

Factors Affecting Selection of Nesting Habitat by Bluegills (*Lepomis macrochirus*) Within a Natural Lake



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Acknowledgements

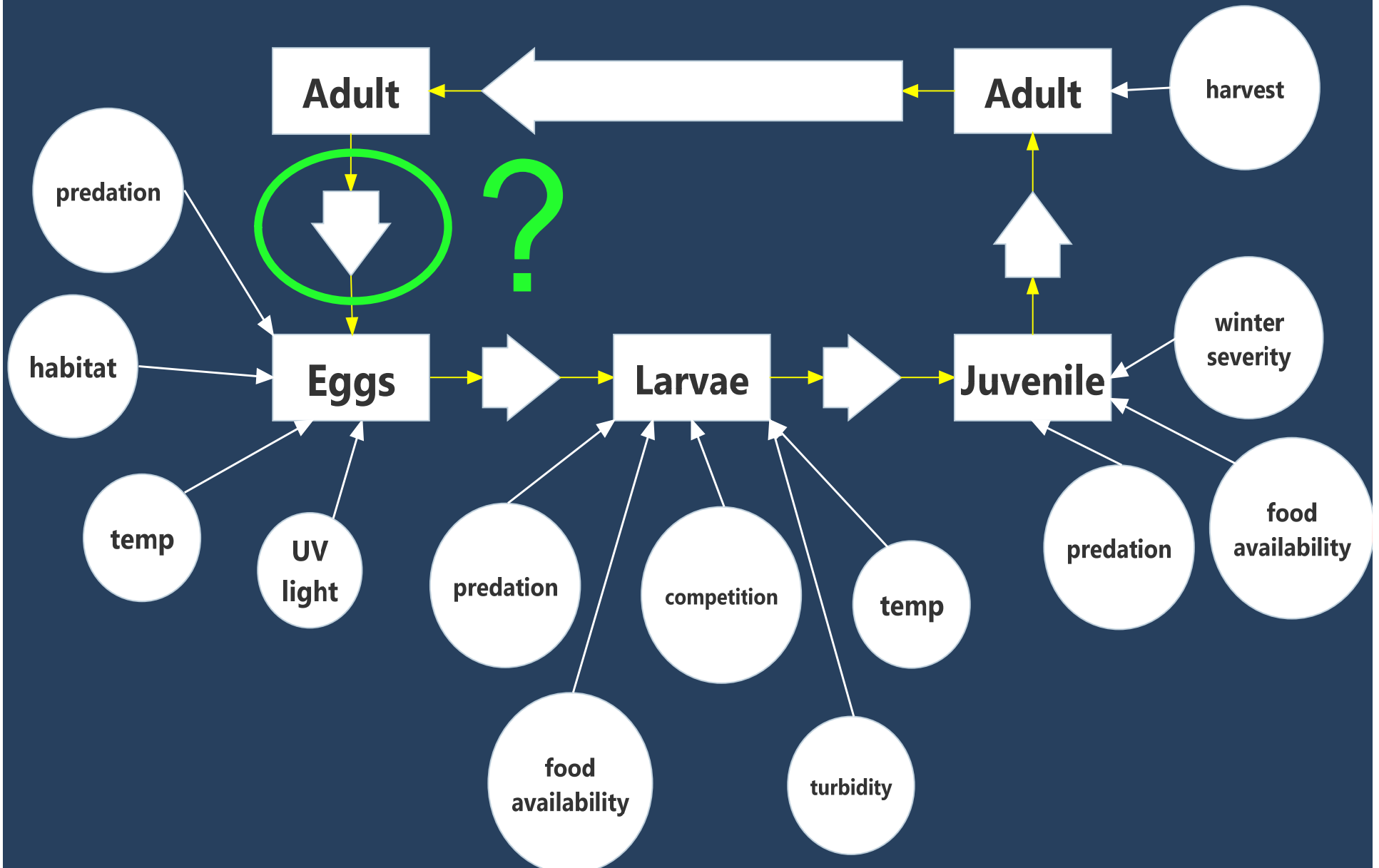
- SDSU Technicians
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Bluegill (BLG)

