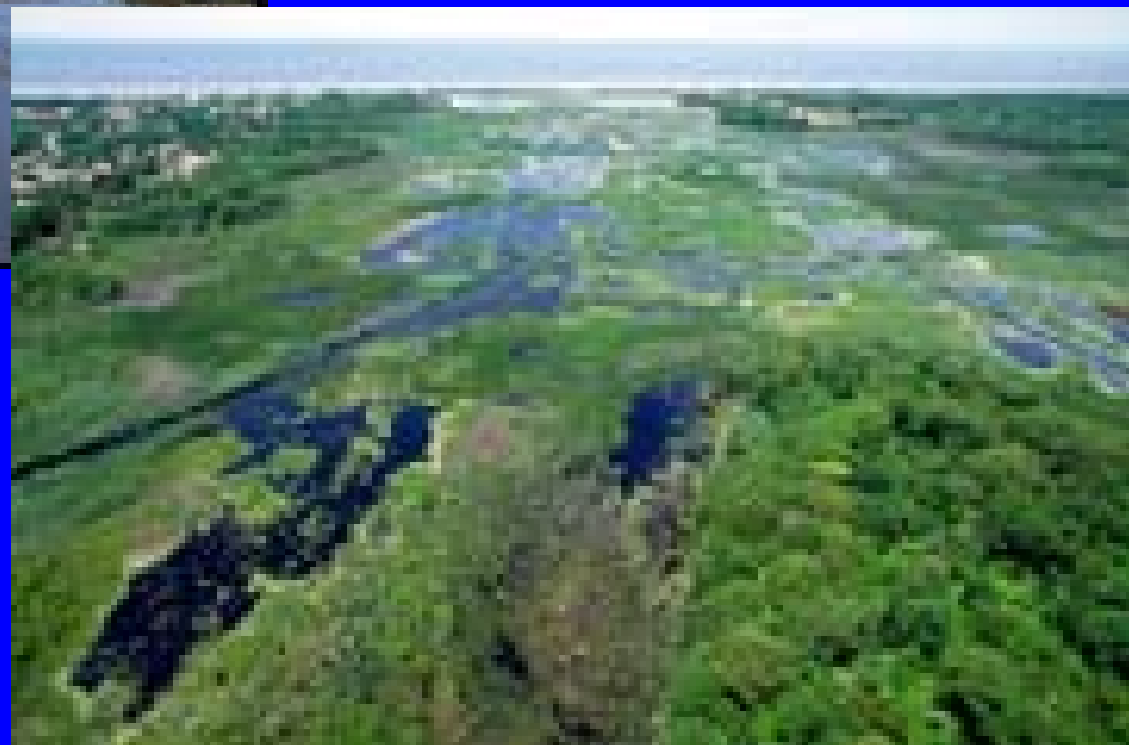
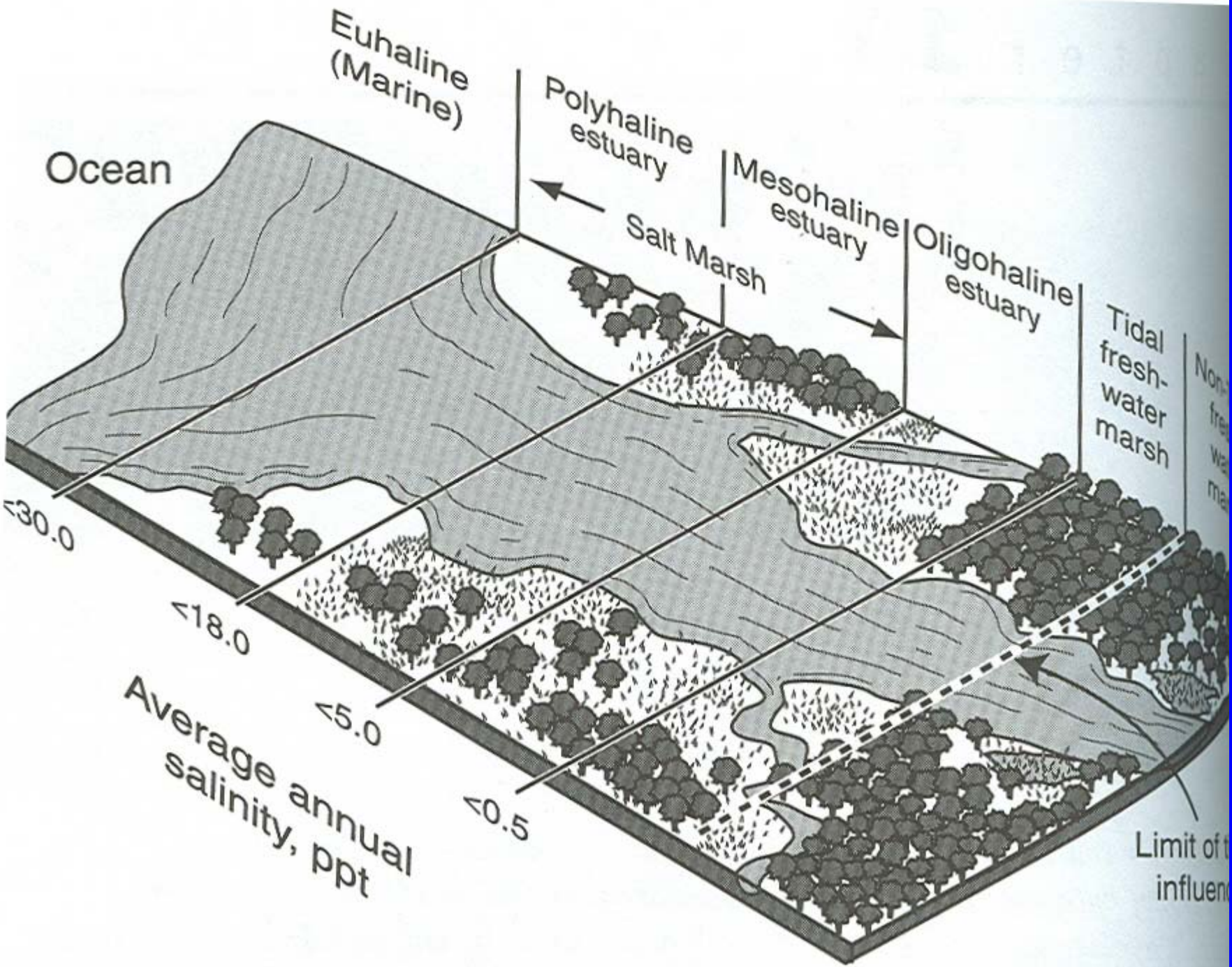
Tidal Freshwater Marshes



