Cetacean Critical Habitat Assessment: Central-East Coast of Venezuela

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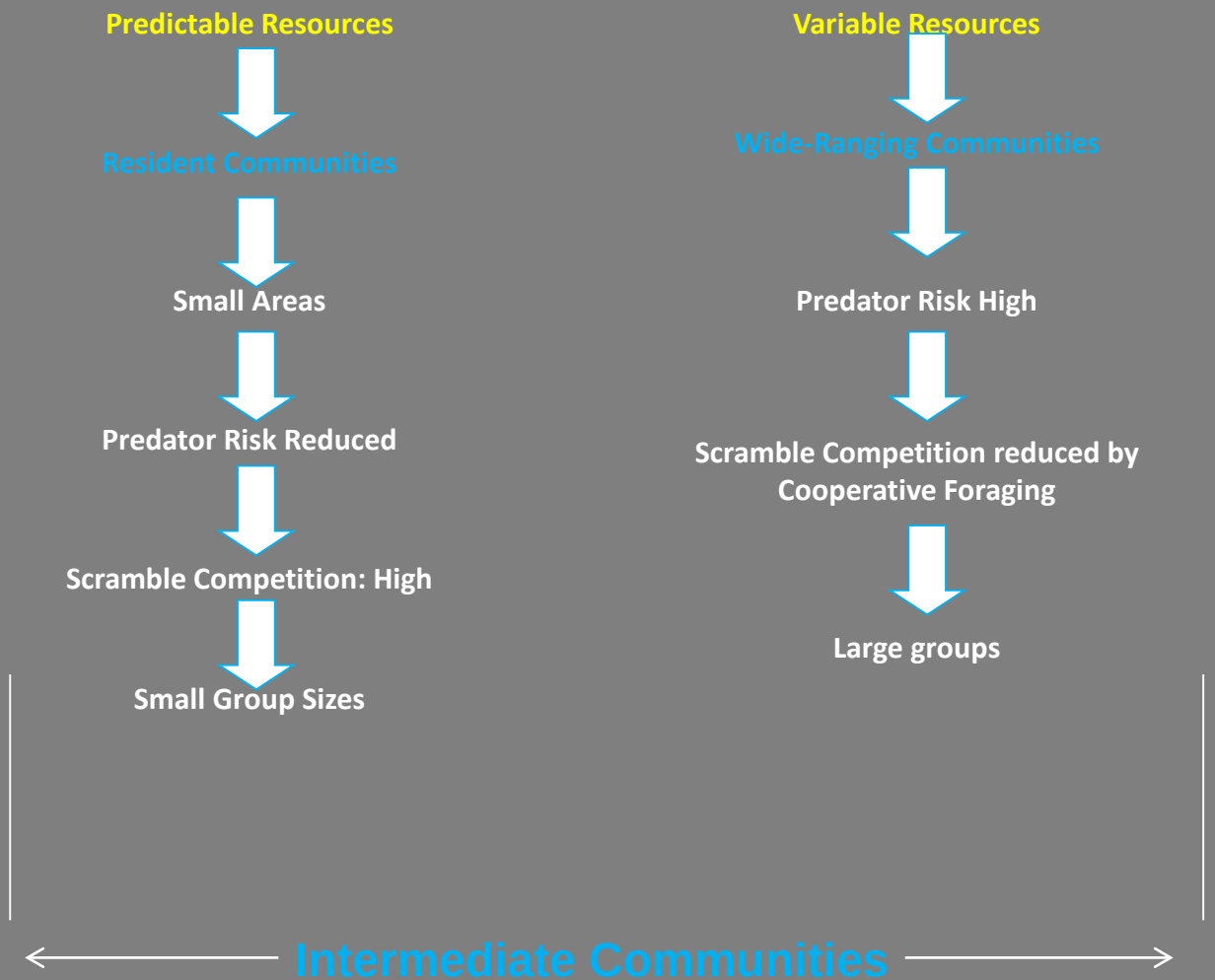
The Conceptualization of Habitat

- Habitat is defined as the physical/biological resources and properties of any spatial location that evoke animal occupancy
- The availability of such properties vary across a species range; areas where their availability/density increases can be classified as critical or even unique for the needs of species and populations.
- The degree of anthropogenic disruption of natural habitats often corresponds with the area/habitat accessibility and its exposure to human activities, defining the degree of overlap in resource use.
- If understood and properly managed, human influence on natural habitats can be converted into management strategies that aim, among others, at long-term wildlife conservation.
- For group-living animals such as cetaceans, their socio-behavioural responses to **habitat structure** may have profound implications on their broader-scale population processes.

