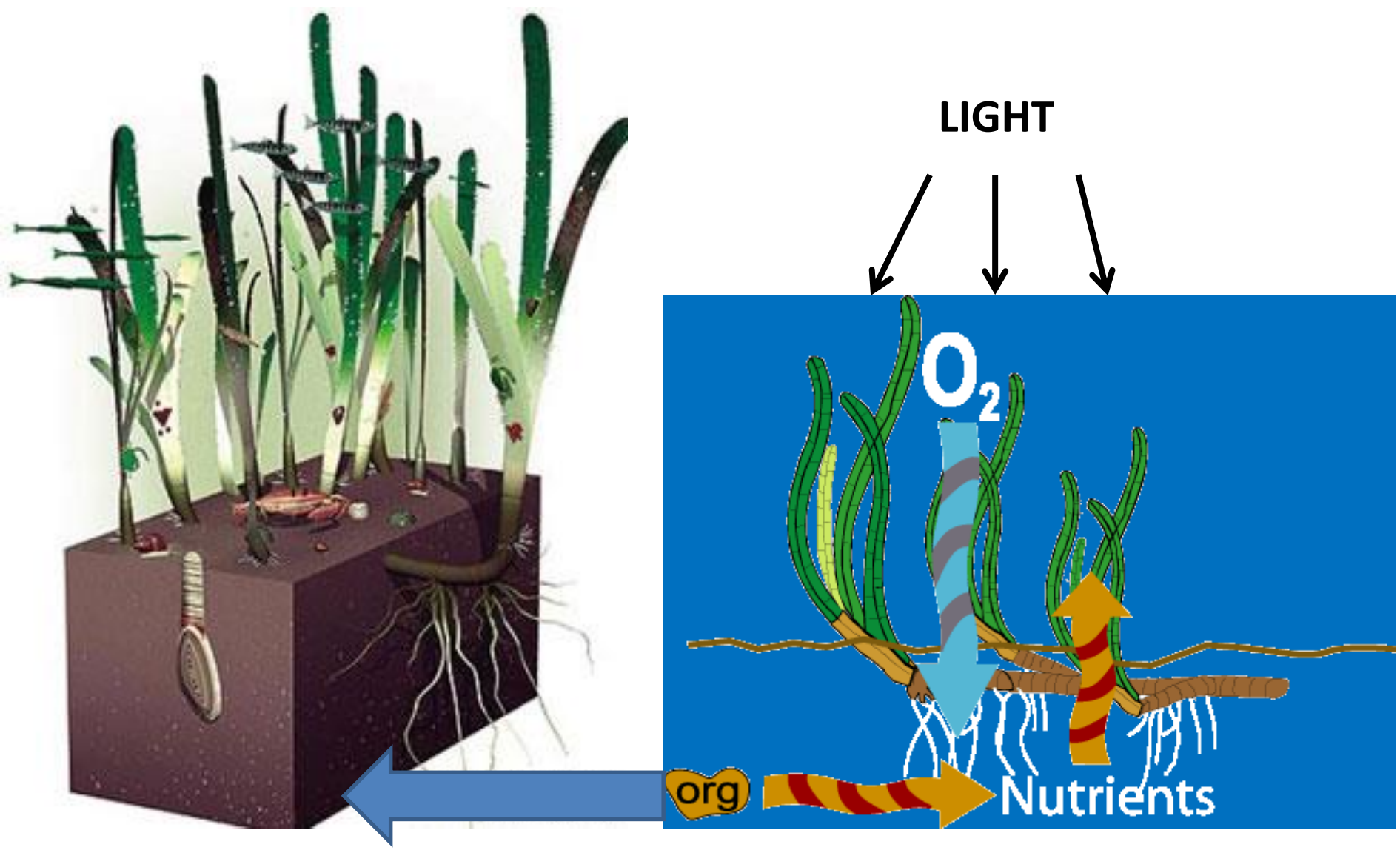
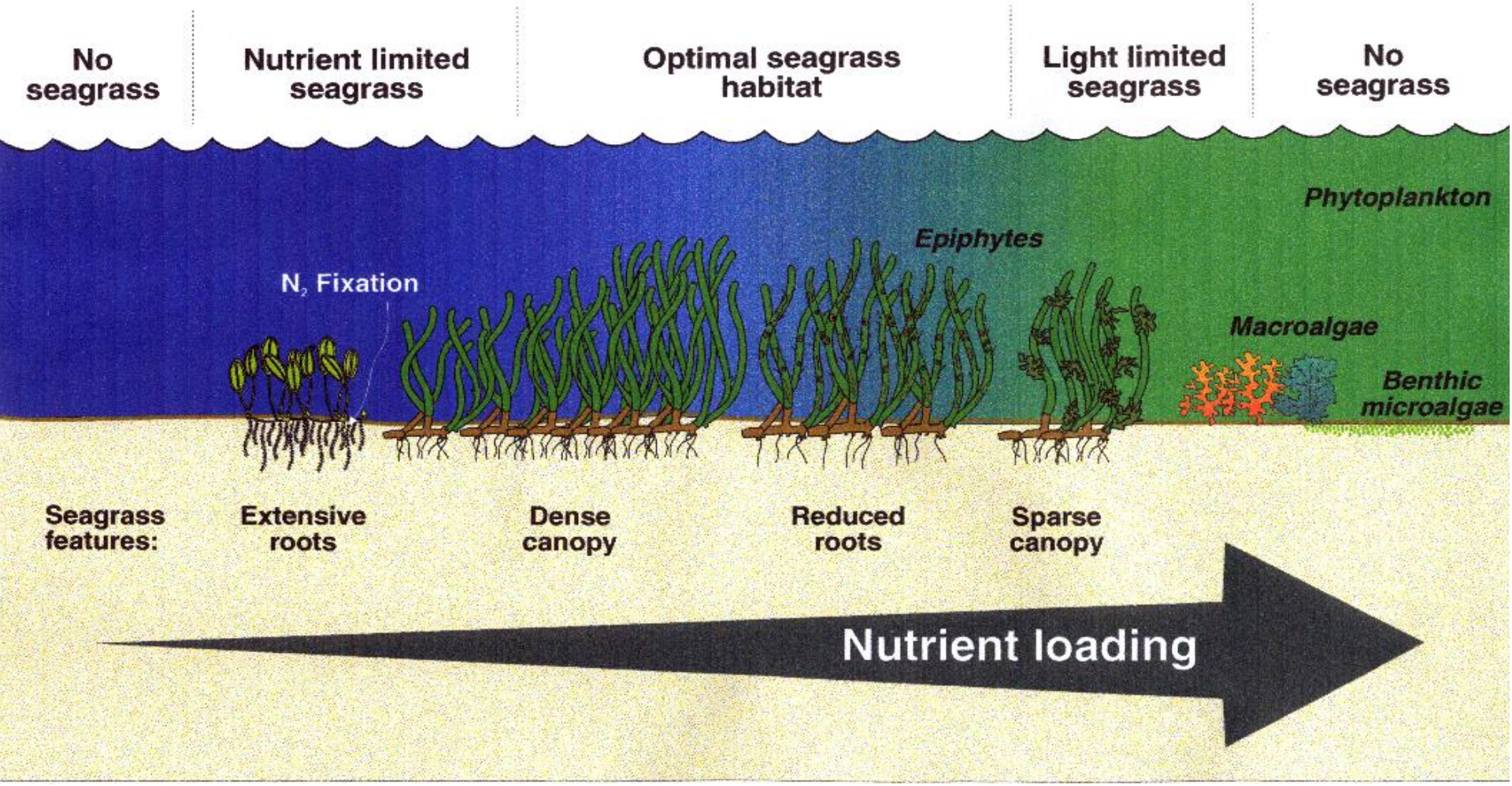
SAV ECOLOGY AND WATER QUALITY

