

# Marine Life Protection Act Initiative



## UCSB Bren Student Group Marxan Analysis

**Presented to the MLPA North Central Coast  
Regional Stakeholder Group**

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## How is Marxan analysis relevant?

- Marxan - software tool employed in support of MPA planning efforts around the world
- Some RSG members asked staff/SAT for Marxan analysis; Bren student group masters project w/ staff input
- Marxan as an exploratory tool – can provide insight into areas that may contribute toward habitat goals but have less potential economic impact



# What is Marxan?

MARXAN software – optimization tool that works to find the most efficient set of planning units that meet conservation goals (eg. habitats included), with minimum cost (eg. potential impacts to commercial fisheries) and least amount of area

- GIS –based; using same spatial data as MLPA planning and evaluation process
- Study region divided up into 0.5 x 0.5 minute blocks or “planning units”
- Optimizing tradeoffs between biophysical (habitats) and socioeconomic (commercial fishery) factors



## Important caveats

- Marxan output presented here is not an “MPA plan” and is not intended to be prescriptive.....does not tell you where you should put an MPA
- Tells you which planning units show up, and how often, in model output.... based on inputs and goals provided
- Simply additional information for your deliberations



# Marxan inputs by planning unit

## Conservation Targets

- Habitats (by SAT evaluation subregion – north, south, Farallons)
  - Intertidal (rocky, beach, tidal flat, marsh)
  - Estuaries
  - Surfgrass, Eelgrass
  - Average kelp
  - Rock 0-30m, 30-100m
  - Soft 0-30m, 30-100m

## Cost Factors

- Socioeconomics - commercial fisheries data only (from Ecotrust survey); data from 34 fisheries aggregated into index of importance for each planning unit (weighted by revenue)



# Conservation Goals Used

Why use percentage goals for habitats? Model requires it.

Set low, moderate, high conservation goals (10, 17, 34%) for each habitat .... based on minimum and maximum size and spacing guidelines

- Low: minimum size and minimum spacing would amount to about 10% of study region area
- Moderate: maximum size and maximum spacing would amount to about 17% of study region area
- High: maximum size and minimum spacing would amount to about 34% of study region area



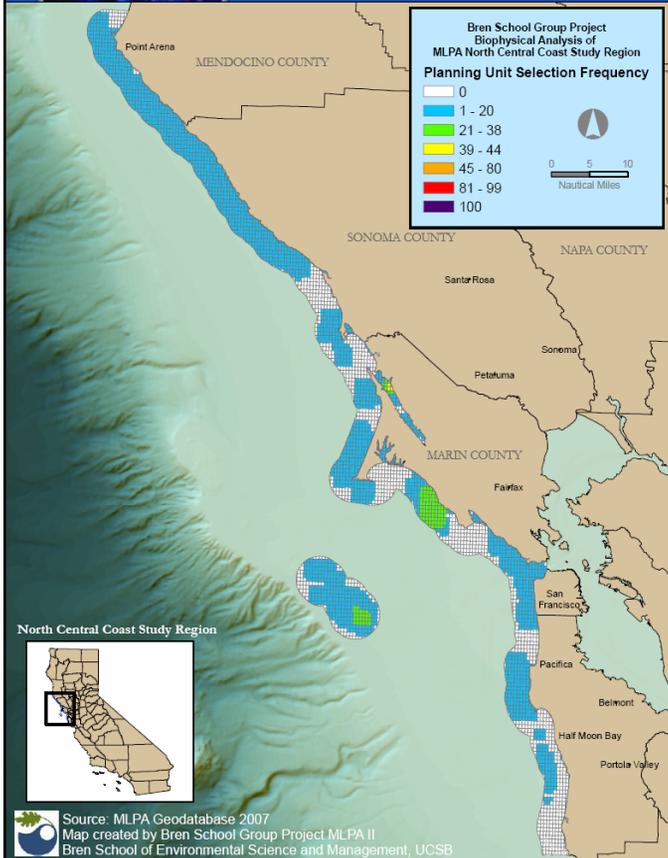
# Marxan output

Summed solution – number of times a planning unit was selected in multiple runs (1000) of Marxan model

