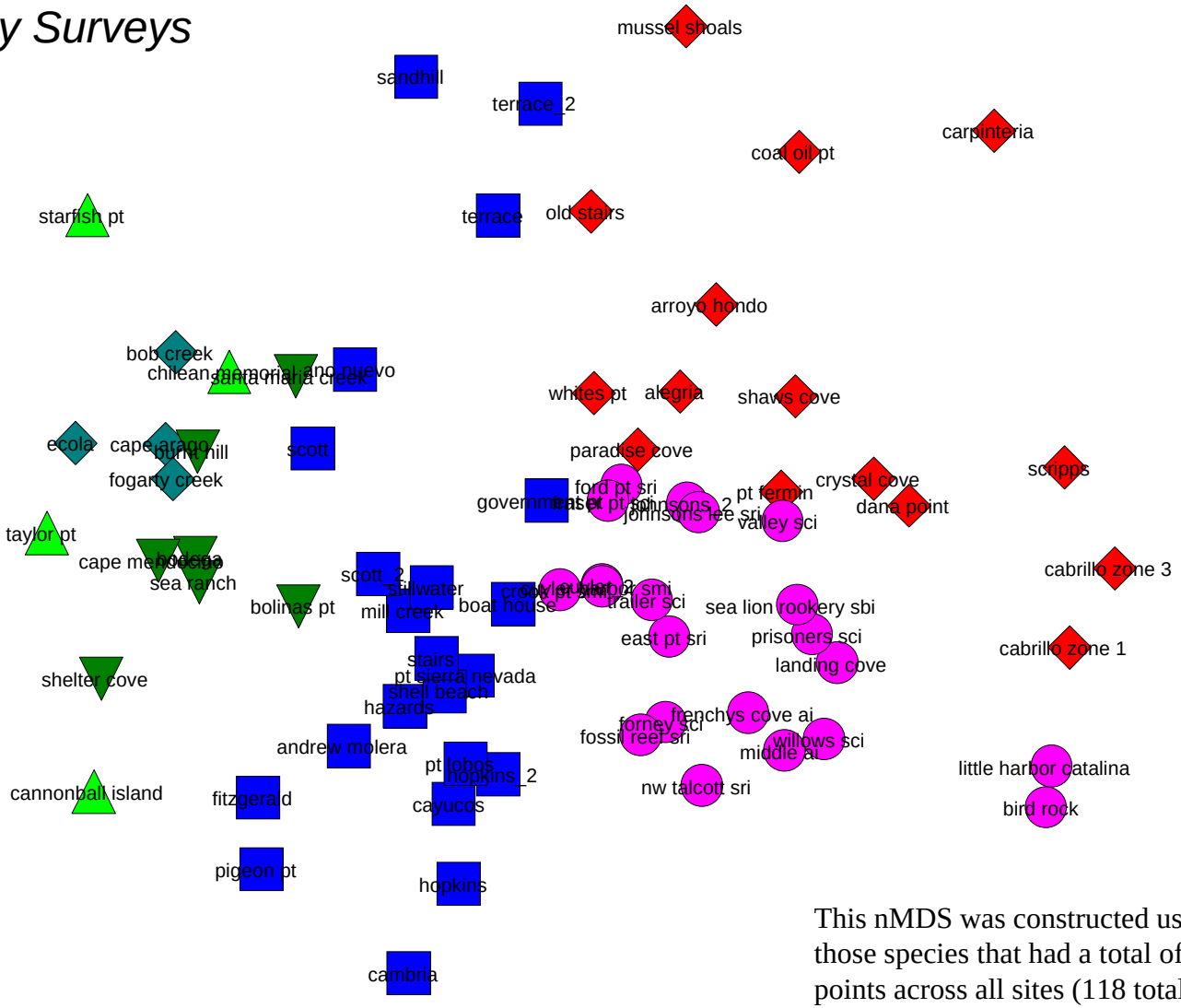
Biodiversity Surveys

Distributions and Abundances
Site Comparisons
Community data

Al

Stress: 0.19

Community Surveys



This nMDS was constructed using only those species that had a total of at least 25 points across all sites (118 total spp). Data were sq. rt. transformed.

