

Mapping and Monitoring Submerged Aquatic Vegetation in Ichetucknee and Manatee Springs

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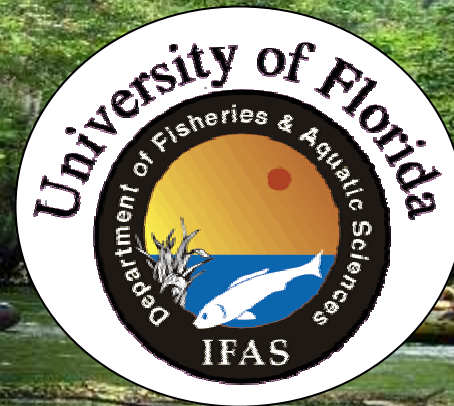
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Project History

- Administered by SRWMD
- Funded through grant from FDEP for Florida Springs Initiative
- Component of baseline data collection (water quality, vegetation, flow) for springs – use to manage resource effectively
- Assist with development of MFLs
- Project began in February 2003, completed first phase in June 2003, second phase in June 2004



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Objectives

- **Phase 1 (2003)**
 - Map SAV in Ichetucknee and Manatee Spring Runs
 - Monitoring (SAV, periphyton, canopy, physicochemical, light, flow)
 - SAV-associated Macroinvertebrate Sampling
 - Recreational Use Impact Assessment
- **Phase 2 (2004)**
 - Remap high use areas in Ichetucknee Springs
 - Conduct shading analysis, flow, depth mapping
 - Conduct surface water quality sampling and additional macrophyte/periphyton sampling



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Study Areas

Ichetucknee Springs



Manatee Springs



Suwannee River



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Mapping Methods

- March-May 2003 and 2004
- GPS in open canopy areas
- Transect mapping in heavily canopied areas (% coverage by species along 100 ft transects) – tied to GPS
- Used USGS DOQQ aerial as basemap
- Shoreline photointerpreted from aerial, widths verified using measuring tape
- Only SAV points mapped in Manatee Springs due to sparse coverage of SAV – points converted to polygons using field notes/sketches

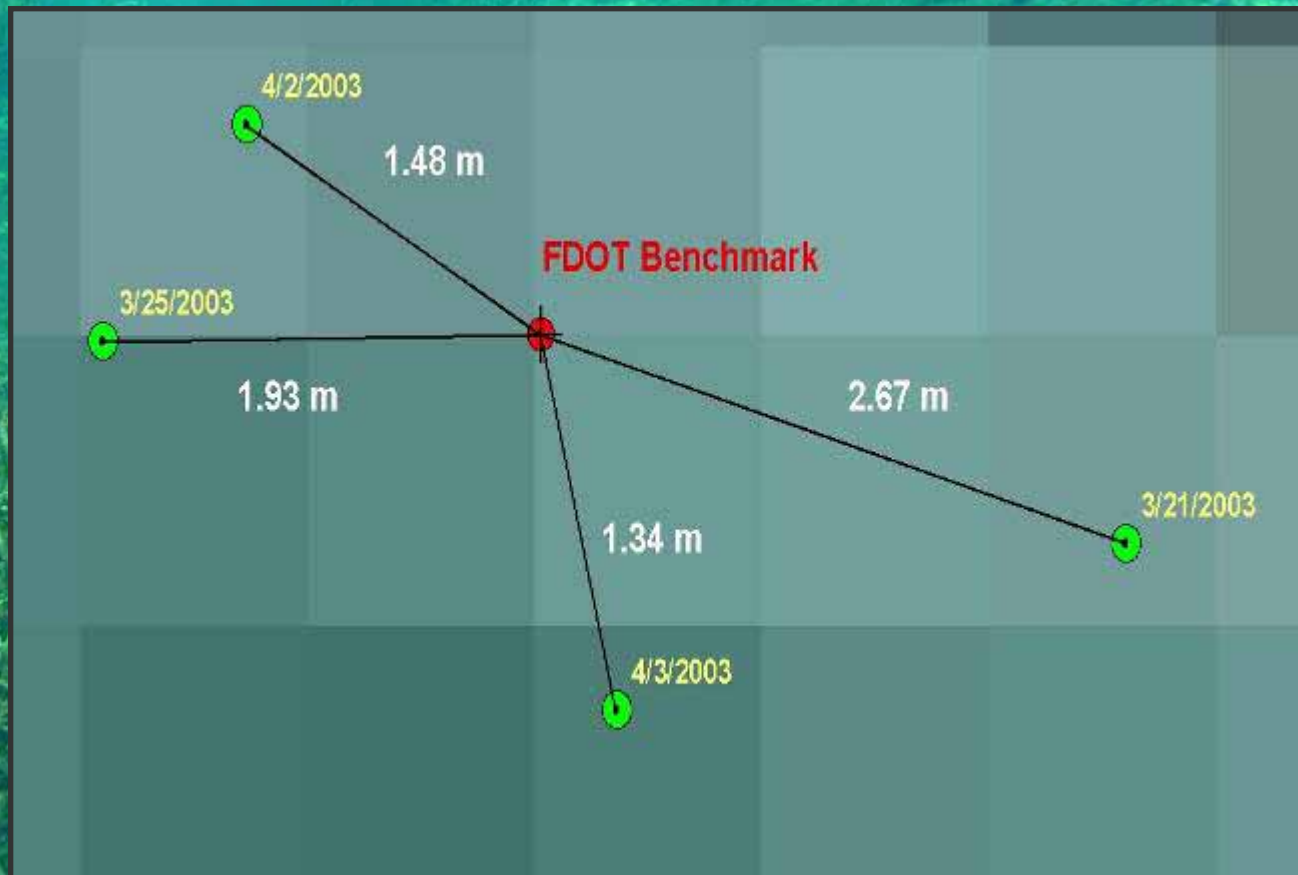


Mapping Methods

- Use of handheld computer linked with GPS hardware and GIS software
- ArcPad 6.0 (ESRI)
- PDOP < 6.0
- <5 m horizontal accuracy
- Target minimum map unit 30 sq. ft.
- QC checks for horizontal accuracy using known benchmark
- Overall map accuracy of 94%



