

(a)(2) WATERS TRIBUTARIES

NAVIGABLE WATER PROTECTION RULE IMPLEMENTATION WEBINAR

Regulatory Division - Savannah District
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OVERVIEW

- Tributaries
- Determining flow regimes
- Ditches
- Tools



Loxahatchee River



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TRIBUTARIES – (a)(2) WATERS - DEFINITION

The term *tributary* means a river, stream, or similar naturally occurring surface water channel that contributes surface water flow to a water identified in paragraph (a)(1) of this definition in a typical year either directly or through one or more waters identified in paragraph (a)(2)-(a)(4) of this definition. A tributary must be perennial or intermittent in a typical year.



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TYPICAL YEAR - DEFINITION

When precipitation and other climatic variables are within the normal periodic range (e.g., seasonally, annually) for the geographic area of the applicable aquatic resource based on a rolling thirty-year period.



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(a)(1) WATER - DEFINITION

The territorial seas, and waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters which are subject to the ebb and flow of the tide.



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(a)(3) WATER - DEFINITION

The term *lakes and ponds, and impoundments of jurisdictional waters* means standing bodies of open water that contribute surface water flow to a water identified in paragraph (a)(1) of this definition in a typical year either directly or through one or more waters identified in paragraph (a)(2)-(a)(4) of this definition.



Lake Superior



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(a)(4) WATER - DEFINITION

Wetlands that

- a) abut, meaning that touch at least at one point or side of, an (a)(1)-(a)(3) water;
- b) are inundated by flooding from an (a)(1)-(a)(3) water in a typical year;
- c) are physically separated from an (a)(1)-(a)(3) water only by a natural berm, bank, dune, or similar natural feature; or
- d) are physically separated from an (a)(1)-(a)(3) water only by an artificial dike, barrier, or similar artificial structure so long as that structure allows for a direct hydrologic surface connection between the wetlands and the (a)(1)-(a)(3) water in a typical year, such as through a culvert, flood or tide gate, pump, or similar artificial feature.



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NWPR - KEY DEFINITIONS

Perennial:

- The term *perennial* means surface water **flowing continuously year-round**.

Intermittent:

- The term *intermittent* means surface water **flowing continuously during certain times of the year and more than in direct response to precipitation** (e.g., seasonally when the groundwater table is elevated or when snowpack melts).

Ephemeral:

- The term *ephemeral* means surface water flowing or pooling **only in direct response to precipitation** (e.g., rain or snow fall).

Snowpack:

- The term *snowpack* means **layers of snow that accumulate over extended periods of time** in certain geographic regions or at high elevation (e.g., in northern climes or mountainous regions).



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TRIBUTARIES – (a)(2) WATERS - DEFINITION

The term *tributary* means a river, stream, or similar naturally occurring surface water channel that **contributes surface water flow** to a water identified in paragraph (a)(1) of this definition in a typical year either directly or through one or more waters identified in paragraph (a)(2)-(a)(4) of this definition. A tributary must be **perennial or intermittent** in a typical year.



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TRIBUTARIES – (a)(2) WATERS

CONTRIBUTION OF SURFACE WATER FLOW

- Perennial or intermittent streams that contribute surface water flow to an (a)(1) water in a typical year either directly or through one or more
 - (a)(2) tributaries
 - (a)(3) lakes, ponds or impoundments of a jurisdictional water
 - (a)(4) adjacent wetlands



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TRIBUTARIES – (a)(2) WATERS

NATURAL AND ARTIFICIAL FEATURES

- A tributary does not lose its jurisdictional status if it contributes surface water flow to a downstream jurisdictional water in a typical year through the following features:
 - A channelized non-jurisdictional surface water feature
 - A subterranean river
 - A culvert, dam, tunnel, or similar artificial feature
 - A debris pile, boulder field, or similar natural feature
 - An excluded feature under paragraph b of the Rule



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CHANNELIZED NON-JURISDICTIONAL SURFACE WATER

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This type of feature includes non-jurisdictional ditches or ephemeral streams which are not themselves jurisdictional but can provide a channelized surface water connection for upstream perennial or intermittent waters in a typical year.



