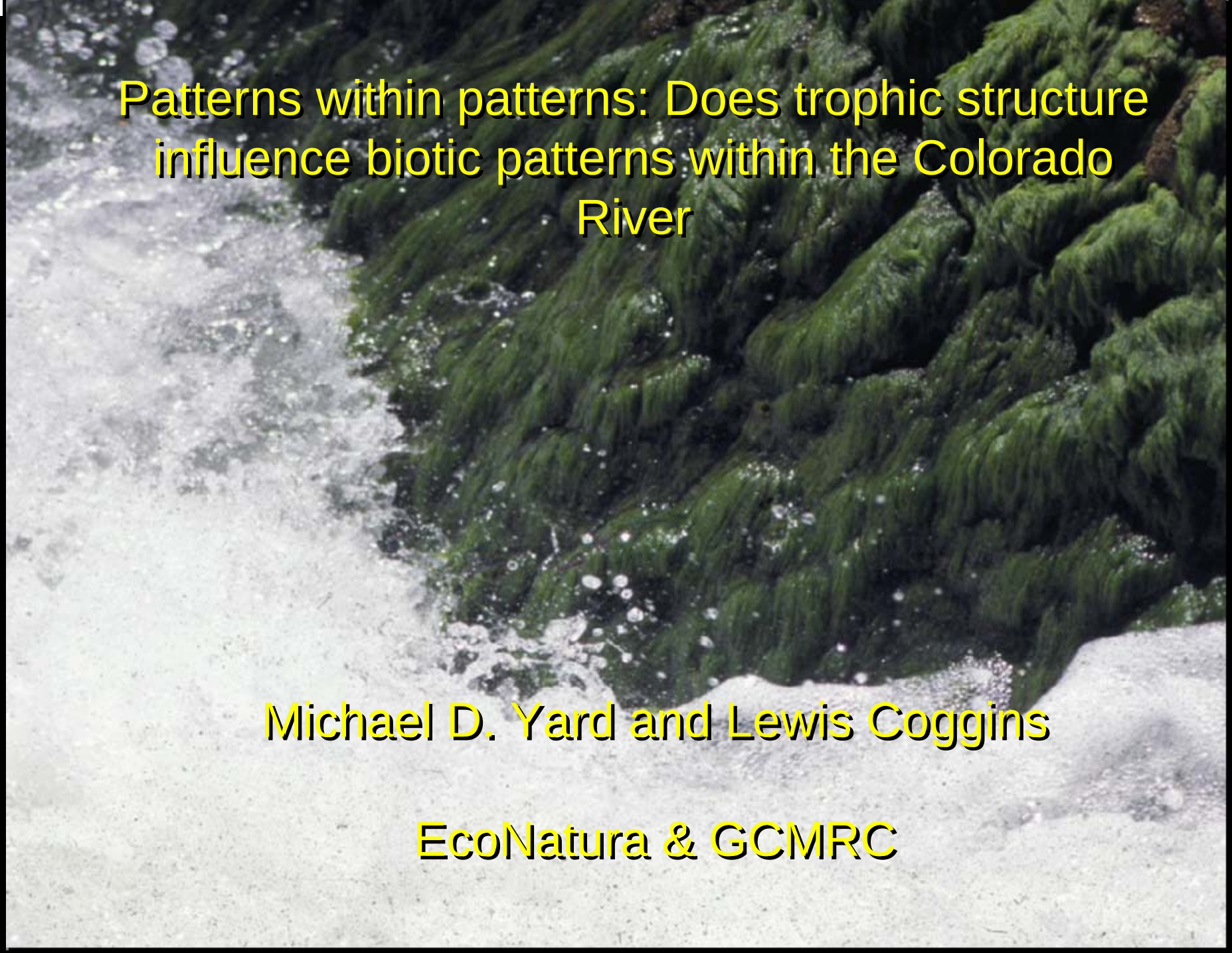


Patterns within patterns: Does trophic structure influence biotic patterns within the Colorado River

