

Ocean Beaches:

Nourishment Effects and Ecosystem Role

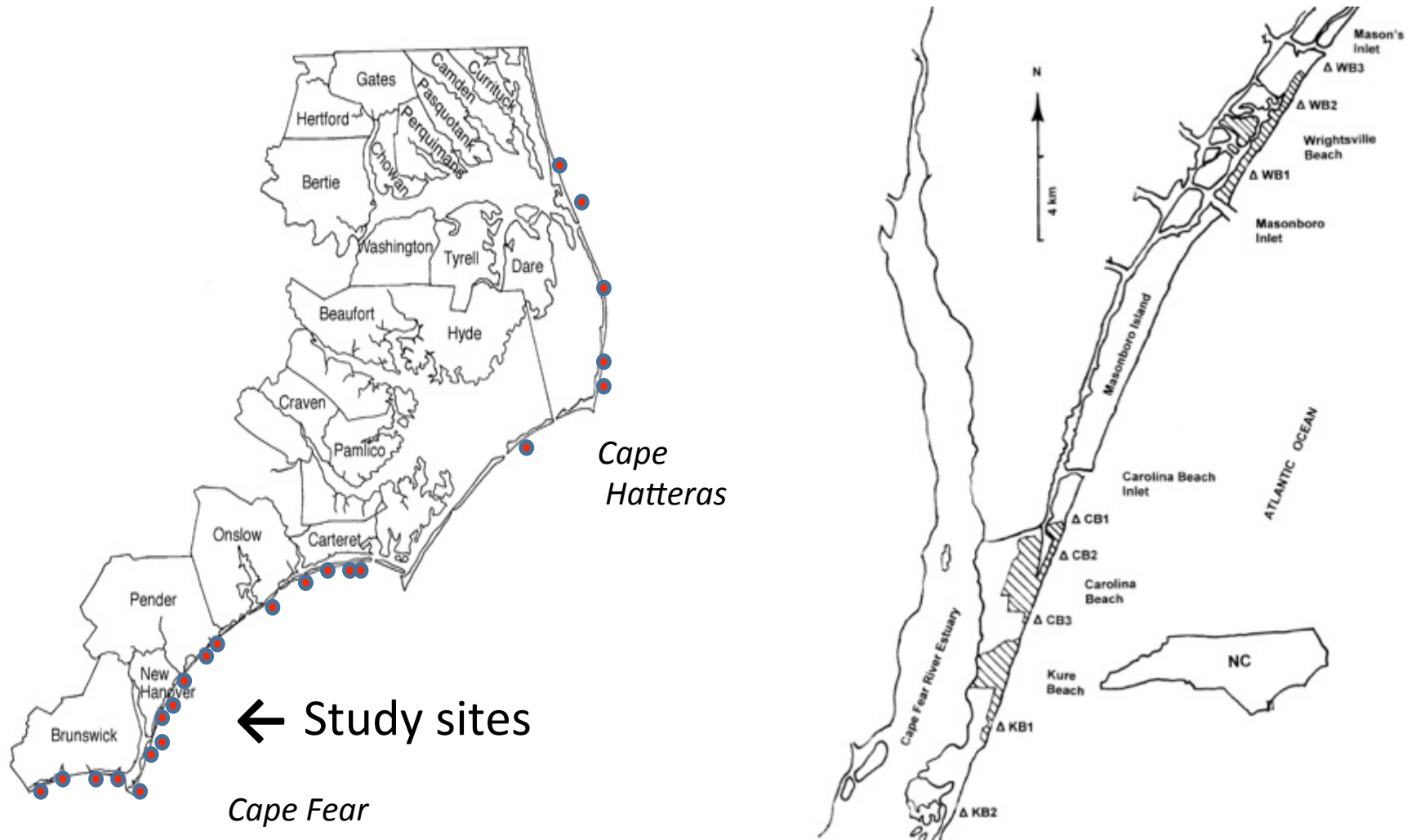
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UNCW Biology and Marine Biology

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Beach Nourishment in North Carolina

