Benthic Nutrient Cycling at the Coastal Bays Land-Sea Interface: Investigation of Ammonium Sources

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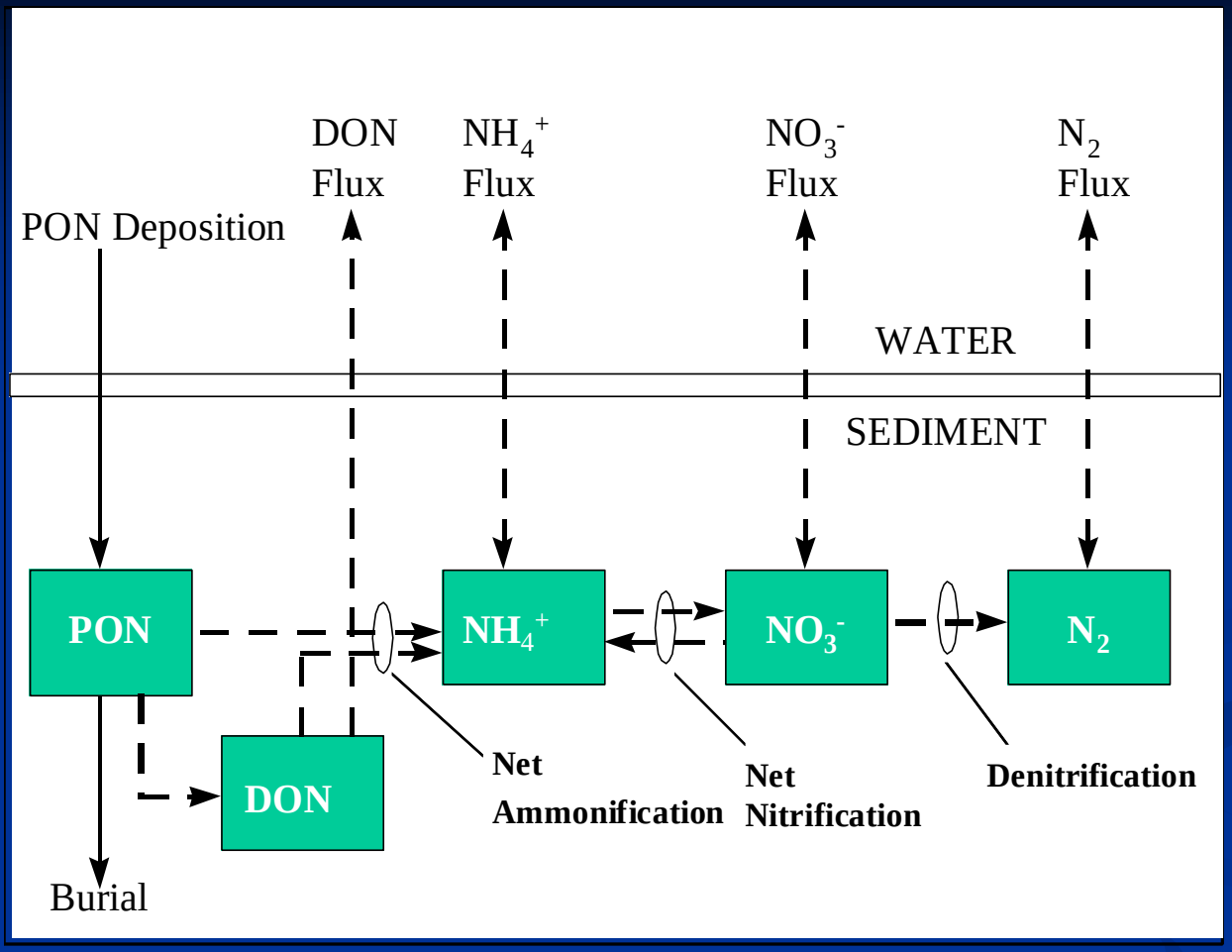
Questions

- Are wetlands a potential N source, primarily through transformation of NO_3^- to NH_4^+?
- Are sediments a key source of internal N for phytoplankton growth in Johnson Bay?



