



Practical Approaches to Ecosystem-Based Management

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The Big Picture

- Most information, and most management tools, presented at this workshop are single-species based.
- What's new/reemphasized?
 - Better bycatch accounting.
 - Tracking people, not permits.
 - Habitat protection, including closed areas.
 - Simple trophic interactions.
 - Complex over parameterized models.



What's Missing?

- Using spatial ecology better in single species models.
 - Species associations.
 - Habitat-based models.
 - Spatio-temporal environmental variables.
- Identifying and advising on trade-offs.
 - It's OY, stupid.

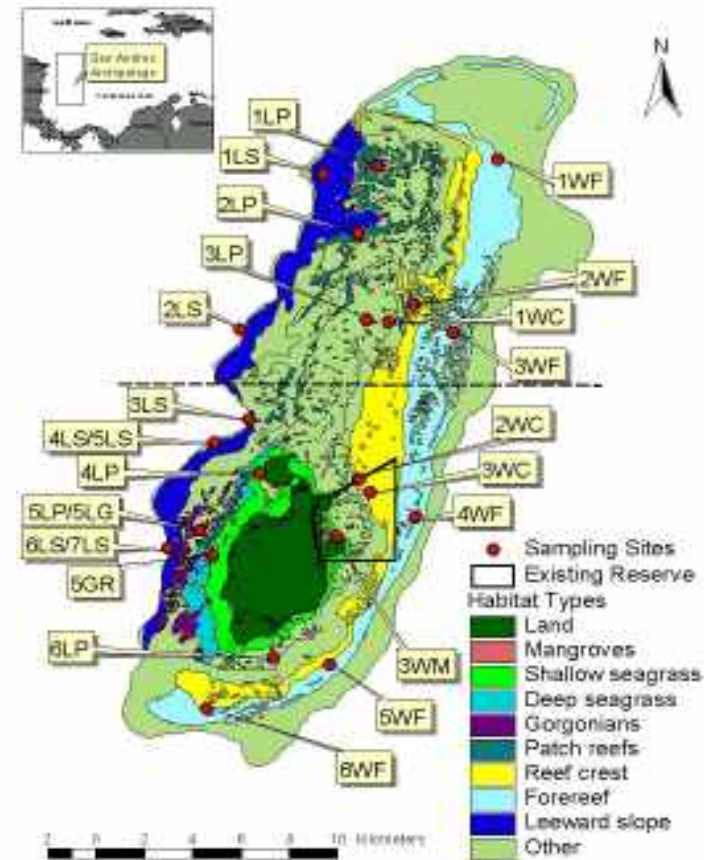


Species Associations

- Catch per unit effort derived abundance indices cover wide range of conditions.
- Species associations on haul/trip provides information on ecology, fishing behavior.
- Using associations, we can track consistent set of habitats and behaviors (Stephens and MacCall 2004).
- Categorizing/grouping can also help.

Habitat-Based Models

- Seaflower Biosphere Reserve in the San Andrés Archipelago, Colombia with comprehensive zoning process.
- Defined habitats, tested them through benthic and fish surveys.

