

Room enough for everyone?

Understanding human uses & interactions in RI coastal waters



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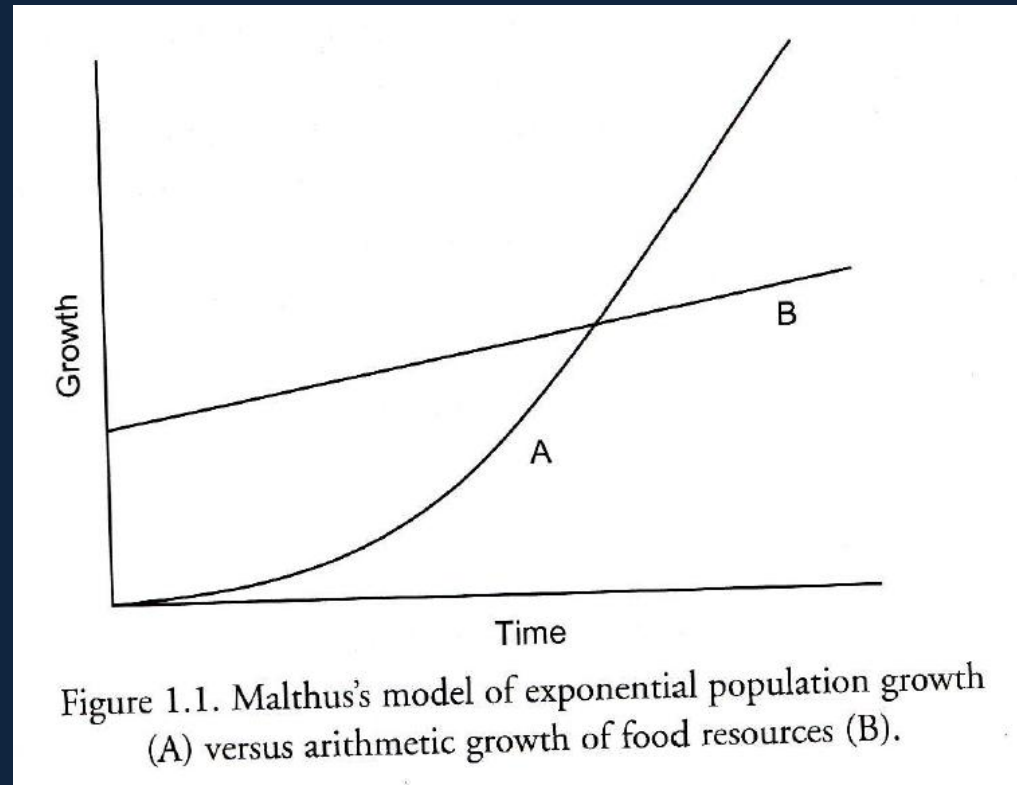
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Overview

- (1) Introduction to social carrying capacity
- (2) Understanding social carrying capacities-
Mapping and Spatial modeling
- (3) Understanding social carrying capacities-
Evaluative studies

(1) Introduction to Social Carrying Capacity

- Carrying capacity is not a new concept
- Brief history
 - Human population
 - Wildlife and range management
 - Recreation and parks

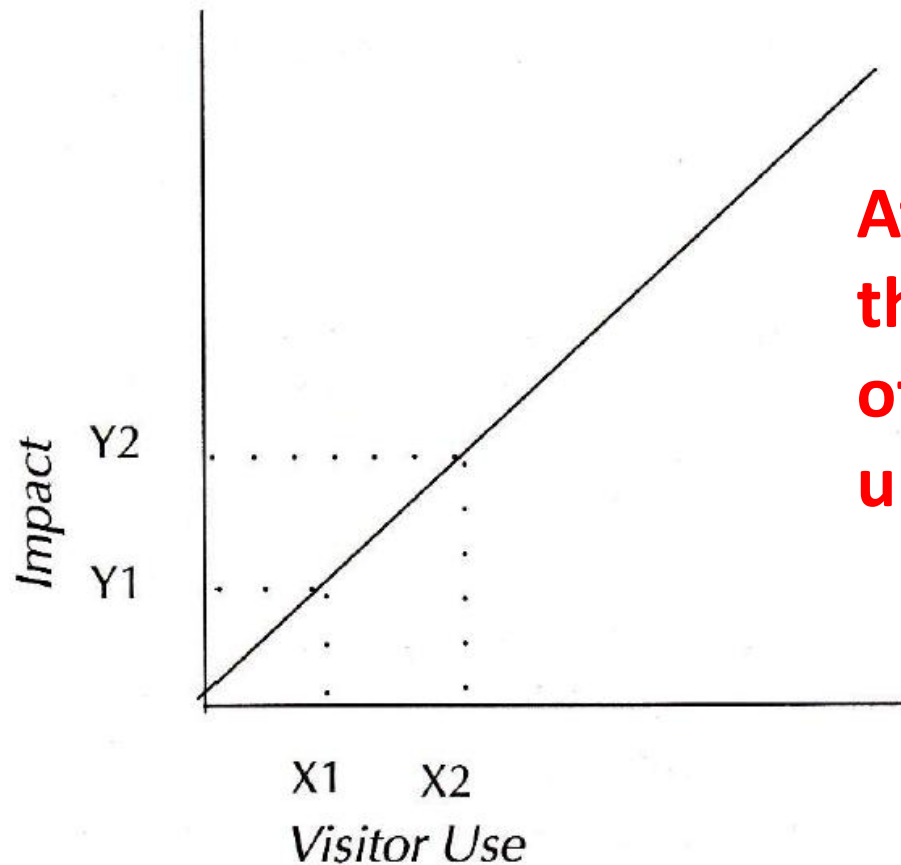


Different types of carrying capacity

- Ecological
- Production
- Physical
- **Social**



Social carrying capacity (SCC)



