

Florida's Endangered Lichen Species  
*Cladonia perforata*  
Morphological Analysis,  
Fragmentation, Growth Rate, and More



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Palm Beach County ERM

- General Lichen Info
- *Cladonia perforata*
- Morphological Analysis
- Fragment Viability
- Growth Rate
- Conclusions
- *Cladonia subsetacea*

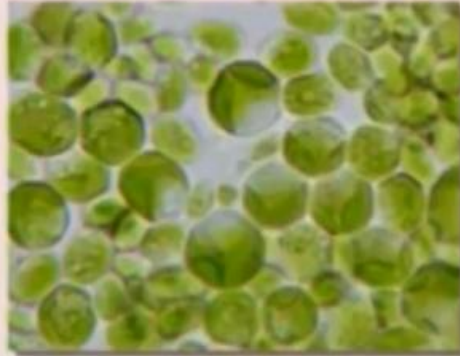
# Why care about lichens?



- Hydro Buffer, nitrogen fixing (Cyanolichens)
- Soil formation & stabilization.
- Food for Wild Turkey & Spruce Grouse
- Desert tortoises – dietary deficiencies
- Nesting material for 50+ N. American bird species
- Northern Flying Squirrel (listed in N.C. & W.V.)
- Caribou – 90% of winter Diet.
- Anthropogenic uses



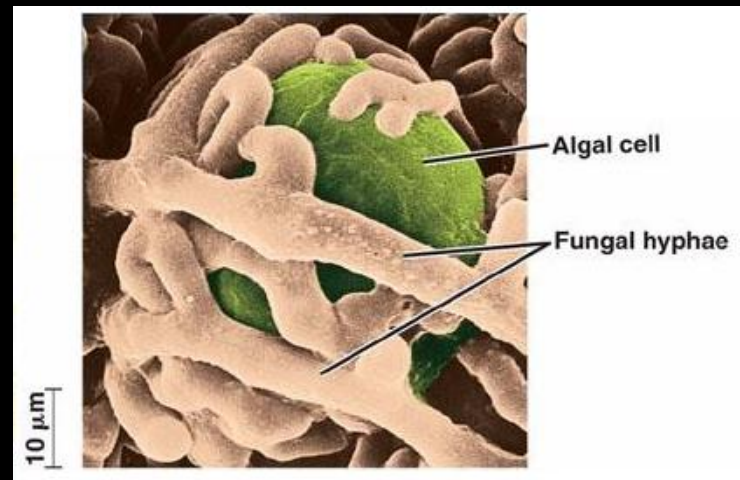
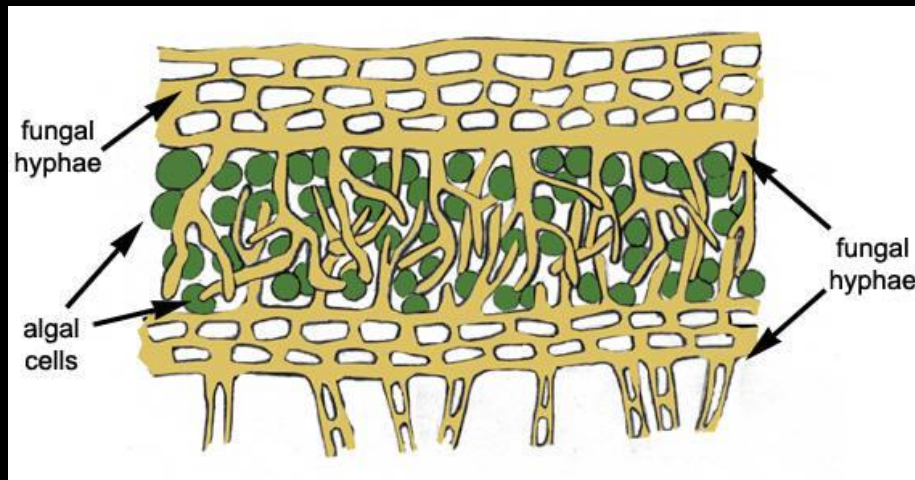
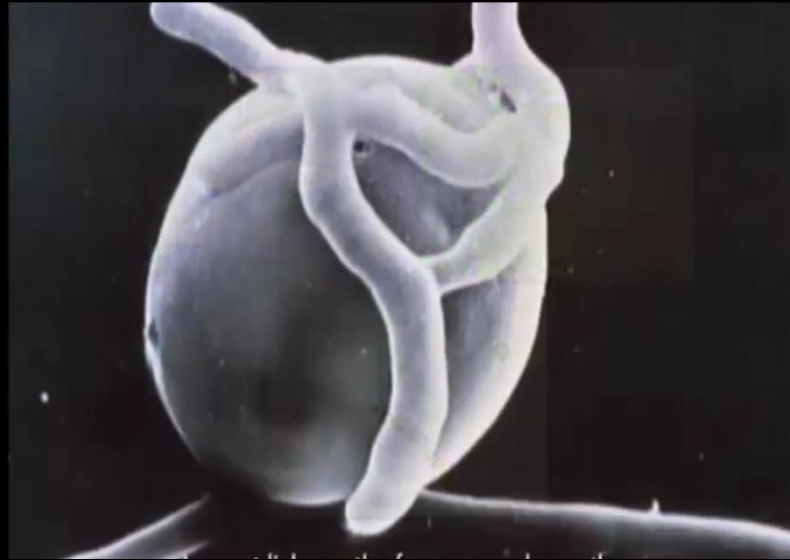
# What is a Lichen?



One fungus joins with green algae or photosynthetic bacteria called cyanobacteria, and sometimes both.

- Fungi
- Protista
- Monera

# What is a Lichen?



# Types of Lichens



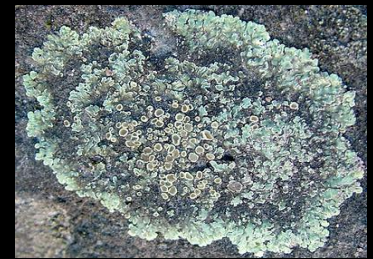
Foliose



Fruticose



Squamulose



Crustose

# How Tough?

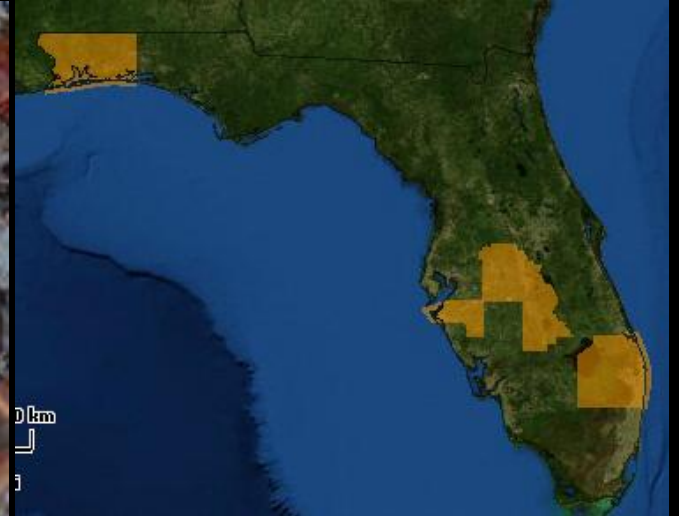


- Brittle when desiccated
- Flammable
- Vulnerable to Sulphur dioxide & heavy metals in rain