- BLG life history:
 - Typically considered protracted spawners
 - In Northern latitudes, spawn from late spring/early summer until late summer
 - Usually consistent recruitment, some weak/strong year classes

BLG Recruitment



BLG Nesting Behavior

- Differ from other sunfish spp.
- Considered colonial spawners
 - Nests can range up to several hundred
- Construct shallow “bowls” in sediment
 - Sweeping motion
- Males guard nest until hatching



Previous Work

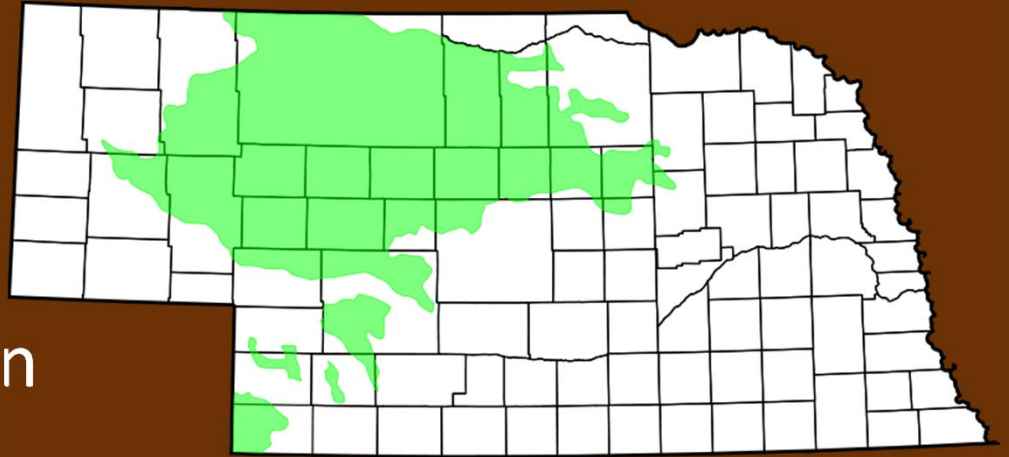
- Few studies have examined factors associated with BLG nesting sites
- Early work focused on qualitative observations
 - Early 1900's
- Recently, study in SD examined factors
 - Substantial anthropogenic disturbance
- Identification of two possible factors
 - Nesting substrate
 - Aquatic macrophytes

Objective

Quantify specific abiotic and biotic habitat factors associated with bluegill nest site selection within a natural lake in the Nebraska Sandhills

Nebraska Sandhills

- Encompasses nearly 20,000 mi²
- Largest sand dune formation in the Western hemisphere
- Largest contiguous area of grassland in the U.S.
- One of the largest wetland complexes in the United States- Ogallala Aquifer
- Minimal agricultural production



Study Area

- West Long Lake
 - Located within the Valentine NWR in Cherry County, NE
 - 31 ha natural lake
 - Mean depth of 1.3m
 - Mix of emergent and submersed vegetation
 - Simple fish community



Methods

- BLG colonies found by inspection of entire shoreline by boat
- Each colony with > 5 nesting males marked with GPS
- Angling used to verify some nesting males
- 25 of 75 random sites also selected for comparison



Methods

- Habitat characteristics measured:

