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Mapping Submerged Aquatic Vegetation in Glen Canyon Using Hydroacoustics—a Proof of Concept

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Need for Project

- Understanding what controls density and growth of trout in Lees Ferry is important for managing fishery & downstream resources

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- Food availability and habitat complexity are two of the most important factors that determine density and growth of animal populations

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- Understanding what controls density and growth of trout in Lees Ferry is important for managing fishery & downstream resources
- Food availability and habitat complexity are two of the most important factors that determine density and growth of animal populations
- Submerged aquatic vegetation (SAV) is an important source of food and habitat complexity in rivers

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Major changes in SAV have occurred

- New species of SAV showed up in the early 90s
  - Chara, Potamogeton, aquatic mosses, etc

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- Initially colonized sandy substrates but seem to have expanded to hard substrates also
- Best data documenting these trends comes from AZGFD qualitative surveys

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Major changes in SAV have occurred

Chara

Potamogeton

Cladophora

Egeria

Aquatic Moss

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All images courtesy of U. of Florida

What does it mean?

Changes in species composition of SAV 'may significantly change the aquatic foodbase in the dam tailwater' Ayers and McKinney 1996

an expanded *Chara/Potamogeton* 'community in the Glen Canyon tailwater may benefit the fish population by providing cover and an expanded food base' Ayers and McKinney 1996

'…intermediate densities of submerged macrophytes and a heterogeneous river substrate (i.e., a variety of SAV types) provide the most suitable conditions for a trout population' Ayers and McKinney 1996

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Not all SAV types created equal

- *Cladophora* supports higher density of inverts and diatoms than other types of macroalgae in the CRE
- However, a thorough analysis of invertebrate and diatom densities among new SAV types has never been conducted
- Chick and McIvor (1994) found fish density and biomass differed significantly between SAV types in Lake Okeechobee
- Other SAV types may provide better cover for juvenile fishes

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Objectives of SAV Project

- Map distribution, density, and composition of SAV throughout selected reaches of Glen Canyon

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- Determine whether invertebrate and diatom density and composition varies among SAV types
- Develop trout density coverage for GIS to determine whether trout density is affected by SAV type or density

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Mapping Methods

- Develop seasonal SAV map at five 1mile long reaches in Glen Canyon
- Use Biosonics digital echosounder and digital GPS to map bottom depth, plant presence/absence, plant height, and density in spring 2007 and winter 2008
- Conduct additional transects within each reach using underwater video and SCUBA to determine species composition