Definitions

- Euhaline: "true" marine zone, above 30 ppt salinity
- Polyhaline: 18 to 30 ppt salinity, dominated by grasses like *Spartina*
- Mesohaline: middle zone, 5 ppt salinity
- Oligohaline: less than 5 ppt salinity, diverse plants and animals, high productivity

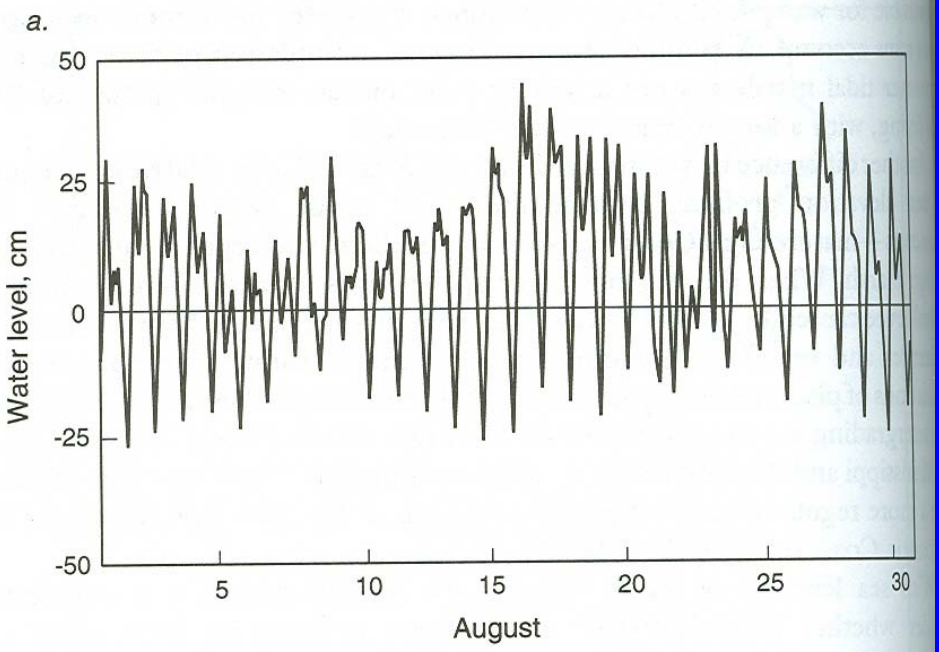

Euhaline
(Marine)
Ocean
Polyhaline
estuary
Salt Marsh
Mesohaline
estuary
Oligohaline
estuary
Tidal
fresh-
water
marsh
<30.0
<18.0
<5.0
<0.5
Average annual
salinity, ppt
Limit of t
influen