JUD KENWORTHY

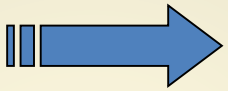


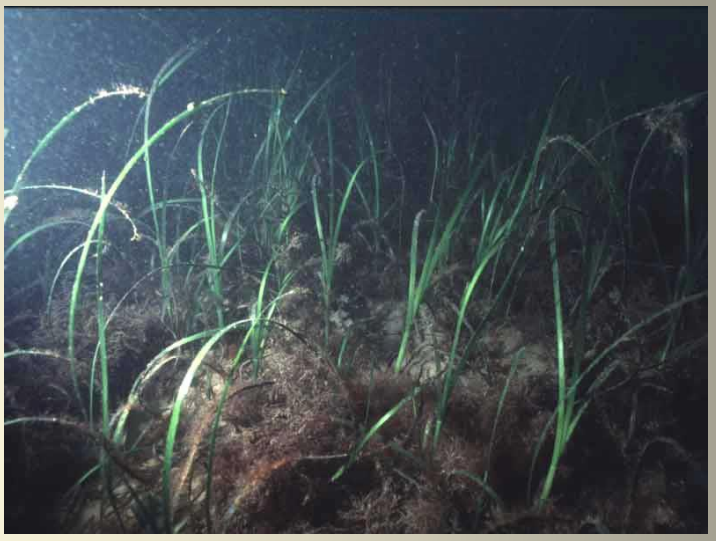
SEDIMENT ORGANIC MATTER LOADING

PARADIGM - PHASE SHIFT

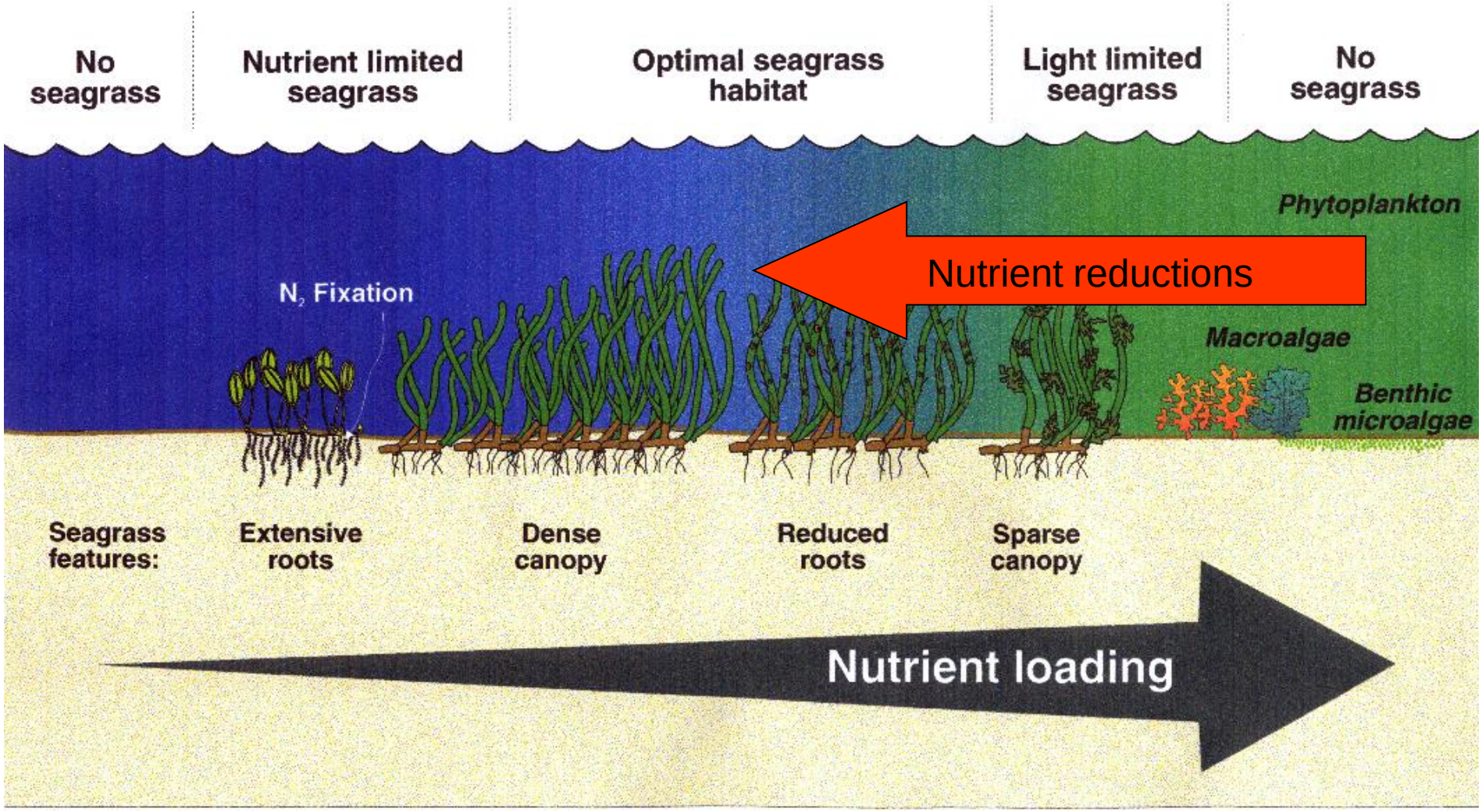


Light limitation = major cause of seagrass declines



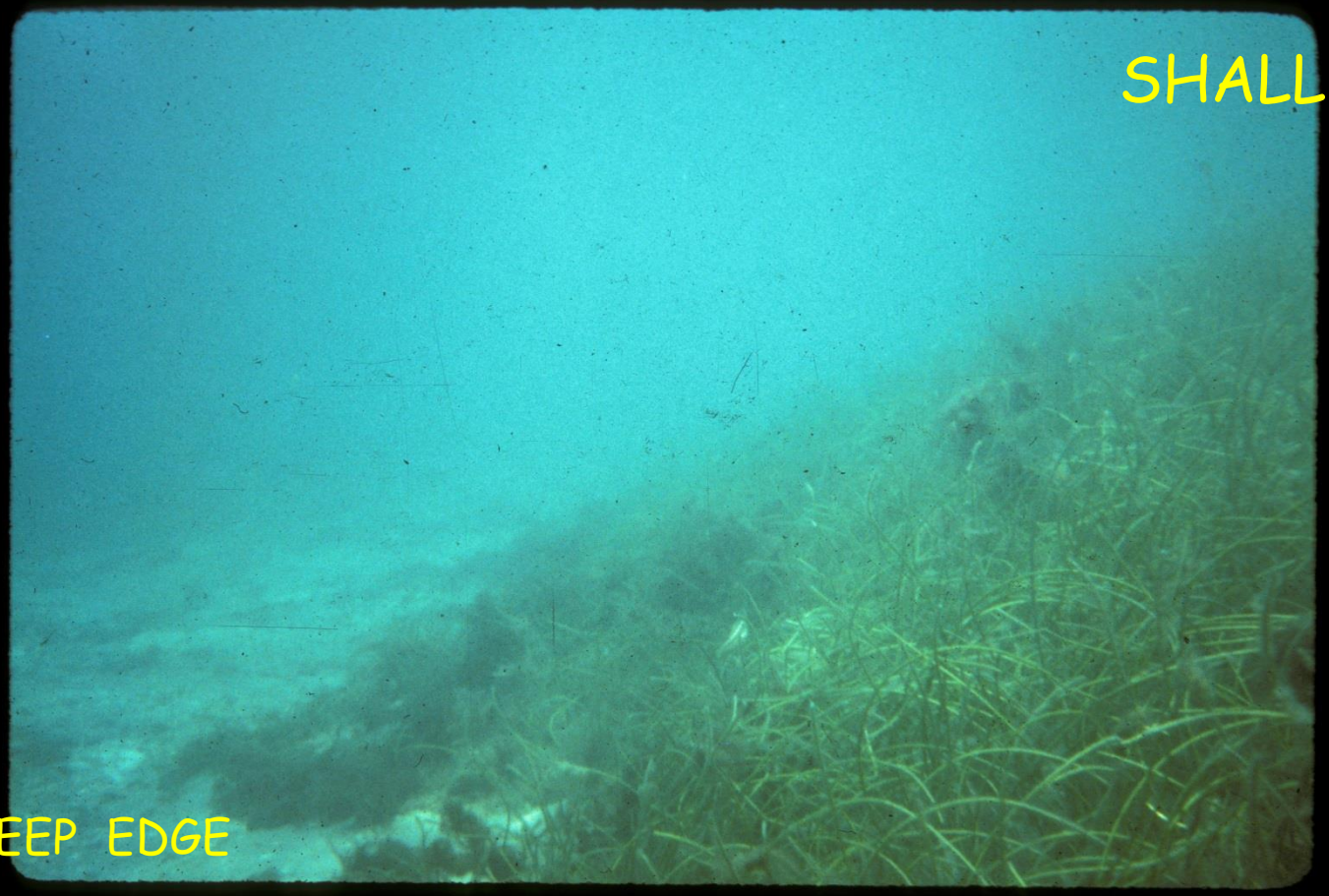


Reductions in loading can lead to seagrass recoveries



SEDIMENT OGANIC MATTER LOADING ?

