

Changes in epiphytic diatoms in the Colorado River downstream of Glen Canyon Dam following reduced flow variation



John D. Wehr¹, Mia C. Wrey¹, Lawrence Stevens². 1: Louis Calder Center, Fordham University, Armonk, NY, 10504, USA;
2: Springs Stewardship Institute, Museum of Northern Arizona, Flagstaff, AZ 86001, USA

Flood-Scour System: 1964-1991

- Extremes of flow variation from dam
- Regular 2 – 3+ meter daily “tides”
- Stable substrata: boulders + cobbles
- Primary Macrophyte:** →



Cladophora glomerata

Stabilized Flow: 1992-2021

- Reduced variation in water released
- Maximum daily “tide” ≤ 0.5 meter
- Sand retained, fines colonized
- Primary Macrophytes:** →



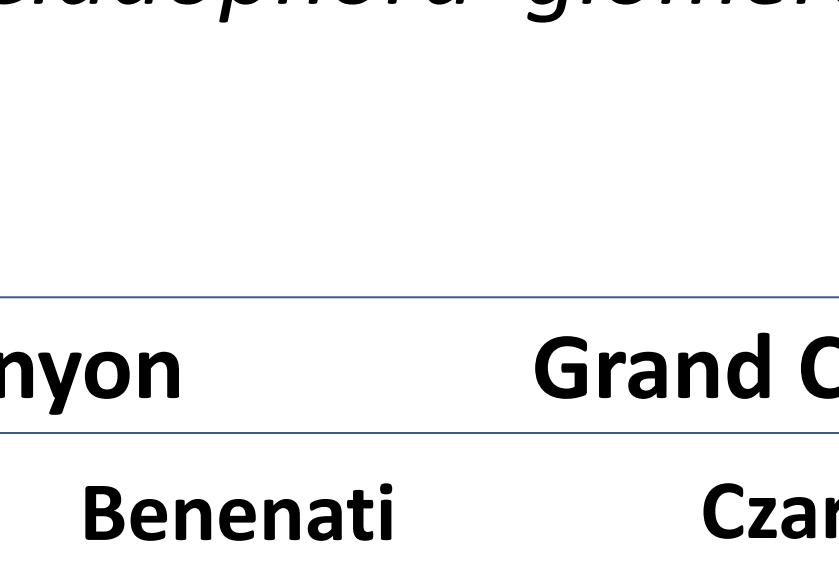
Fontinalis hypnoides



Chara cf. vulgaris



Zannichellia palustris



Cladophora glomerata



Potamogeton spp.