WA OR NC CC SC CI

Melissa Wilson, Pete Raimondi

BLM Sites in Southern California
1975-1978

San Miguel

Santa Cruz

Anacapa

Santa Rosa

Santa Barbara

San Nicolas

Santa Catalina

San Clemente

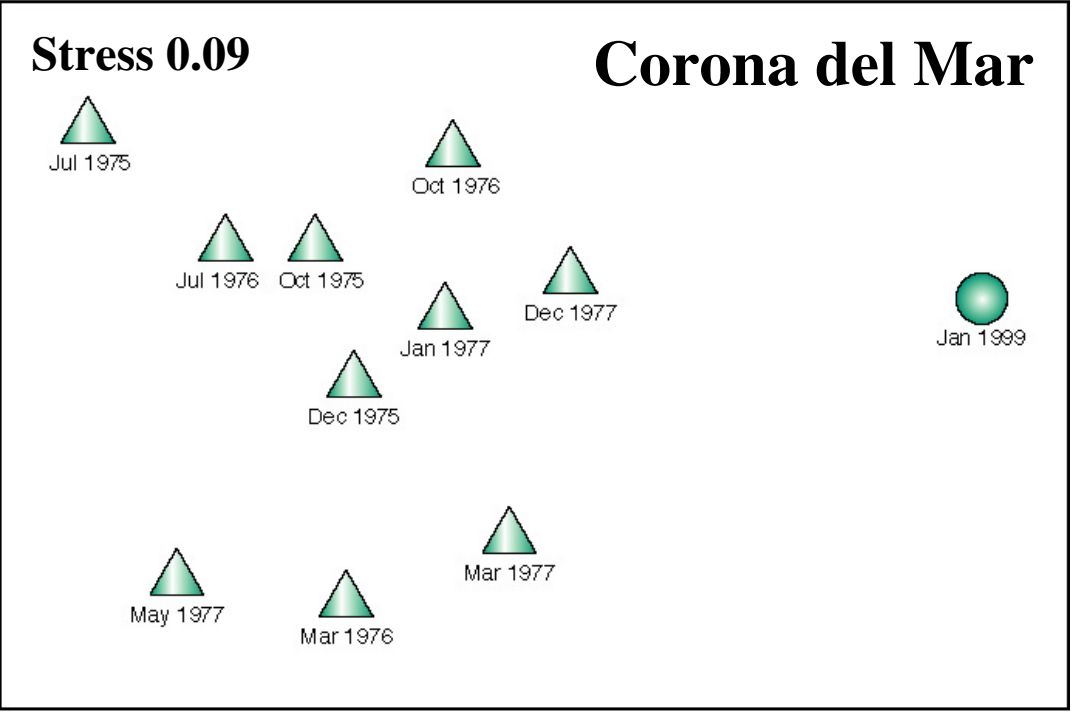
34°

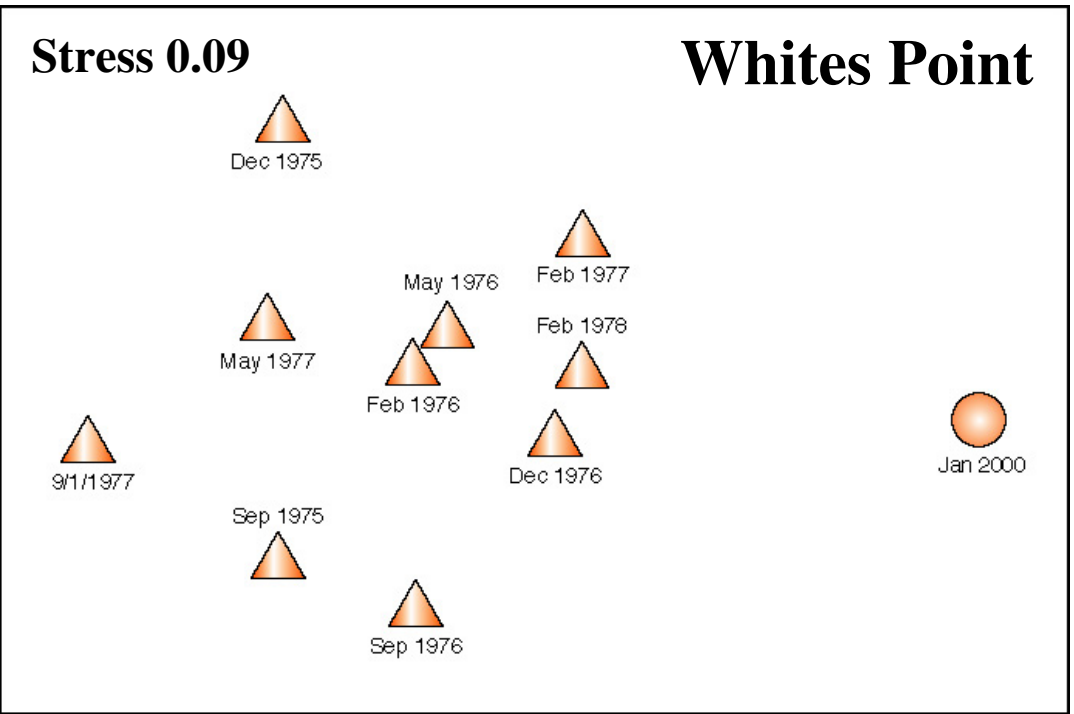
33°

119°W

118°W

Mark M. Littler's Studies





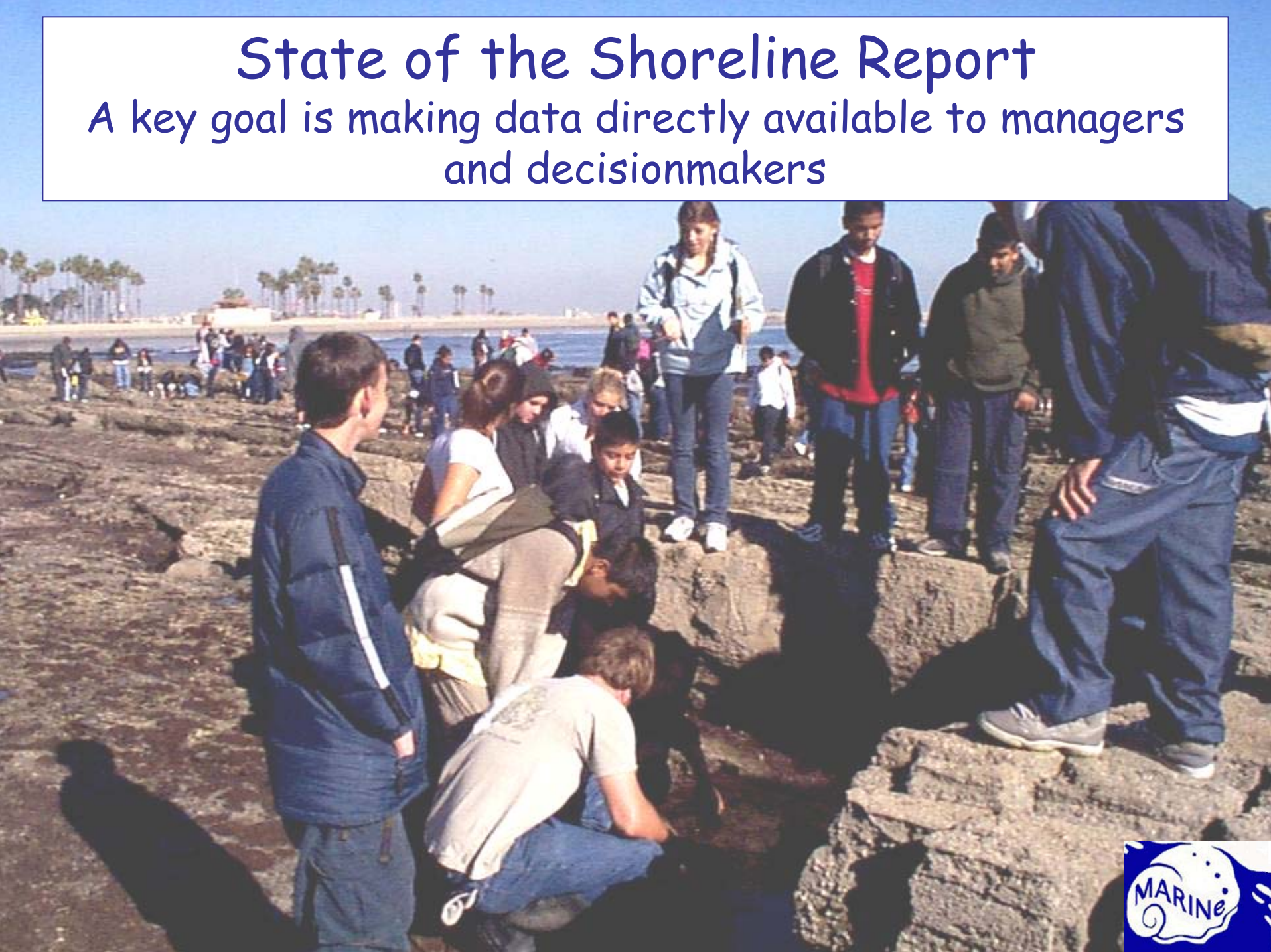
MDS Ordinations Mainland Sites

1999-2000 Samples differ from seasonal and annual variation exhibited by 1970s Samples

Steve Murray

State of the Shoreline Report

A key goal is making data directly available to managers and decisionmakers



A Key Goal of MARINe is Increasing Public Awareness of Tidepools and How They Can Help Protect these Resources

www.MARINe.gov

MARINe

CHANNEL ISLANDS NATIONAL PARK

NCEAS

UC SANTA CRUZ

USC

UCLA

U.S. NAVY

TATMAN Foundation

CAL STATE FULLERTON

PISCO

SANDAG

San Diego's Regional Planning Agency