

COASTAL RIVERS AQUATIC VEGETATION ANALYSIS

TECHNICAL MEMORANDUM

CHASSAHOWITZKA RIVER DATA ANALYSIS - 2015

PREPARED FOR:

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

DECEMBER 2015



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1.0 INTRODUCTION AND BACKGROUND

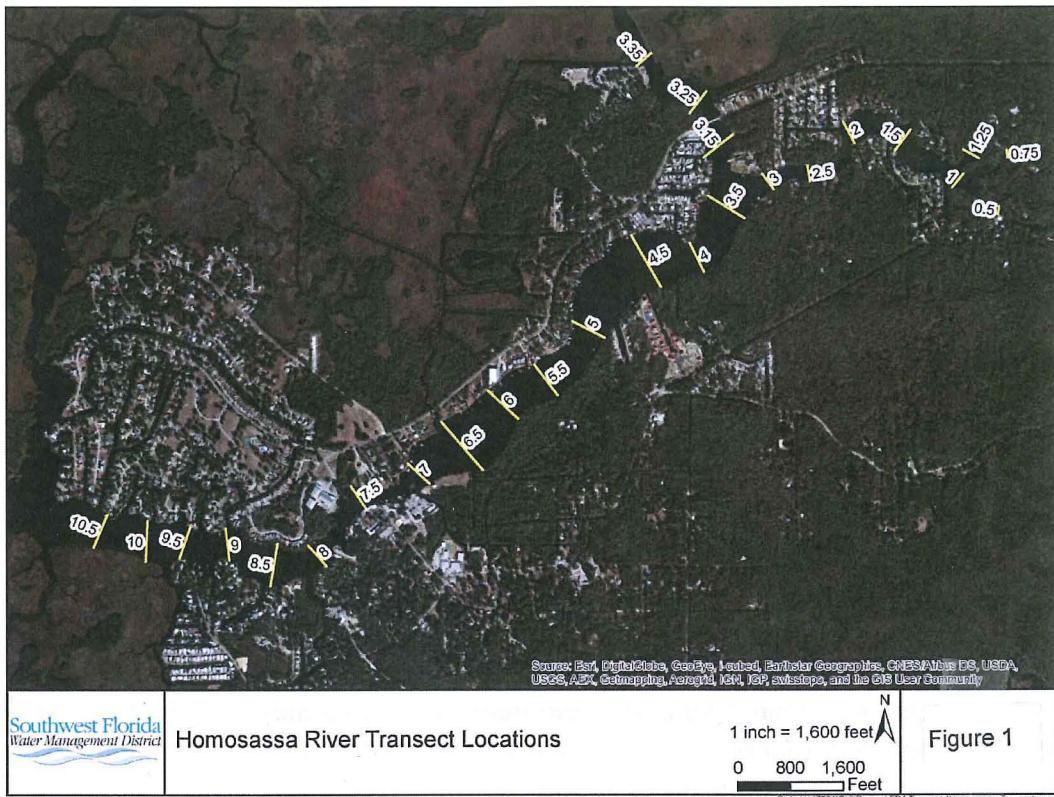
Sampling of submersed aquatic vegetation (SAV) including macrophytes and macroalgae in the Chassahowitzka River was conducted during August 2015. Macrophytes and macroalgae were sampled at 20 regularly spaced transects (perpendicular to stream flow) from just below the main spring to the marsh complex. These transects had been sampled previously during 1998-2000 and 2003-2011. Five (5) additional transects were added during the 2015 sampling session for a total of 25 transects. The additional transects were located at the main spring and in selected channel bifurcations and side tributaries. Figure 1 presents the location of the sampled transects.

Along each transect, five stations were sampled for submersed vegetation, with one in the middle and two to either side approximately one-third and two-thirds the distance to the shoreline. At each of the resulting 125 stations, a 0.5m x 0.5m (0.25 m²) quadrat was placed on the substrate and the above-ground biomass contained within the quadrat removed by divers and transported to the surface.

Macrophytes and macroalgae were separated immediately by hand and the different fractions were spun in a nylon mesh bag to remove excess water. Samples were then weighed with calibrated hand-held Pesola® scales. Weights were recorded to the nearest 1g for samples less than 1 kg and to the nearest 10 g for samples greater than 1 kg. All types of vegetation (unknown macroalgae were preserved for subsequent identification) present in the quadrat were recorded and ranked according to their relative abundances. For convention, the phrase ‘total vegetative biomass’ includes macrophytes and macroalgae (primarily filamentous forms).

Data collected at each station included:

- Estimated total percent cover and percent cover by species, using 0.5m x 0.5m quadrats.
- Substrate type, percent canopy cover, any other adjacent macrophytes that were not in the quadrat.
- All aboveground biomass within the 0.5m x 0.5m quadrat, sorted by taxon, and wet weights measured.
- Any unidentified species. These were bagged, labeled, and placed on ice for identification in the lab.
- Additional qualitative data including epiphytic coverage, weather conditions, tides, wildlife observed and visual water quality.
- Quantitative data including salinity and water temperature.



SAV abundance was summarized and statistical comparisons within and between the three rivers using the data collected. The results of the field data collection effort were analyzed for the following parameters:

- SAV Coverage for each transect on each river system and for the river system as a whole (% average +/- standard error).
- SAV Biomass for each transect on each river system and for the river system as a whole (average kg wet weight/m² +/- standard error).
- Angiosperm Biomass for each transect on each river system and for the river system as a whole (average kg wet weight/m² +/- standard error).
- Macroalgae Biomass for each transect on each river system and for the river system as a whole (average kg wet weight/m² +/- standard error).

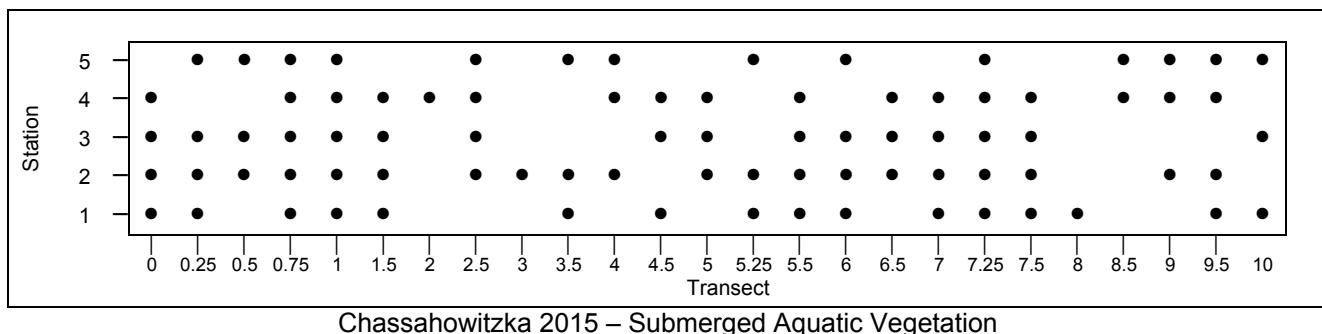
Also, frequency of occurrence (% of stations sampled) of angiosperm and macroalgal species were calculated and charts prepared.

2.0 RESULTS

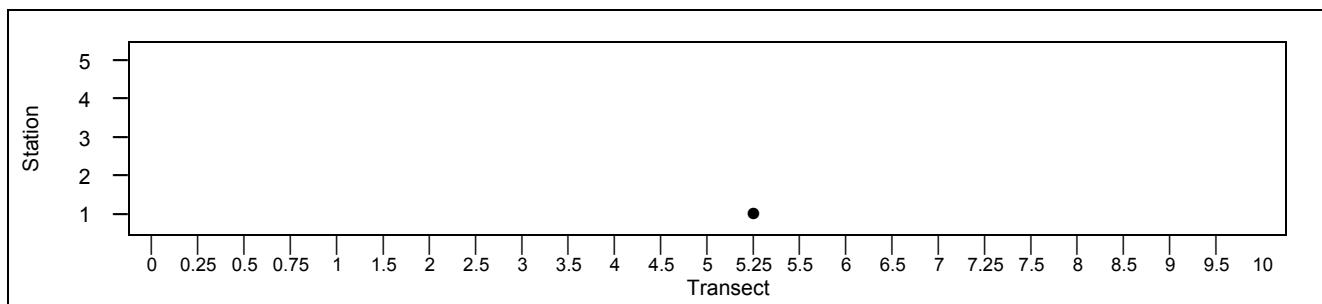
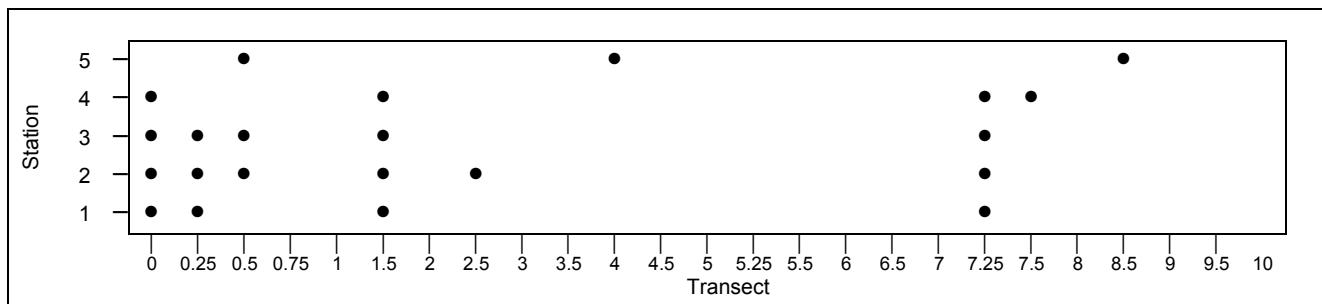
Results of the data analysis are presented in the following sections:

1. 2015 Results for Chassahowitzka River – tables and graphs
2. Period of Record Results for Chassahowitzka River – tables and graphs
3. Period of Record Summaries comparing the three (3) rivers – Chassahowitzka, Homosassa and Weeki Wachee. Note that the additional transects sampled in 2015 were not considered when comparing historical data.

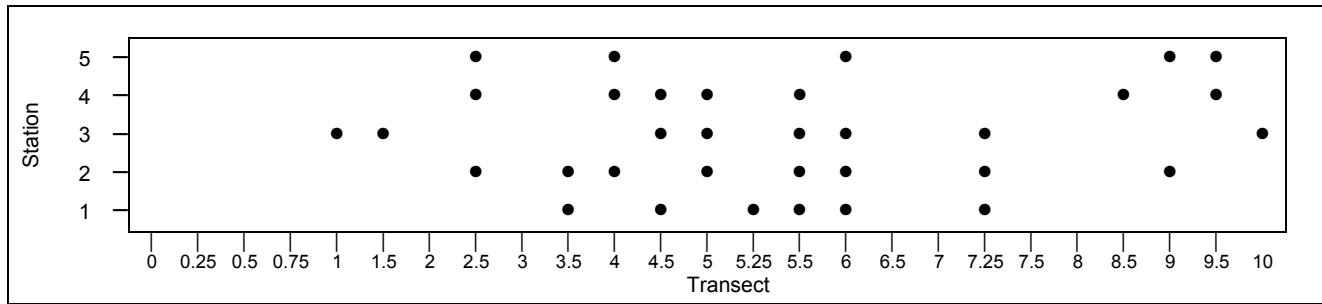
2015 Results – Frequency of Occurrence Charts

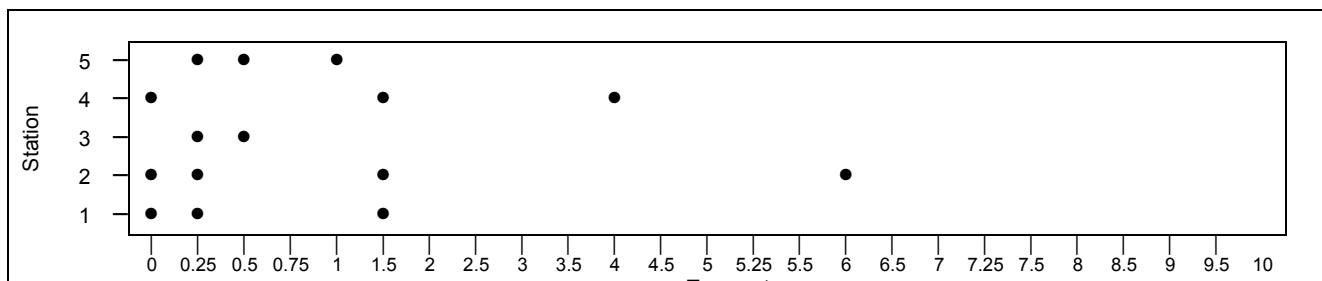
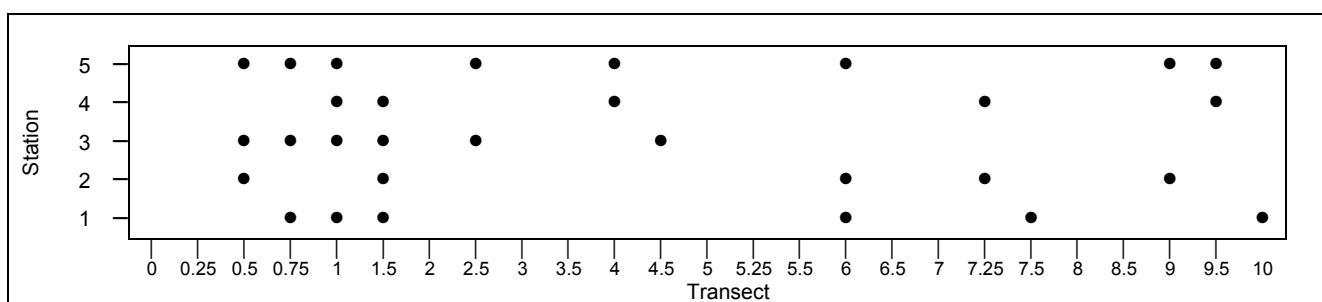
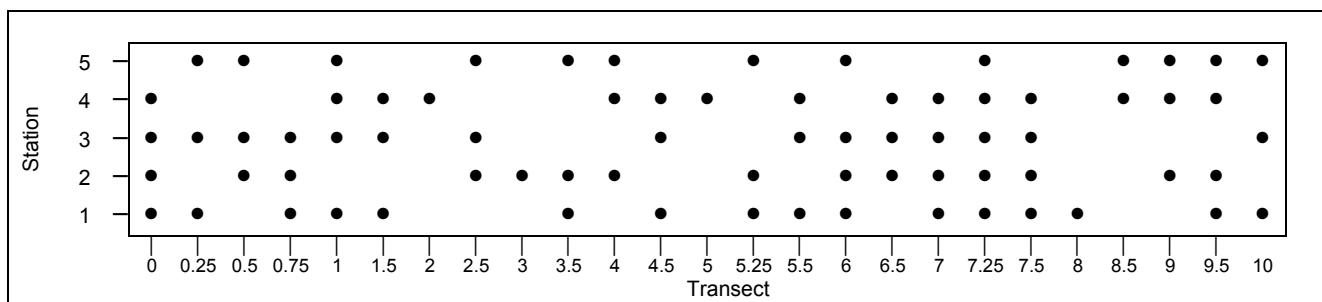
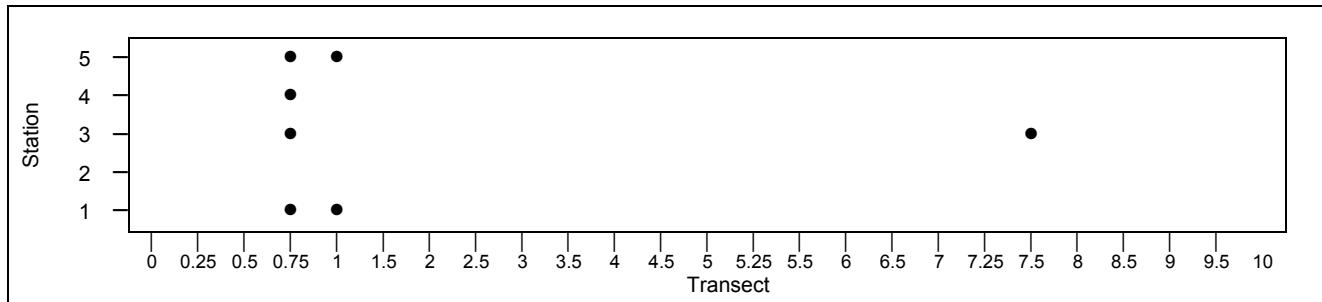


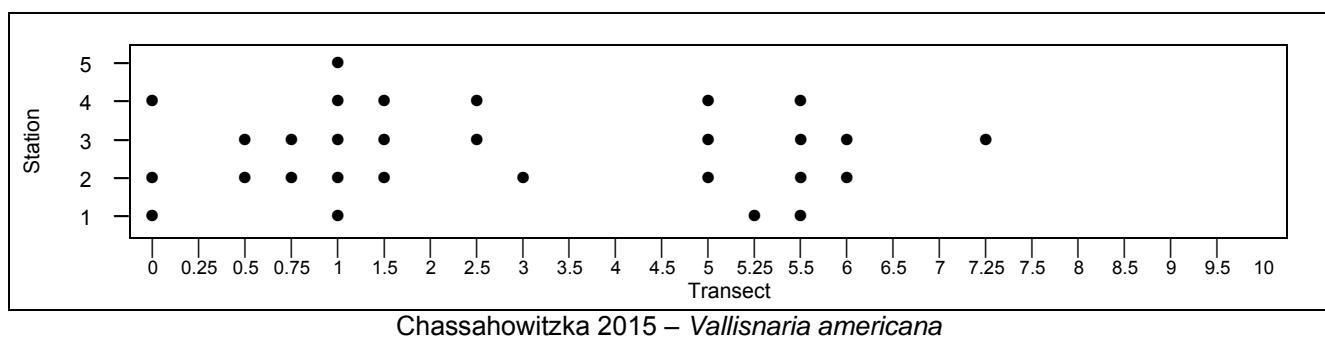
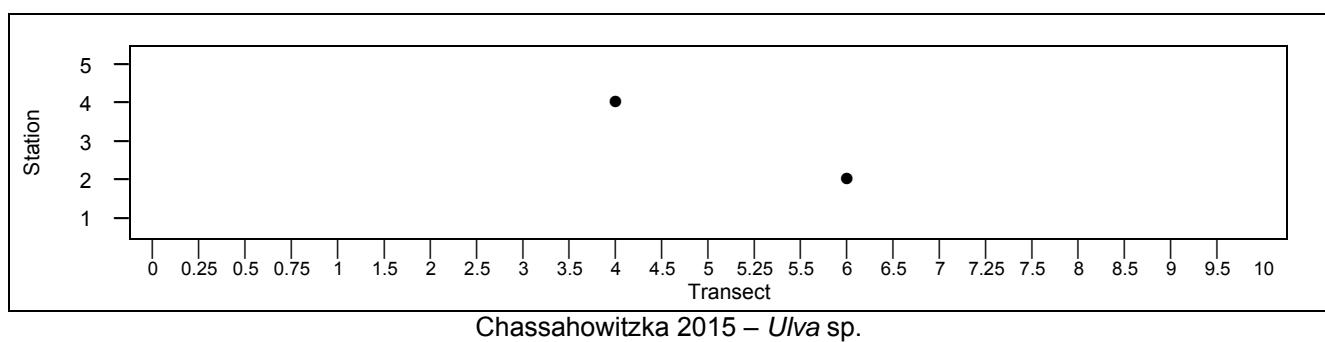
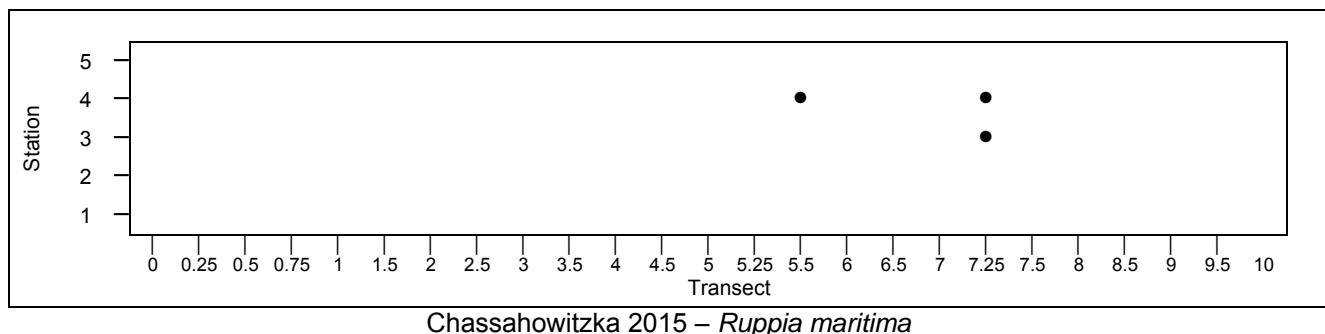
Chassahowitzka 2015 – Submerged Aquatic Vegetation

Chassahowitzka 2015 – *Chaetomorpha* sp.