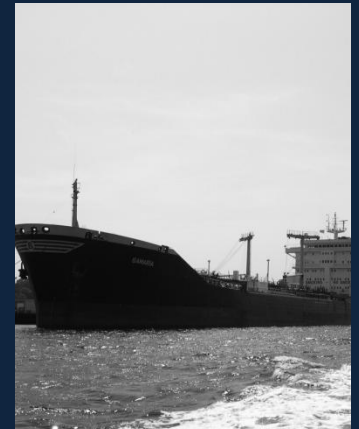
At what point, does the amount or type of impact become unacceptable?

Figure 4-2. Hypothetical relationship between visitor use and impact to the recreation environment. (From Manning and Lime 1996.)

Social carrying capacity

The level of use beyond which environmental & social impacts exceed acceptable levels specified by evaluative standards

(Manning 2007; Shelby & Heberlein 1986)



Management
objectives



Indicators



Standards

Statements that define desired
human and natural conditions

Specific measures of conditions

- Minimum acceptable quality of conditions
- Acceptability levels of individuals are measured and aggregated

Management
objectives



Indicators



Standards

RI Aquaculture Policy 300.11(D)(1d)

(1) compatibility of the proposal with other existing and potential uses of the area

(7) impact of proposed activities on the scenic qualities of the area

- Maps and models of how people are using coastal waters
- Perceptions of interactions
- Perceptions of scenic quality

• What are acceptable levels of use interactions?

- What are acceptable levels of scenic quality?
- Is there shared agreement of acceptability?
Or do acceptability levels vary by stakeholder characteristics?
- How does acceptability vary by location?

(2) Mapping, Spatial Modeling and Social Carrying Capacity



- Could be thought of as a three-step process.
 - First, determining what type of human uses are occurring and where are they occurring,
 - ✦ Which typically is not a “hardline” boundary.
 - Second, determining what the “behavioral” characteristics of different uses.
 - ✦ Knowing how different uses “behave” is important for modeling and planning.
 - ✦ What are the positive or negative externalities of the use.
 - Third, determining what different user groups think about the behaviors of other uses within different planning scenarios.

Mapping and Modeling Human Uses



- What can be mapped and modeled?
 - Spatial
 - ✦ Basic physical footprint
 - 2 dimensional or
 - 3 dimensional
 - ✦ Travel and operating patterns
 - ✦ Intensity of the use
 - Temporal
 - ✦ Seasonality
 - ✦ Hours
 - ✦ Frequency of the use
 - Behavioral attributes of the use
 - ✦ Potential conflicts, Potential synergies
 - Noise, lighting, smells
 - Improved water quality
 - Economic impact
 - Visual amenity or disamenity?

Methods for Mapping



- “Participatory” mapping
- Aerial surveys
- Fixed point observations
- Boat based offset transect surveys
- Triangulation between methods

Methods



- Participatory mapping examples.
 - Asking people to draw their past activities or valued places on a map.
 - Asking people to record their last trip.
 - ✦ E.g., mail or online survey.
 - Asking people to keep a travel diary.
 - Providing people with GPS and cameras.
- Clear instructions.
 - ✦ Critical to carefully design study, e.g., what is mapped, how are definitions used.
 - ✦ Understandable and feasible
 - ✦ Fidelity by participants in following instructions

Methods



- Participatory mapping: Possible problems
 - Participatory mapping is often binary:
 - ✦ An activity is either there (or has been there) or it hasn't.
 - ✦ But it tells us nothing about it's intensity, frequency, duration, or variety of characteristics.
 - ✦ Relative importance of areas within a category.
 - Reliability
 - ✦ Memories
 - ✦ Might not be a random sample—bias.

Methods



- Participatory mapping: Potential benefits.
 - Can be relatively inexpensive.
 - Involves stakeholders in determining what should be mapped.
 - Transparency
 - ✦ Clear methods for collecting and processing.
 - ✦ Objectives, indicators, standards.
 - Information about attributes
 - ✦ Very useful in informing mapping and modeling
 - ✦ Stakeholders are experts in the functioning and important attributes of uses.

Methods



- Aerial surveys:
 - Relatively inexpensive to take usable aerial photographs.
 - ✦ More costly if professionally processed to remove distortion
 - Accurately captures visible activities.
 - Digitizing for use in GIS
 - ✦ Can be time consuming.
 - ✦ Accurately characterizing activities can be difficult.
 - E.g., are occupants on a stationary boat fishing or not?
 - Usually based on one or a relatively small number of samples.
 - ✦ More of a snapshot, which may not be representative.
 - ✦ Peak days and low days.