- Very pliable when hydrated
- Poikilohydric
- Low nutrients & little water
- UV protection

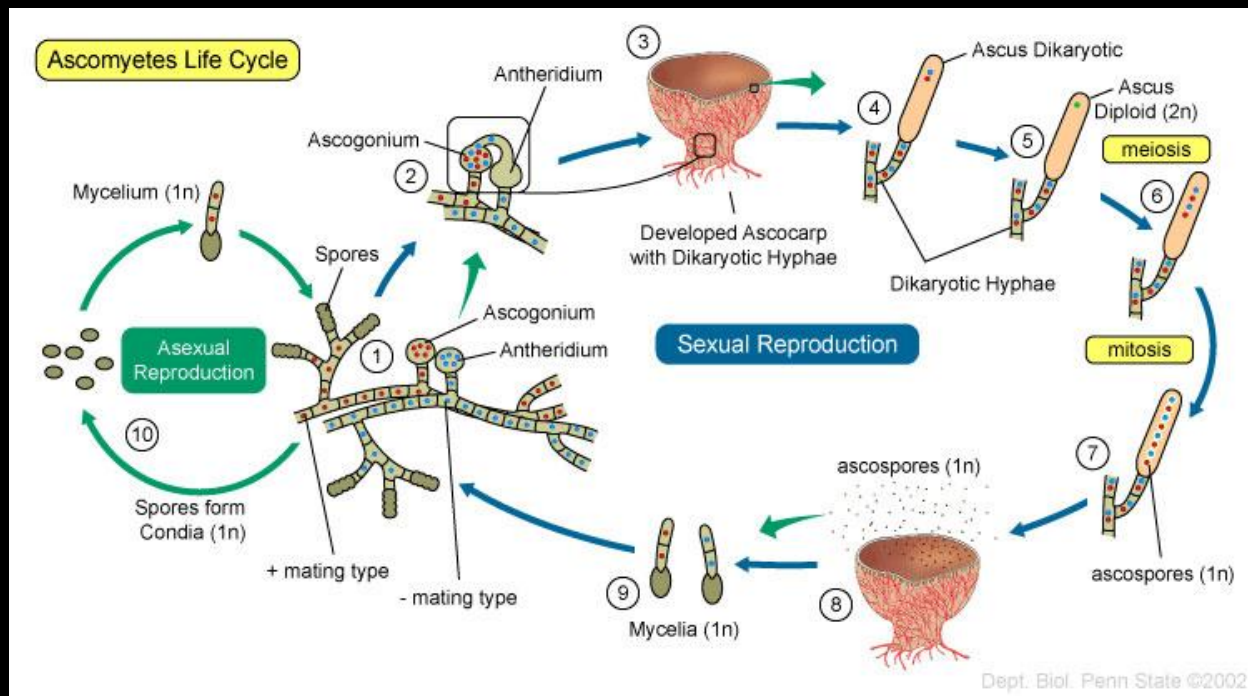
# *Cladonia perforata*



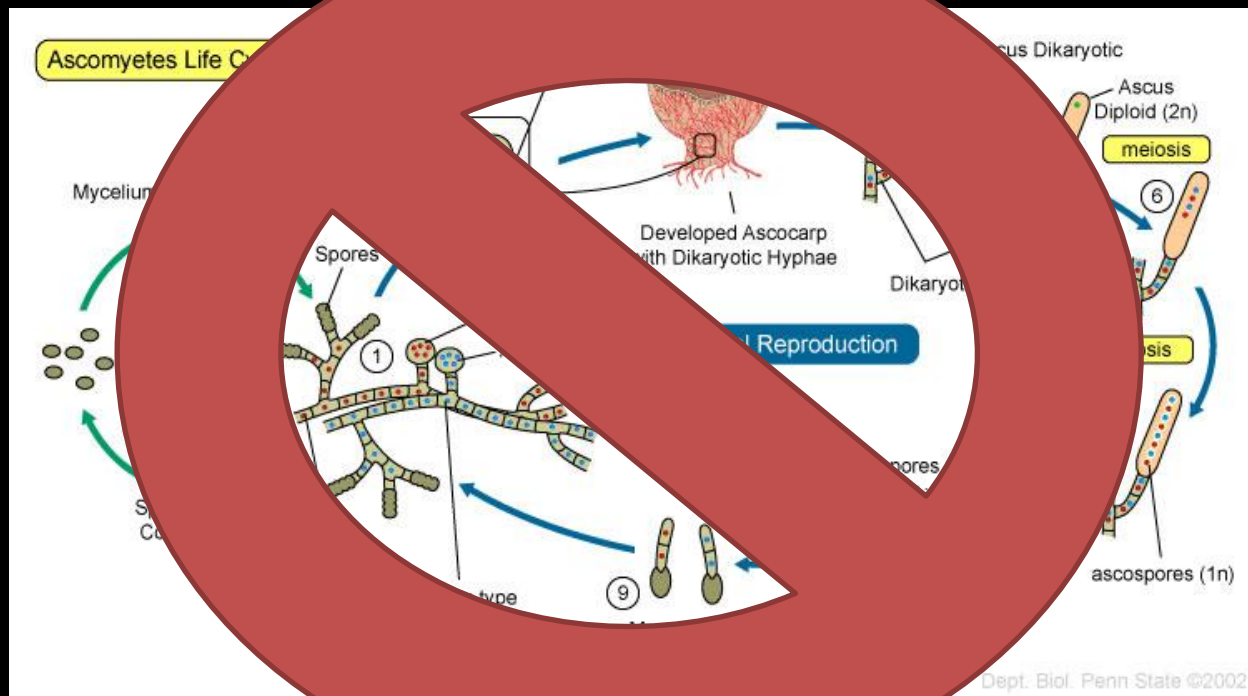


# Sexual Reproduction ?

## Phylum Ascomycota



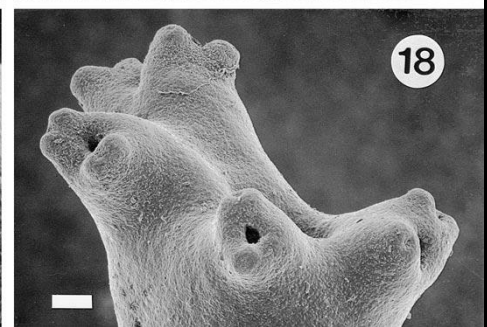
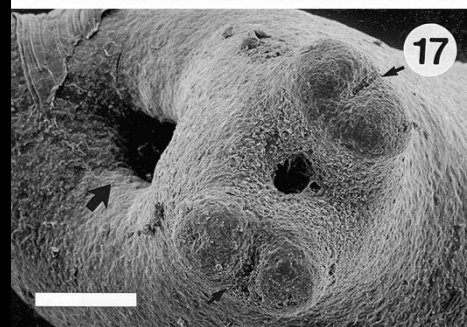
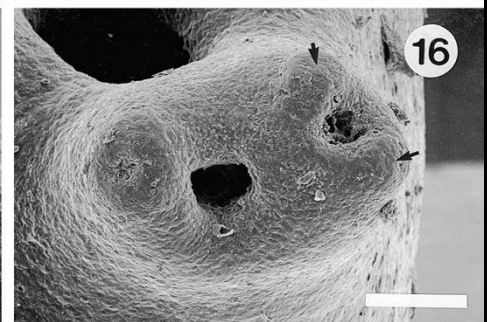
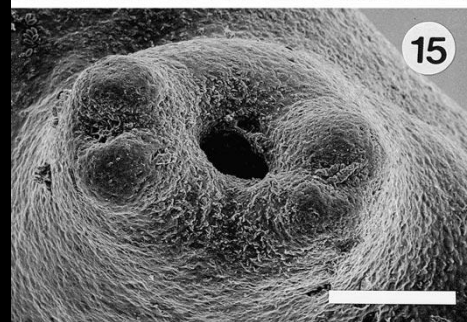
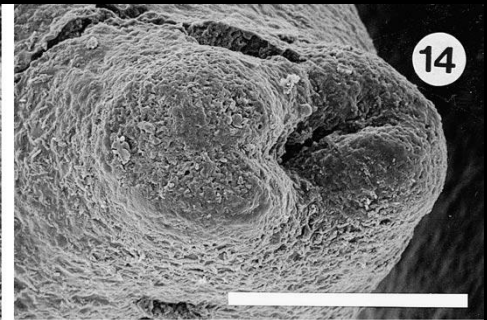
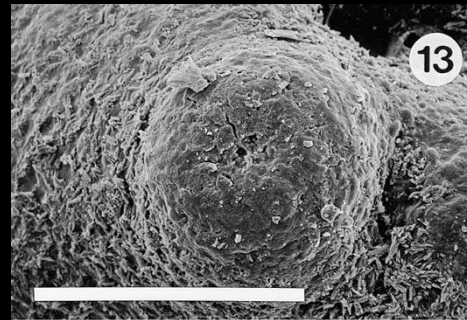
# *Sexual Reproduction ?*