Chassahowitzka 2015 – Filamentous algae

Chassahowitzka 2015 – *Gracilaria* sp.

Chassahowitzka 2015 – *Hydrilla verticillata*Chassahowitzka 2015 – *Myriophyllum spicatum*Chassahowitzka 2015 – *Najas guadalupensis*Chassahowitzka 2015 – *Potamogeton pectinatus*



**2015 Results – Substrate Composition, SAV Coverage, SAV
Biomass, Angiosperm Biomass and Macroalgae Biomass**

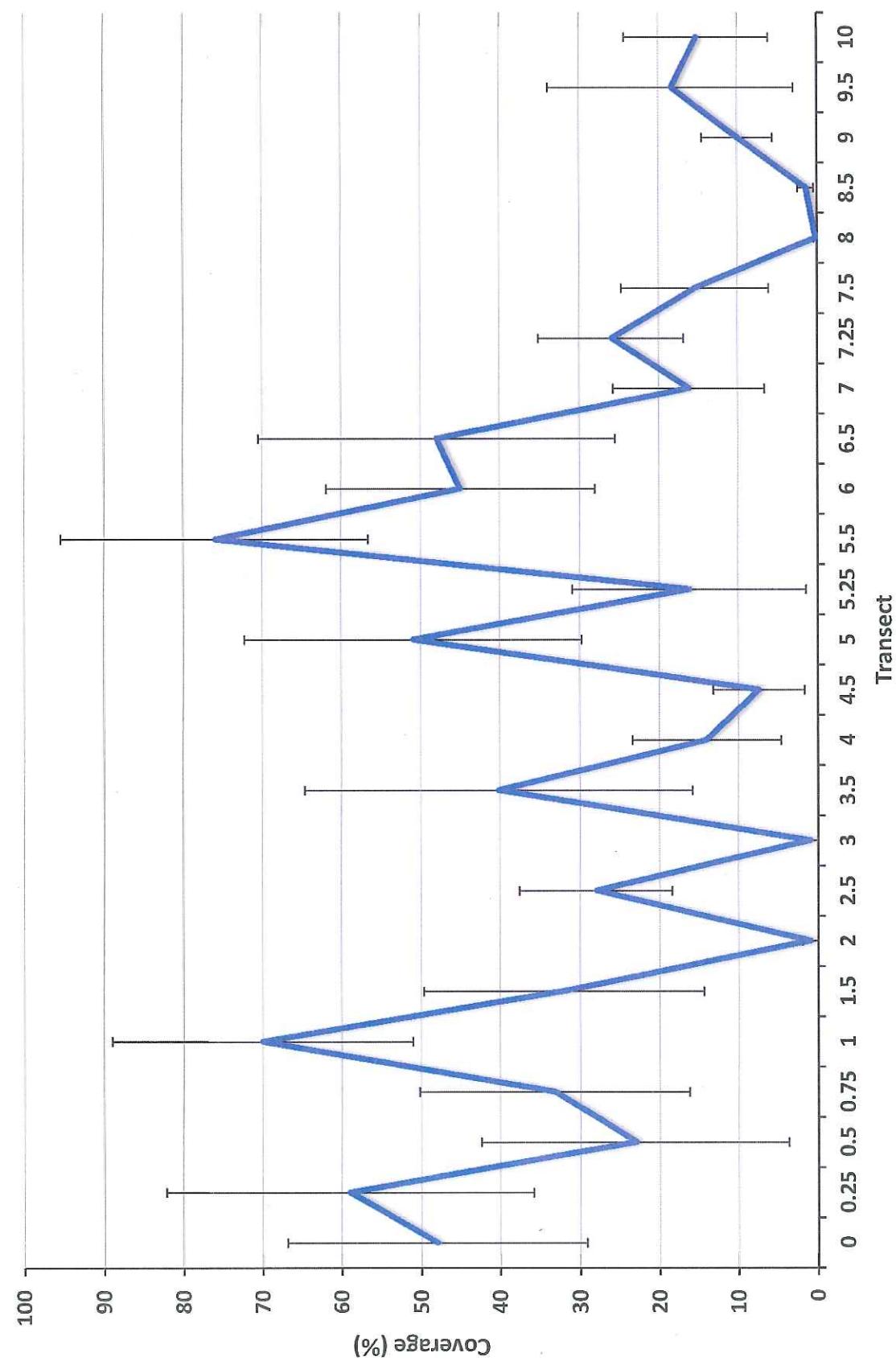
Station	0	0.25	0.5	0.75	1	1.5	2	2.5	3	3.5	4	4.5	5	5.25	5.5	6	6.5	7	7.25	7.5	8	8.5	9	9.5	10
5	SSh	MS	S	R	SM	S	M	M	M	SM	M	SM	S	S	SM	S	M	S	M	M	M	S	M	MS	S
4	SSh	MS	S	S	S	S	S	SM	S	SM	M	S	S	S	SM	S	S	S	SM	S	M	M	S	MS	S
3	S	S	S	S	S	S	S	SM	S	SM	M	S	S	S	SM	S	S	SM	S	SM	S	M	S	MS	S
2	SSh	MS	S	S	S	S	S	SM	SM	SM	M	SM	S	S	M	S	S	SM	S	SM	M	SM	M	MS	
1	MS	M	S	S	S	S	S	M	M	M	SM	S	S	M	S	M	M	SM	M	M	M	M	M	MS	

Transect

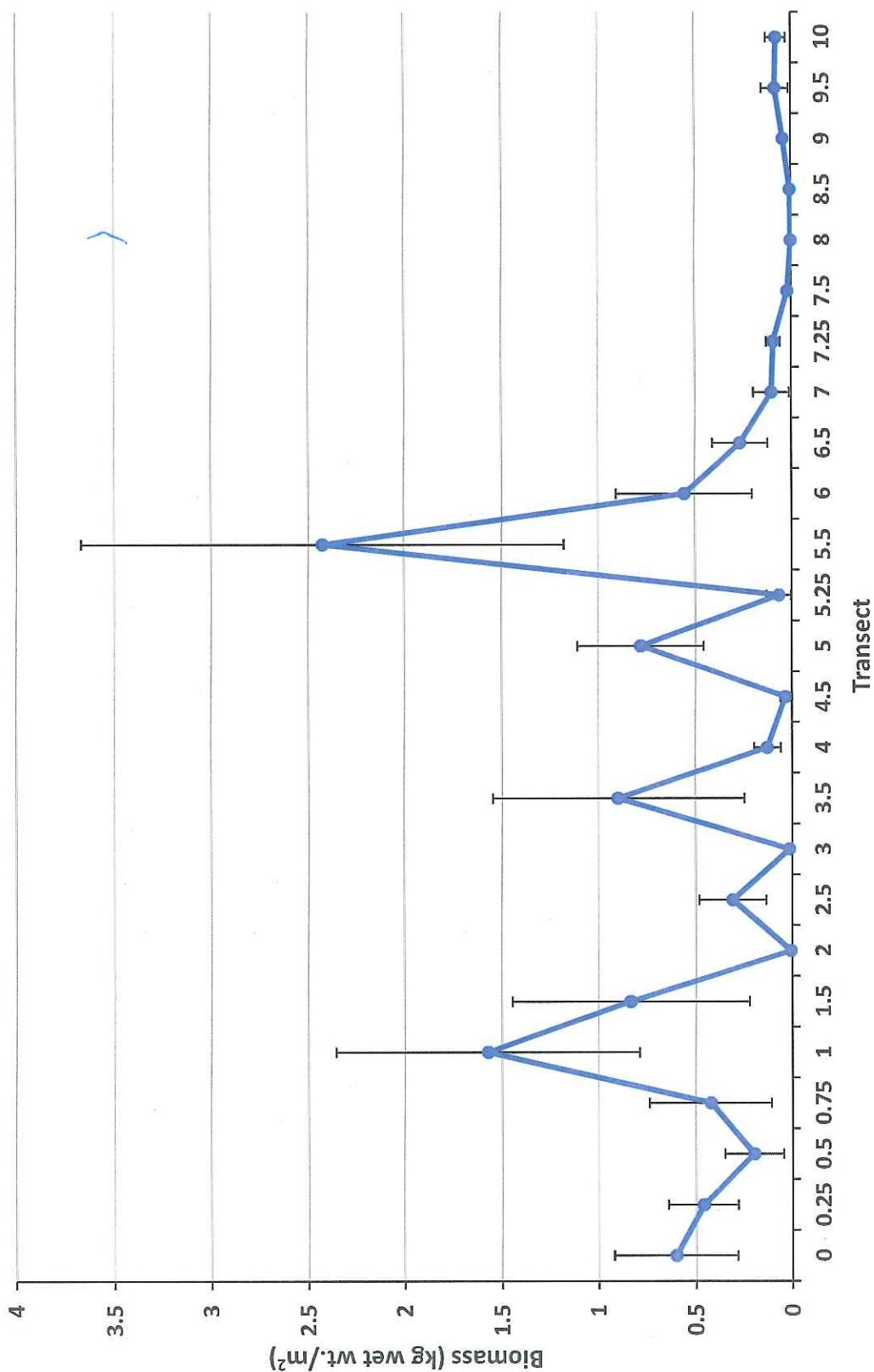
M=Mud, MS=Mud/Sand, R=Rock, S=Sand, SM=Sand/Mud, Sand Shell=SSh

Chassahowitzka 2015 – Bottom Types

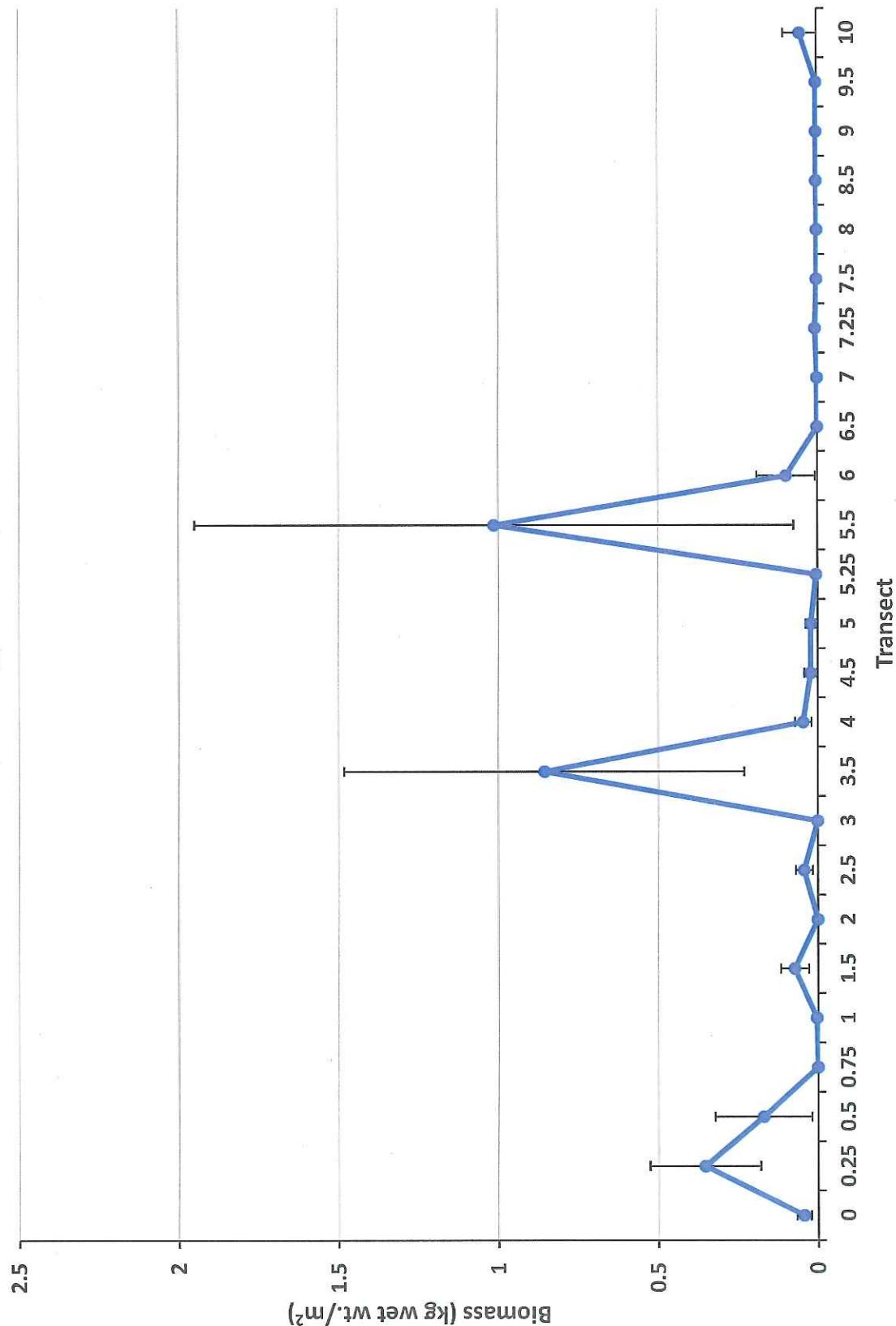
Chassahowitzka SAV Coverage 2015 (%, mean \pm std. err.)



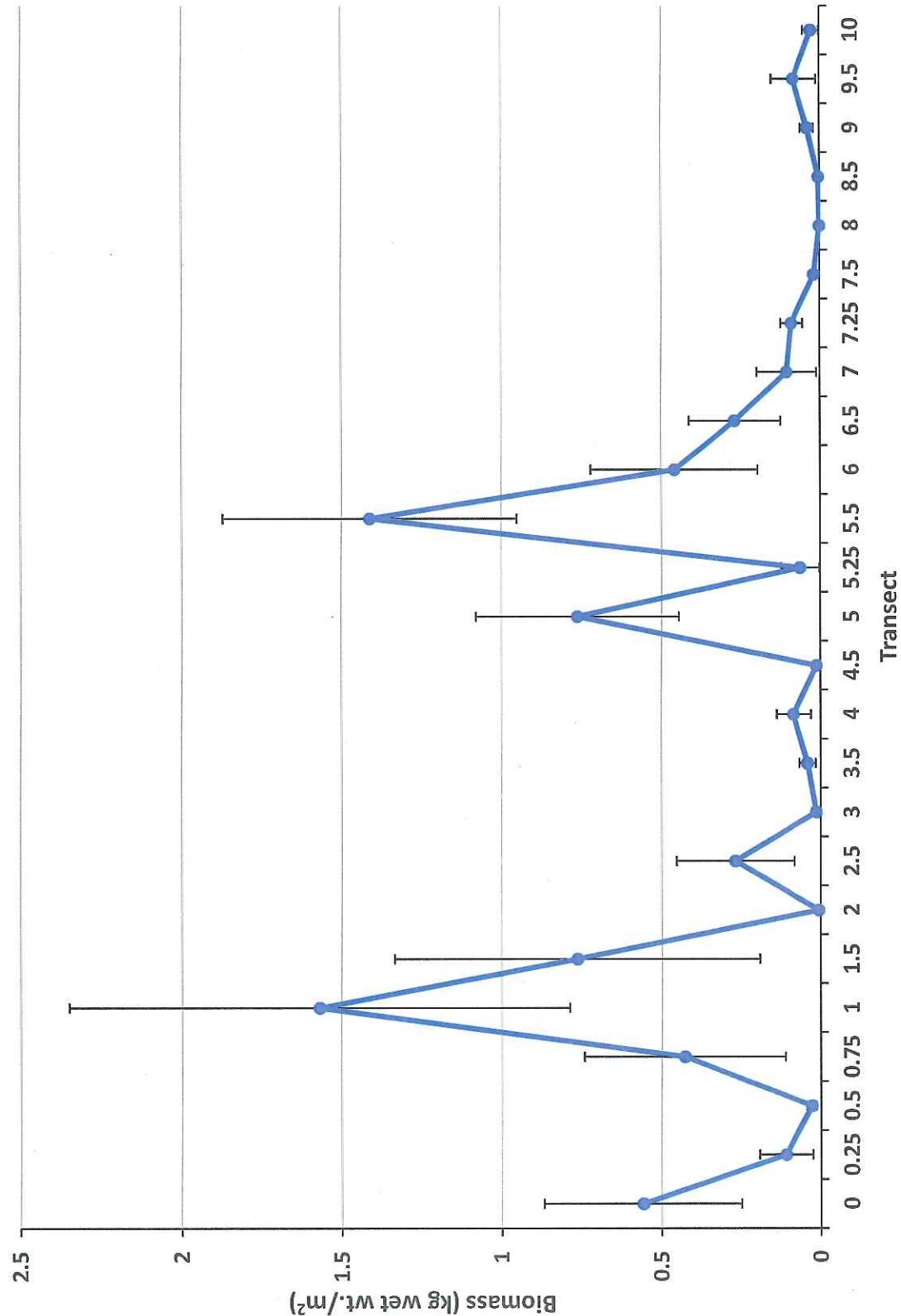
Chassahowitzka Total SAV Biomass (Mean \pm std. err.)



Chassahowitzka Macroalgal Biomass 2015
(Mean \pm std. err.)



Chassahowitzka Angiosperm Biomass 2015
(Mean \pm std. err.)



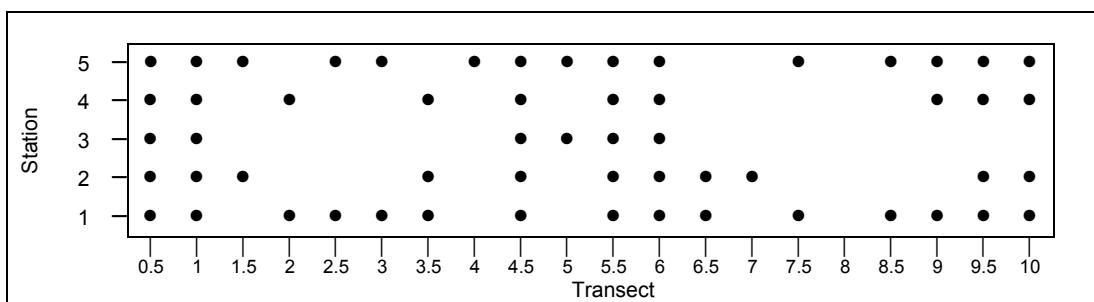
2006-2011, 2015 Results – Frequency of Occurrence Table

Frequency of Occurrence (% of station sampled) of Angiosperm and Macroalgal Species for the Chassahowitzka River

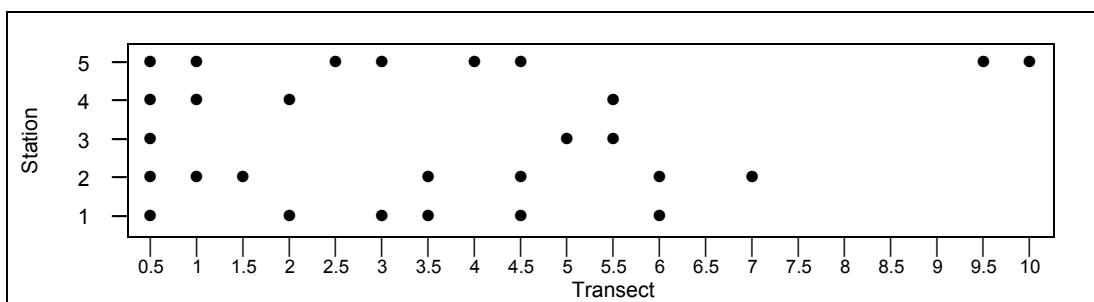
Species	Frequency of Occurrence (n=100) (%)							
	2006	2007	2008	2009	2010	2011	2015	2015*
<i>Ceratophyllum demersum</i>						1		
<i>Chara</i> sp.			2			1		
<i>Chaetomorpha</i> sp.							0.8	
<i>Elodea canadensis</i>								
Filamentous algae	28	4	28	26	19	21	11	17.6
<i>Gracilaria</i> sp.		7		5	13		30	27.2
<i>Hydrilla verticillata</i>	3	9	5	7	5	1	8	12
<i>Myriophyllum spicatum</i>	11	10	9	17	38	46	25	24
<i>Najas guadalupensis</i>	2	8	21	23	34	24	56	59.2
<i>Potamogeton pectinatus</i>	19	7	16	14	12	1		
<i>Potamogeton pusillus</i>			4	2			3	5.6
<i>Ruppia maritima</i>	14	7	5	8		14	1	2.4
<i>Ulva</i> sp.							2	1.6
<i>Vallisneria americana</i>	13	18	26	24	21	20	22	23.2
<i>Zannichellia palustris</i>				4	6			
None	43	60	32	40	17	33	38	33.6

