4D coordinate work

Based on conversations with Zhaoying Angie Wei, Rebecca Murphy, Elgin Perry, Jon Harcum

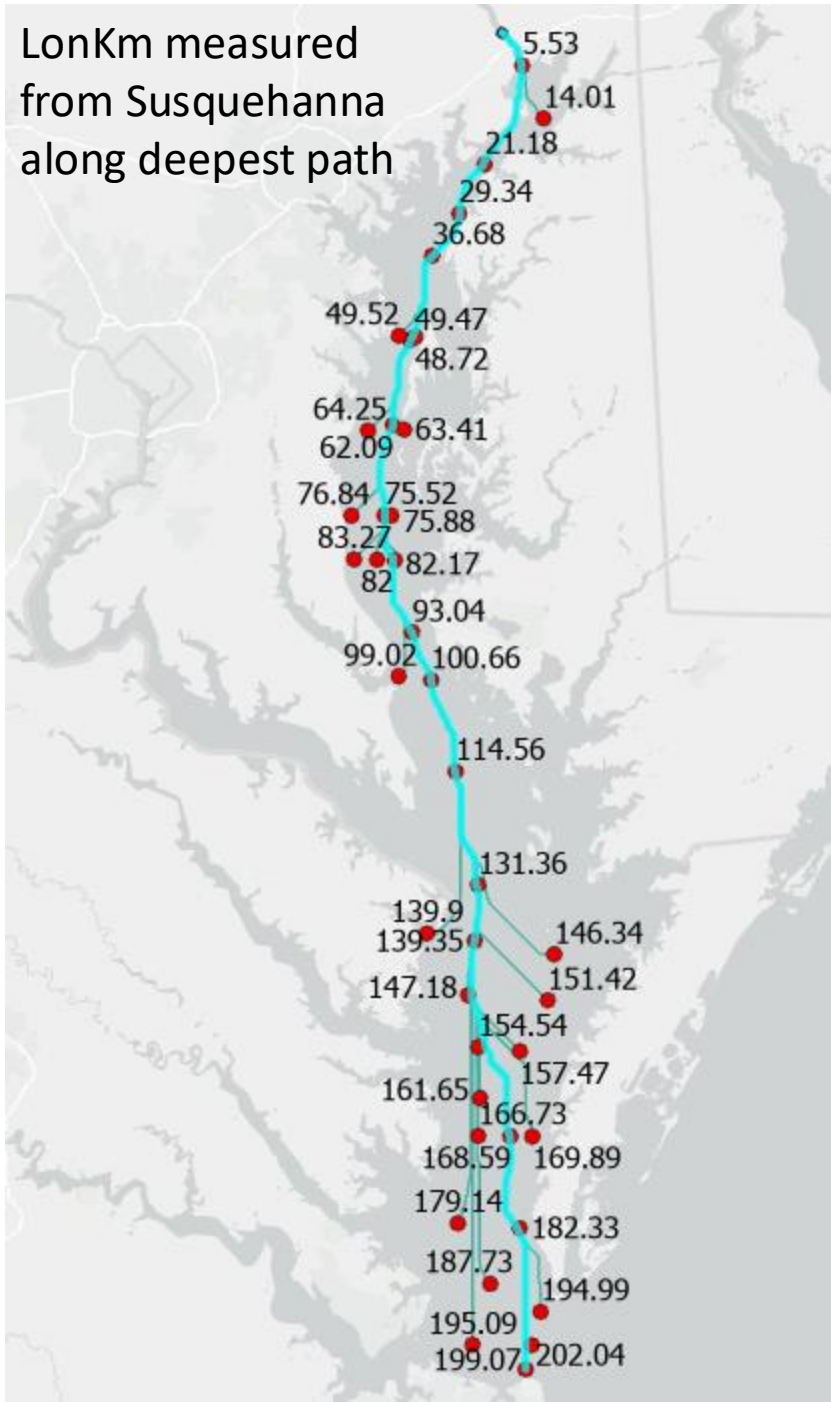
Update Feb 27, 2023

Coordinates for 4D

In the mainstem pilot GAM you've seen us use location in 3 dimensions:

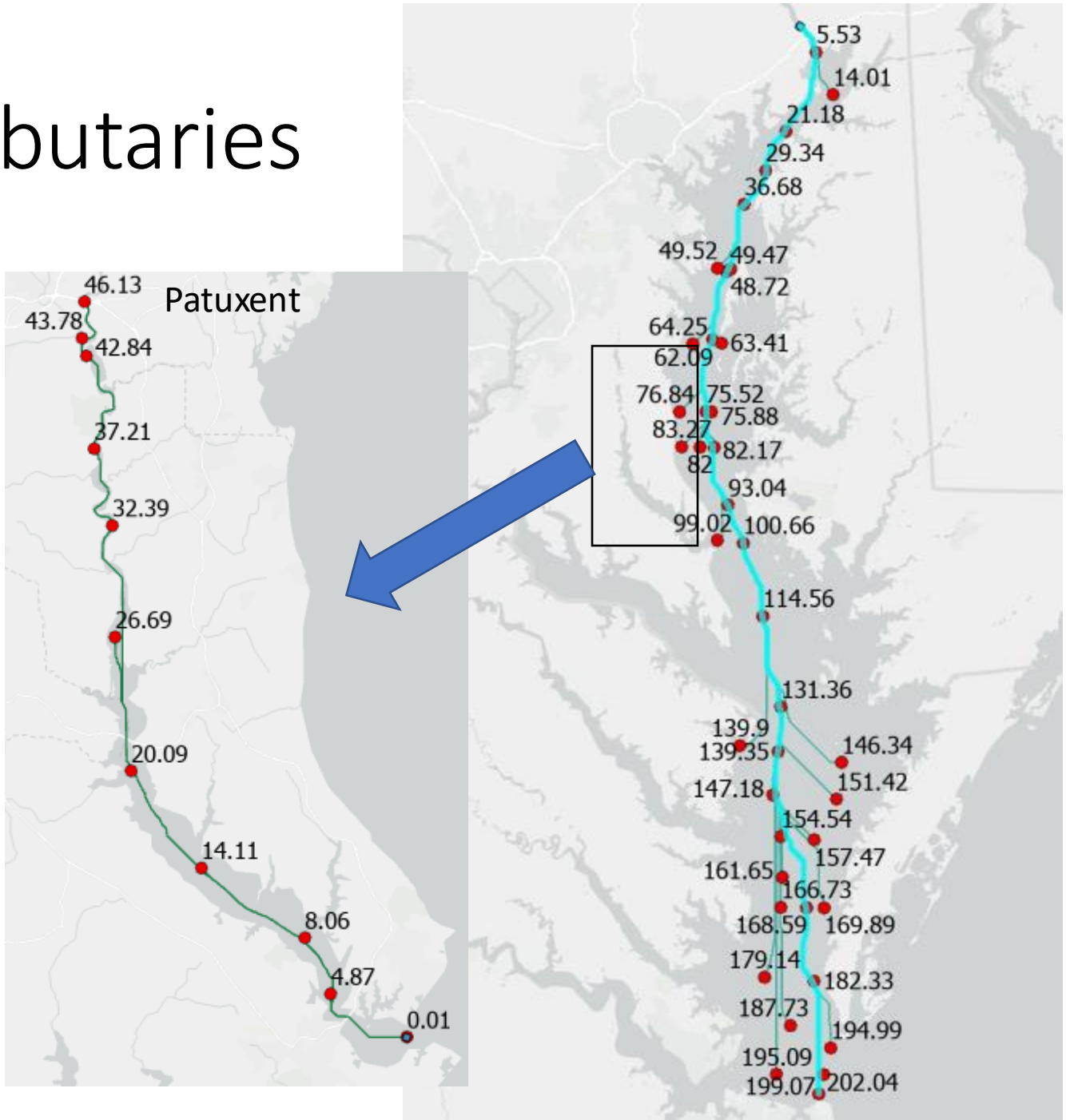
- **y = lonKm:** distance from mouth of the Susquehanna (also called RiverKm)
- **x = latKm:** distance perpendicular to deepest channel (negative one way, positive other)
- **z = wDepth:** distance from surface

Also, **bDepth:** depth of water column at that point (same for all wDepths, computed from topobathymetry)