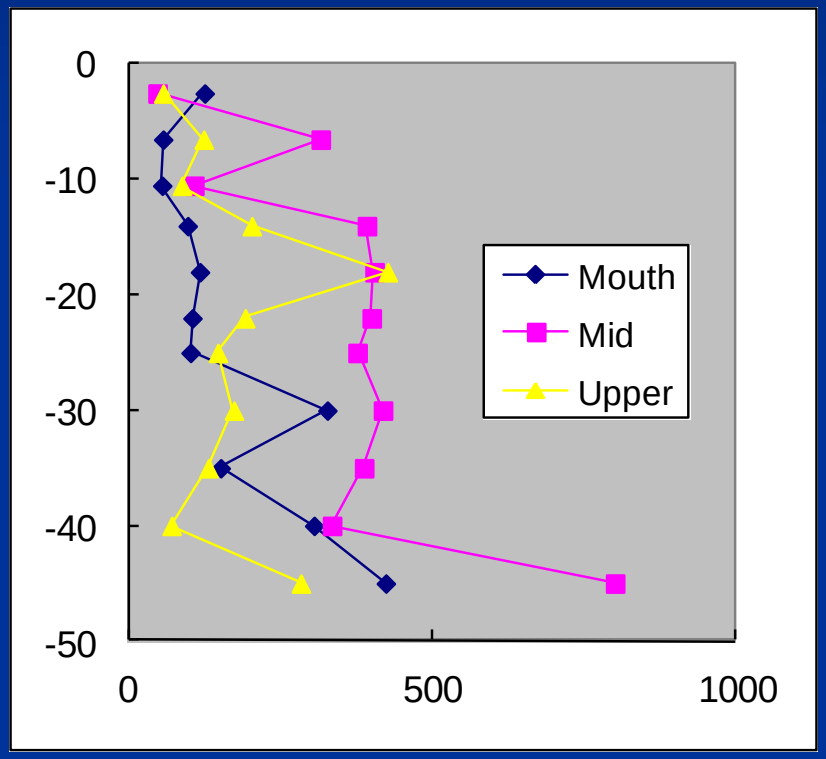
Denitrification: $NO_x \rightarrow N_2$

DNRA: $NO_x \rightarrow NH_4^+$

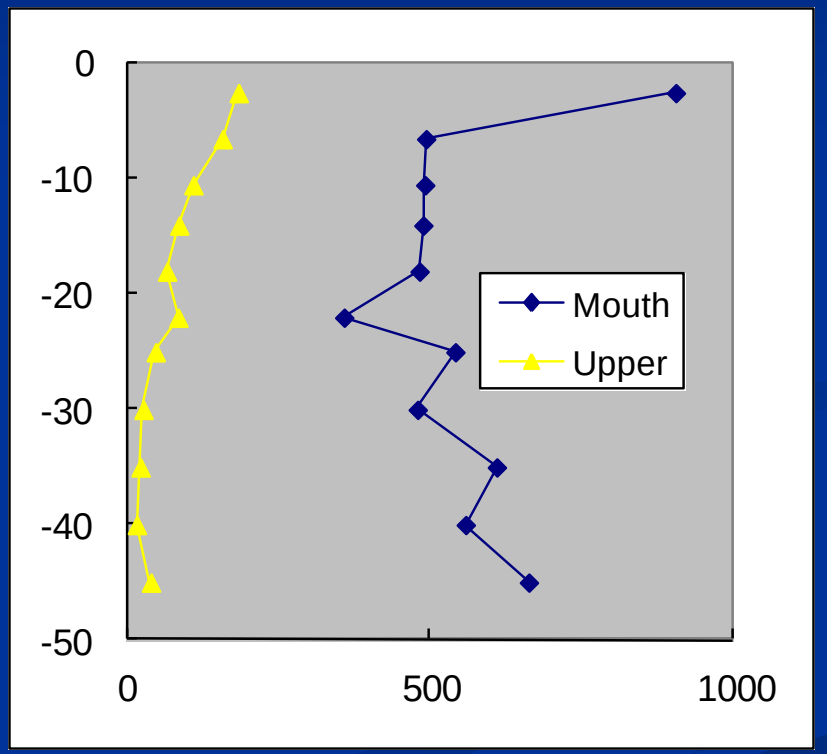

Powell Creek
Boxiron Creek
Union Greenbackville Cemetery
State Line Rd
State Route 679
Prudential Carruthers Realtors
Custom Dr
Ballast Rd
Davey Jones Blvd
Doubloon Ct
Galleon Ct
Captains Courtdor
Shad Landing State Park
Pocomoke River State Forest
Worcester Hwy
113
703
366
12
Snow Hill Rd
S Church St
EA Vaughn Wildlife Mgt Area
Purnell Pond
Brockatonorton Bay
Martin Bay
Rowley Cove
Johnson Bay
Chincoteague Bay
Parker Bay
Purnell Bay
Assateague Island
Green Run Bay
Assateague Island National Seashore
Pope Bay
West Bay
Maryland
Virginia
Calfpen Bay