QC Check





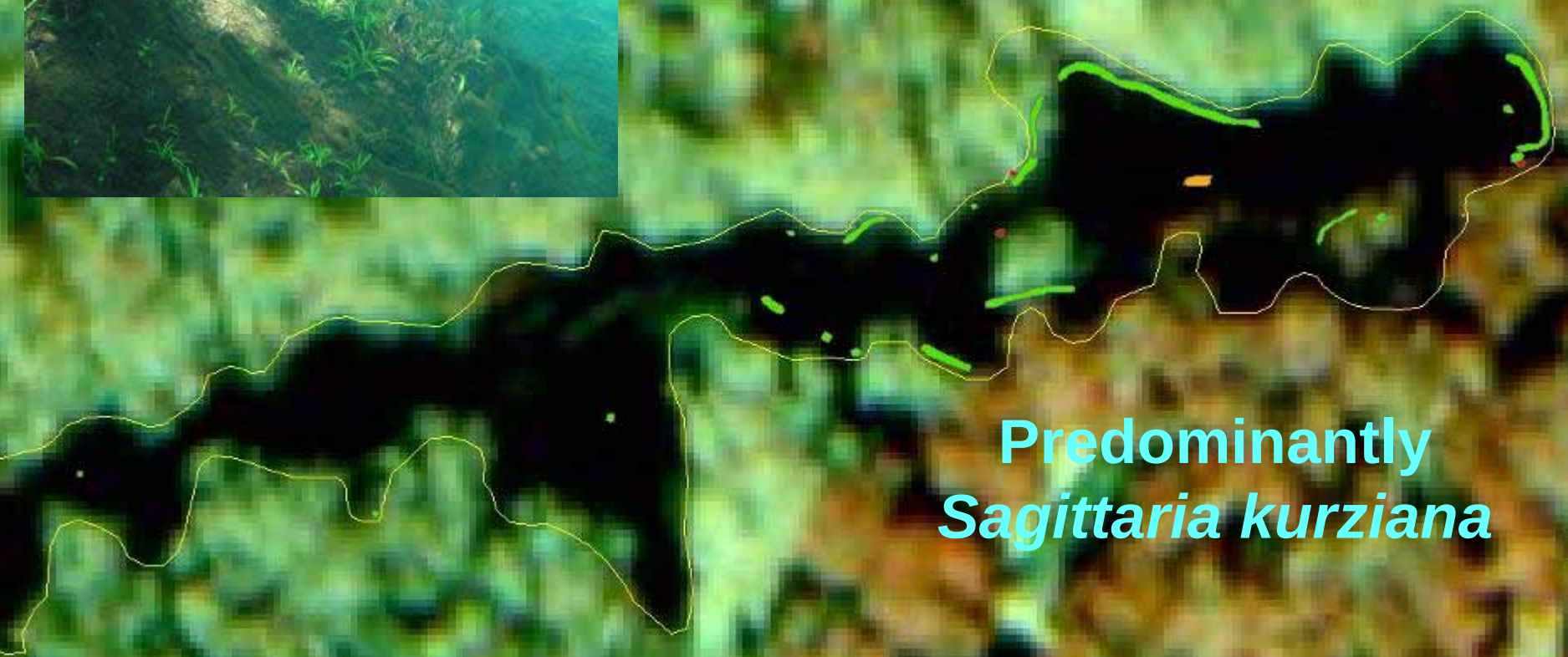
Manatee Springs



Suwannee River



Manatee Springs

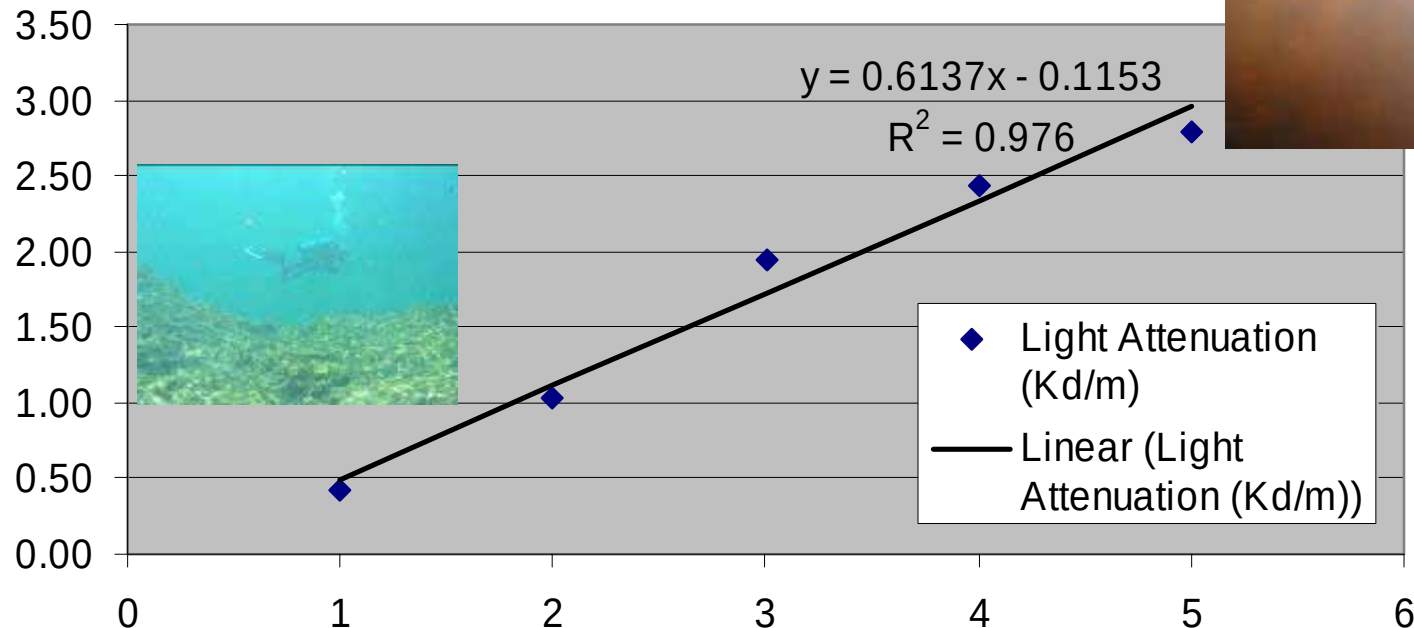


**Predominantly
*Sagittaria kurziana***

Manatee Springs