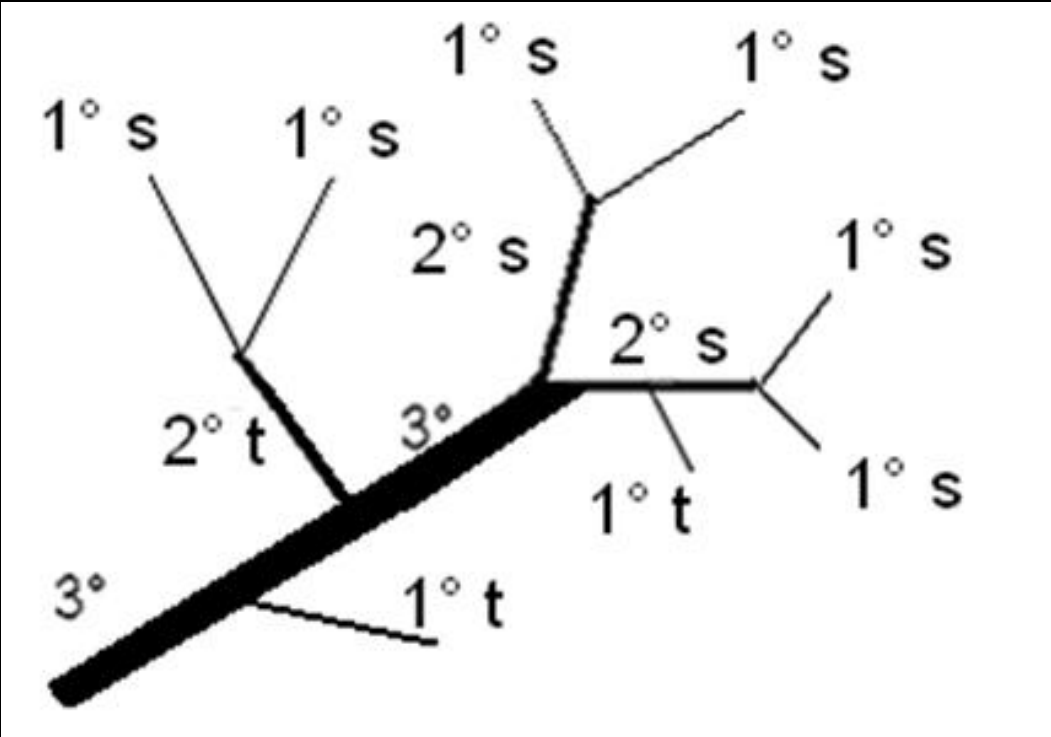
*Soredia?*



# *Cladonia perforata*



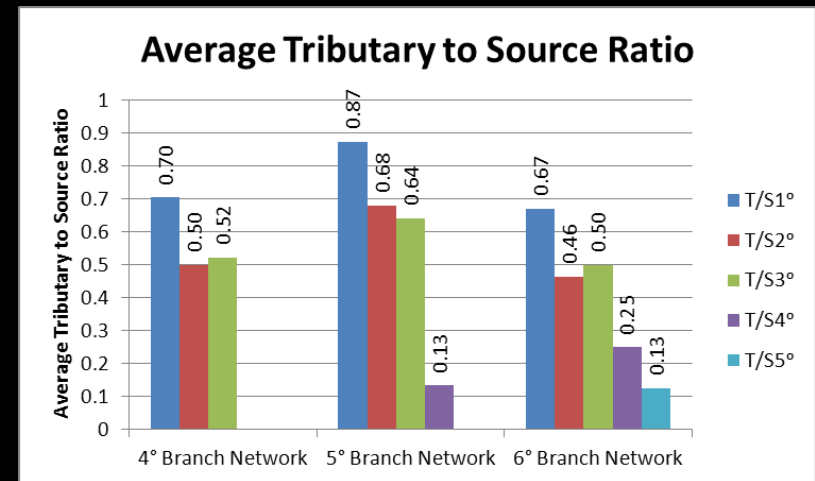
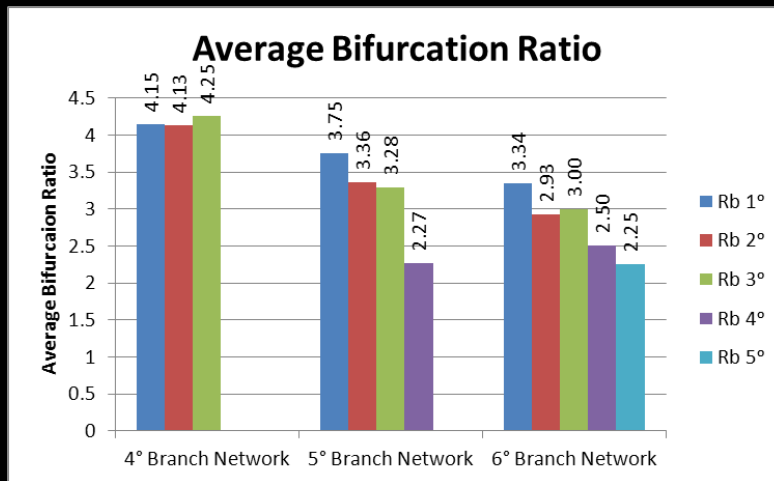
SAMUEL HAMMER



# Morphology

## Results & Discussion

Sixteen 4° branching networks  
 Thirty 5° branching networks  
 Four 6° branching networks



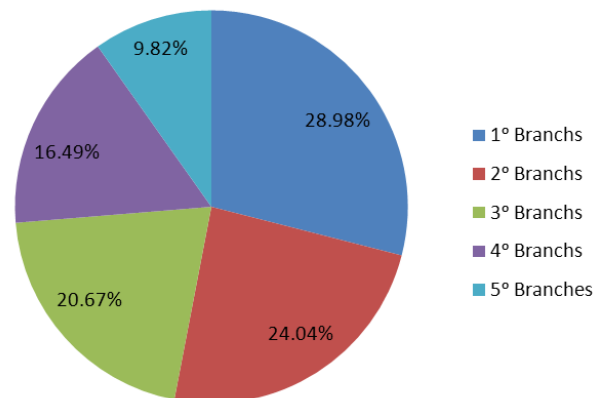
$$(R_b = N_i / N_{i+1})$$

$$T_i / S_i$$

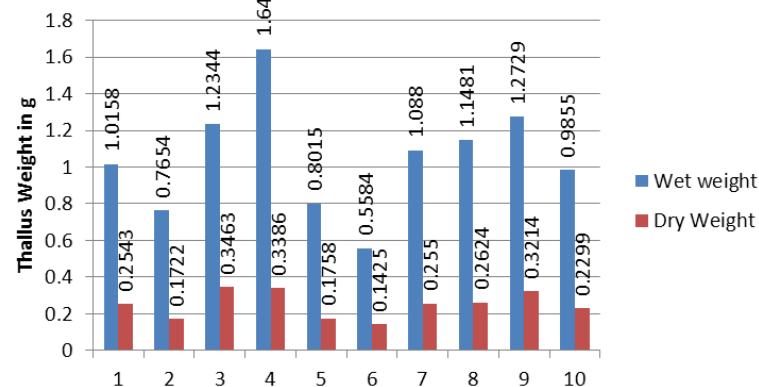
# Morphology

## Results & Discussion

### Branch Composition of Total Thallus



### Dry Weight to Wet Weight



Dry weight averaged 23.85 % of saturated weight.