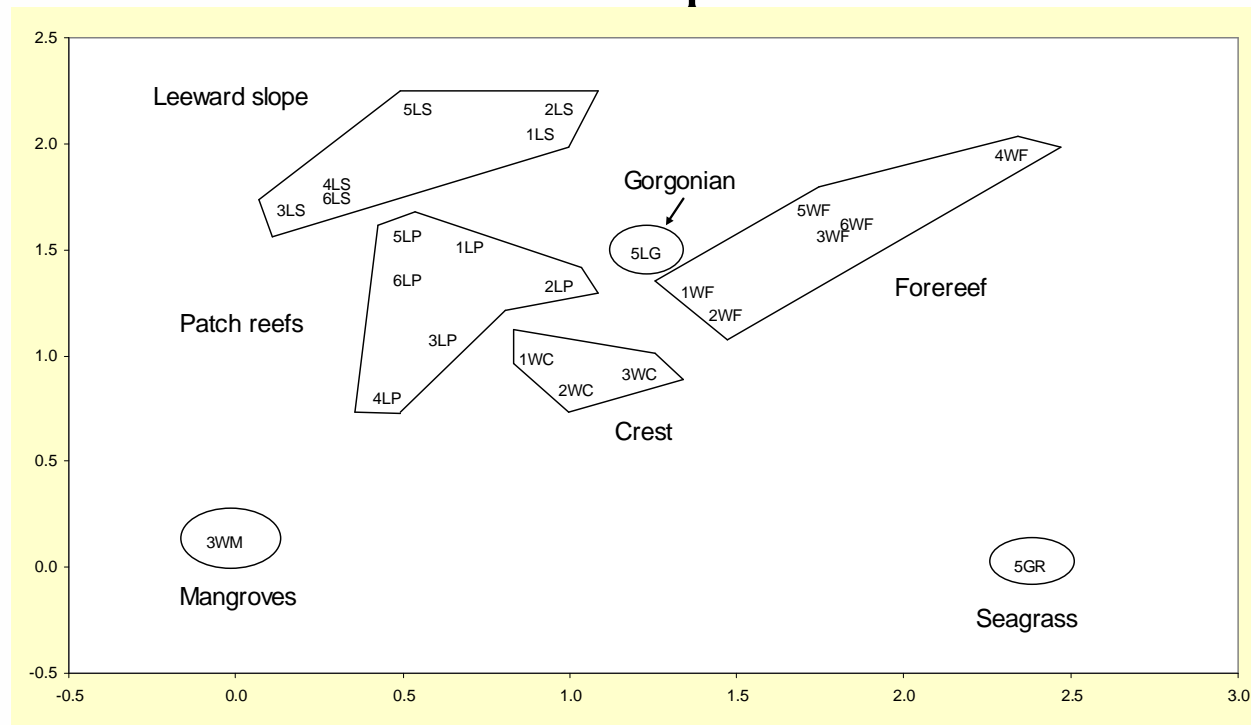


From Friedlander et al. 2003



Habitats Were Important

- Benthic communities matched (of course).
- Fish assemblages also tightly tied to habitat types.
- Confirmed the central importance of habitats.

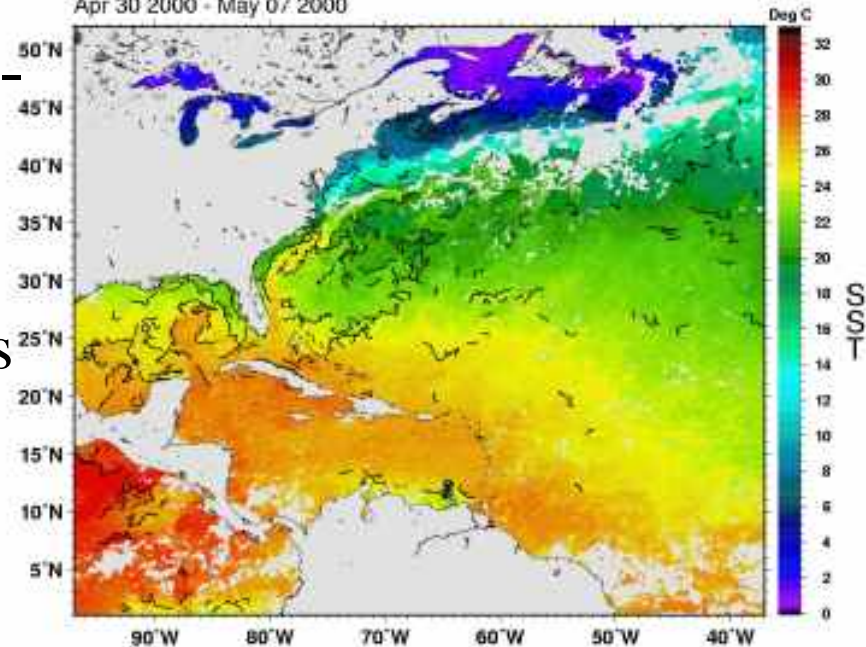




Spatio-Temporal Env'tl Variables



- Habitat is fluid.
- Have extensive satellite-based information on habitat attributes:
 - Sea surface temperatures (SST) and fronts;
 - Ocean color (K);
 - Current patterns;
 - and more.