Michael D. Yard and Lewis Coggins

EcoNatura & GCMRC

TROPHIC FOOD WEB

LIGHT

PRIMARY PRODUCERS

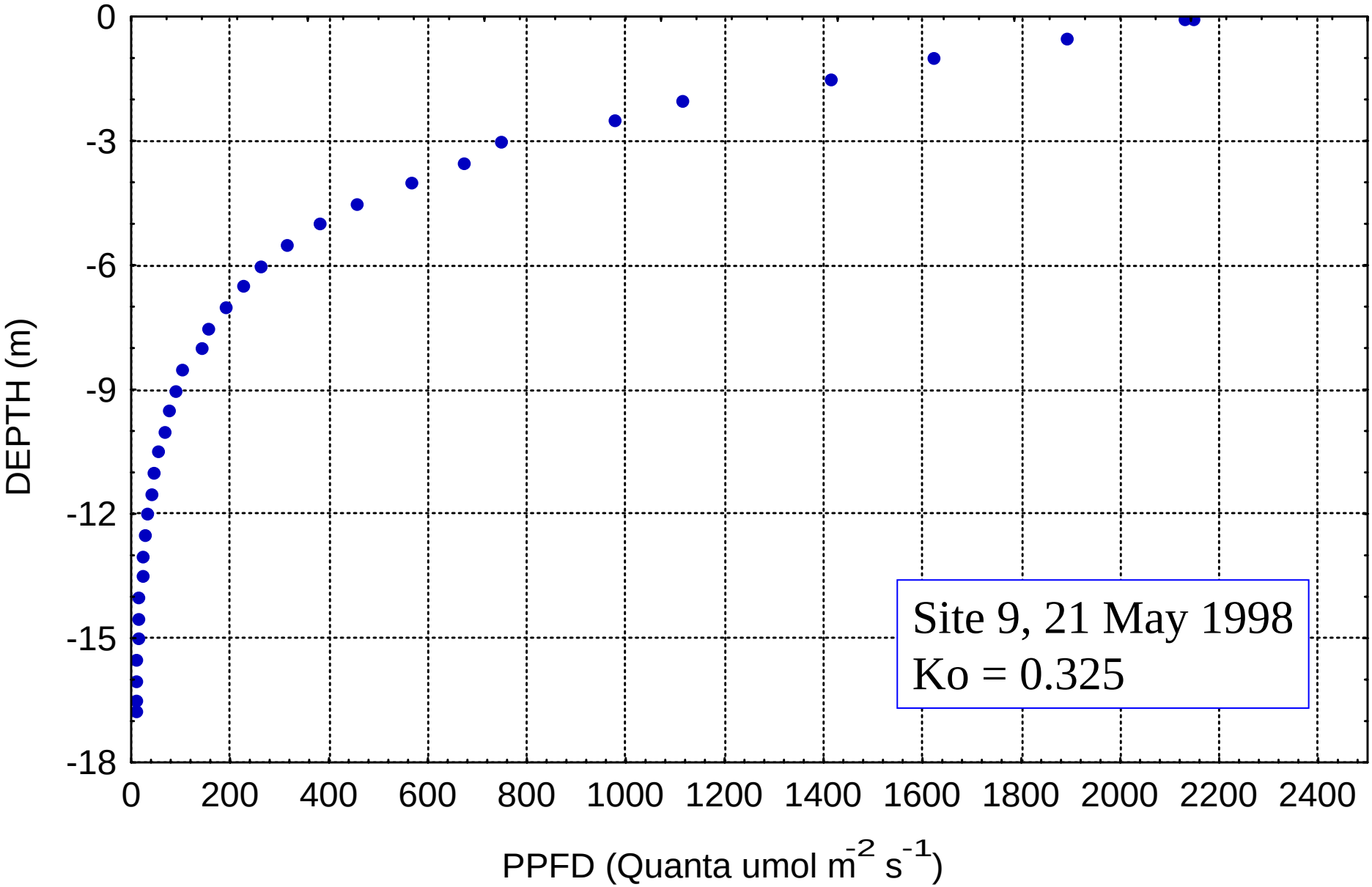
SUSPENDED SEDIMENT

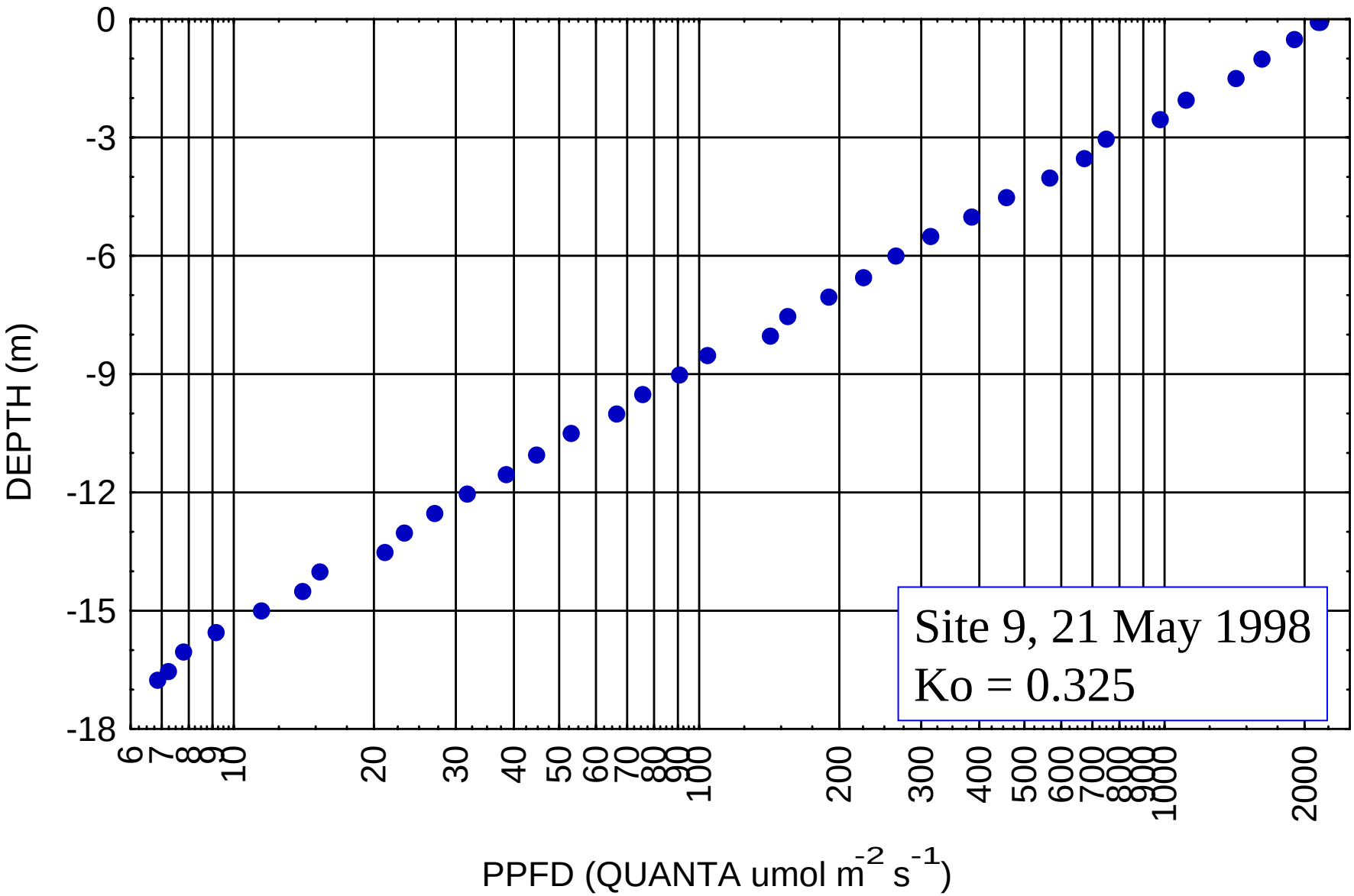
SECONDARY PRODUCERS

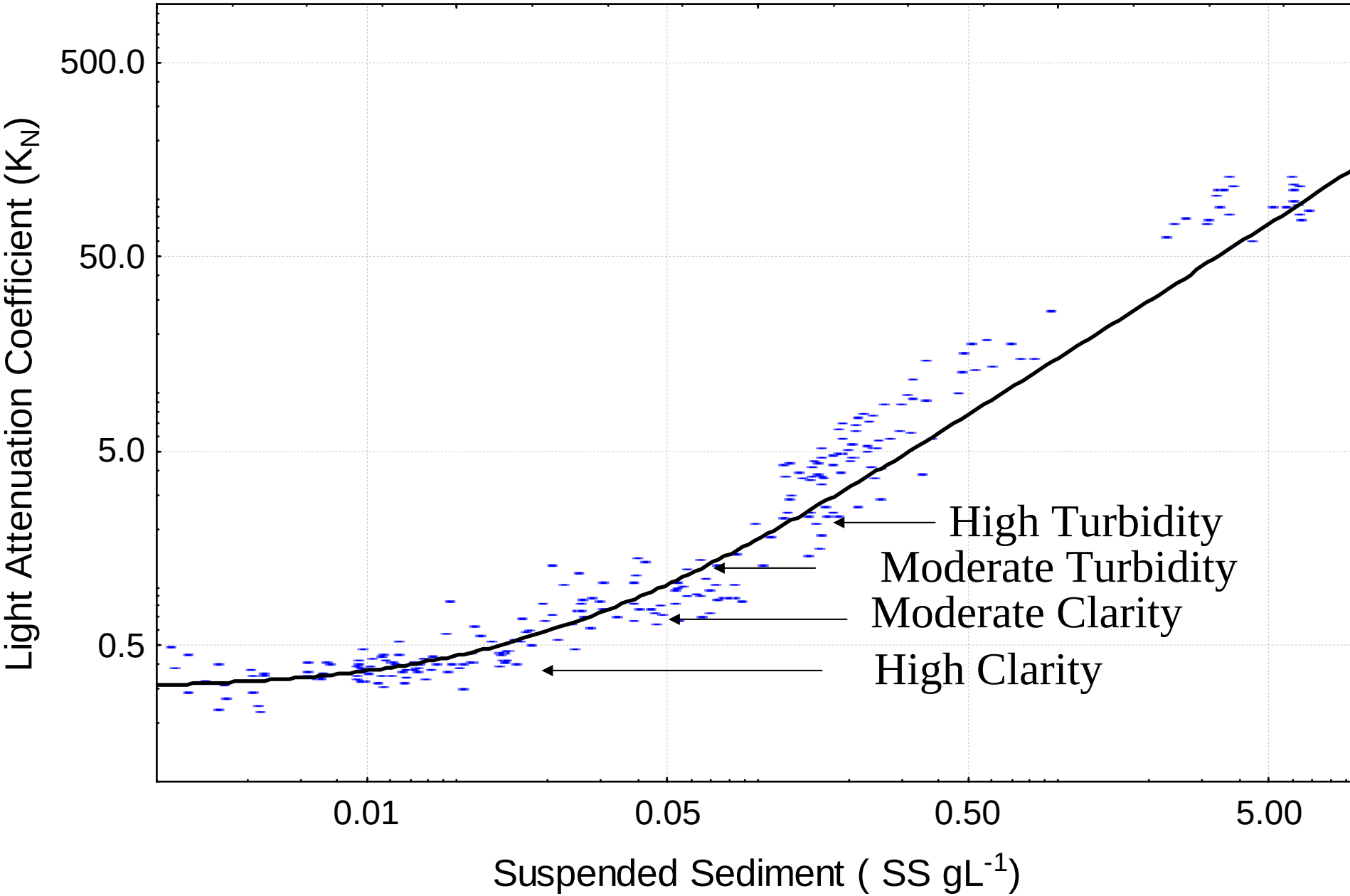