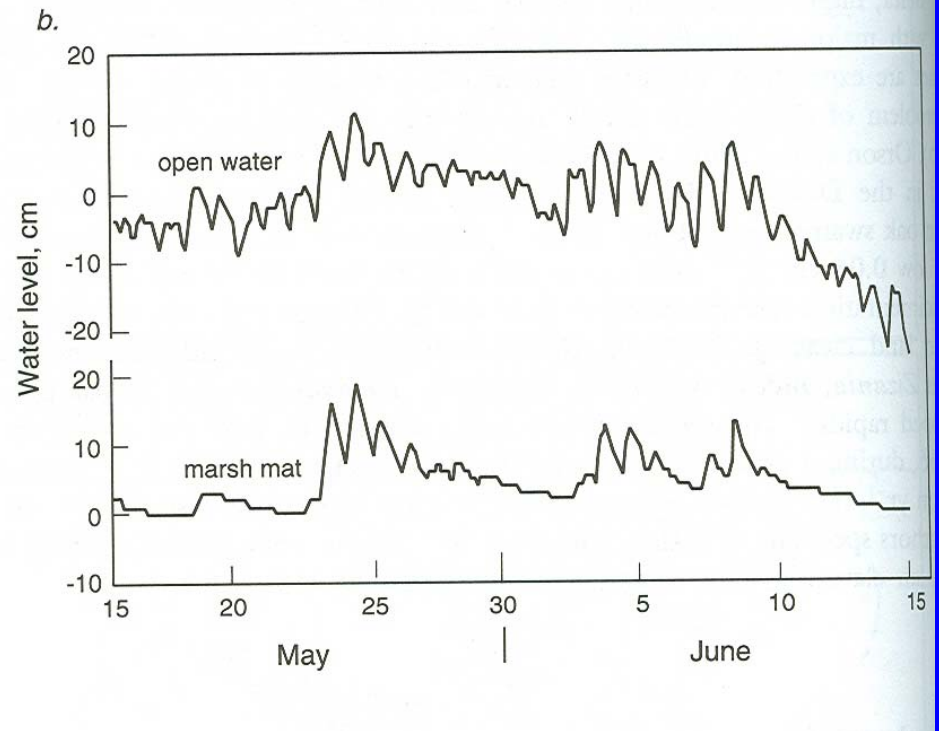
Three types

- Mature Marshes - 500 yrs old, well-developed peat substrate, Atlantic coast
- Floating Marshes - broke free of substrate, northern Gulf Coast
- New Marshes - on new river deltas

Distribution

- Found in areas with significant rainfall
- Still developing on the Atlantic coast in river deltas
  - Elevation differences within the marsh due to tidal variation
- In northern Gulf of Mexico, less elevation difference