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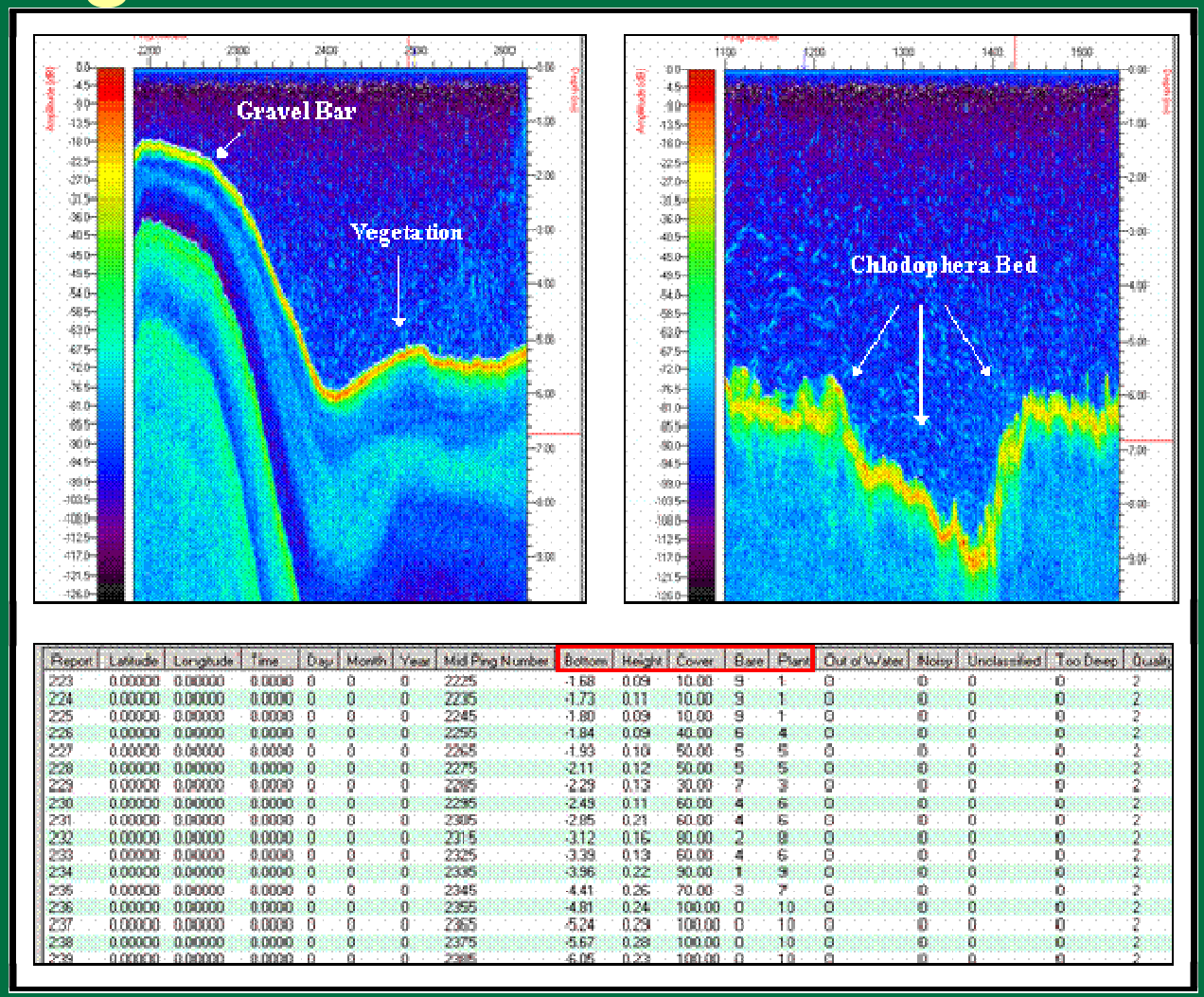
Mapping Methods



Report	Latitude	Longitude	Time	Day	Month	Year	Mid Ping Number	Bottom	Height	Cover	Base	Plant	Out of Water	Noisy	Unclassified	Too Deep	Quality
223	0.00000	0.00000	0.0000	0	0	0	2225	-1.68	0.09	10.00	9	1	0	0	0	0	2
224	0.00000	0.00000	0.0000	0	0	0	2235	-1.73	0.11	10.00	9	1	0	0	0	0	2
225	0.00000	0.00000	0.0000	0	0	0	2245	-1.80	0.09	10.00	9	1	0	0	0	0	2
226	0.00000	0.00000	0.0000	0	0	0	2255	-1.84	0.09	40.00	6	4	0	0	0	0	2
227	0.00000	0.00000	0.0000	0	0	0	2265	-1.93	0.10	50.00	5	5	0	0	0	0	2
228	0.00000	0.00000	0.0000	0	0	0	2275	-2.11	0.12	50.00	5	5	0	0	0	0	2
229	0.00000	0.00000	0.0000	0	0	0	2285	-2.29	0.13	30.00	7	3	0	0	0	0	2
230	0.00000	0.00000	0.0000	0	0	0	2295	-2.49	0.11	60.00	4	6	0	0	0	0	2
231	0.00000	0.00000	0.0000	0	0	0	2305	-2.85	0.21	60.00	4	6	0	0	0	0	2
232	0.00000	0.00000	0.0000	0	0	0	2315	-3.12	0.16	90.00	2	8	0	0	0	0	2
233	0.00000	0.00000	0.0000	0	0	0	2325	-3.39	0.13	60.00	4	6	0	0	0	0	2
234	0.00000	0.00000	0.0000	0	0	0	2335	-3.96	0.22	90.00	1	9	0	0	0	0	2
235	0.00000	0.00000	0.0000	0	0	0	2345	-4.41	0.26	70.00	3	7	0	0	0	0	2
236	0.00000	0.00000	0.0000	0	0	0	2355	-4.81	0.24	100.00	0	10	0	0	0	0	2
237	0.00000	0.00000	0.0000	0	0	0	2365	-5.24	0.29	100.00	0	10	0	0	0	0	2
238	0.00000	0.00000	0.0000	0	0	0	2375	-5.67	0.28	100.00	0	10	0	0	0	0	2
239	0.00000	0.00000	0.0000	0	0	0	2385	-6.05	0.23	100.00	0	10	0	0	0	0	2