All 10 thalli had 5° branch networks

# *Fragmentation*





# *Cladonia perforata*

## Fragmentation



500 total fragments

2mm -100

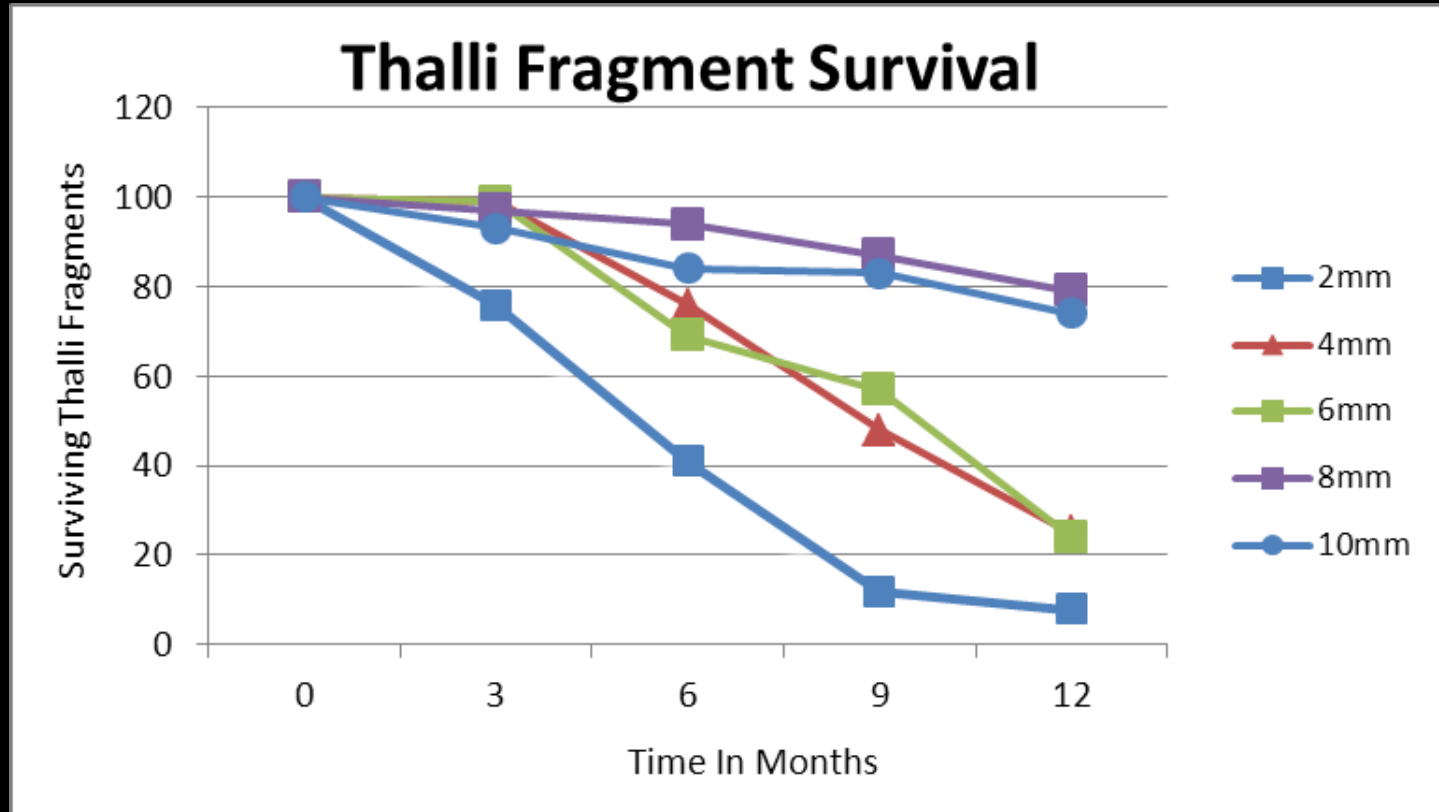
4mm-100

6mm-100

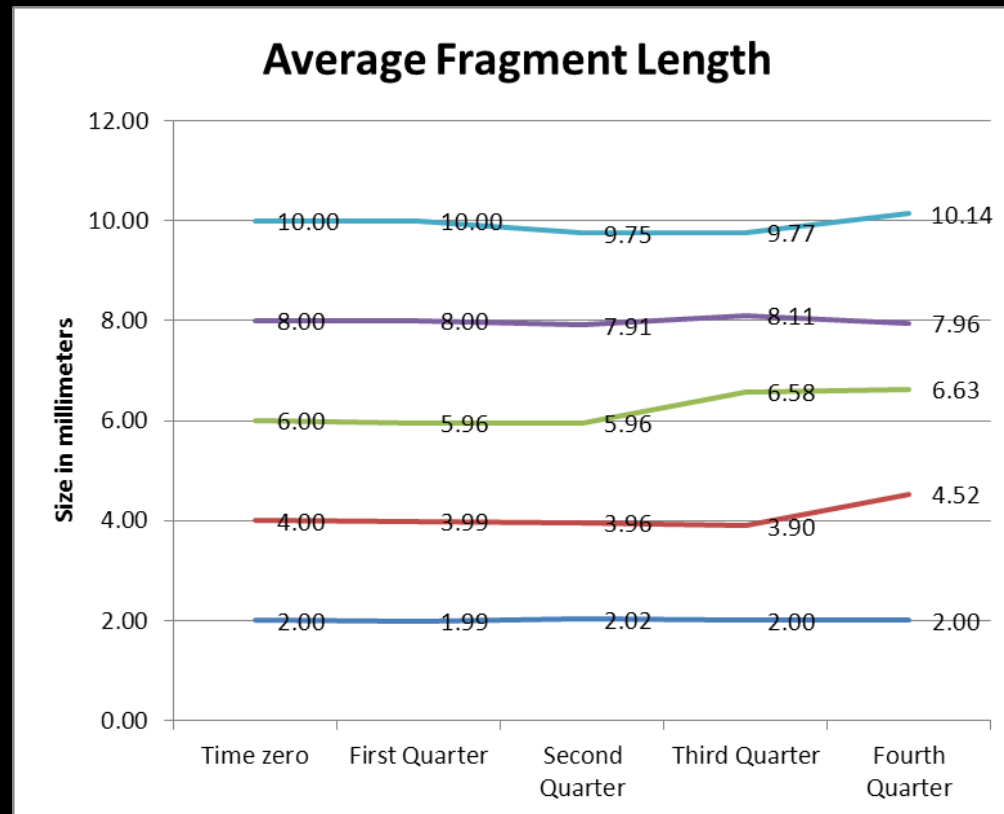
8mm-100

10mm-100

# *C. perforata* fragmentation Results



# *C. perforata* fragmentation Results



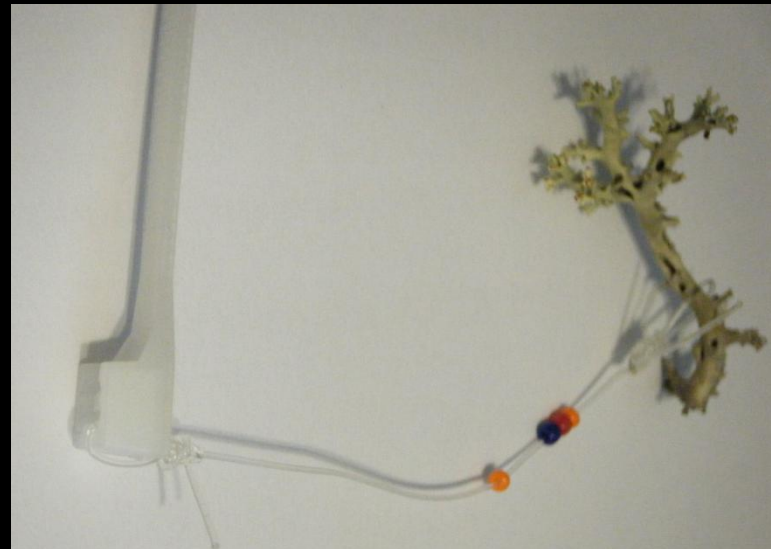
*C. Perforata*  
*Fragment mortality*