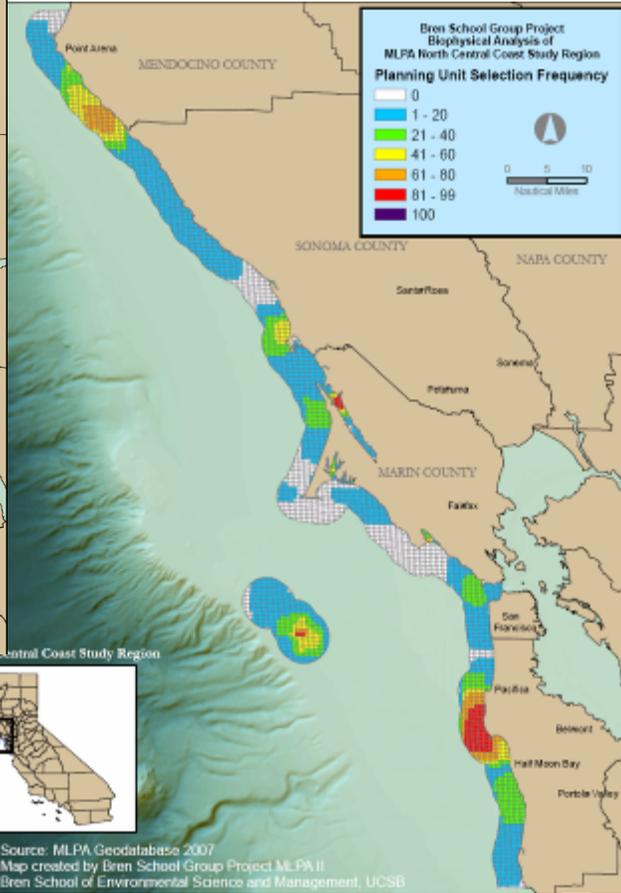
Three sets of maps provided:

- Fig. 1a-c. Biophysical goals only (at 10, 17, 34% goals for habitats)
- Fig. 2a-c. Biophysical goals and socioeconomic tradeoffs (at 10, 17, 34% goals for habitats)
- Fig. 3. Cost threshold – locations with maximum of all habitats included, while no more than 10% of fisheries potential impact