GRAZERS

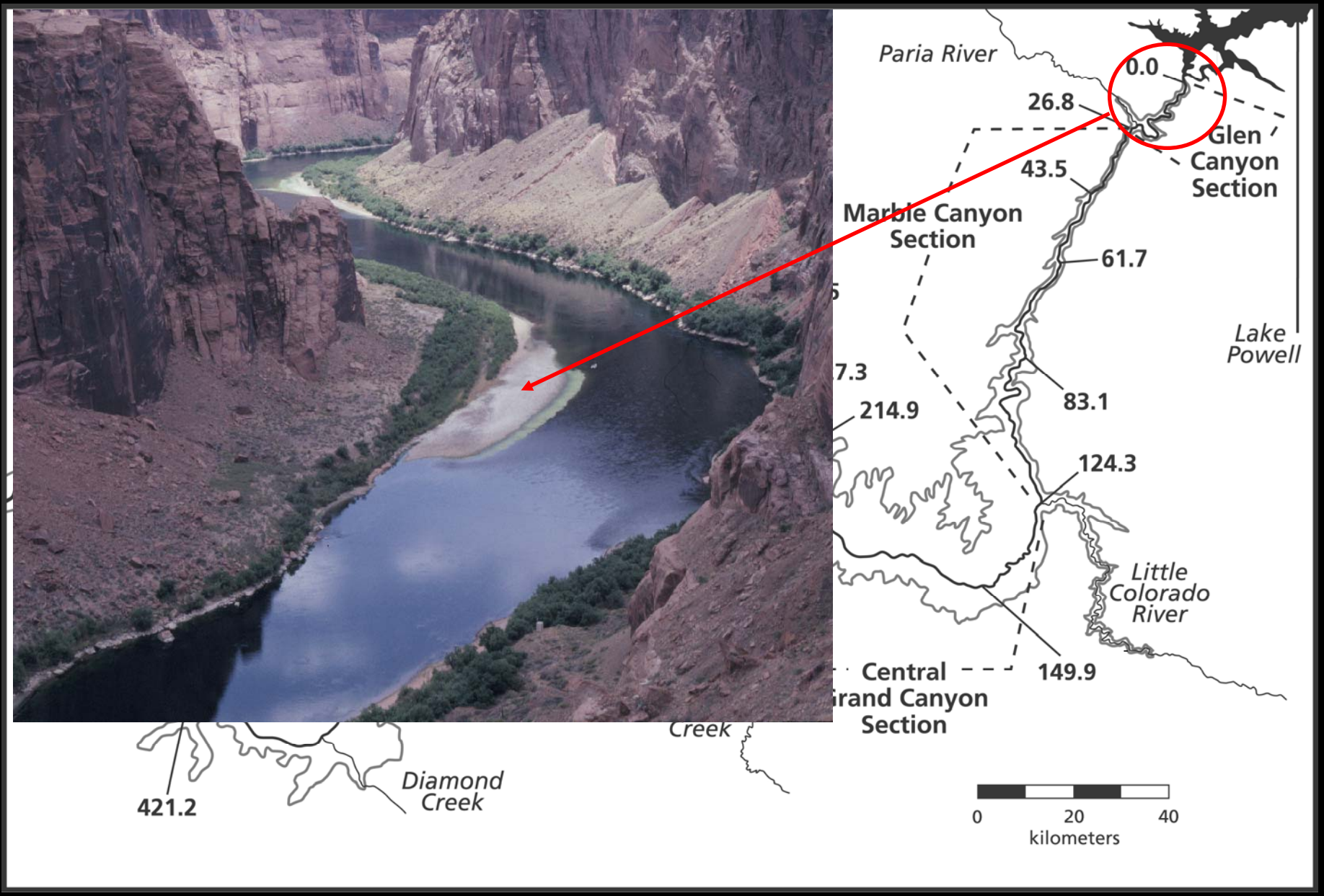
Gammarus & Chironomids

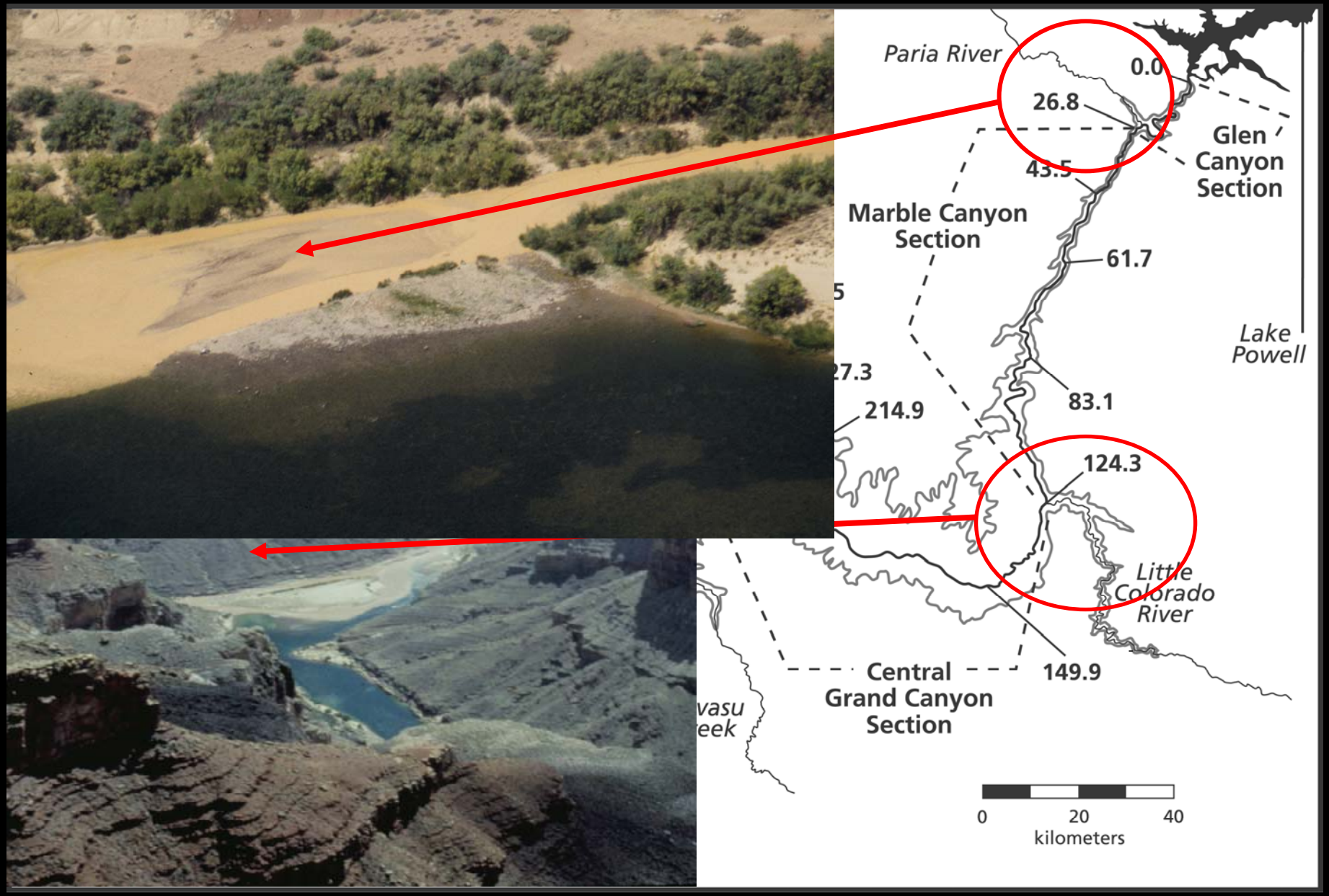
FISH


Site 9, 21 May 1998
Ko = 0.325
DEPTH (m)
0
-3
-6
-9
-12
-15
-18
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
PPFD (Quanta umol m-2 s-1)