a.
Water level, cm
50
25
0
-25
-50
5
10
15
20
25
30
August

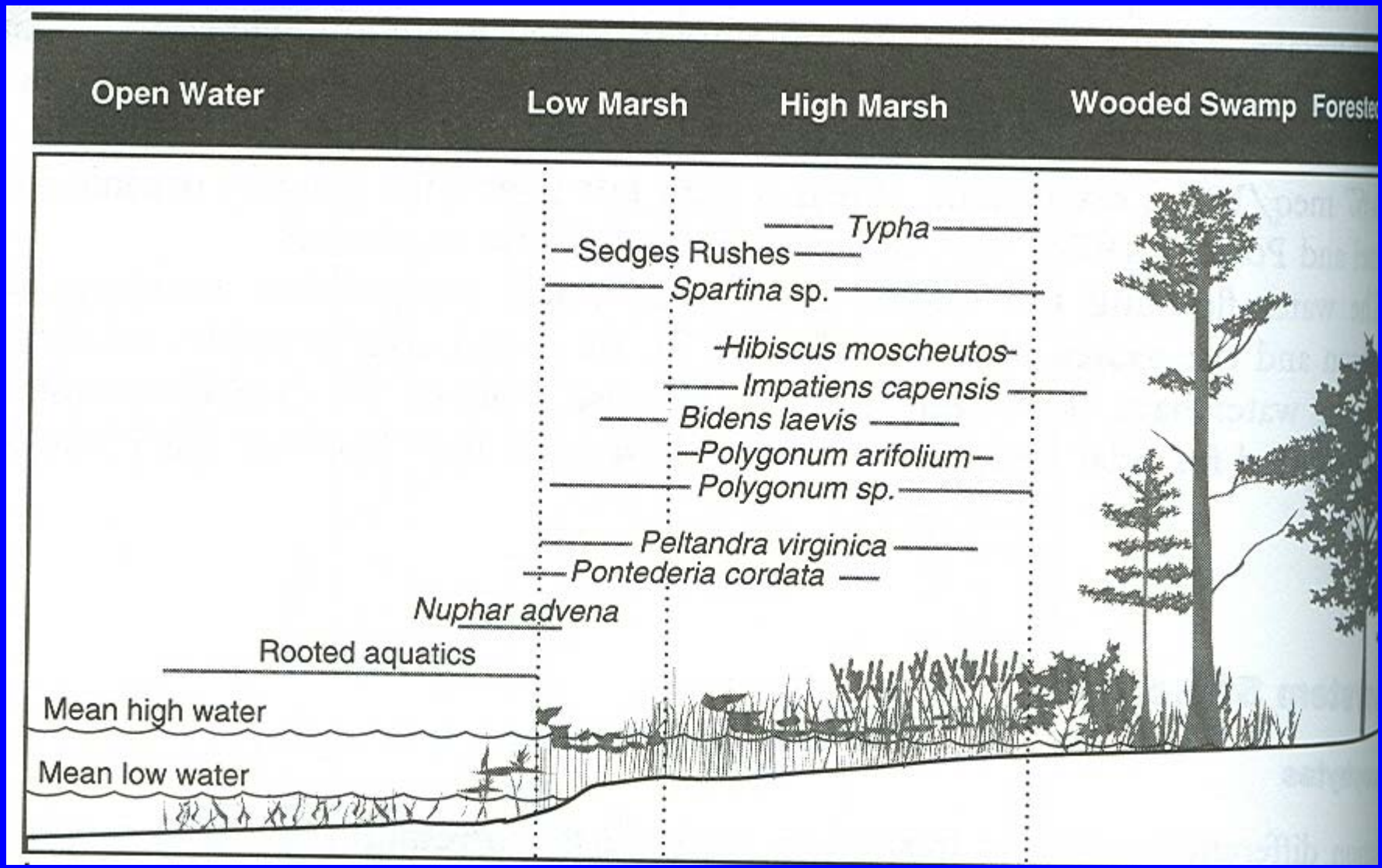

b.
Water level, cm
20
10
0
-10
open water
20
10
0
-10
marsh mat
15
20
25
30
5
10
15
May
June

