Study area = 11 HUC12s spanning DE and MD
Objective:
Extract NWI v2 wetland polygons (excluding tidal or riverine types) that intersect stream channels in the Choptank/Tuckahoe Watersheds [i.e. HUC10s] to develop an independent CONN metric for ICI/IWI. Two characterizations of stream networks will be used to quantify the difference in connectivity estimates:

Semi-automated network [lidar derived, Megan Lang, Jason Todd, et al.]
NHDPlusV2

>> Connectivity will be estimated by evaluating the following for wetlands from at the catchment scale as:

The count of wetland polygons intersecting stream channels in a catchment
The percentage of areal coverage for wetland polygons intersecting stream channels in a catchment
The area of wetland polygons intersecting stream channels in a catchment

<u>to eventually associate catchments with IWI/ICI/CONN values within the HUC12 boundary for the most downstream catchment with the appropriate HUC12</u>

The data I used:

DATA CATEGORY	STREAMS		WETLANDS	WATERSHED
DATA	NHDV2 flowlines	SEMI-AUTO LIDAR	NWI v2	NHDV2
DATA SOURCE	NHDPlusV2 MA-02] / NHD Snapshot / Hydrography / NHD Flowline	Laurie A / Jason T	FWS state downloads page	WBD Snapshot shapefile from the NHDPlusV2 data
NOTES	[Drainage Area Name MA (Mid-Atlantic) and VPU number 02] Only NHDFlowline used, no NHDArea, NHDLine, NHDWaterbody, etc No consideration of FTYPE – most of the ftypes characterized in the study area are 'StreamRiver' with next rank = 'ArtificialPath', next rank = 'CanalDitch'; a few 'Connector']		NWIv2 for MD and DE data as is, except for removing Riverine, and anything Estuary, Marine, and overlapping polygons between states	

General approach

Clip both stream representations to study area
Extract NWI types of interest [non–riverine and non-tidal wetlands] from NWI v2 wetlands data
Clip extracted NWI v2 data to study area

1. Stream buffering – Used Buffering tool – 10m buffer [means 10m laterally from each side and extending from the beginning or end of a stream].

2. Remove nested wetland type polygons – Used Dissolve tool -- Dissolve NWI wetlands in study area first on attribute [wetland type] then on FID to create dissolved wetland polygons.

3. From dissolved wetland data (step 2), select wetlands that intersect each buffered stream network to extract connected wetlands. Used Select by Location: target NWIv2 / source = 10 m buffered stream network.

4. Get percent wetland coverage and area for wetlands connected to buffered stream networks (step 3) within catchments -- Used Tabulate by Intersection tool – Join to catchment shapefile and export to new shapefile to preserve join.

5. Get counts for wetland polygons in catchment bounds

a. Create dummy field = 1 on each shapefile from 3.
b. For wetland polygon counts not cut by catchment boundaries-- Used Spatial Join tool [catchments to file from step 5a].
c. For partial wetland counts cut by catchment boundaries -- Used Intersect tool [catchments to file from step 5a].
d. Summarize outputs from 5b and 5c on Feature ID and dummy field / export summaries as tables.
e. Join tables from d, export to preserve join / join exported tables join to catchment shapefile from 4 / export again to preserve join.

6. Delete unwanted columns / add a field for total counts [summed counts for wetland polygons crossed and uncrossed by catchment bounds] / field calculator for the three count fields [uncrossed, crossed and total wetland counts for each catchment record].

7. Join ICI /IWI data [from Anne Kuhn's email 2-14-17]

8. Join HUC level info / add a field named 'UpCatMax' to denote the most downstream catchment within each of the 11 HUC12s in the study area. Catchments were marked as 'max' by comparing accumulated values for catchments I previously derived using StreamCat code [for another project] – the StreamCat code [published online] can be adapted to associate and then accumulate any data of interest from upstream catchments within HUC12s – the catchment with the highest value [for whatever data you used] is the 'most accumulated' [downstream] one. *BUT* this assumes that the most downstream catchment is the same for NHD network as for the semi-automated lidar network.

