

Offshore Fish Community Ecological Interactions

Lake Superior – State of the Lake 2005

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Offshore Community

Predators: Siscowet
Burbot
Sea Lamprey

Prey Fishes: Deepwater Sculpin
Kiyi
Cisco (i.e., lake herring)

Invertebrates: *Mysis relicta*
Diporeia
Zooplankton

Offshore Ecological Interactions

Structure and Function

How do the pieces fit together?

How does the structure affect interactions?

- **Energy and nutrient flow**
- **Feedback to the structure**

Ecology and Fish Community Objectives

Kitchell et al. (2000). Sustainability of the Lake Superior fish community: interactions in a food web context. Ecosystems 3:545-560.

- Modeled potential management actions in food web context
- Feedbacks created outcomes more complex than simple linear dynamics
- Heuristic tool – suggests constraints to fish community objectives given current structure
- Spatial context to recognize heterogeneity

Available Information Since 2000

- **Phase II Acoustic Study - Lakewide**
- **June Siscowet Surveys**
- **Updated Predator Consumption Study**
- **Lower Trophic Level Survey**
- **Diel Vertical Migration Studies**
- **Integrated Sampling Strategies**
- **Stable Isotopes**

Conceptual Offshore Food Web

Day

Night

Pelagic

Cisco
↑
Zooplankton

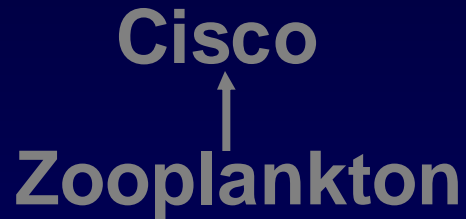
Benthic

Conceptual Offshore Food Web

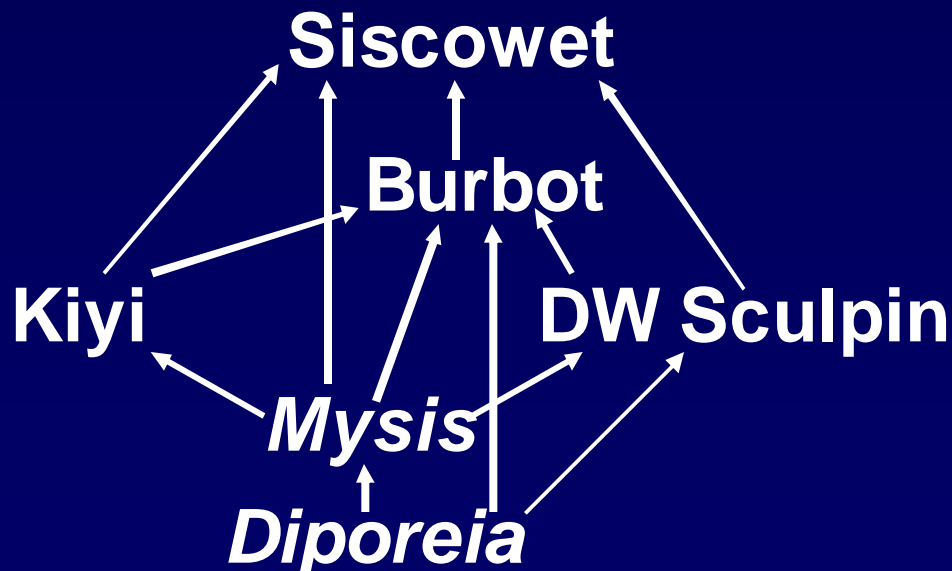
Day

Night

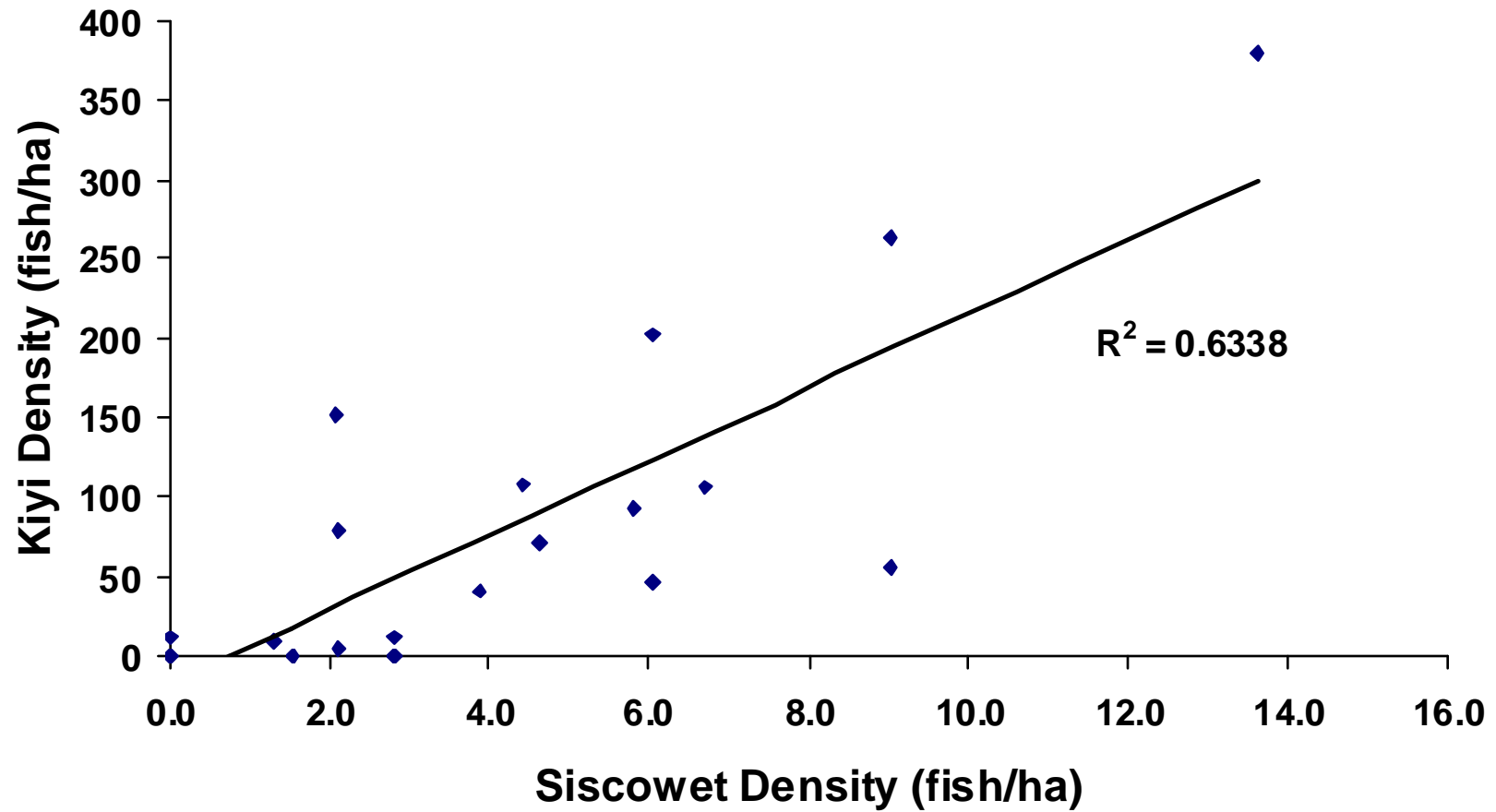