Bottom Type	Sq. Meters	Acres	%
SAV	124.24	0.03	1%
Bare	8916.28	2.20	99%
Total	9040.53	2.23	100%

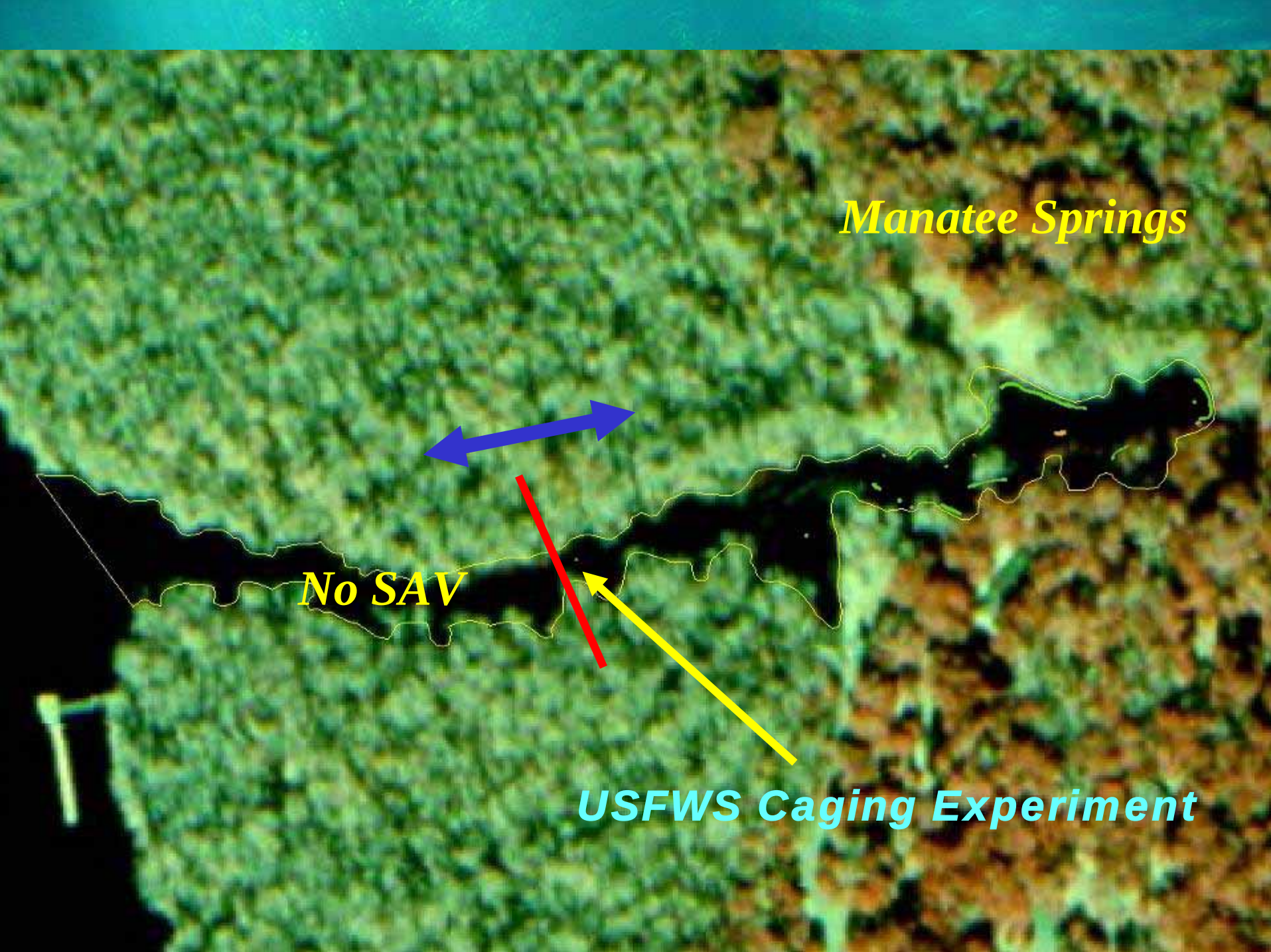
Light Attenuation with Distance from Manatee Spring Boil
toward Suwannee River



