

# Bull Kelp Life History Study

## Developing Strategies for Canopy Habitat Restoration

Brian Allen

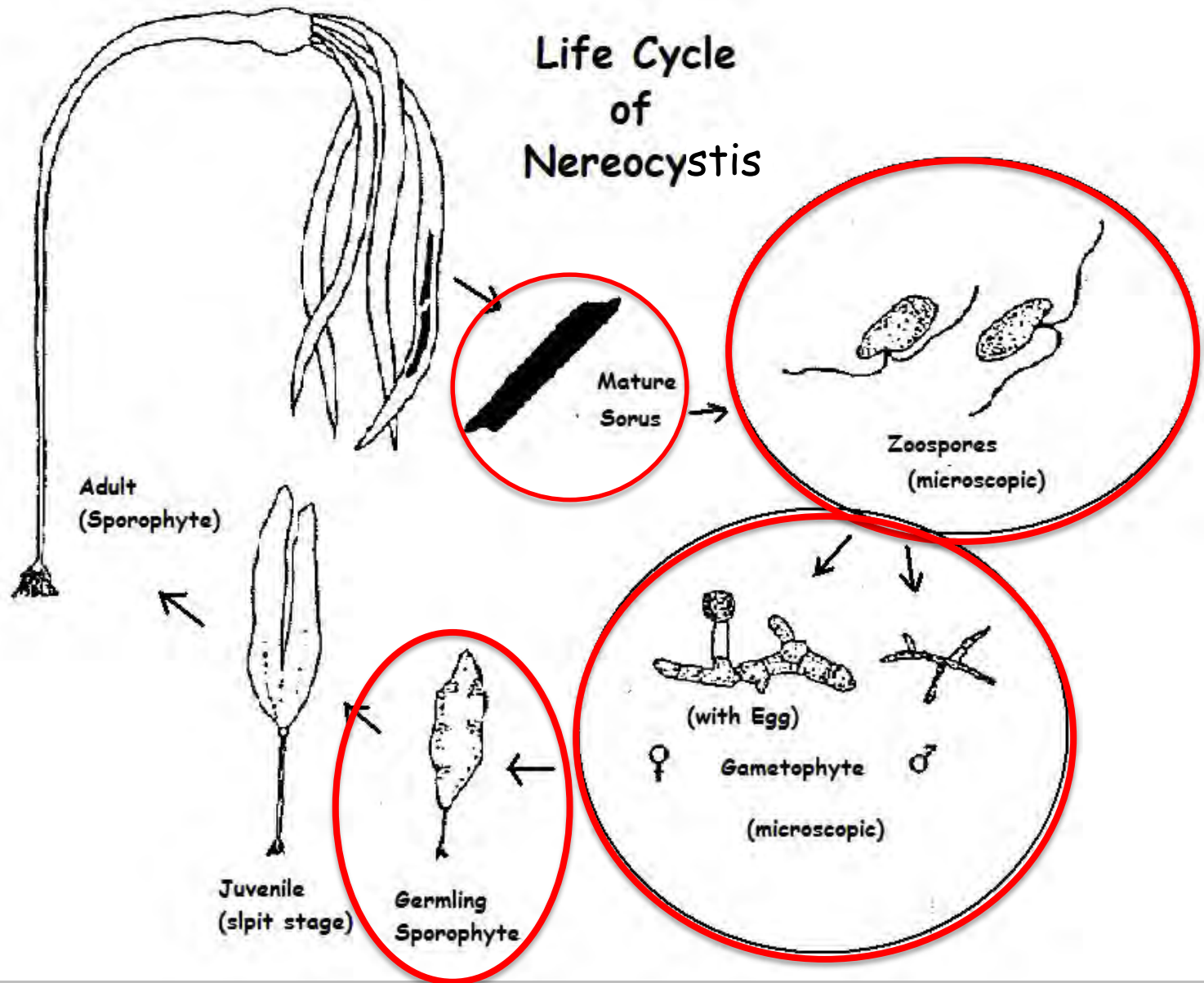
Puget Sound Restoration Fund



# Why Restore Canopy Kelp?

- Unique Biogenic Habitat
  - Functional role in estuary nutrient circulation
- Documented Loss in Puget Sound
- Interest in canopy habitat recovery
- ESA species recovery plans – habitat
  - PS Rockfish
  - PS Salmon

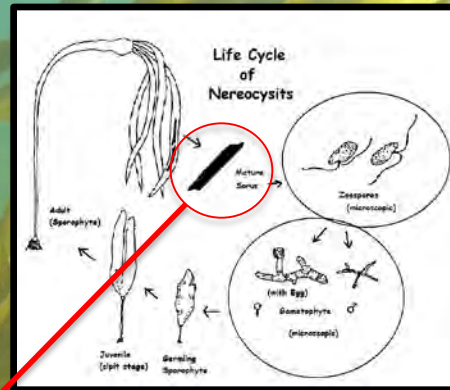
# Life Cycle of Nereocystis



# Research Question

1. What material is the best choice?
  - Enhancement without active management
  - Catalyze the F2 generation *in situ*
  - Scale to acres
1. When to outplant?
  - Before the winter solstice? In the summer? What is the temporal range here?