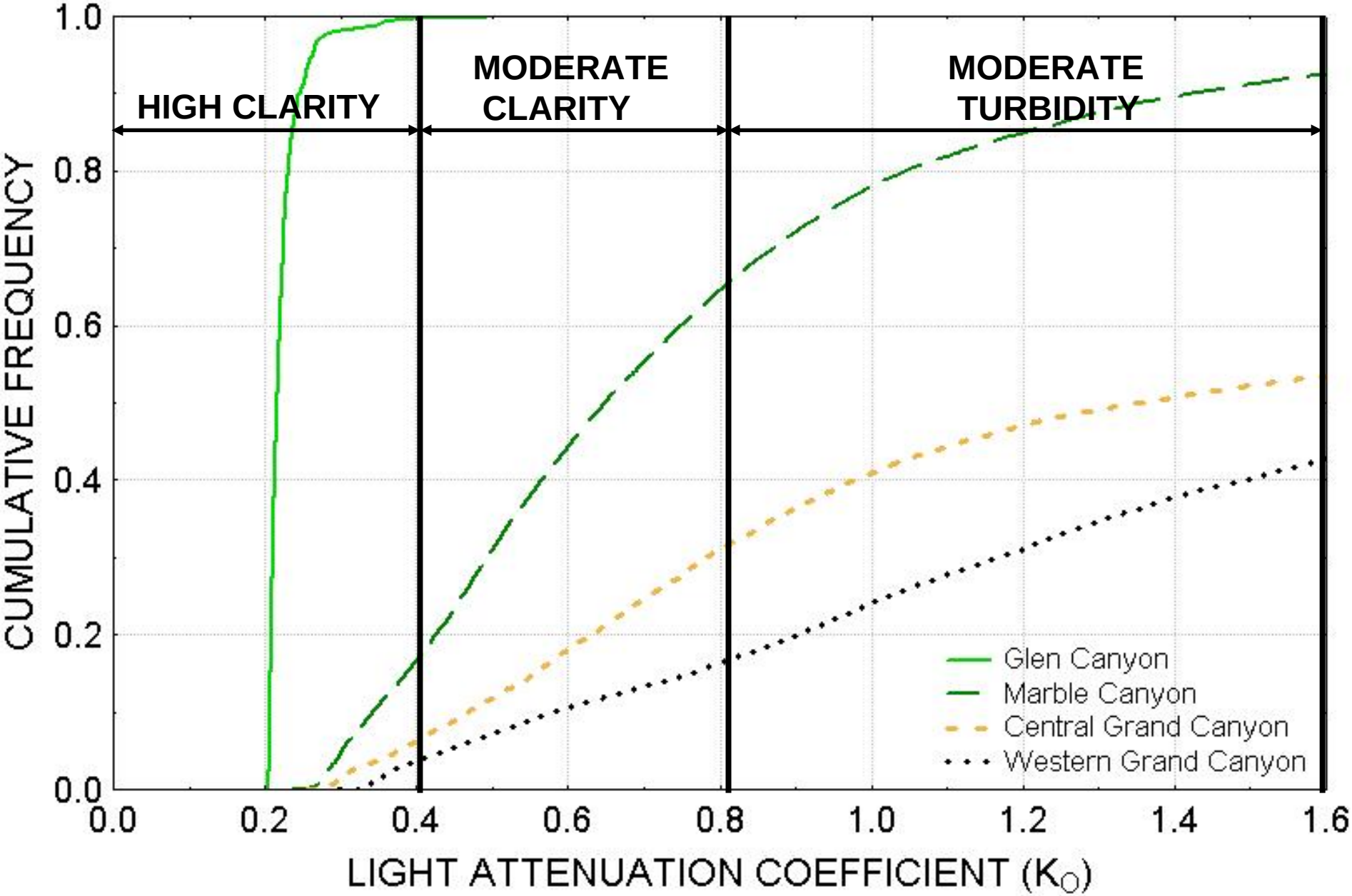

Site 9, 21 May 1998
Ko = 0.325
DEPTH (m)
0
-3
-6
-9
-12
-15
-18
PPFD (QUANTA umol m-2 s-1)
6
7
8
9
10
20
30
40
50
60
70
80
90
100
200
300
400
500
600
700
800
900
1000
2000


500.0
50.0
5.0
0.5
Light Attenuation Coefficient (K_N)
0.01
0.05
0.50
5.00
Suspended Sediment (SS gL^{-1})
High Turbidity
Moderate Turbidity
Moderate Clarity
High Clarity

