James River Chlorophyll Study
2011, 2012

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Objectives

Determine the composition and abundance of phytoplankton present in water samples provided by participants in the James River Chlorophyll study.

Make available appropriate data sets and pertinent results coming from this analysis.

James River Water Samples: 2011

Hampton Roads Sanitation District
267 samples

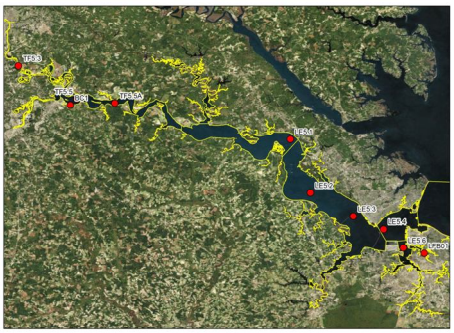
Virginia Commonwealth University
39 samples

Hopewell Regional Waste Water Treatment Facility.
8 samples

Others (VDEQ, VDH, ODU)
22 samples

Total water samples analyzed 2011 = 336

2011 Fixed Station Locations



General Summary

- Blooms occurred between April and October.
- The chlorophyll 15 ug/L level, proved an appropriate alert level to begin sampling for bloom presence and development
- Blooms were dominated by dinoflagellates in the lower James, and cyanobacteria in the upper James.
- Blooms continued to be produced by both non- HAB and HAB taxa.

Potential Bloom Producers

1. Lower James River: Mainly Dinoflagellates, with diatoms the common background taxa.

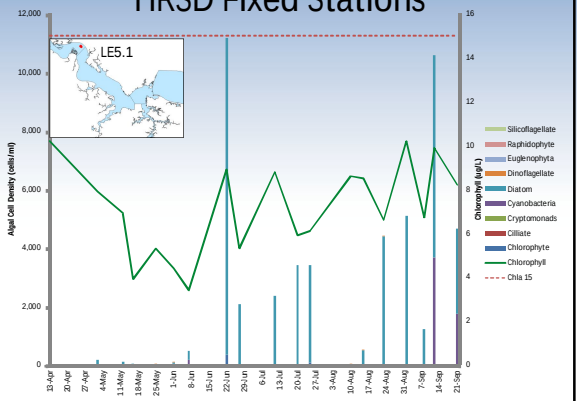
Akashiwo sanguinea, Cochlodinium polykrikoides, Heterocapsa rotundata, Heterocapsa triquetra, Karlodinium veneficum, Prorocentrum minimum, and *Scrippsiella trochoidea*.

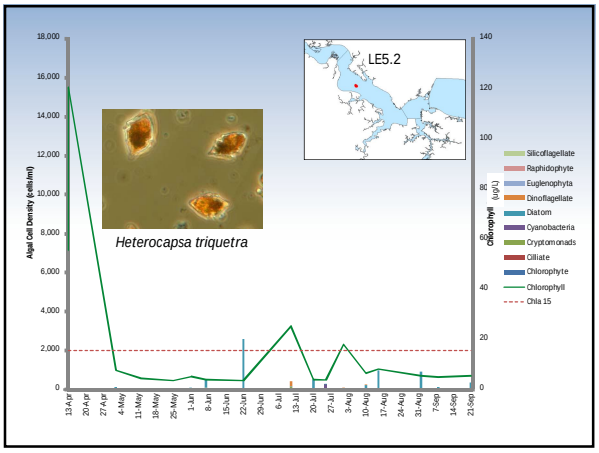
2. Upper James River: A composite of cyanobacteria, with diatoms and chlorophytes common background species. Potential bloomers include: *Anabaenopsis elenkinii, Limnothrix redekei, Microcystis aeruginosa*, and *Pseudanabaena limnetica.*