Almost 100 of 310 ocean beach miles @ 4 years

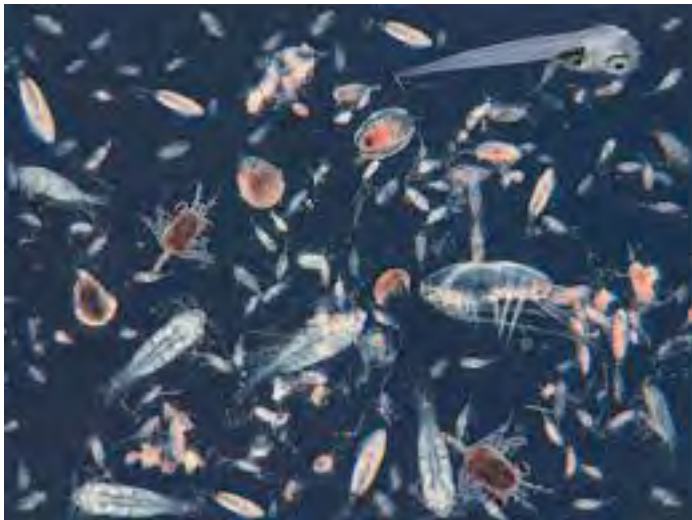


Microbiota – a productive base

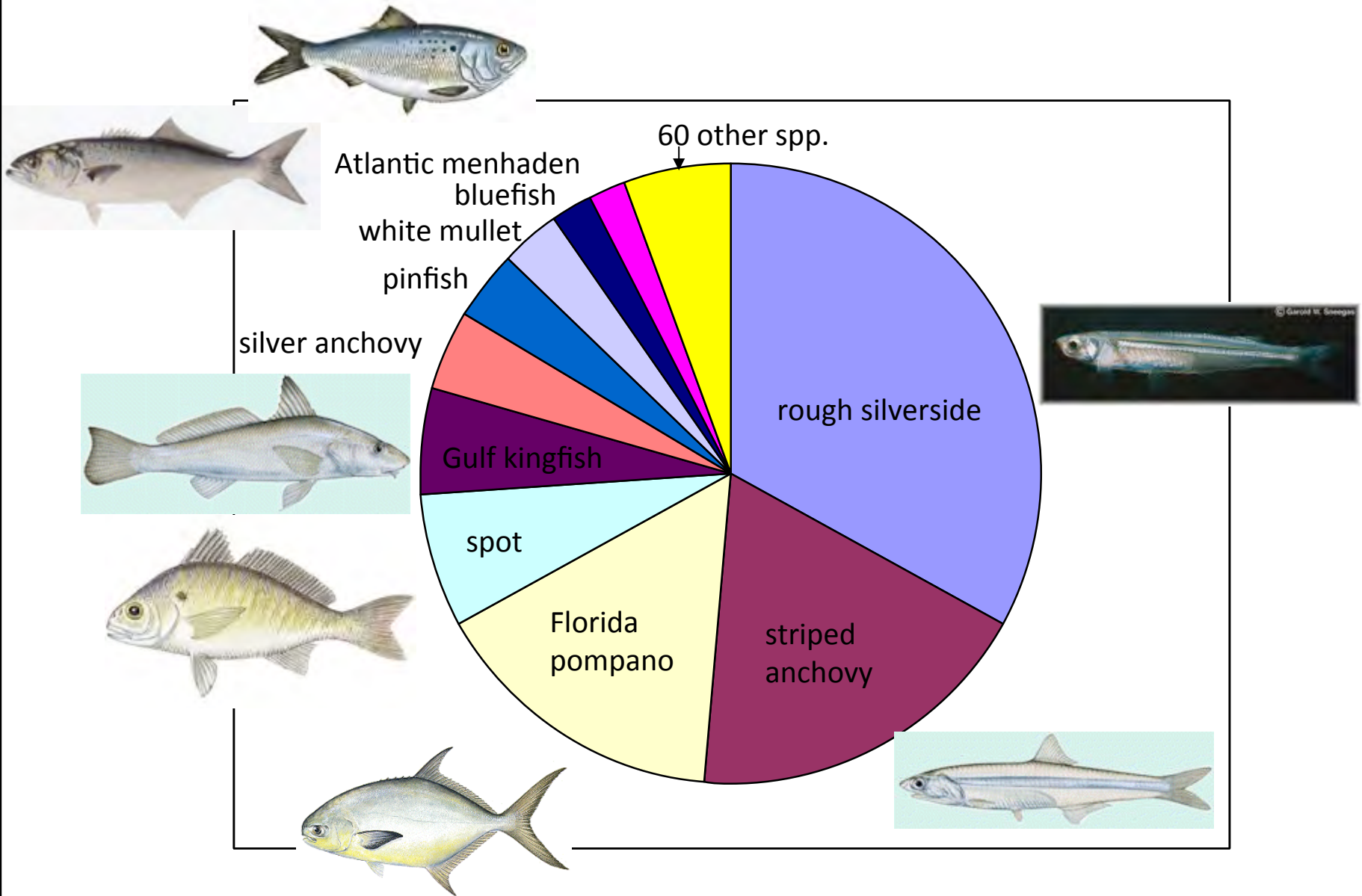
- **Phytoplankton 1⁰ Production:**
 - High in summer: 32–88.0 mg C m⁻³ h⁻¹; lower in winter: 1–10
- **Phytoplankton Biomass:**
5.57±4.67 mg chl *a* m⁻³ annually
- **Physiologically healthy:**
FRRF ($\sigma_{PSII} = 327-380$; $F_v/F_m \sim 62-72\%$)
- **Nutrient limitation effects:**
N primary, Si secondary
- **Sediment Microbiota:**
 - Microalgae biomass (chl *a*): 9.74 ± 6.34 mg m⁻³
 - **Meiofauna (AFDW):** 4760 ± 6340 mg m⁻²
 - **Sediment DNA:** 3.3 ± 3.3 mg m⁻²
 - **Meiofauna AFDW:** = $f(\text{Phyto Chl}a > \text{BMA Chl}a)$
 - **Sediment DNA:** = $f(\text{Phyto Chl}a > \text{BMA Chl}a)$
 - → Beach microbiota community trophically linked to surf zone phytoplankton