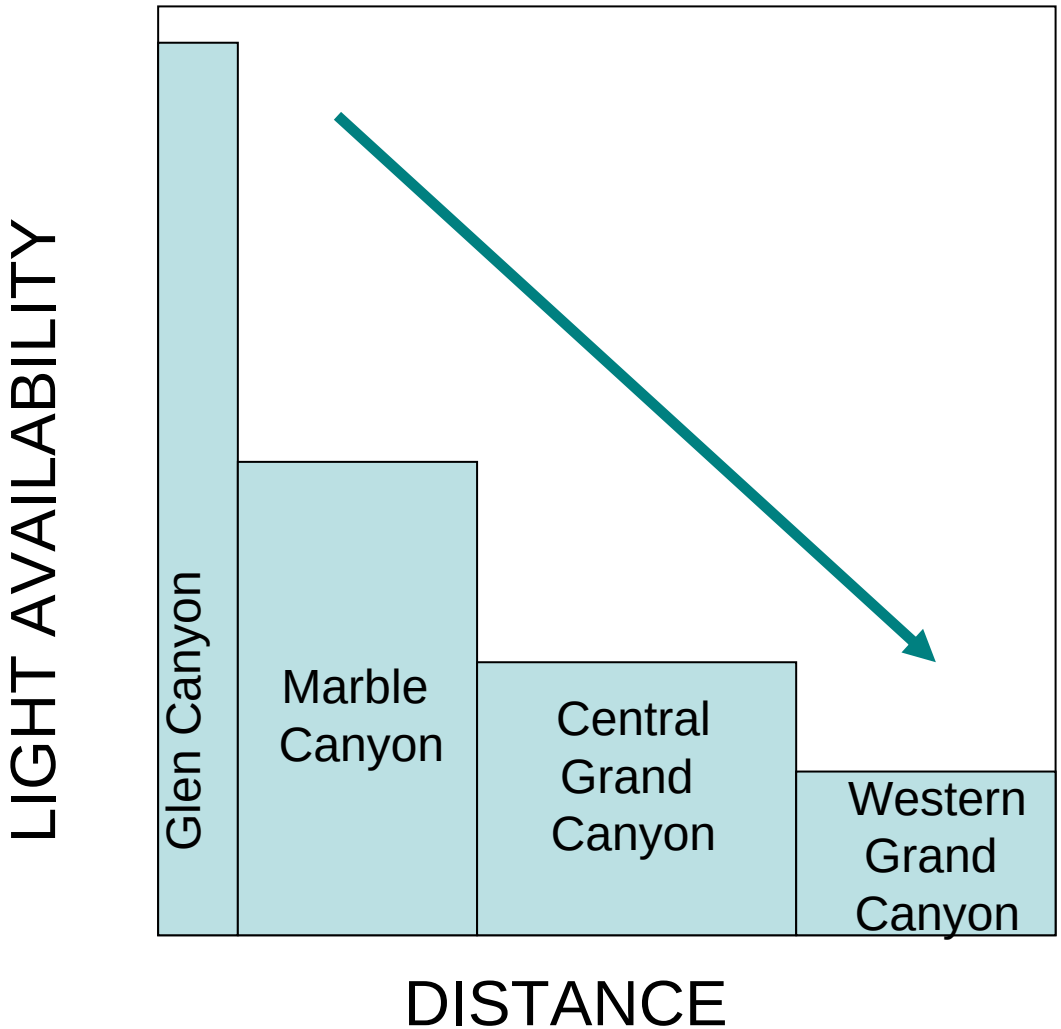

Paria River
0.0
26.8
Glen
Canyon
Section
43.5
Marble Canyon
Section
61.7
Lake
Powell
7.3
214.9
83.1
124.3
Little
Colorado
River
Central
irand Canyon
Section
149.9
Creek
Diamond
Creek
421.2
0
20
40
kilometers

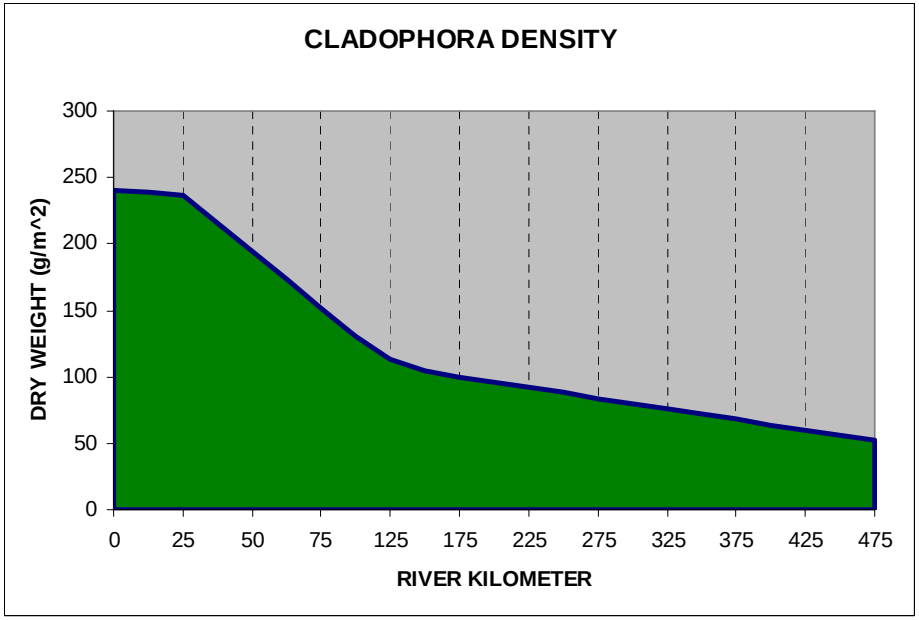

Paria River
0.0
26.8
43.5
Glen Canyon Section
Marble Canyon Section
61.7
Lake Powell
83.1
214.9
124.3
Little Colorado River
149.9
Central Grand Canyon Section
0
20
40
kilometers

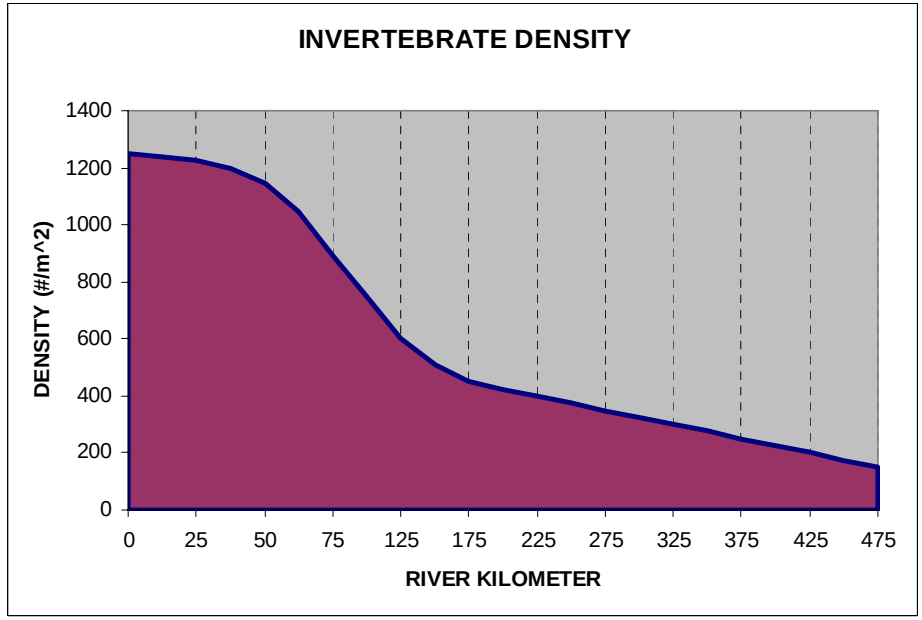
Mean Daily Light Attenuation Coefficients



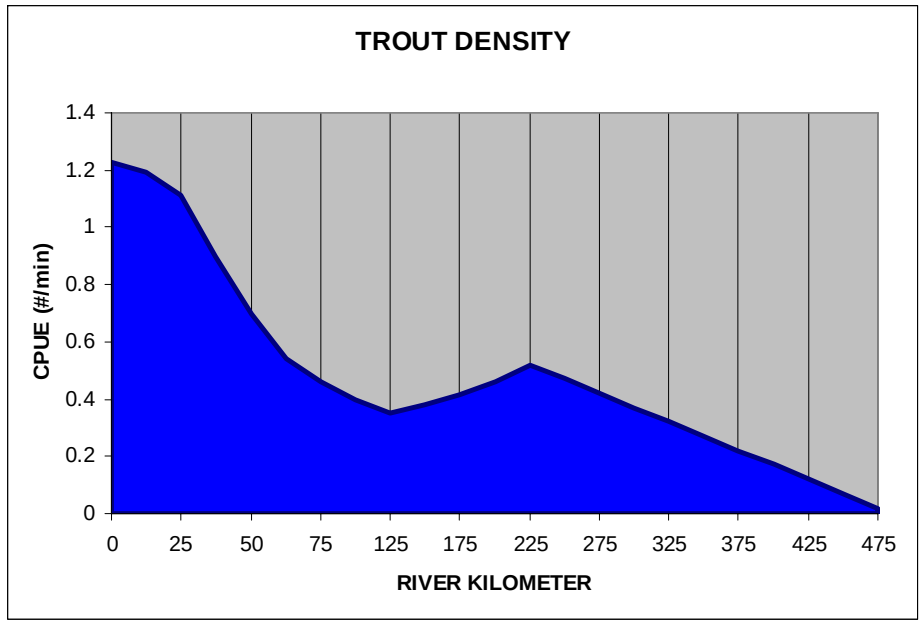
Stair-step decrease in light availability

