Pop up process talk: First Mallard Branch at Rush Ranch

- Key reference
- Informs our “guiding image” for tidal marsh processes and restoration targets
- How do tidal marshes advantage native fish?
- How does structure beget function?

Theme 2: Habitat restoration

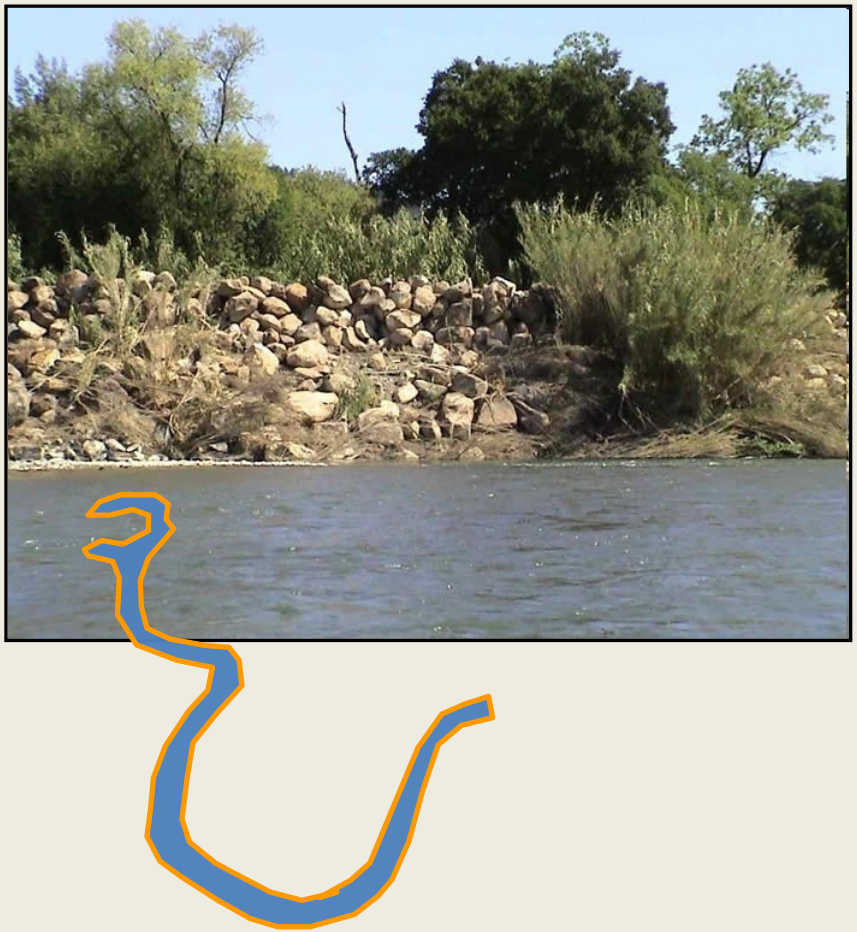
- Acquisition and implementation strategies must be relevant to listed species recovery.
- We are investing in trajectories of change.
- Restoration might work if we restore land-water connections at process scales and useful locations.

<u>The basic premise is:</u>

Work with nature, let nature do the work.

Land-water connections determine function for species

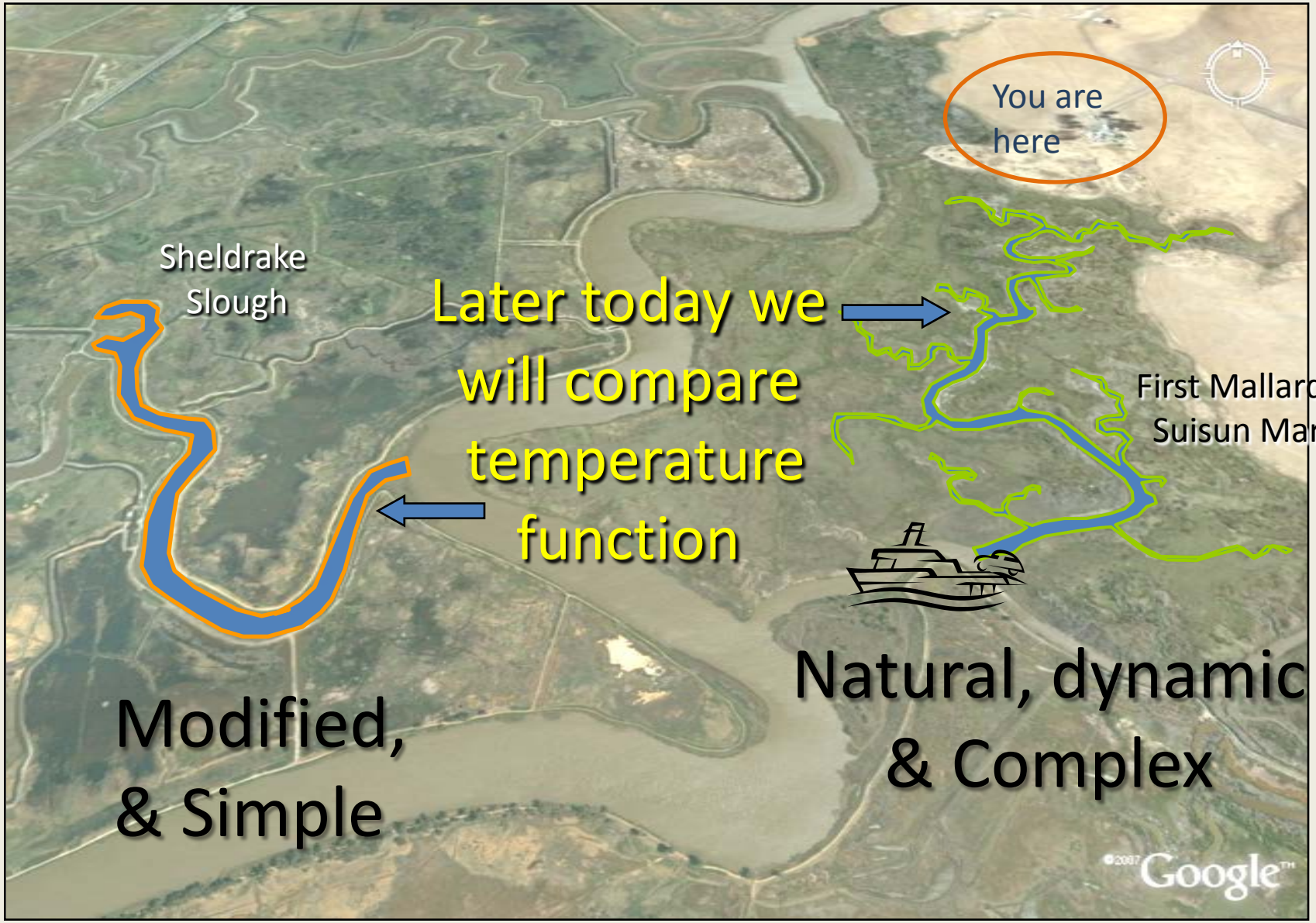
Simple land-water interface
- Limited function -