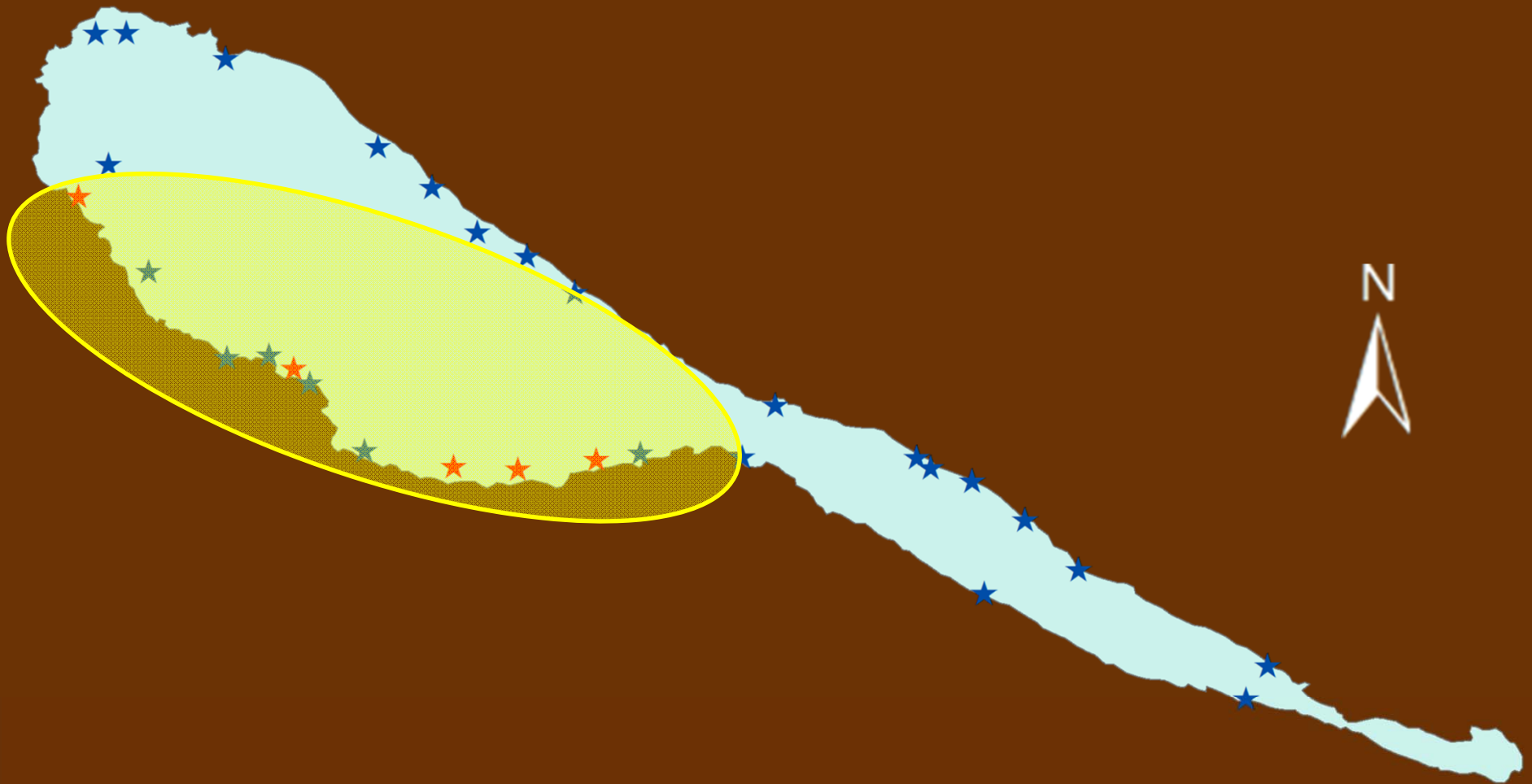
- Water temperature
- Dissolved oxygen
- Water conductivity
- Substrate firmness
- Water depth
- Distance to shore
- Maximum fetch
- Southern fetch
- Core substrate sample