WE LET THE PLANTS TELL US

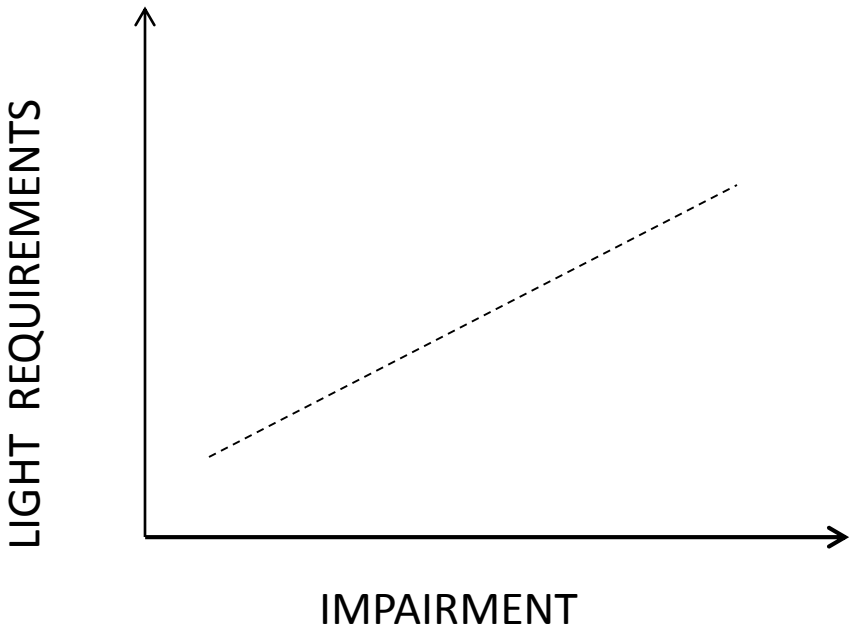


SAV MINIMUM LIGHT REQUIREMENT

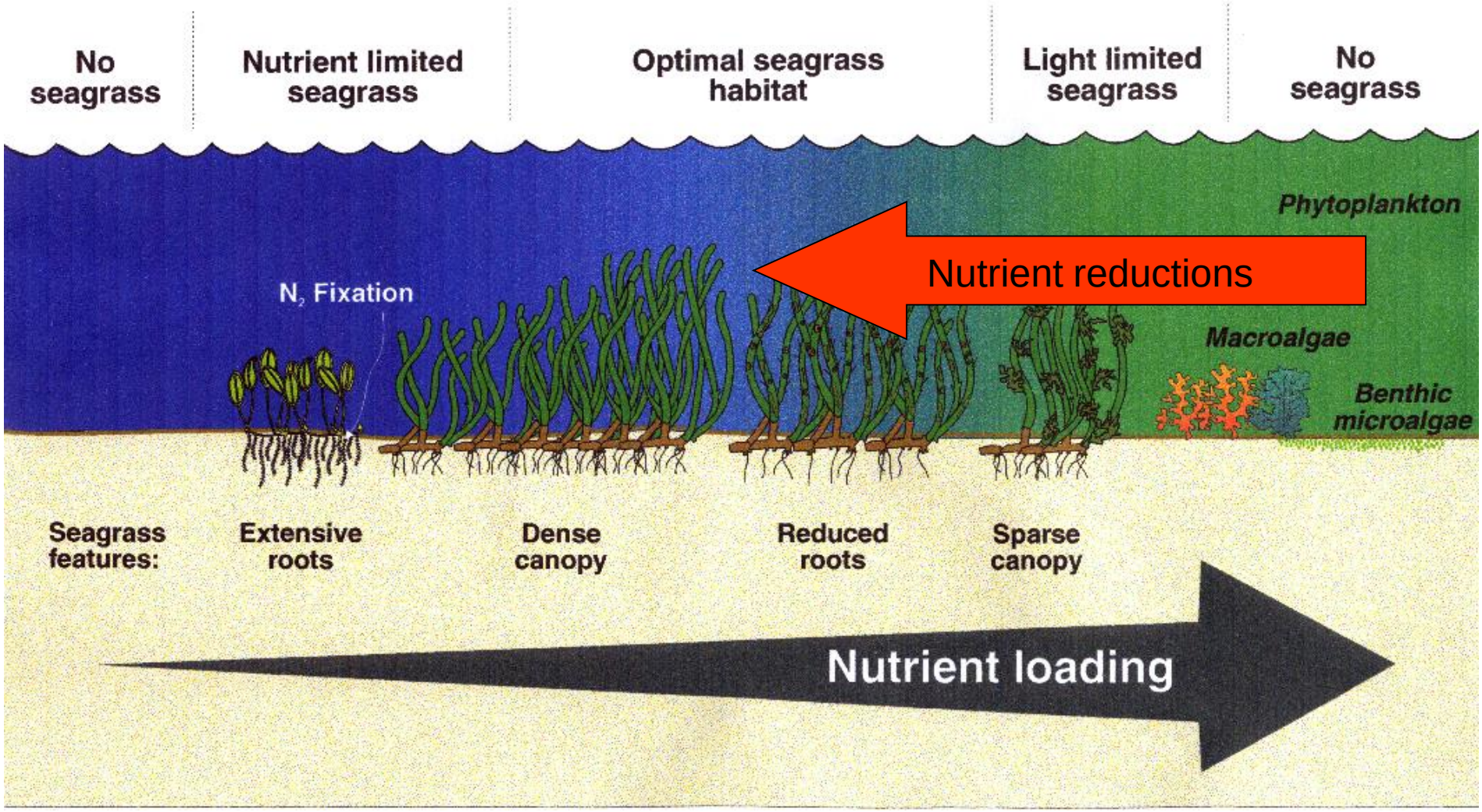
SAV HAVE HIGH LIGHT REQUIREMENTS

Plant	Min. light requirement (% of surface)
SAV/SEAGRASS	**5-37%**
Phytoplankton	0.5-1.0
Green algae	0.05-1.0
Brown algae	0.7-1.5
Red algae	0.0005