Methods

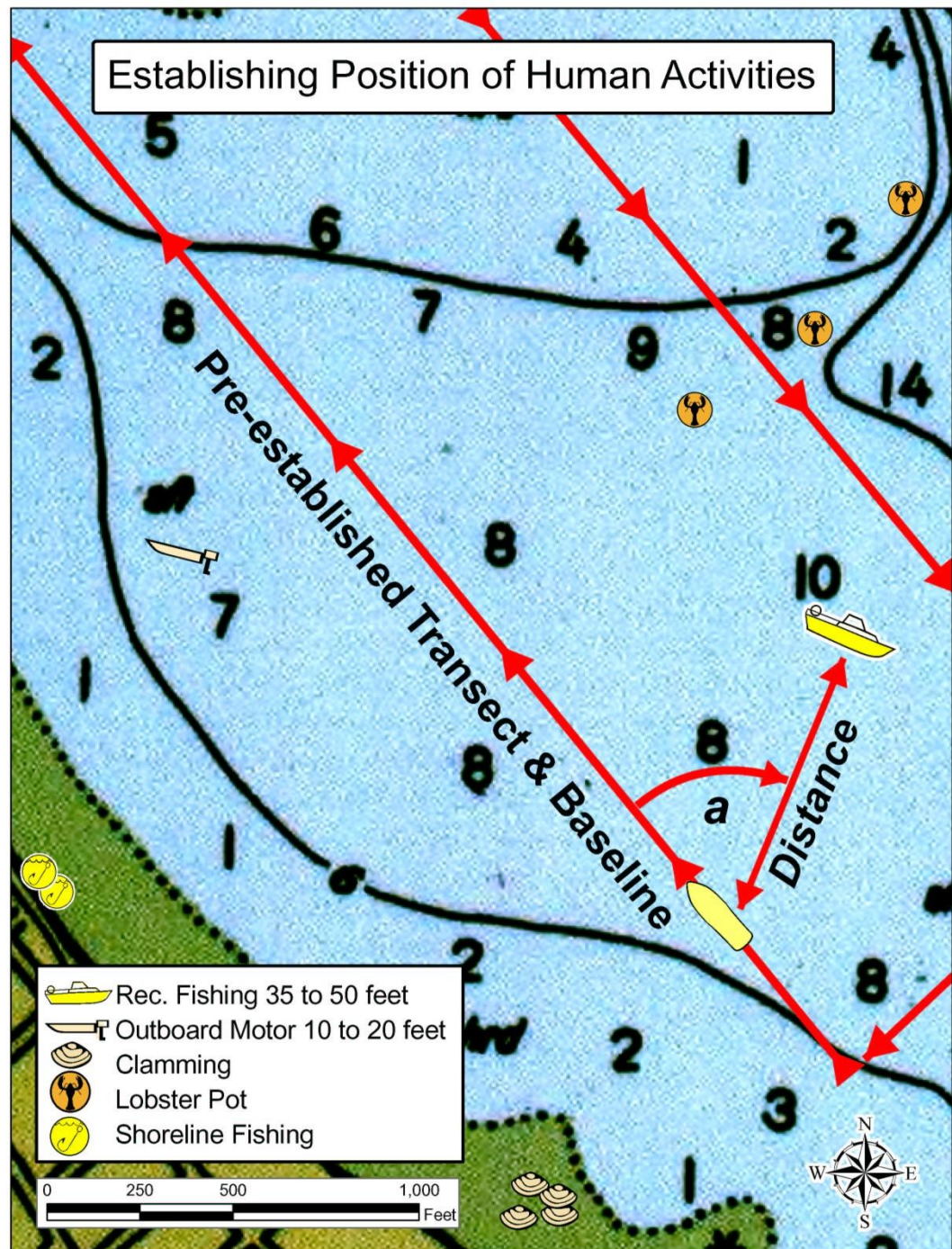


- **Observational studies**
 - Observing, mapping, and characterizing activity from set observation points.
 - Can make observations on many randomly selected days and at various times.
 - Accurately mapping activity can be difficult.
 - ✦ Markers can help
 - ✦ On the water activities can be particularly problematic.

Boat-Based Offset Transect Surveys



- Ran set transect lines on 30 randomly selected days in summer of 2006 and 28 days in 2007
- The order of the runs each day were randomly selected
- Measure the straight line distance & angle to every observation
- Calculate position of each observation



Recording Attributes in ArcPad



Recording Attributes in ArcPad

- We developed a list of attributes based upon multiple sources.
- Created a series of drop down choice menus that would immediately appear when a record was created.
- The recorder would enter data by tapping.

The screenshot shows a mobile application window titled "Observations" with a blue header and a red close button. The window contains a form with several fields and a list of activities. The fields are: "Id" (value: 1554), "Time" (empty), "Activity" (empty), "Shoreline" (empty), "Motor_rec" (value: bicycling), "Sail" (value: chilling), "Rowed" (value: clamming), "Commercial" (value: dog walking), "Official" (value: fishing (hook and line)), "Work_boat" (value: nature exploration), and "Swimming" (value: swimming). The "Motor_rec" field is currently expanded, showing a list of activities: bicycling, chilling, clamming, dog walking, fishing (hook and line), nature exploration, swimming, wading, and walking/running. At the bottom of the window are "ok" and "x" buttons.