7. Rename field names to desired names using Alter Field tool.

Shapefiles in the map file:

wbd_study_area	Study area = choptank / tuckahoe watersheds [HUC10s]
catchment_study_area	Catchments contained in study area [HUC12s]
choptank_tuckahoe_nhd_flowlines	Choptank River / Tuckahoe Creek main tributaries
semiauto_buff10	Semi-automated lidar streams buffered 10m and clipped to study area
nhd_flowlines_buff10	NHDV2 Flowlines buffered 10m and clipped to study area
nwi_dissolve_xby_nhd	NWI dissolved polys intersecting buffered NHD, extracted ['xby' = crossed by]
nwi_dissolve_not_xby_nhd	NWI dissolved polys NOT intersecting buffered NHD, extracted
nwi_dissolve_xby_semiauto	NWI dissolved polys intersecting buffered semi-auto lidar, extracted, ['xby' = crossed by]
nwi_dissolve_not_xby_semiauto	NWI dissolved polys NOT intersecting buffered semi-auto lidar, extracted
nwi_study_area	NWI un-dissolved polys w/o regard to intersecting streams, for MD & DE [=all non-Riverine / non-tidal NWI polygons in the study area]
nwi_dissolve_study_area	NWI dissolved polys w/o regard to intersecting streams, for MD & DE [=all non-Riverine / non-tidal NWI polygons in the study area]
nwi_xby_nhd_final	nhd catchments shape joined to all calculated values for nhd stream network + iwi/ici metrics + watershed attributes
nwi_xby_semiauto_final	nhd catchments shape joined to all calculated values for semiauto stream network + iwi/ici metrics + watershed attributes
choptank_tuckahoe_study_area	Plain background if needed for visualization

FIELDS
A list of the fields in the two 'final' files only: containing the calculated values:
[nwi_xby_nhd_final & nwi_xby_semiauto_final [both in a .gdb] also as .csv spreadsheets attached to email]

Note -- For the wetlands counts in catchments: i.e. for WetCntWhole and WetCntPartial fields – I think these fields are not necessarily useful as distinguishing between wetland polygons crossed by catchment bounds and those not is not always differentiated by much, because even if the wetland was just barely cut off by a catchment bound, it was counted as 'partial' by the way I did it – but I left those fields anyway --

OBJECTID	
FEATUREID	Native field from NHD catchments shapefile: joined to Flowline by COMID from NHD Flowline
SOURCE	Native field from NHD catchments shapefile: all records = NHDFlowline
CatAreaSqKM	Renamed native field from NHD catchments shapefile: area of the catchment in sq kilometers
WetAREASqM	Calculated: GIS tool Tabulate by Intersection: area of wetland in the catchment in sq meters
WetPercentage	Calculated: GIS tool Tabulate by Intersection: percentage wetland coverage in the catchment
WetCntWhole	Calculated: Summarize FEATUREID on Spatial Join : count of whole wetland polygons in catchment. Value -1 means no wetlands in catchment.
WetCntPartial	Calculated: Summarize FEATUREID on Intersect minus WetCntWhole: count of partial wetland polygons in catchment. Value -1 means no wetlands in catchment.
WetCntAll	Calculated: Sum WetCntWhole + WetCntPartial: count of total wetland polygons. Value -1 means no wetlands in catchment.
iwi	
ici	
prg	
HYDindx	
CHEMindx	
SEDindx	
CONNindx	
TEMPindx	
HABTindx	
HUC_8	
HUC_10	
HUC_12	
HU_10_NAME	
HU_12_NAME	
UpCatSqKM	Calculated: from StreamCat output: accumulated area in SqKM for upstream catchments for stream flow at that point in that HUC12.
UpCatMax	Calculated: from StreamCat output: the greatest accumulated area, and therefore the most downstream catchment in that HUC12: marked with 'max'.
Shape_Area	A field that is automatically added by ARCGIS when data is managed in a .gdb [and can't be deleted]
Shape_Length	A field that is automatically added by ARCGIS when data is managed in a .gdb [and can't be deleted]