Habitat structure influences the energy acquisition and predation risk

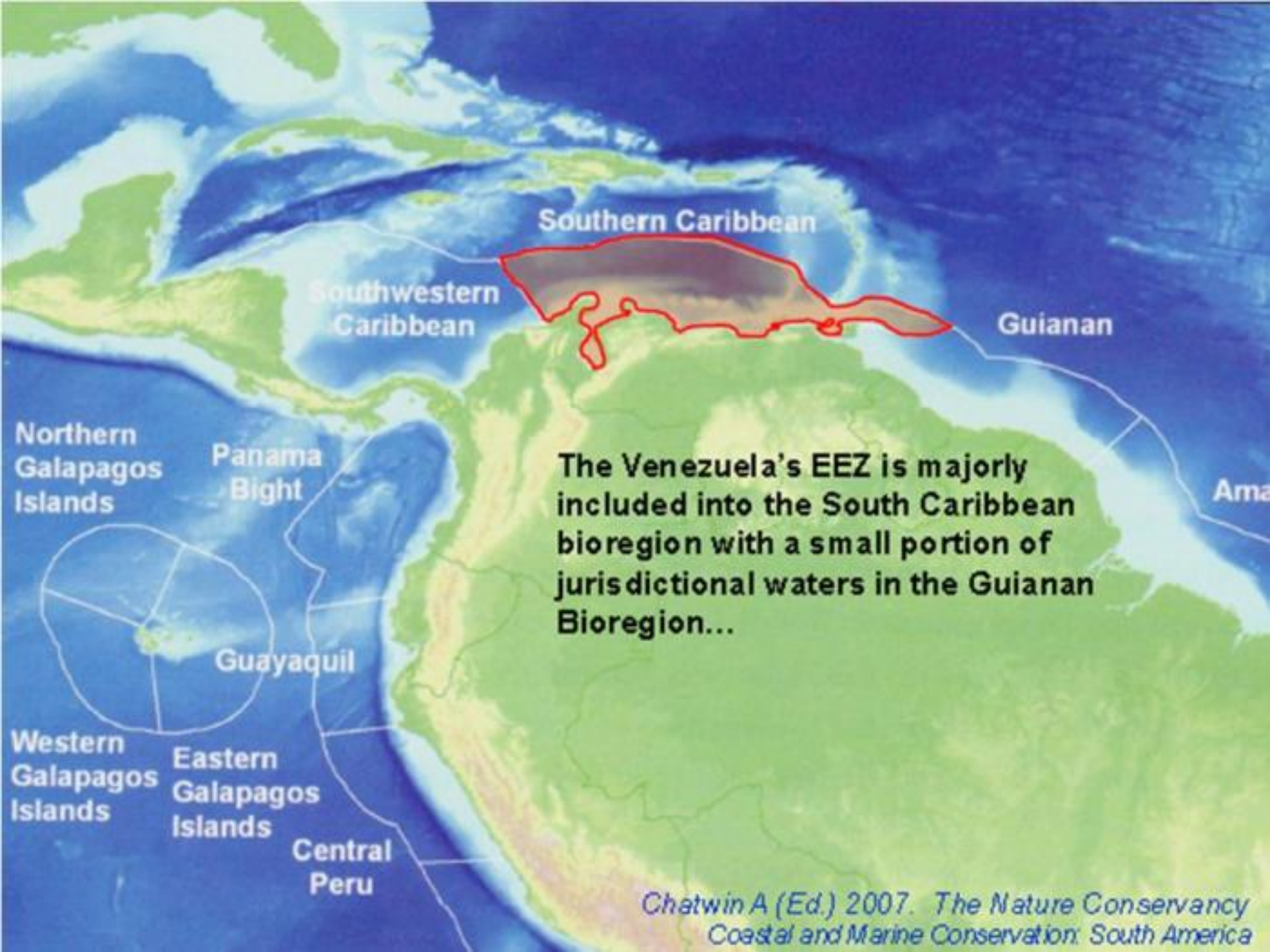


Karczmarski et al 2005; Gowans, Würsig, Karczmarski 2008

Cetacean Habitat Assessment in Venezuela

- This contribution reports an assessment and identification of dolphin critical habitats off the central-east coast of Venezuela.