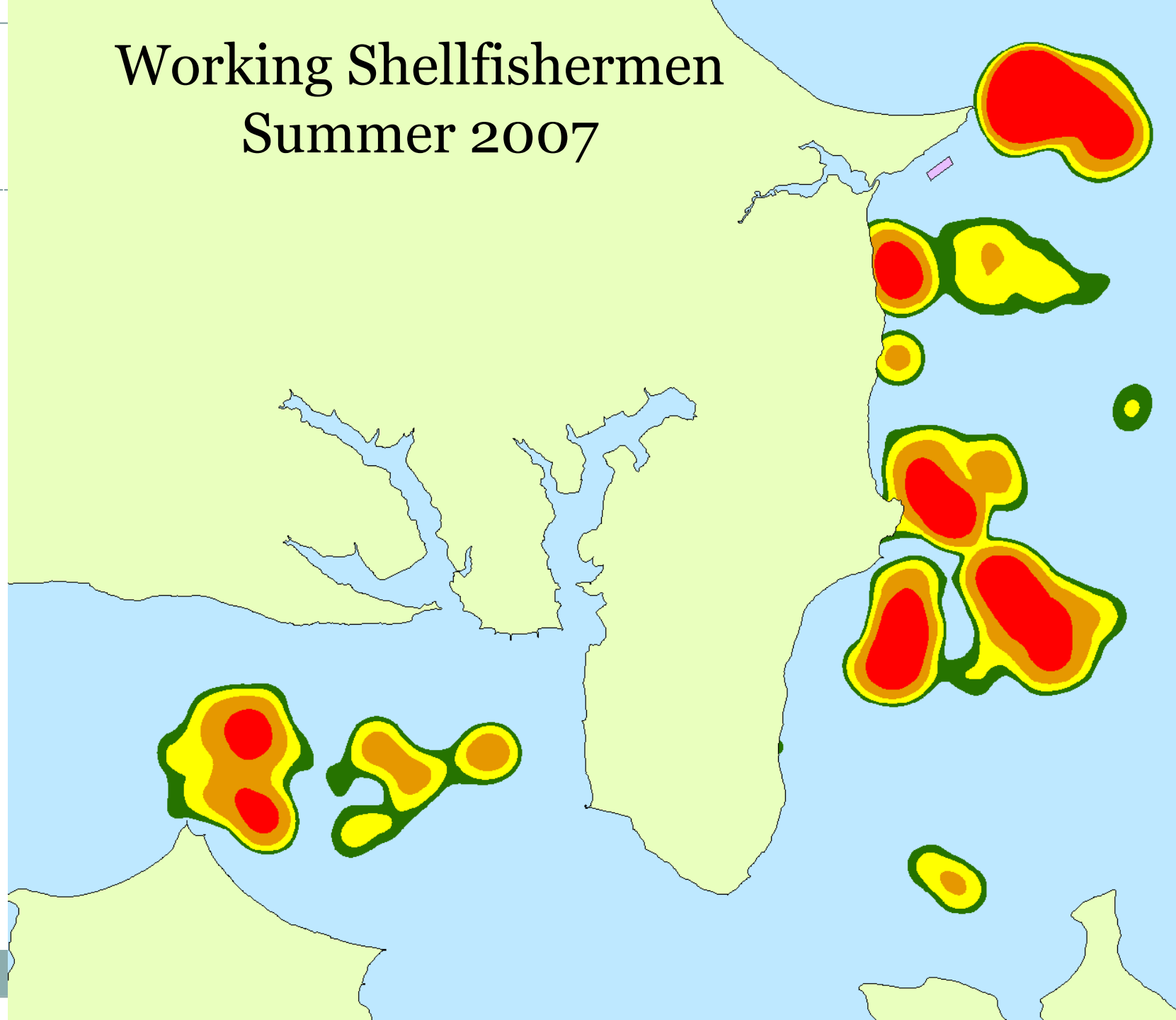
Attribute	Value
Id	1554
Time	
Activity	
Shoreline	
Motor_rec	bicycling
Sail	chilling
Rowed	clamming
Commercial	dog walking
Official	fishing (hook and line)
Work_boat	nature exploration
Swimming	swimming
	wading
	walking/running