2011 Data

Pore Water Ammonium µmol L^{-1}



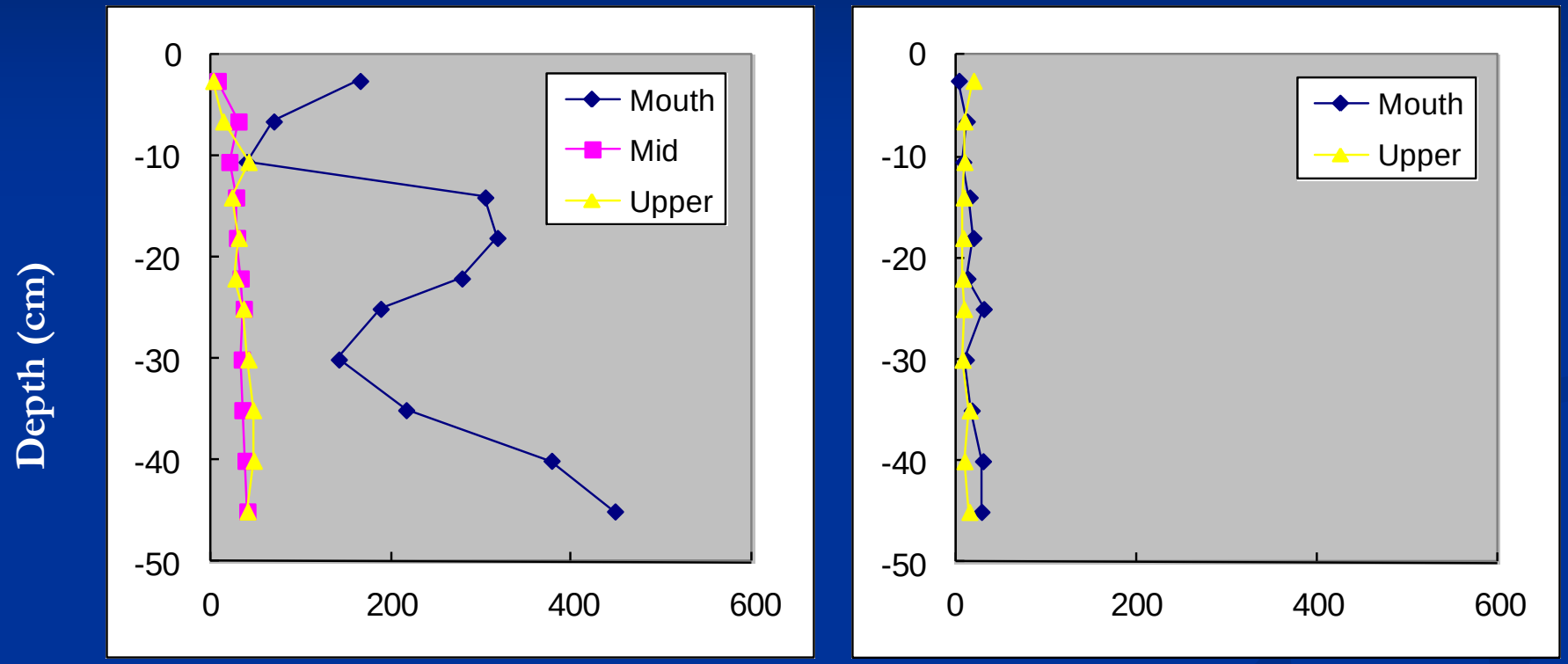
Scarborough Creek



Boxiron Creek