Surf Zone Zooplankton

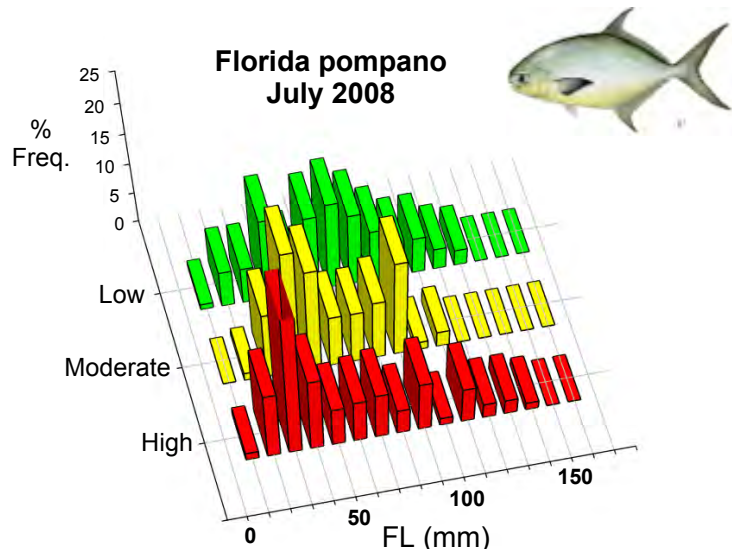
- Overall abundances $\sim 8,000 \pm \sim 8,000 \text{ m}^{-3}$
- Copepods dominate + seasonal meroplankton
- [Meroplankton] = $f(\text{Phyto chl}a, \text{temp})$
- Locational abundances vary $\sim 1.5 \text{ X}$
- Seasonal abundances vary $\sim 4\text{X}$
- → food for zooplanktivorous fishes