The Database

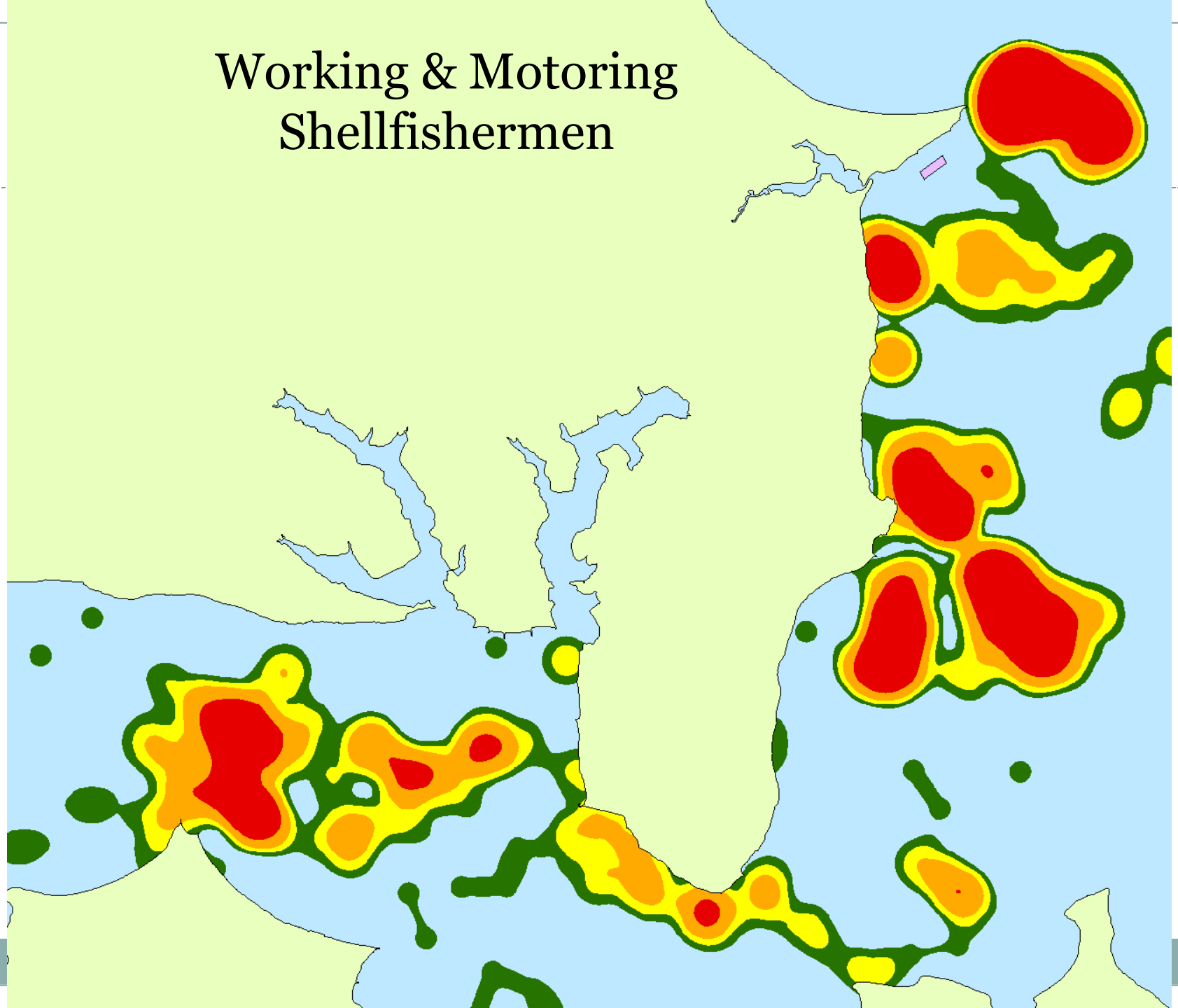


- 14279 observations Bayscape in 2006-2007
- 3252 observations for NBNERR in 2007
- Approximately 17,500 observations total.
- Points turned into density grids.