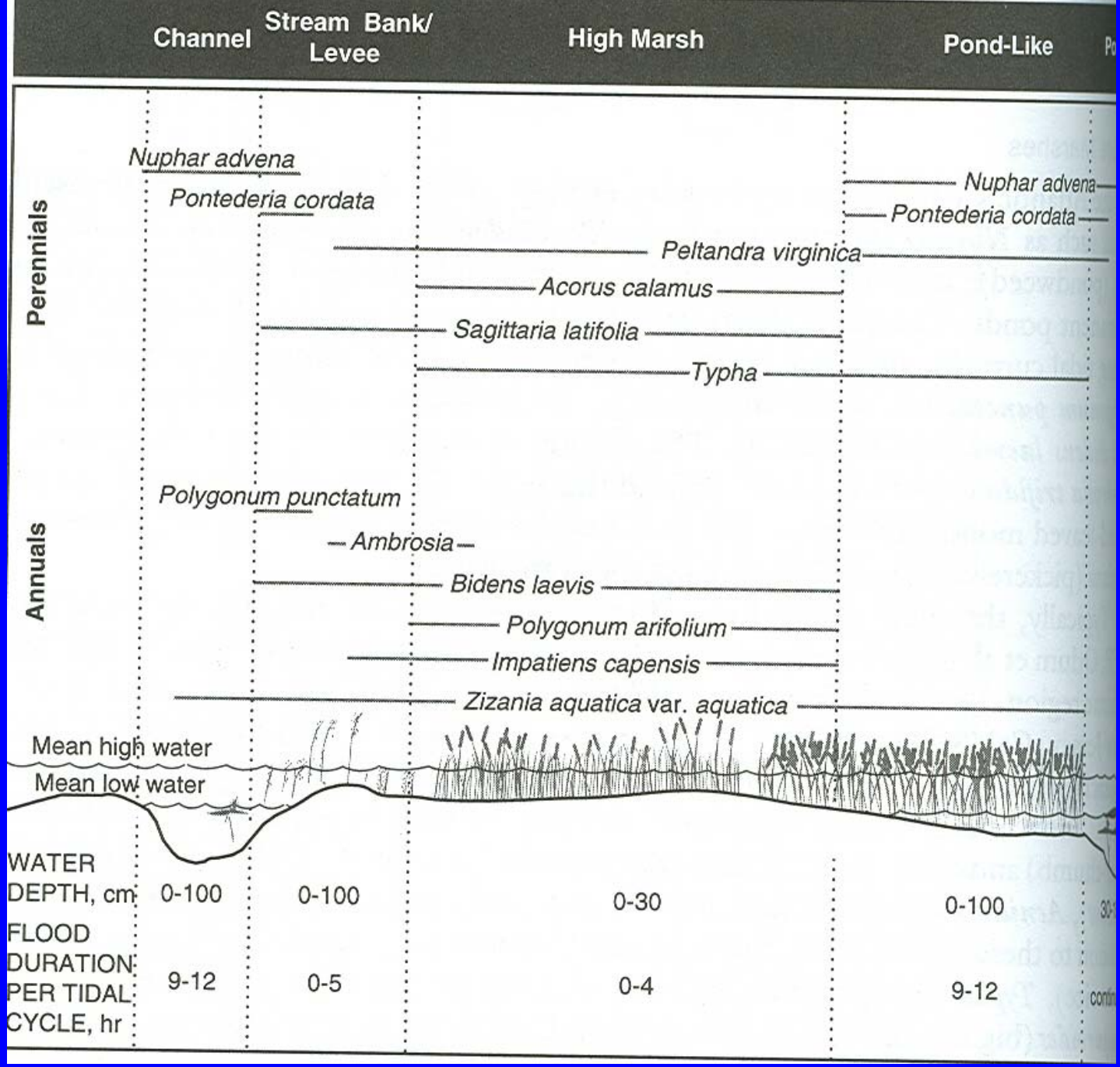
Soil Characteristics

- Anaerobic except for a thin layer at the top of the sediment
- Nutrients vary, ammonia in winter, low levels in summer