*n=125

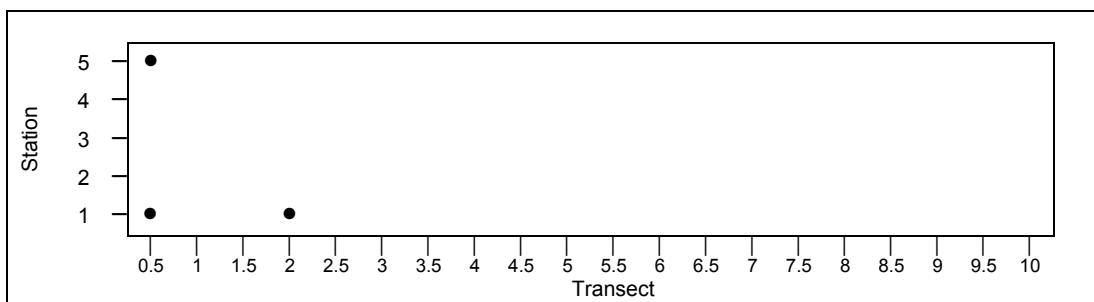
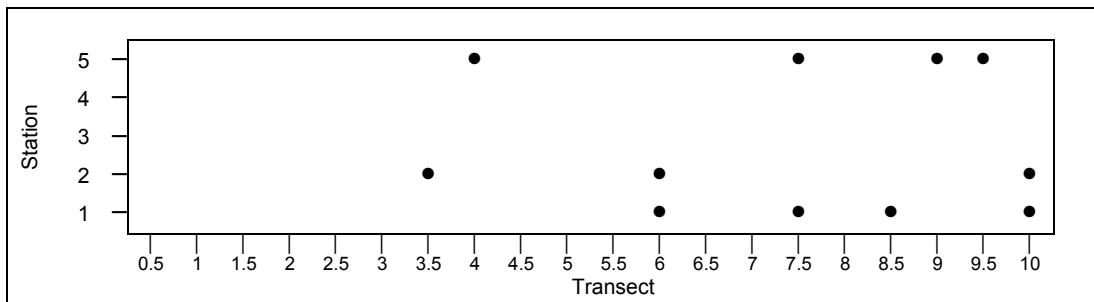
2006 - 2011 Results – Frequency of Occurrence Charts

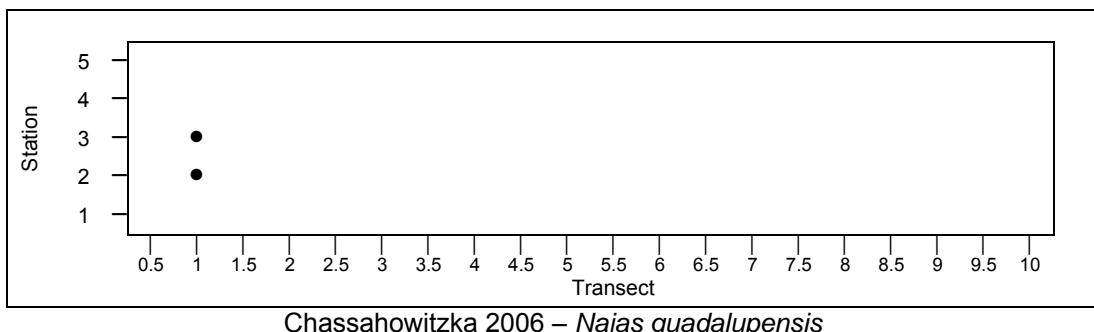
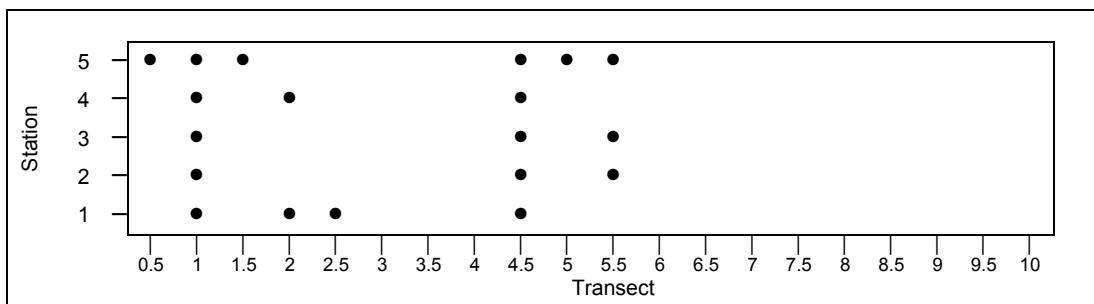
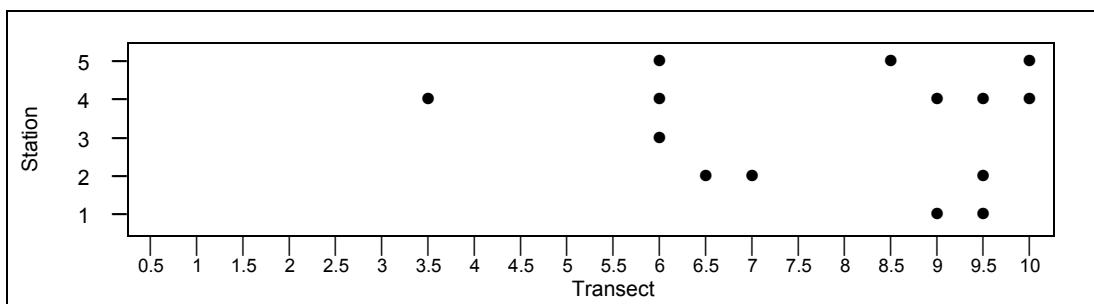
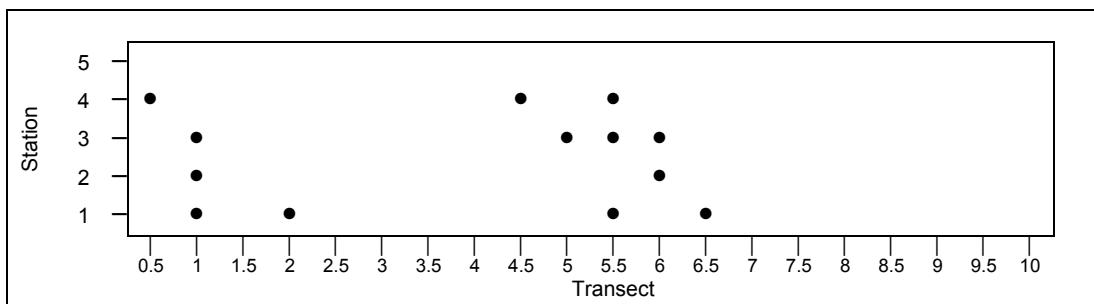


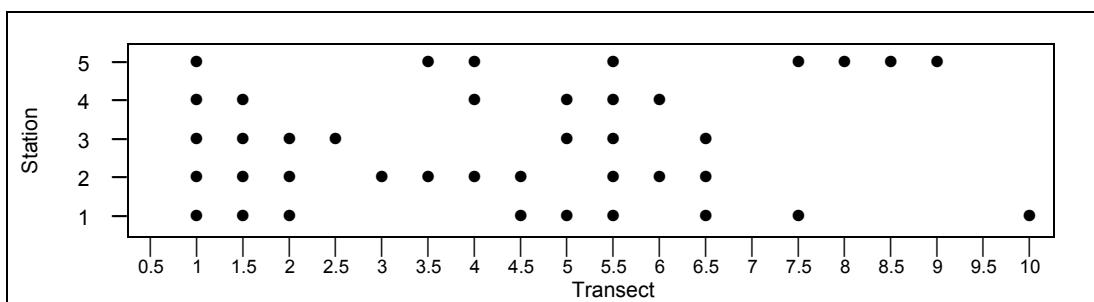
Chassahowitzka 2006 – Submerged Aquatic Vegetation



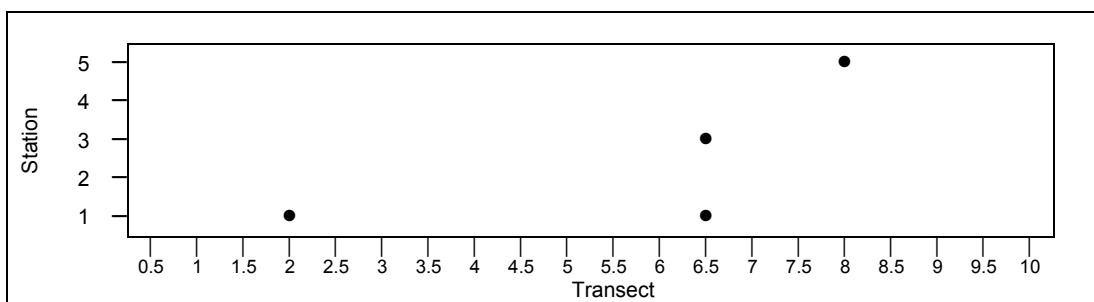
Chassahowitzka 2006 – Filamentous algae

Chassahowitzka 2006 – *Hydrilla verticillata*Chassahowitzka 2006 – *Myriophyllum spicatum*

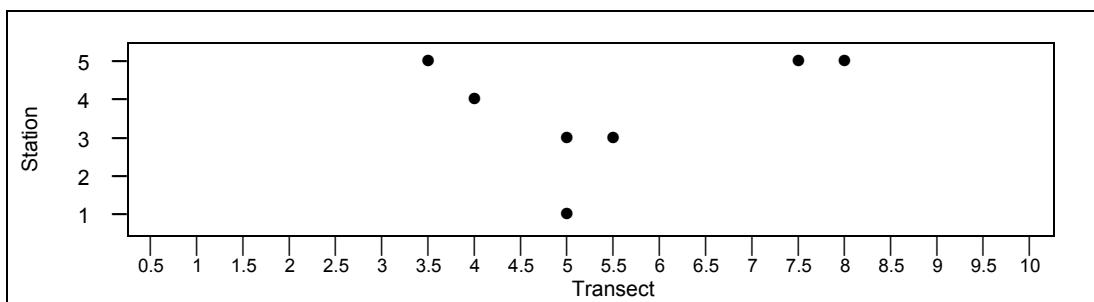
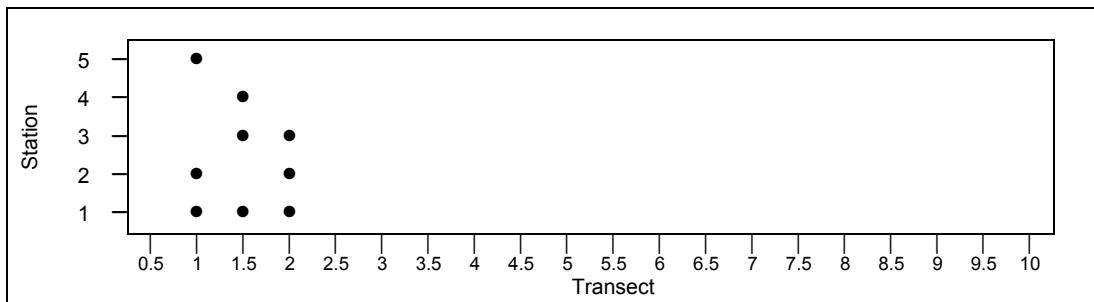
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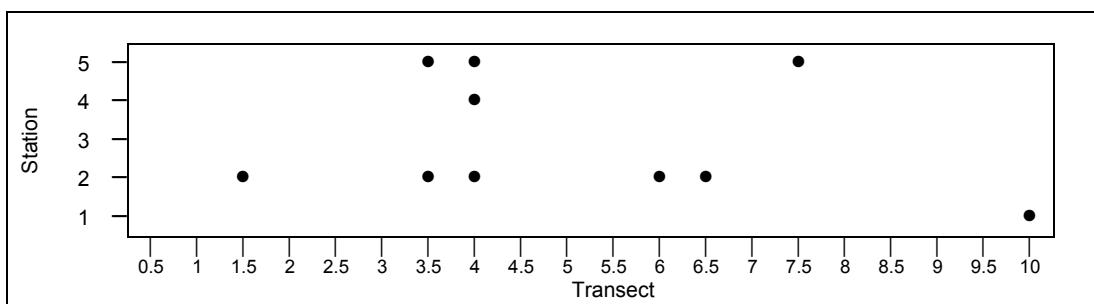
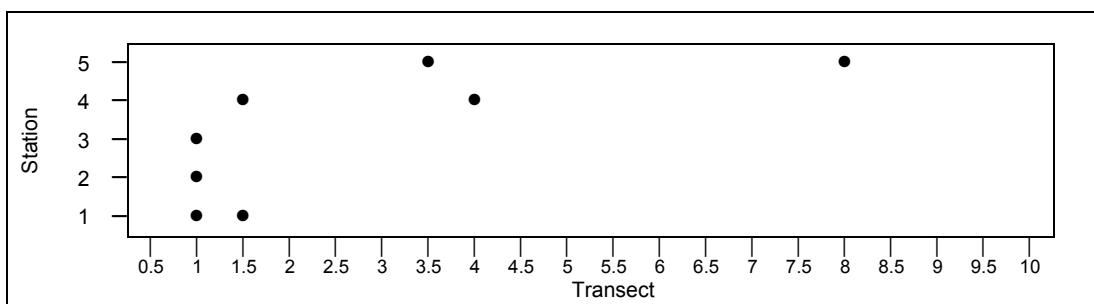
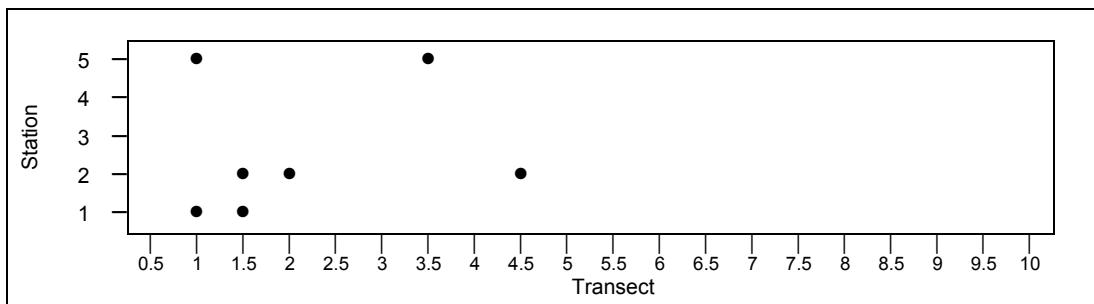
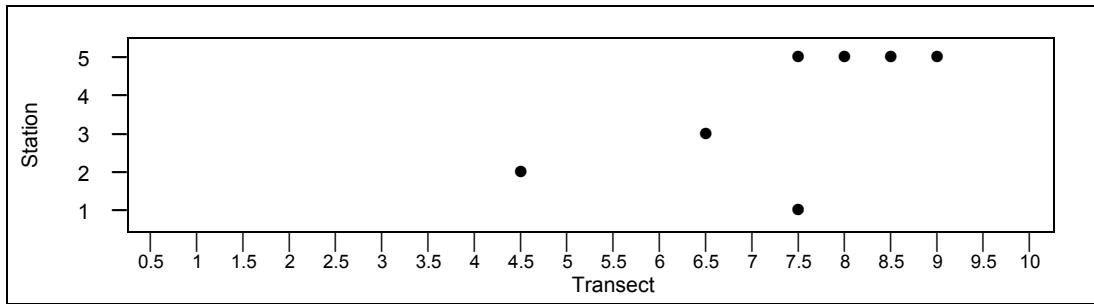


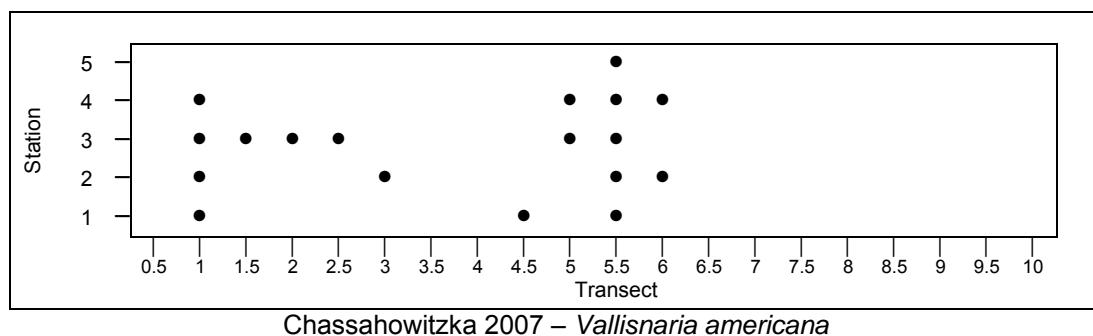
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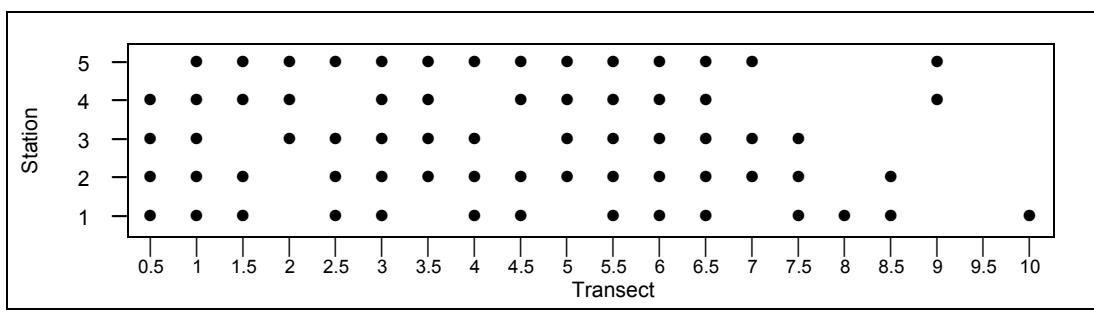


Chassahowitzka 2007 – Filamentous algae

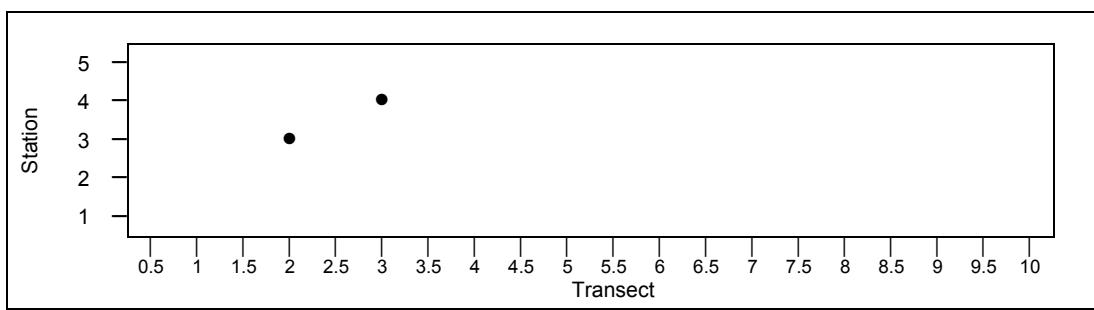
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Chassahowitzka 2007 – *Myriophyllum spicatum*Chassahowitzka 2007 – *Najas guadalupensis*Chassahowitzka 2007 – *Potamogenton pectinatus*Chassahowitzka 2007 – *Ruppia maritima*

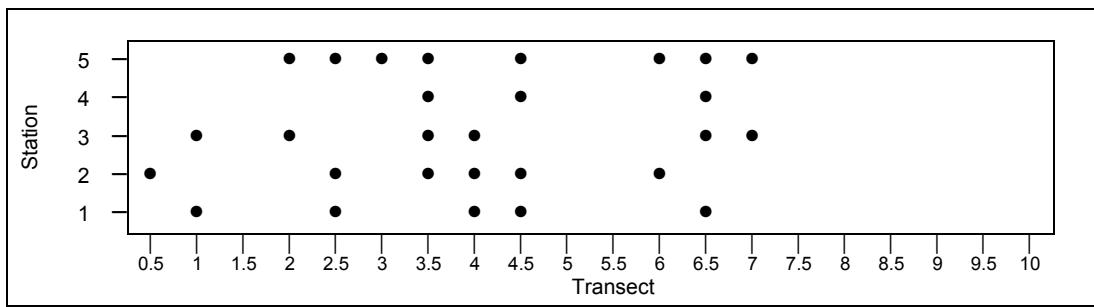




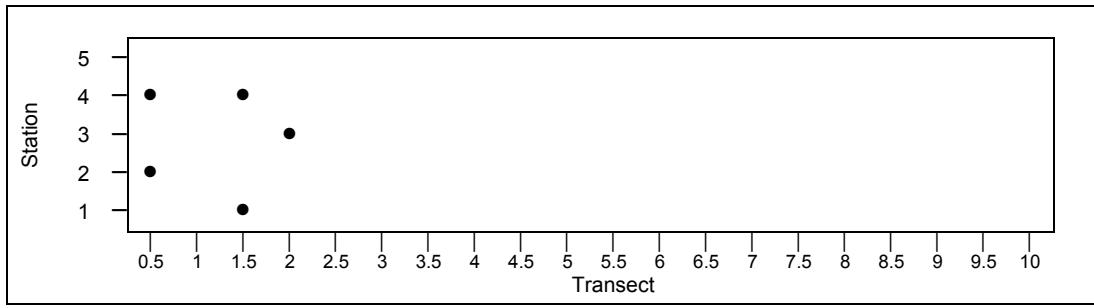
Chassahowitzka 2008 – Submerged Aquatic Vegetation