Sample Collection: 2020

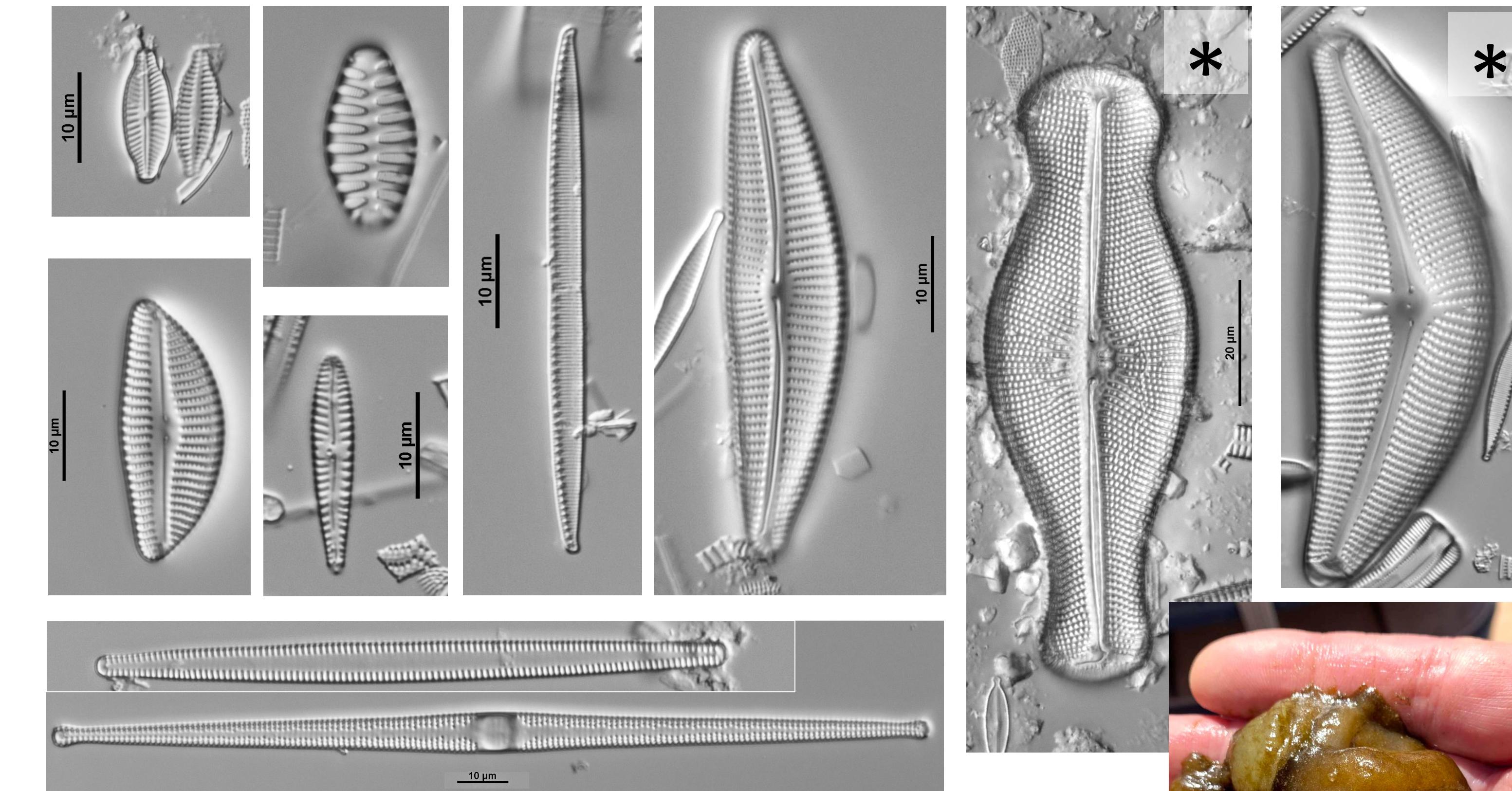
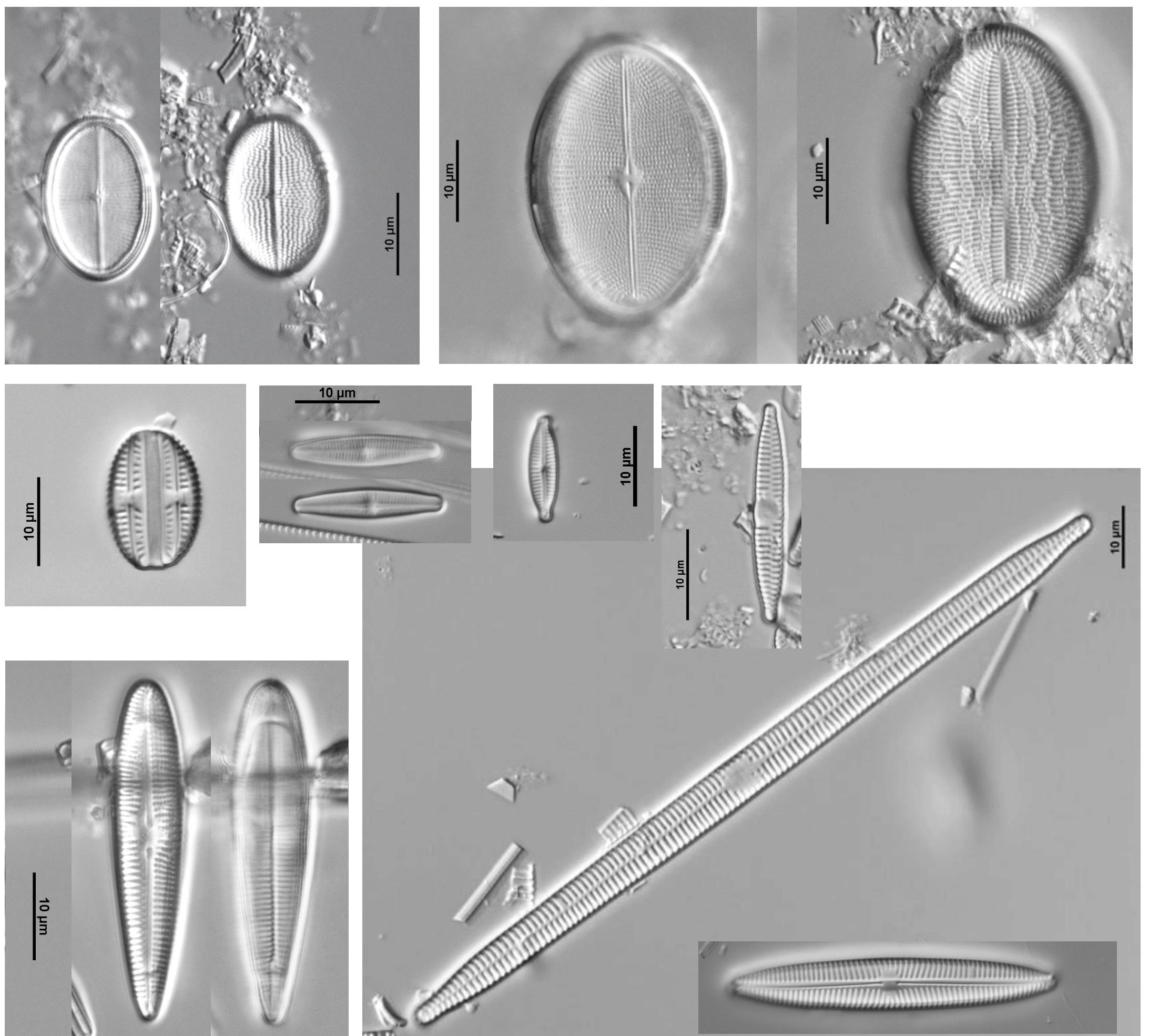
- Epiphytic diatoms collected from submersed macrophytes and other substrata
- 6 stations x 5-10 replicates: March - June - September – December