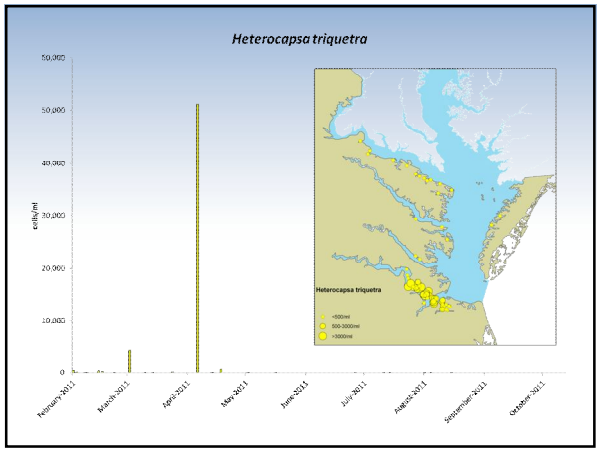
Species/Chlorophyll Relationships

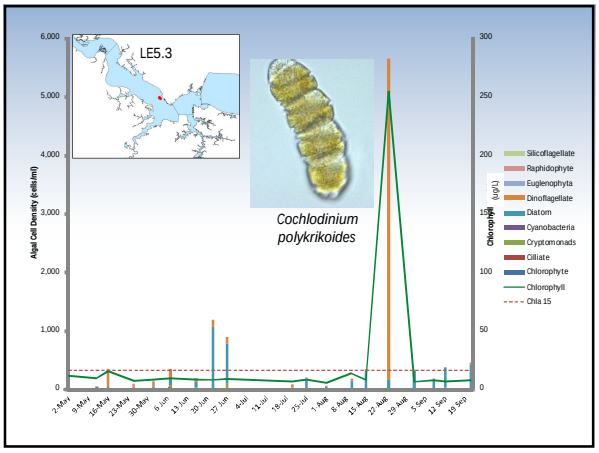
- Review of 2011 Results From the Lower James River Stations
- Present data assessment of 2012 Hampton Roads Sanitation District James Rivier sample analysis to date