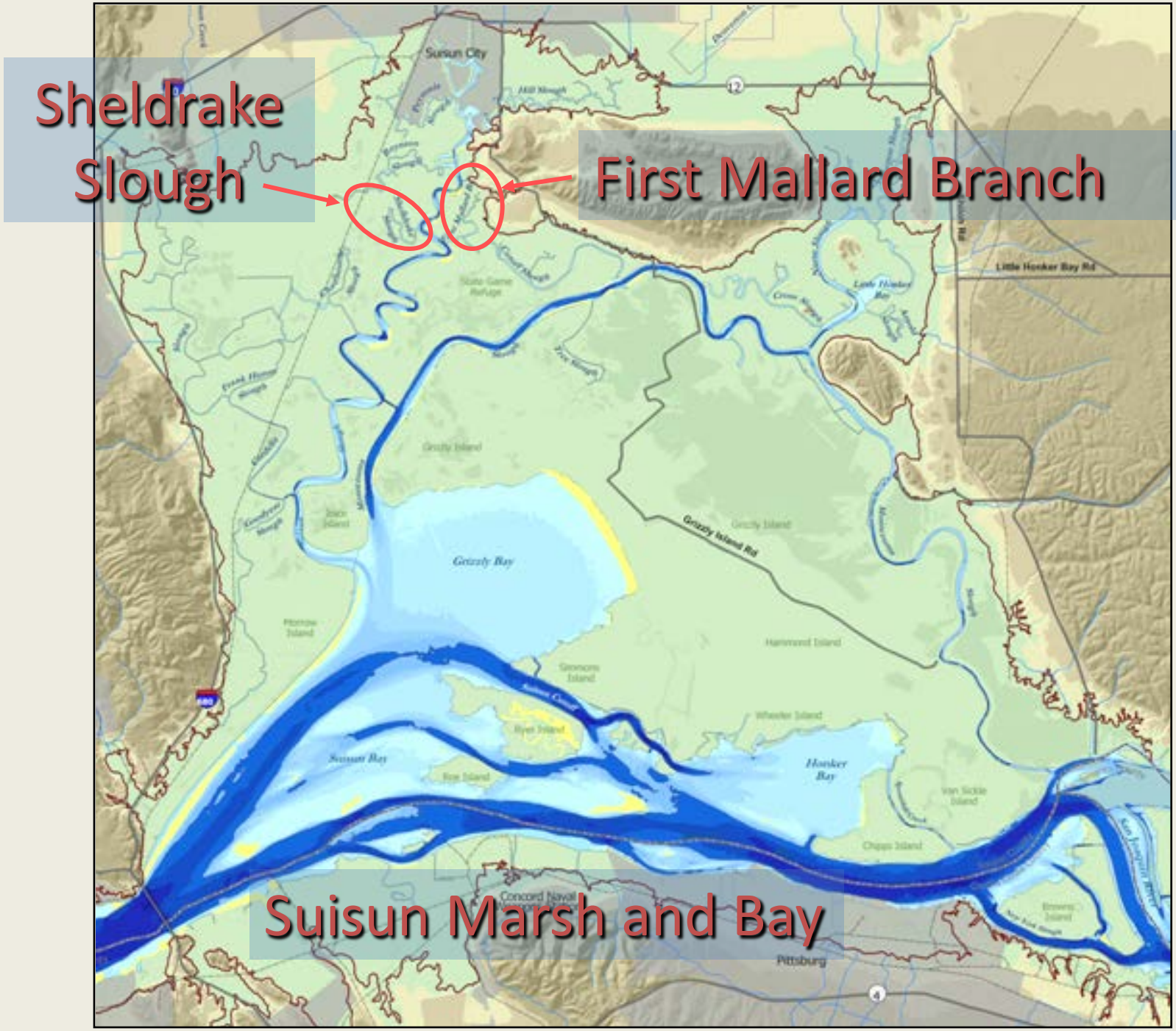


≠

Complex land-water interface
- Lots o' function -

Structure determines function

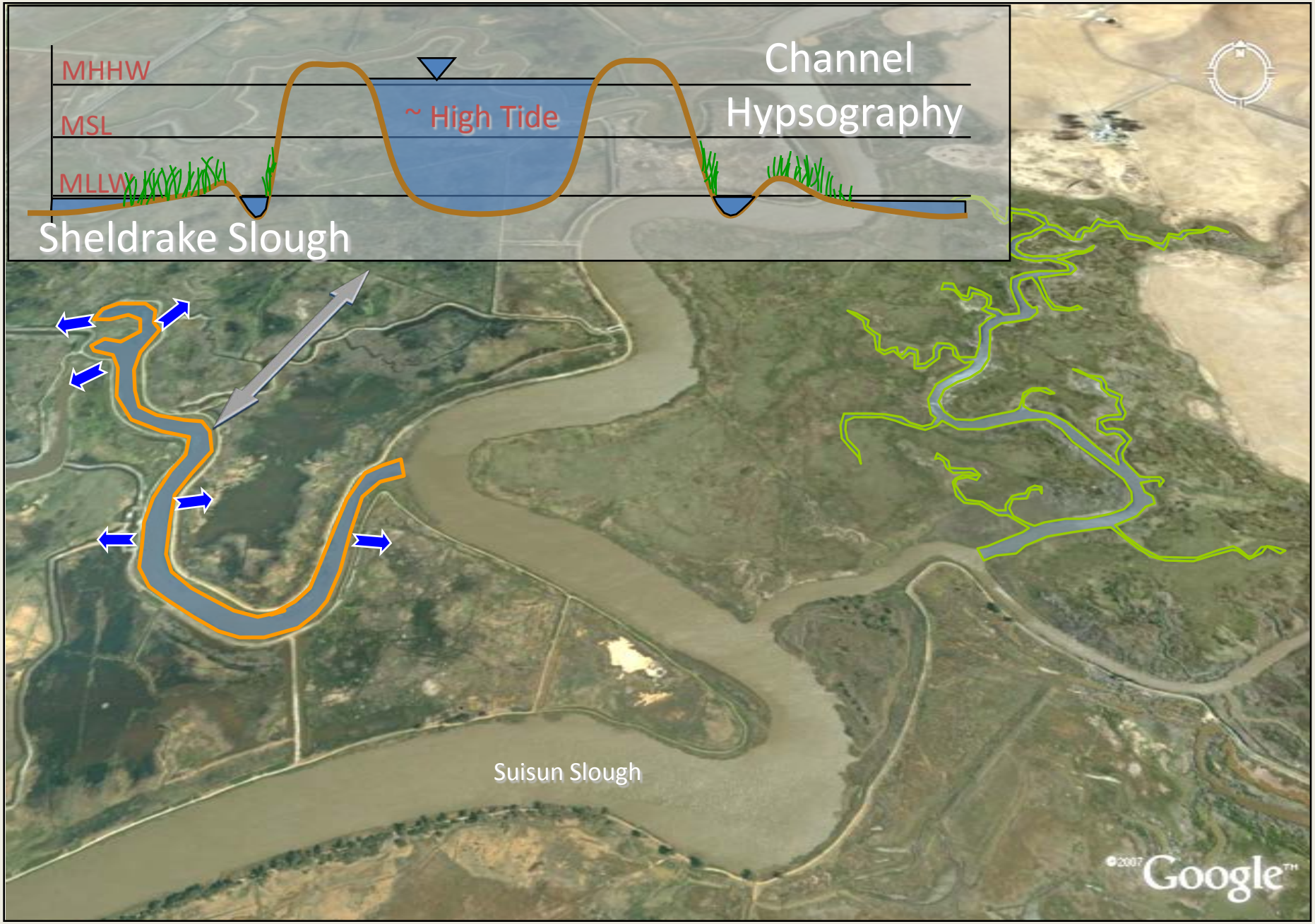



Sheldrake Slough
First Mallard Branch
Suisun Marsh and Bay
Suisun City
Grizzly Bay
Suisun Bay
Honker Bay
Grizzly Island Rd
Little Honker Bay Rd
Concord Naval Weapons Station
Pittsburg