- The assessment is done by the means of two complementary approaches at varying geographic scales, a local fine-scale and regional meso-scale, applied to two indicator dolphin species: (a) in-shore Guiana dolphin (*Sotalia guianensis*) and (b) neritic common dolphin (*Delphinus* spp).


Southern Caribbean
Southwestern Caribbean
Guianan
Northern Galapagos Islands
Panama Bight
The Venezuela's EEZ is majorly included into the South Caribbean bioregion with a small portion of jurisdictional waters in the Guianan Bioregion...
Guayaquil
Western Galapagos Islands
Eastern Galapagos Islands
Central Peru
Chatwin A (Ed.) 2007. The Nature Conservancy
Coastal and Marine Conservation: South America

Southwestern Caribbean

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Southwestern Caribbean

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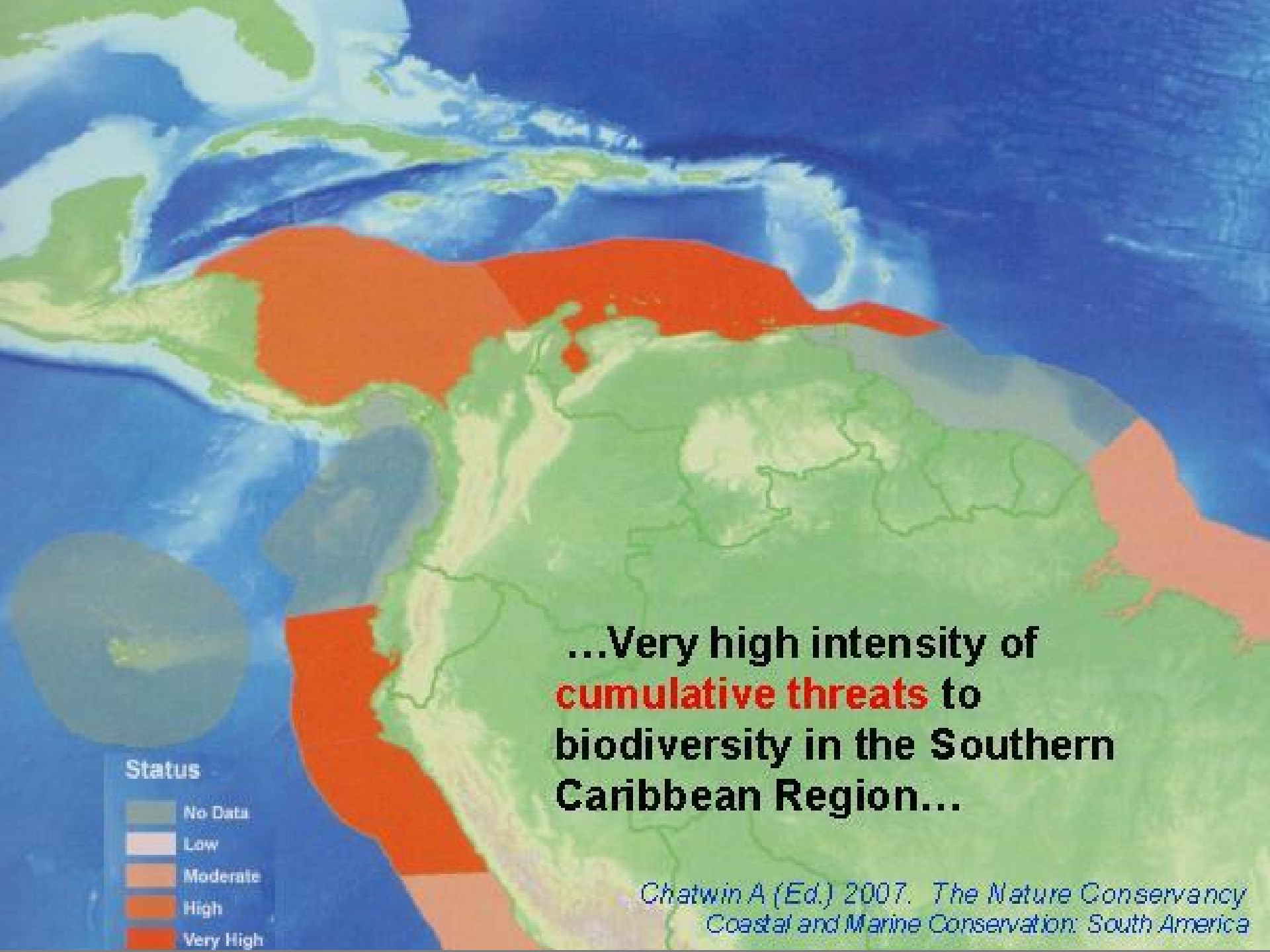
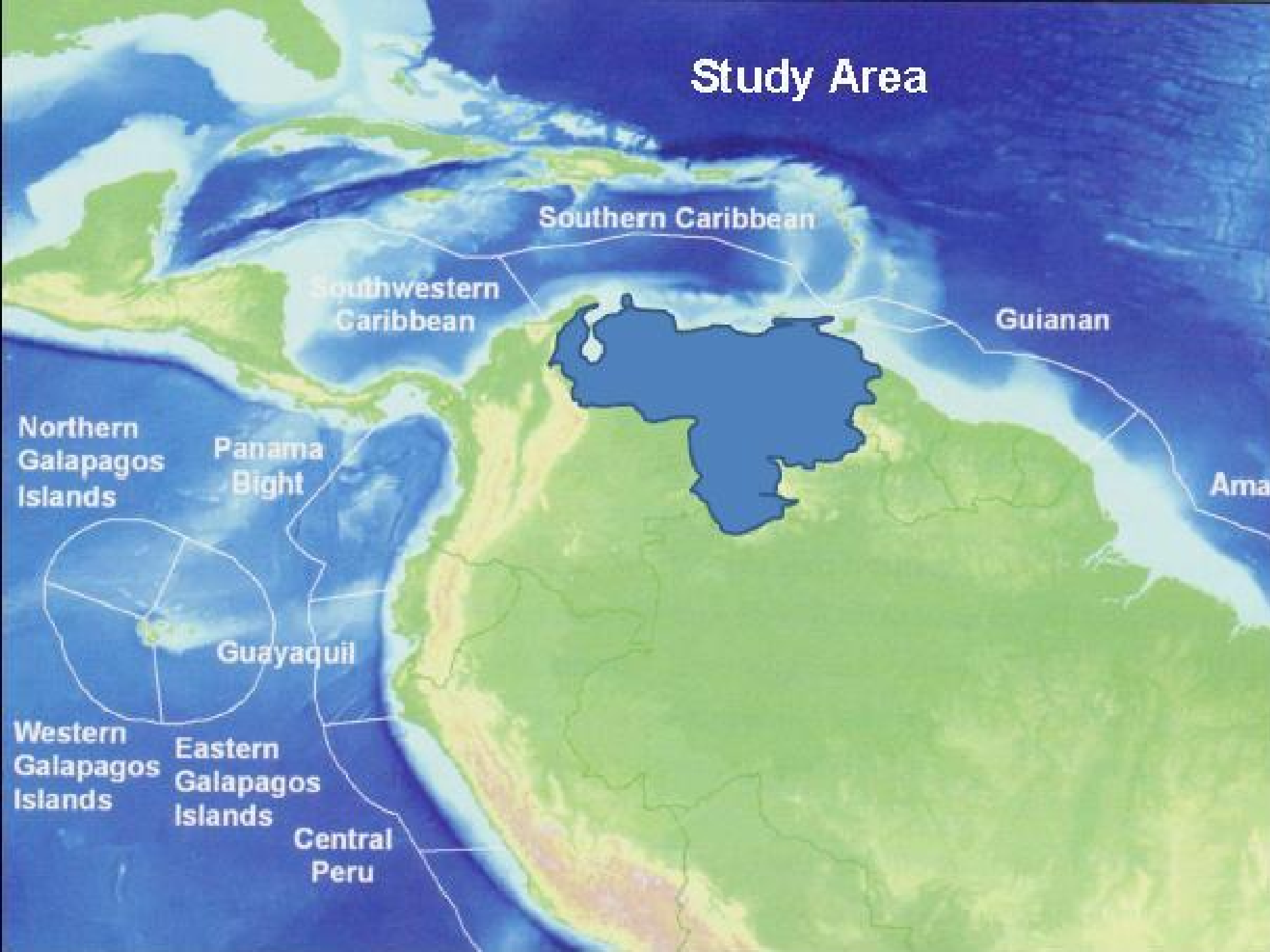
The coastal domain of Venezuela, holds the largest population concentration in the Caribbean (61% of the country's population), together with an equally considerable shipping traffic and one of the largest fishing catches in the region