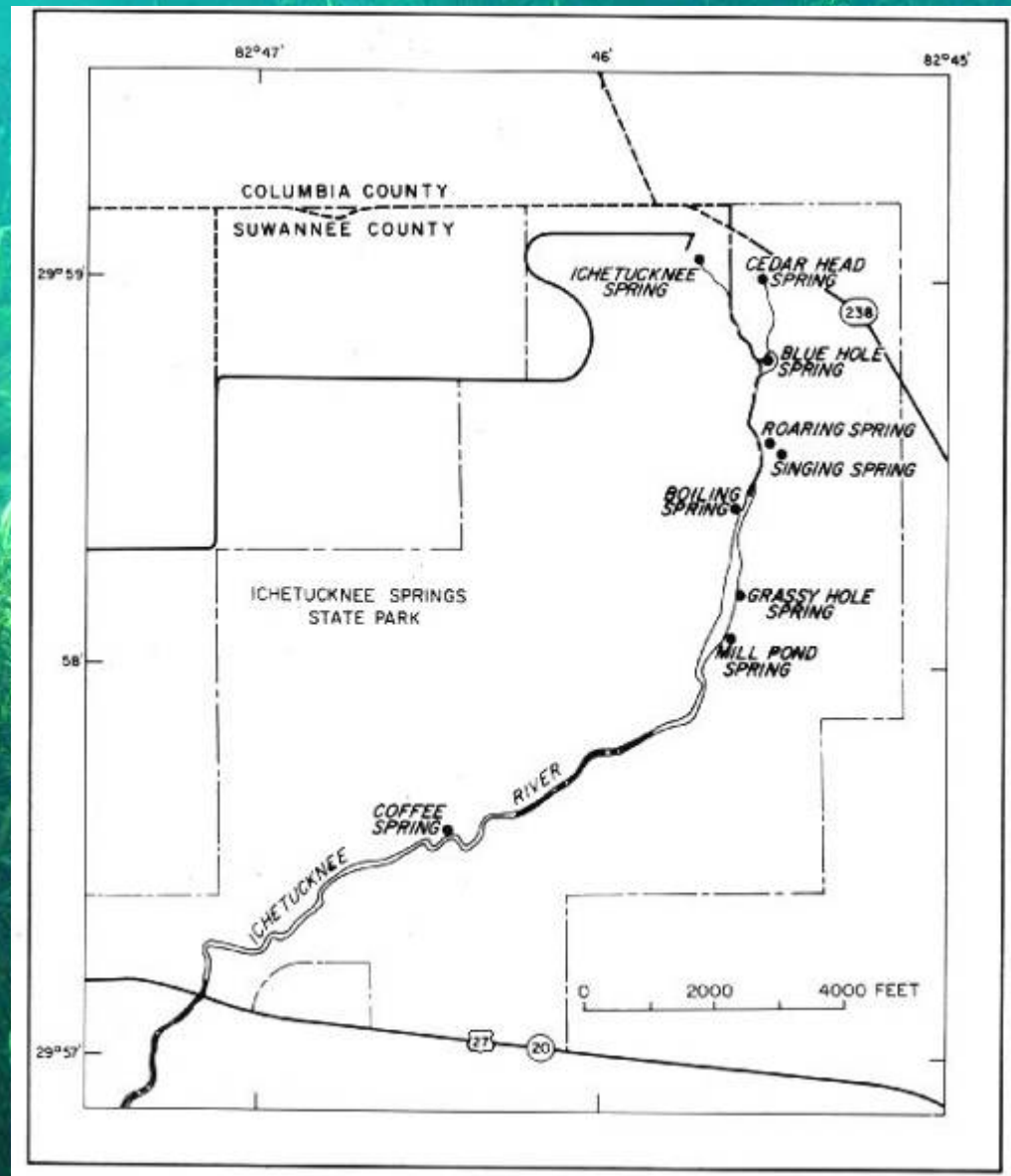
Manatee Springs

No SAV

USFWS Caging Experiment



Ichetucknee Springs



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**Ichetucknee State
Park**

Headspring



Rice Marsh



Floodplain

US 27





Sagittaria kurziana



Vallisneria americana



Zizania aquatica



Chara sp.

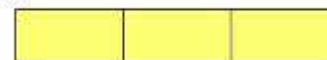
Ichetucknee Springs

Bottom Type	Sq. Meters	Acres	%
Bare	4970.70	1.23	3.30%
Emergent	27652.07	6.83	18.35%
SAV	118035.45	29.17	78.35%
Total	150658.22	37.23	100.00%

SAV Species	Sq. Meters	Acres	% of Total	Mean Braun Blanquet Cover
<i>Sagittaria kurziana</i>	76317.06	18.86	52.44%	3
<i>Zizania aquatica</i>	27199.58	6.72	18.69%	2
<i>Vallisneria americana</i>	25801.89	6.38	17.73%	3
<i>Chara</i> sp.	14821.98	3.66	10.18%	3
<i>Myriophyllum heterophyllum</i>	876.69	0.22	0.60%	2
<i>Ludwigia repens</i>	499.08	0.12	0.34%	2
<i>Hydrocotyle</i> sp.	28.78	0.01	0.02%	1