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SUBTERRANEAN RIVER

A subterranean river is a natural channel that temporarily flows underground as a channelized river or stream, maintaining the same or very nearly the same flow volume underground and at the downstream point where it returns to the surface. Similarly urban areas can have artificial buried underground tunnel systems that act in the same way.



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CULVERT, DAM, TUNNEL, OR SIMILAR ARTIFICIAL FEATURE ¹⁴

A culvert, dam, tunnel, or other similar artificial feature can convey surface water flows from upstream jurisdictional waters to downstream jurisdictional waters. If those surface water flows are conveyed in a typical year, jurisdiction of the upstream waters is not severed.



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DEBRIS PILE, BOULDER FIELD, OR SIMILAR NATURAL FEATURES

Natural features can also convey surface water flows from upstream jurisdictional waters to downstream jurisdictional waters. If those flows are conveyed in a typical year, jurisdiction of the upstream waters is not severed.



Photo: Stream with debris pile.



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FEATURES THAT SEVER JURISDICTION

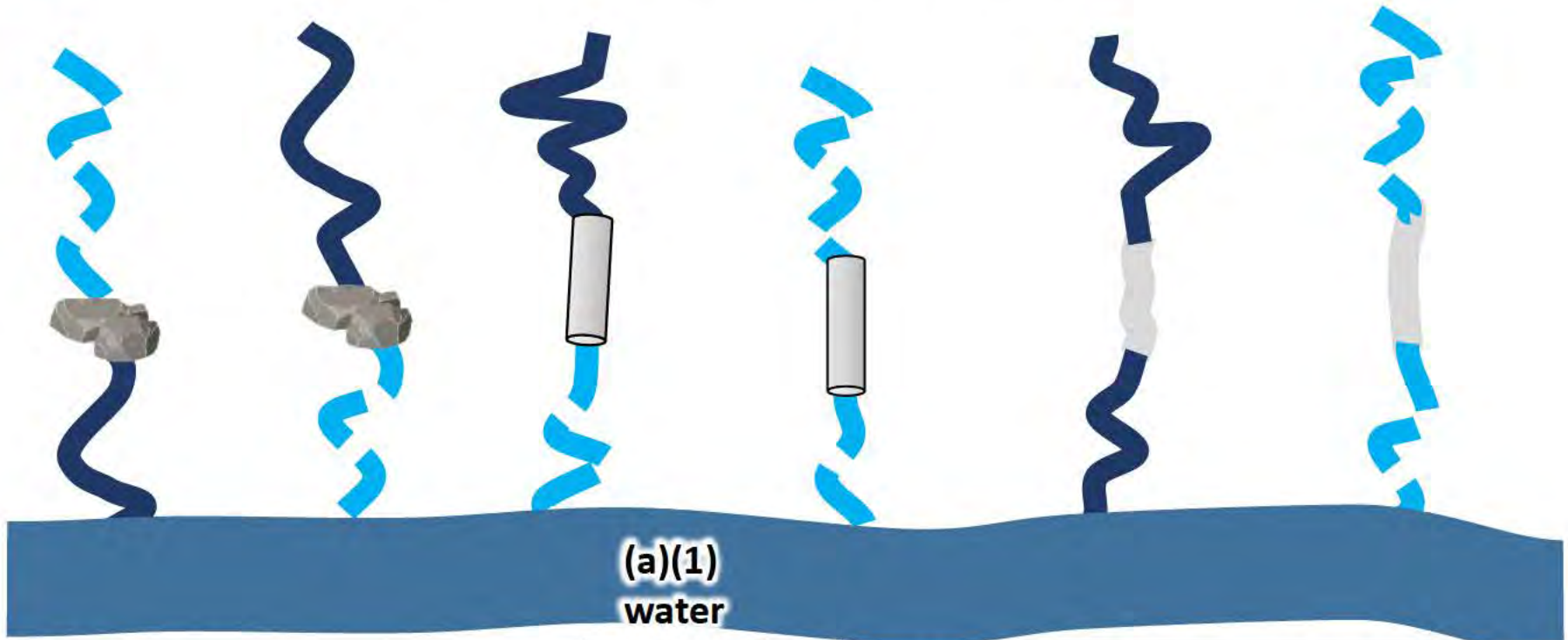
- Surface stream channels that disappear underground and become part of the ground water aquifer.
 - They never reconnect with the downstream tributary system (other than possibly via groundwater) and as such are not jurisdictional.
- Stream channel breaks that do not contribute surface water flows to downstream jurisdictional waters in a typical year.
 - These stream breaks may only convey surface water flows during precipitation events that generally do not occur in a typical year (e.g., 10-, 25-, 50-, 100- or 500-year storms or floods).