Chatwin A (Ed.) 2007. The Nature Conservancy Coastal and Marine Conservation: South America



…Very high intensity of cumulative threats to biodiversity in the Southern Caribbean Region…

Chatwin A (Ed.) 2007. The Nature Conservancy Coastal and Marine Conservation: South America


Study Area
Southern Caribbean
Southwestern Caribbean
Guianan
Northern Galapagos Islands
Panama Bight
Guayaquil
Western Galapagos Islands
Eastern Galapagos Islands
Central Peru


66°30'0"W
66°0'0"W
65°30'0"W
65°0'0"W
64°30'0"W
64°0'0"W
63°30'0"W
63°0'0"W
62°30'0"W
62°0'0"W
61°30'0"W
12°0'0"N
11°50'0"N
11°40'0"N
11°30'0"N
11°20'0"N
11°10'0"N
11°0'0"N
10°50'0"N
10°40'0"N
10°30'0"N
10°20'0"N
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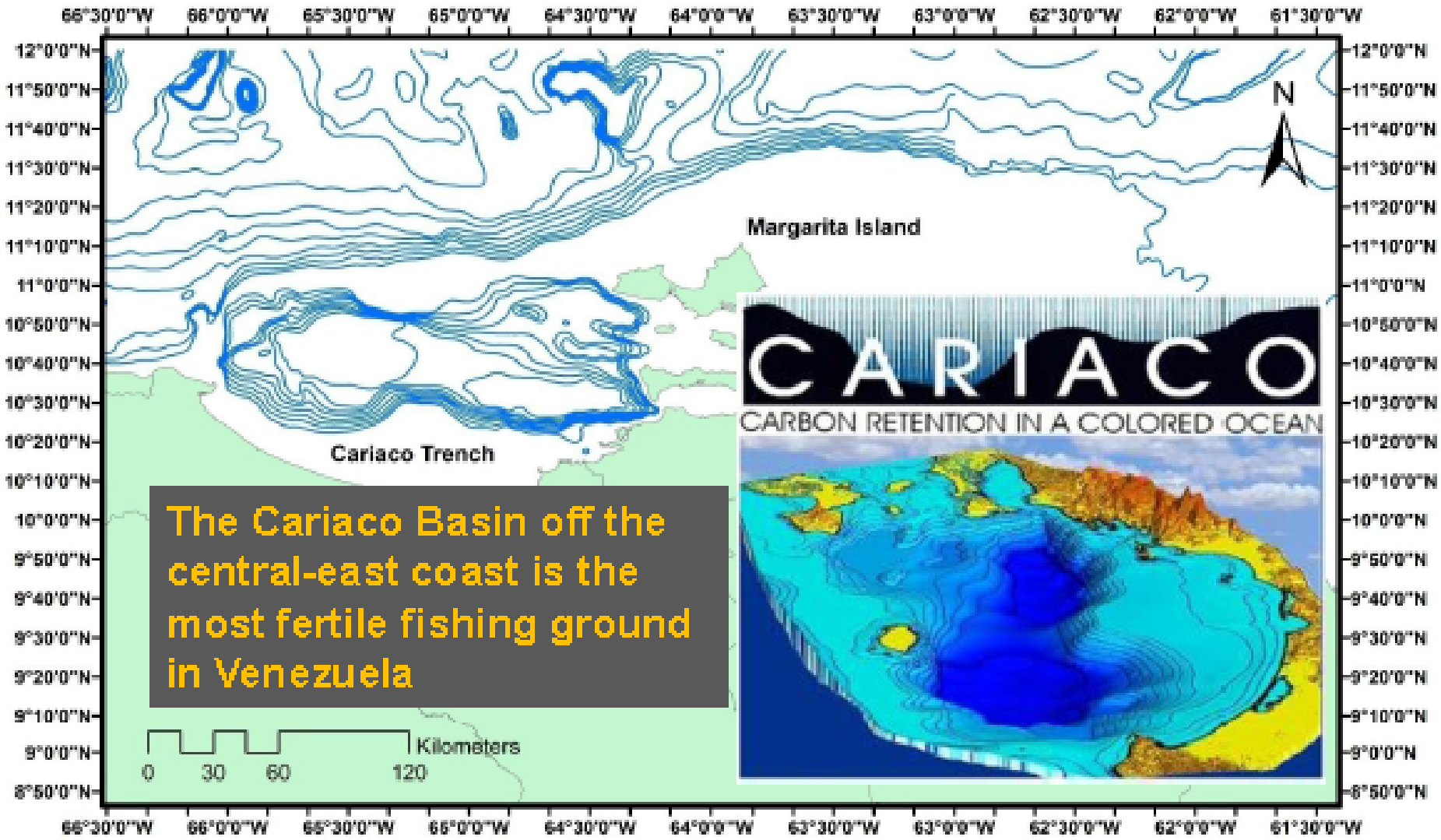
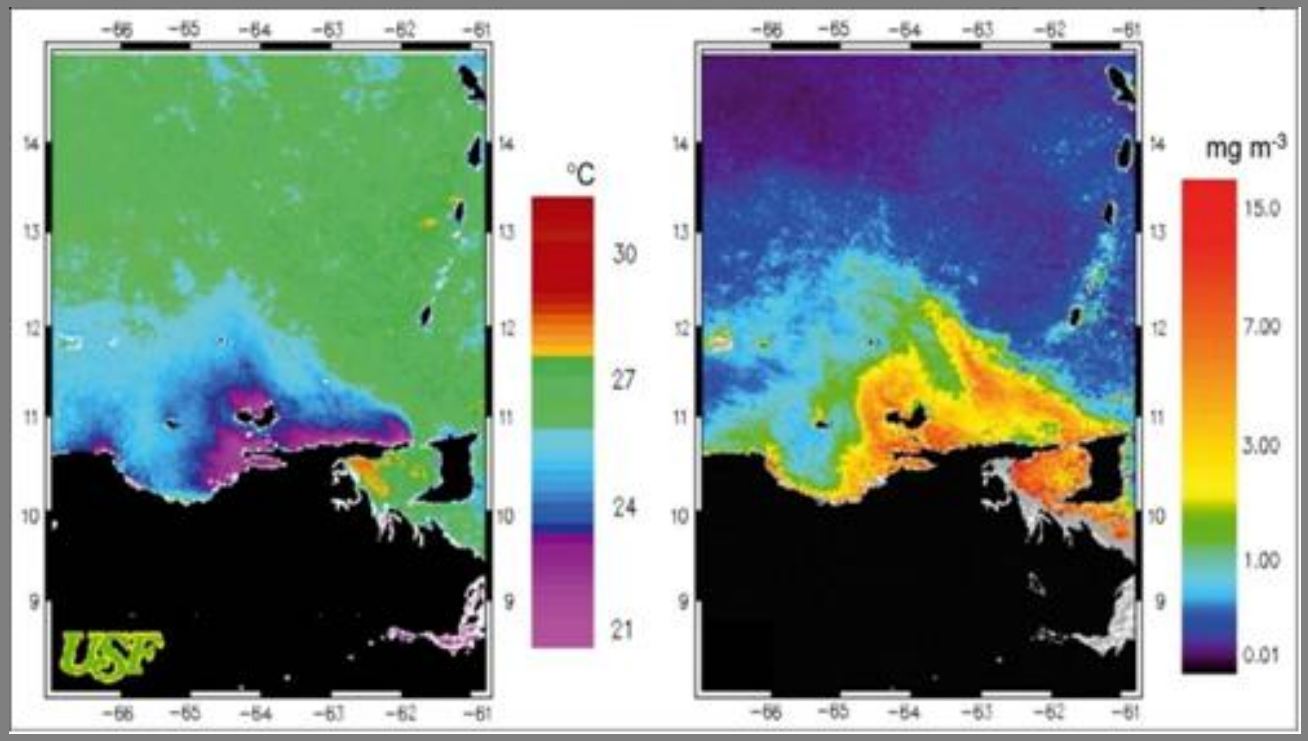
10°0'0"N
9°50'0"N
9°40'0"N
9°30'0"N
9°20'0"N
9°10'0"N
9°0'0"N
8°50'0"N
N
Margarita Island
Cariaco Trench
Venezuela
0
30
60
120
Kilometers

The Cariaco Basin



- Wind induced coastal upwelling processes complemented with the influence of the Orinoco River plume during the second half of the year.
- Important pelagic fish stock that sustains a high level of coastal development and one of the richest marine biodiversity in the region.