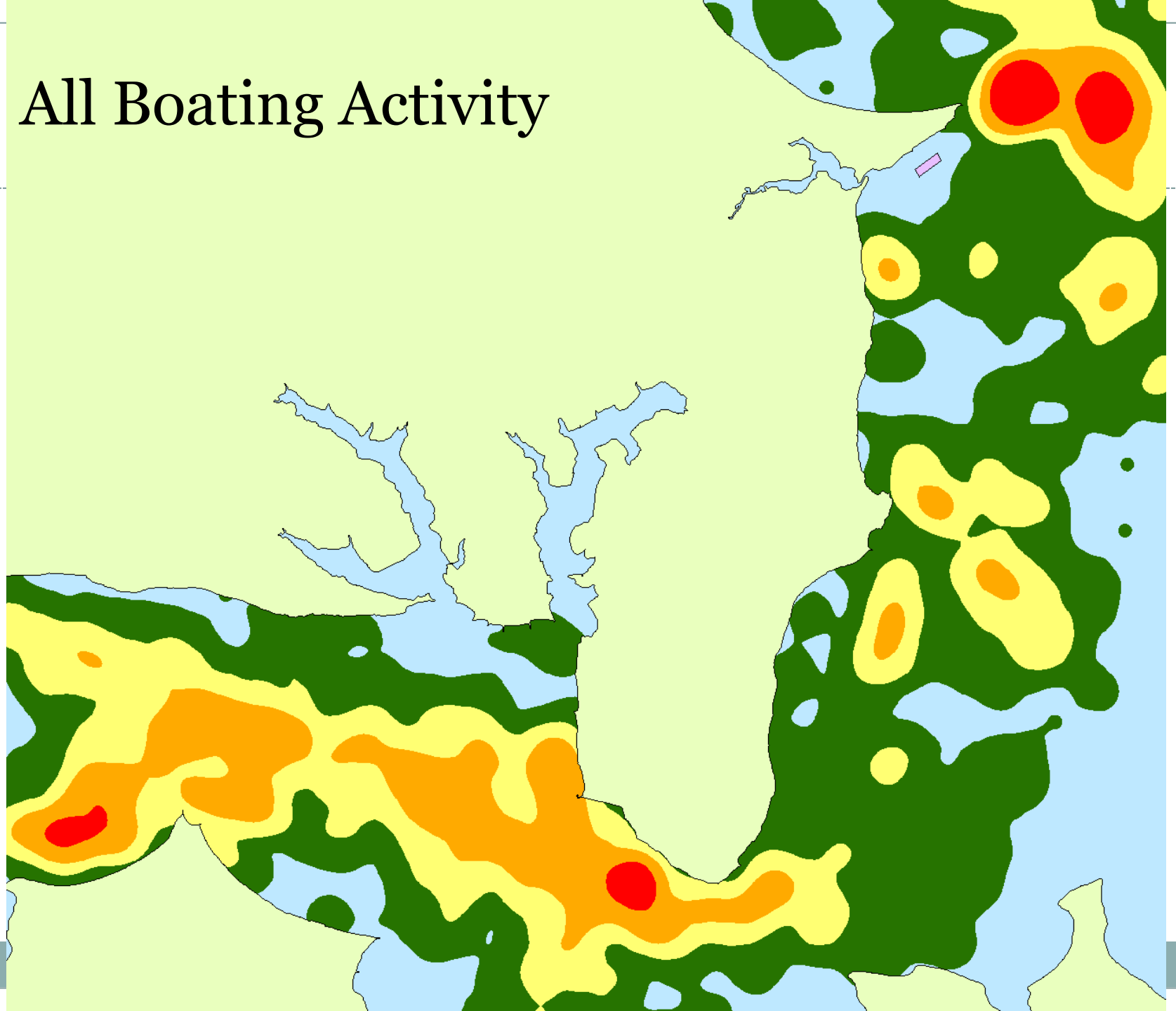
Working Shellfishermen Summer 2007



Working & Motoring Shellfishermen



All Boating Activity



Modeling Indicators and Planning for Shellfish Management



- **Developing impact relevant attributes.**
 - Noise, Light
 - Hours
 - Frequency
 - ✦ E.g. daily or once a year.
 - ✦ Seasonal activities
 - Movement in and out of use areas
- **Impacts into indicators and standards**
 - Perceptions of attributes by others
 - Accuracy of perceptions
 - Modeling possible impacts
 - Mitigating impacts to maximize shellfish production

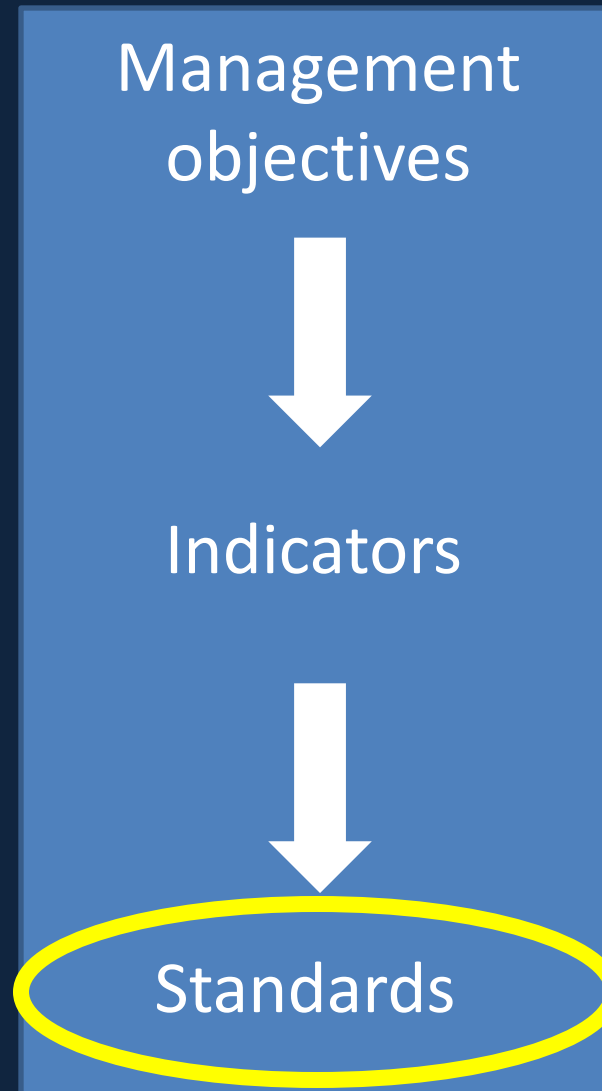
Chilling



Fishing



(3) Understanding social carrying capacities (Evaluative)