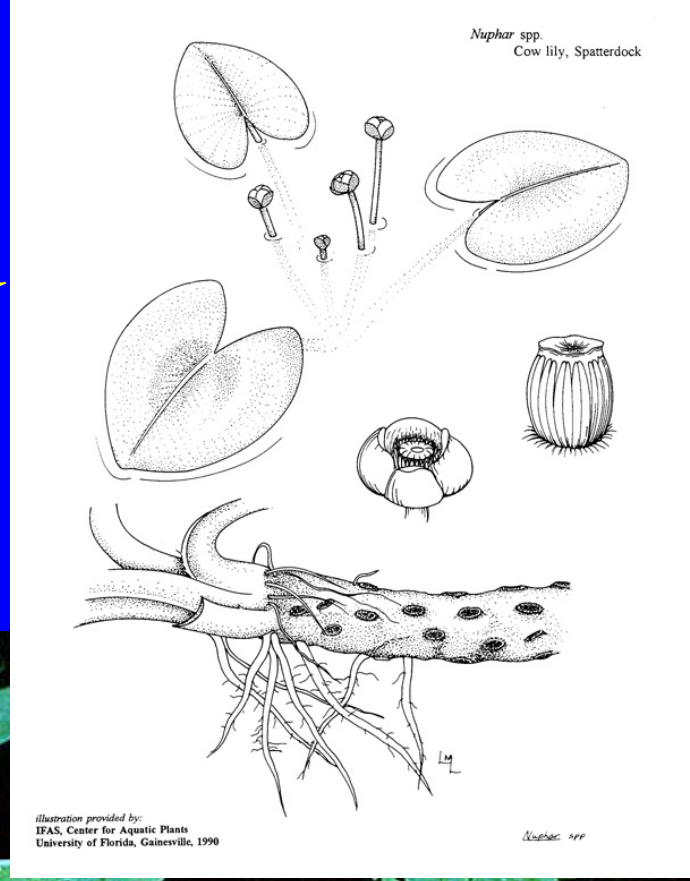
Plants

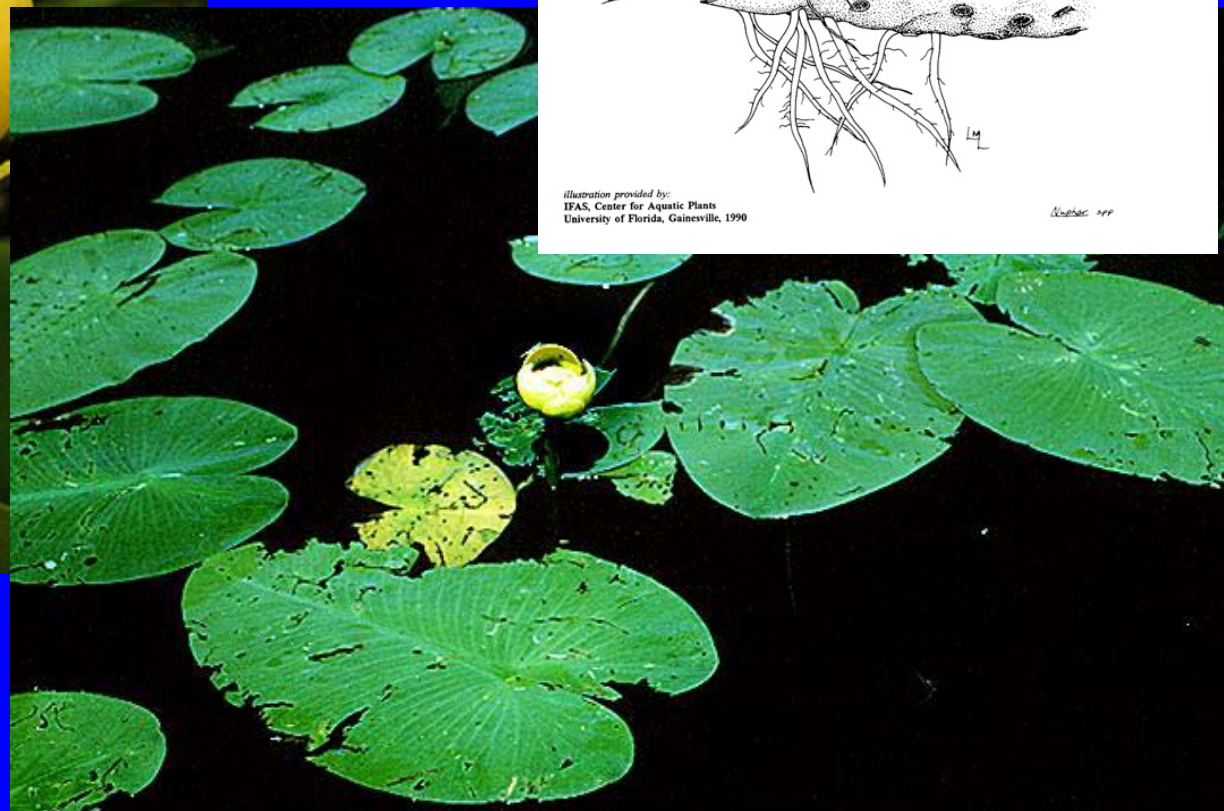
- Mature marshes
  - Submerged - *Nuphar, Elodea, Potamogeton, Myriophyllum*
  - Low marsh behind stream levee - *Peltandra virginica* (arrow arum), *Pontederia cordata* (pickerelweed), *Sagittaria* (arrowhead)
  - High marsh - *Zizania aquatica* (wild rice), *Typha, Spartina, Sagittaria*


Open Water
Low Marsh
High Marsh
Wooded Swamp
Typha
Sedges Rushes
Spartina sp.
Hibiscus moscheutos
Impatiens capensis
Bidens laevis
Polygonum arifolium
Polygonum sp.
Peltandra virginica
Pontederia cordata
Nuphar advena
Rooted aquatics
Mean high water
Mean low water


Channel
Stream Bank/ Levee
High Marsh
Pond-Like
Perennials
Nuphar advena
Pontederia cordata
Peltandra virginica
Acorus calamus
Sagittaria latifolia
Typha
Nuphar advena
Pontederia cordata
Annuals
Polygonum punctatum
Ambrosia
Bidens laevis
Polygonum arifolium
Impatiens capensis
Zizania aquatica var. aquatica
Mean high water
Mean low water
WATER DEPTH, cm
0-100
0-100
0-30
0-100
FLOOD DURATION PER TIDAL CYCLE, hr
9-12
0-5
0-4
9-12