# *Growth rates*



# *Securing thalli*



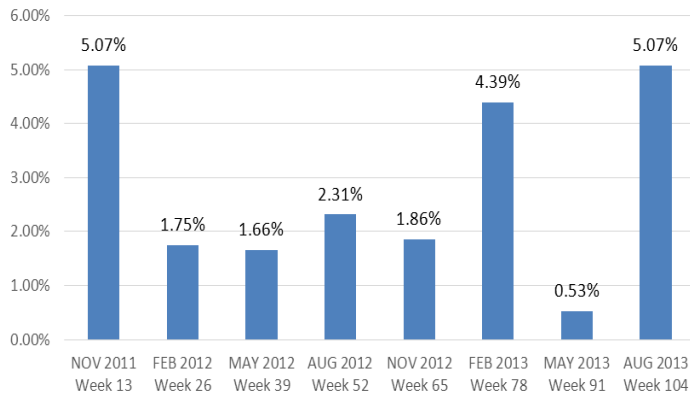
# Growth Rate

## Methods

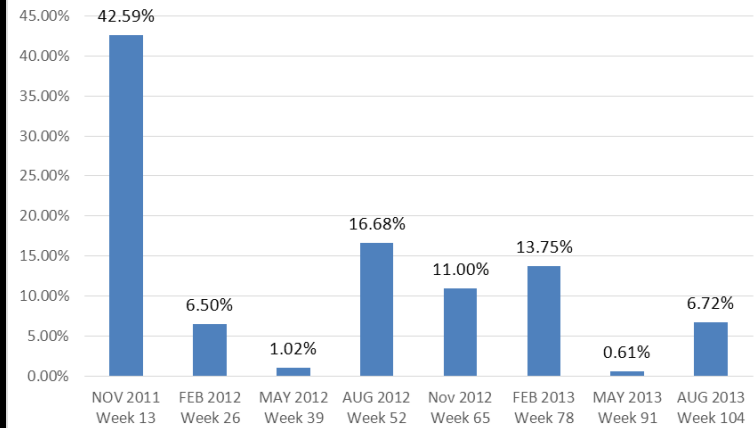


# Growth Rate Results & Discussion

### Average Linear Growth



### Average Weight Change



11.96% per year

	NOV Week 13	FEB Week 26	MAY Week 39	AUG Week 52	NOV Week 65	FEB Week 78	MAY Week 91	AUG Week 104
Thalli retrieved for Measurements	48	48	47	45	44	44	39	34