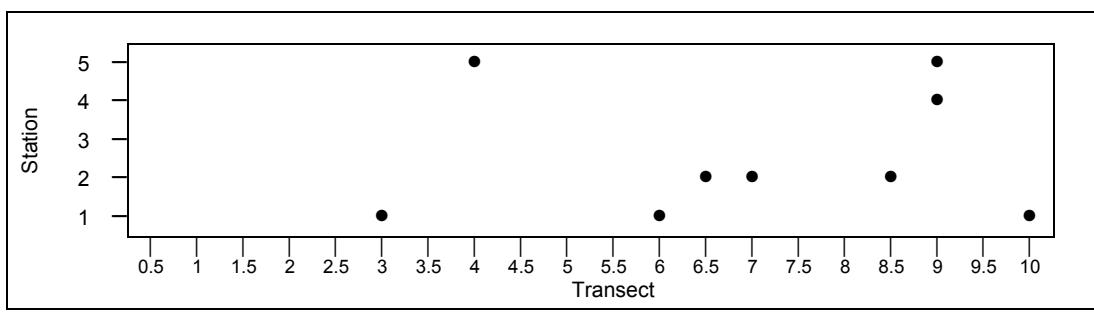
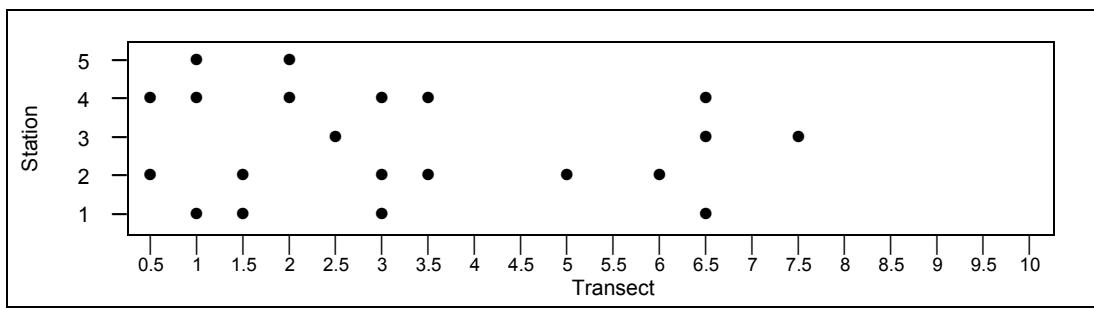
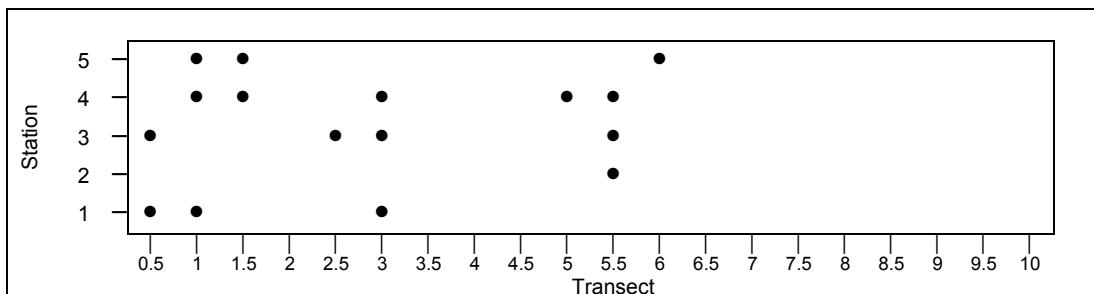
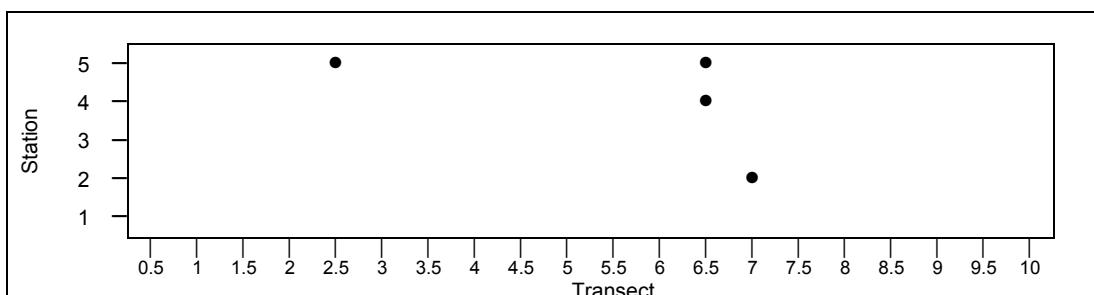
Chassahowitzka 2008 – Chara sp.

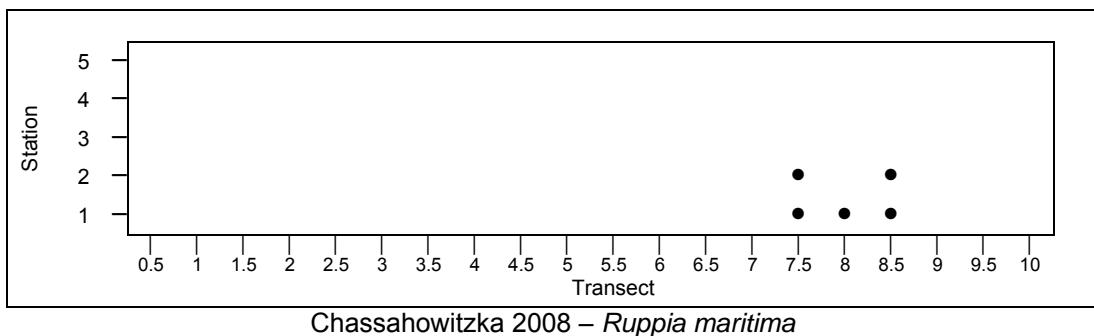


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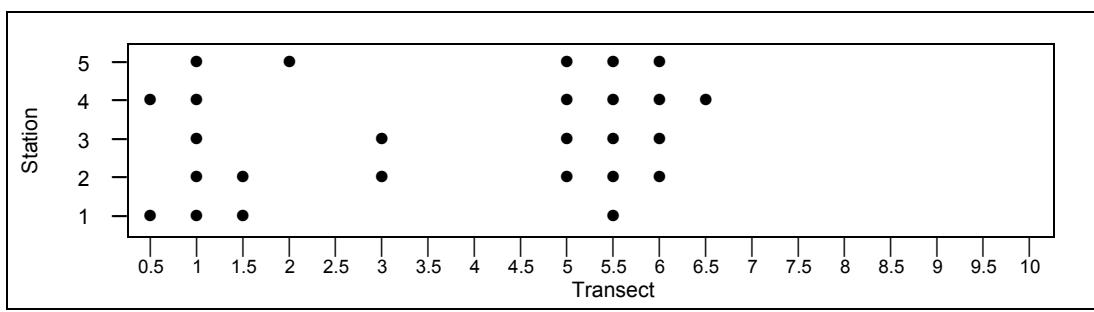


Chassahowitzka 2008 – Hydrilla verticillata

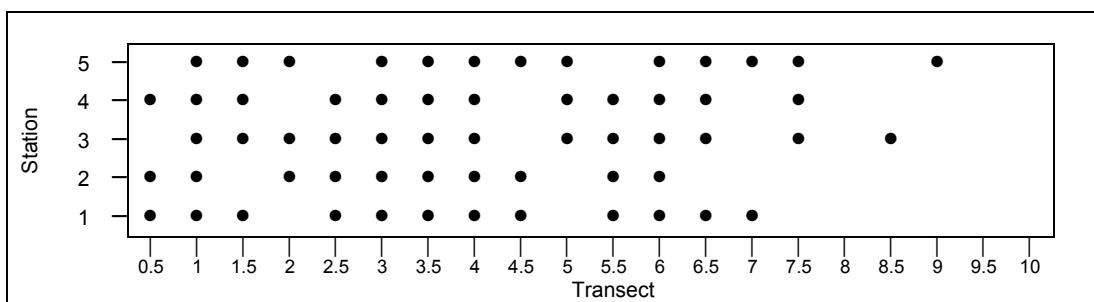
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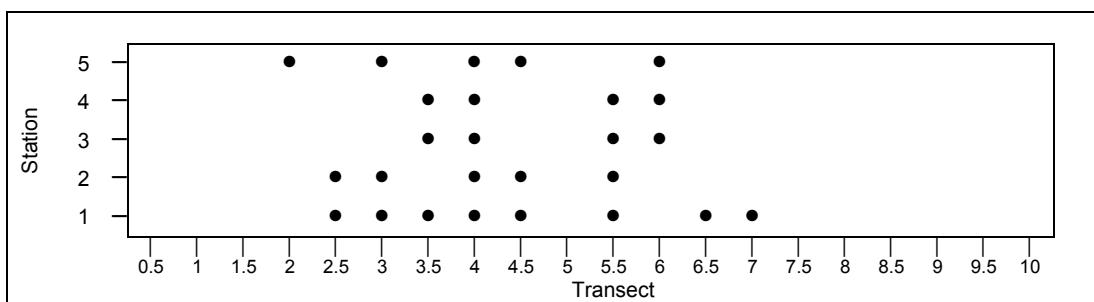
Chassahowitzka 2008 – *Ruppia maritima*



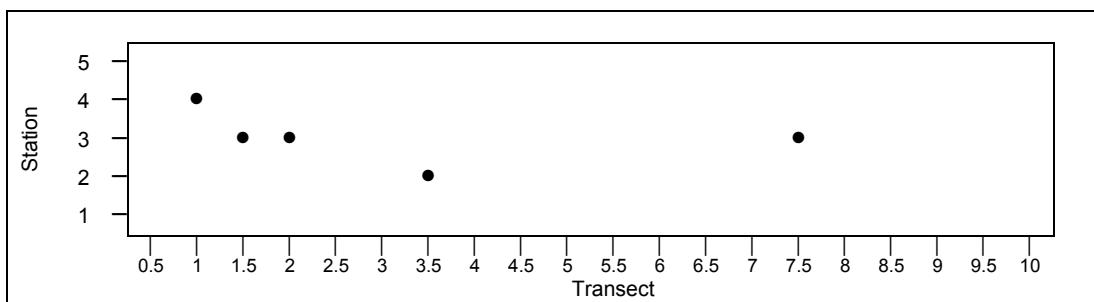
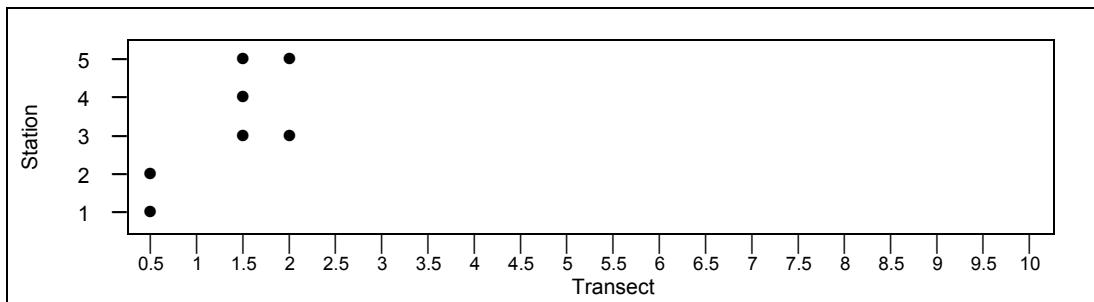
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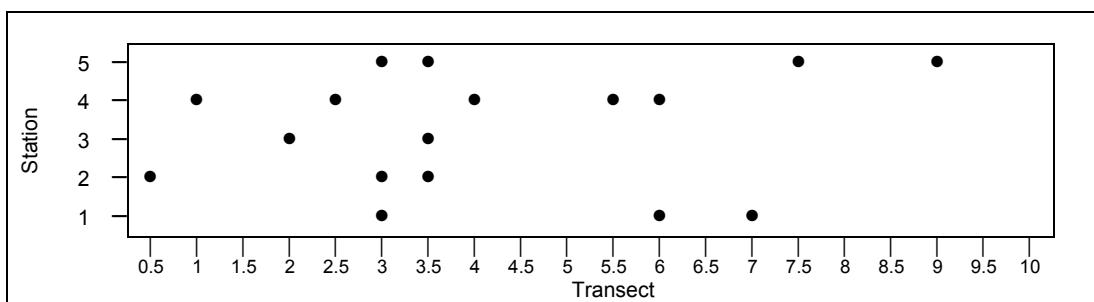
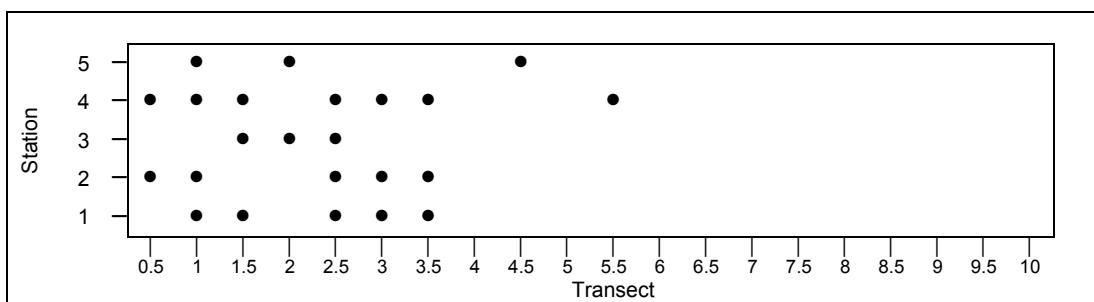
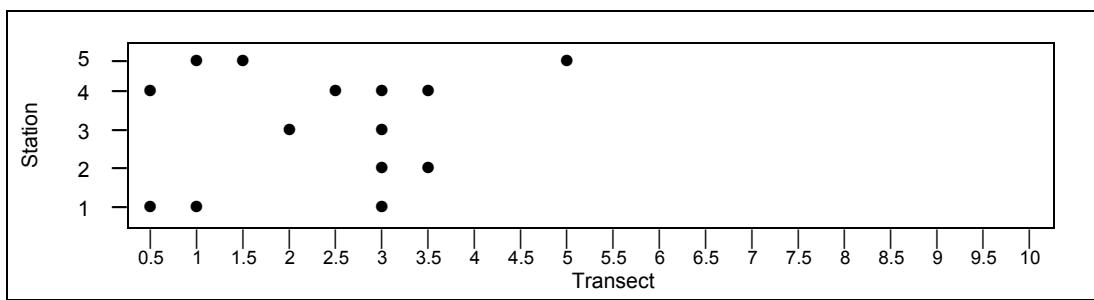
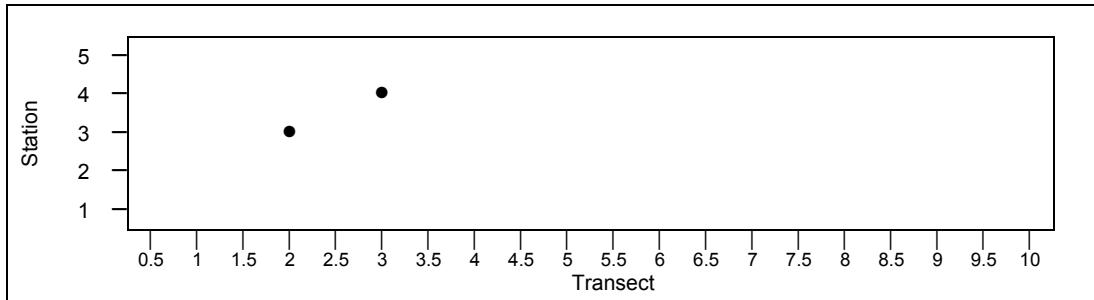