# Experimental Treatments

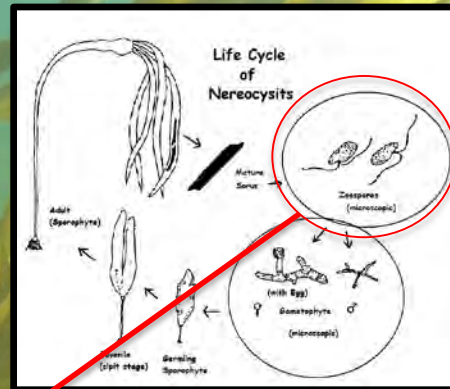


## Treatment #1 – Sorus Transfer

- Sori collected and prepared for transit to lab
- Sori desiccated in cooler during transport (5 hours)
- Initiated same day as collection
- Outplanted to field site on Day 7



# Experimental Treatments

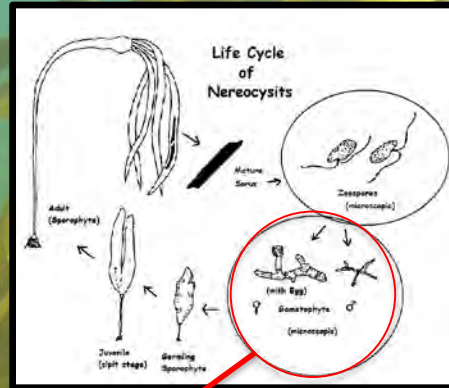


## Treatment #2 – Lab Spores

- Same collection
- Desiccated overnight
- Inoculated with all lab treatments
- Transferred to dock at 24 hours post inoculation
- Transferred to field site on Day 7

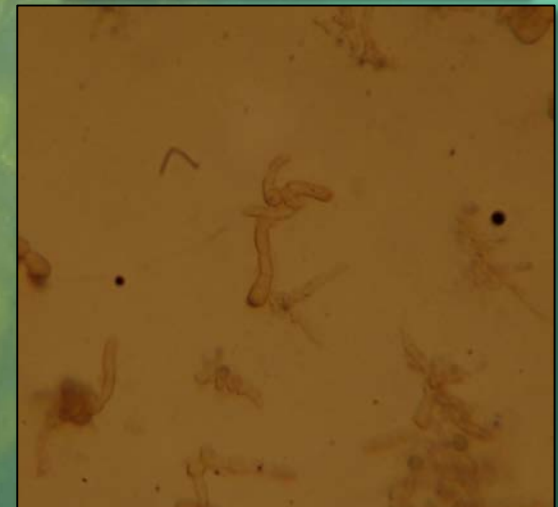


# Experimental Treatments

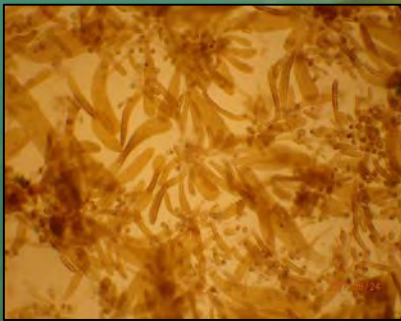
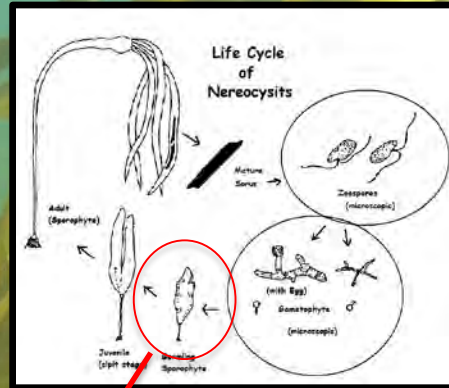


## Treatment #3 - Gametophyte

- Inoculated with all lab treatments
- After 24 hours, transfer to lab aquaria
- Transfer with Treatments 1, 2 and Blank on Day 7