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Tributaries – Contribution of Flow

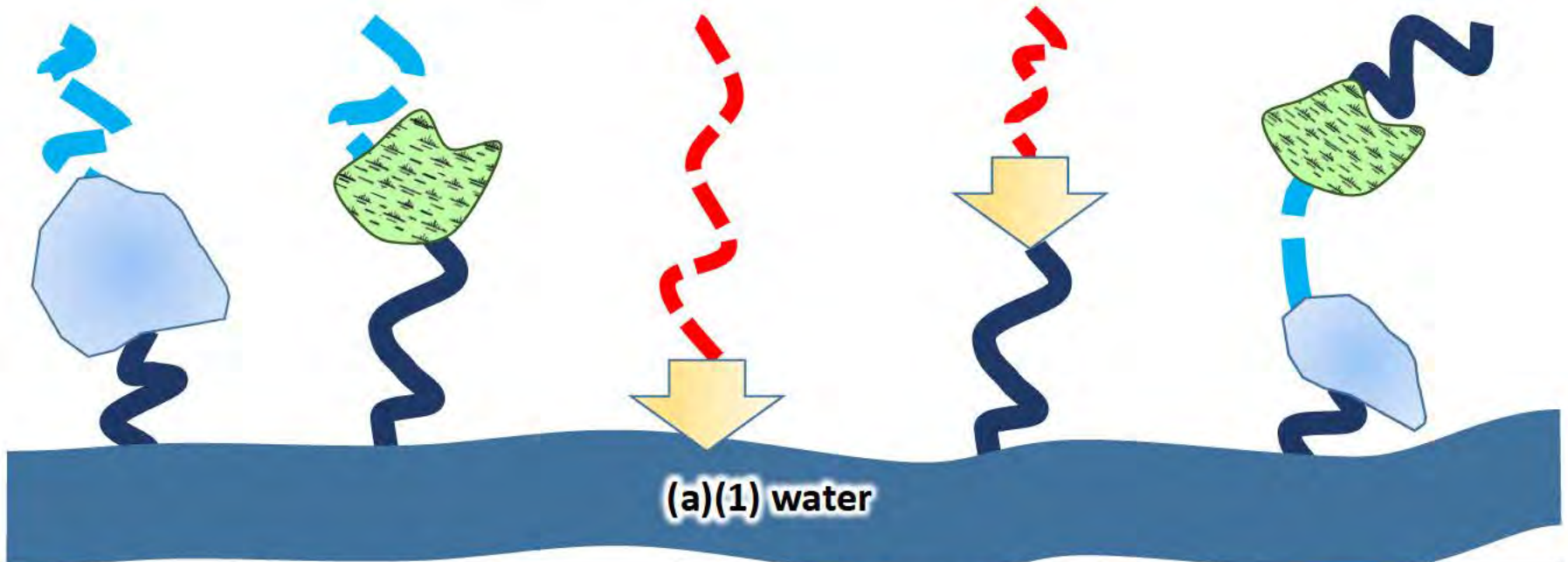


-  Perennial Tributary (jurisdictional)
-  Intermittent Tributary (jurisdictional)
-  Boulder field, debris pile, or similar natural feature (not jurisdictional)
-  Culvert, dam, tunnel, or similar artificial feature (not jurisdictional)
-  Subterranean river or stream (not jurisdictional)

Artificial or natural features do not sever jurisdiction for the upstream reach of the tributary if a channelized non-jurisdictional surface water feature conveys surface water flow to a downstream jurisdictional water in a typical year.