2011 Data

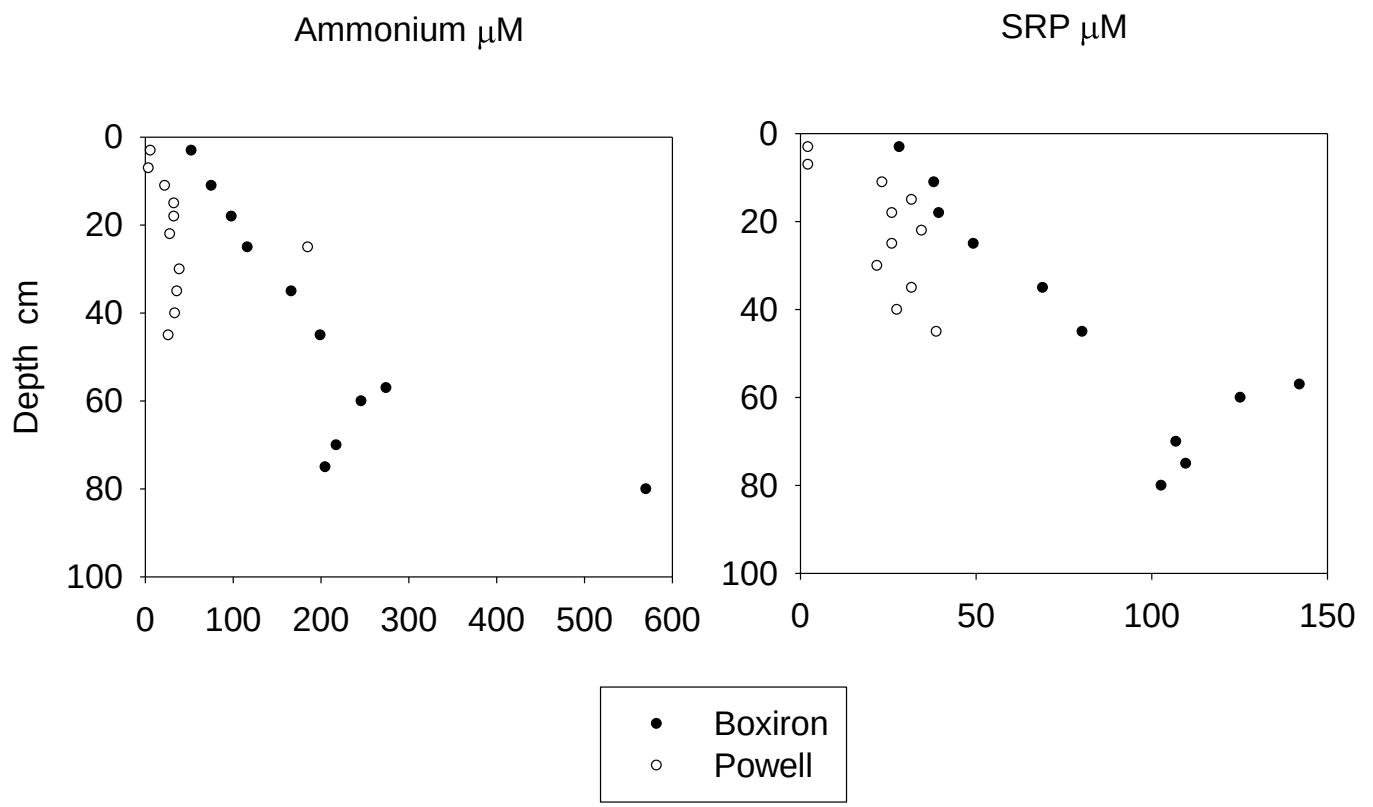
Pore Water SRP µmol L^{-1}



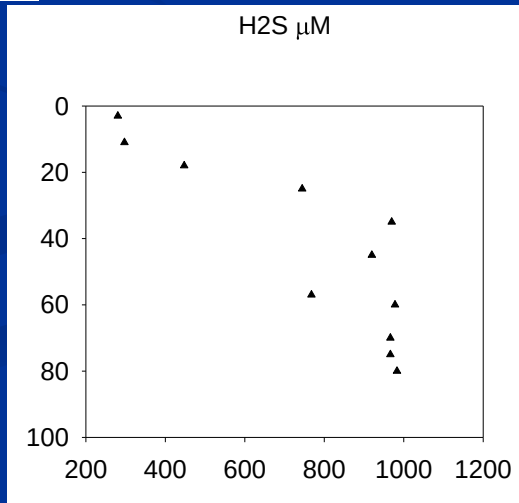