IMPAIRMENT = INCREASING LIGHT REQUIREMENTS

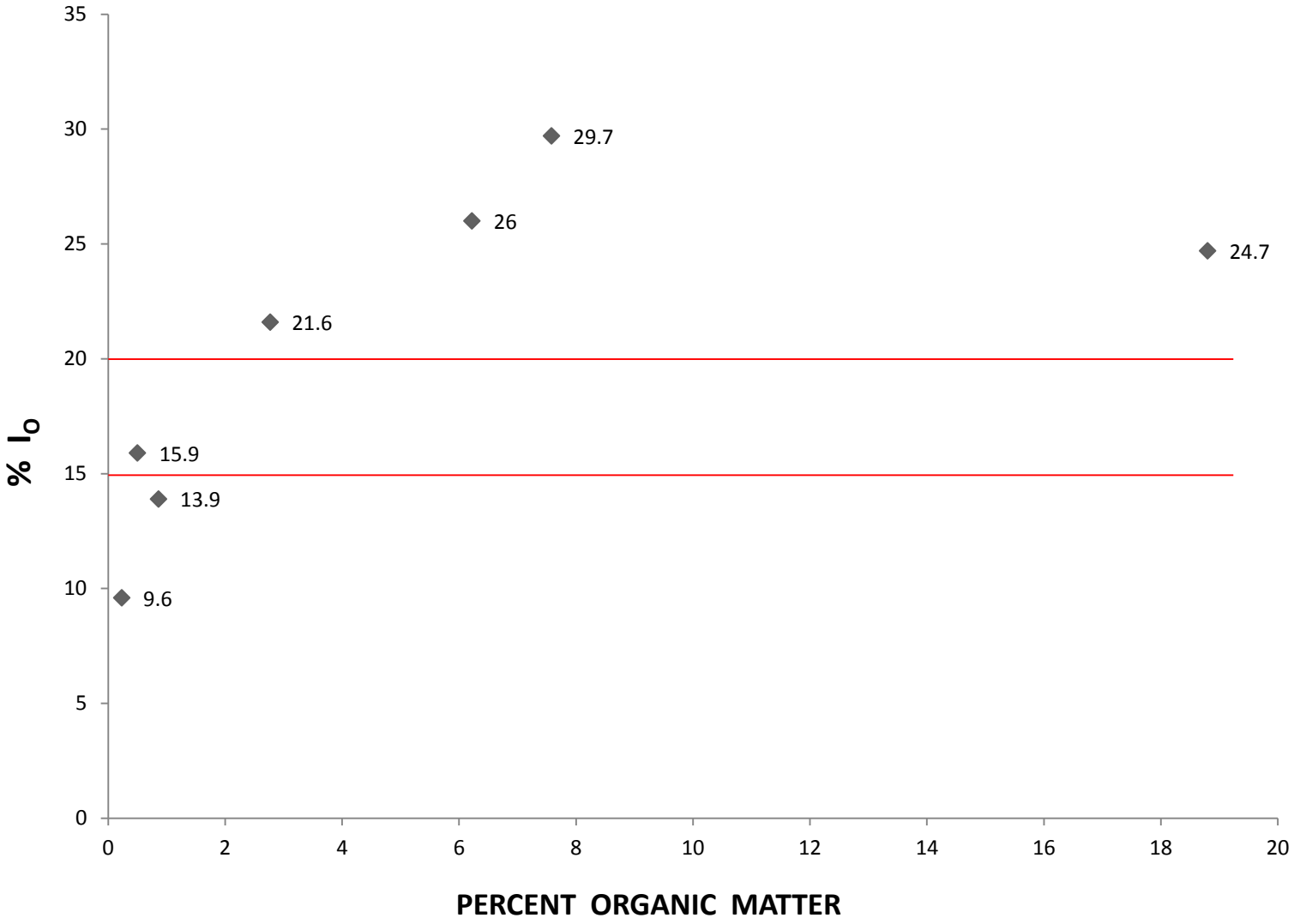


Reductions in loading can lead to seagrass recoveries



SEDIMENT OGANIC MATTER LOADING ?