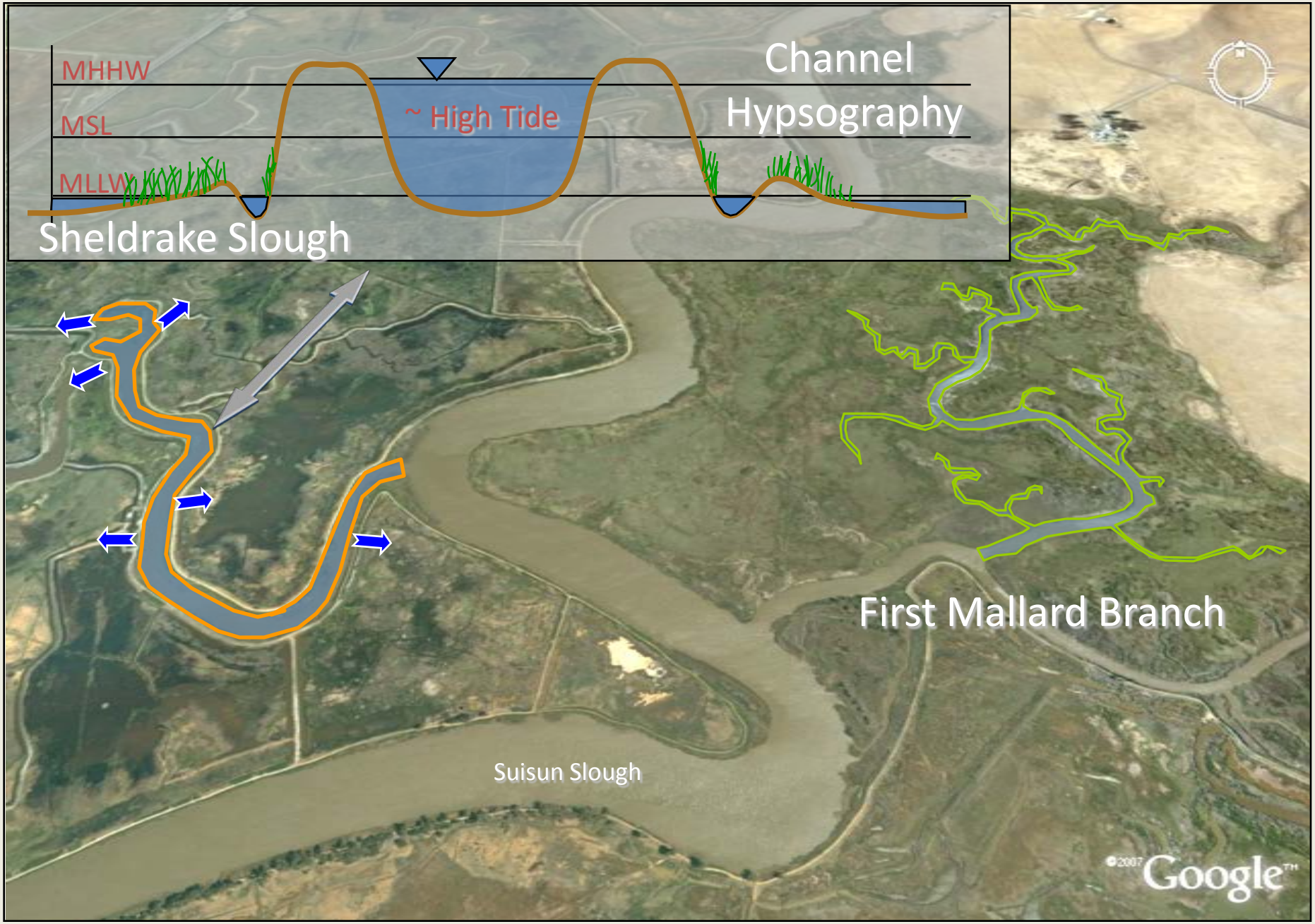
Different shape, different function

Different shape, different function

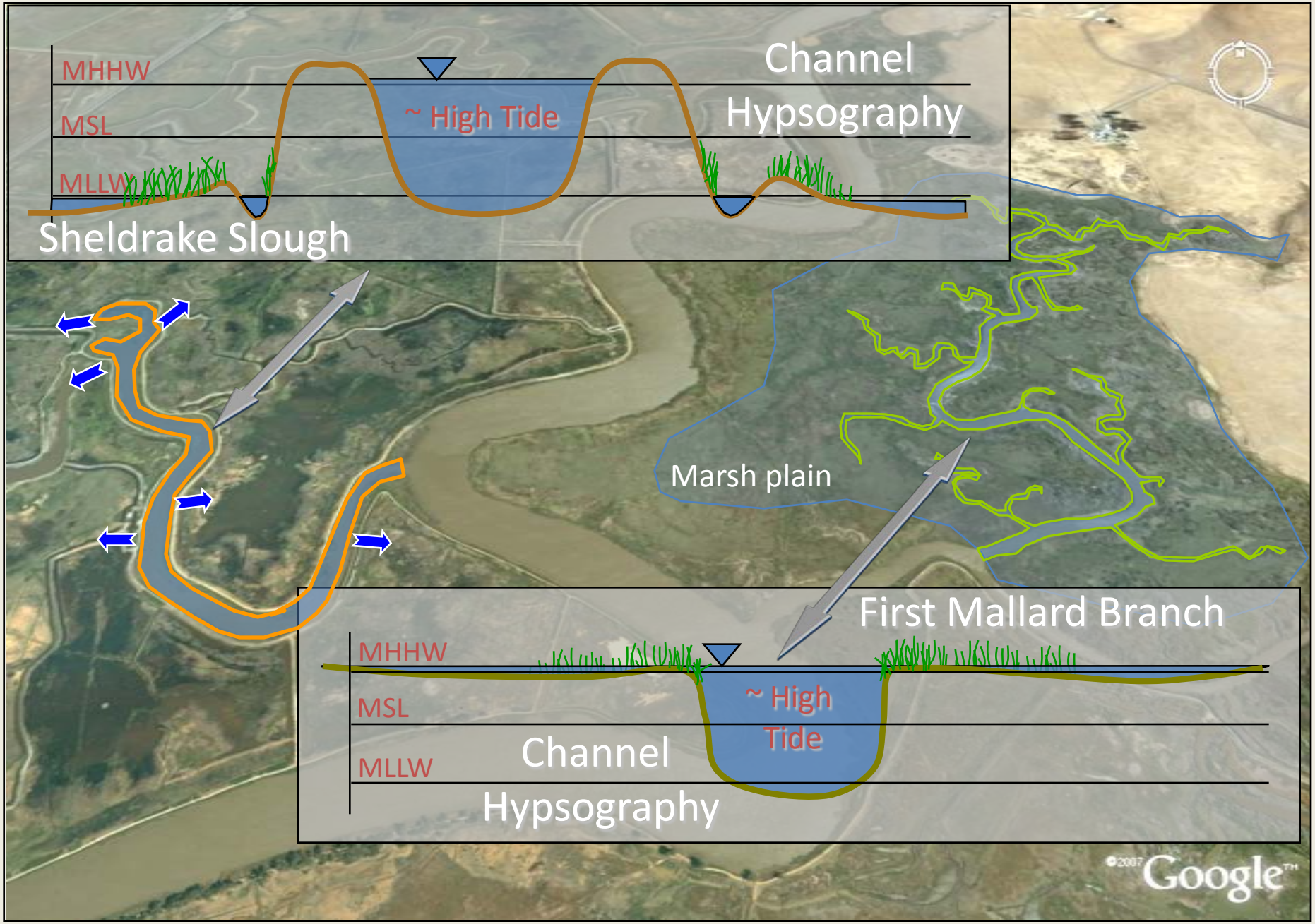
Different shape, different function



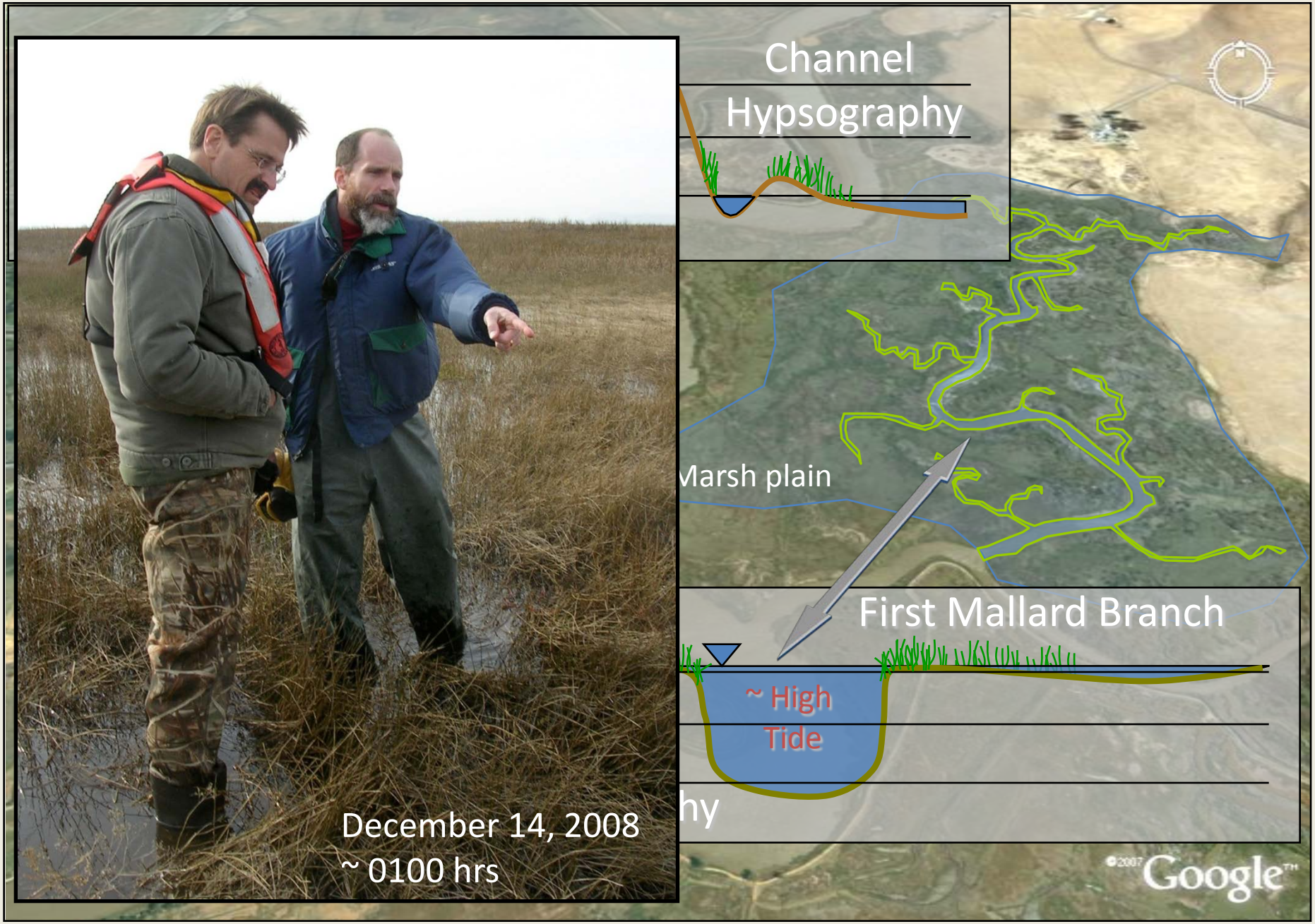
Different shape, different function