Methods

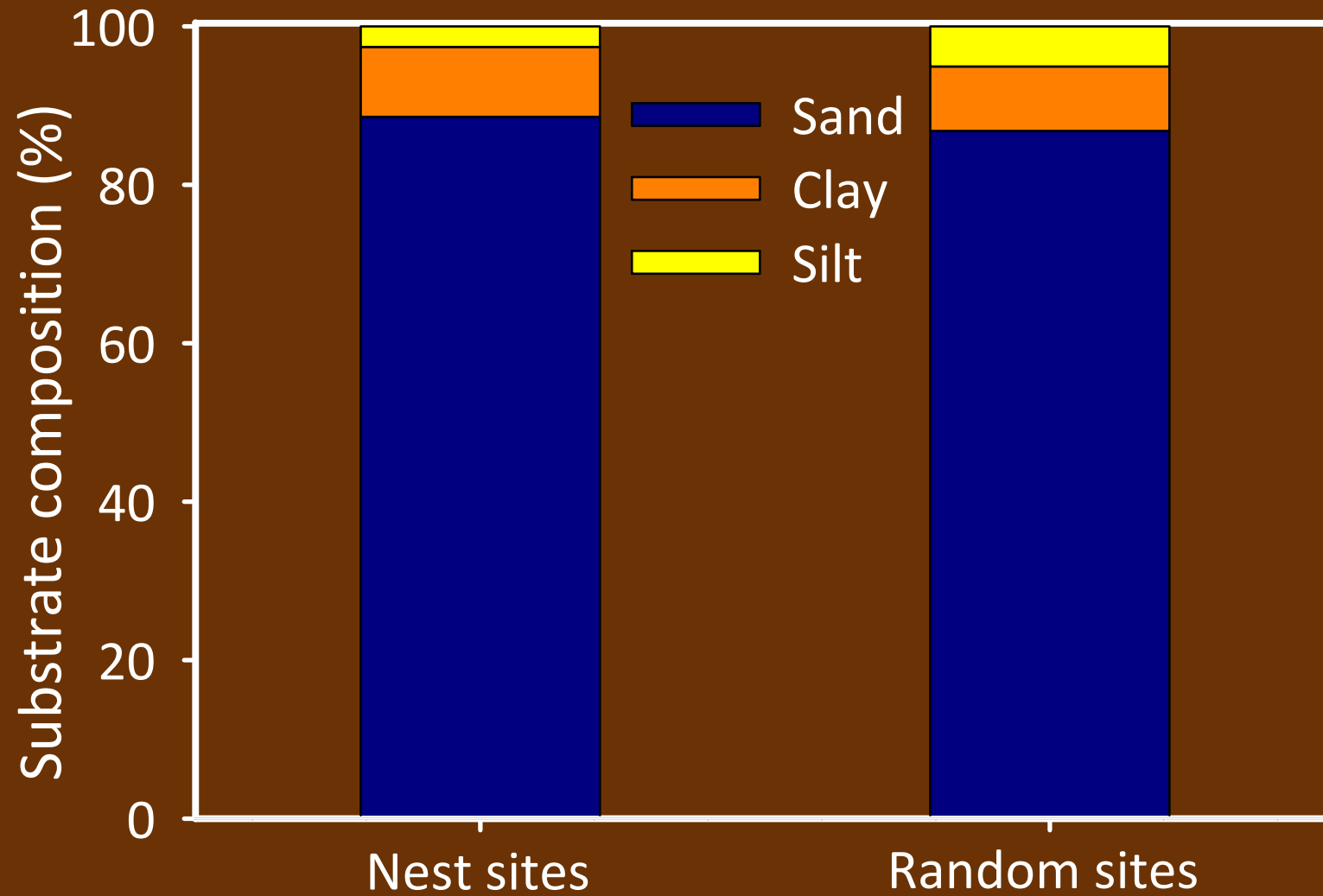
- Nearest emergent and submersed macrophyte species
- Maximum emergent vegetation height
- Submersed vegetation coverage
 - Vegetation coverage score (1 to 5)
- Data analysis
 - Continuous variables: Kolmogorov-Smirnov test
 - Nesting substrate: Kruskal-Wallis test
 - Categorical variables: Fisher's Exact test
 - Alpha of 0.10 used for all comparisons