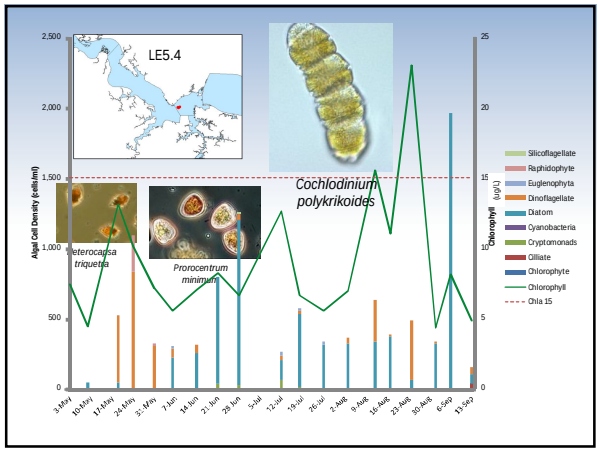
HRSD Fixed Stations

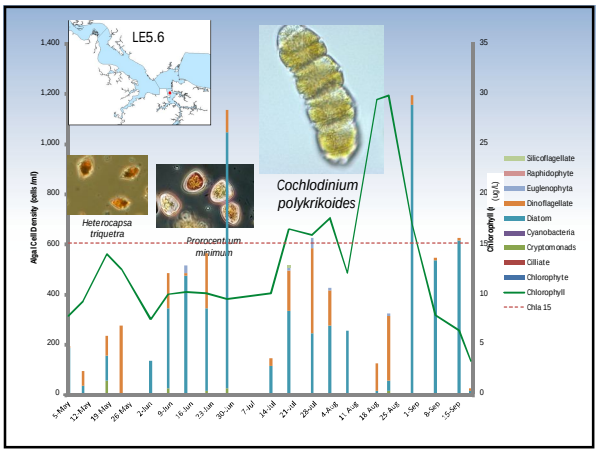


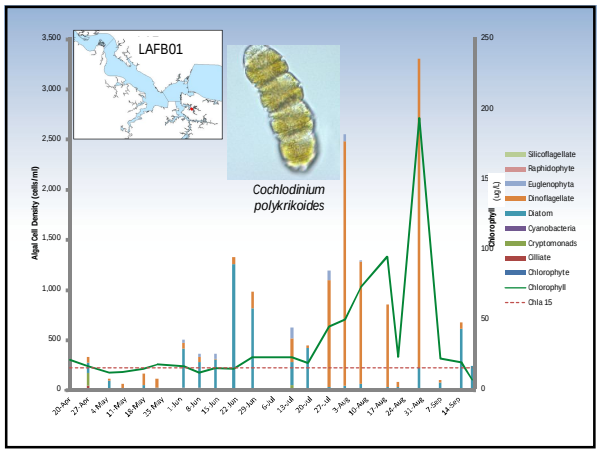


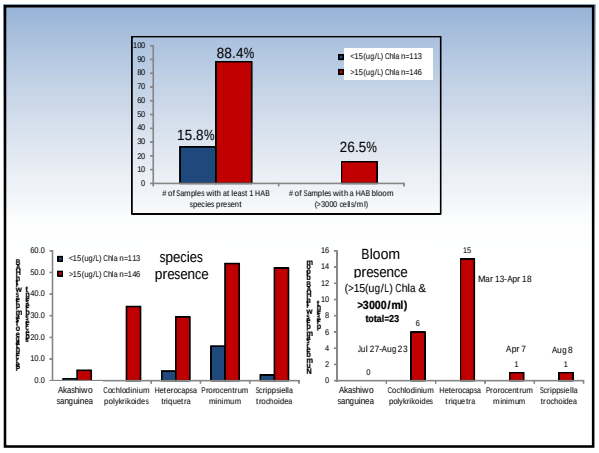


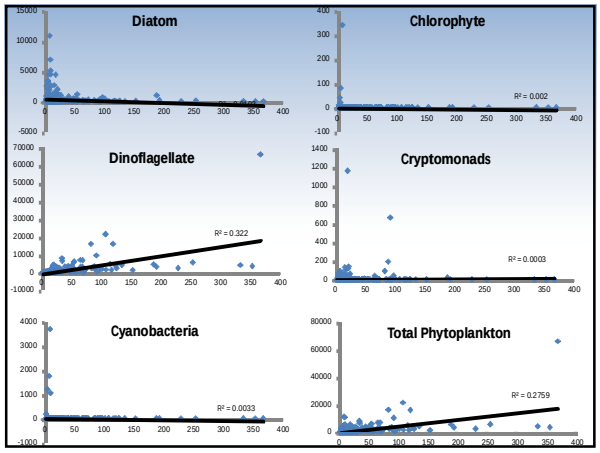












Species	Group	max	min	mean	stdev	correllation with chlorophyll	Code
Cochlodinium polykrikoides	Dinoflagellate	4350	0	205.6371	682.1812	**0.570815207**	Coch_polykr
Dinoflagellate (unid.)	Dinoflagellate	2900	0	92.08494	360.9971	**0.460719083**	Dino_(unid.
Heterocapsa triquetra	Dinoflagellate	65940	0	689.5753	4439.477	**0.415097292**	Hete_trique
Ceratium furca	Dinoflagellate	70	0	0.617761	5.01979	**0.296819504**	Cera_furca
Prorocentrum micans	Dinoflagellate	150	0	5.096525	14.63676	**0.22019329**	Pror_micans
Gymnodinium sp.	Dinoflagellate	1000	0	27.99228	112.2248	**0.186754292**	Gymn_sp.1
Euglena sp.	Euglenophyta	160	0	8.185328	25.53665	**0.160133122**	Eugl_sp.
Scrippsiella trochoidea	Dinoflagellate	20250	0	166.2934	1277.518	**0.139191912**	Scri_trocho
Thalassionema nitzschioides	Diatom	780	0	14.67181	70.60226	**0.125300365**	Thal_nitzsc
Heterocapsa rotundata	Dinoflagellate	9300	0	81.31274	639.1266	**0.086214103**	Hete_rotund
Odontella mobiliensis	Diatom	30	0	0.23166	2.317862	**0.066285032**	Odon_mobili
Diplopsalis lenticula	Dinoflagellate	30	0	0.27027	2.39596	**0.057280916**	Dipl_lentic
Chaetoceros decipens	Diatom	220	0	2.895753	21.70344	**0.041432581**	Chae_decipe
Akashiwo sanguinea	Dinoflagellate	710	0	5.366795	51.10561	**0.035402066**	Akas_sanqui
Ceratulina pelagica	Diatom	80	0	1.388961	8.188575	**0.028841407**	Cera_pelagi
Ditylum brightwellii	Diatom	20	0	0.19305	1.635777	**0.019178801**	Dity_bright
Cryptomonas sp.	Cryptomonads	1160	0	13.66795	85.32236	**0.017222081**	Cryp_sp.
Dinophysis punctata	Dinoflagellate	10	0	0.07722	0.877045	**0.015655925**	Dino_puncta
Eutreptia lanowii	Euglenophyta	890	0	4.826255	56.69404	**0.011132904**	Eutr_lanowi
Chaetoceros sp.	Diatom	180	0	3.397683	18.5533	**0.008205083**	Chae_sp.
Prorocentrum minimum	Dinoflagellate	3780	0	44.78764	263.0741	**0.004197783**	Pror_minimu

2012 James River monitoring

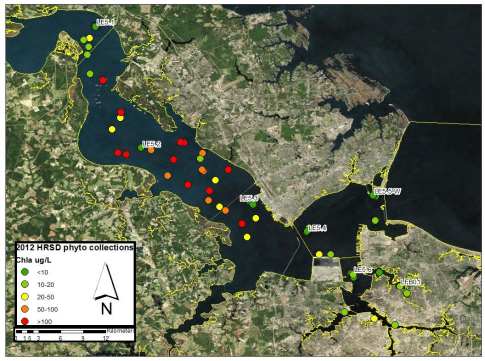
- Began February 15
- HRSD
  - 129 samples collected to date (4/27/12)
- Hopewell Regional Waste Water Treatment Facility
  - 1 sample (March)