Scarborough Creek

Boxiron Creek

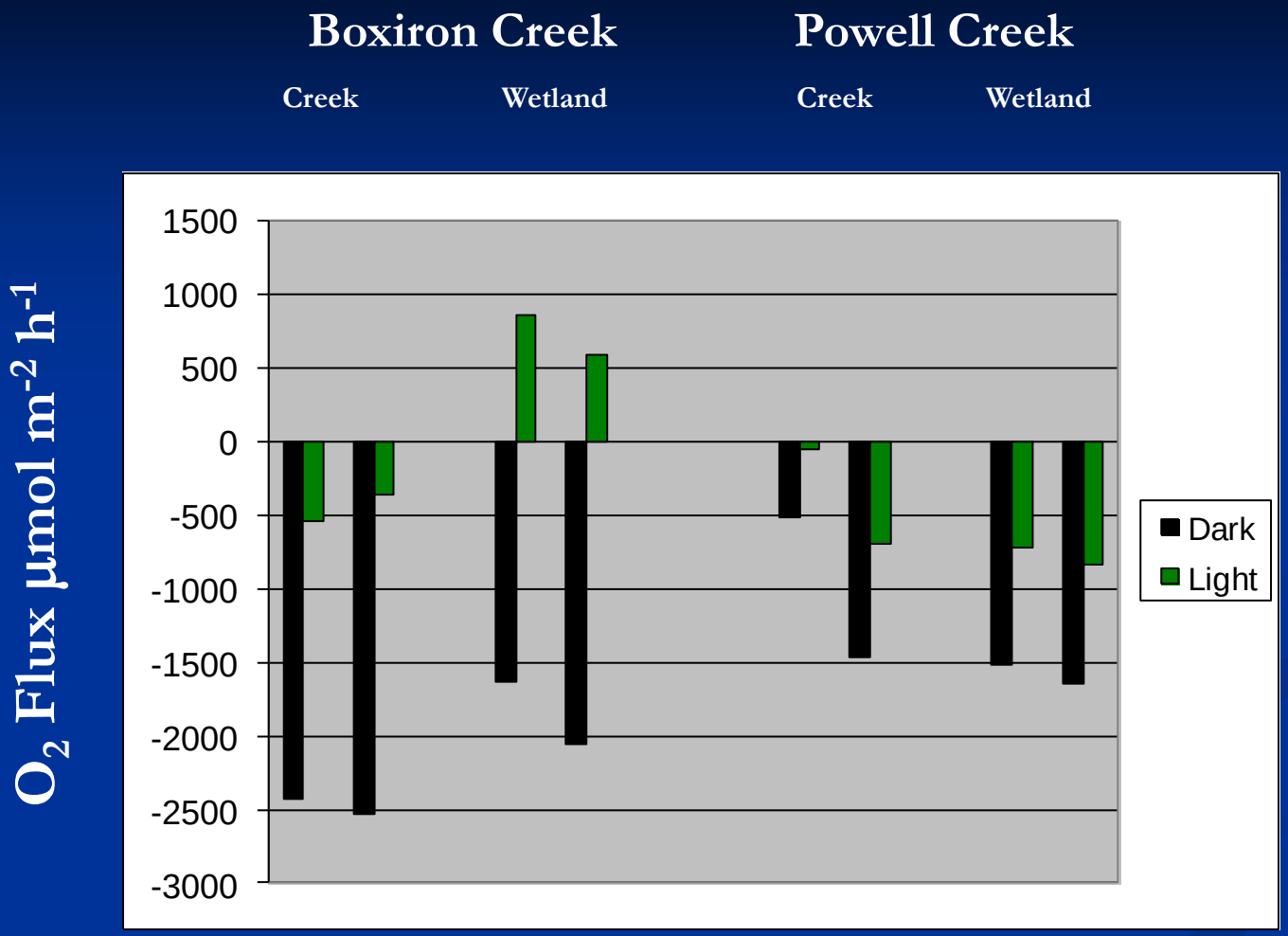
2012 Data