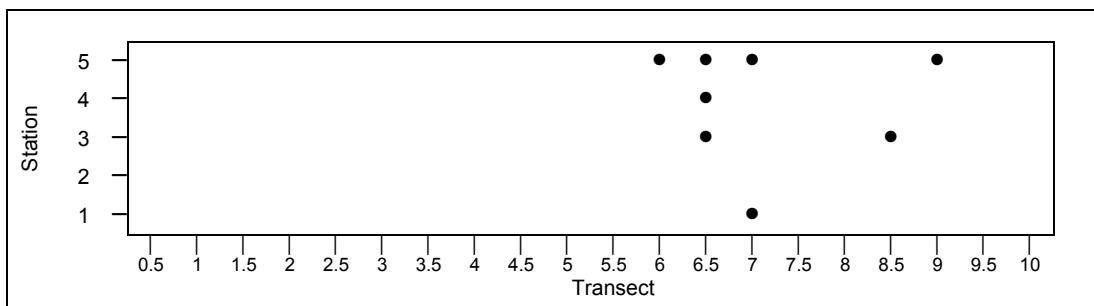
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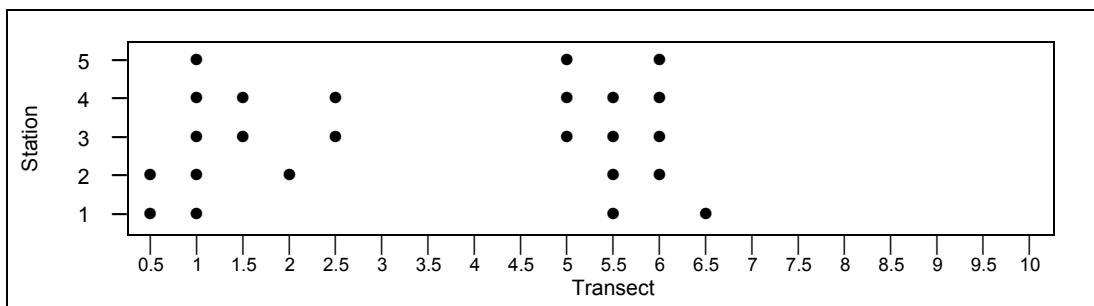
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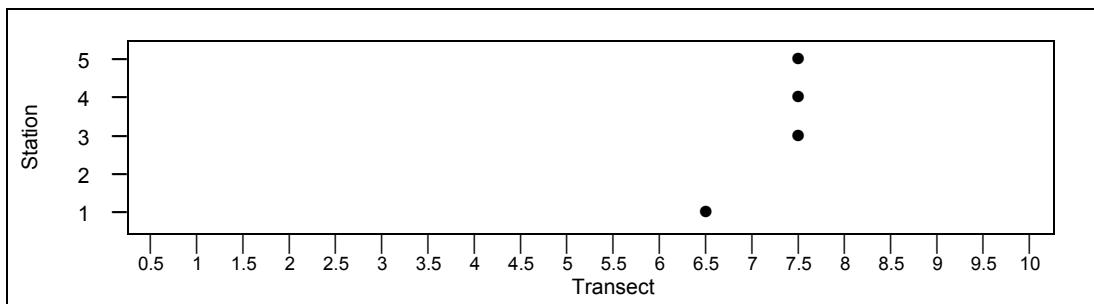
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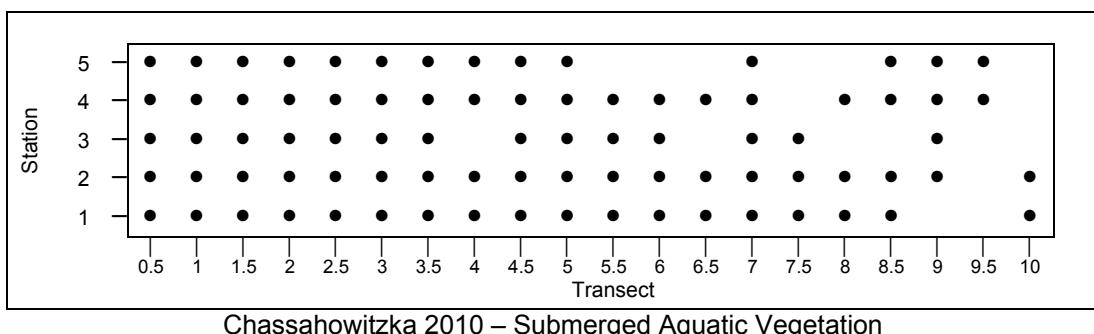
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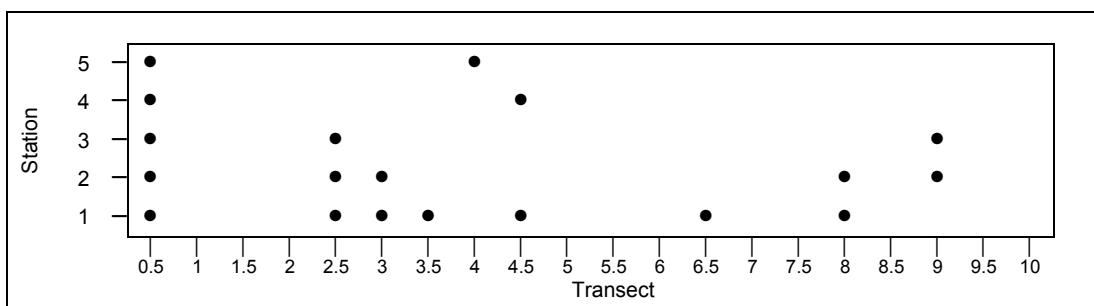
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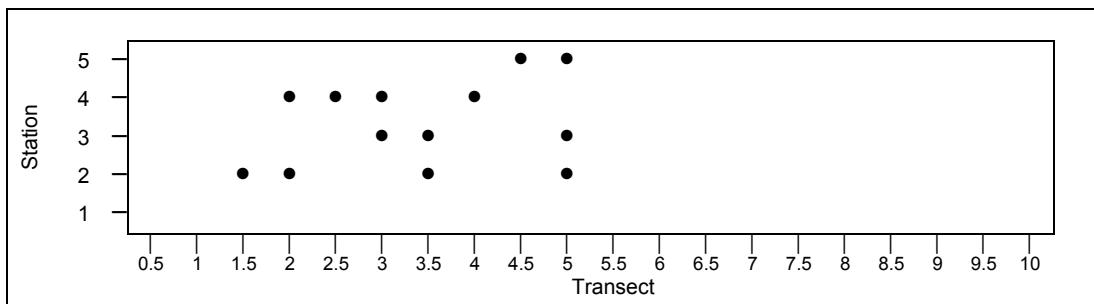
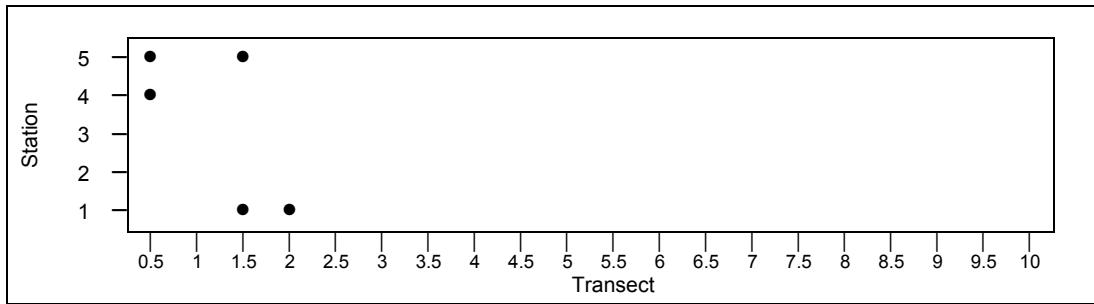
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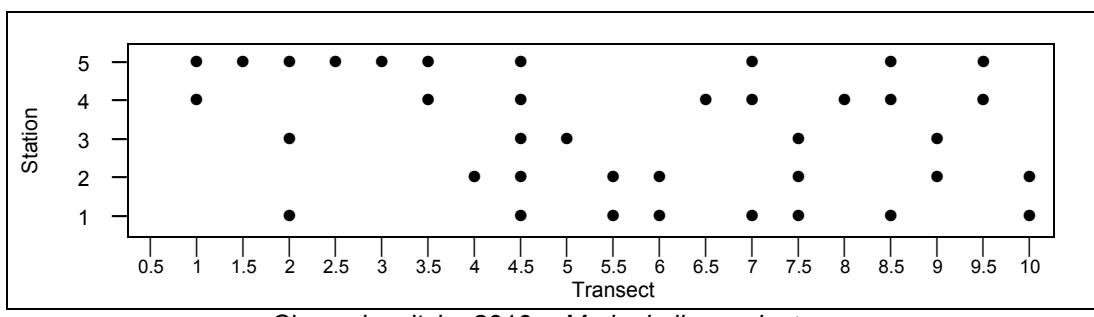
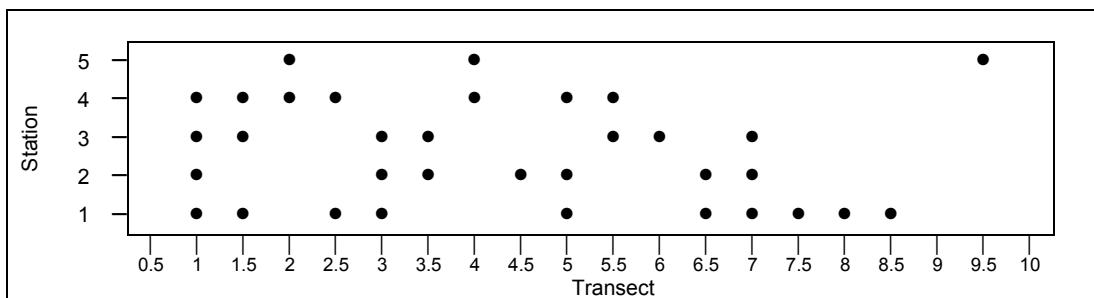
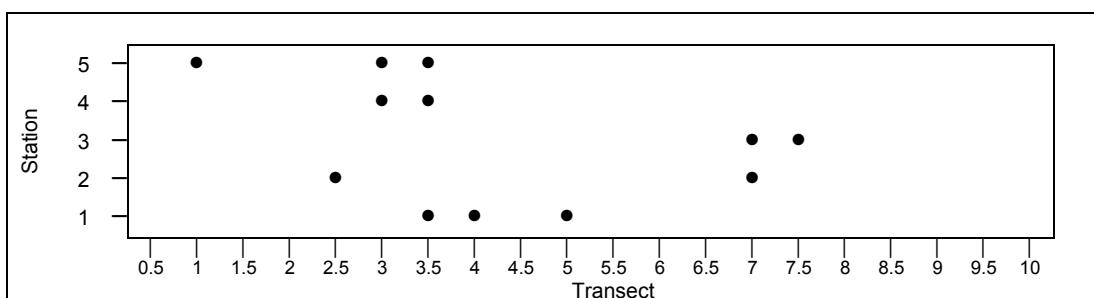
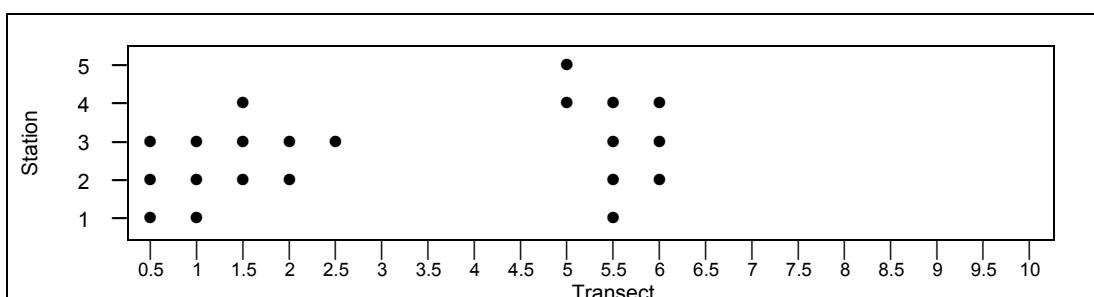


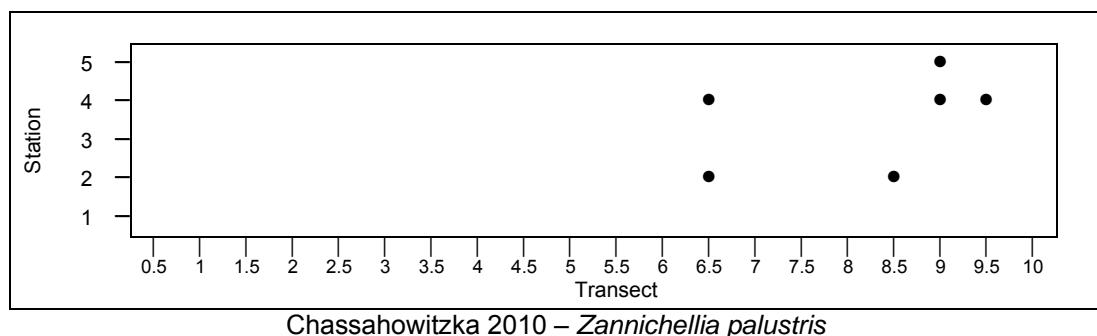
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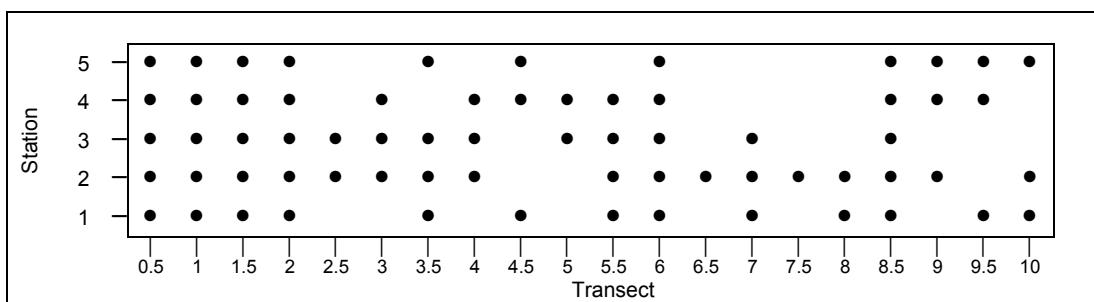


Chassahowitzka 2010 – Filamentous algae

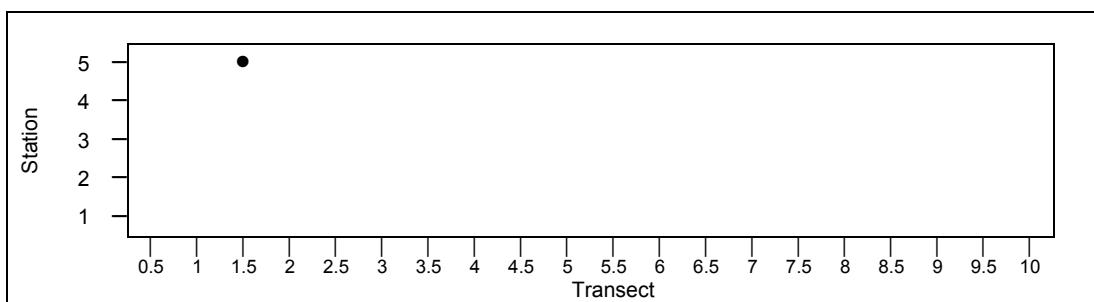
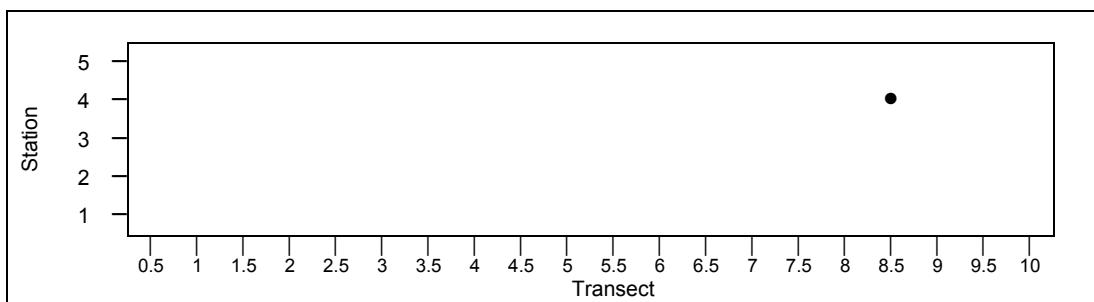
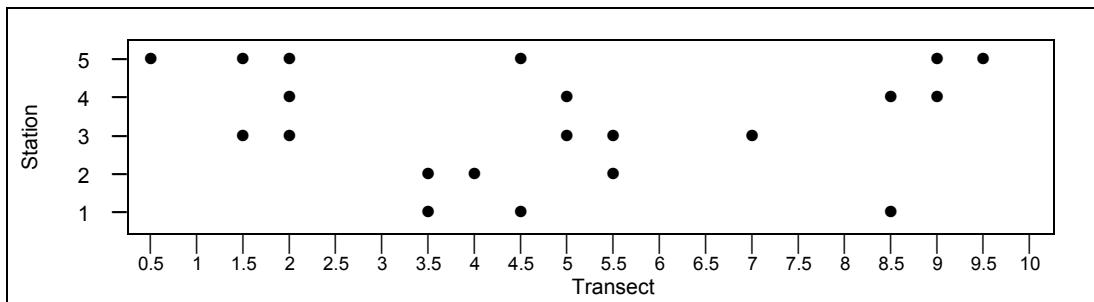
Chassahowitzka 2010 – *Gracilaria* sp.Chassahowitzka 2010 – *Hydrilla verticillata*

Chassahowitzka 2010 – *Myriophyllum spicatum*Chassahowitzka 2010 – *Najas guadalupensis*Chassahowitzka 2010 – *Potamogenton pectinatus*Chassahowitzka 2010 – *Vallisnaria americana*

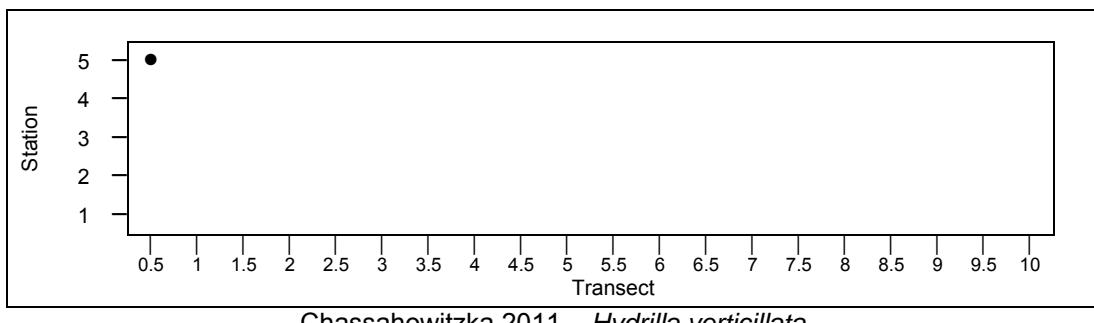
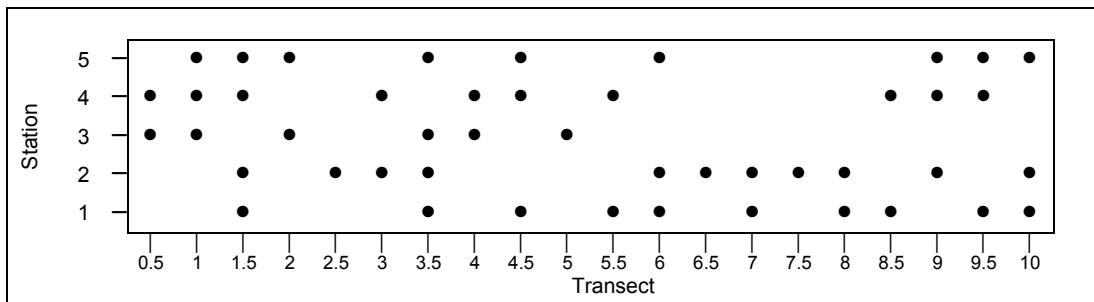
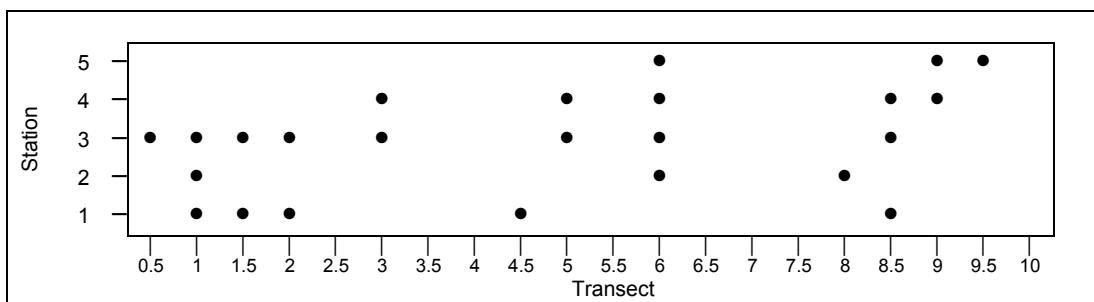
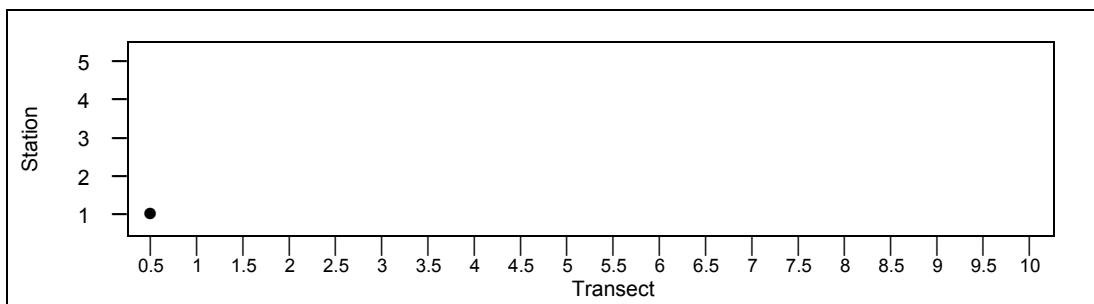


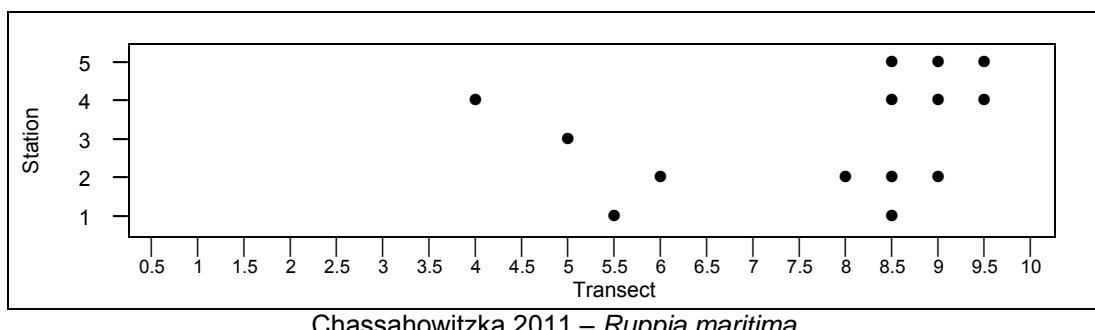


Chassahowitzka 2011 – Submerged Aquatic Vegetation

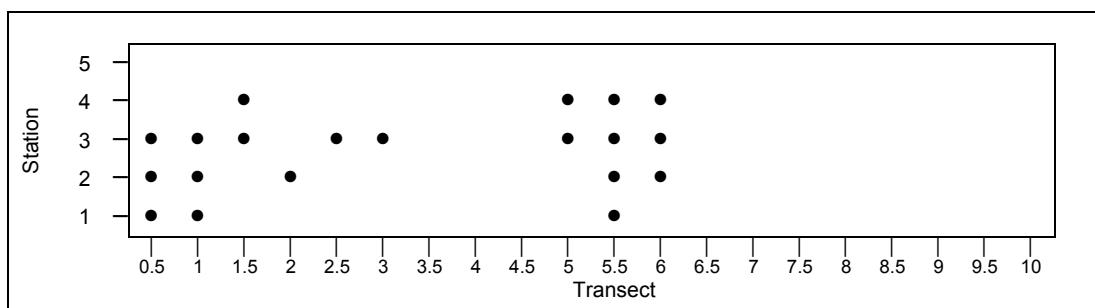
Chassahowitzka 2011 – *Ceratophyllum demersum*Chassahowitzka 2011 – *Chara* sp.