Muller Karger et al 2004. Deep Sea Research II 58: 927-943

North-East Coast as a Model Area for Cetacean Critical Habitat Assessment:

- Diverse eco-dynamics that promote cetacean diversity
- North-East coast identified as a priority zone for marine conservation

Klein et al 2007. Conservation Priorities in Venezuela. In: Chatwin, A. (Ed.). TNC

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Regional (meso) scale *Delphinus spp*

GIS + NNI + Kernel Density Estimate

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Behavior + Spatiotemporal Patterns

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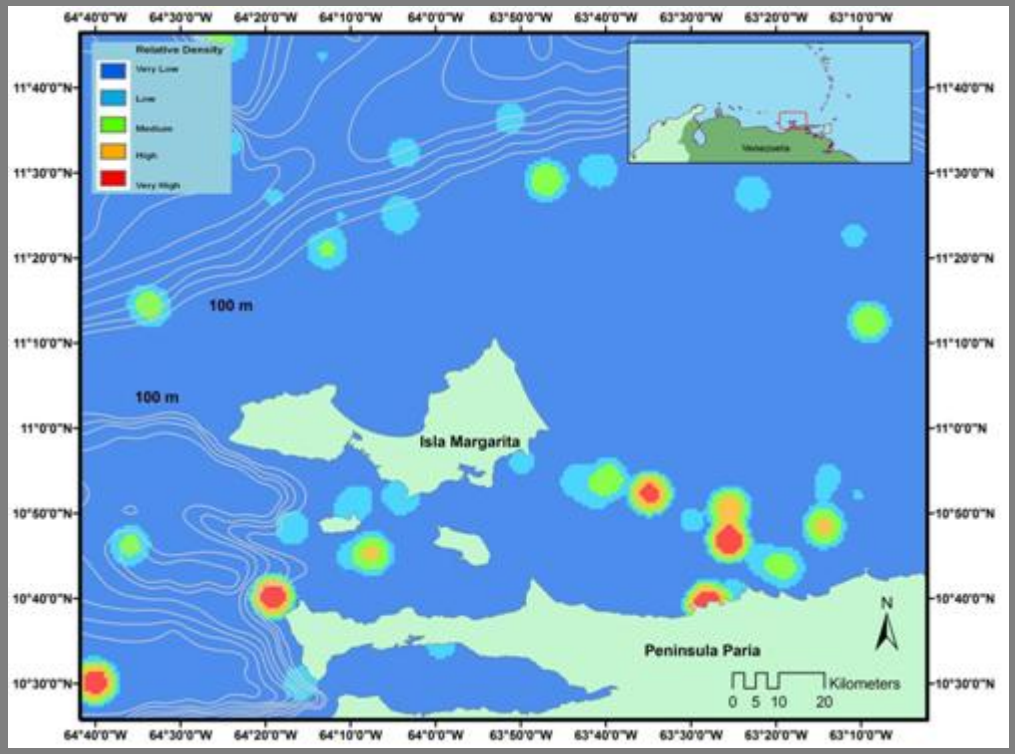
Local (fine) scale Sotaliaguianensis

Behavior + Spatiotemporal Patterns

- Our aim is to identify areas of critical importance to support a healthy dolphin population as part of an **ecosystem based framework** that integrates the current level of coastal development.
- Rooted in behavioral and spatial ecology, but recognizing the key aspects of the *governmental policies and priorities* that **influence decision making**