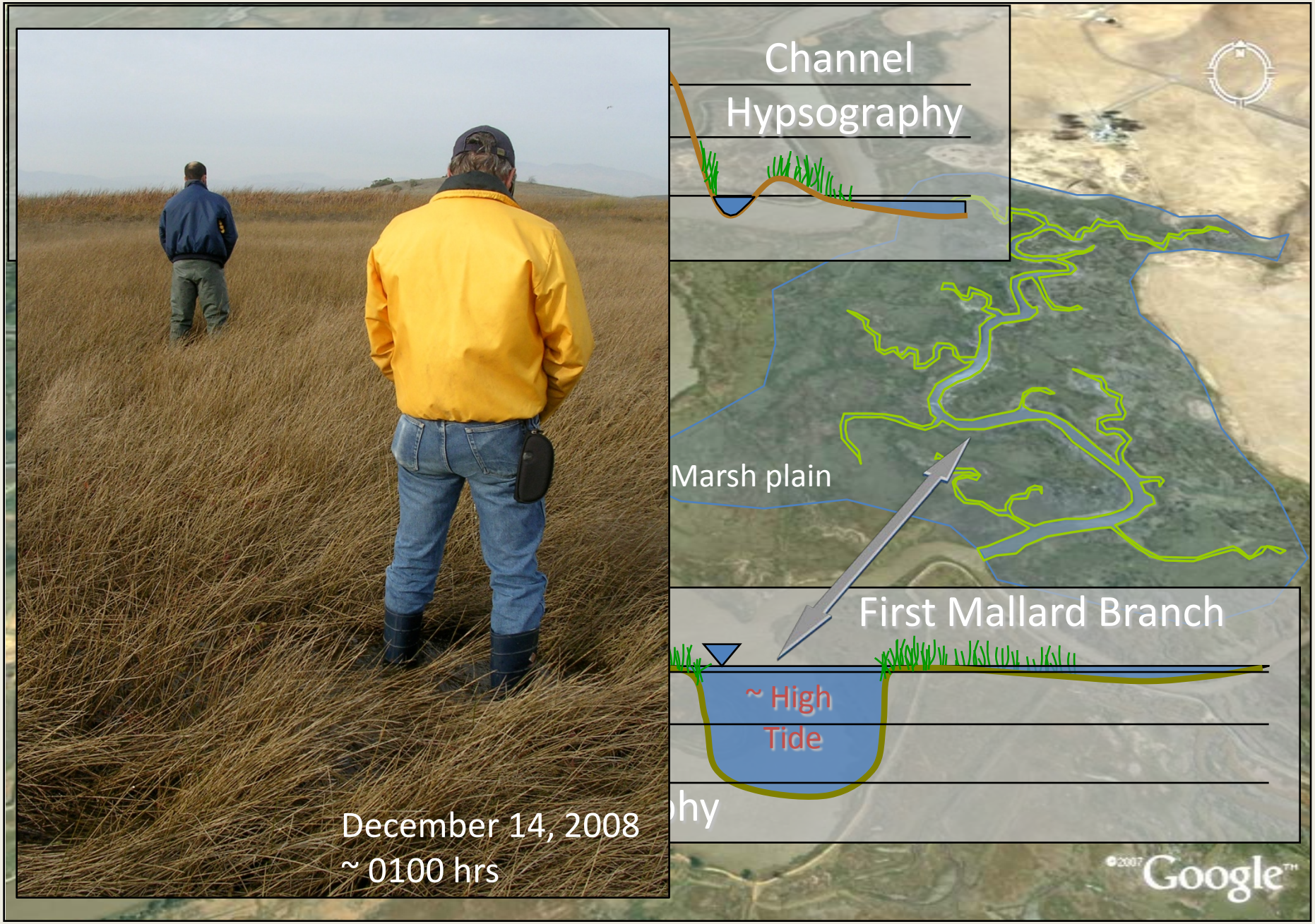
Different shape, different function



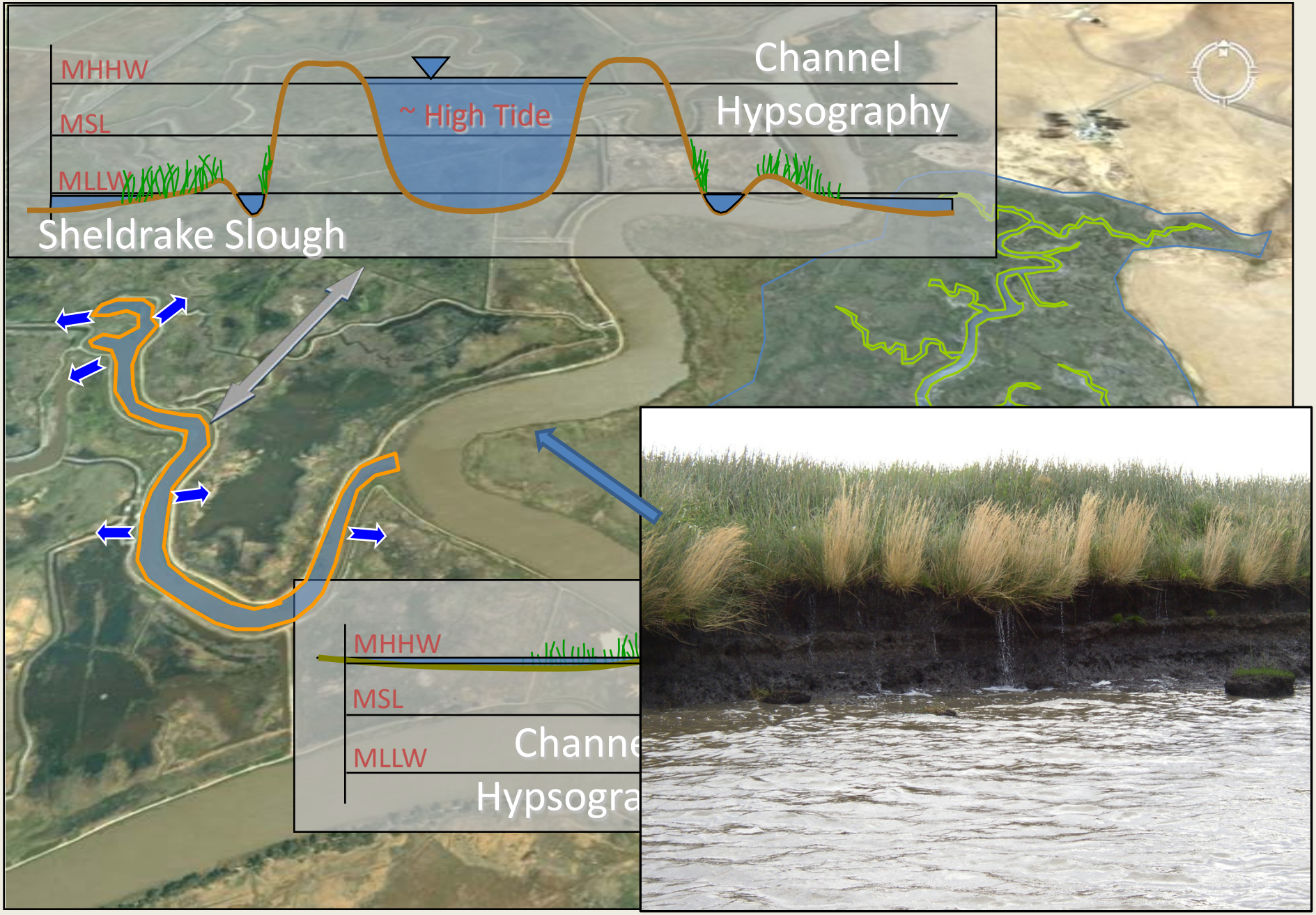
Different shape, different function



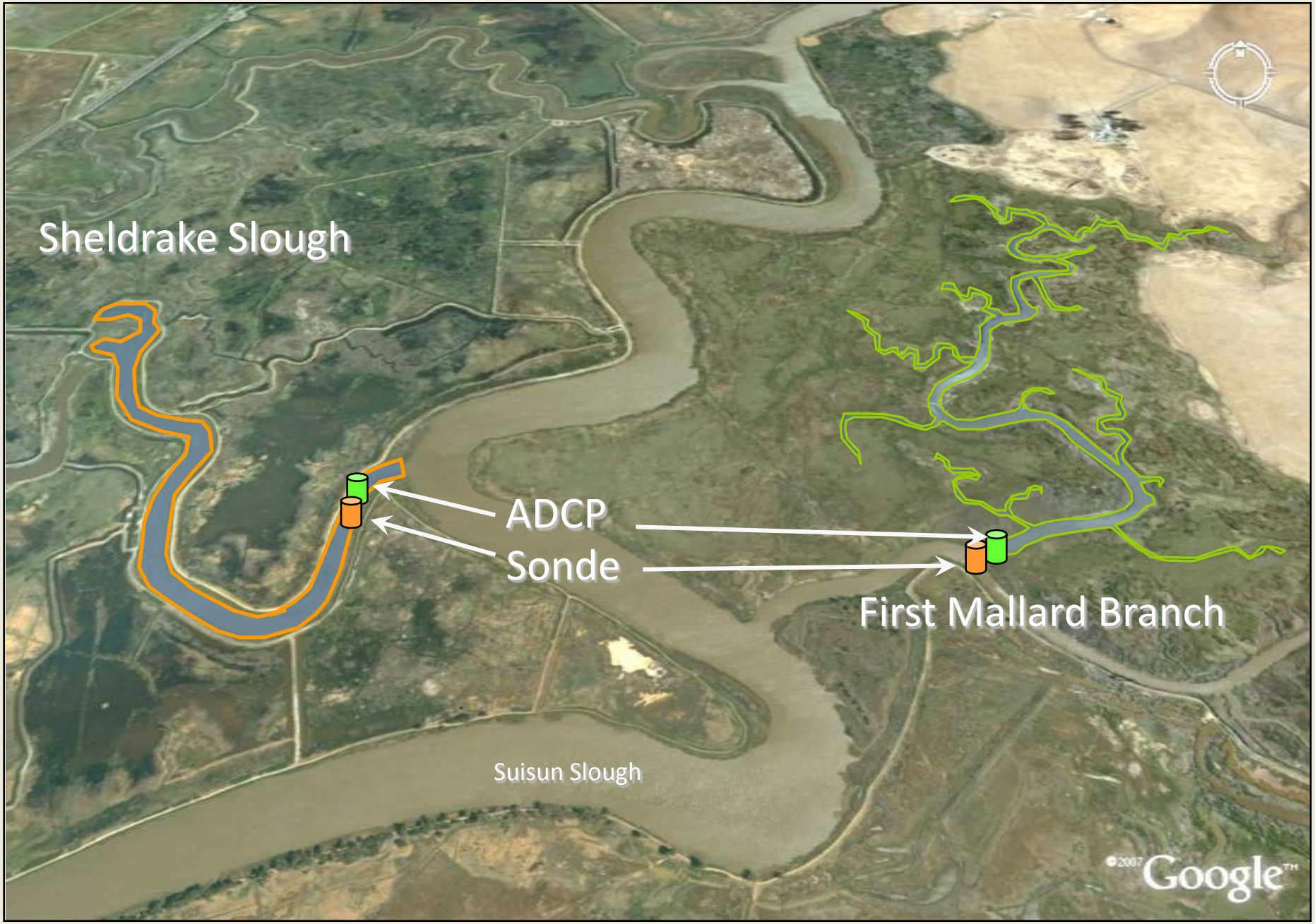
Different shape, different function



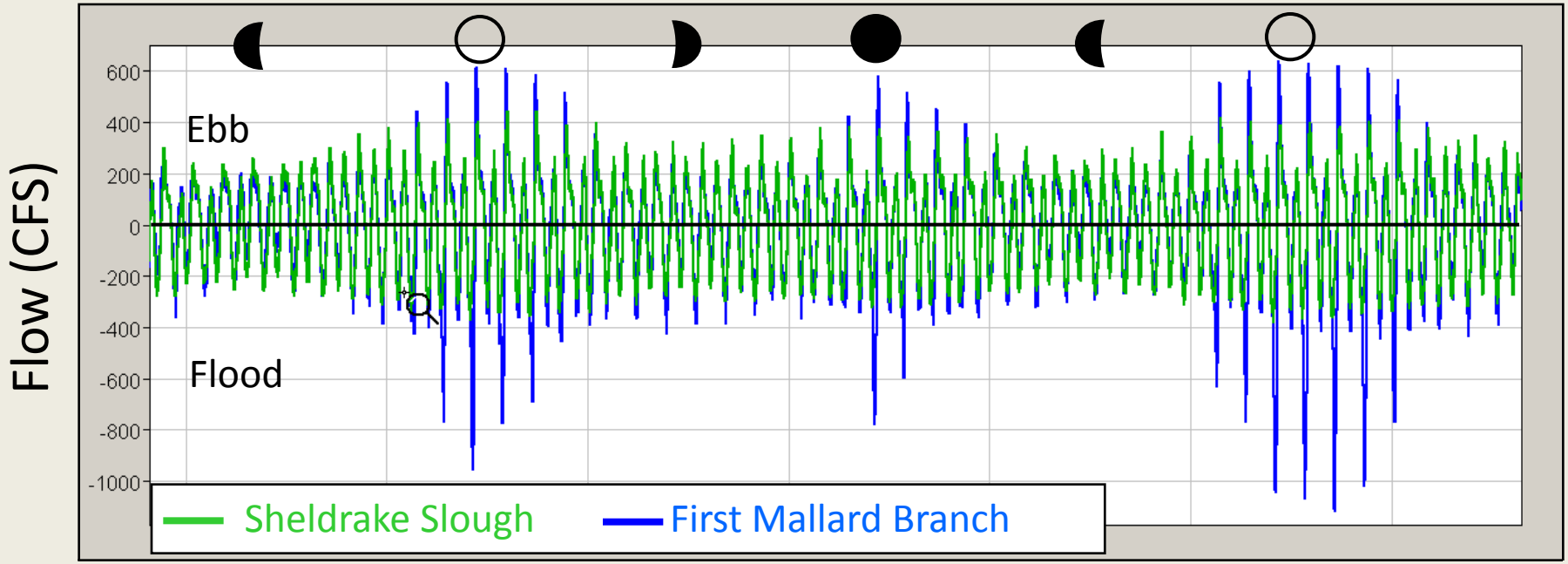