Pelagic



Benthic



Day Benthic Food Web



Conceptual Offshore Food Web

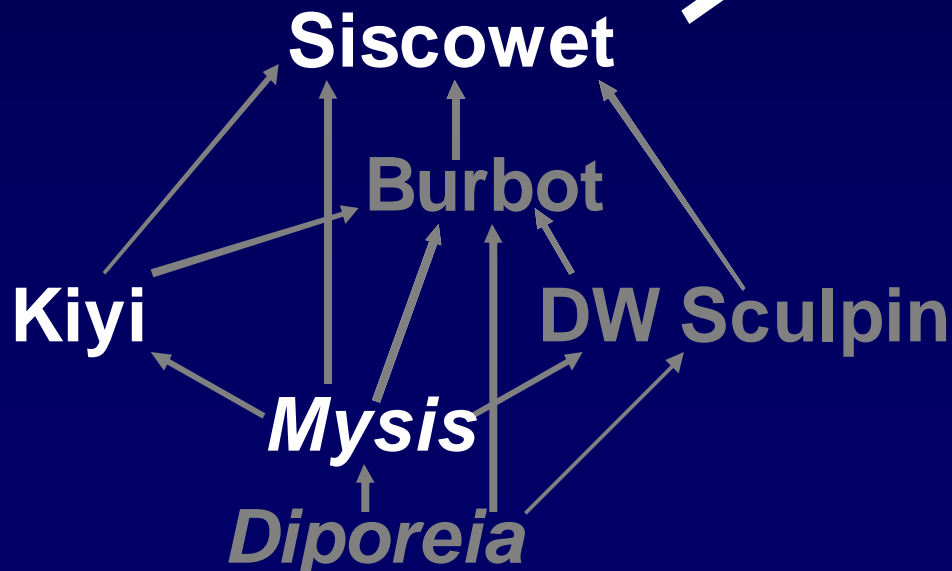
Day

Night

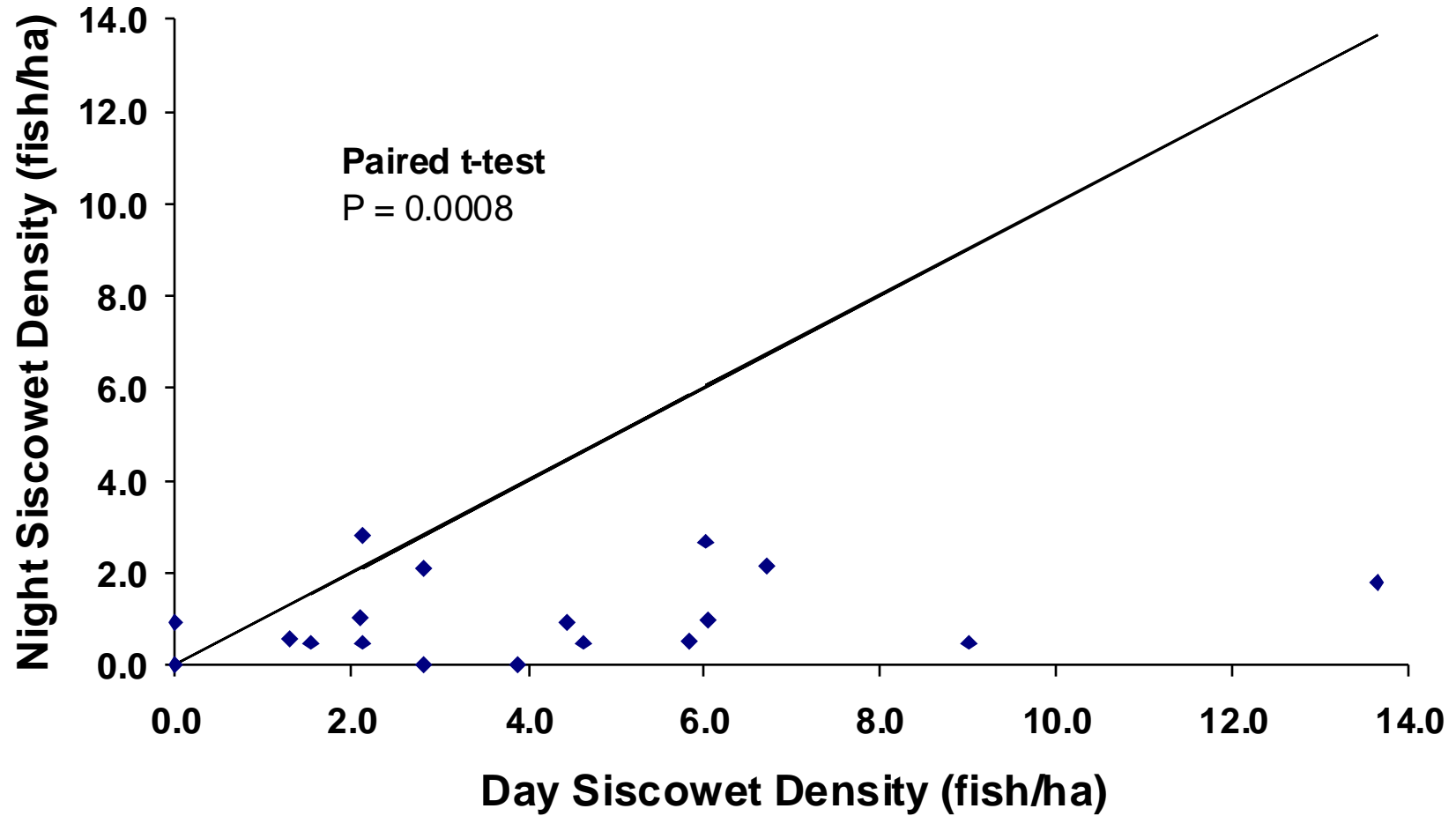
Pelagic

Cisco
↑
Zooplankton

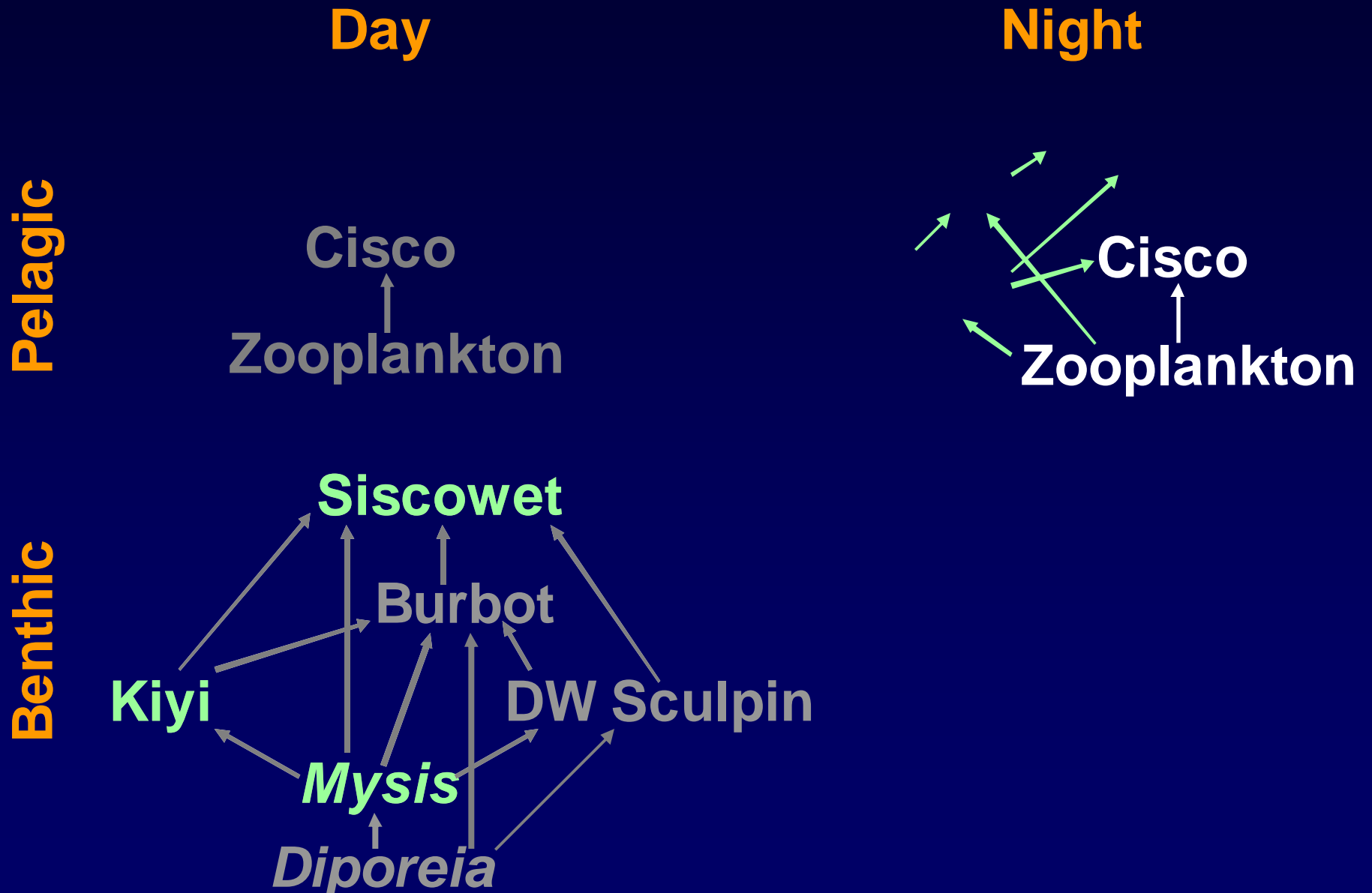
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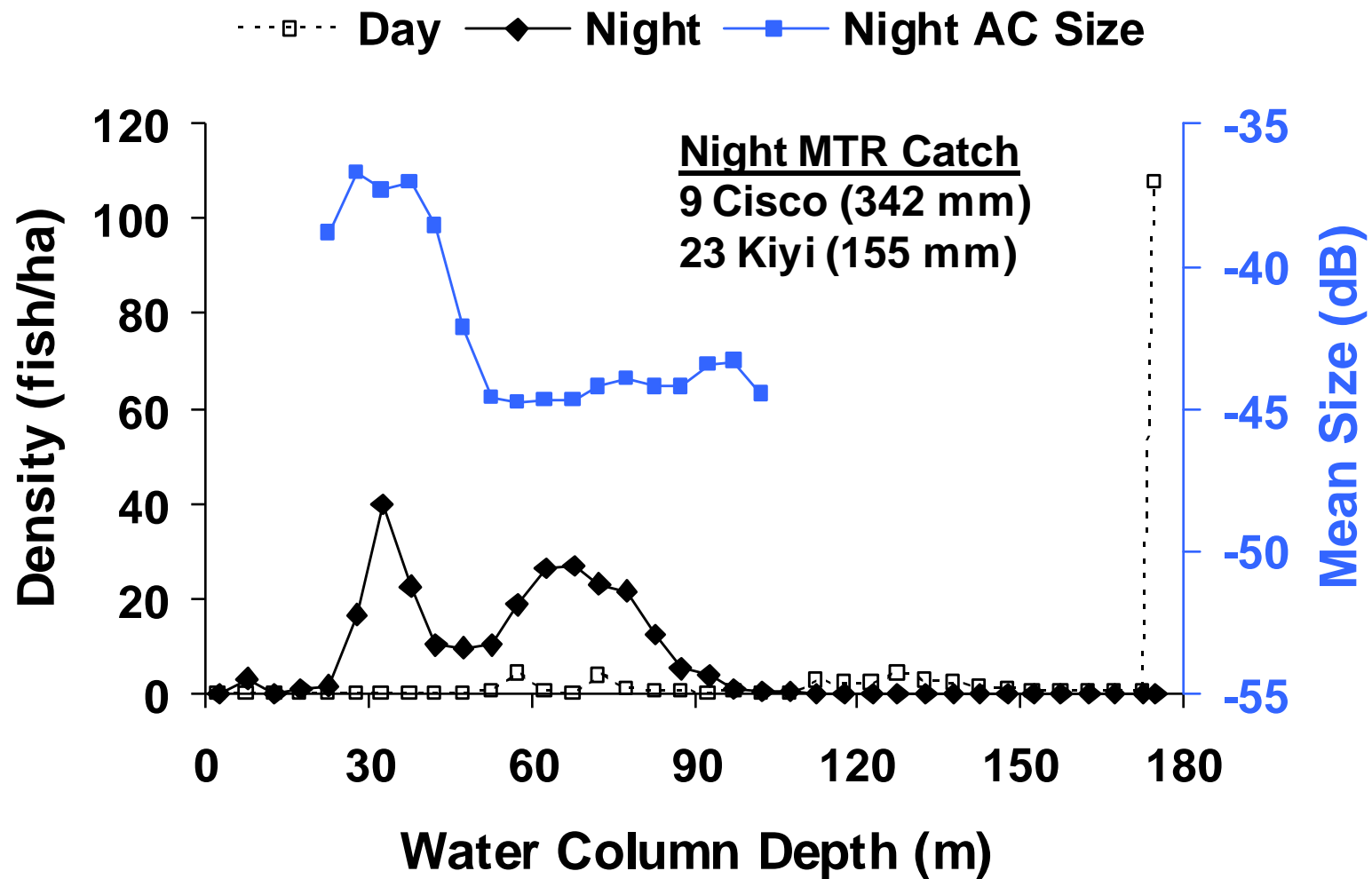
Diel Vertical Migration