Chassahowitzka 2011 – Filamentous algae

Chassahowitzka 2011 – *Hydrilla verticillata*Chassahowitzka 2011 – *Myriophyllum spicatum*Chassahowitzka 2011 – *Najas guadalupensis*Chassahowitzka 2011 – *Potamogeton pectinatus*



Chassahowitzka 2011 – *Ruppia maritima*



Chassahowitzka 2011 – *Vallisneria americana*

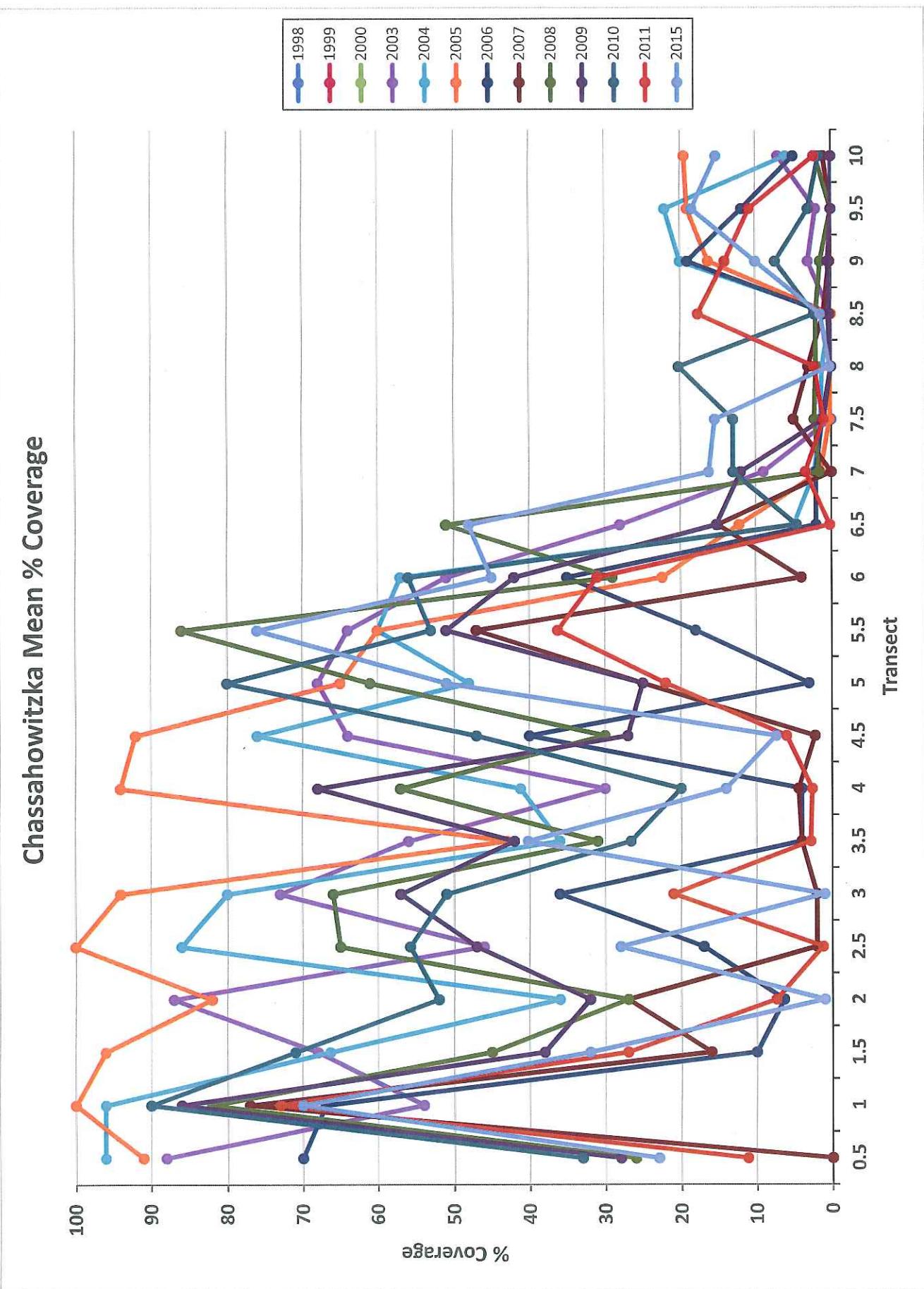
**Period of Record Results – SAV Coverage, SAV Biomass,
Angiosperm Biomass and Macroalgae Biomass**

RIVER	YYYY	TRANSECT	Mean TOTAL SAV COVERAGE (%)	Std Err TOTAL SAV COVERAGE (%)	Mean Total SAV (kg wet wt/m ²)	Std Err Total SAV (kg wet wt/m ²)	Mean Angiosperms (kg wet wt/m ²)	Std Err Angiosperms (kg wet wt/m ²)	Mean Macroalgae (kg wet wt/m ²)	Std Err Macroalgae (kg wet wt/m ²)
Chassahowitzka	1998	0.5			2.52	0.99919968	1.008	0.410930651	1.512	0.654021406
Chassahowitzka	1998	1			2.88	0.74188948	2.312	0.883936649	0.568	0.362524482
Chassahowitzka	1998	1.5			5.48	1.276871176	2.8	0.874070935	2.68	0.773563184
Chassahowitzka	1998	2			3.48	1.205985075	1.36	0.778203058	2.12	0.677052435
Chassahowitzka	1998	2.5			5.24	1.154816003	2.688	1.17292114	2.552	1.02640343
Chassahowitzka	1998	3			2.52	0.560713831	1.56	0.778203058	0.96	0.278567766
Chassahowitzka	1998	3.5			1.296	0.465205331	0.528	0.424716376	0.768	0.301038204
Chassahowitzka	1998	4			1.36	0.401995025	0.8	0.260768096	0.56	0.16
Chassahowitzka	1998	4.5			2.16	0.624179461	1.52	0.387814389	0.64	0.406939799
Chassahowitzka	1998	5			1.84	0.495580468	1.84	0.495580468	0	0
Chassahowitzka	1998	5.5			2.24	0.365513338	2.24	0.365513338	0	0
Chassahowitzka	1998	6			1	0.357770876	0.92	0.30724583	0.08	0.08
Chassahowitzka	1998	6.5			1.712	0.862498696	1.712	0.862498696	0	0
Chassahowitzka	1998	7			1.84	0.604648658	1.7	0.629094588	0.14	0.115585466
Chassahowitzka	1998	7.5			0.76	0.37094474	0.672	0.399879982	0.088	0.069742383
Chassahowitzka	1998	8			0.408	0.39807537	0.408	0.39807537	0	0
Chassahowitzka	1998	8.5			0.012	0.008	0.0088	0.007838367	0.0032	0.0032
Chassahowitzka	1998	9			1.84	0.803492377	1.128	0.679694049	0.712	0.62589456
Chassahowitzka	1998	9.5			0.6808	0.325773909	0.2216	0.119268437	0.4592	0.263409643
Chassahowitzka	1998	10			0.64	0.248193473	0.56	0.172046505	0.08	0.08
Chassahowitzka	1999	0.5			3.12	1.2240915	0.84	0.248193473	2.28	1.240322539
Chassahowitzka	1999	1			1.48	0.344093011	0.96	0.116619038	0.52	0.30724583
Chassahowitzka	1999	1.5			1.376	0.973044706	1.192	0.821346212	0.184	0.154147981
Chassahowitzka	1999	2			2.968	1.271543943	0.488	0.27118997	2.48	1.387587835
Chassahowitzka	1999	2.5			3.52	0.650691939	2.084	0.784	1.436	0.450661736
Chassahowitzka	1999	3			3.62	0.893532316	2.768	1.069740155	0.852	0.505790471
Chassahowitzka	1999	3.5			1.456	0.485402925	1.256	0.54952343	0.2	0.070142712
Chassahowitzka	1999	4			1.34	0.479165942	0.22	0.12	1.12	0.392937654
Chassahowitzka	1999	4.5			1.812	1.085054837	1.552	1.127148615	0.26	0.235116992
Chassahowitzka	1999	5			1.248	0.347424812	1.2072	0.334484807	0.0408	0.039807537
Chassahowitzka	1999	5.5			1.4	0.334664011	1.2392	0.299627502	0.1608	0.159801877
Chassahowitzka	1999	6			2.24	0.60876925	2.24	0.60876925	0	0
Chassahowitzka	1999	6.5			1.0528	0.583167077	1.0352	0.588496933	0.0176	0.01562562
Chassahowitzka	1999	7			0.5648	0.288996609	0.516	0.295664675	0.0488	0.025405511
Chassahowitzka	1999	7.5			0.668	0.344998551	0.464	0.341607962	0.204	0.199037685
Chassahowitzka	1999	8			1.08	0.942528514	0.1152	0.072821975	0.9648	0.958807092
Chassahowitzka	1999	8.5			0.044	0.018330303	0.0432	0.017951045	0.0008	0.0008
Chassahowitzka	1999	9			0.02	0.015491933	0.02	0.015491933	0	0
Chassahowitzka	1999	9.5			0.028	0.023323808	0.012	0.008	0.016	0.016
Chassahowitzka	1999	10			0.104	0.084711274	0.056	0.037629775	0.048	0.048
Chassahowitzka	2000	0.5			0.732	0.523664014	0.204	0.111785509	0.528	0.420218991
Chassahowitzka	2000	1			2.08	0.18547237	1.748	0.213316666	0.332	0.190326036
Chassahowitzka	2000	1.5			2.56	0.526877595	1.4	0.589915248	1.16	0.534415569
Chassahowitzka	2000	2			1.88	0.863110653	1.36	0.913980306	0.52	0.182428068
Chassahowitzka	2000	2.5			2.68	0.909065454	2.18	0.955070678	0.5	0.273056771
Chassahowitzka	2000	3			0.668	0.193452837	0.404	0.167140659	0.264	0.104
Chassahowitzka	2000	3.5			0.456	0.337247684	0.3368	0.315978227	0.1192	0.03522272
Chassahowitzka	2000	4			0.3	0.080249611	0.096	0.051536395	0.204	0.054184869
Chassahowitzka	2000	4.5			1.116	0.240698982	0.732	0.244262154	0.384	0.081584312
Chassahowitzka	2000	5			1.688	0.465342884	1.512	0.466973233	0.176	0.062096699
Chassahowitzka	2000	5.5			2.48	0.886791971	2.308	0.771818632	0.172	0.147051012
Chassahowitzka	2000	6			0.468	0.185752524	0.292	0.090244113	0.176	0.112853888
Chassahowitzka	2000	6.5			0.644	0.589894906	0.564	0.549129237	0.08	0.045166359
Chassahowitzka	2000	7			0.144	0.116344317	0.0008	0.0008	0.1432	0.116388316
Chassahowitzka	2000	7.5			0.08	0.070142712	0.012	0.008	0.068	0.063118935
Chassahowitzka	2000	8			0.016	0.016	0.008	0.008	0.008	0.008
Chassahowitzka	2000	8.5			0.0088	0.007838367	0.0088	0.007838367	0	0
Chassahowitzka	2000	9			0.024	0.01661904	0.016	0.01661904	0.004	0.004
Chassahowitzka	2000	9.5			0.016	0.01661904	0.012	0.01661904	0	0
Chassahowitzka	2000	10			0.012	0.012	0.012	0.012	0	0
Chassahowitzka	2003	0.5	88	4.898979486	1.872	0.313917187	1.5	0.274007299	0.372	0.09329523
Chassahowitzka	2003	1	54	7.483314774	1.192	0.533464151	1.136	0.531842082	0.056	0.021354157
Chassahowitzka	2003	1.5	68	12	1.596	0.145931491	1.076	0.242849748	0.52	0.257060304
Chassahowitzka	2003	2	87	8.306623863	1.7	0.22592034	1.472	0.245161172	0.228	0.185429232
Chassahowitzka	2003	2.5	46	13.54621718	1.1192	0.363219823	0.9392	0.402820854	0.18	0.098386991
Chassahowitzka	2003	3	73	11.5758369	2.296	1.029551359	1.892	1.042220706	0.404	0.254118083
Chassahowitzka	2003	3.5	56	19.39071943	0.6544	0.263407213	0.3944	0.227154925	0.26	0.25502941
Chassahowitzka	2003	4	30	14.83239697	0.112	0.058514955	0.084	0.062096699	0.028	0.023232808
Chassahowitzka	2003	4.5	64	13.26649916	1.172	0.273685951	0.696	0.091956512	0.476	0.286384357
Chassahowitzka	2003	5	68	18.54723699	1.0968	0.301055211	1.0968	0.301055211	0	0
Chassahowitzka	2003	5.5	64	13.6381817	0.88	0.270407101	0.876	0.27191175	0.004	0.004
Chassahowitzka	2003	6	51	10.29563014	0.9	0.360887794	0.9	0.360887794	0	0
Chassahowitzka	2003	6.5	28	11.5758369	0.3368	0.148142634	0.336	0.147702404	0.0008	0.0008
Chassahowitzka	2003	7	9	3.31662479	0.0568	0.041979042	0.0528	0.037997895	0.004	0.004
Chassahowitzka	2003	7.5	0	0	0	0	0	0	0	0
Chassahowitzka	2003	8	0	0	0	0	0	0	0	0
Chassahowitzka	2003	8.5	0	0	0	0	0	0	0	0
Chassahowitzka	2003	9	3	2	0.012	0.008	0.012	0.008	0	0
Chassahowitzka	2003	9.5	2	2	0.024	0.024	0.024	0.024	0	0
Chassahowitzka	2003	10	7	5.830951895	0.0688	0.06297174	0.068	0.063118935	0.0008	0.0008
Chassahowitzka	2004	0.5	96	2.449489743	0.4272	0.105241817	0.0832	0.014772948	0.344	0.100876162
Chassahowitzka	2004	1	96	4	1.6592	1.193657505	1.4872	1.230501296	0.172	0.080894994
Chassahowitzka	2004	1.5	66.4	18.51917925	1.9064	0.729650437	1.6336	0.735765832	0.2728	0.169103046

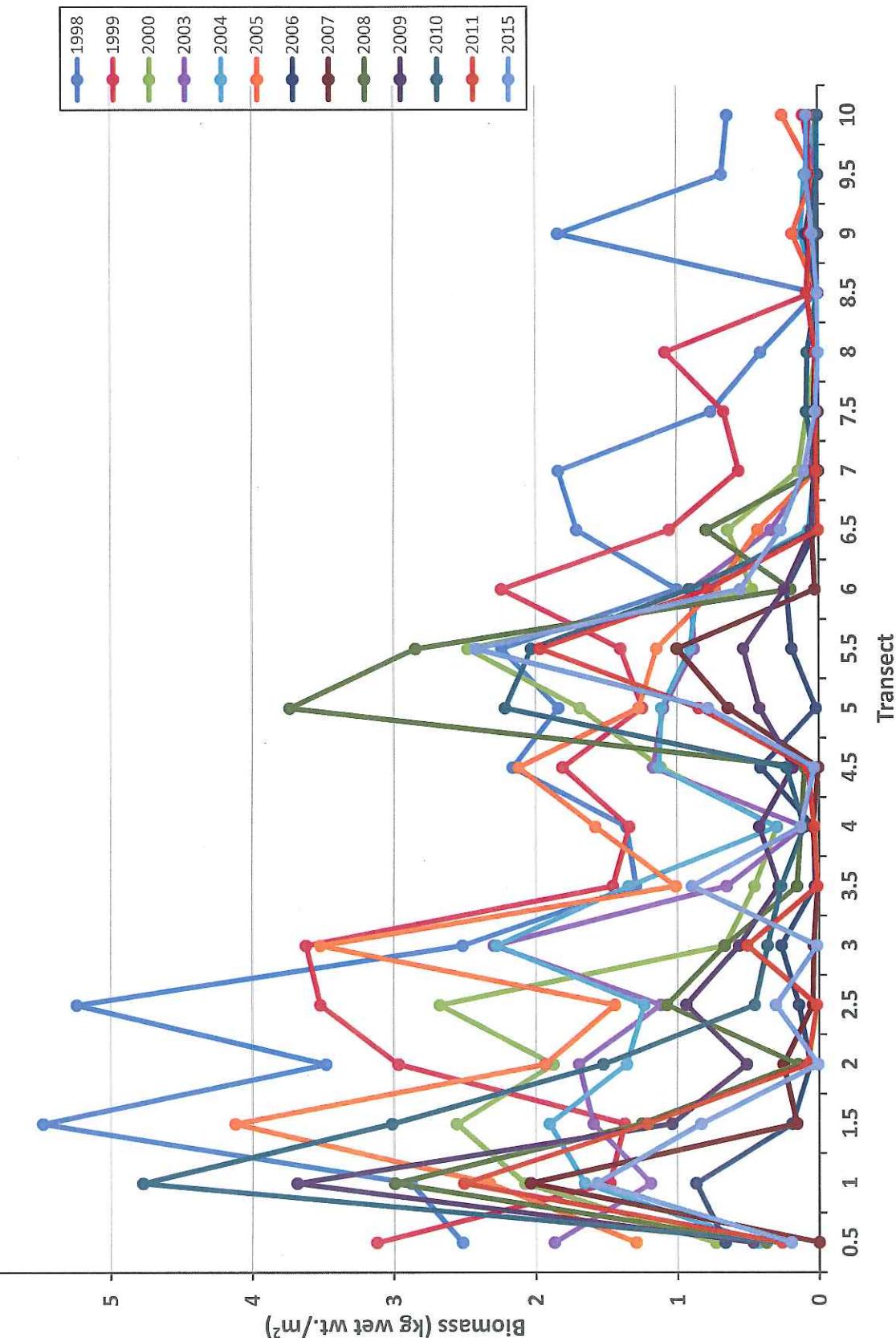
RIVER	YYYY	TRANSECT	Mean TOTAL SAV COVERAGE (%)	Std Err TOTAL SAV COVERAGE (%)	Mean Total SAV (kg wet wt/m ²)	Std Err Total SAV (kg wet wt/m ²)	Mean Angiosperms (kg wet wt/m ²)	Std Err Angiosperms (kg wet wt/m ²)	Mean Macroalgae (kg wet wt/m ²)	Std Err Macroalgae (kg wet wt/m ²)
Chassahowitzka	2004	2	36	13.6381817	1.3616	0.664687114	1.1248	0.515425106	0.2368	0.173442325
Chassahowitzka	2004	2.5	86	14	1.2384	0.469141514	0.7944	0.50648846	0.444	0.095582425
Chassahowitzka	2004	3	80	17.60681686	2.2768	0.891041099	2.1168	0.827073298	0.16	0.070710678
Chassahowitzka	2004	3.5	36	21.41261311	1.3456	0.834216854	1.28	0.808430578	0.0656	0.063606289
Chassahowitzka	2004	4	41.2	24.01957535	0.3032	0.154191569	0.0224	0.01562562	0.2808	0.141140497
Chassahowitzka	2004	4.5	76	11.22497216	1.1296	0.456802102	0.96	0.506558585	0.1696	0.112325242
Chassahowitzka	2004	5	48	10.67707825	1.1096	0.304427594	1.1016	0.298359783	0.008	0.008
Chassahowitzka	2004	5.5	60	13.03840481	0.9064	0.298311515	0.8776	0.284601054	0.0288	0.019324596
Chassahowitzka	2004	6	57	18.94729532	0.8592	0.262191991	0.8568	0.261782811	0.0024	0.0016
Chassahowitzka	2004	6.5	5	3.872983346	0.0704	0.049357472	0.0536	0.034539253	0.0168	0.0168
Chassahowitzka	2004	7	2.2	1.15758369	0.0288	0.02309632	0.028	0.023323808	0.0008	0.0008
Chassahowitzka	2004	7.5	1.4	0.92736185	0.0224	0.020419598	0.0024	0.000979796	0.02	0.02
Chassahowitzka	2004	8	1.2	0.969535972	0.0104	0.009431861	0.0024	0.0016	0.008	0.008
Chassahowitzka	2004	8.5	0	0	0	0	0	0	0	0
Chassahowitzka	2004	9	20	9.354143467	0.124	0.061449166	0.12	0.061967734	0.004	0.004
Chassahowitzka	2004	9.5	22	15.62049935	0.096	0.058787754	0.096	0.058787754	0	0
Chassahowitzka	2004	10	6	2.449489743	0.008	0.003577709	0.0064	0.002993326	0.0016	0.0016
Chassahowitzka	2005	0.5	91	5.567764363	1.296	0.2448183	0.596	0.200439517	0.7	0.233066514
Chassahowitzka	2005	1	100	0	2.328	0.85366504	2	0.961332409	0.328	0.141788575
Chassahowitzka	2005	1.5	96	4	4.12	0.731464285	3.92	0.849941174	0.2	0.122637678
Chassahowitzka	2005	2	82	11.13552873	1.936	0.455429468	1.58	0.41521079	0.356	0.130598622
Chassahowitzka	2005	2.5	100	0	1.444	0.368966123	1.104	0.375787174	0.34	0.046043458
Chassahowitzka	2005	3	94	6	3.52	1.275241154	3.36	1.284741219	0.16	0.087635609
Chassahowitzka	2005	3.5	43	16.55294536	1.0112	0.542340705	0.9224	0.561431884	0.0888	0.078162907
Chassahowitzka	2005	4	94	4	1.58	0.474425969	1.108	0.606023102	0.472	0.166925133
Chassahowitzka	2005	4.5	92	4.898979486	2.1216	0.376173577	2.04	0.412989104	0.0816	0.070217946
Chassahowitzka	2005	5	65	15.65247584	1.2744	0.507652795	1.14	0.549836339	0.1344	0.072493862
Chassahowitzka	2005	5.5	60	8.94427191	1.144	0.357737334	1.124	0.358351783	0.02	0.012649111
Chassahowitzka	2005	6	22.4	11.39122469	0.732	0.420742201	0.732	0.420742201	0	0
Chassahowitzka	2005	6.5	12.2	7.927168473	0.4288	0.310827026	0.4288	0.310827026	0	0
Chassahowitzka	2005	7	1.4	0.979795897	0.0176	0.015676734	0.0176	0.015676734	0	0
Chassahowitzka	2005	7.5	0.2	0.2	0.0008	0.0008	0.0008	0.0008	0	0
Chassahowitzka	2005	8	0	0	0	0	0	0	0	0
Chassahowitzka	2005	8.5	0	0	0	0	0	0	0	0
Chassahowitzka	2005	9	16.2	11.59482643	0.182	0.160199875	0.182	0.160199875	0	0
Chassahowitzka	2005	9.5	19	13.07669683	0.028	0.012	0.02	0.008944272	0.008	0.008
Chassahowitzka	2005	10	19.4	9.075241044	0.252	0.139226434	0.24	0.143805424	0.012	0.012
Chassahowitzka	2006	0.5	70	17.60681686	0.6664	0.228765732	0.0216	0.01505191	0.6448	0.237653193
Chassahowitzka	2006	1	67	14.62873884	0.8696	0.162044932	0.5536	0.060591749	0.316	0.174172329
Chassahowitzka	2006	1.5	10	6.32455532	0.192	0.182164761	0.008	0.008	0.184	0.184
Chassahowitzka	2006	2	6.4	5.9126982	0.0608	0.05496727	0.036	0.031240999	0.0248	0.023812602
Chassahowitzka	2006	2.5	17	15.77973384	0.144	0.116344317	0.024	0.024	0.12	0.12
Chassahowitzka	2006	3	36	22.27105745	0.268	0.225707776	0	0	0.268	0.225707776
Chassahowitzka	2006	3.5	4	1.870828693	0.0296	0.022894541	0.0048	0.003878144	0.0248	0.023812602
Chassahowitzka	2006	4	4	4	0.036	0.036	0.024	0.024	0.012	0.012
Chassahowitzka	2006	4.5	40	7.071067812	0.4128	0.143707481	0.236	0.089755223	0.1768	0.110391304
Chassahowitzka	2006	5	3	2	0.02	0.012649111	0.016	0.009797959	0.004	0.004
Chassahowitzka	2006	5.5	18	4.636809248	0.192	0.064373908	0.16	0.048579831	0.032	0.02059126
Chassahowitzka	2006	6	35	10	0.2288	0.071815319	0.204	0.060133186	0.0248	0.023812602
Chassahowitzka	2006	6.5	2	1.224744871	0.016	0.011661904	0.016	0.011661904	0	0
Chassahowitzka	2006	7	2	2	0.028	0.028	0.0008	0.0008	0.0272	0.0272
Chassahowitzka	2006	7.5	1.2	0.969535972	0.0048	0.003878144	0.0048	0.003878144	0	0
Chassahowitzka	2006	8	0	0	0	0	0	0	0	0
Chassahowitzka	2006	8.5	0.4	0.244948974	0.0048	0.003878144	0.0048	0.003878144	0	0
Chassahowitzka	2006	9	19	14.26534262	0.0888	0.062204823	0.0888	0.062204823	0	0
Chassahowitzka	2006	9.5	11.8	9.58853482	0.0064	0.003487119	0.004	0.001264911	0.0024	0.0024
Chassahowitzka	2006	10	5	1.58113883	0.0088	0.0032	0.008	0.00334664	0.0008	0.0008
Chassahowitzka	2007	0.5	0	0	0	0	0	0	0	0
Chassahowitzka	2007	1	77	15.93737745	2.0376	0.671268173	2.0376	0.671268173	0	0
Chassahowitzka	2007	1.5	16	5.338539126	0.1584	0.084801887	0.1584	0.084801887	0	0
Chassahowitzka	2007	2	27	19.07878403	0.2536	0.156361632	0.1496	0.145616483	0.104	0.104
Chassahowitzka	2007	2.5	2	2	0.0456	0.0456	0.0456	0.0456	0	0
Chassahowitzka	2007	3	2	2	0.0376	0.0376	0.0376	0.0376	0	0
Chassahowitzka	2007	3.5	4	2.449489743	0.0112	0.006974238	0.0096	0.0064	0.0016	0.0016
Chassahowitzka	2007	4	4.4	2.315167381	0.0432	0.032873089	0.0384	0.033480741	0.0048	0.0048
Chassahowitzka	2007	4.5	2.2	1.959591794	0.0032	0.001959592	0.0032	0.001959592	0	0
Chassahowitzka	2007	5	25	14.31782106	0.6408	0.446748968	0.584	0.396302914	0.0568	0.055805376
Chassahowitzka	2007	5.5	47	16.40121947	1.0008	0.431826632	1	0.43219255	0.0008	0.0008
Chassahowitzka	2007	6	4	2.915475947	0.0264	0.023515102	0.0264	0.023515102	0	0
Chassahowitzka	2007	6.5	15	9.486832981	0.0488	0.036538199	0.0344	0.03148587	0.0144	0.008908423
Chassahowitzka	2007	7	0	0	0	0	0	0	0	0
Chassahowitzka	2007	7.5	5	3.872983346	0.0336	0.031637952	0.0216	0.019661129	0.012	0.012
Chassahowitzka	2007	8	3	3	0.0204	0.0204	0.0044	0.0044	0.016	0.016
Chassahowitzka	2007	8.5	1	1	0.0016	0.0016	0.0016	0.0016	0	0
Chassahowitzka	2007	9	0.2	0.2	0.0008	0.0008	0.0008	0.0008	0	0
Chassahowitzka	2007	9.5	0	0	0	0	0	0	0	0
Chassahowitzka	2007	10	1	1	0.004	0.004	0.004	0.004	0	0
Chassahowitzka	2008	0.5	26	12.08304597	0.3768	0.258653127	0.3728	0.258486054	0.004	0.004
Chassahowitzka	2008	1	82	9.16515139	2.9928	1.022521902	2.9592	1.017716188	0.0336	0.020614558
Chassahowitzka	2008	1.5	45	19.10497318	1.2568	0.755154448	1.2568	0.755154448	0	0
Chassahowitzka	2008	2	27	15.13274595	0.152	0.074993333	0.084	0.036	0.068	0.041761226
Chassahowitzka	2008	2.5	65	16.73320053	1.076	0.418779178	0.18	0.156204994	0.896	0.476252034
Chassahowitzka	2008	3	66	10.17349498	0.6688	0.2934441	0.4888	0.322957335	0.18	0.156204994