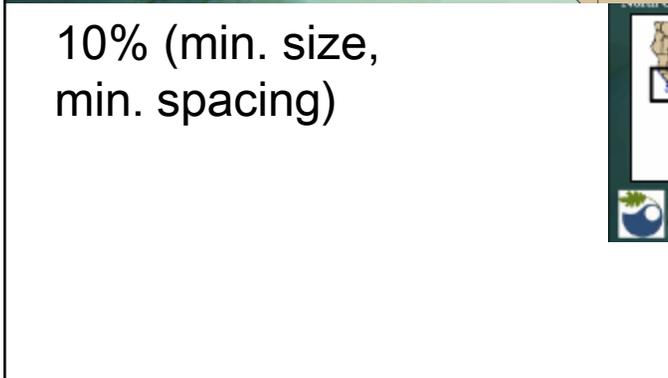
# Biophysical (Habitat) Goals only



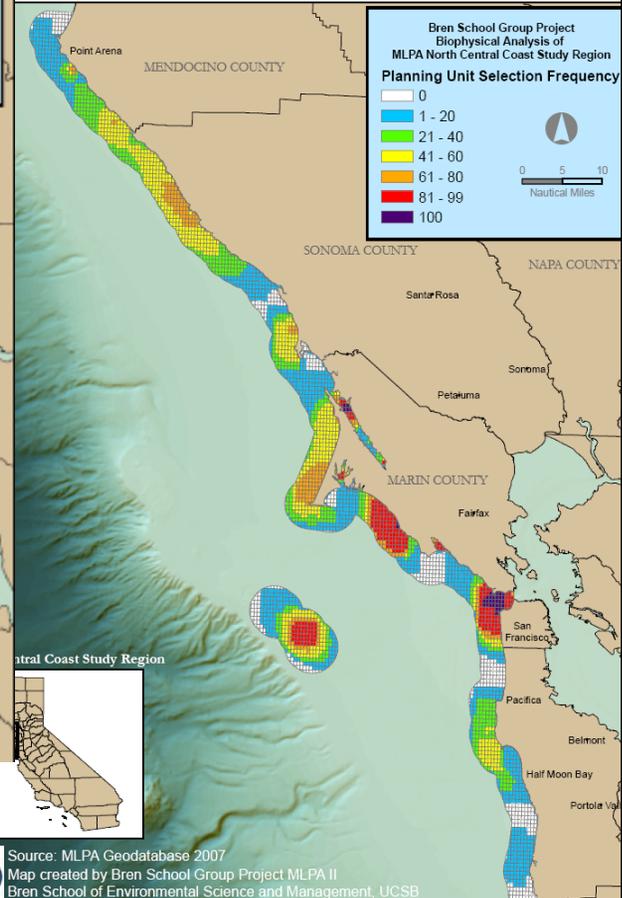
17% (max. size,  
max. spacing)