Nesting Locations

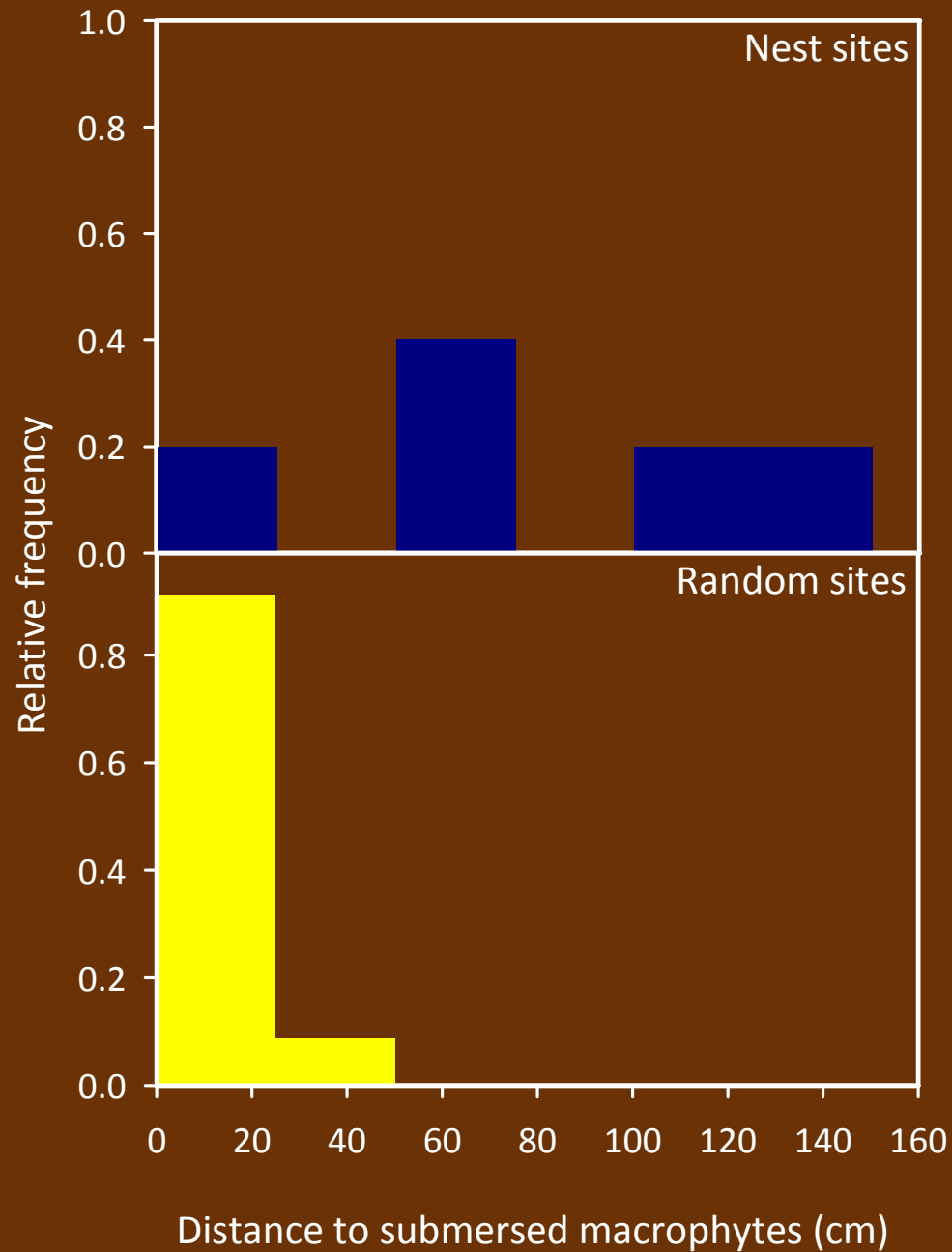


Nest (red) and random (blue) sites located in West Long Lake.