Total:130

Expected total: at least 450

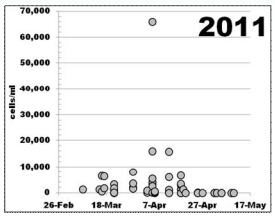
2012 lower James River-HRSD

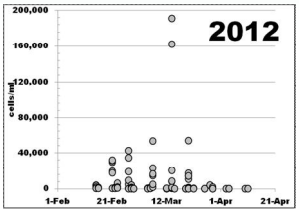
129 samples to date



Heterocapsa triquetra

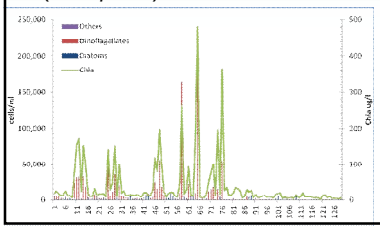
- 2011 bloom began around first week in April
  - max: 65,000 cells/ml
    - 4/6/12-Chla 367ug/L
- 2012 bloom began second week in Feb
  - max density 191,000 cells/ml
    - 3/14/12- Chla: 481ug/L

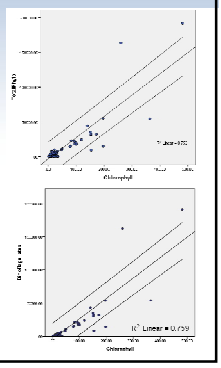




Chlorophyll relationship

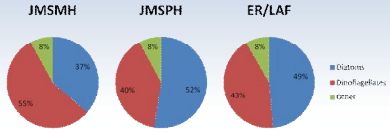
- Highly significant regression between Chlorophyll and total cell density (p<0.000, R^2=.75)
- Largely driven by almost monospecific dinoflagellate (*H. triquetra*) bloom





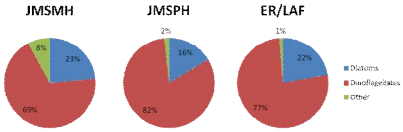
2012 winter/spring composition

- Abundance



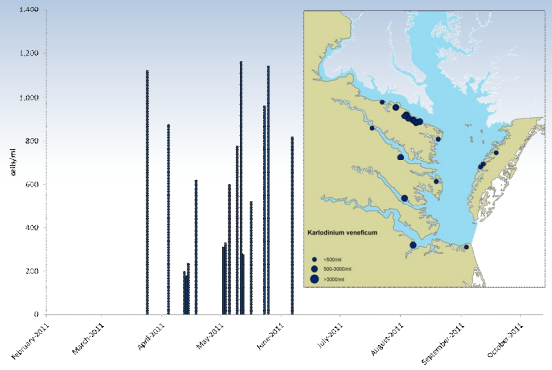
Diatoms: 46%
Dinoflagellates: 46%
Other: 8%

- Biomass

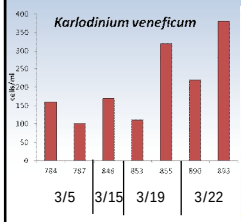


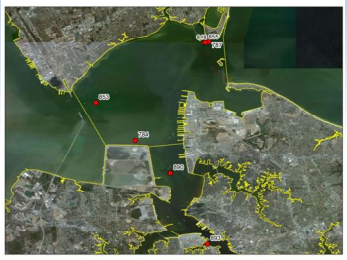
Diatoms: 21%
Dinoflagellates: 76%
Other: 4%

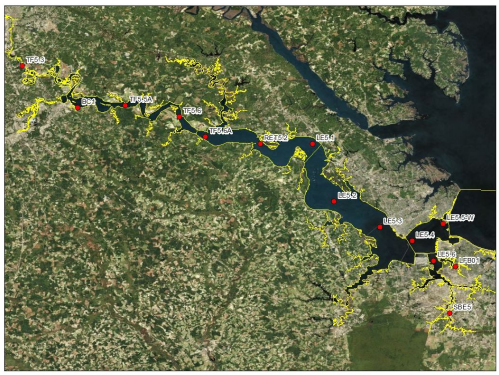
Karlodinium veneficum 2011



Karlodinium veneficum 2012





K. veneficum subdominant taxa to other dinoflagellate and diatom taxa (*Prorocentrum minimum*, *Skeletonema costatum*), all samples had low chlorophyll levels (6.9-21.3ug/L)

Planned Fixed Stations:2012