Legend

ZIZ



1 2 3

VAL



3 1

SAG



3 2 1

MYR



1

CHA

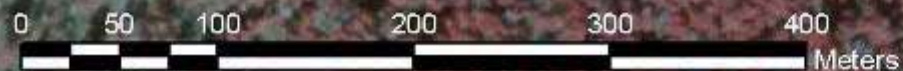


1 2 3



Headspring Reach

Rice Marsh Reach



Headspring Reach

Rice Marsh Reach

Legend

ZIZ



VAL



SAG



MYR



CHA



0 501



0 50 100 200 300 400

Meters

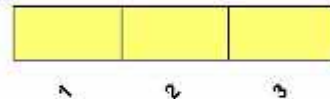
Floodplain Reach

US 27

0 50 100 200 300 400
Meters

Legend

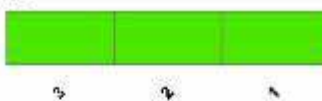
ZIZ



VAL



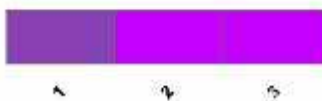
SAG



MYR



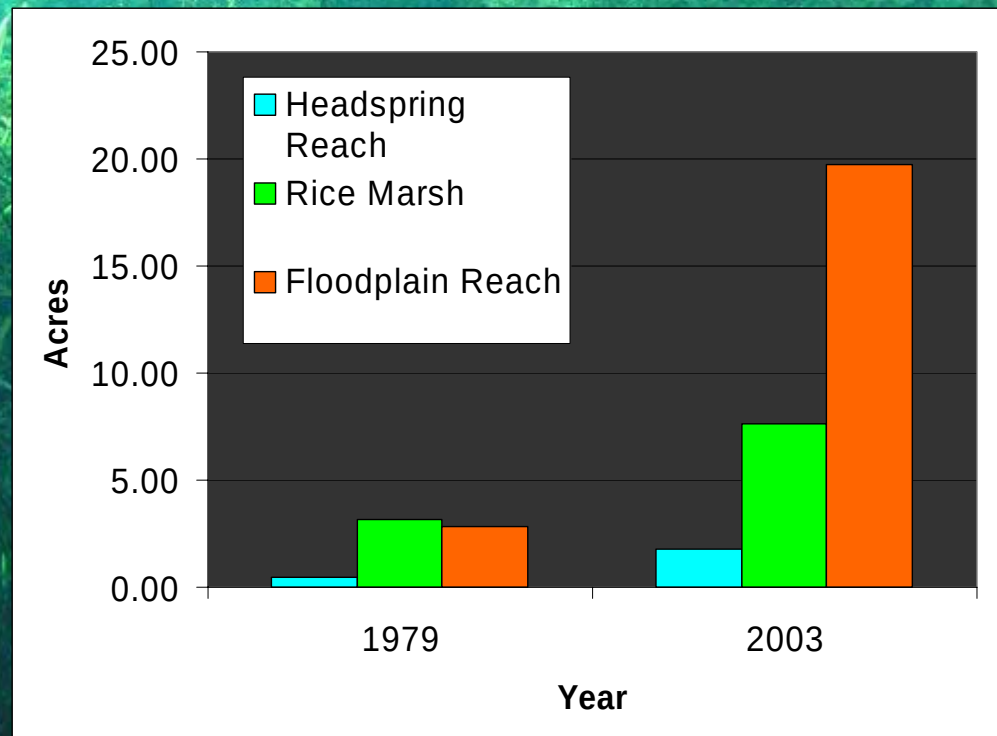
CHA



Historical Change

Area	Year	Sq. Meters	Acres	% Change
Headspring Reach	1979	1872.00	0.46	
	2003	7230.49	1.79	286%
Rice Marsh	1979	12685.00	3.13	
	2003	30799.70	7.61	143%
Floodplain Reach	1979	11479.00	2.84	
	2003	80005.26	19.77	597%

*all 1979 values estimated—original mapping was performed by Dutoit via transect method, cutoff points for reaches were estimated



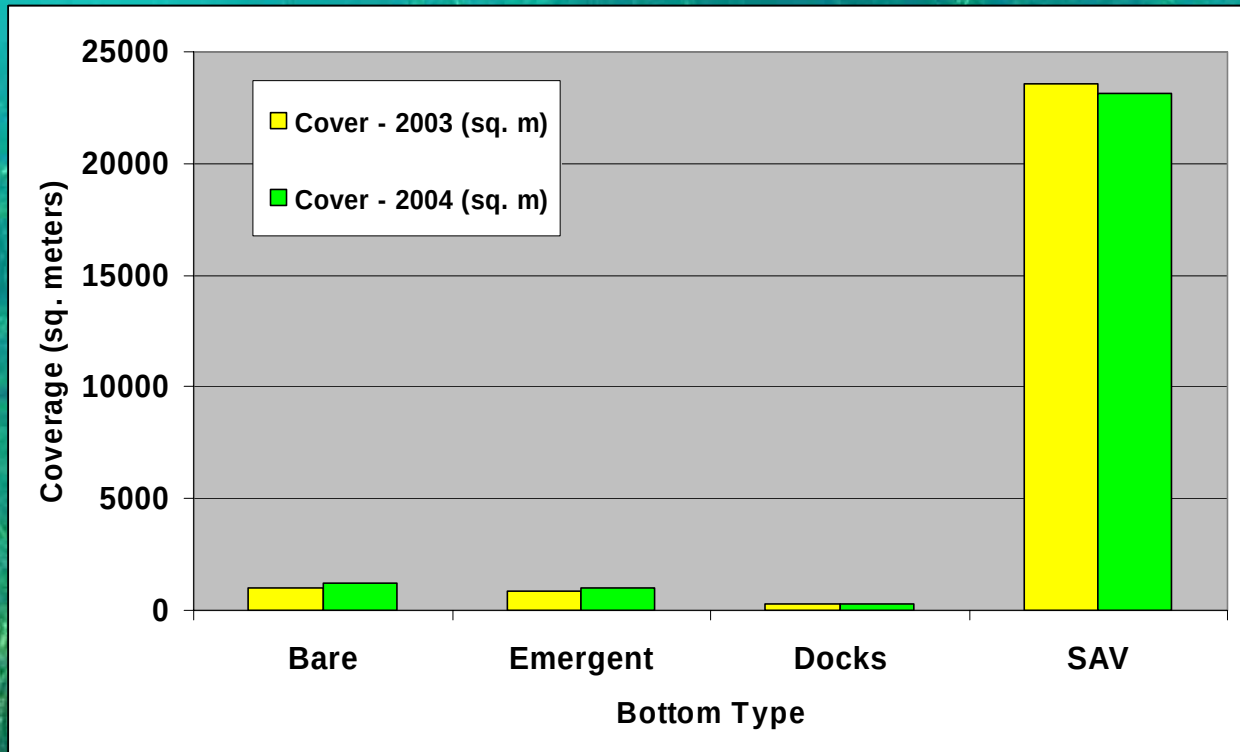
Remapping of High Use Areas (2004)

- Determine if SAV impacted by summer of 2003 recreational usage
- Focus on shallow areas and exit/entry points