# Experimental Treatments



## Treatment #4 - Sporophyte

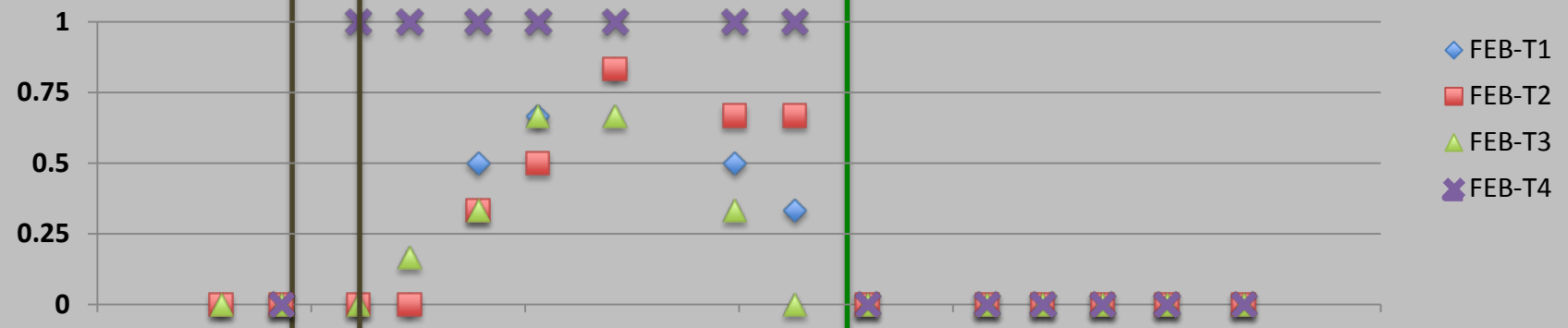
- Inoculated with all lab treatments
- Cultured 21 days
- Transferred to field site on Day 21