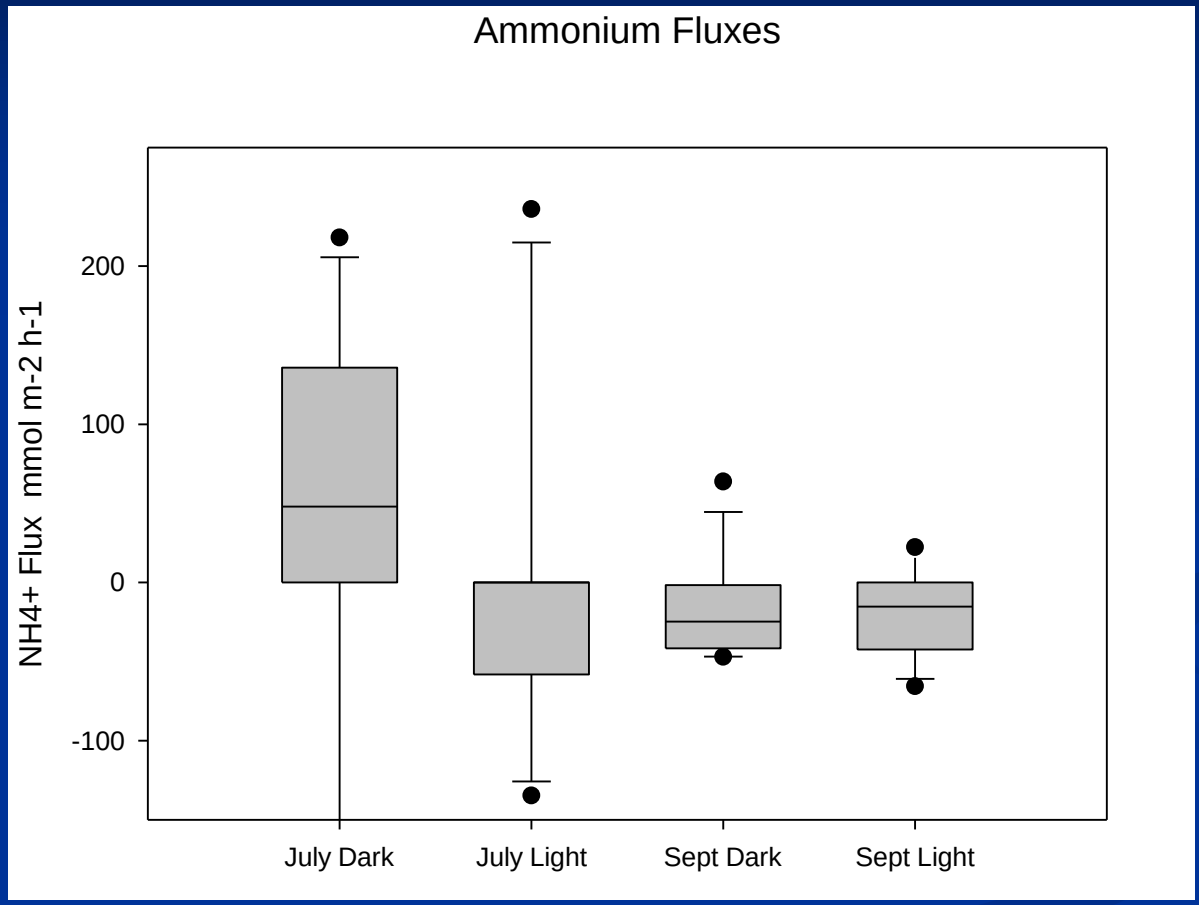


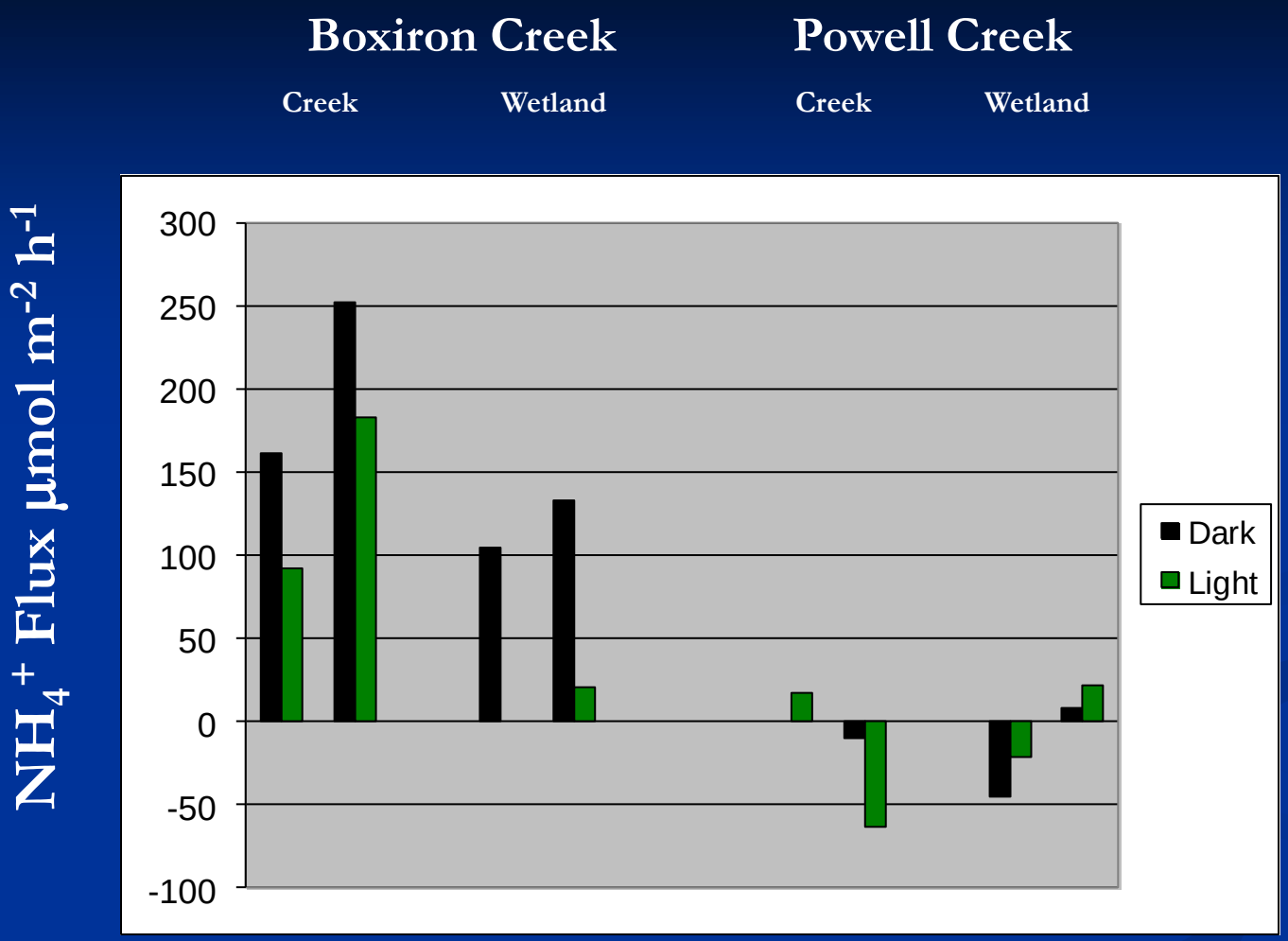
Boxiron: Bottom of equilibrator had sand on it