Other types of artificial or natural features, such as dams, boulder fields, debris piles, and subterranean rivers/streams maintain jurisdiction so long as they convey surface water flow from an upstream tributary to a downstream jurisdictional water in a typical year.

Tributaries – Contribution of Flow



-  **Perennial Tributary** (jurisdictional)
-  **Intermittent Tributary** (jurisdictional)
-  **Perennial or Intermittent Stream** (not-jurisdictional)
-  **(a)(3) Water** (jurisdictional)
-  **(a)(4) Adjacent Wetland** (jurisdictional)
-  **Diffuse overland sheetflow** (not jurisdictional)

The final rule defines "tributary" to mean a river, stream, or similar naturally occurring surface water channel that contributes surface water flow to the territorial seas or traditional navigable waters (paragraph (a)(1) waters) in a typical year either directly or through one or more tributaries (paragraph (a)(2) waters), lakes, ponds, and impoundments of jurisdictional waters (paragraph (a)(3) waters), or adjacent wetlands (paragraph (a)(4) waters).

Non-channelized, diffuse stormwater and overland sheet flow cannot sustain a regular or predictable surface water connection between upstream and downstream waters and therefore cannot maintain jurisdiction between such waters.

DETERMINING FLOW REGIMES

- Flow regime relevance
- Definitions
- Physical Attributes and Indicators
- Remote Tools



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TRIBUTARIES – (a)(2) WATERS - DEFINITION

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FLOW REGIME RELEVANCE

One requirement of a tributary is that it must have perennial or intermittent flows in a typical year.

- Is the stream's flow duration intermittent or perennial in a typical year (normal conditions)?
- Knowing the current conditions informs what additional evidence will be needed to complete the flow regime conclusion.



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EXAMPLES OF TYPICAL YEAR APPLICATION FOR FLOW REGIME

- If site observations show flowing water in non-typical drier than normal conditions and it has not recently rained, then there is less need to gather historical aerial evidence of flows collected during typical years. In this scenario, more weight may be given to the flow meeting the requirements in the NWPR.
- If site observations show flowing water during non-typical wetter than normal conditions, then additional evidence would be needed to support the decision. Evidence of water in the channel (or lack thereof) in point in time resources (e.g. historic aerials) from typical years is one example of what could be used to support the decision.



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FLOW – INTERMITTENT

- Intermittent flows may occur seasonally such as in the spring when evapotranspiration is low and the groundwater table is elevated. Under these conditions, the groundwater table intersects the channel bed and groundwater provides continuous base flow for weeks or months at a time even when it is not raining or has not very recently rained.
- Snow pack and artificial sources such as effluent can also be sources of intermittent flows.
- Note that groundwater input is not a requirement in the Rule's definition of "intermittent".



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FLOW – SNOW PACK

- Melting snowpack can be the sole or primary source of perennial or intermittent flow in a tributary.
- The term “snowpack” is defined as “layers of snow that accumulate over extended periods of time in certain geographic regions or at high elevation (e.g., in northern climes or mountainous regions).”
- “Extended periods of time” refers to more than merely a single snowfall event or periodic events with repeated snowmelts after each occurrence, but rather recurring snow events which result in an accumulation of multiple layers of snow in certain geographic regions, or at high elevations.



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FLOW – EPHEMERAL VS INTERMITTENT

More than direct response to precipitation?