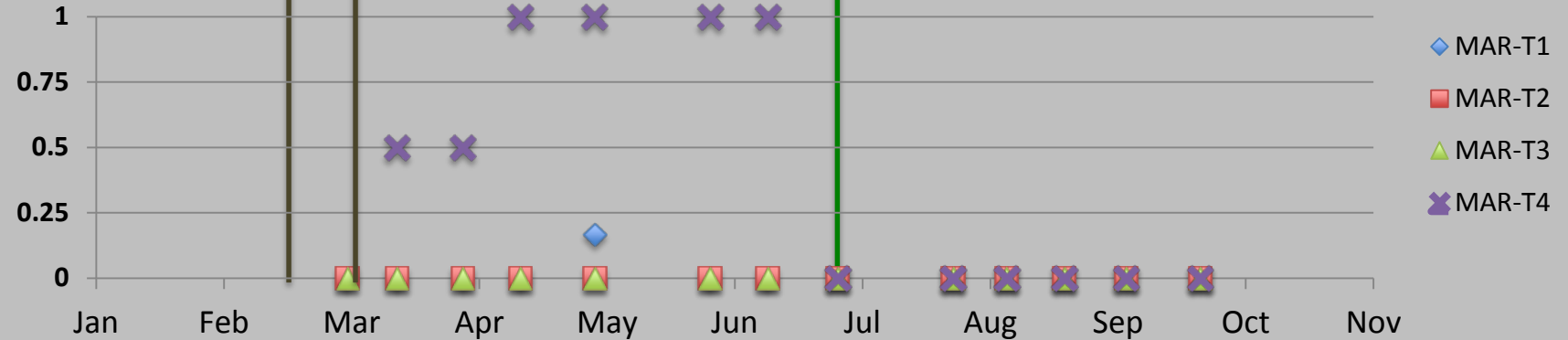
# JANUARY

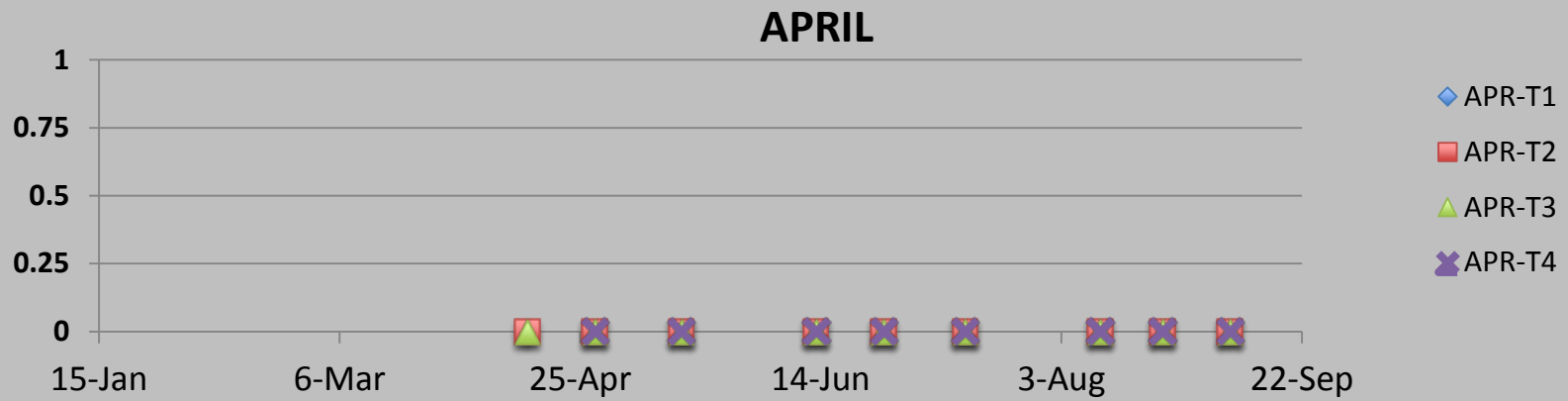


# FEBRUARY



# MARCH

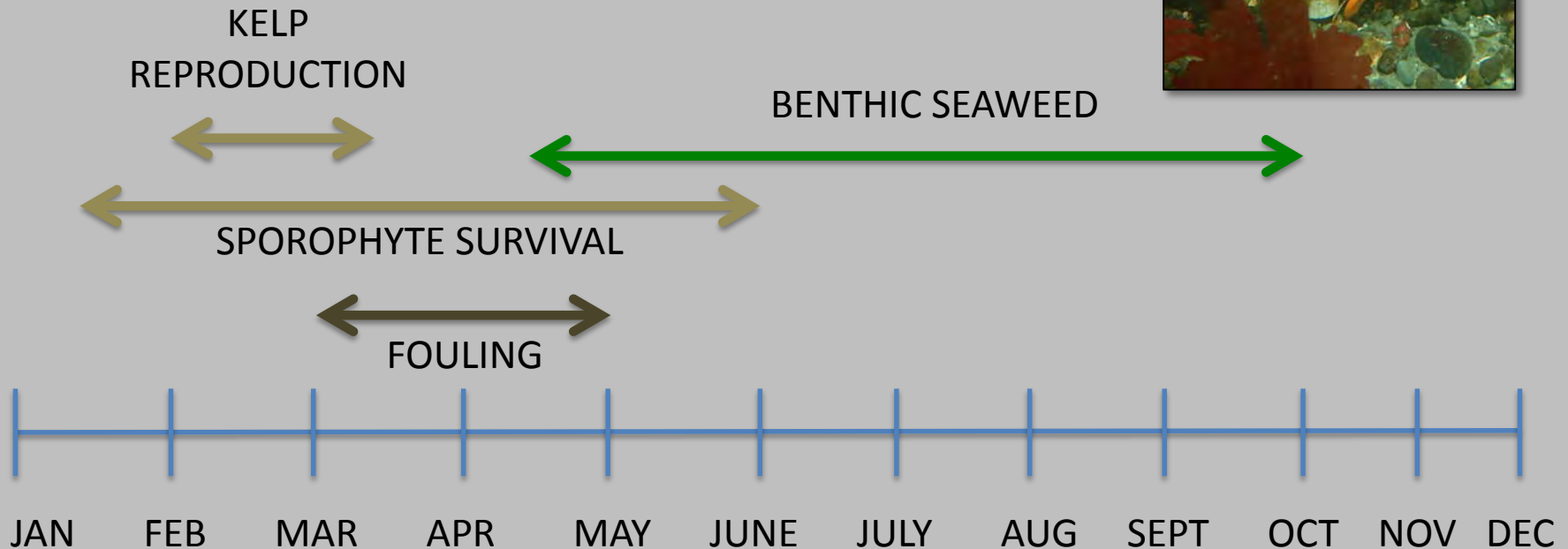




- No sporophyte recruits after March
- May-October results look same as April

# Conditions affecting kelp treatments

- Grazing (“scrapers”)
- Abrasion (sediment & seaweed)
- Diatom fouling (maybe)
- Shading



# Finish the work

- Complete November & December
- Monitor outplants through March 2018
  - Assess the fate of late fall transfers
  - Summer transfers?