Pathfinder AVHRR SST
Apr 30 2000 - May 07 2000



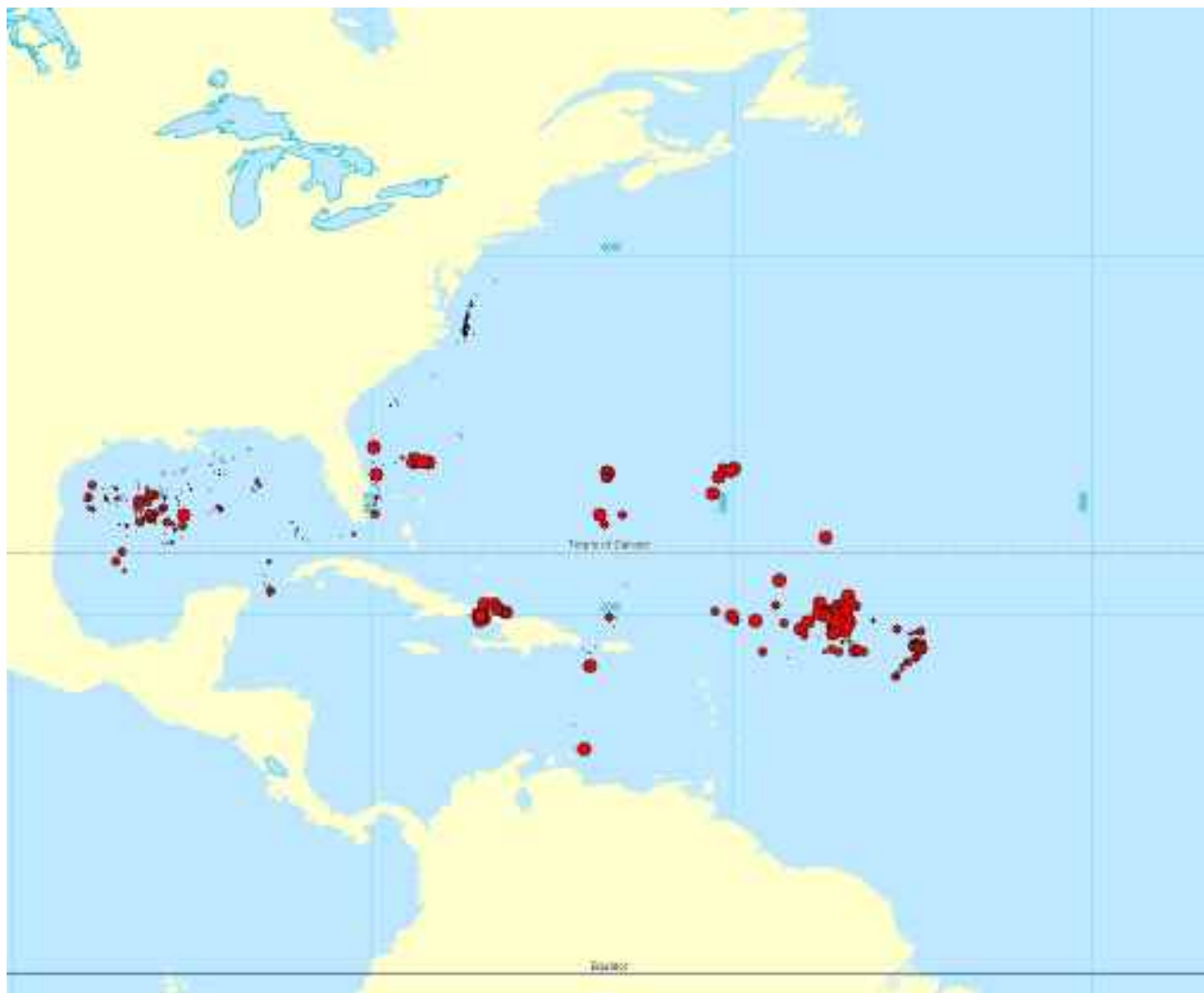


Ex: Coupling with Fisheries Data

- US Pelagic Observer Program
 - Records catch and discards, location, and time of each longline haul by sample of US vessels.