PERCENT ORGANIC MATTER
vs.
SEAGRASS LIGHT REQUIREMENT



WATER SURFACE

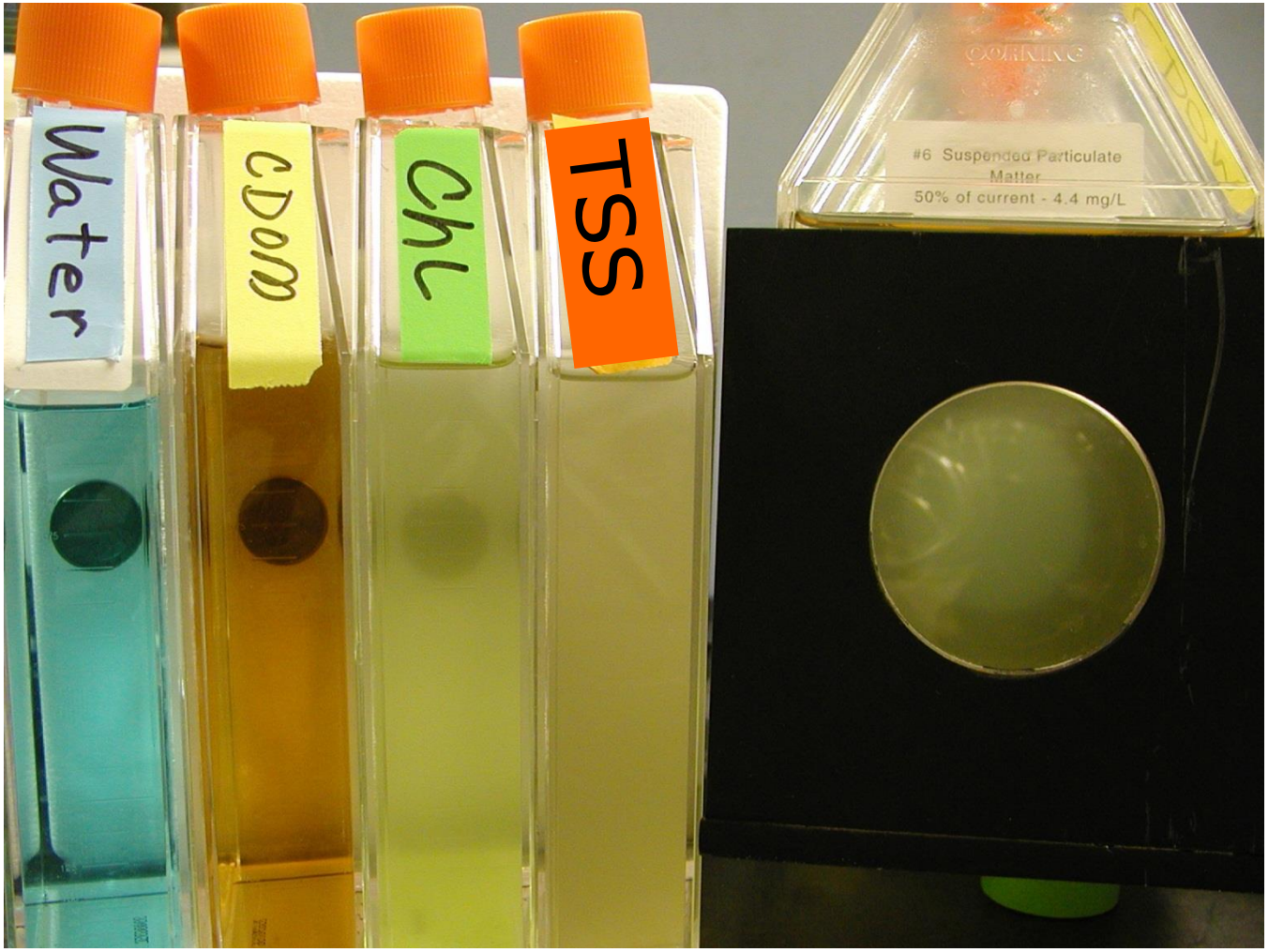
I_0 = Incident Light

Attenuated (-k)