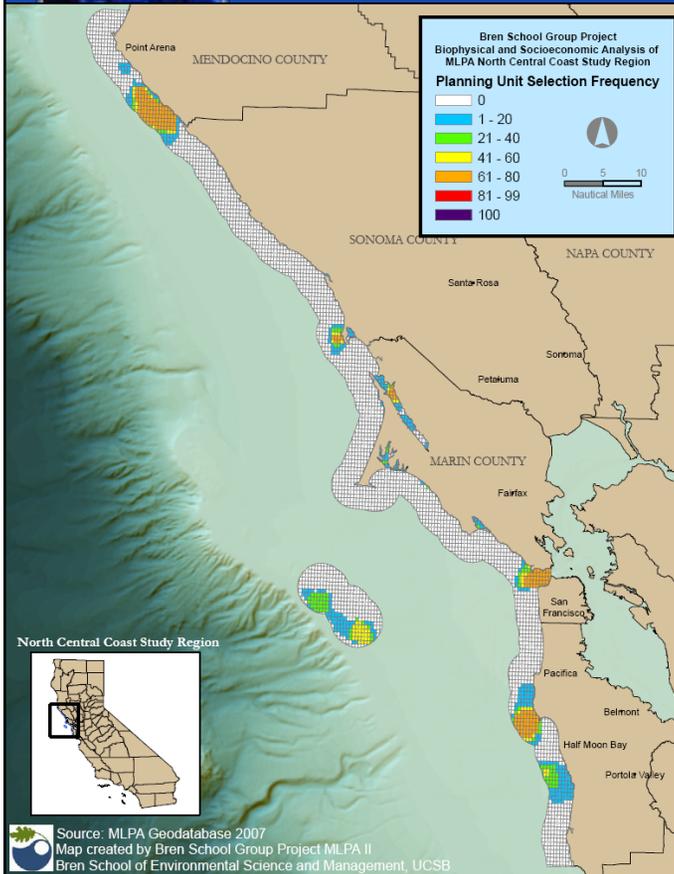
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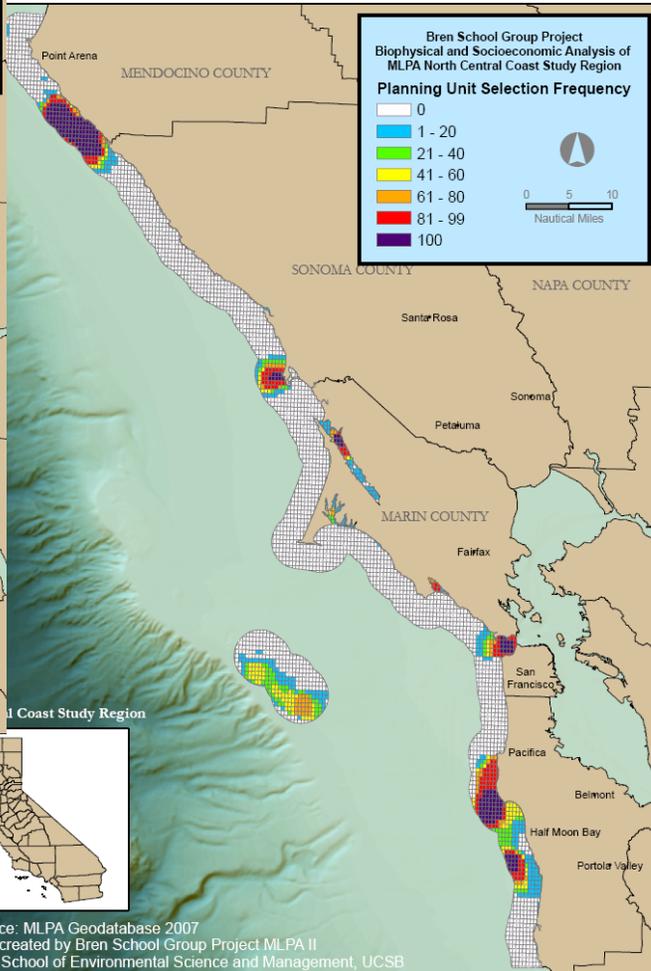
10% (min. size,  
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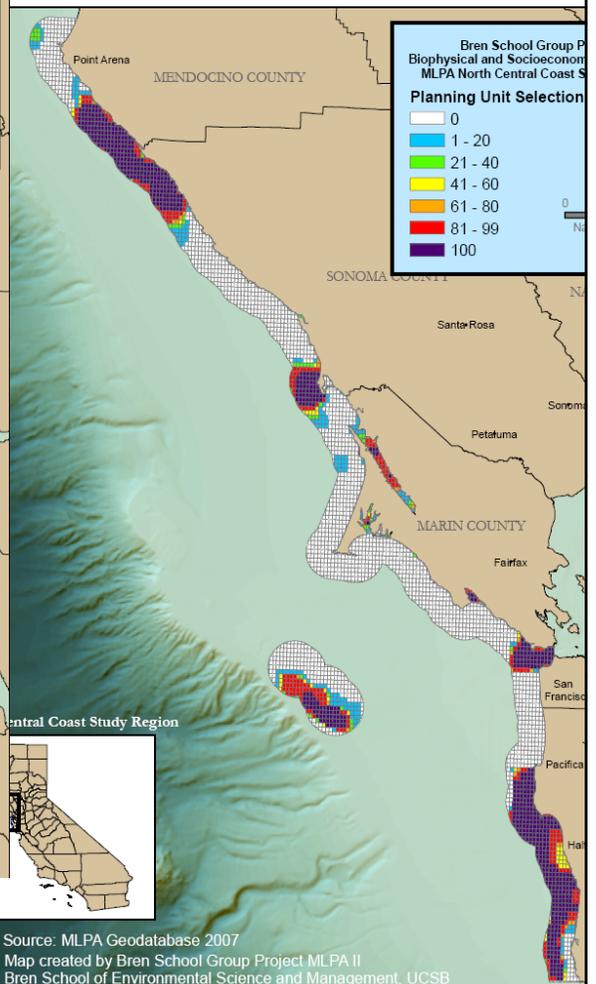
# Biophysical x Socioeconomic Goals



17% (max. size,  
max. spacing)



34% (max. size,  
min. spacing)