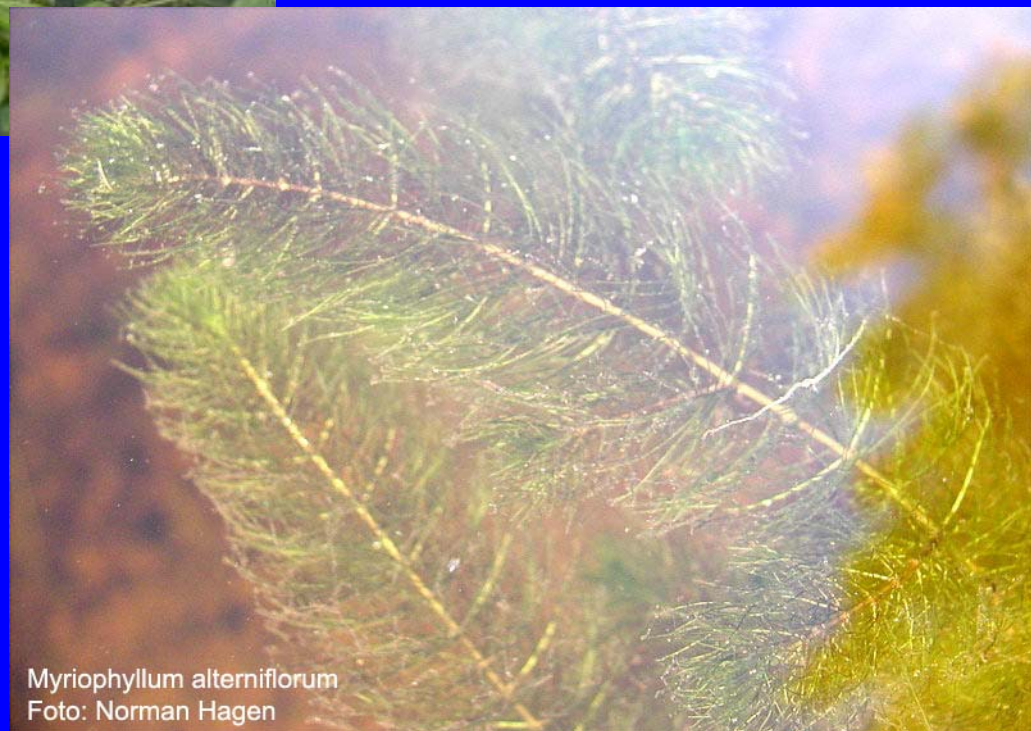
Submerged



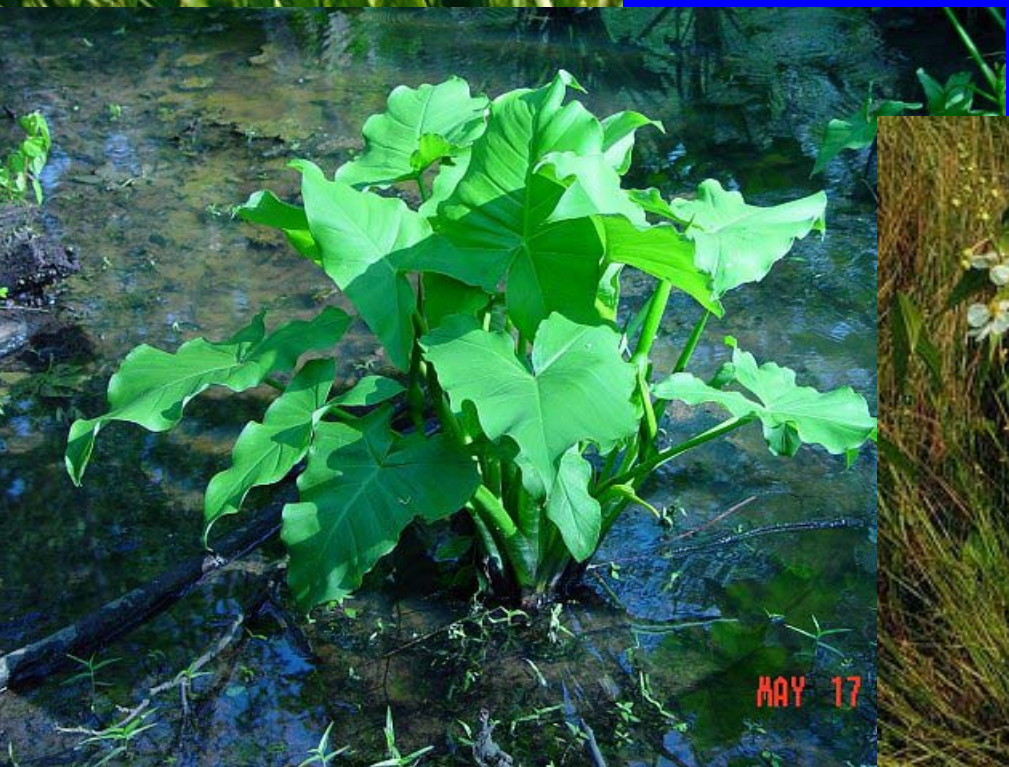


Nuphar
(splatterdock)


Photo by Matthew C. Perry


Myriophyllum alterniflorum
Foto: Norman Hagen

Low Marsh



High Marsh


Zizania aquatica
Wild rice
illustration provided by:
IFAS, Center for Aquatic Plants
University of Florida, Gainesville, 1993

Plants Continued

- Floating marshes
  - *Phragmites, sagittaria, spartina*
- New marshes
  - *Salix, Scirpus, deltarum, Sagittaria latifolia, Typha*