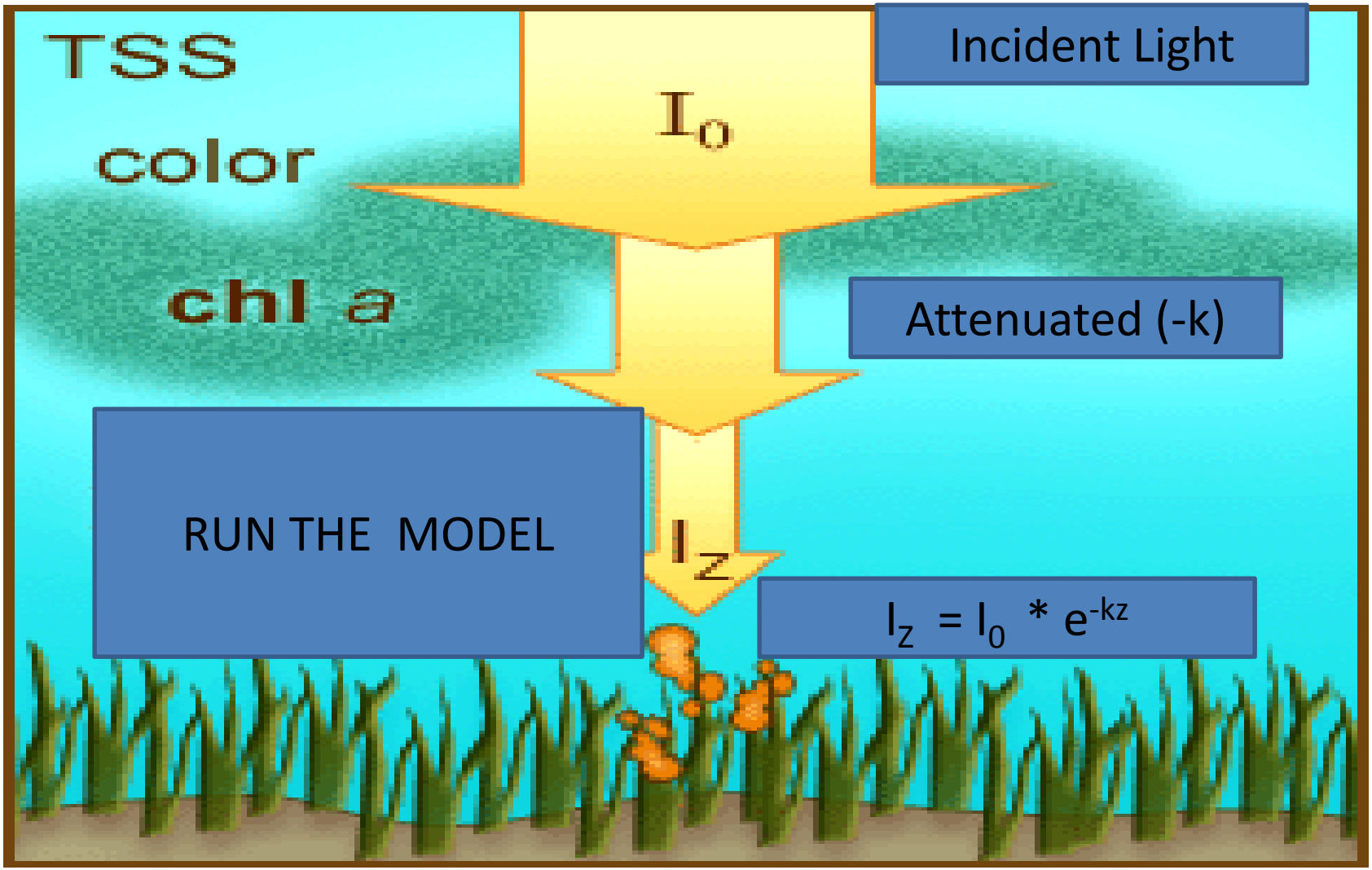
$I_z = I_0 * e^{-kz}$

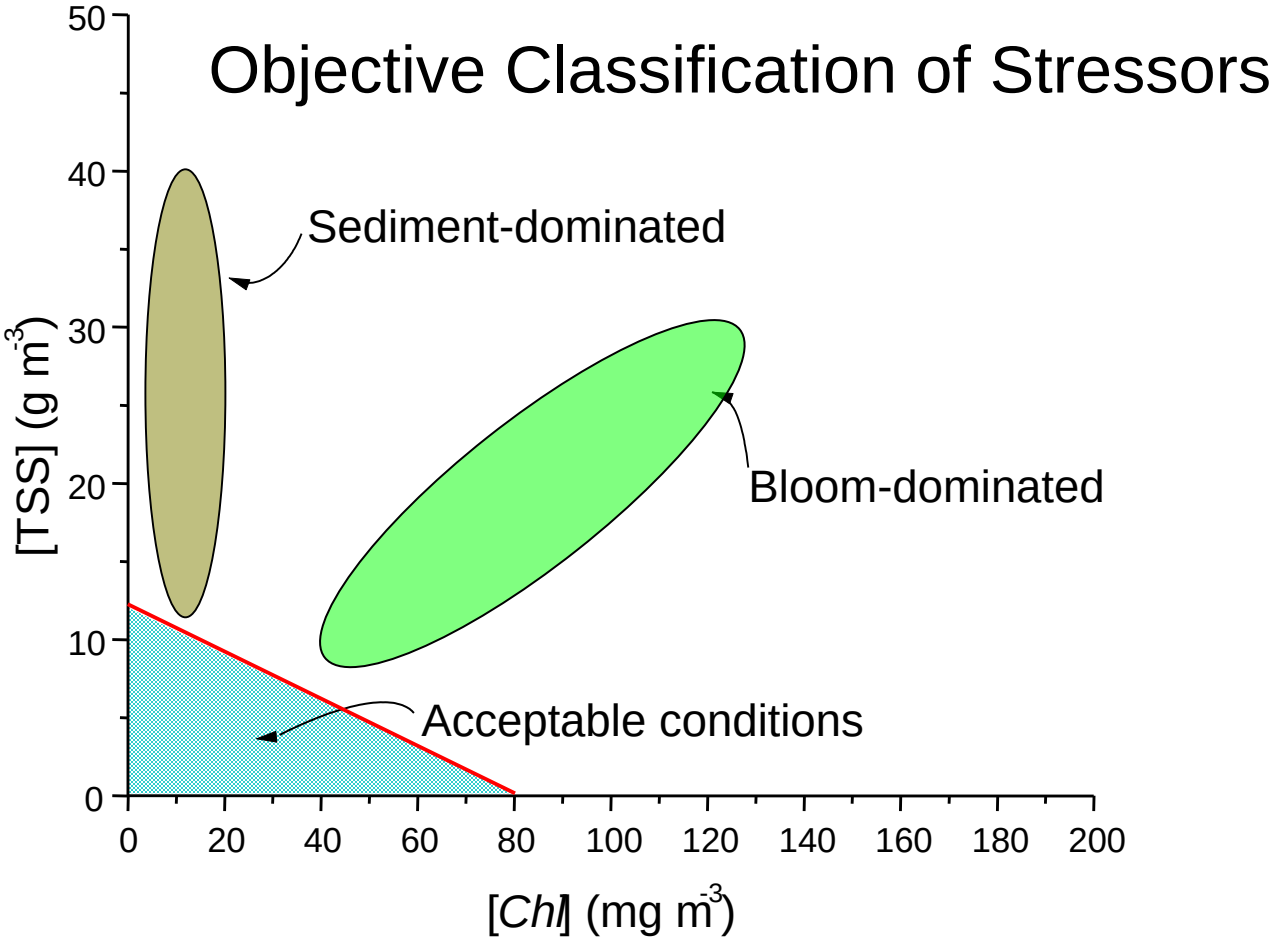
$(I_z / I_0) * 100 =$ % SI