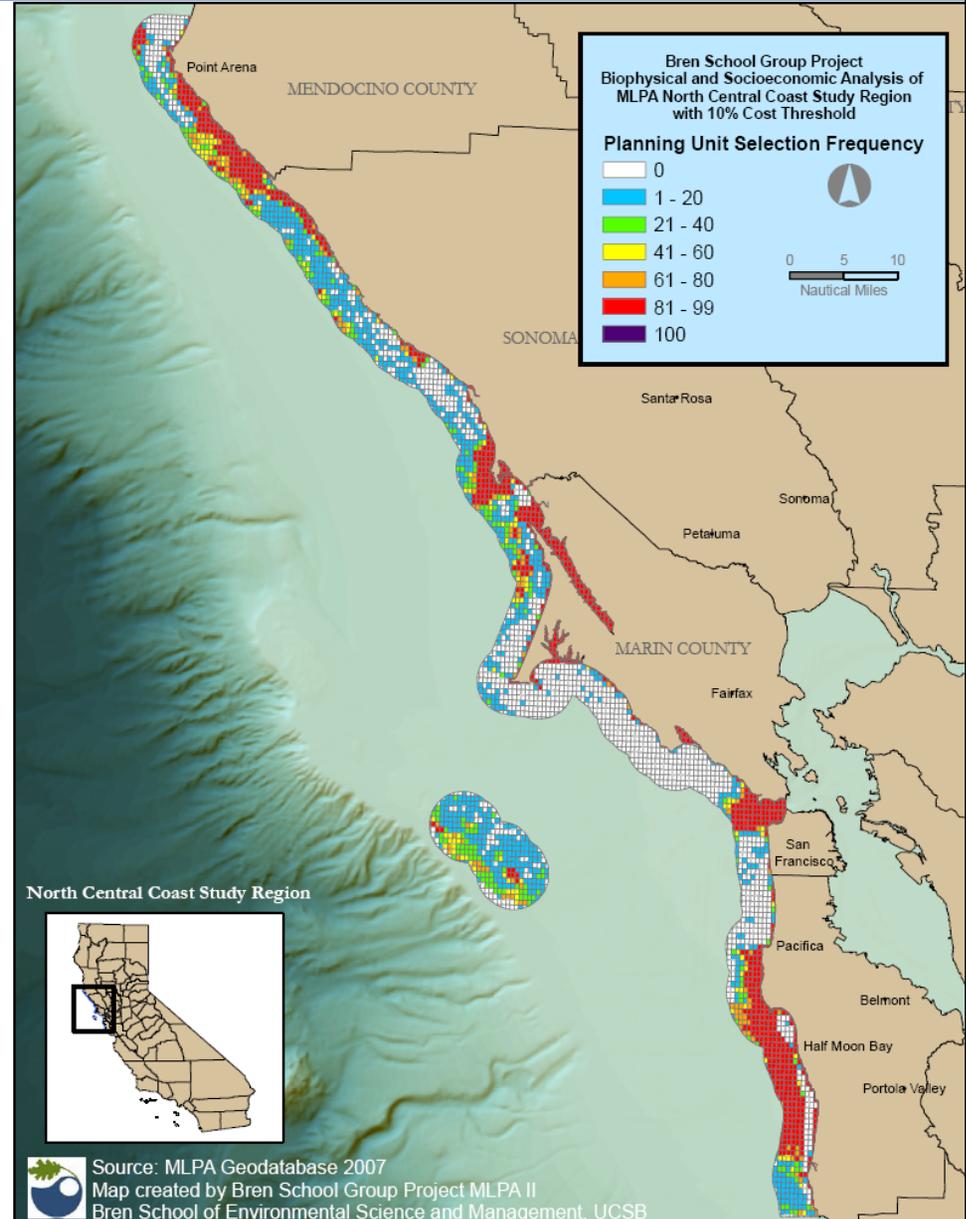


10% (min. size,  
min. spacing)



# 10% cost threshold

- Model run to identify planning units that would include maximum amount of all habitats, while keeping potential impact to all commercial fisheries at 10%





# Summary

- Outputs interesting and may foster some ideas
- Outputs not a MPA plan or recommendation!
- Marxan is a model and is only incorporating inputs provided .....for example, this analysis is NOT considering other factors you are also weighing:
  - Habitat quality, conservation value, unique ecological features
  - Other non-habitat biodiversity features (eg. bird and mammal rookeries)
  - Access, proximity, popularity of different sites to users
  - Tradeoffs w/ other socioeconomic factors: Recreational fishing, ports/harbors, tribal uses, etc
  - And the many other factors we have heard about from RSG members, public, etc.



# Thanks to Bren Students

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- Masters Group Project students
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  - Cheryl Chen
  - Emily Frost
  - Jessica Spence
  - Meghan Sullivan
- Faculty advisor: Bruce Kendall