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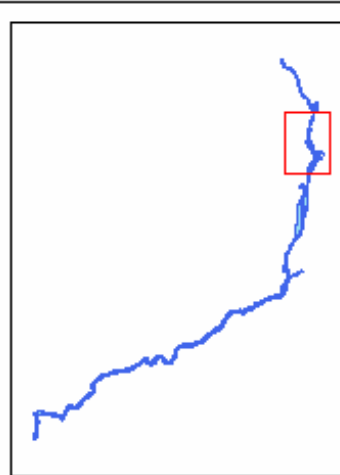
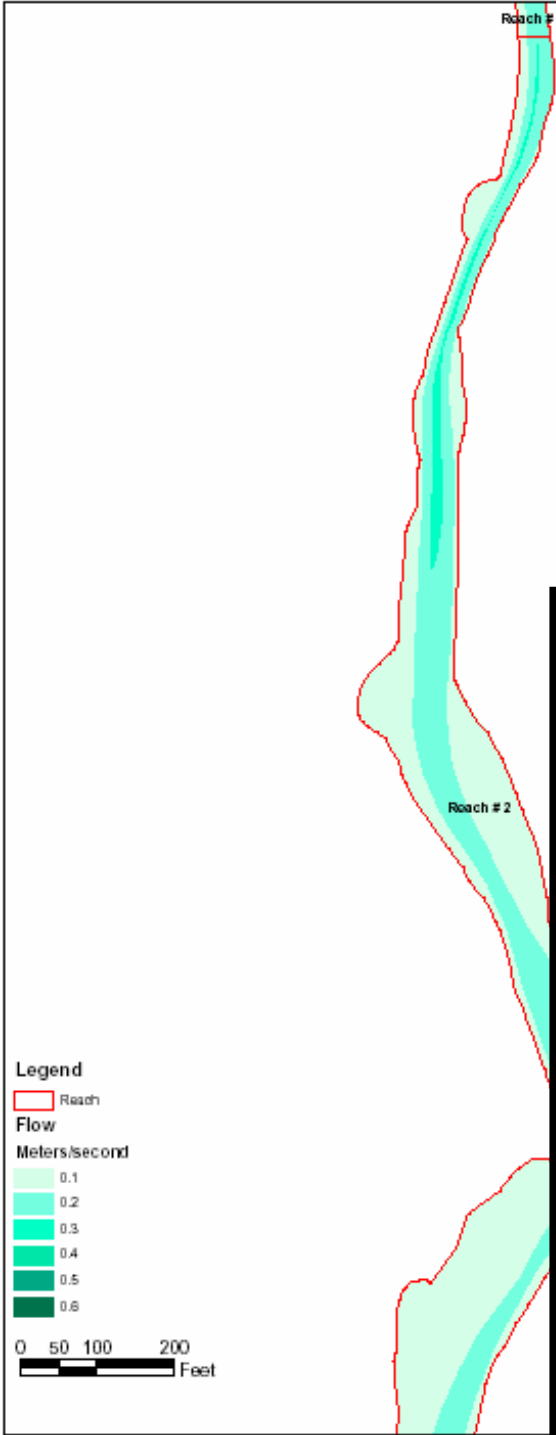
Type	Cover - 2003 (sq. m)	Cover - 2004 (sq. m)	Difference (sq. m)
Bare	974	1229	255
Emergent	825	1024	199
Docks	281	281	0
SAV	23599	23145	-454

Shading Flow Depth Mapping

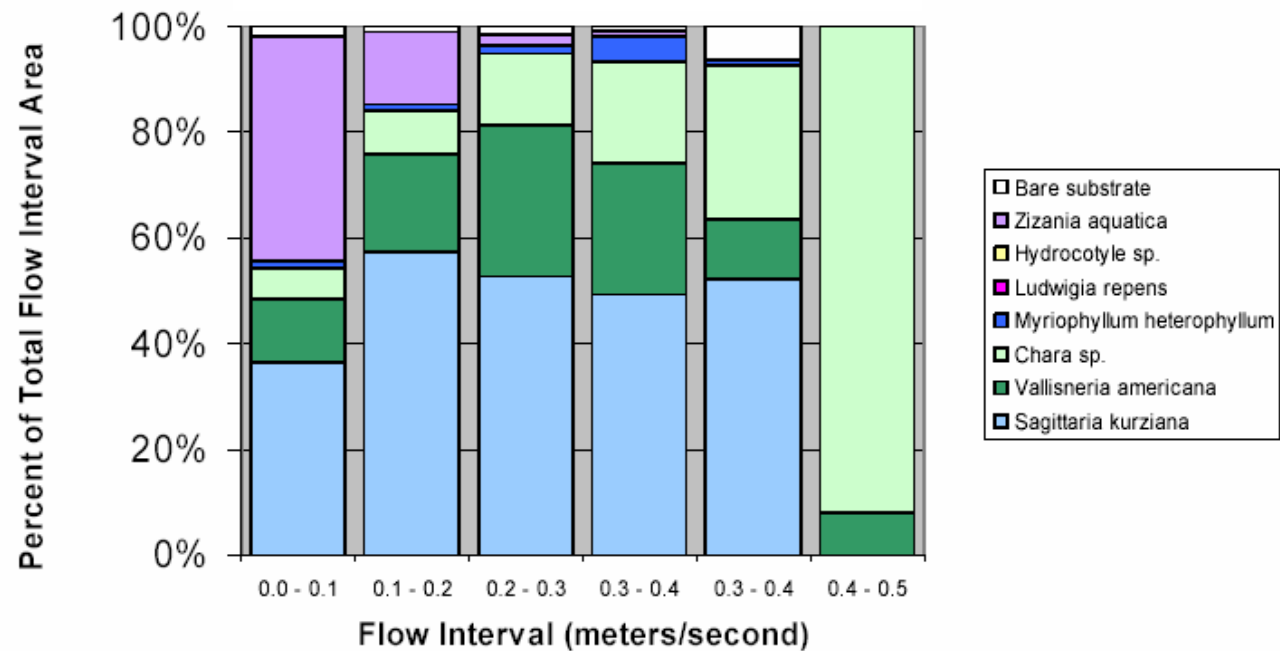
- Field measurements at multiple transect locations
- Tree height
- Canopy cover
- Water depth
- Flow velocity