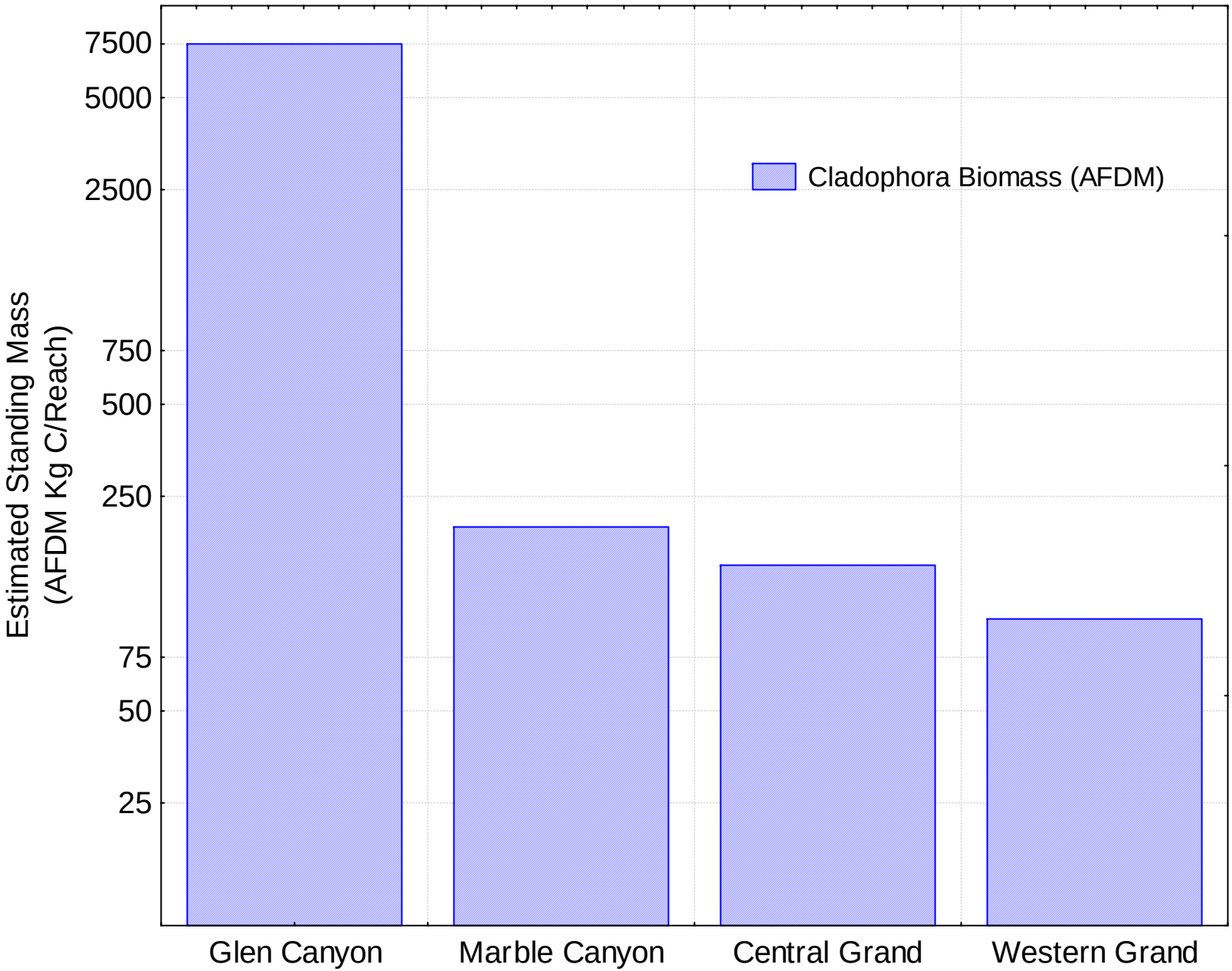




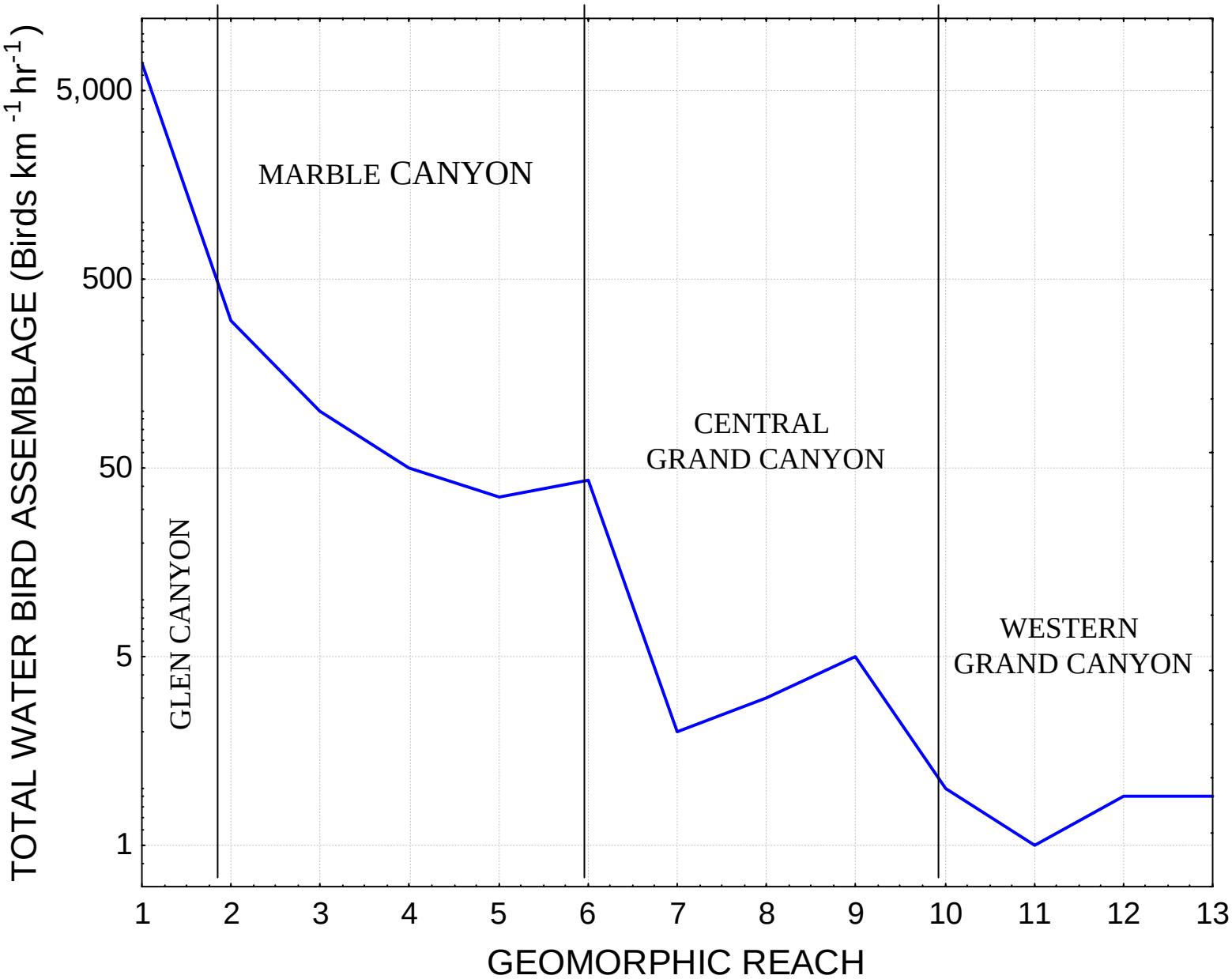


Usher et al. 1987
Carothers et al. 1981
Carothers and Brown 1990