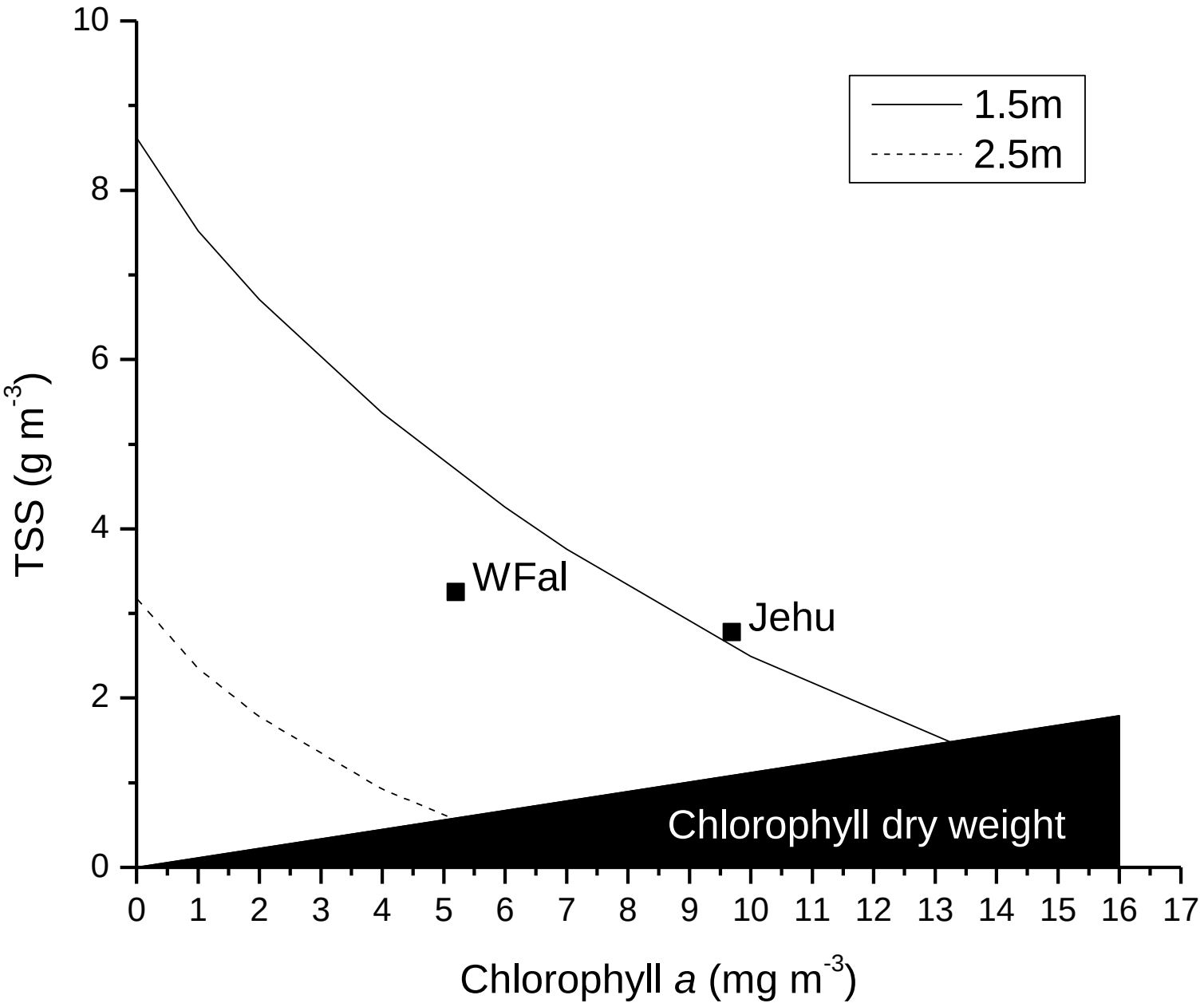
Optical Components of Water Quality Affecting the Growth of SAV