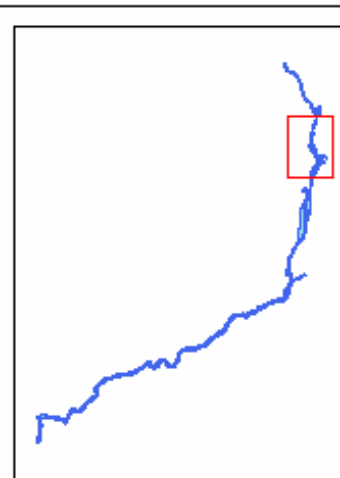
Flow Velocity



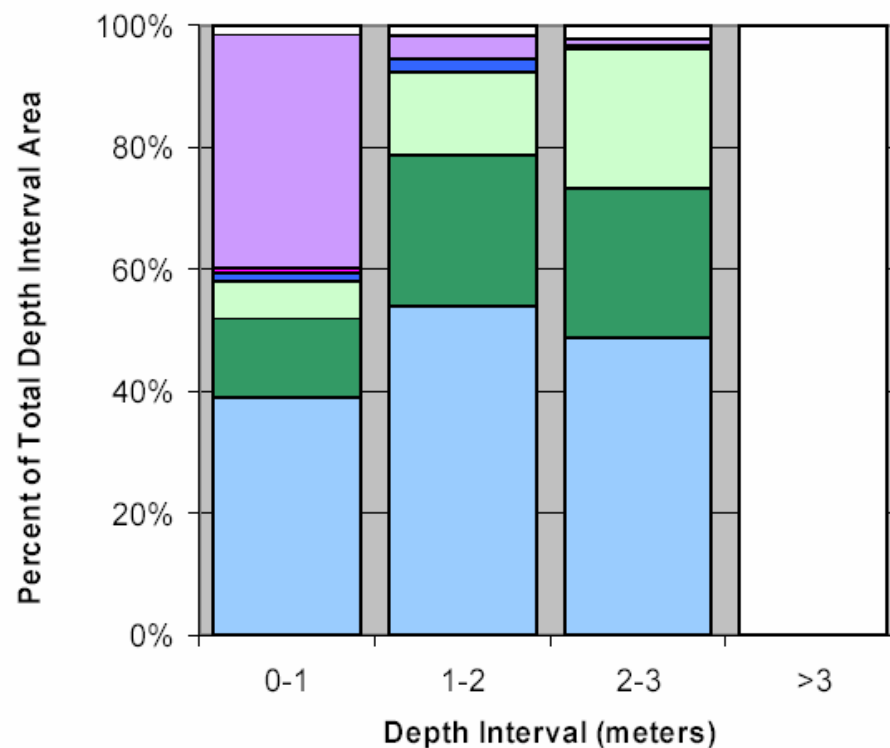
Relative Distributions of SAV Cover by Flow



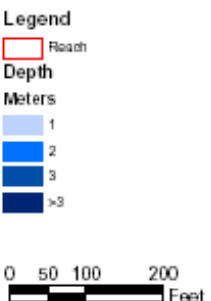
Depth



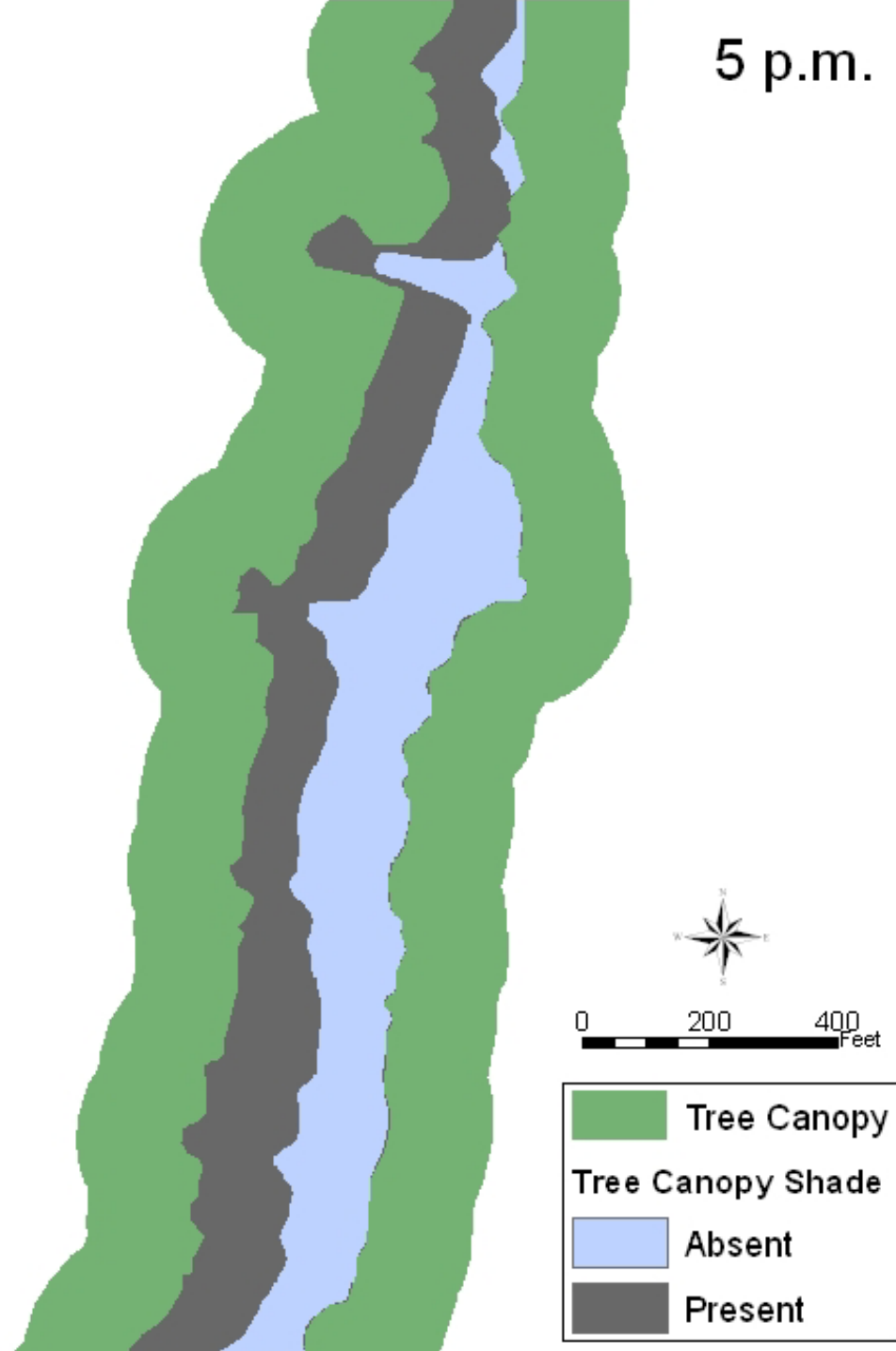
Relative Distributions of SAV Cover by Depth