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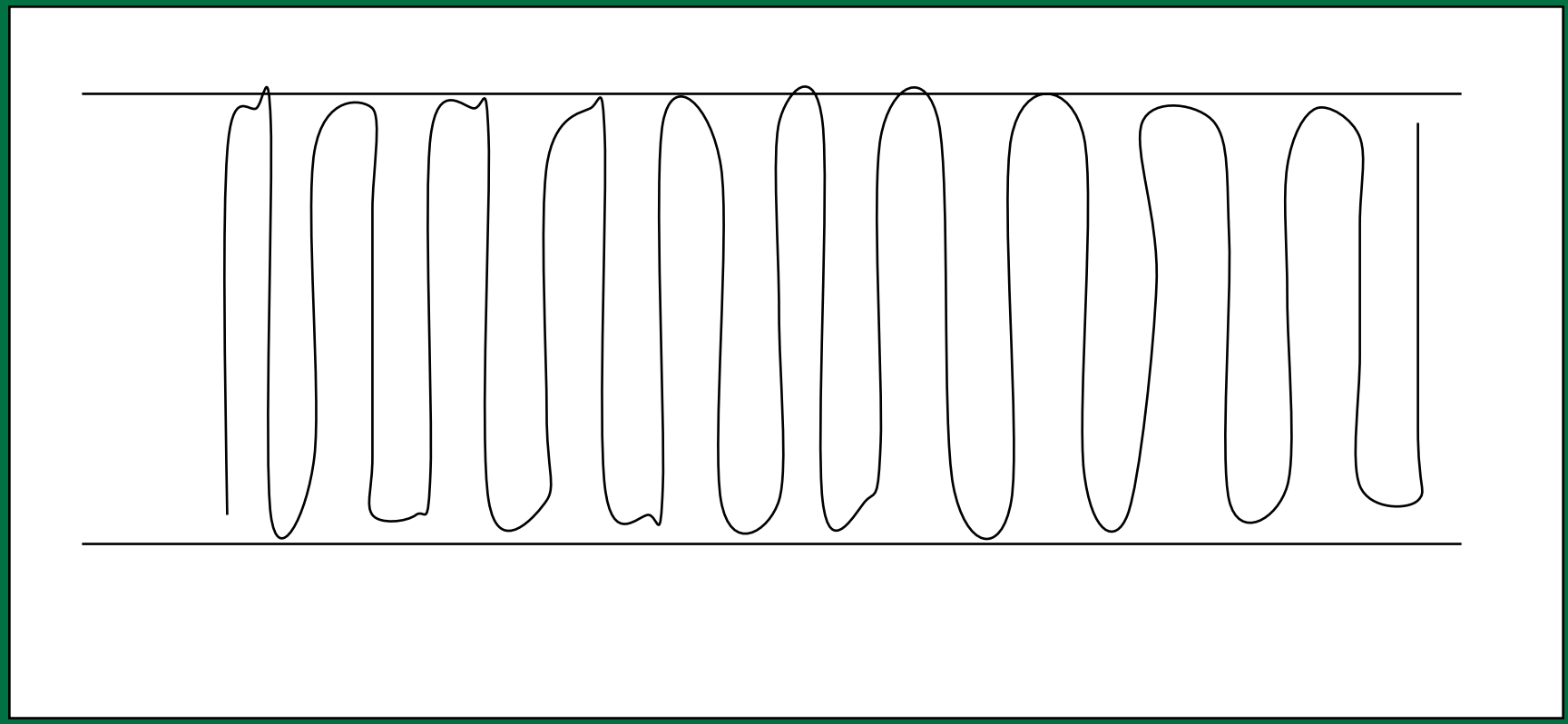
Hydroacoustics Output