Different shape, different function



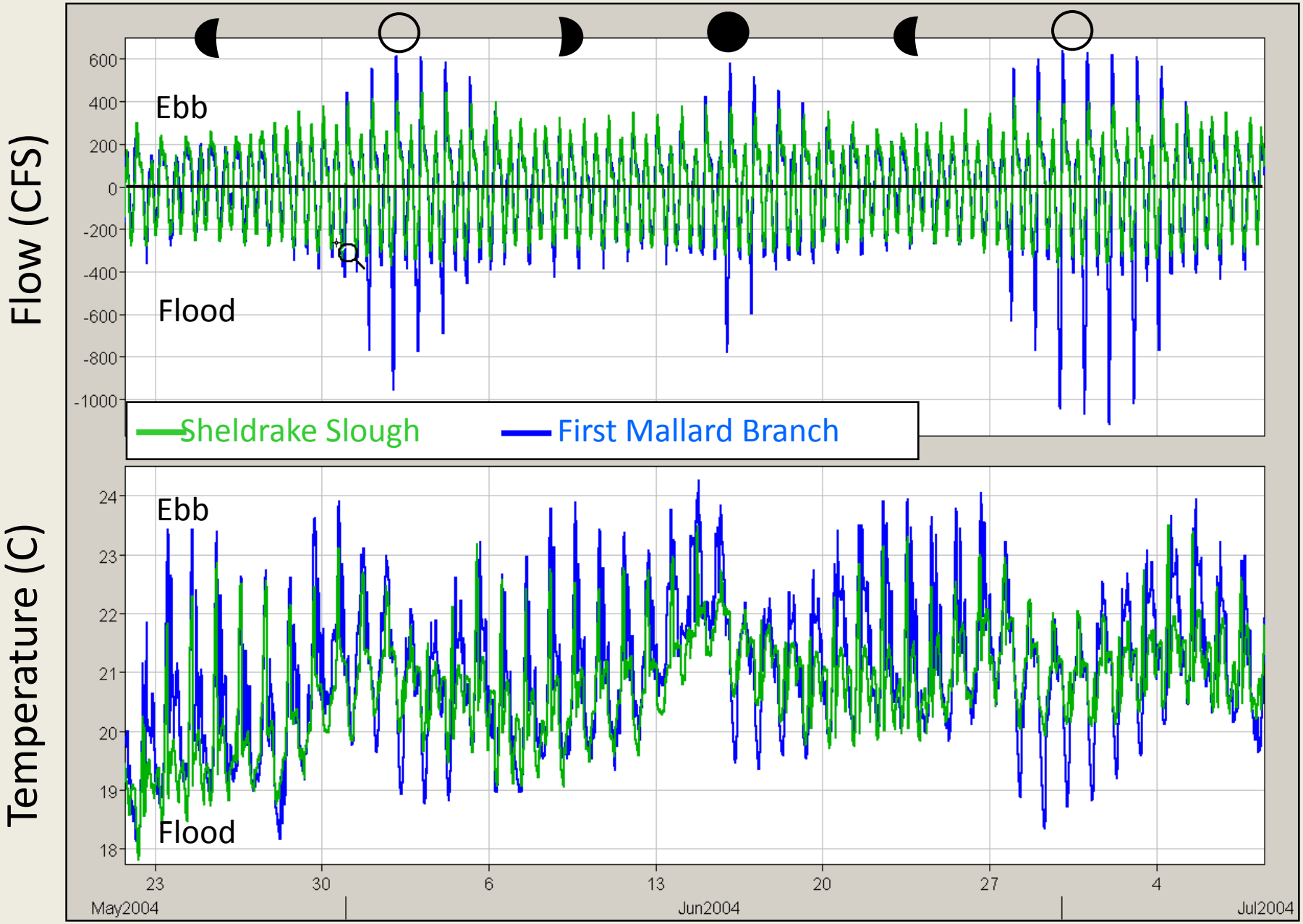
Different shape, different function



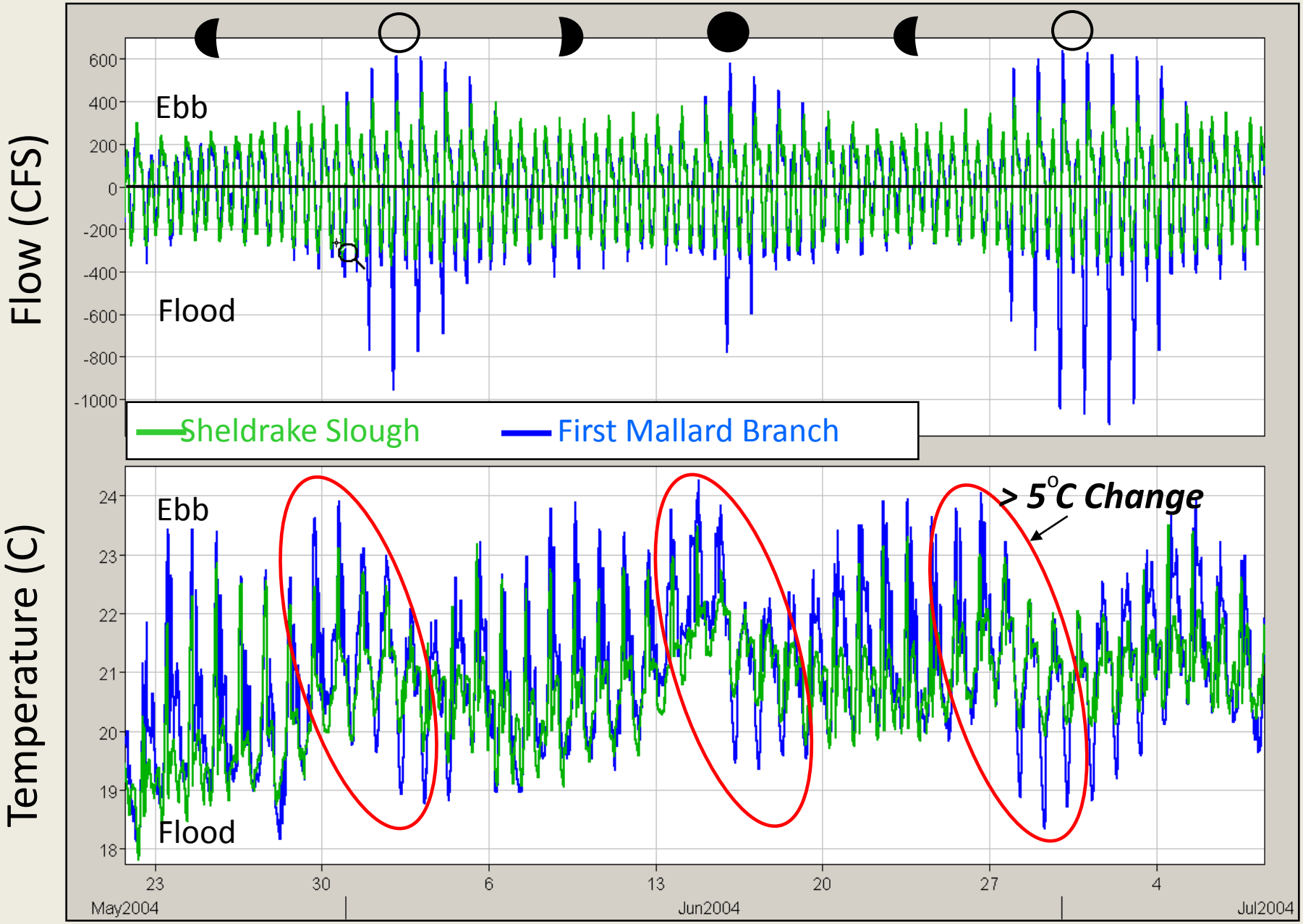
Flow Variability



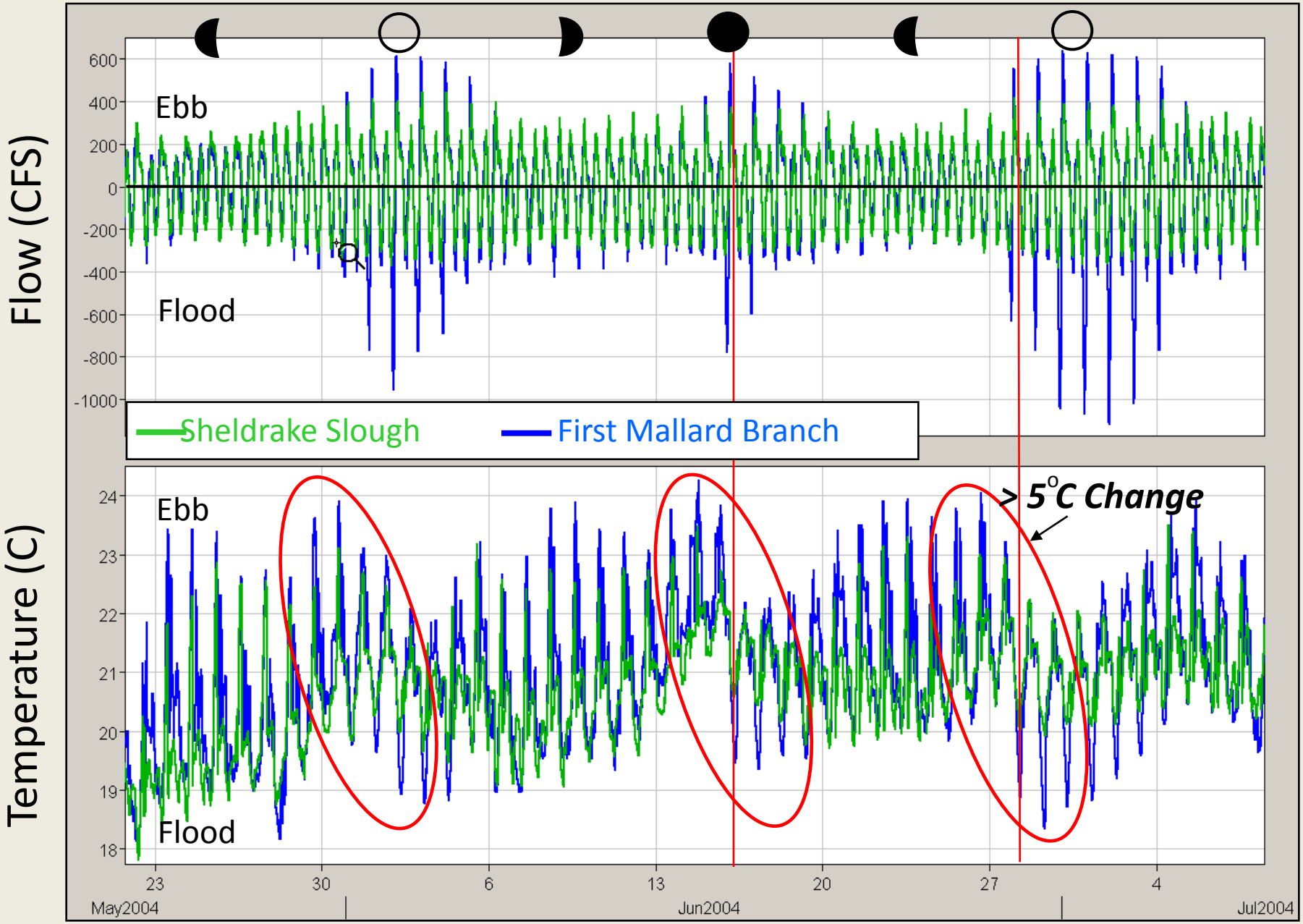
Flow and Temperature Variability



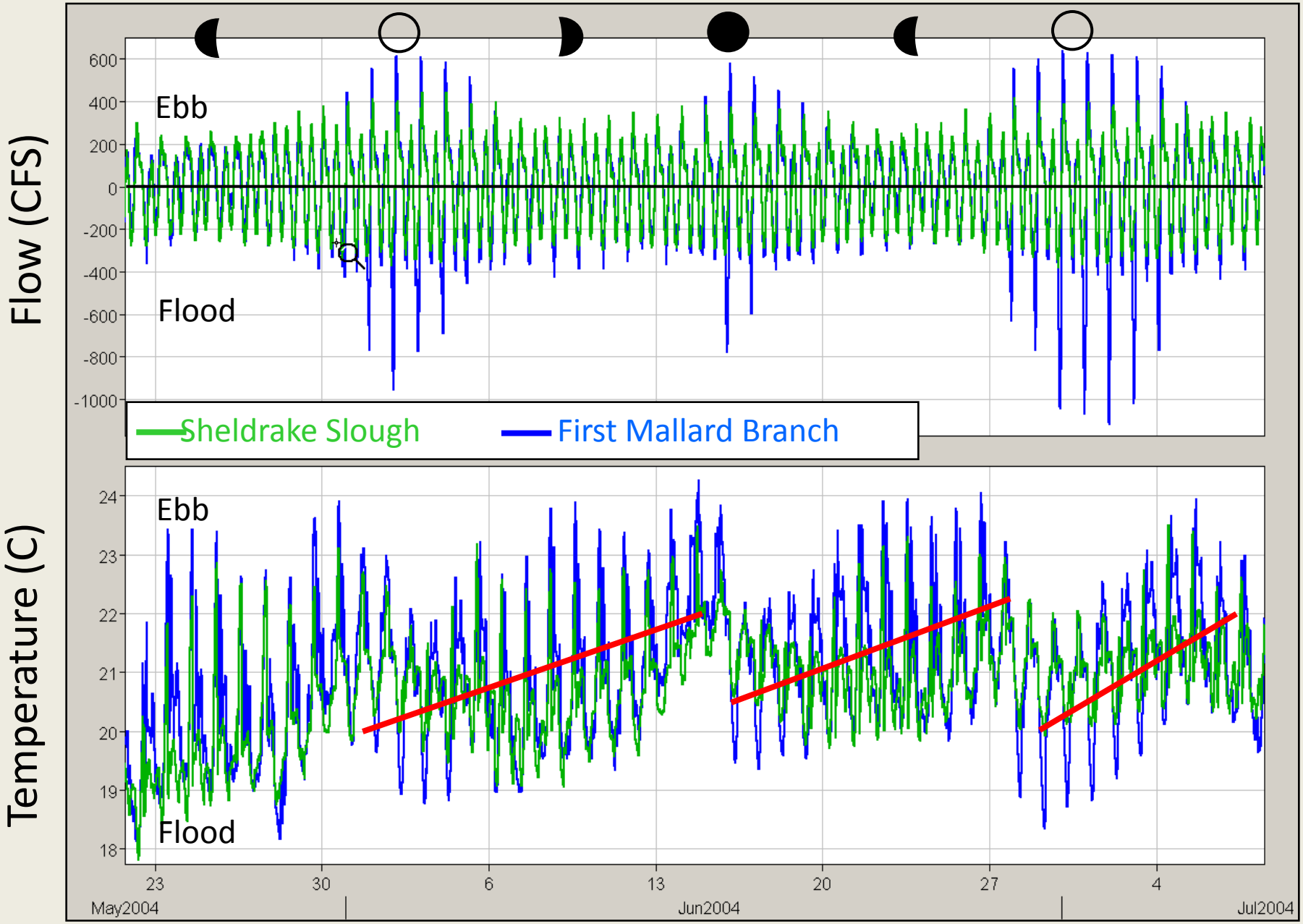