Acceptability of boat encounters in a Hawaiian marine park

Needham et al. 2011

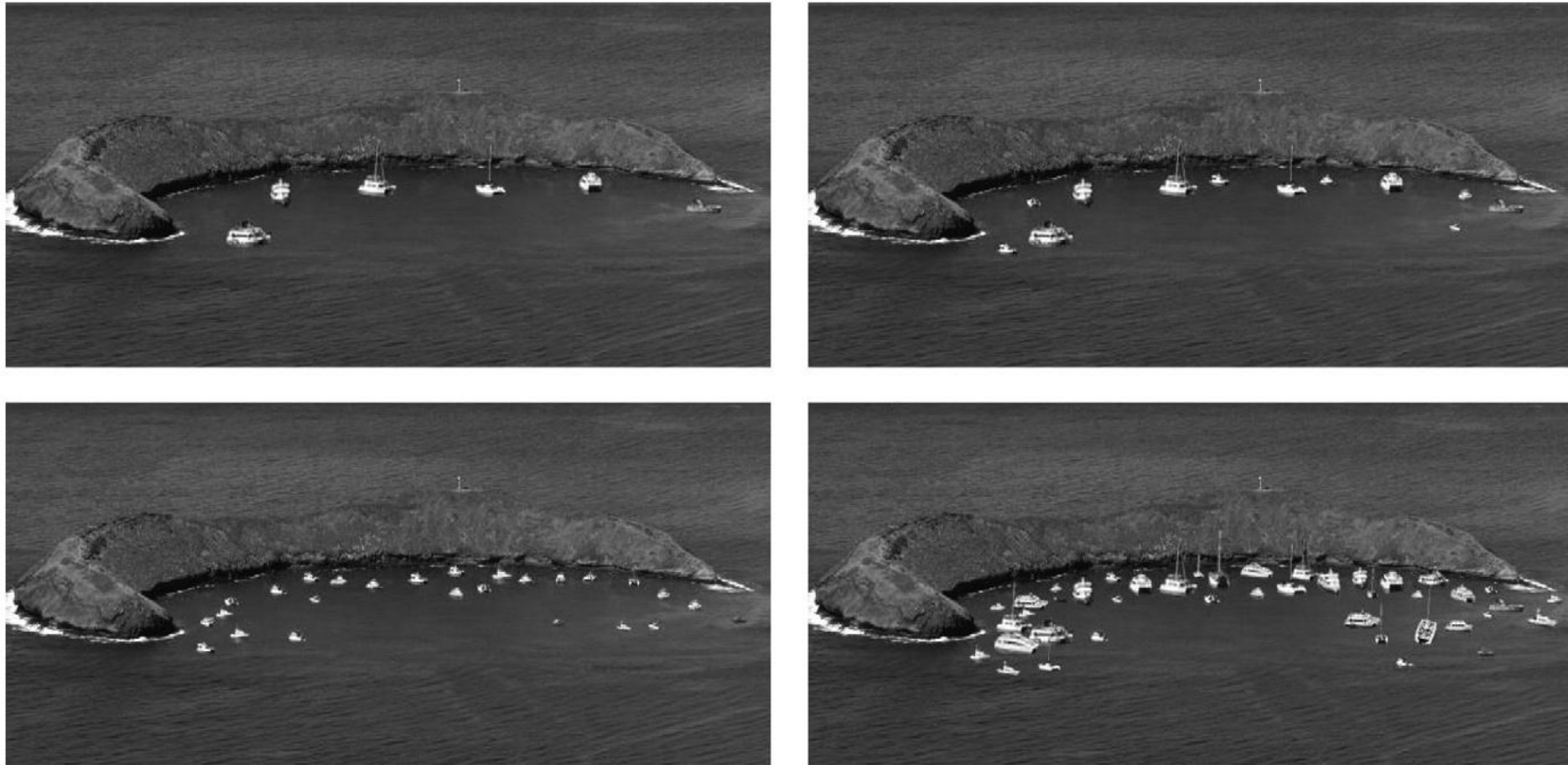


Fig. 2. Sample photographs used for measuring encounter norms.