# Growth Rate

## Results & Discussion



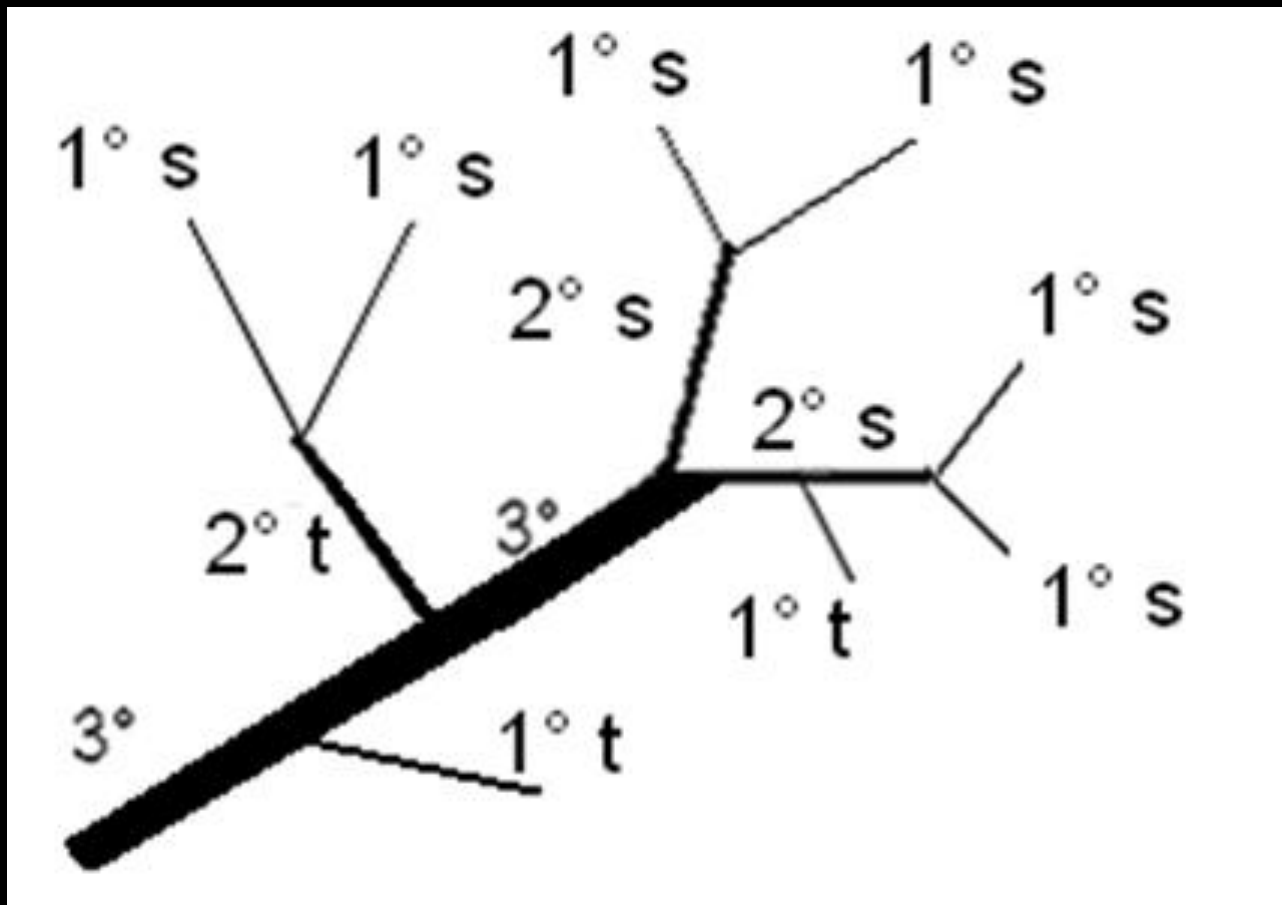
May 2013



August 2013

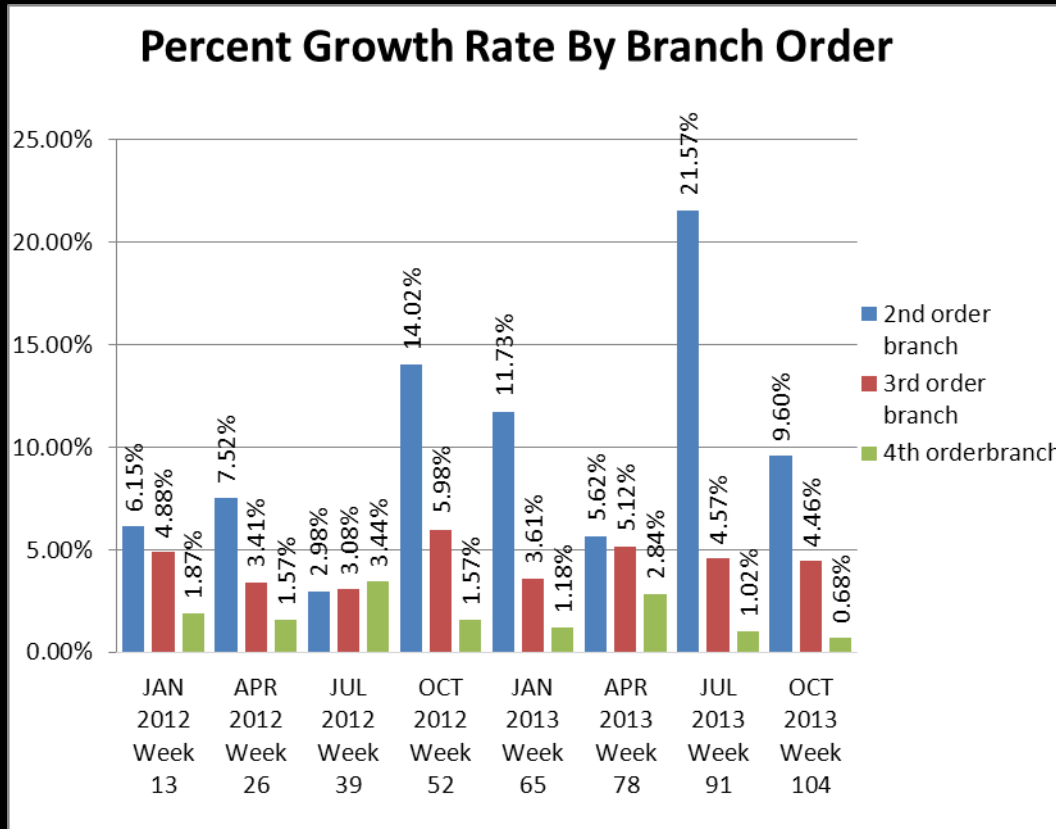


# Intercalary Growth Rates



# Intercalary Growth Rates

## Results & Discussion



	JAN 2012	APR 2012	JUL 2012	OCT 2012	JAN 2013	APR 2013	JUL 2013	OCT 2013
Thalli retrieved for Measurements	48	45	43	38	33	29	25	24

# Growth Rate

## Results & Discussion



# Growth Rate

Branching frequency



August 2011

August 2013

# Growth Rate

Independent branch growth



August 2011

August 2013

# Summary

- Tributary to source ration decreases as branching networks increase.
- The average thallus grows at a rate of 11.96% per year.
- Branches grow at independent rates
- Branching events may occur less frequently than once every 2 years.
- **Lower order** branches of a thalli grow at a quicker rate than higher order branches.
- There is a positive correlation between fragment size and survivability after one year.

# *Recovery*



# *Cladonia subsetacea*

Smithsonian Institution, National Museum of Natural History, Department of Botany