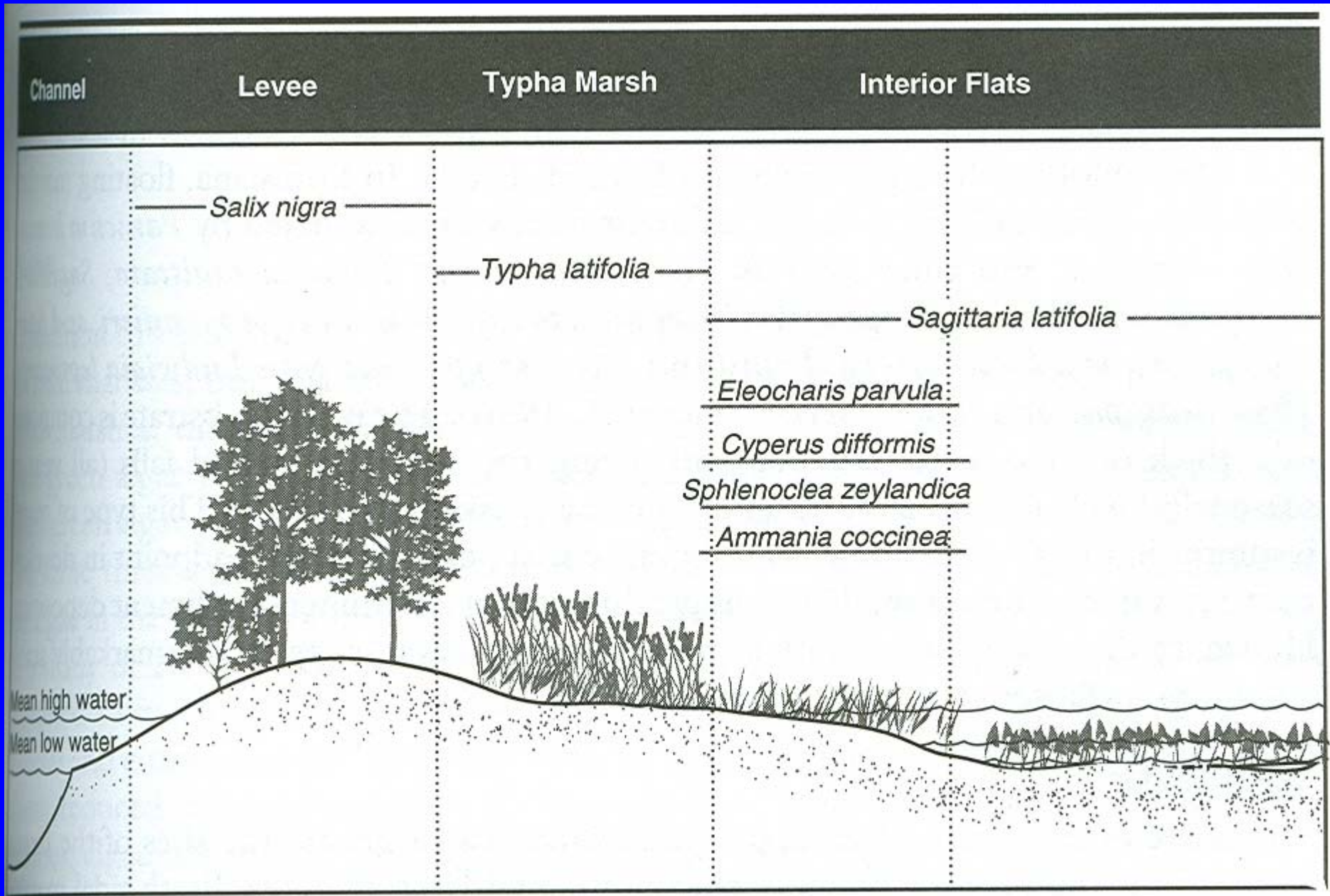


Figure 10-7 ***(Continued).***

Animal Diversity

- Supports largest density and diversity of birds
  - 280 spp of birds
  - 44 spp of ducks and other waterfowl
    - supported by the mass amount of food built up in the backs of the marshes
- Supports a large variety of mammals
  - beavers, otters, muskrat, mink, and nutria

Fish and Crustacean Life Cycle

- Freshwater species: bluegill, largemouth bass
- Estuarine: bay anchovy
- Estuarine-marine: silver perch, black drum, tarpon, brown shrimp
- Catadromous: spawns out at sea, returns to live in freshwater (example: eel)
- Anadromous: spawns in freshwater, lives out at sea (examples: striped bass, herring, shad, sturgeons, and some shrimp)

Productivity

- Produce 10 to 30 tons/dry matter/ hectare/ year (only the plants)
- more species richness, but less productivity

Nutrients

- exporters of nutrients: lose nutrients
- new marshes plant growth unrelated to sediment nutrients
- eutrophic areas due to anthropologic influences
- accumulations of heavy metals

Case Study/Current Events:

Salt Marsh Projects

- SF Bay Tidal Wetland Restoration
- http://sfbay.wr.usgs.gov/access/Dingler/home.html
- San Pablo Bay Sedimentation Changes
- http://sfbay.wr.usgs.gov/access/Bathy/sanpablobay/
- Suisun Bay
- http://sfbay.wr.usgs.gov/access/Bathy/suisunbay/
- South San Francisco Bay
- http://sfbay.wr.usgs.gov/access/Bathy/southSanFrancisco/index.html

Coastal Protection

- California Coastlines
- http://www.californiacoastlines.org