 - Dolphinfish CPUE quantified; can be done for other species as well.
 - Data examined for spatial patterns.
 - Data also examined for environmental correlates for various species.
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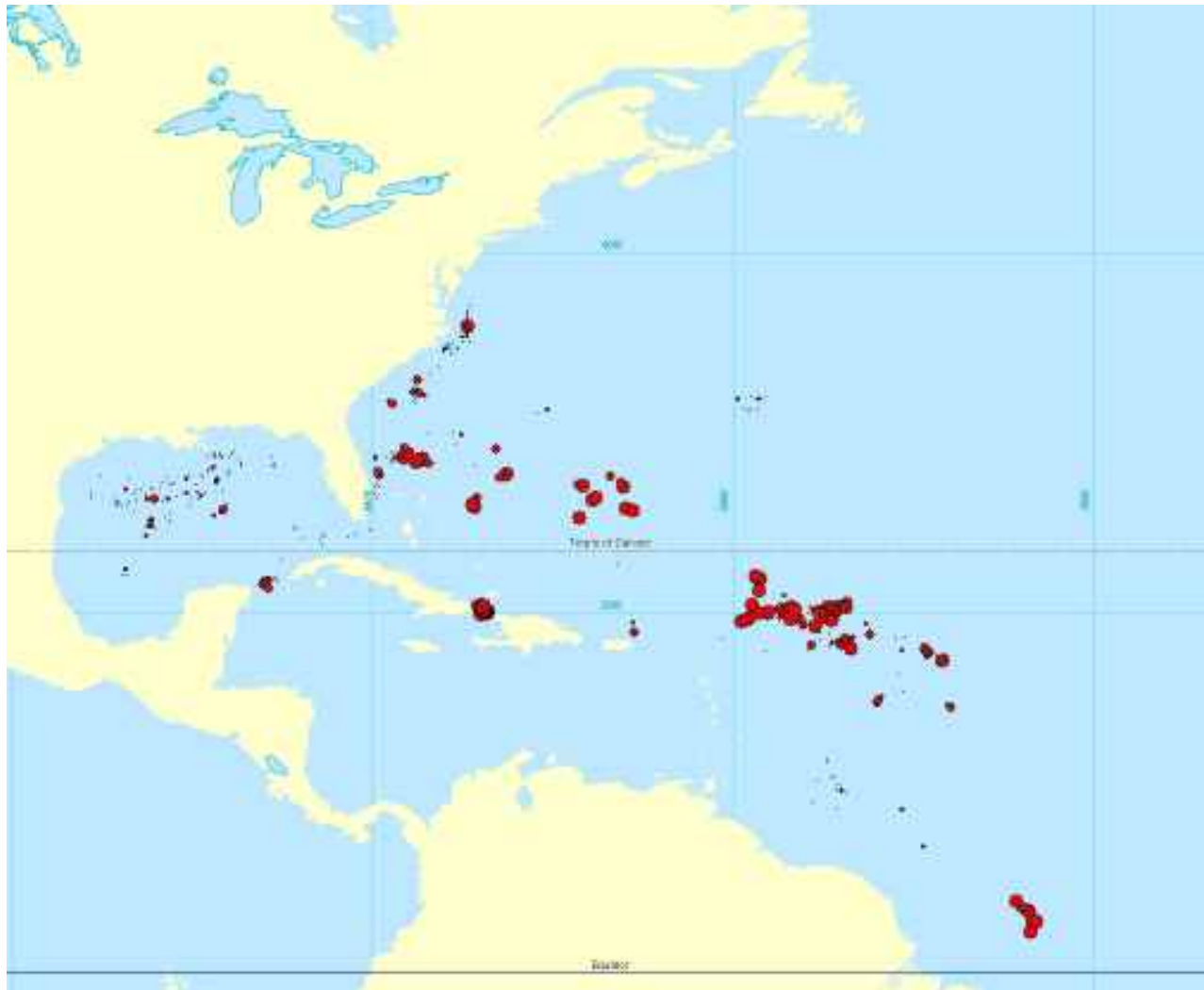