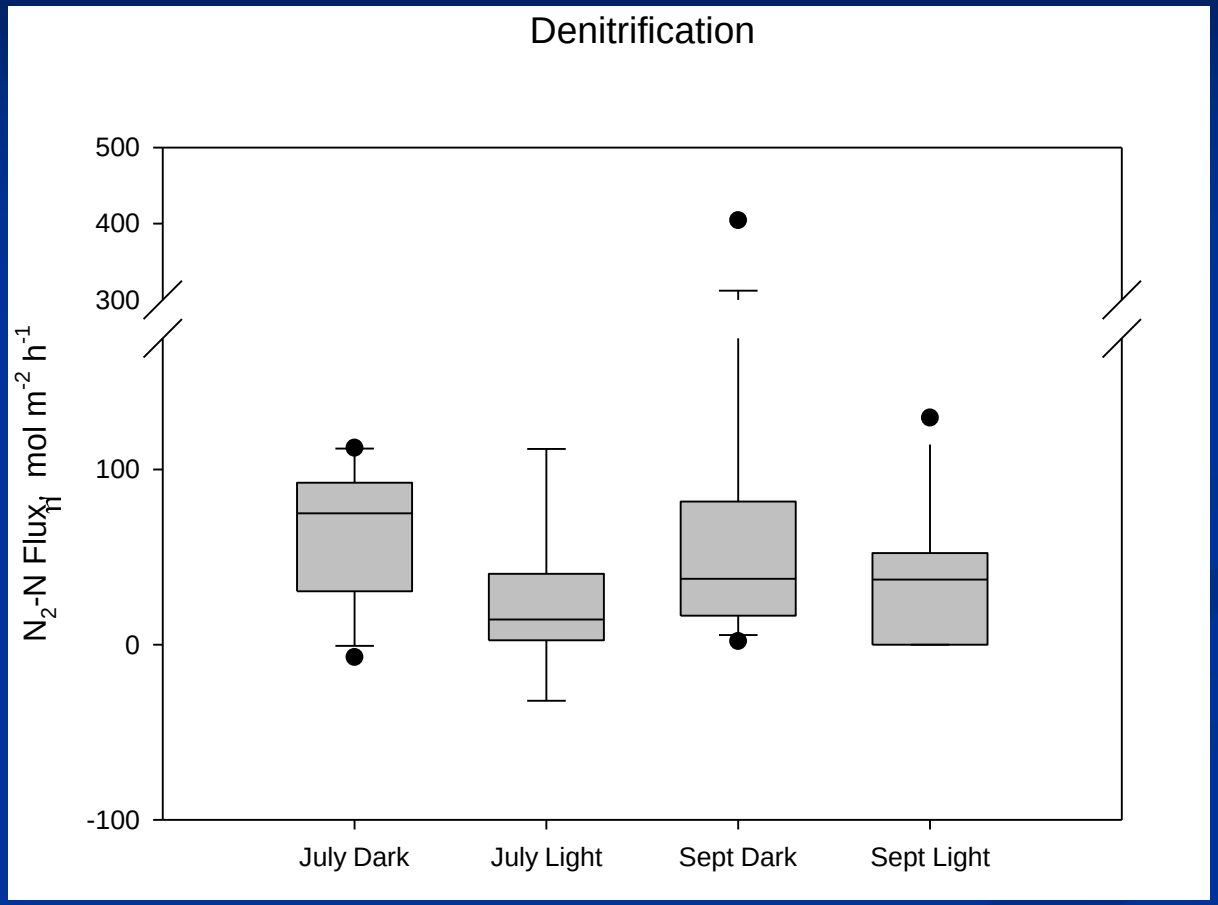
Summer 2012

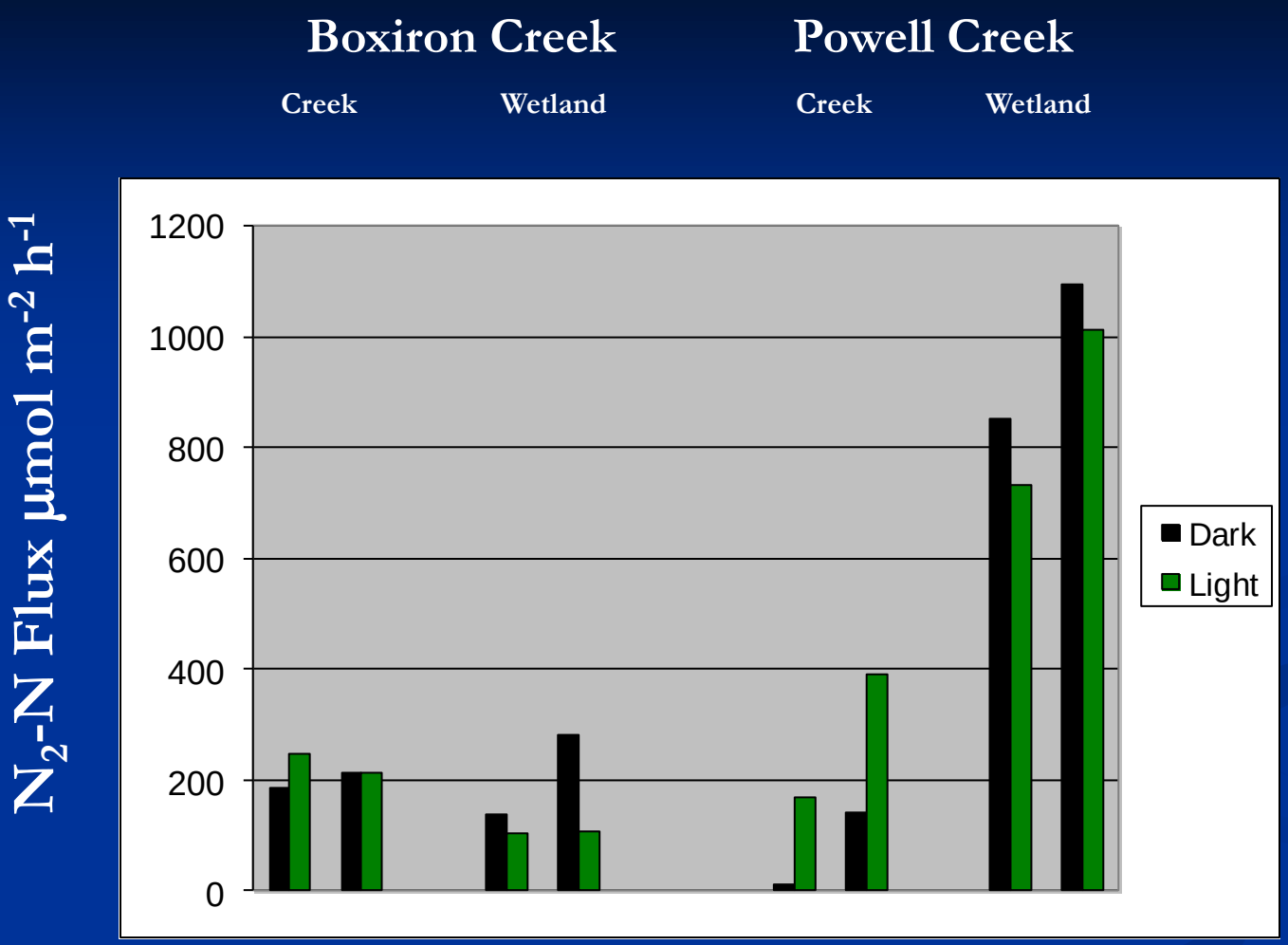

Boxiron Creek
Powell Creek
Creek
Wetland
Creek
Wetland
O_2 Flux µmol m^{-2} h^{-1}
1500
1000
500
0
-500
-1000
-1500
-2000
-2500
-3000
Dark
Light

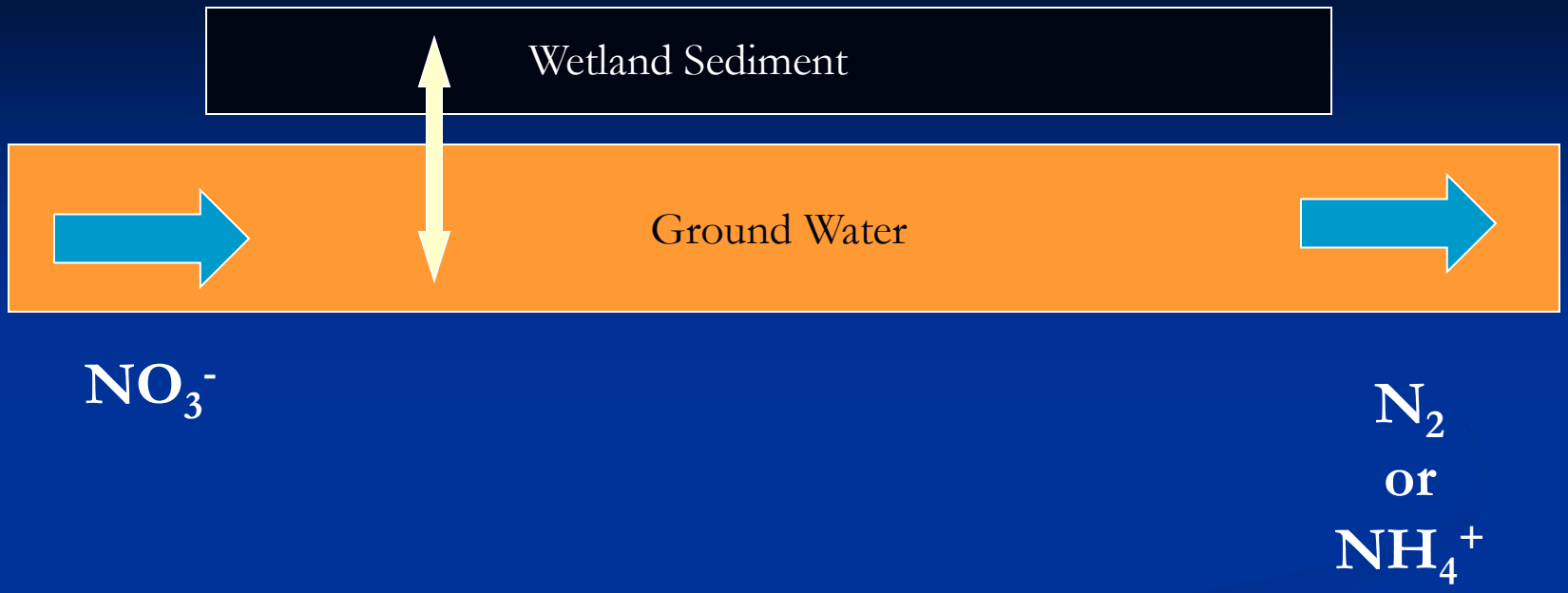

Ammonium Fluxes
NH4+ Flux mmol m-2 h-1
200
100
0
-100
July Dark
July Light
Sept Dark
Sept Light


Boxiron Creek
Powell Creek
Creek
Wetland
Creek
Wetland
NH_4^+ Flux µmol m^{-2} h^{-1}
300
250
200
150
100
50
0
-50
-100
Dark
Light

2011 Johnson Bay Data




Boxiron Creek
Powell Creek
Creek
Wetland
Creek
Wetland
N_2-N Flux µmol m^{-2} h^{-1}
1200
1000
800
600
400
200
0
Dark
Light



- Ground water nitrate can be denitrified or converted to ammonium (*DNRA*) at the groundwater/wetland interface
- I would hypothesize that there is a seasonal "switch", possibly related to temperature and hydrogen sulfide, that may result in late season ammonium inputs
- The soluble reactive P concentrations here are exceptionally high