Flow and Temperature Variability



Flow and Temperature Variability



Flow and Temperature Variability

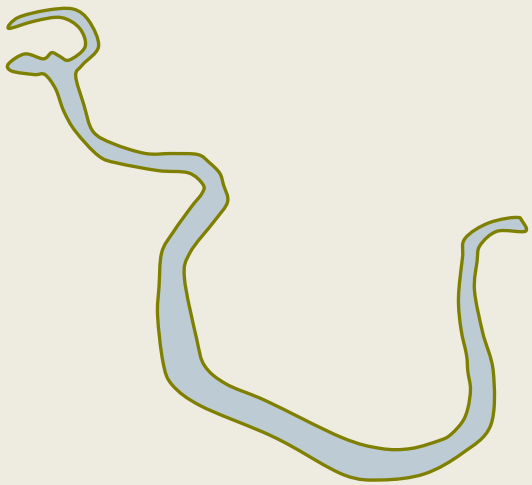


Total Flux = Advective Flux (Spring Neap) + Dispersive Flux (Tides)

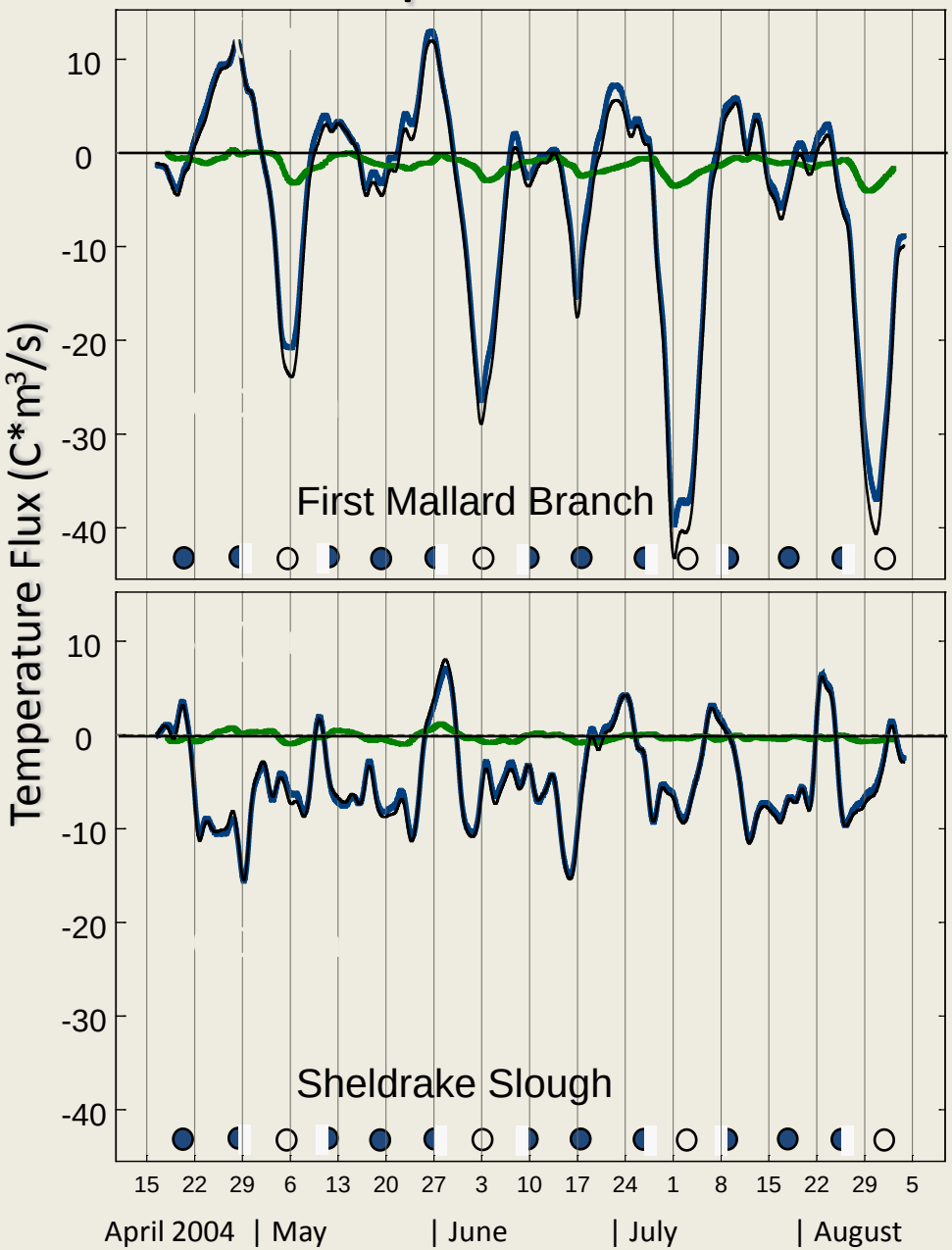
$$\langle Qt*Ct\rangle = \langle Qt\rangle\langle Ct\rangle + \langle Q't*C't\rangle$$

1. The natural slough is tied to lunar cycle

2. The natural slough is more variable



Temperature Flux

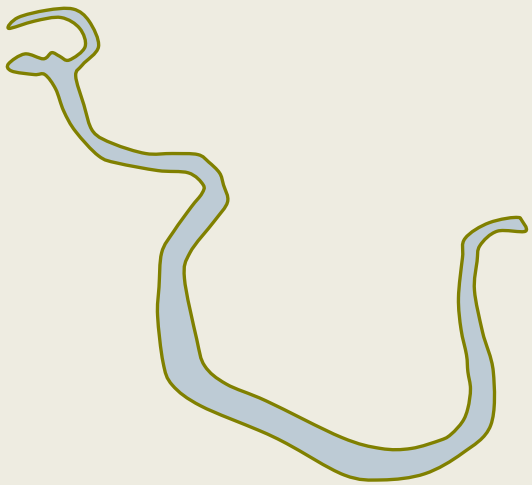


Total Flux = Advective Flux (Spring Neap) + Dispersive Flux (Tides)