Mapping Methods



Example Boat Transect Needed To Develop Map

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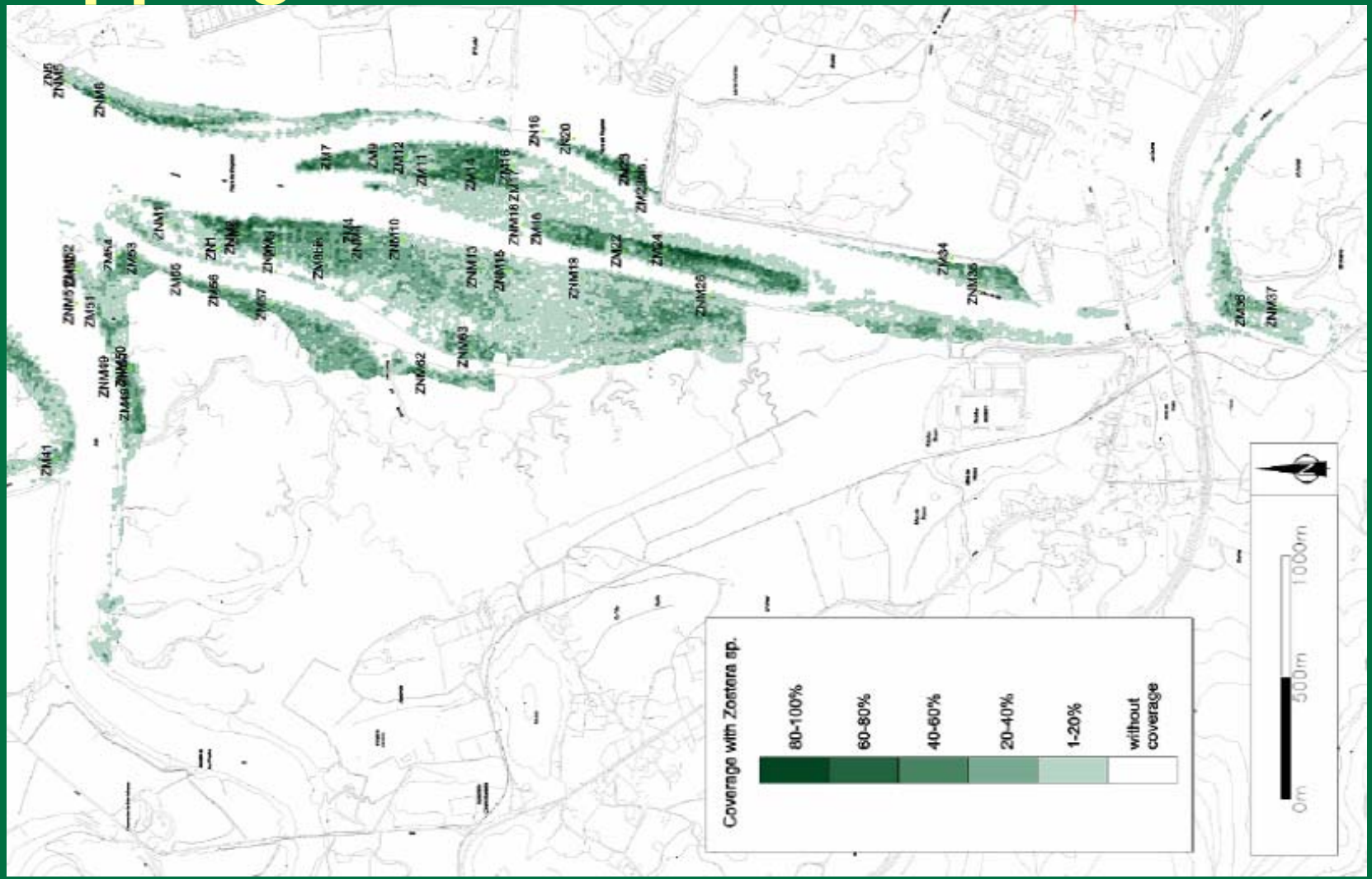
Mapping Methods



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Example SAV Map Developed Using Hydroacoustics

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Underwater Video

Invertebrate and Diatom Methods

- Collect quantitative samples of different SAV types using SCUBA
- Determine invertebrate and diatom density using standard methods

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Comparisons with fish distribution

- Conduct mapping at same time as AZGFD and/or Korman's trout monitoring
- Develop trout coverage and intersect with SAV coverage

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Deliverables

- Seasonal base map (Spring 2007 & Winter 2008)
  - Draft of 1st map to be presented to TWG by July 31, 2007. Completed 1st map to be delivered by December 31, 2007. Completed 2nd map to be delivered by Sep 30, 2008.
- Report describing methods, results of invertebrate and diatom research, and relationship of SAV to fish distribution
  - To be delivered by Sep 30, 2008
- GIS coverage of trout distribution/density
  - To be delivered by Sep 30, 2008

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Questions

- What is current distribution of Cladophora relative to other SAV types?
- Does the density and species composition of inverts/diatoms differ among SAV types?
- Is the density/distribution of juvenile or adult trout affected by SAV type or density?

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