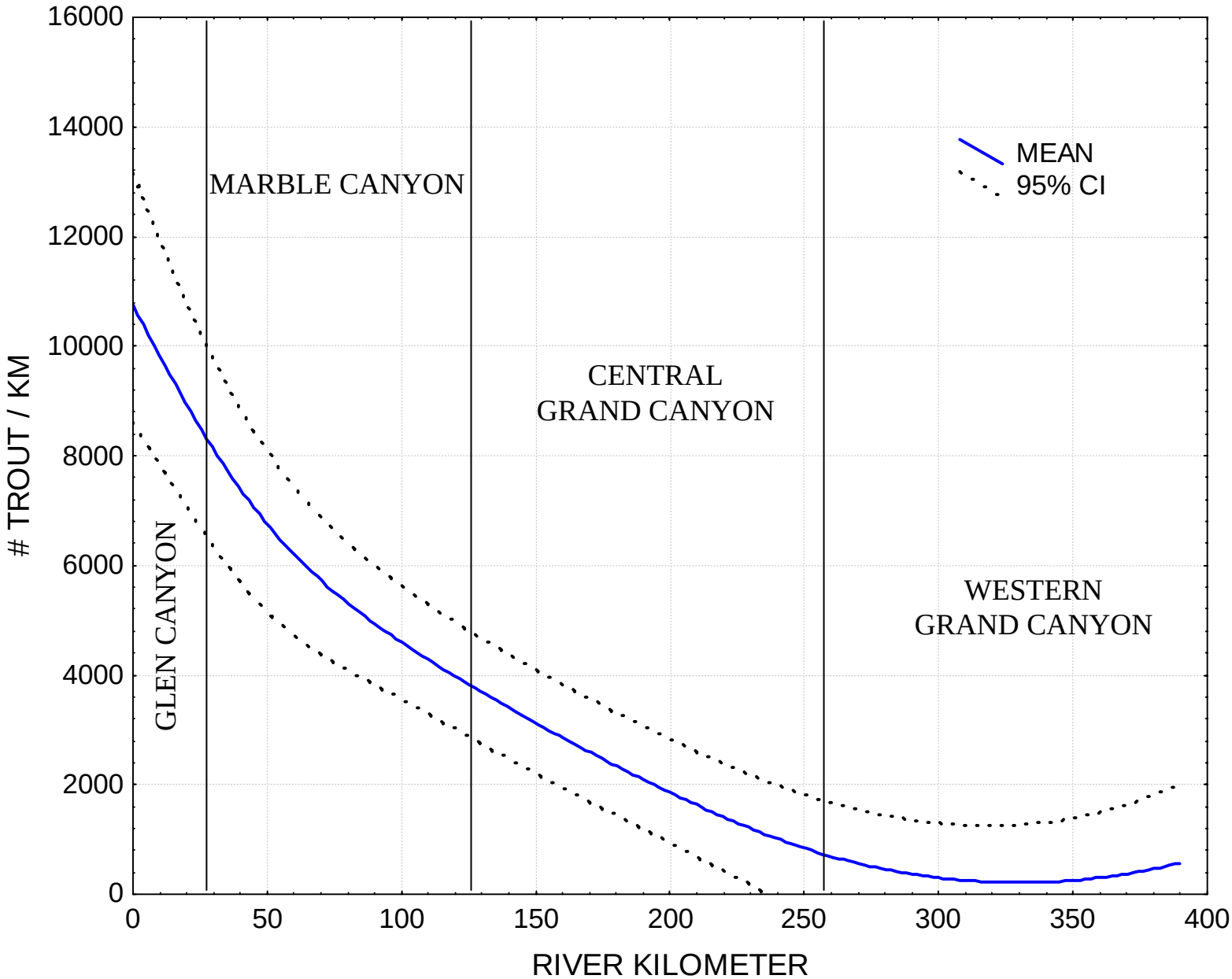


Stevens *et al*. (1997a)

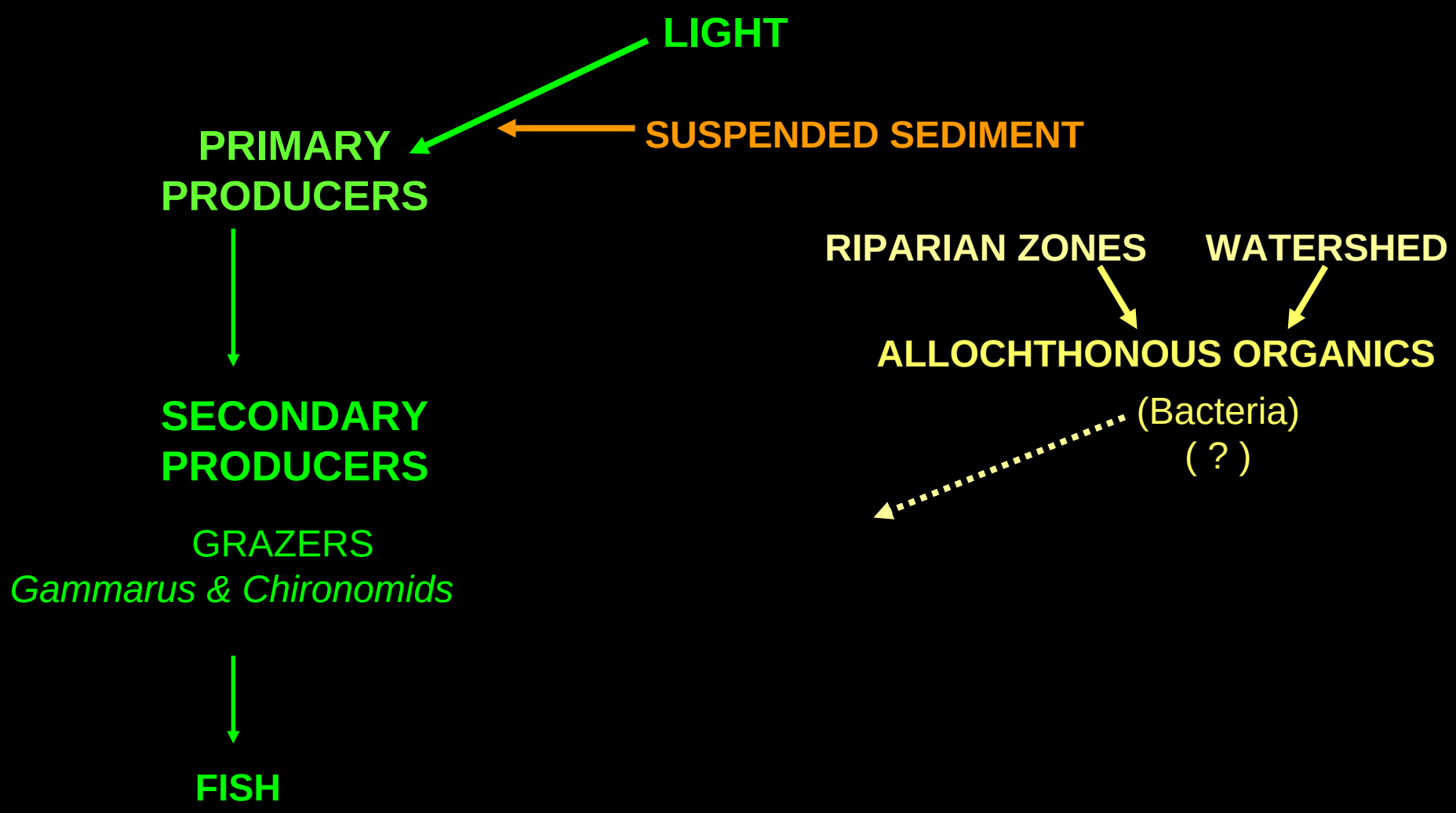


Stevens *et al*. (1997b)