RIVER	YYYY	TRANSECT	Mean TOTAL SAV COVERAGE (%)	Std Err TOTAL SAV COVERAGE (%)	Mean Total SAV (kg wet wt/m ²)	Std Err Total SAV (kg wet wt/m ²)	Mean Angiosperms (kg wet wt/m ²)	Std Err Angiosperms (kg wet wt/m ²)	Mean Macroalgae (kg wet wt/m ²)	Std Err Macroalgae (kg wet wt/m ²)
Chassahowitzka	2008	3.5	31	13.82027496	0.1568	0.076172436	0.0328	0.031809433	0.124	0.065238026
Chassahowitzka	2008	4	57	22.56102835	0.1304	0.069989714	0.004	0.004	0.1264	0.071661426
Chassahowitzka	2008	4.5	30	17.88854382	0.1016	0.071010985	0	0	0.1016	0.071010985
Chassahowitzka	2008	5	61	23.89560629	3.7328	1.557463271	3.7328	1.557463271	0	0
Chassahowitzka	2008	5.5	86	9.797958971	2.848	0.488	2.848	0.488	0	0
Chassahowitzka	2008	6	29	5.567764363	0.2	0.035777088	0.184	0.034871192	0.016	0.009797959
Chassahowitzka	2008	6.5	51	20.88061302	0.7936	0.603807387	0.1456	0.044156087	0.648	0.579330648
Chassahowitzka	2008	7	1.6	0.92736185	0.0104	0.007547185	0.0016	0.0016	0.0088	0.007838367
Chassahowitzka	2008	7.5	2.2	1.15758369	0.0024	0.000979796	0.0024	0.000979796	0	0
Chassahowitzka	2008	8	2	2	0.0016	0.0016	0.0016	0.0016	0	0
Chassahowitzka	2008	8.5	2	1.224744871	0.0032	0.001959592	0.0032	0.001959592	0	0
Chassahowitzka	2008	9	1.4	0.979795897	0.0064	0.004118252	0.0064	0.004118252	0	0
Chassahowitzka	2008	9.5	0	0	0	0	0	0	0	0
Chassahowitzka	2008	10	2	2	0.02	0.02	0.02	0.02	0	0
Chassahowitzka	2009	0.5	28	18.81488772	0.4688	0.376390011	0.4688	0.376390011	0	0
Chassahowitzka	2009	1	86	8.717797887	3.6824	0.782965236	3.6816	0.783185904	0.0008	0.0008
Chassahowitzka	2009	1.5	38	19.33907961	1.04	0.656812911	1.036	0.656812952	0.004	0.004
Chassahowitzka	2009	2	32	19.33907961	0.5136	0.390864887	0.4672	0.39947846	0.0464	0.028442222
Chassahowitzka	2009	2.5	47	18.94729532	0.9384	0.384026249	0.5944	0.399360689	0.344	0.29213262
Chassahowitzka	2009	3	57	20.46948949	0.5672	0.24154304	0.2056	0.115803972	0.3616	0.149781708
Chassahowitzka	2009	3.5	42	16.62828915	0.284	0.08011991	0.1104	0.044874937	0.1736	0.064691267
Chassahowitzka	2009	4	68	19.59591794	0.4216	0.228506805	0.0008	0.0008	0.4208	0.22884545
Chassahowitzka	2009	4.5	27	19.07878403	0.1848	0.174898371	0.0008	0.0008	0.184	0.174098823
Chassahowitzka	2009	5	25	19.10497318	0.4192	0.283005018	0.4192	0.283005018	0	0
Chassahowitzka	2009	5.5	51	16	0.5328	0.346745786	0.5328	0.346745786	0	0
Chassahowitzka	2009	6	42	11.5758369	0.244	0.063017458	0.1384	0.050748005	0.1056	0.045775102
Chassahowitzka	2009	6.5	15.2	9.409569597	0.0496	0.028526479	0.048	0.027334959	0.0016	0.0016
Chassahowitzka	2009	7	12	9.695359715	0.0328	0.024079867	0.0128	0.008236504	0.02	0.02
Chassahowitzka	2009	7.5	1	0.447213596	0.004	0.001788854	0.0032	0.001496663	0.0008	0.0008
Chassahowitzka	2009	8	0	0	0	0	0	0	0	0
Chassahowitzka	2009	8.5	0.2	0.2	0.0008	0.0008	0.0008	0.0008	0	0
Chassahowitzka	2009	9	0.4	0.4	0.0016	0.0016	0.0016	0.0016	0	0
Chassahowitzka	2009	9.5	0	0	0	0	0	0	0	0
Chassahowitzka	2009	10	0	0	0	0	0	0	0	0
Chassahowitzka	2010	0.5	33	8.306623863	0.2656	0.112161312	0.1448	0.072259532	0.1208	0.052845435
Chassahowitzka	2010	1	90	5.700877126	4.7716	2.03381832	4.77	2.034126446	0.0016	0.0016
Chassahowitzka	2010	1.5	71	18.05547009	3.014	1.24564971	2.9788	1.236711381	0.0352	0.031353469
Chassahowitzka	2010	2	52	12.10371844	1.5264	0.665752927	1.398	0.69991028	0.1284	0.110186025
Chassahowitzka	2010	2.5	55.8	19.06934713	0.456	0.14301888	0.2544	0.127106884	0.2016	0.114553743
Chassahowitzka	2010	3	51	16.53783541	0.3664	0.233497238	0.0784	0.018616122	0.288	0.229137513
Chassahowitzka	2010	3.5	26.6	18.37280599	0.2704	0.234434127	0.0208	0.00496387	0.2496	0.237643767
Chassahowitzka	2010	4	20	11.29158979	0.1056	0.04876498	0.0296	0.02275434	0.076	0.058103356
Chassahowitzka	2010	4.5	47	17.43559577	0.2304	0.11936063	0.1188	0.067780823	0.1116	0.066628522
Chassahowitzka	2010	5	80	18.77498336	2.2148	1.056583475	2.0588	1.083820576	0.156	0.088181631
Chassahowitzka	2010	5.5	53	17.29161647	2.0312	0.741884519	2.0096	0.731126911	0.0216	0.01505191
Chassahowitzka	2010	6	56	15.68438714	0.9152	0.378050579	0.9136	0.377727097	0.0016	0.0016
Chassahowitzka	2010	6.5	4.6	2.767670501	0.0112	0.005388877	0.0096	0.004261455	0.0016	0.0016
Chassahowitzka	2010	7	13	5.991660872	0.0228	0.01254751	0.0212	0.011892855	0.0016	0.000979796
Chassahowitzka	2010	7.5	13	9.507891459	0.084	0.0505049069	0.084	0.0505049069	0	0
Chassahowitzka	2010	8	20.2	15.42854947	0.078	0.067929375	0.0456	0.036432952	0.0324	0.031902351
Chassahowitzka	2010	8.5	2.2	0.860232527	0.008	0.004195235	0.008	0.004195235	0	0
Chassahowitzka	2010	9	7.4	4.501110974	0.0168	0.011892855	0.0136	0.009682975	0.0032	0.002332381
Chassahowitzka	2010	9.5	3	2	0.0084	0.006584831	0.0084	0.006584831	0	0
Chassahowitzka	2010	10	1.6	1.029563014	0.0064	0.004118252	0.0064	0.004118252	0	0
Chassahowitzka	2011	0.5	11.2	3.527038418	0.2648	0.085644848	0.2568	0.090212194	0.008	0.008
Chassahowitzka	2011	1	73	18.68154169	2.508	0.817302881	2.508	0.817302881	0	0
Chassahowitzka	2011	1.5	27	13.92838828	1.2144	0.884893304	1.1504	0.842667764	0.064	0.046647615
Chassahowitzka	2011	2	7.4	1.661324773	0.0816	0.036322996	0.064	0.039048688	0.0176	0.011214277
Chassahowitzka	2011	2.5	1.2	0.969535972	0.0168	0.015818976	0.0168	0.015818976	0	0
Chassahowitzka	2011	3	21	13.0766983	0.508	0.360865626	0.508	0.360865626	0	0
Chassahowitzka	2011	3.5	2.8	1.827566688	0.0104	0.00418252	0.0048	0.001959592	0.0056	0.003919184
Chassahowitzka	2011	4	2.6	1.2489996	0.0344	0.023919866	0.0296	0.024903012	0.0048	0.0048
Chassahowitzka	2011	4.5	6	2.915475947	0.0792	0.053522332	0.0648	0.054323476	0.0144	0.011634432
Chassahowitzka	2011	5	22	15.62049935	0.8472	0.525375904	0.8272	0.512784399	0.02	0.012649111
Chassahowitzka	2011	5.5	36.2	14.36802005	1.9696	0.678041415	1.9056	0.64011199	0.064	0.046647615
Chassahowitzka	2011	6	31	9.797958971	0.7816	0.224644074	0.7816	0.224644074	0	0
Chassahowitzka	2011	6.5	0.2	0.2	0.0016	0.0016	0.0016	0.0016	0	0
Chassahowitzka	2011	7	3.4	1.886796226	0.0184	0.008158431	0.012	0.008	0.0064	0.0064
Chassahowitzka	2011	7.5	1	1	0.016	0.016	0.016	0.016	0	0
Chassahowitzka	2011	8	2.2	1.959519794	0.0224	0.020458739	0.0224	0.020458739	0	0
Chassahowitzka	2011	8.5	17.6	8.89156904	0.0808	0.036821733	0.052	0.01884675	0.0288	0.024113067
Chassahowitzka	2011	9	14	9.407443861	0.0584	0.037128964	0.0416	0.022506888	0.0168	0.015818976
Chassahowitzka	2011	9.5	10.8	9.810198775	0.064	0.039779392	0.032	0.015440207	0.032	0.032
Chassahowitzka	2011	10	2.2	1.15758369	0.072	0.036660606	0.072	0.036660606	0	0
Chassahowitzka	2015	0.5	23	19.33907961	0.1992	0.152904676	0.0288	0.014718696	0.1704	0.151639573
Chassahowitzka	2015	1	70	18.973665956	1.572	0.782670301	1.5688	0.782962603	0.0032	0.0032
Chassahowitzka	2015	1.5	32	17.64936259	0.8336	0.61120288	0.7616	0.571480323	0.072	0.044235732
Chassahowitzka	2015	2	1	1	0.0064	0.0064	0.0064	0.0064	0	0
Chassahowitzka	2015	2.5	28	9.565563235	0.3088	0.173276196	0.2664	0.18514254	0.0424	0.026278508
Chassahowitzka	2015	3	1	1	0.0136	0.0136	0.0136	0.0136	0	0
Chassahowitzka	2015	3.5	40.2	24.41393045	0.8968	0.649382969	0.0408	0.024992799	0.856	0.62563248
Chassahowitzka	2015	4	14	9.407443861	0.1288	0.068403509	0.084	0.053635809	0.0448	0.0258426
Chassahowitzka	2015	4.5	7.4	5.723635209	0.0344	0.025095019	0.0128	0.007088018	0.0216	0.019620398

RIVER	YYYY	TRANSECT	Mean TOTAL SAV COVERAGE (%)	Std Err TOTAL SAV COVERAGE (%)	Mean Total SAV (kg wet wt/m ²)	Std Err Total SAV (kg wet wt/m ²)	Mean Angiosperms (kg wet wt/m ²)	Std Err Angiosperms (kg wet wt/m ²)	Mean Macroalgae (kg wet wt/m ²)	Std Err Macroalgae (kg wet wt/m ²)
Chassahowitzka	2015	5	51	21.23676058	0.7816	0.324065672	0.7608	0.317642315	0.0208	0.015252541
Chassahowitzka	2015	5.5	76	19.39071943	2.424	1.249818547	1.4112	0.460659354	1.0128	0.938282175
Chassahowitzka	2015	6	45	16.88194302	0.5552	0.349681913	0.4568	0.261574922	0.0984	0.091438285
Chassahowitzka	2015	6.5	48	22.44994432	0.268	0.143331783	0.268	0.143331783	0	0
Chassahowitzka	2015	7	16.2	9.58853482	0.1048	0.092963649	0.1048	0.092963649	0	0
Chassahowitzka	2015	7.5	15.4	9.335952014	0.0192	0.00852291	0.0184	0.008818163	0.0008	0.0008
Chassahowitzka	2015	8	0.2	0.2	0.0008	0.0008	0.0008	0.0008	0	0
Chassahowitzka	2015	8.5	1.4	0.979795897	0.0056	0.003919184	0.004	0.003098387	0.0016	0.000979796
Chassahowitzka	2015	9	10	4.472135955	0.0408	0.019935897	0.0392	0.019895728	0.0016	0.000979796
Chassahowitzka	2015	9.5	18.4	15.50677271	0.0832	0.070658616	0.0816	0.069978282	0.0016	0.000979796
Chassahowitzka	2015	10	15.2	9.140021882	0.0784	0.05213214	0.0264	0.024416388	0.052	0.052