Dolphinfish CPUE January





Dolphinfish CPUE February





Dolphinfish CPUE March





Dolphinfish CPUE April





Dolphinfish CPUE July



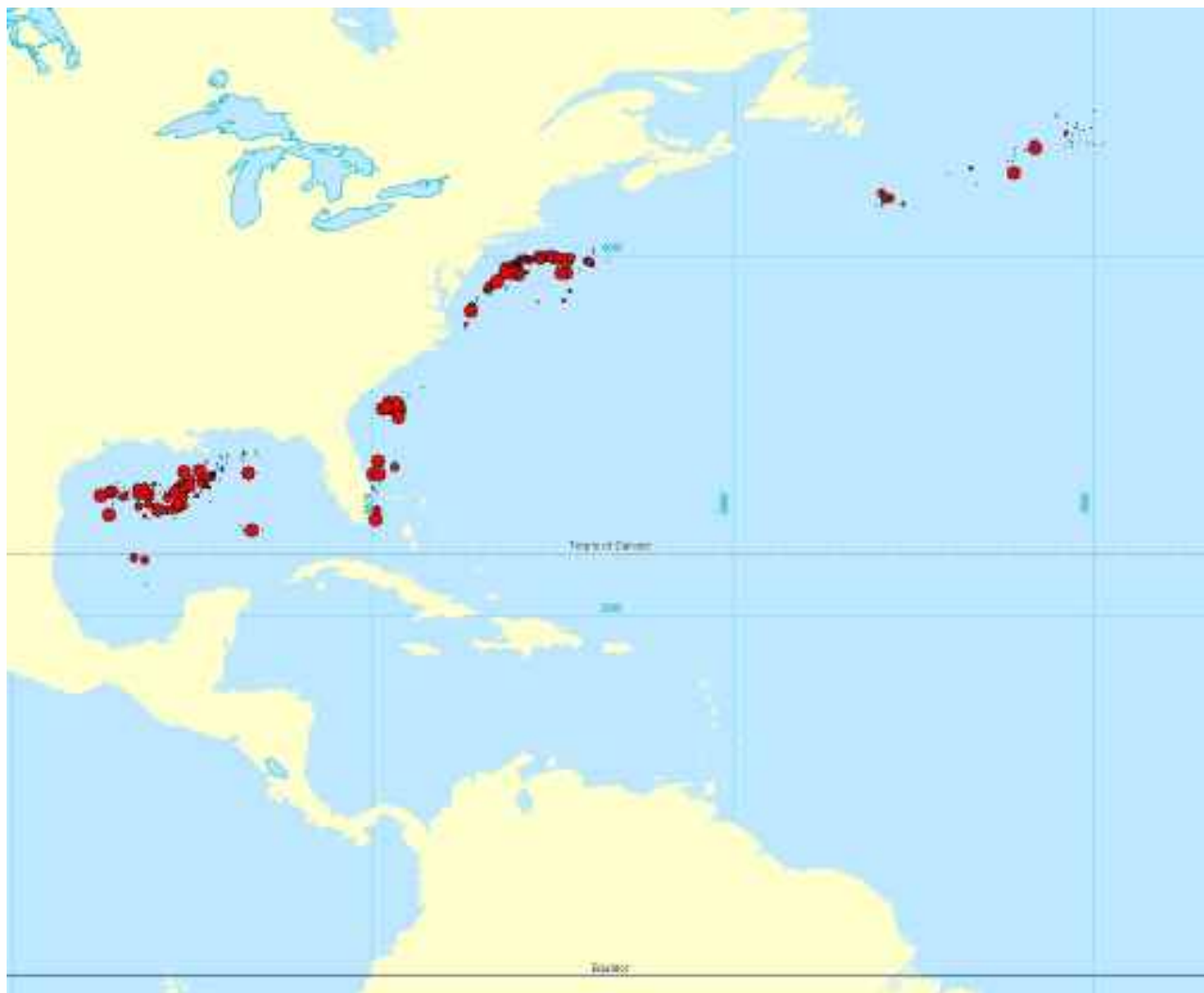


Dolphinfish CPUE August





Dolphinfish CPUE September





Dolphinfish CPUE October





Dolphinfish CPUE November

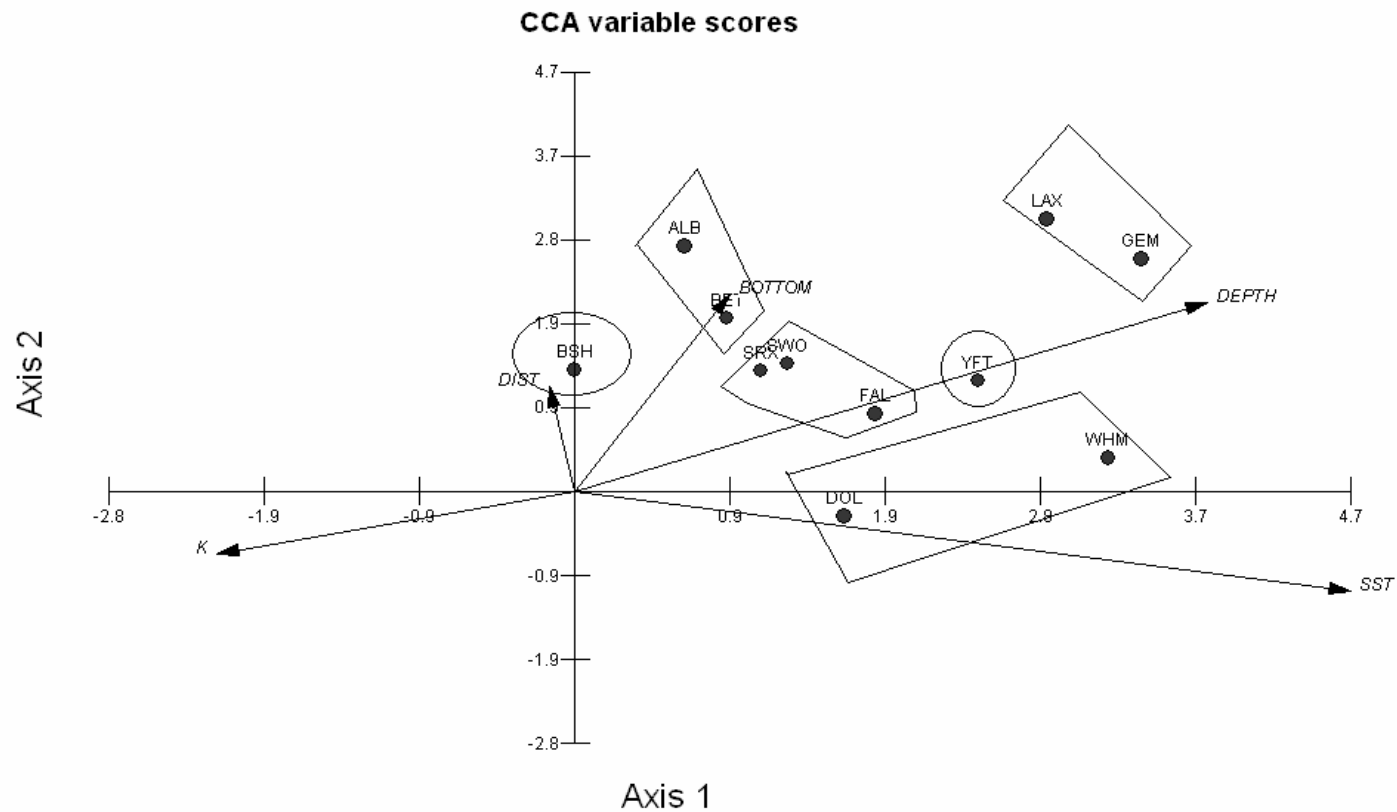




Dolphinfish CPUE December



Explaining CPUE Patterns



Vector scaling: 9.70



Spatial Ecology—Valuable Tool

- Relatively simple studies of environmental variables and spatial patterns can yield much better understanding of systems.
- Necessary data are available for many fisheries and could be collected efficiently for many others.
- Complements conventional methods, and informs new ones.





It's OY, Stupid

- What are the key potential objectives, how do we advise political process of trade-offs?

Biology

- Multispecies fisheries create trade-offs (Ricker 1958).
- Ecological interactions lead to trade-offs in yields from fisheries (May et al. 1979).



Trade-Offs

And Beyond

- Access/tradition vs. profits (Hardin 1968).
- Risk vs. rewards.

What Do We Need?

- To identify clearly stated potential social, economic, and ecological objectives (OY).
- To provide advice on how alternatives address each potential objective (some ✓).



Steps Forward Sustainable Fisheries Act Required Provisions

3. Social, economic, ecological factors
 - ✓ *Using spatial ecology better in S-S models.*
 - ✓ Simple trophic interactions.
 - ✓ *Identifying and advising on trade-offs.*
 - ? Complex over parameterized models?
7. Habitat protection, including closed areas.
11. Better bycatch accounting.
6. Tracking people, not permits.

NORR