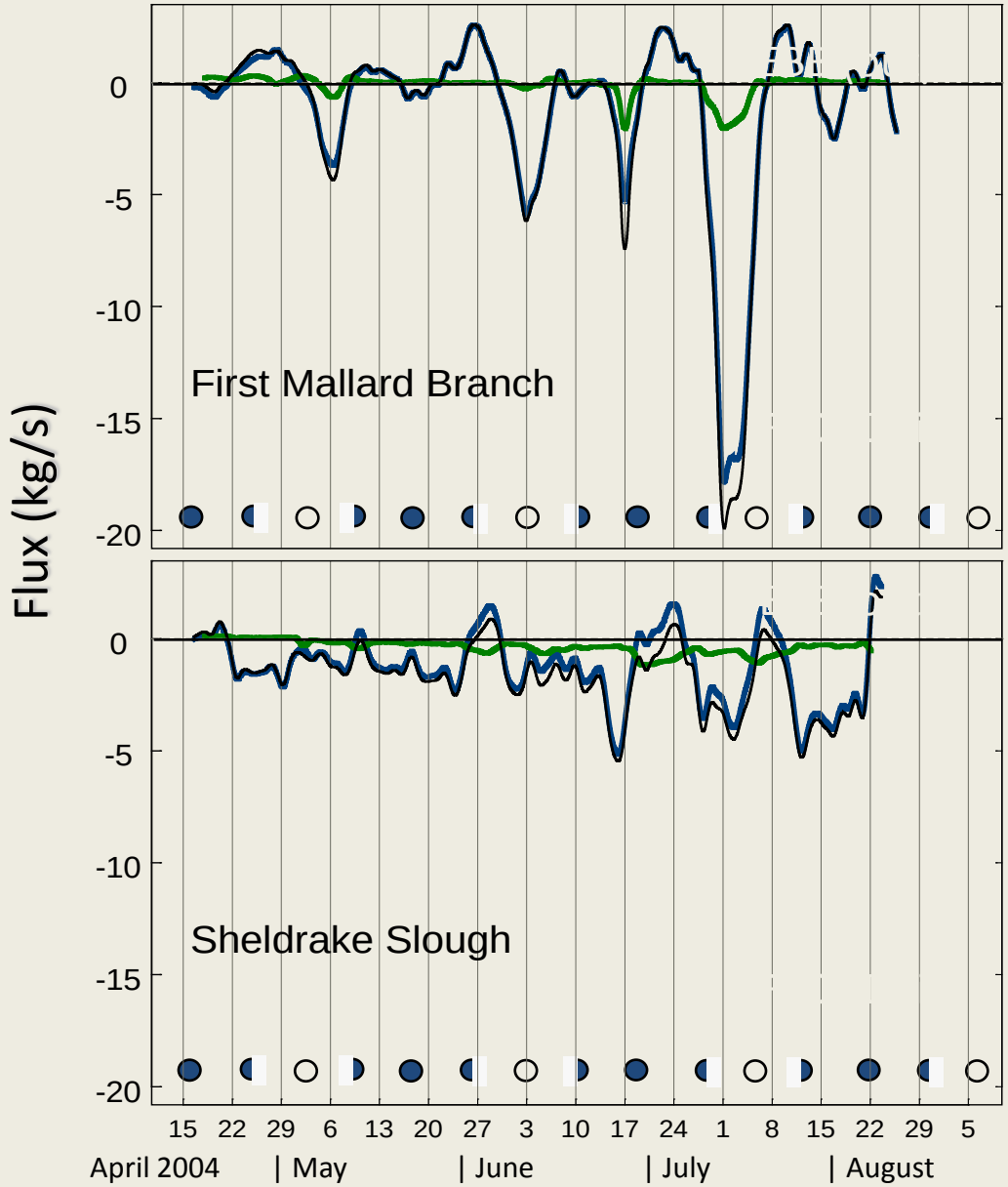
$$\langle Qt*Ct \rangle = \langle Qt \rangle \langle Ct \rangle + \langle Q't*C't \rangle$$

1. The natural slough is tied to lunar cycle

2. The natural slough is more variable



Salt Flux



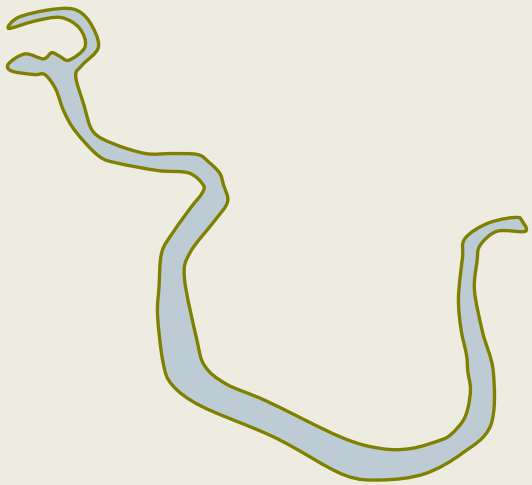
Dissolved Oxygen Flux

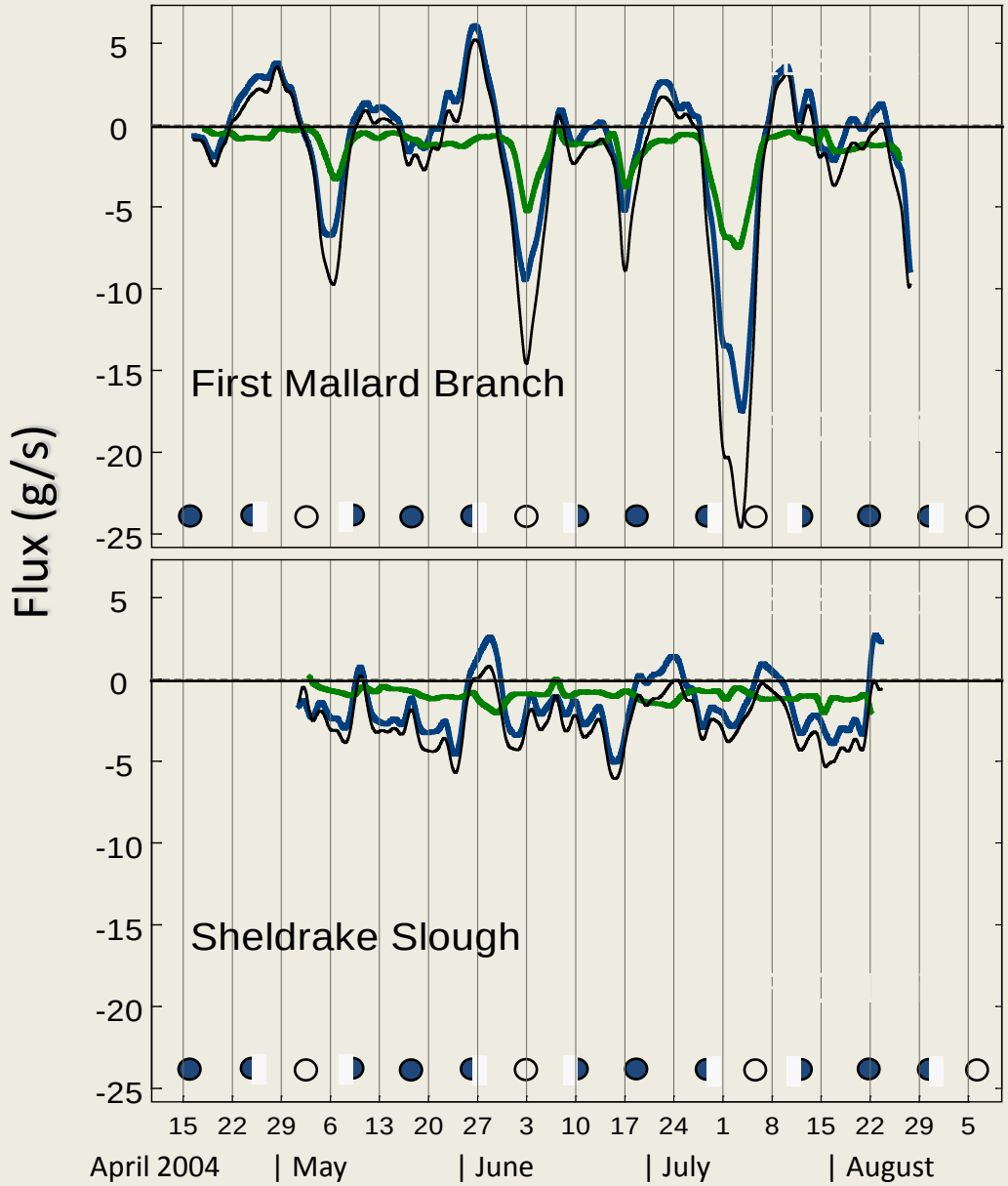
Total Flux = Advective Flux (Spring Neap) + Dispersive Flux (Tides)

$$\langle Qt*Ct\rangle = \langle Qt\rangle\langle Ct\rangle + \langle Q't*C't\rangle$$

1. The natural slough is tied to lunar cycle

2. The natural slough is more variable





Key idea:

- More complex geometry begets more variable functional responses.

Why does that matter?

✓ Native Delta plants and fishes evolved in a more variable estuary. Their life-history and phenology "gets it."