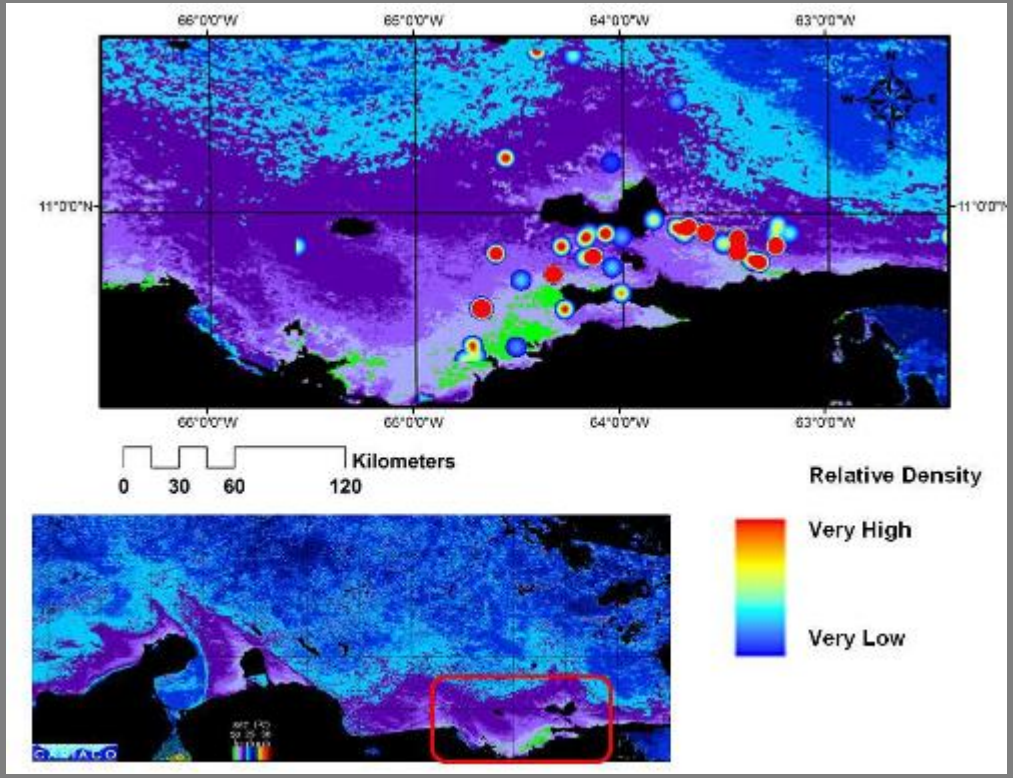

Common Dolphin

High Relative Density Areas for Common Dolphin are Neritic
(significant non random clumped aggregation pattern;
NNI: 0.84, Z score -2.08, p< 0.05).

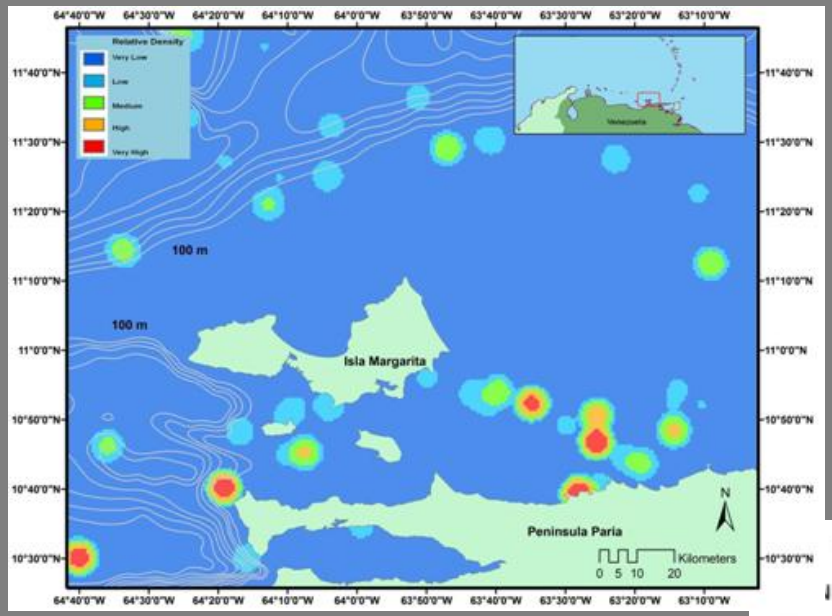


Oviedo et al (2010). JMBA. 90: 1623 -1631

Critical habitats identified by density analyses overlap with equally localized coastal upwelling



An Apparent Spatial Predator-Prey Relationship:
distribution of common dolphins *vs. local commercial fishery*



Small pelagics *vs. common dolphins in sectors referred by Freon et al. (1997) as key fishing grounds.*