Preferences, well-being and crowding of recreational boaters in Spain

Diedrich et al. 2011

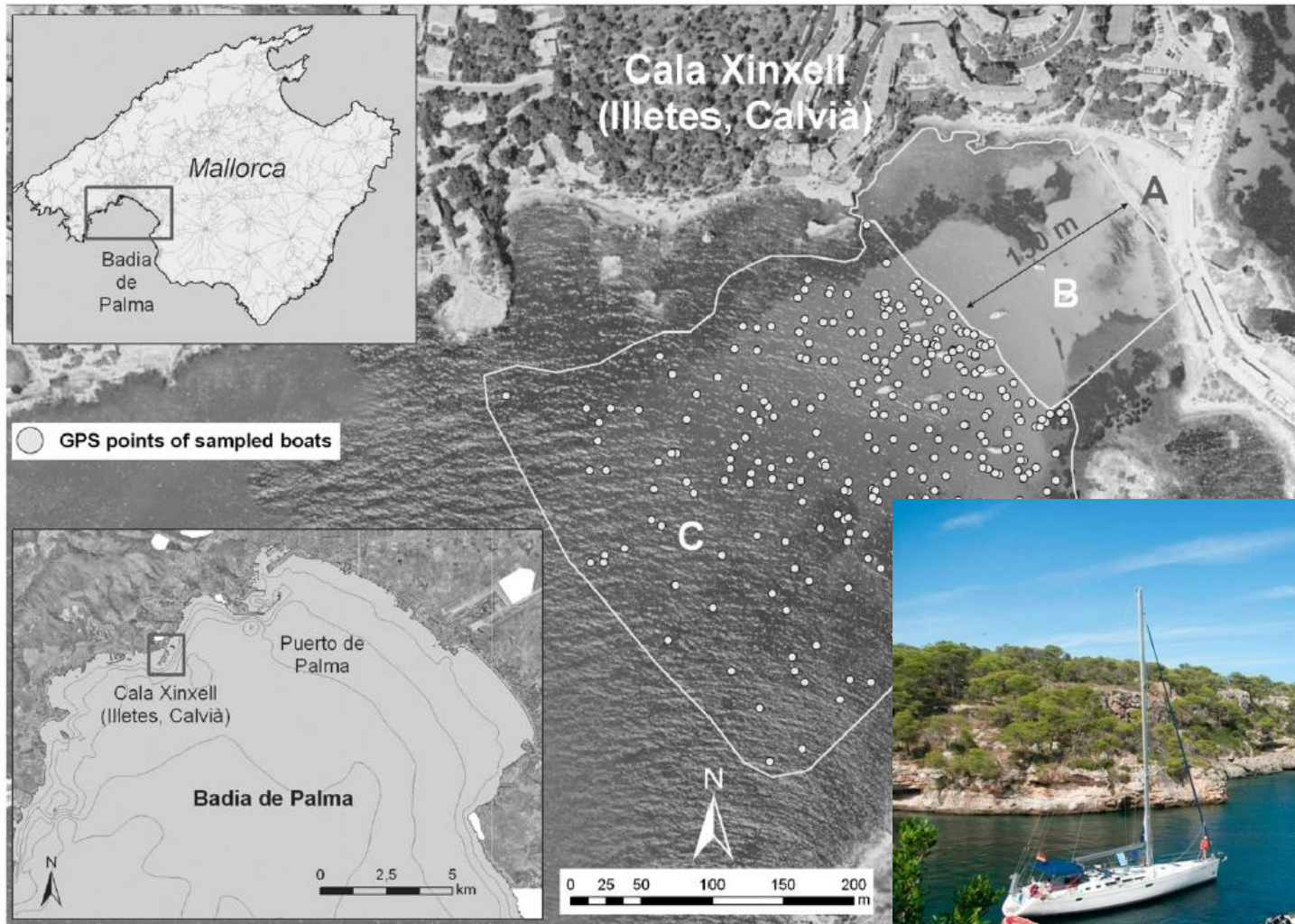


Fig. 1. Map of the study site (Cala Xinxell, Illetes) including zones and GPS references for and

Crowding of snorkelers on Great Barrier Reef

Inglis et al. 1999

a



b



f



Scenic quality of coastal landscapes in RI

Dalton & Thompson 2013

a



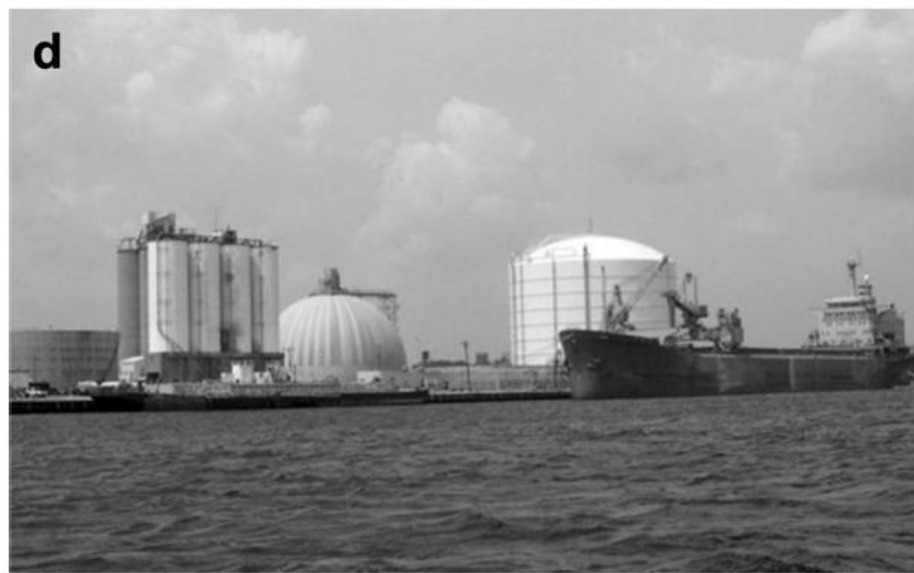
c



b



d



SCC studies for shellfish-related uses in RI?

- Few (if any) studies estimate SCCs related to aquaculture, wild shellfish harvest, or ecological restoration
- Findings from existing SCC studies may not easily transfer to RI (multi-use setting, diverse stakeholder interests)
- Methods could be transferred and modified for shellfish-related uses and other uses in RI coastal waters



Studies of social carrying capacity can be useful to:

- (1) highlight areas of agreement or disagreement on SCCs
- (2) provide ranges of social carrying capacities
- (3) identify factors that affect SCCs, like stakeholder characteristics and environmental & cultural settings
- (4) inform planning and management activities