- Bare substrate
- Zizania aquatica
- Hydrocotyle sp.
- Ludwigia repens
- Myriophyllum heterophyllum
- Chara sp.
- Vallisneria americana
- Sagittaria kurziana



5 p.m.



Shading Analysis

- Spatial Analyst “hillshade” command

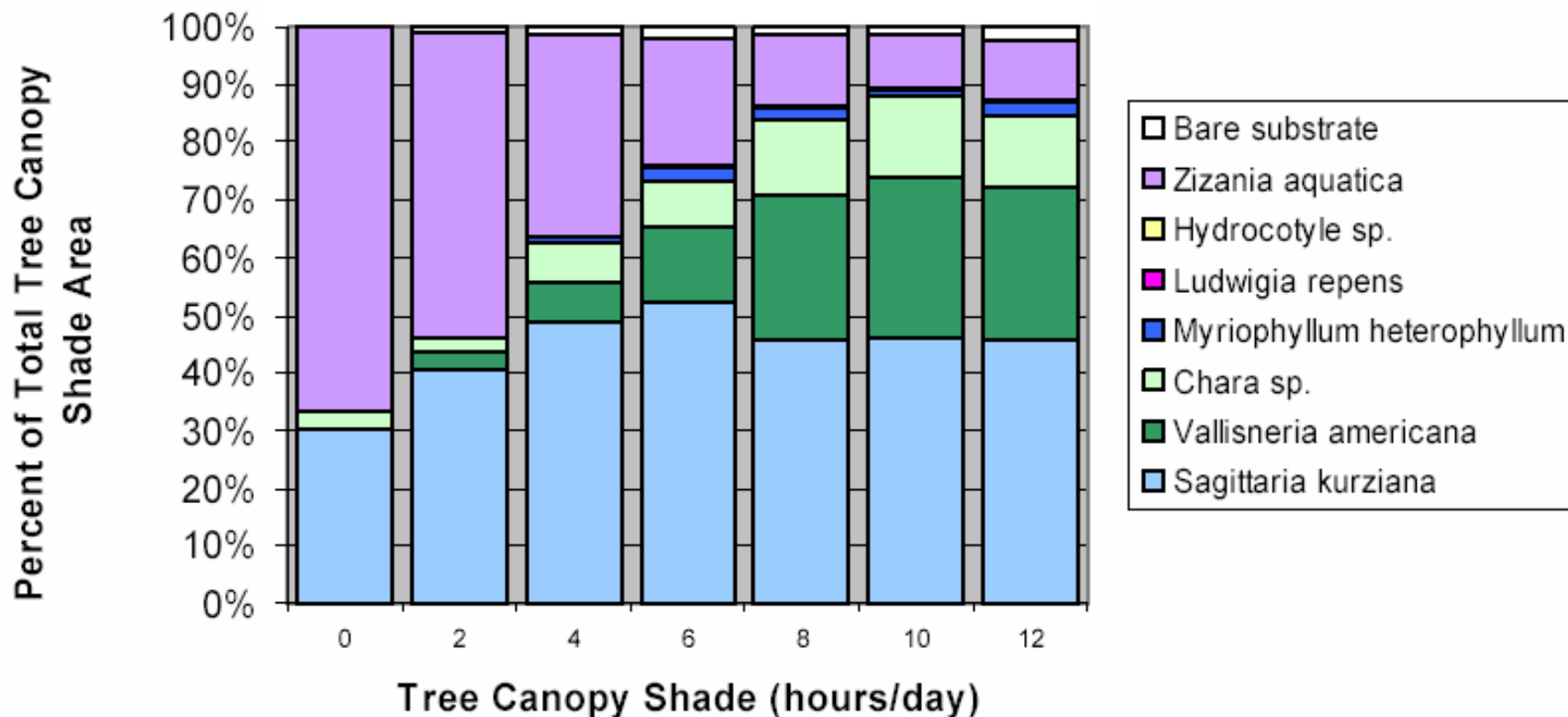
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SAV and Shade

Relative Distributions of SAV Cover by Tree Canopy Shade



SAV – Depth/Flow/Shade Relationships

- *Sagittaria* appears fairly independent of depth, flow, reach, or tree canopy shade
- *Chara* has a positive trend of increasing coverage with increasing depth, flow and tree canopy shade
- *Vallisneria* coverage appears to increase with increasing amounts tree canopy shade, while it is less strongly related to increasing depth and flow
- *Zizania* only occurred in depths shallower than 1 m (typically emergent)

Conclusions

- SAV in Manatee Springs likely varies seasonally due to river inundation, manatee grazing
- SAV in Ichetucknee Springs has increased dramatically since 1979 study
- Small loss in SAV cover (2%) between 2003 and 2004 high use areas, likely due to human activities (installation of new dock and safety cable across river) in lower reach
- Does not appear to be a strong relationship between SAV and canopy cover



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Questions?