USE A BIOOPTICAL MODEL




Objective Classification of Stressors
Sediment-dominated
Bloom-dominated
Acceptable conditions
[TSS] (g m-3)
[Chl] (mg m-3)
0
10
20
30
40
50
0
20
40
60
80
100
120
140
160
180
200


1.5m
2.5m
WFal
Jehu
Chlorophyll dry weight
TSS (g m-3)
Chlorophyll a (mg m-3)
0
2
4
6
8
10
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

VIRGINIA

WATER CLARITY CRITERIA AS PERCENT LIGHT THROUGH-WATER

Based on the following parameters:

Depths; 0.25, 0.5, 0.75, 1.0, 1.25, 1.5, 1.75, 2.0 m

Salinity Regime;

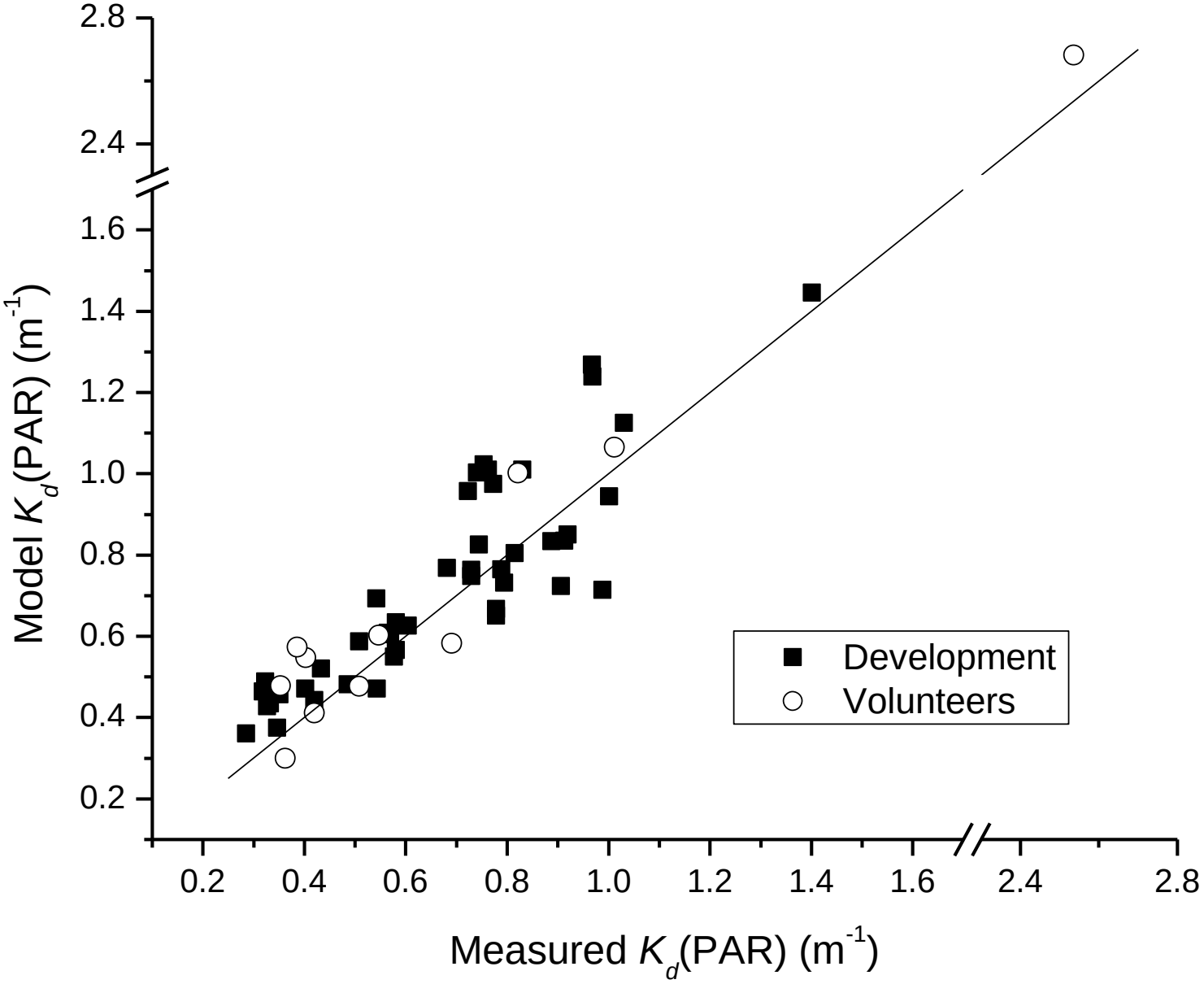
Temporal Application; Growing season means

Tidal-fresh- 13 %; April 1 - October 31; 0.2, 0.4, 0.5, 0.7, 0.9, 1.1, 1.2, 1.4

Oligohaline- 13 %; April 1 - October 31; 0.2, 0.4, 0.5, 0.7, 0.9, 1.1, 1.2, 1.4

Mesohaline- 22 %; April 1 - October 31; 0.2, 0.5, 0.7, 1.0, 1.2, 1.4, 1.7, 1.9

Polyhaline- 22 %; March 1 - May 31, September 1 - November 30; 0.2 0.5 0.7 1.0 1.2 1.4 1.7 1.9


2.8
2.4
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
Model K_d(PAR) (m^{-1})
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
2.4
2.8
Measured K_d(PAR) (m^{-1})
Development
Volunteers