River mile -14.5 → River mile -13.5 → River mile -6.5 → River mile -6.3 → River mile -3.6 → River mile -1.3

Diatom Assemblages: 2020

- ✓ Total of 218 diatom taxa identified and enumerated overall
 - 102 diatom taxa previously recorded in Glen and Grand Canyon reaches
 - 116 diatom taxa previously unrecorded in this system
- ✓ 10 of 30 most abundant diatoms were previously unrecorded in Glen or Grand Canyon →
- ✓ Diatoms with gelatinous stalks* may be invasive or interfere with foodweb interactions

Common Taxa 1980s and 2020 in Glen Canyon Common Taxa first reported in Glen Canyon 2020



Western Area Power
Administration
Argonne
NATIONAL LABORATORY

Top 30 diatom taxa

Glen Canyon	Grand Canyon
Hardwick et al 1991	Benenati et al. 2002
	Czarnecki et al. 1976
<i>Cocconeis</i> <i>placentula</i>	+
<i>Cocconeis</i> <i>pediculus</i>	+
<i>Achnanthidium</i> <i>minutissimum</i>	+
<i>Amphora</i> <i>pediculus</i>	+
<i>Rhoicosphenia</i> <i>abbreviata</i>	+
<i>Gomphonema</i> <i>pumilum</i>	
<i>Ulnaria</i> <i>ulna</i>	+
<i>Fragilaria</i> <i>vaucheriae</i>	+
<i>Diatoma</i> <i>vulgaris</i>	+
<i>Gomphonella</i> <i>calcarea</i>	+
<i>Diatoma</i> <i>moniliformis</i>	+
<i>Pseudostaurosira</i> <i>brevistriata</i>	+
<i>Karayevia</i> <i>ploenensis var. gessneri</i>	
<i>Nitzschia</i> <i>fonticola</i>	+
<i>Cymbella</i> <i>compacta</i>	
<i>Encyonopsis</i> <i>microcephala</i>	+
<i>Staurosirella</i> <i>pinnata</i>	+
<i>Tabularia</i> <i>fasciculata</i>	+
<i>Nitzschia</i> <i>gessneri Hustedt</i>	
<i>Ellerbeckia</i> <i>arenaria</i>	+
<i>Achnanthidium</i> <i>gracillimum</i>	
<i>Staurosirella</i> <i>martyi</i>	
<i>Nitzschia</i> <i>semirobusta</i>	+
<i>Fragilaria</i> <i>gracilis</i>	
<i>Navicula</i> <i>tripunctata</i>	+
<i>Ulnaria</i> <i>acus</i>	+
<i>Navicula</i> <i>veneta</i>	+
<i>Encyonema</i> <i>auerswaldii</i>	
<i>Ctenophora</i> <i>pulchella</i>	+
<i>Staurosirella</i> <i>leptostauron</i>	+