## Restoration Practice

- Sorus and Zoospore transfers make an attractive option (no substrate)
  - ✓ Low regulatory burden
  - ✓ Economic and scalable
- PSRF will be testing in February 2018

# Thank you

Dan Tonnes  
Stephen Shreck  
Reuben Allen  
Max Calloway  
Josh Bouma  
Stuart Ryan  
Betsy Peabody  
Louis Druehl  
Tom Mumford

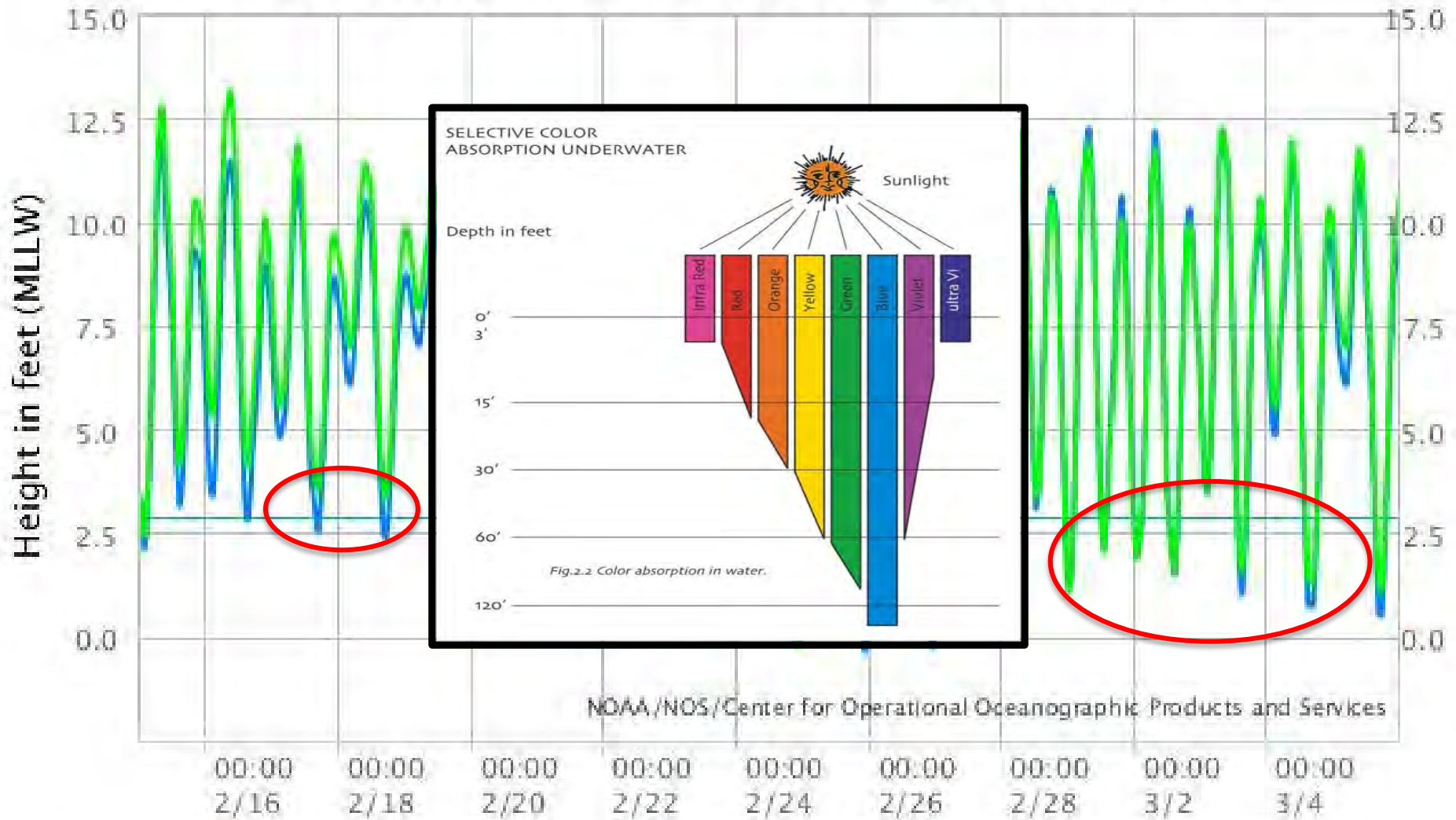


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# NOAA/NOS/CO-OPS

## Verified Hourly Heights at 9447130, Seattle WA

From 2017/02/15 00:00 LST/LDT to 2017/03/05 23:59 LST/LDT



NOAA/NOS/Center for Operational Oceanographic Products and Services