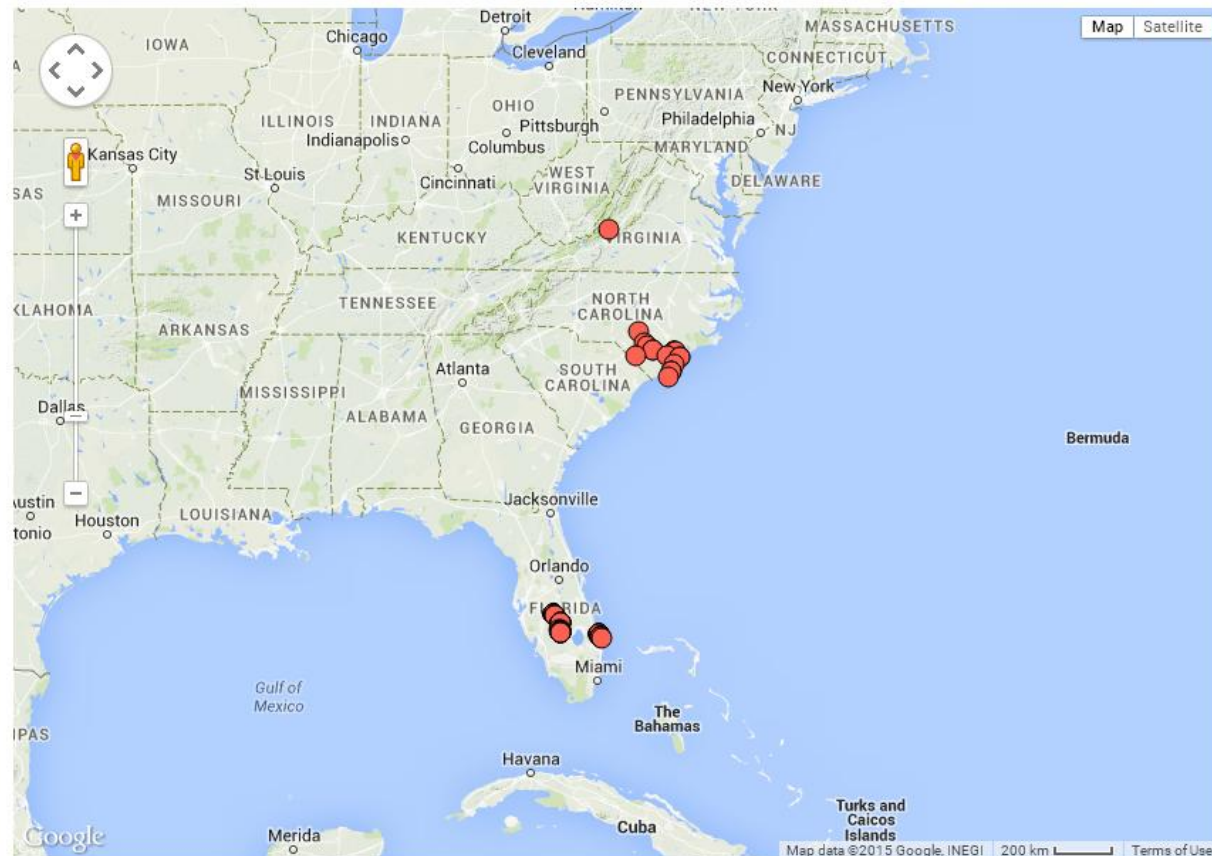




# *Cladonia subsetacea*

Consortium of North American Lichen Herbaria

lichenportal.org/portal/map/googlemap.php?maptype=taxa&taxon=53476&clid=0



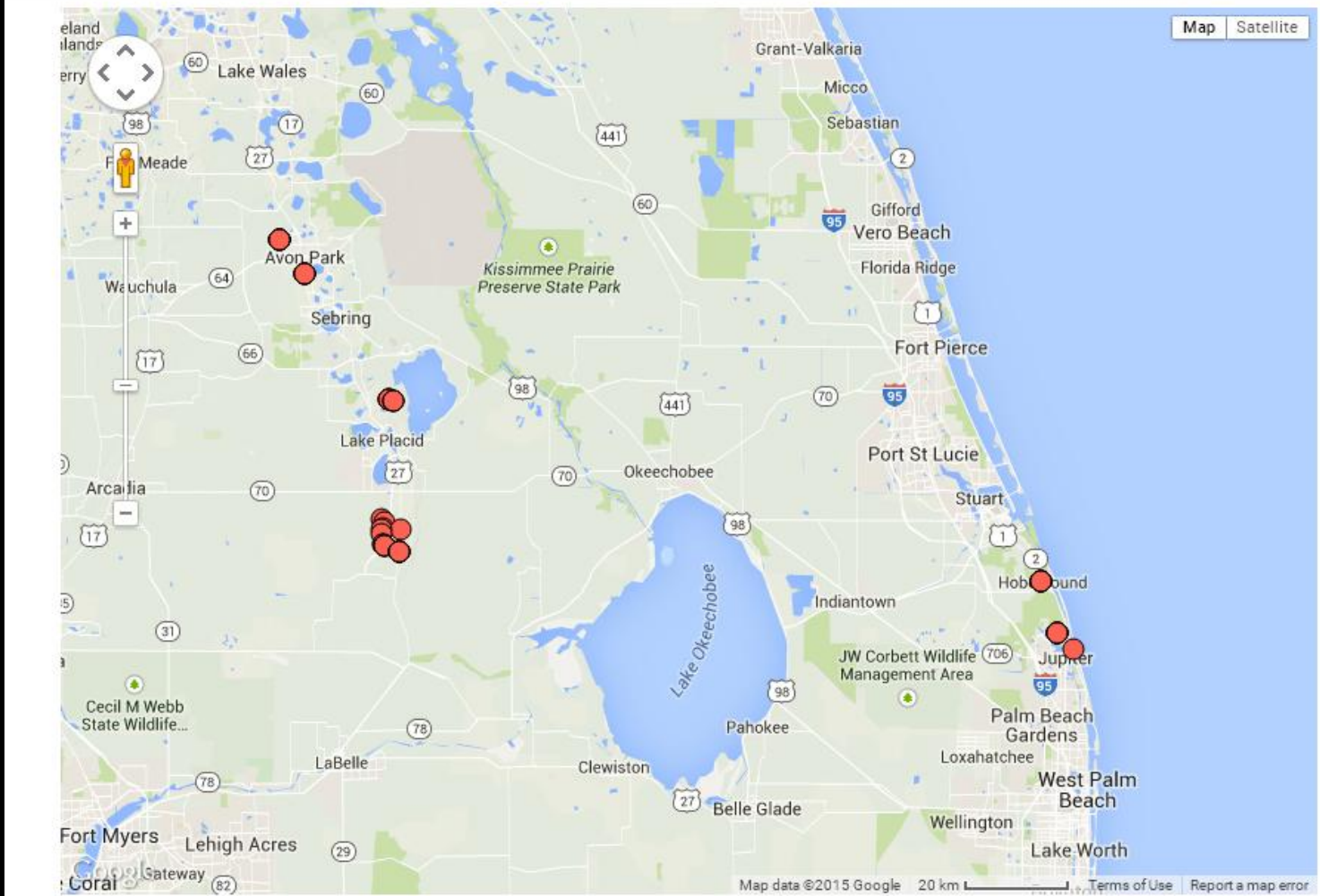
Legend  
■ = *Cladonia subsetacea*

Add Point of Reference  
Latitude decimal:  eg: 34.57 Marker Name:   
Longitude decimal:  eg: -112.38  
Enter in D:M:S format