Expanding to tributaries

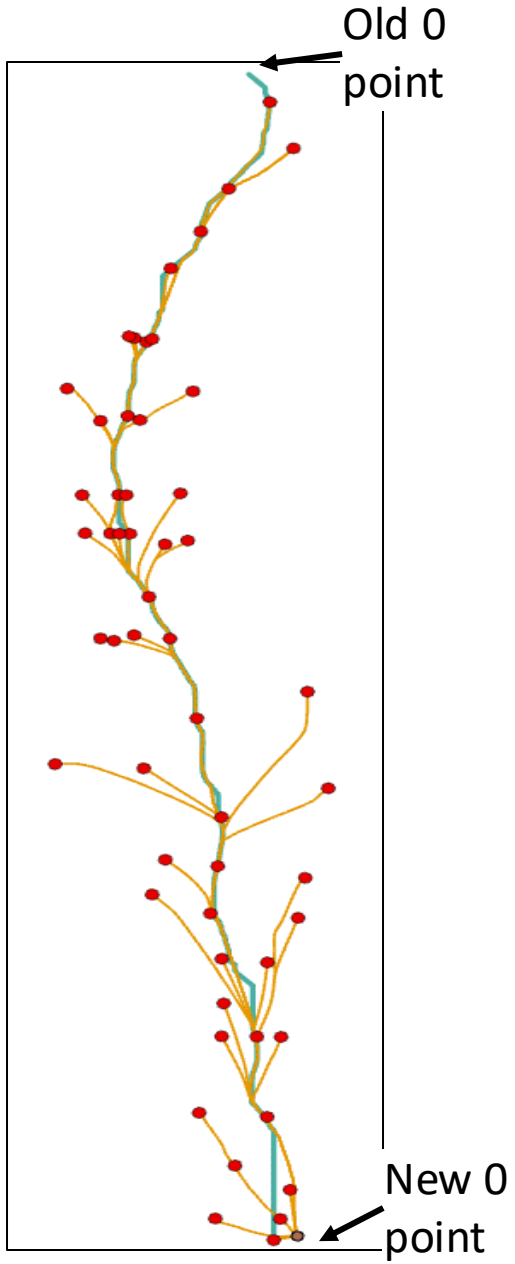
- Angie started to generate similar coordinates along major tributaries
- We started thinking about how we are going to connect the parts of the bay in the interpolation and predictions



Led us to some changes:

<u>Zero point change:</u>

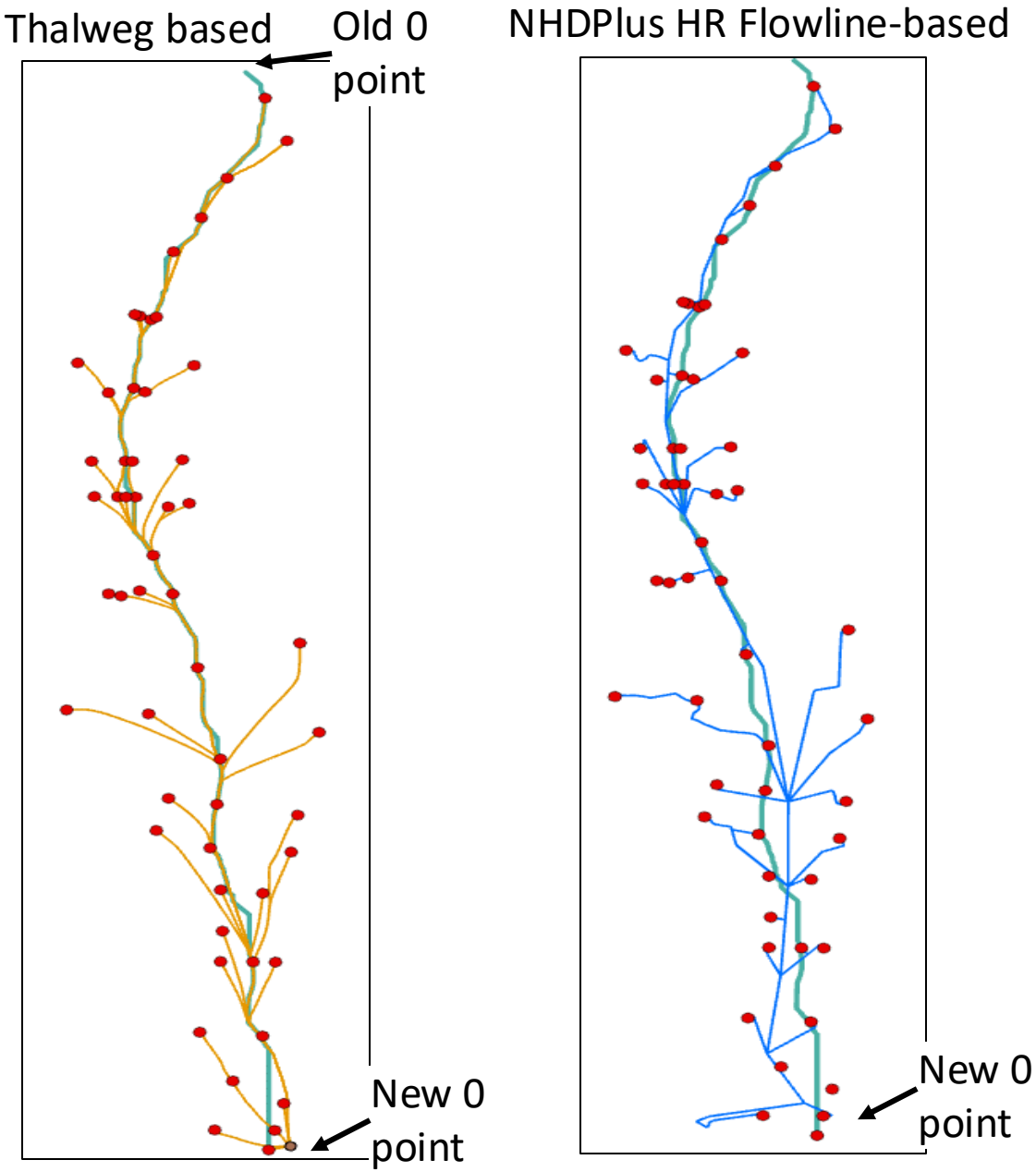
- Set zero point to mouth of Bay, instead of Susquehanna mouth
- Also decided to make this a continuous measure throughout the tidal waters (ie., only 1 zero point for the entire bay)