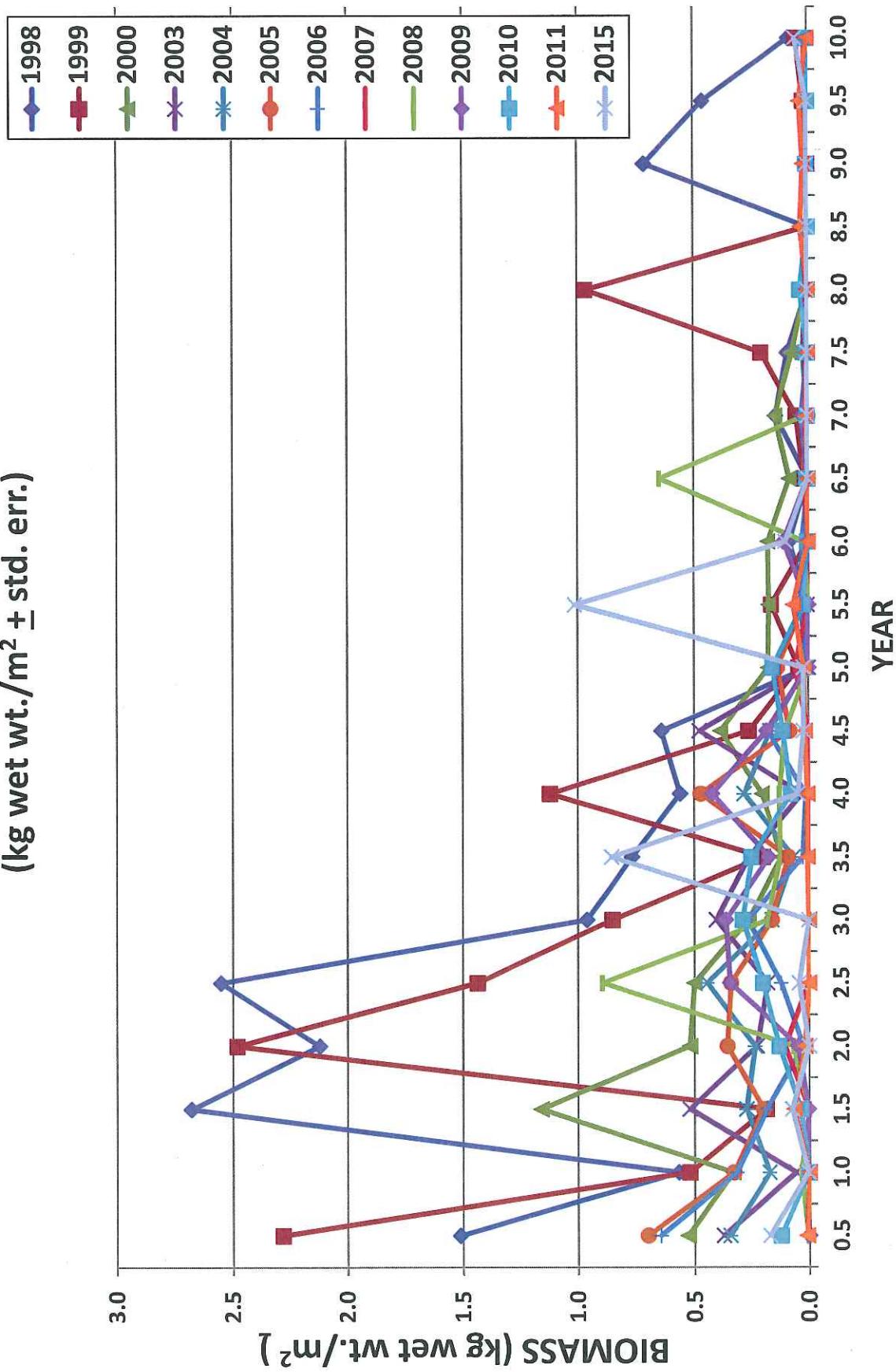


Chassahowitzka Mean SAV Biomass

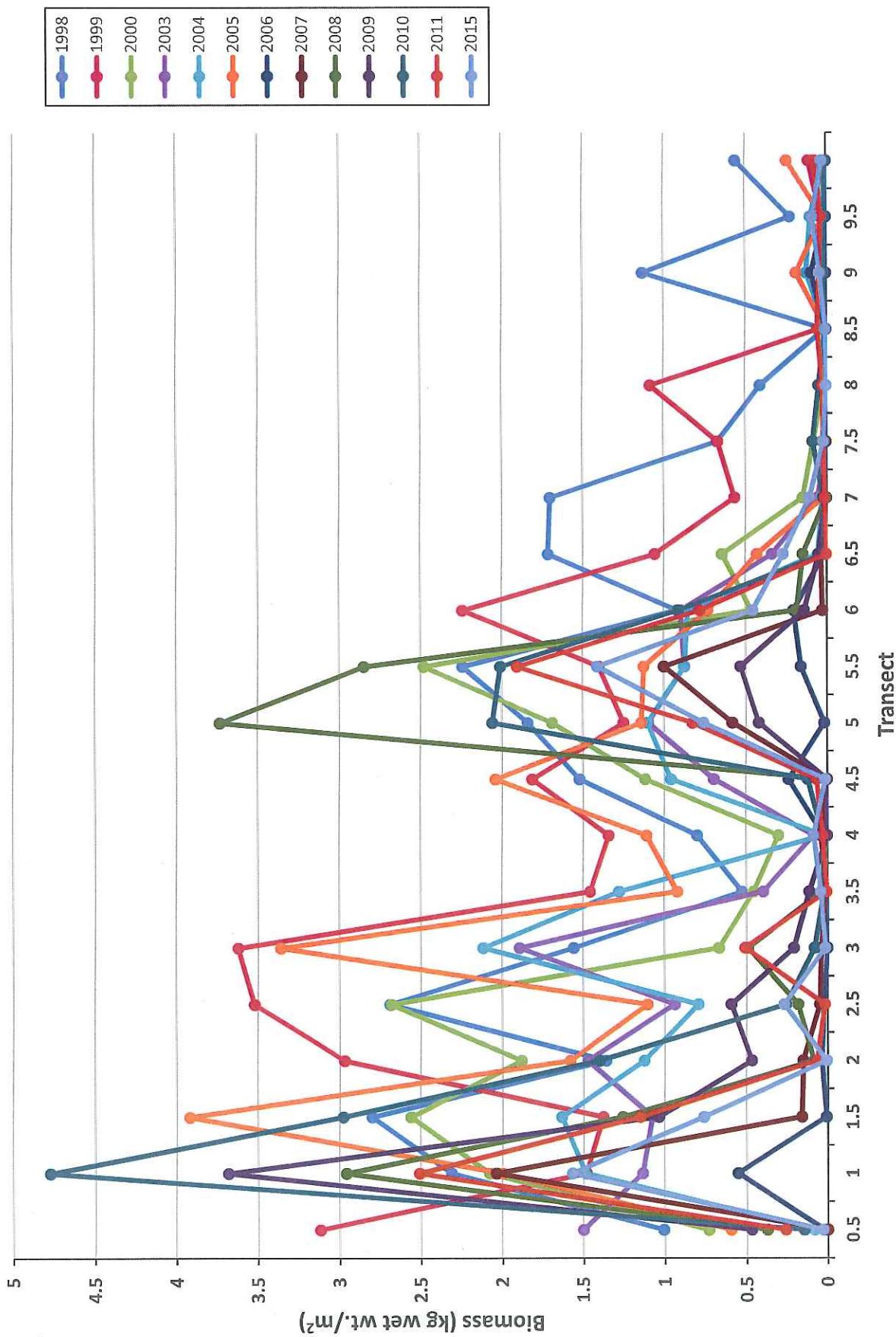


CHASSAHOWITZKA AVERAGE MACROALGAE BIOMASS

(kg wet wt./m² ± std. err.)



Chassahowitzka Mean Angiosperm Biomass

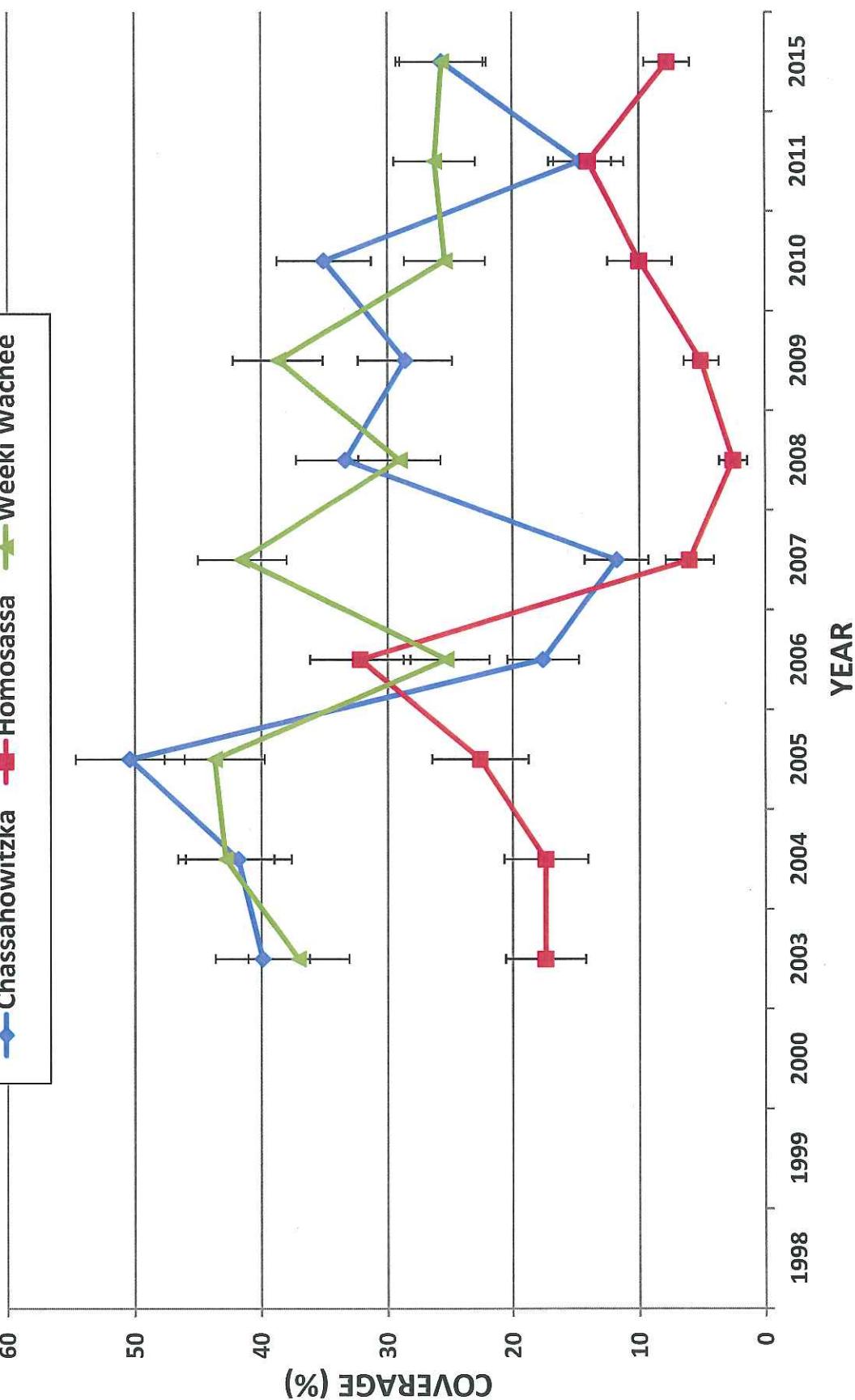


**Period of Record Summaries comparing the three (3) rivers –
Chassahowitzka, Homosassa and Weeki Wachee.**

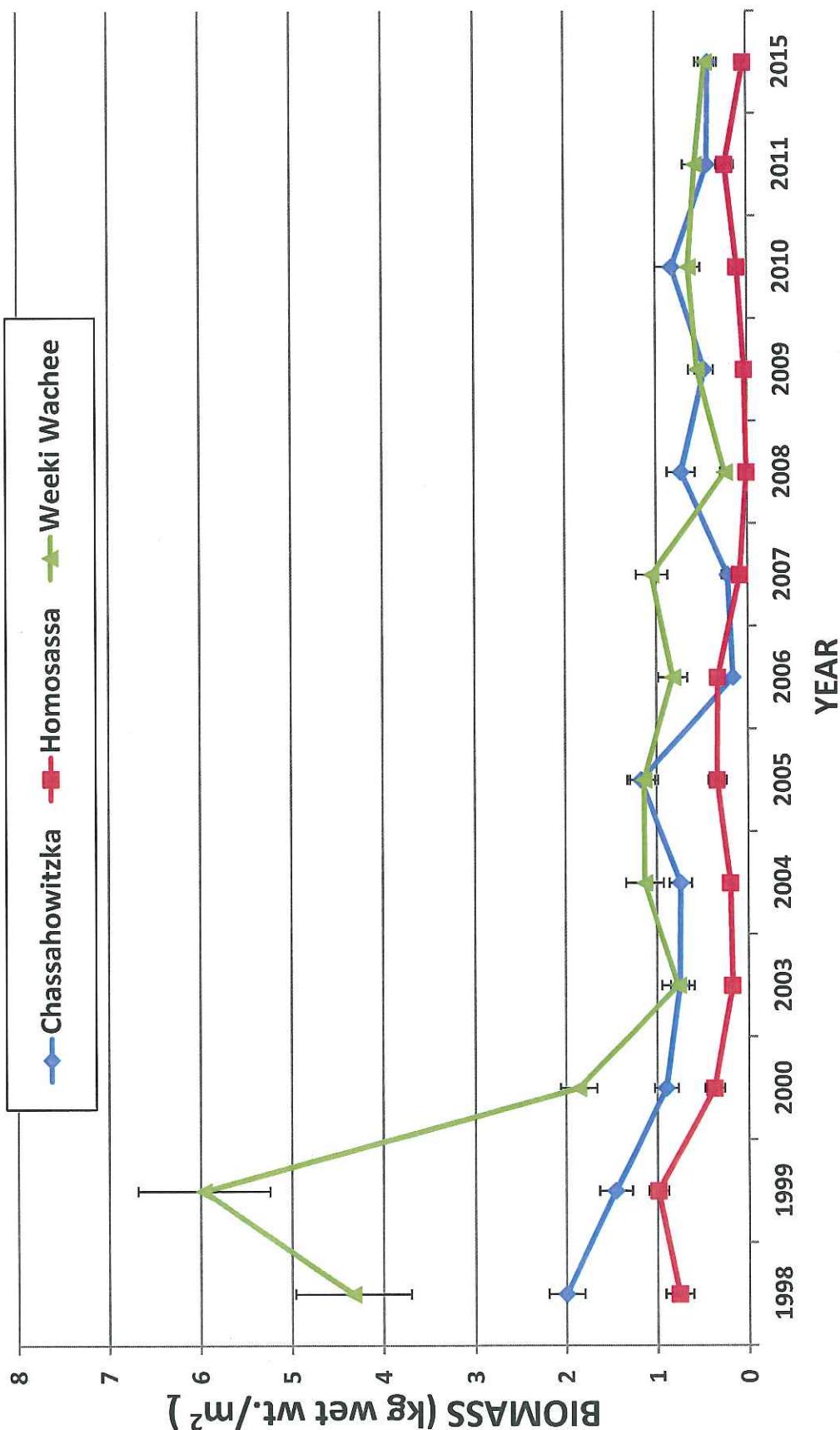
<u>RIVER</u>	<u>YEAR</u>	<u>Mean TOTAL SAV COVERAGE (%)</u>	<u>Std Err TOTAL SAV COVERAGE (%)</u>	<u>Mean Total SAV (kg wet wt/m²)</u>	<u>Std Err Total SAV (kg wet wt/m²)</u>	<u>Mean Angiosperms (kg wet wt/m²)</u>	<u>Std Err Angiosperms (kg wet wt/m²)</u>	<u>Mean Macroalgae (kg wet wt/m²)</u>	<u>Std Err Macroalgae (kg wet wt/m²)</u>
Chassahowitzka	1998			1.9954	0.1997	1.2993	0.1440	0.6961	0.1193
Chassahowitzka	1999			1.4571	0.1752	0.9154	0.1298	0.5417	0.1270
Chassahowitzka	2000			0.9026	0.1283	0.6607	0.1138	0.2419	0.0462
Chassahowitzka	2003	39.9	3.7376	0.7544	0.0972	0.6278	0.0883	0.1267	0.0315
Chassahowitzka	2004	41.82	4.1862	0.7442	0.1200	0.6324	0.1151	0.1118	0.0210
Chassahowitzka	2005	50.39	4.3000	1.1708	0.1512	1.0258	0.1496	0.1450	0.0264
Chassahowitzka	2006	17.59	2.8449	0.1639	0.0312	0.0708	0.0149	0.0931	0.0256
Chassahowitzka	2007	11.79	2.4991	0.2184	0.0644	0.2079	0.0636	0.0105	0.0060
Chassahowitzka	2008	33.36	3.8706	0.7265	0.1499	0.6162	0.1476	0.1103	0.0419
Chassahowitzka	2009	28.59	3.7548	0.4693	0.1007	0.3861	0.1001	0.0832	0.0242
Chassahowitzka	2010	35.02	3.7419	0.8202	0.1792	0.7486	0.1795	0.0715	0.0198
Chassahowitzka	2011	14.64	2.4720	0.4325	0.0983	0.4184	0.0963	0.0141	0.0042
Chassahowitzka	2015	25.67	3.6090	0.4178	0.1022	0.2978	0.0703	0.1200	0.0584

SAV COVERAGE (% , avg. \pm std. err.)

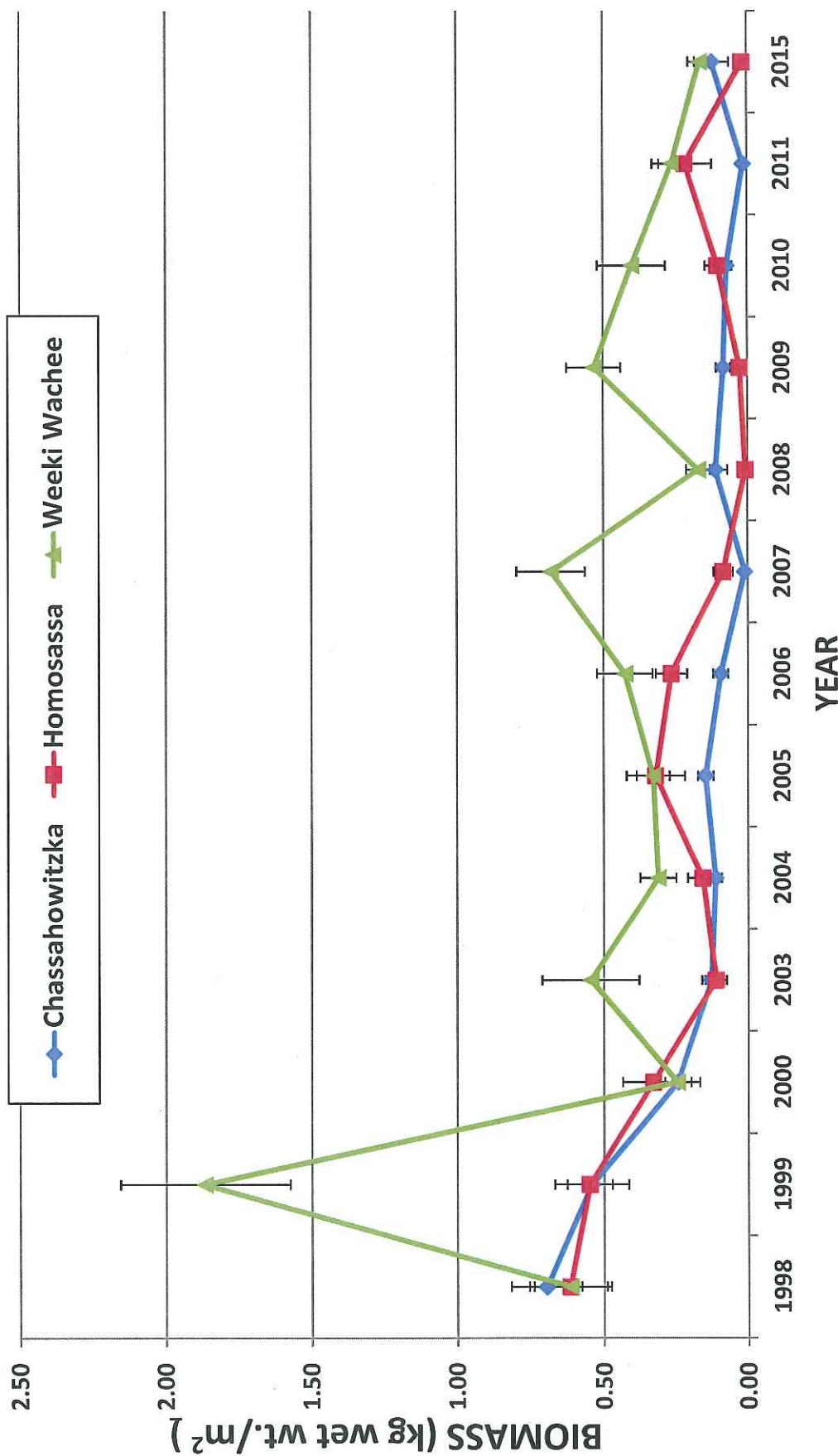
Chassahowitzka — Homosassa — Weeki Wachee



AVERAGE SAV BIOMASS (kg wet wt./m² \pm std. err.)



AVERAGE MACROALGAE BIOMASS (kg wet wt./m² \pm std. err.)



AVERAGE ANGIOSPERM BIOMASS
(kg wet wt./m² \pm std. err.)