# *Cladonia subsetacea*

Consortium of North American Lichen Herbaria

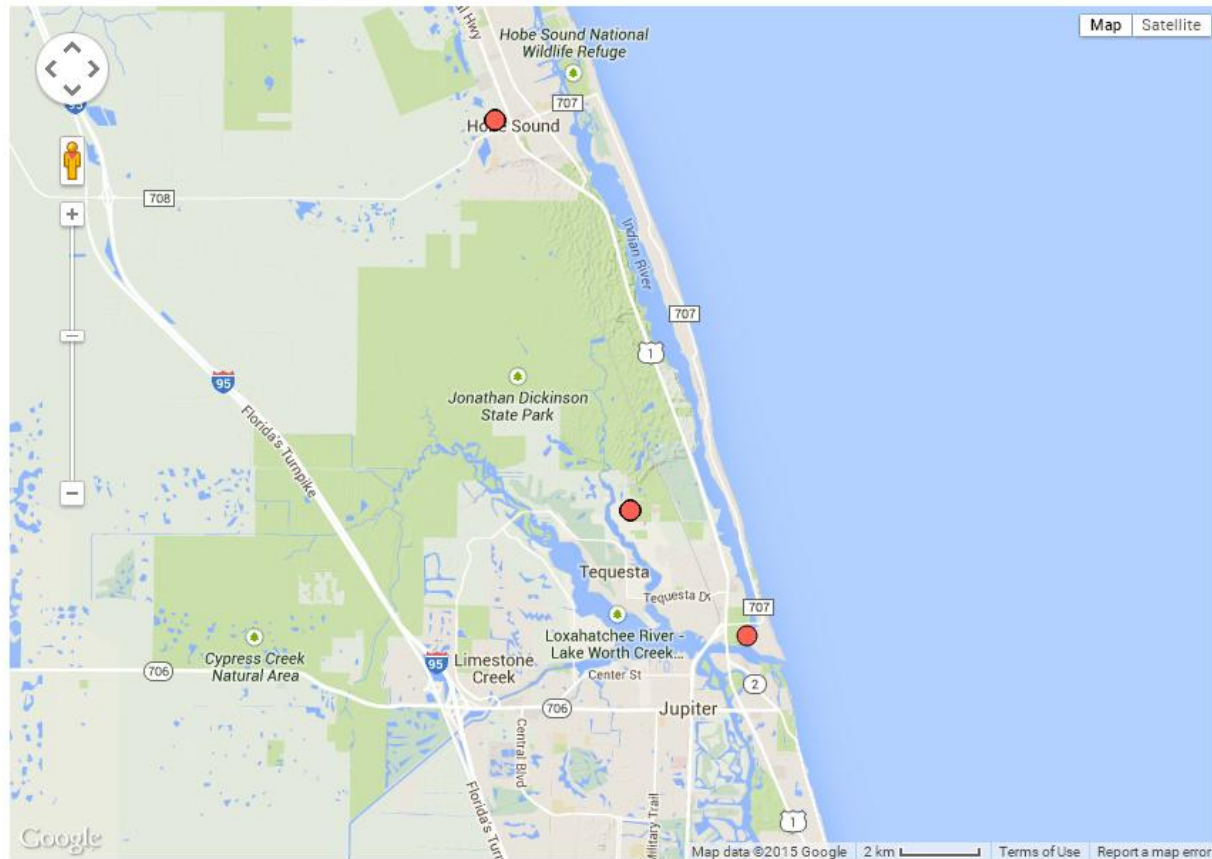
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# *Cladonia subsetacea*

Consortium of North American Lichen Herbaria

lichenportal.org/portal/map/googlemap.php?maptype=taxa&taxon=53476&clid=0



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*Questions?*