Led us to some changes:

NHDPlus HR flowlines

- Change to distance along “flowlines” instead of deepest point calculation following thalweg
  - → Strength
  - Computes much faster
  - Potential to be automated for any points inside the Bay
  - Almost no difference in comparison of GAM results
  - Citable to USGS*

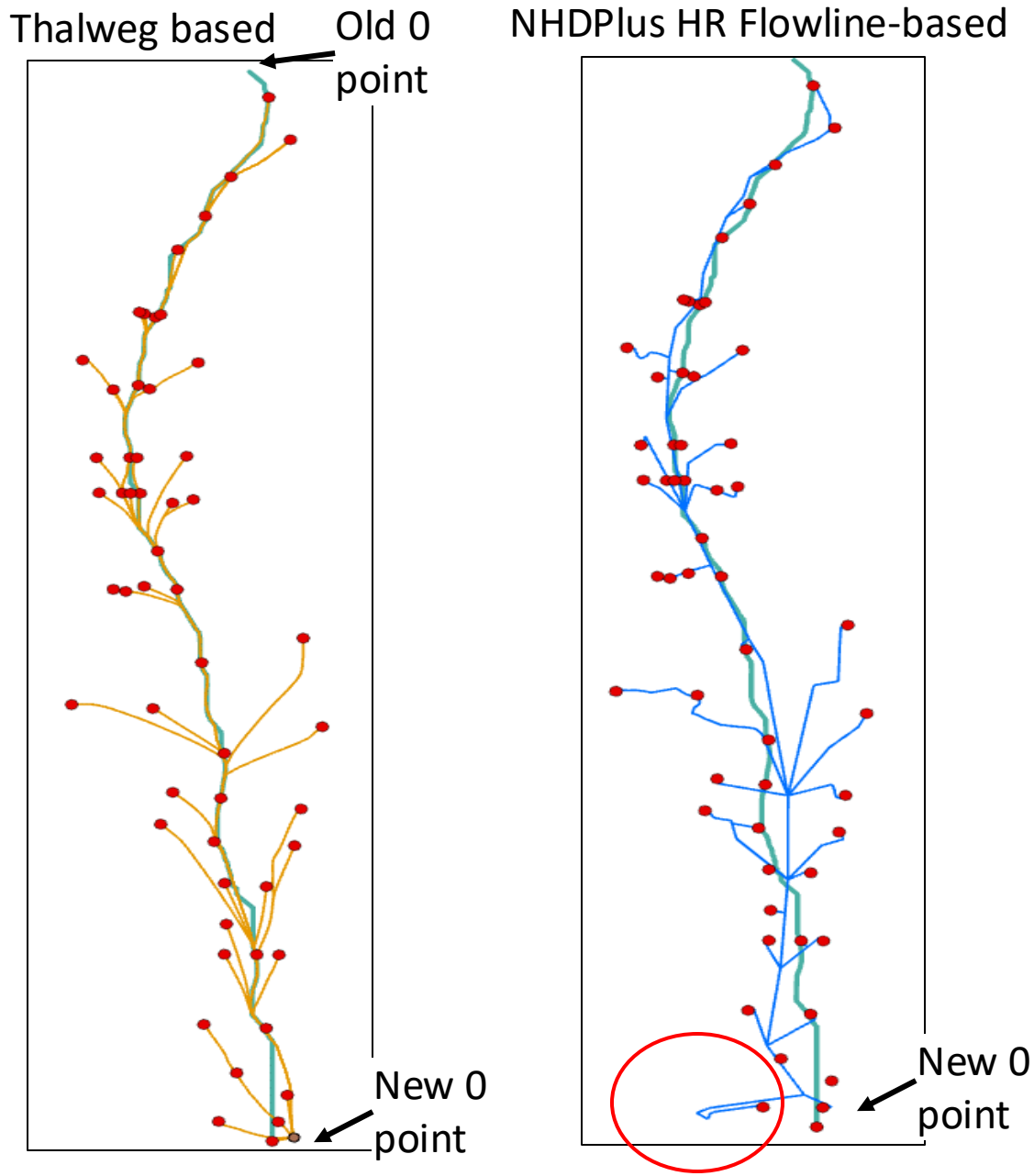


*https://www.usgs.gov/national-hydrography/nhdplus-high-resolution

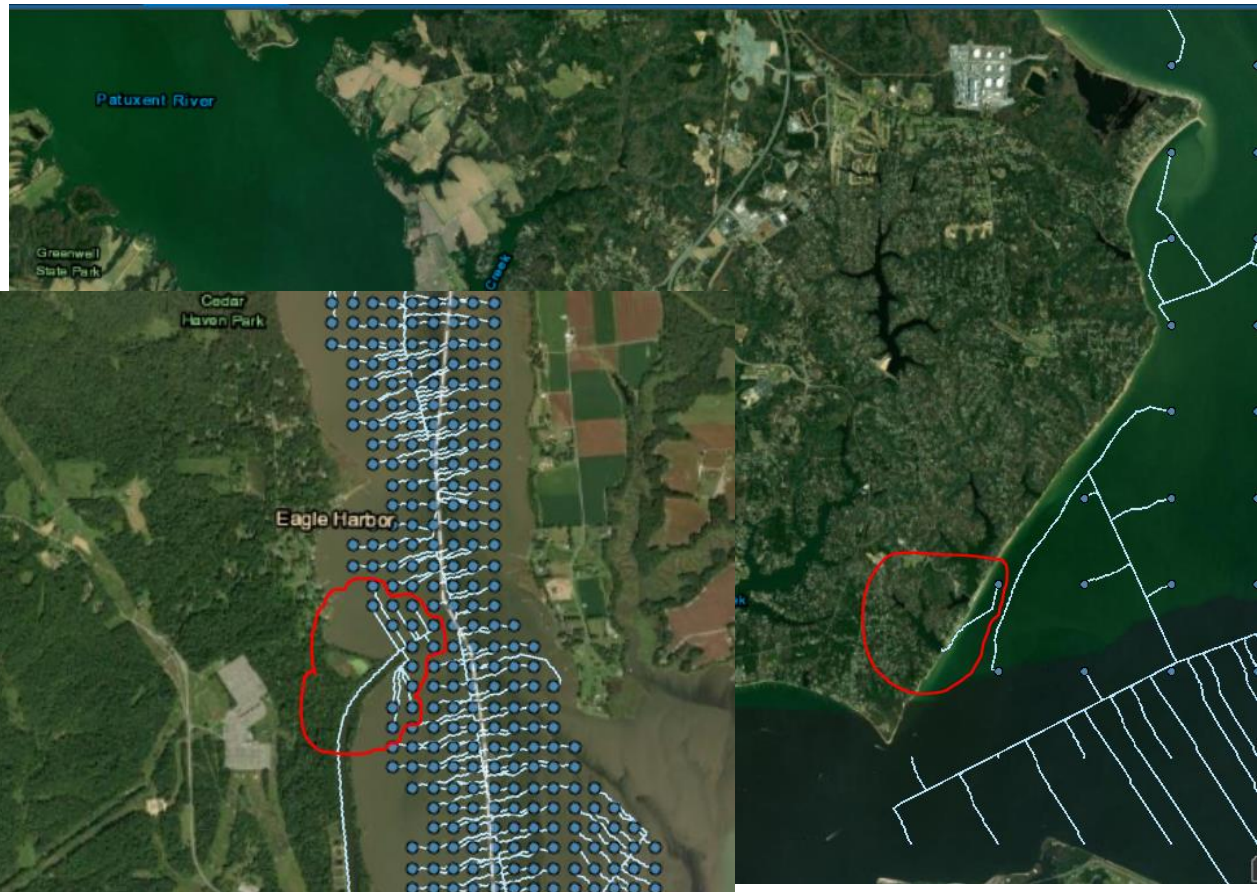
Led us to some changes:

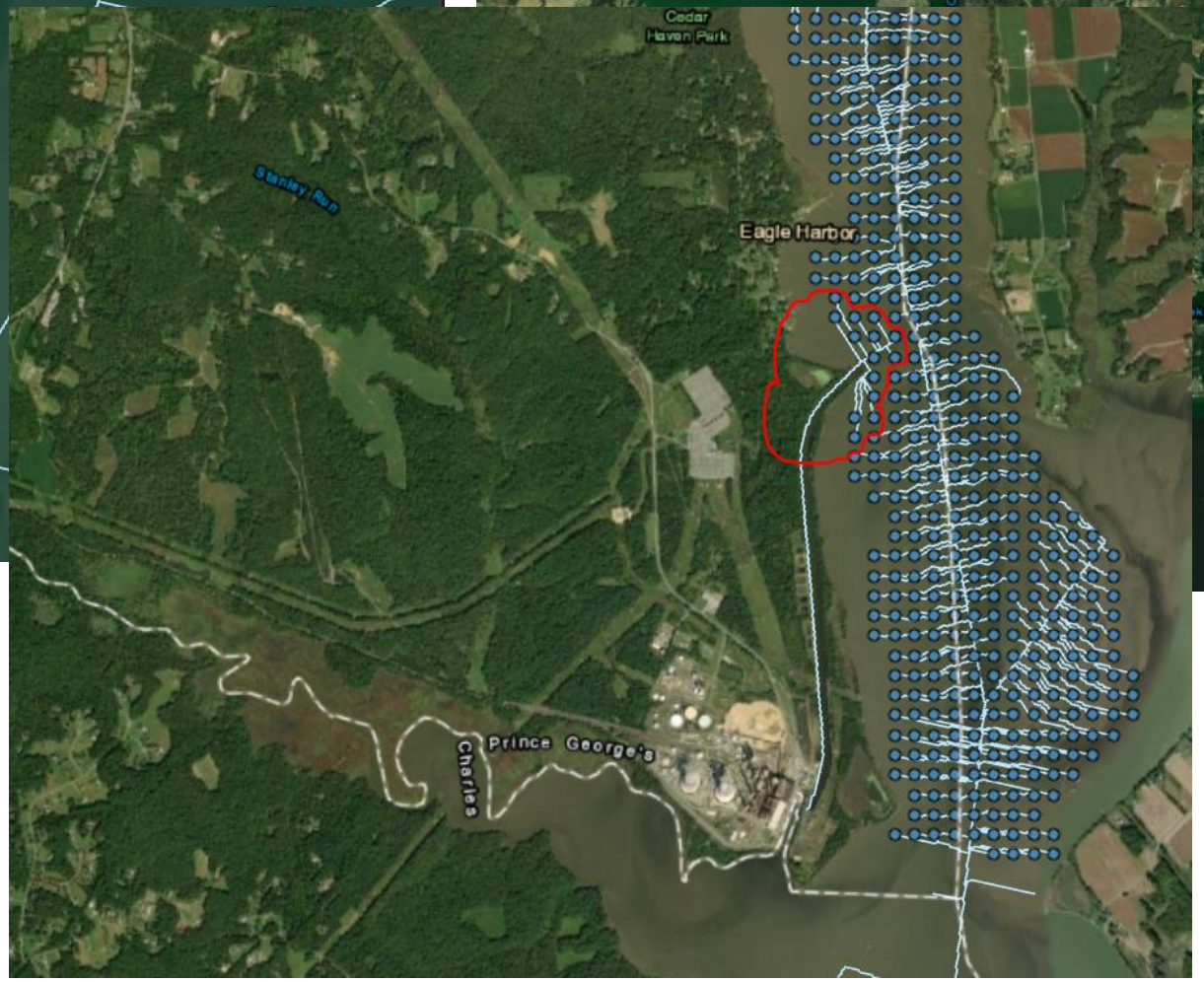
NHDPlus HR flowlines

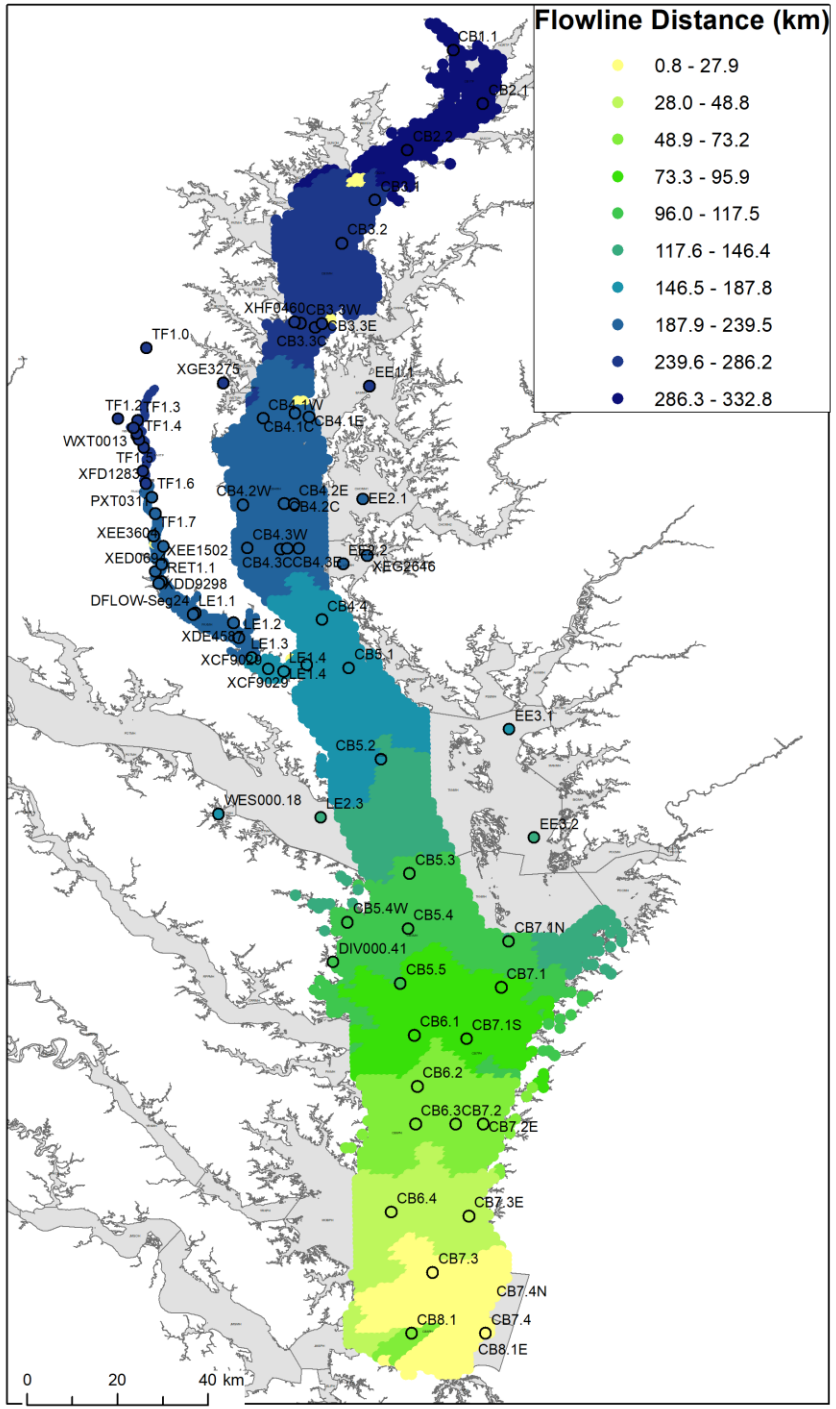
- Change to distance along “flowlines” instead of deepest point calculation following thalweg
  - → Challenges
    - Path extended: going into the James and back out for CB8.1
    - Path cut short: going to deep artificial lake, canal, or treatment plant outlet nearby