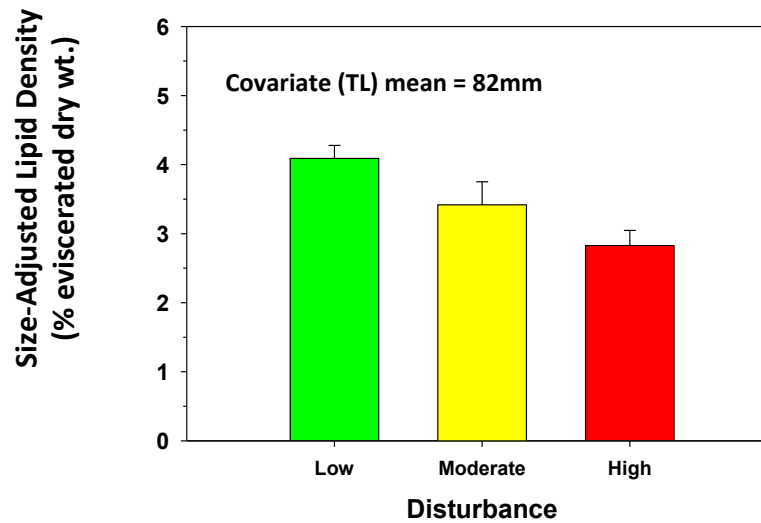
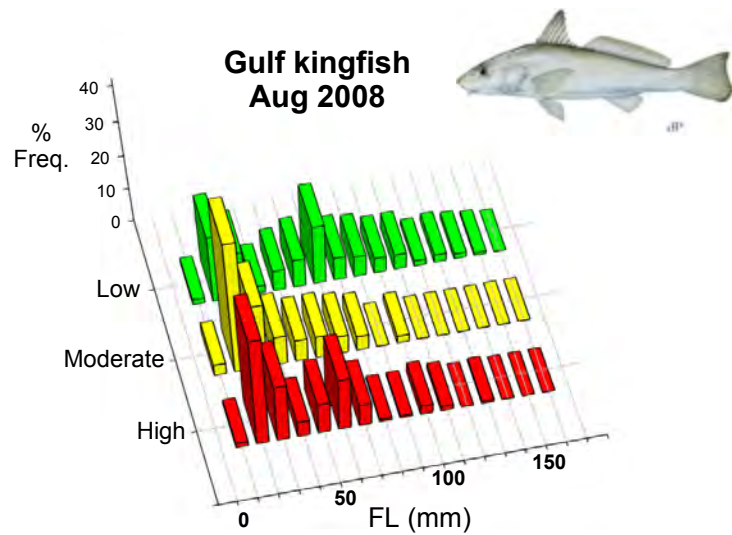
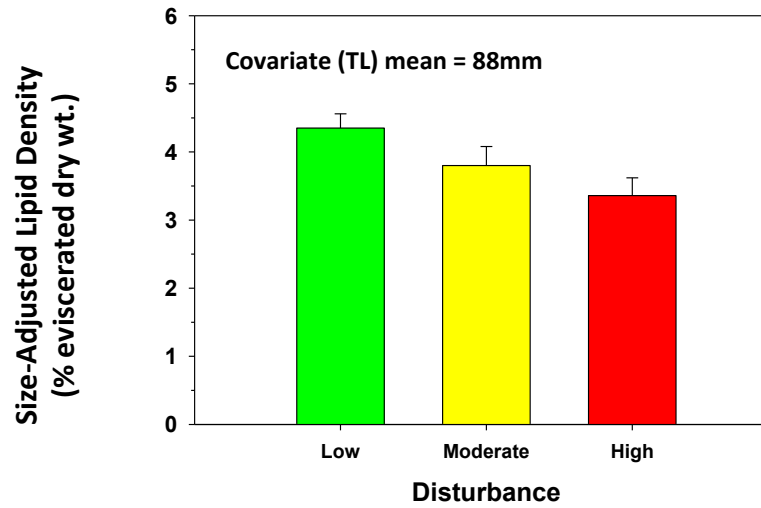
Dominant Surf Zone Fishes



Size-Structure



Nutritional Condition



An aerial photograph showing a beach nourishment project. Several yellow bulldozers are working on a wide, sandy beach. Long, dark pipes are laid out across the sand, likely for sand transport. The ocean waves are visible in the background. The text 'Nourishment Effects' is overlaid on the top half of the image.

Nourishment Effects

- **Microbiota: limited and short-term**
- **Macrofauna: variable, taxon-specific**
- **Fishes: Disturbance favors transient species over resident demersal species; Disturbance associated with poorer body condition**

Ecosystem Role

- **Beach/surf zone as a transitional nursery habitat**