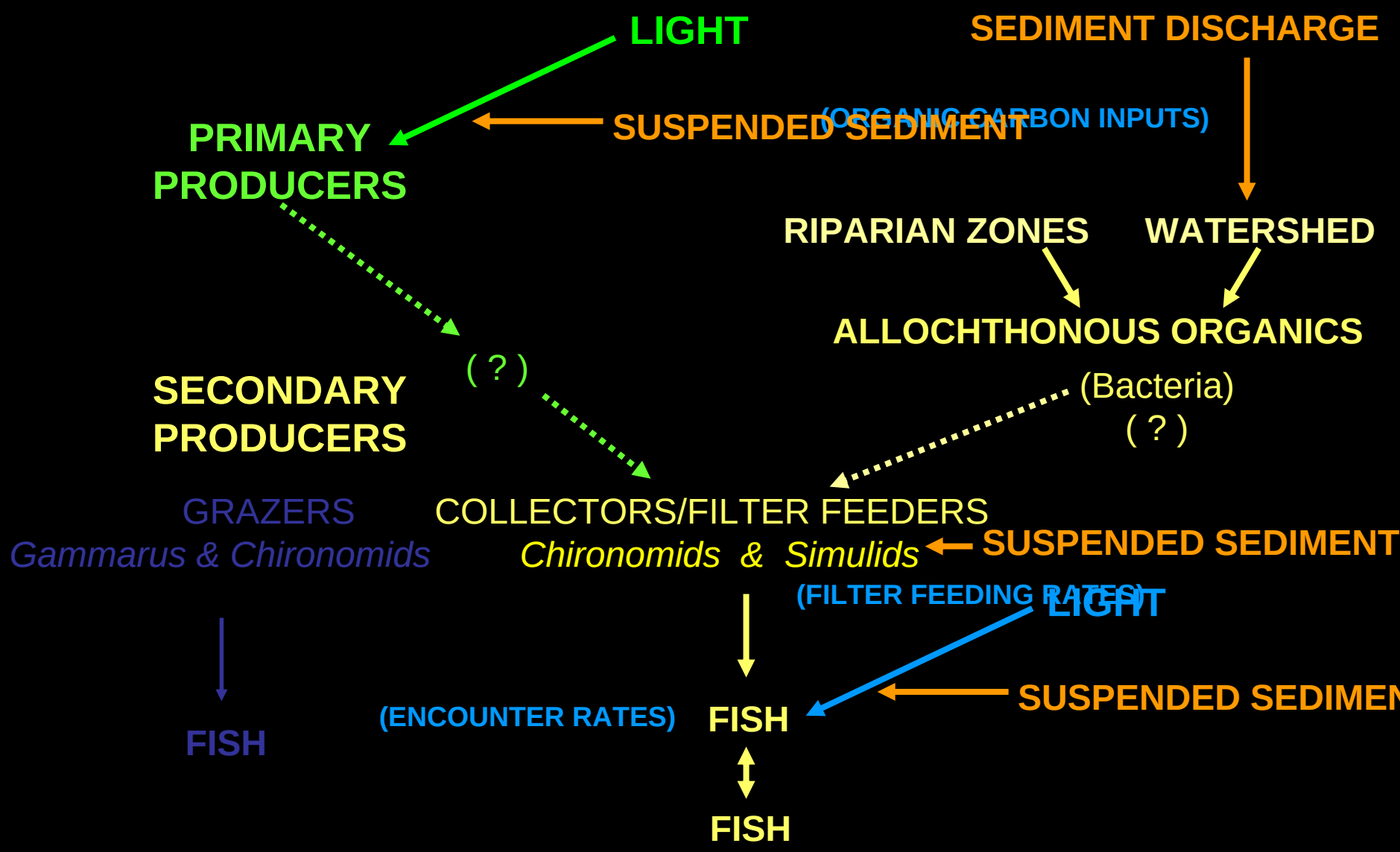
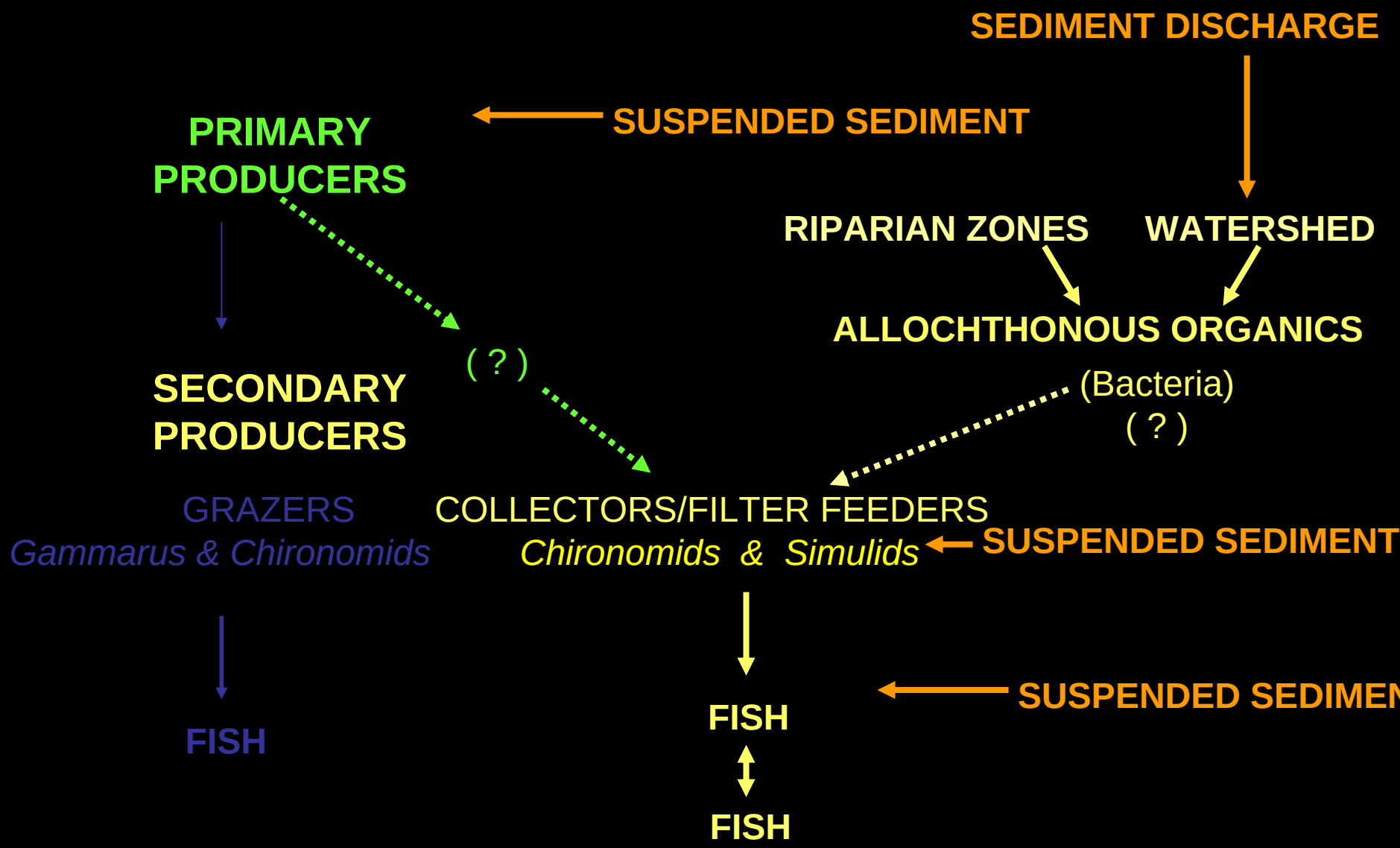
Arizona Game and Fish, Dept (1999, 2001)



TROPHIC FOOD WEB



TROPHIC FOOD WEB



TROPHIC FOOD WEB