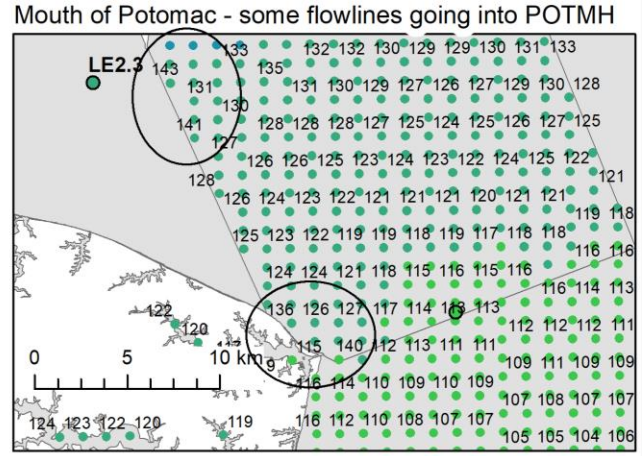


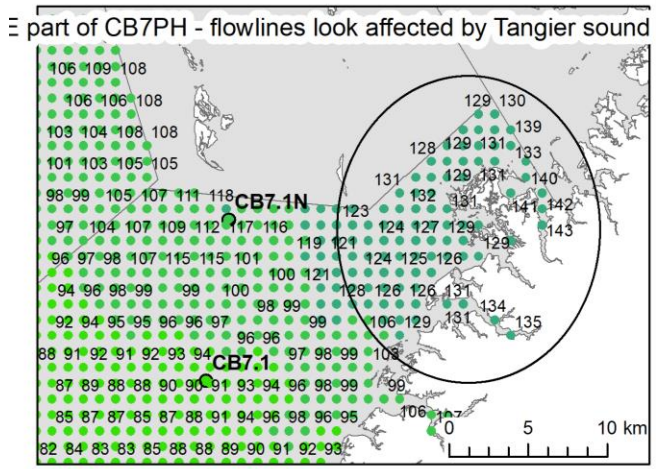
Aberdeen
Proving
Ground

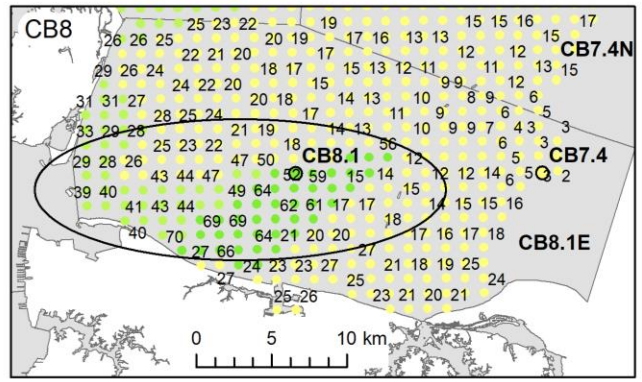

Patuxent River
Greenwell
State Park


Cedar
Haven Park
Stanley Run
Eagle Harbor
Prince George's
Charles


Flowline Distance (km)
0.8 - 27.9
28.0 - 48.8
48.9 - 73.2
73.3 - 95.9
96.0 - 117.5
117.6 - 146.4
146.5 - 187.8
187.9 - 239.5
239.6 - 286.2
286.3 - 332.8
CB1.1
CB2.1
CB2.2
CB3.1
CB3.2
XHF0460
CB3.3W
CB3.3E
CB3.3C
TF1.0
XGE3275
EE1.1
CB4.1W
CB4.1C
CB4.1E
TF1.2
TF1.3
TF1.4
WXT0013
TF1.5
XFD1283
TF1.6
PXT031
CB4.2W
CB4.2C
CB4.2E
EE2.1
TF1.7
XEE360
CB4.3W
XEE1502
XED065
CB4.3C
CB4.3E
EE3.2
XEG2646
RET1.1
XDD9298
DFLOW-Seg24
LE1.1
CB4.4
LE1.2
XDE4580
LE1.3
LE1.4
XCF9029
CB5.1
EE3.1
CB5.2
WES000.18
LE2.3
EE5.2
CB5.3
CB5.4W
CB5.4
CB7.1N
DIV000.41
CB5.5
CB7.1
CB6.1
CB7.1S
CB6.2
CB6.3
CB7.2
CB7.2E
CB6.4
CB7.3E
CB7.3
CB7.4N
CB8.1
CB7.4
CB8.1E
0
20
40 km


Mouth of Potomac - some flowlines going into POTMH
LE2.3
0
5
10 km


part of CB7PH - flowlines look affected by Tangier sound
CB7.1N
CB7.1
0
5
10 km


CB8
CB7.4N
CB8.1
CB7.4
CB8.1E
0
5
10 km