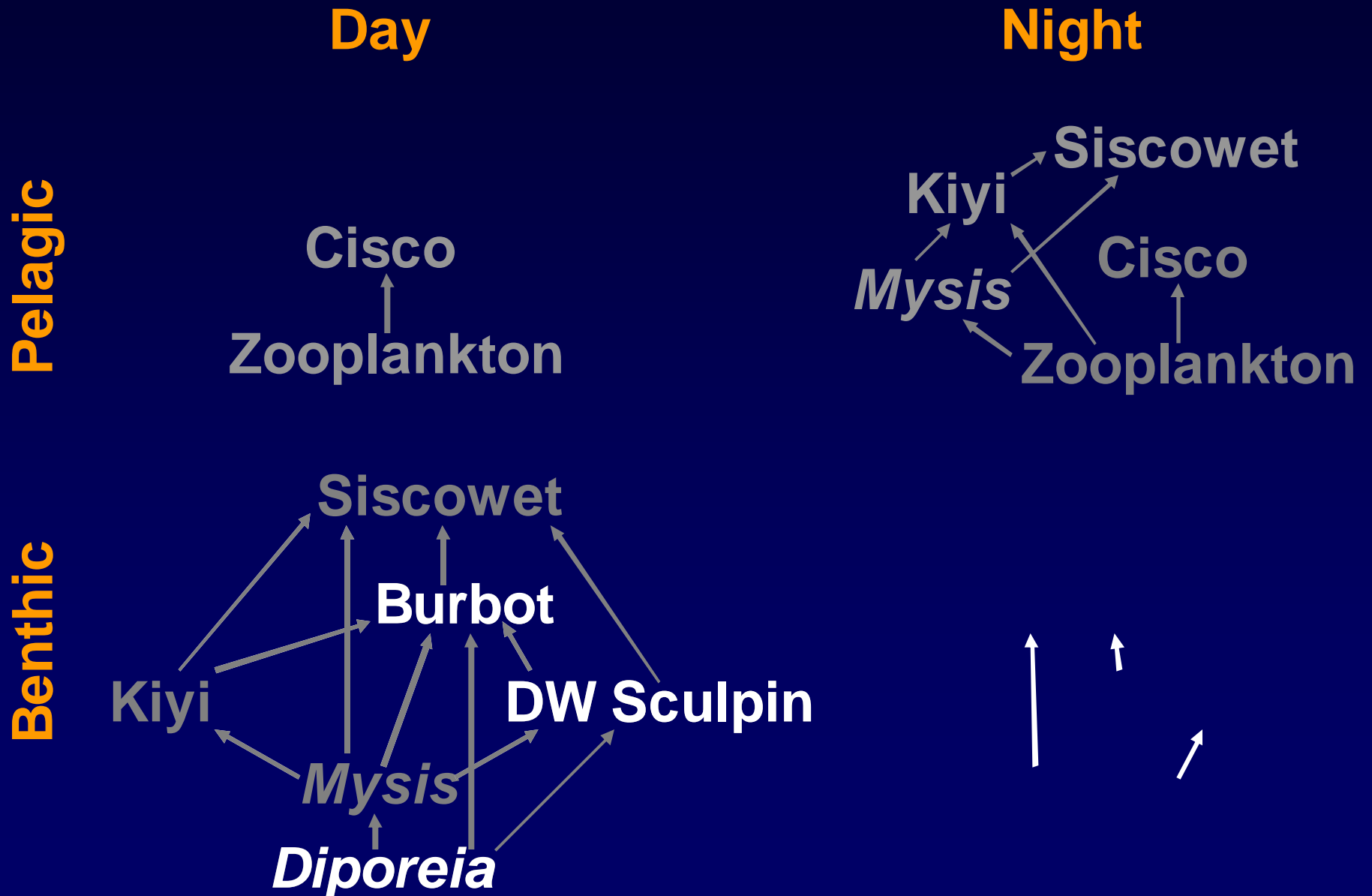
Conceptual Offshore Food Web



Night Pelagic Food Web

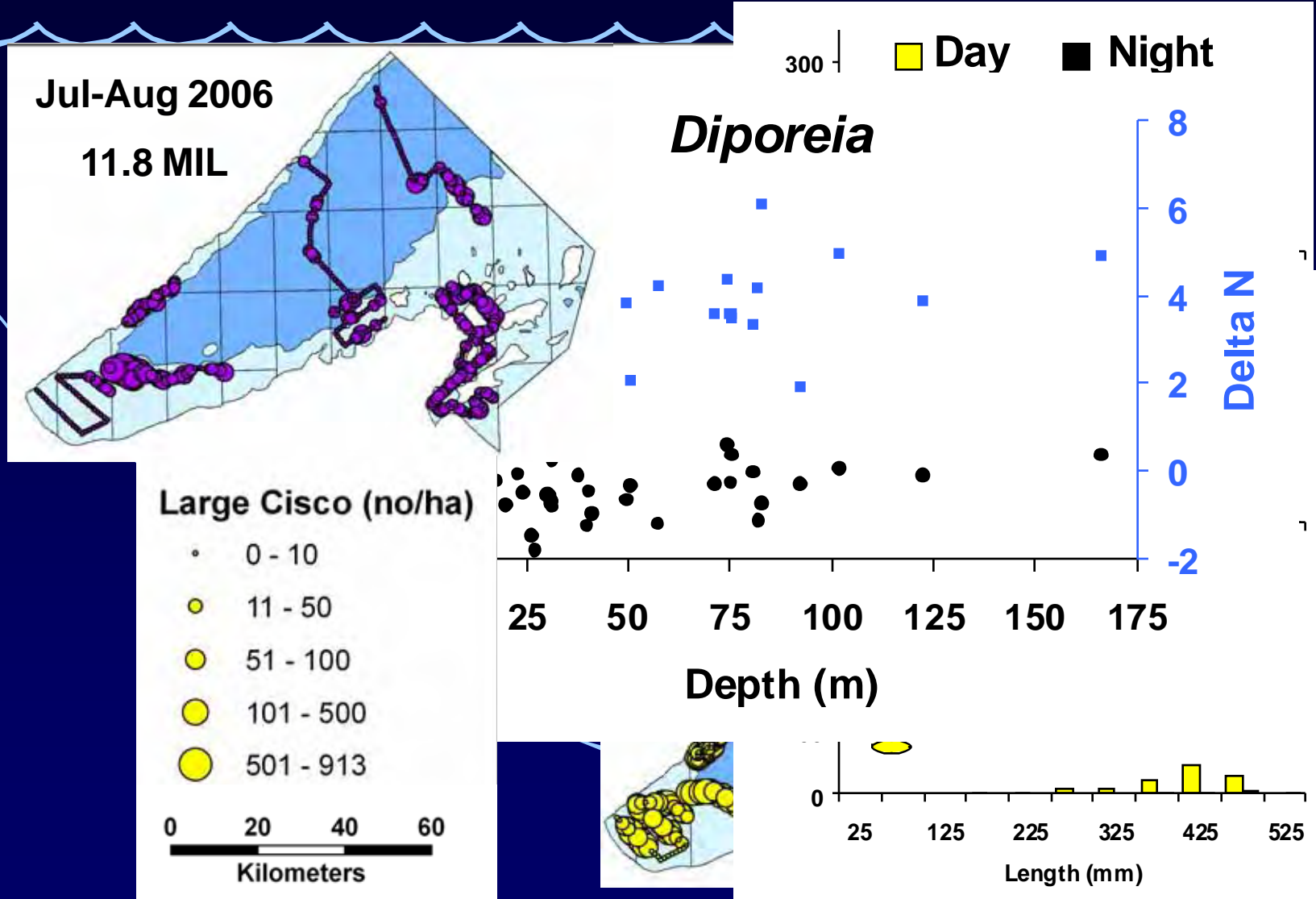


Conceptual Offshore Food Web



From Structure to Function to Structure

Offshore Energy / Oil & Gas / Environmental Services / Deep Seabed Drilling



Ecology and Fish Community Objectives

Extend work of Kitchell et al. (2000)

- Impact of targeted siscowet fishery on offshore and nearshore communities?**
- Impact of invaders on energy/nutrient flow?**
- Importance of cisco recruitment variability to large-scale energy movement?**
- Influence of size-based interactions to energy and nutrient flow within/across habitats?**
- Re-evaluate constraints and opportunities for ecosystem management**