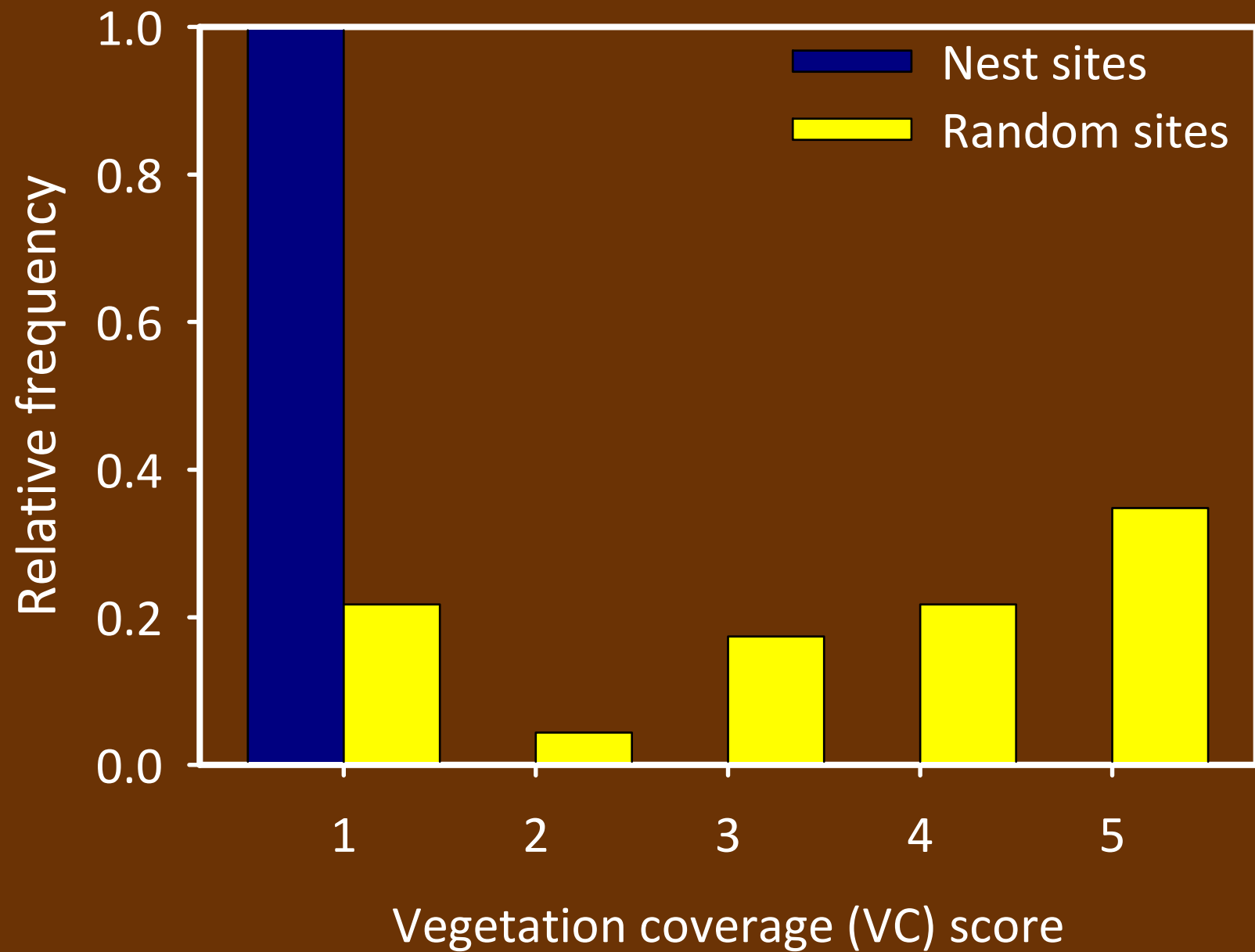
Substrate composition



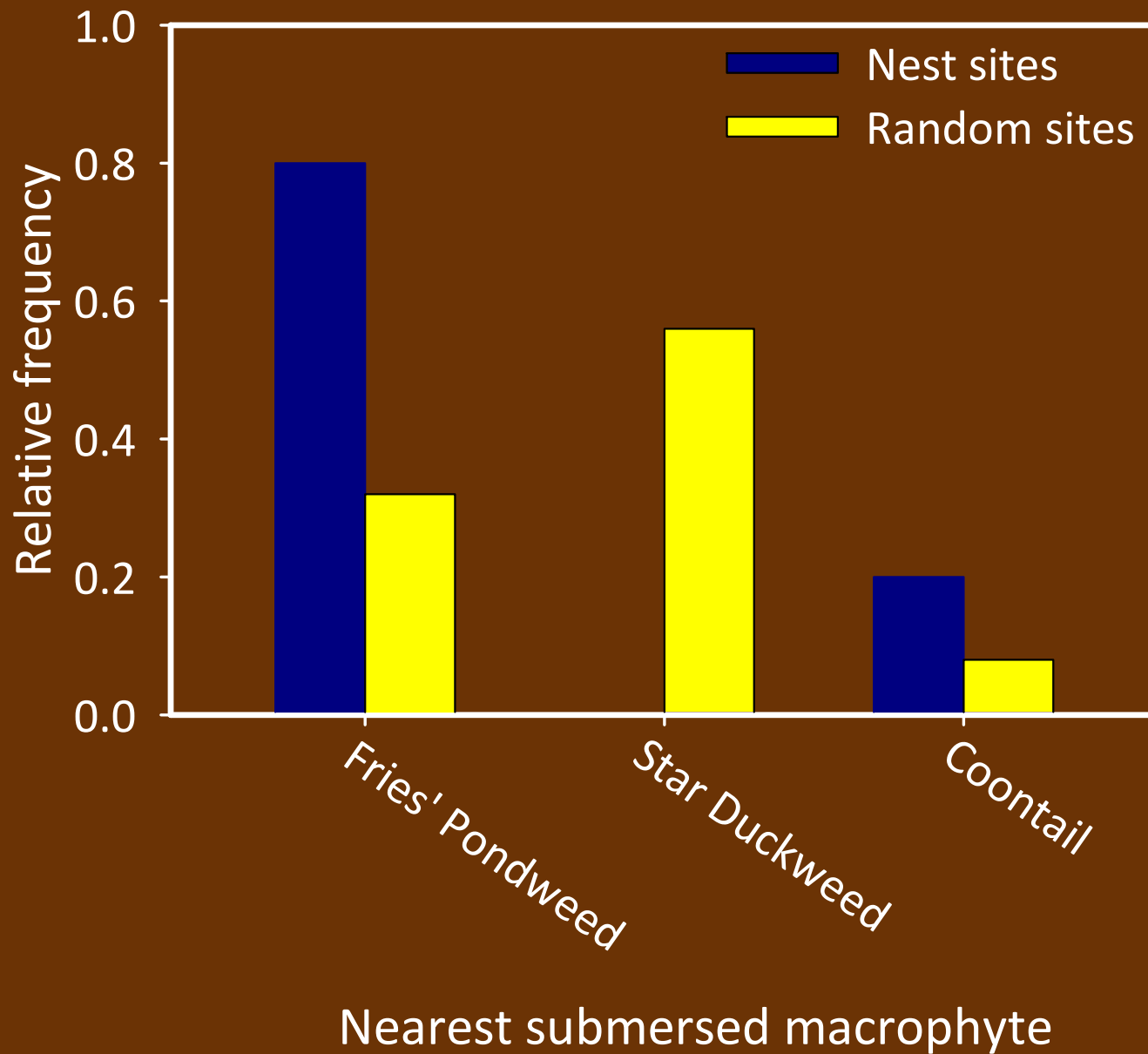
Submersed macrophytes



Submersed macrophytes



Submersed macrophytes



Nesting Substrate

- Confirm previous studies' findings
- “Optimal” substrate likely not limiting
 - Both nesting and random sites contained > 80% sand
- Nesting substrate appears to be primary factor in selecting nesting sites

Submersed Macrophytes

- Also consistent with previous studies
 - Nesting sites associated with reduced levels of submersed macrophytes
- Located most near Fries' Pondweed
 - Star Duckweed absent
- Site selection or mechanical removal?
 - More research needed to elucidate mechanism

Star Duckweed



Coontail



Fries' Pondweed



Southern Fetch

- All nesting sites located on Southern shoreline
- Predominant winds originate from the South
- Also appears that wind/wave protection is a primary factor
 - Not previously described in selection process
 - Black crappie nesting

Selection process

- BLG may prioritize among primary factors
 - Smallmouth bass
- Three main primary factors:
 - Nesting substrate
 - Submersed Macrophytes
 - Wind/wave protection

Future Research

- Selecting process likely system-specific
 - Vary across geographic regions
- Effects on BLG recruitment?
 - BLG resilient, likely will spawn in most systems
 - May help understand variability
- Implications for managers?
 - Target/create nesting areas for anglers