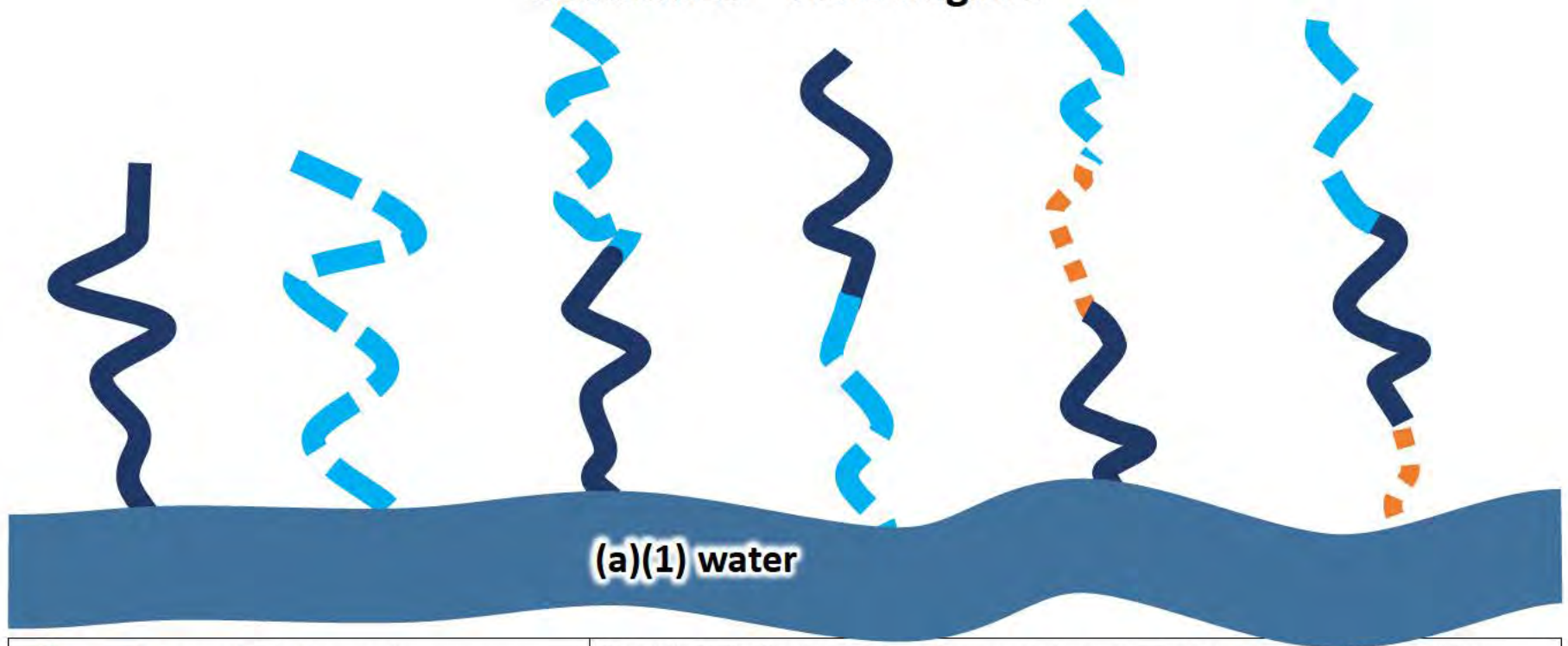
- An ephemeral stream may flow immediately after a rain event and then another rain event occurs that extends that flow duration longer. A stream channel that flows **only** in direct response to precipitation (including multiple, individual back-to-back storms) is considered ephemeral under the Rule.
- Intermittent flows occur through more than a direct response to precipitation runoff, as the precipitation event(s) recharges the riparian aquifer through bank infiltration which in turn supplies a sustained base flow that flows when it is not raining or has not recently rained. Intermittent streams that receive flows from melting snowpack perform similarly, as the slowly melting snow provides sustained base flows.



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Tributaries – Flow Regime



(a)(1) water



Perennial Tributary¹ (jurisdictional)

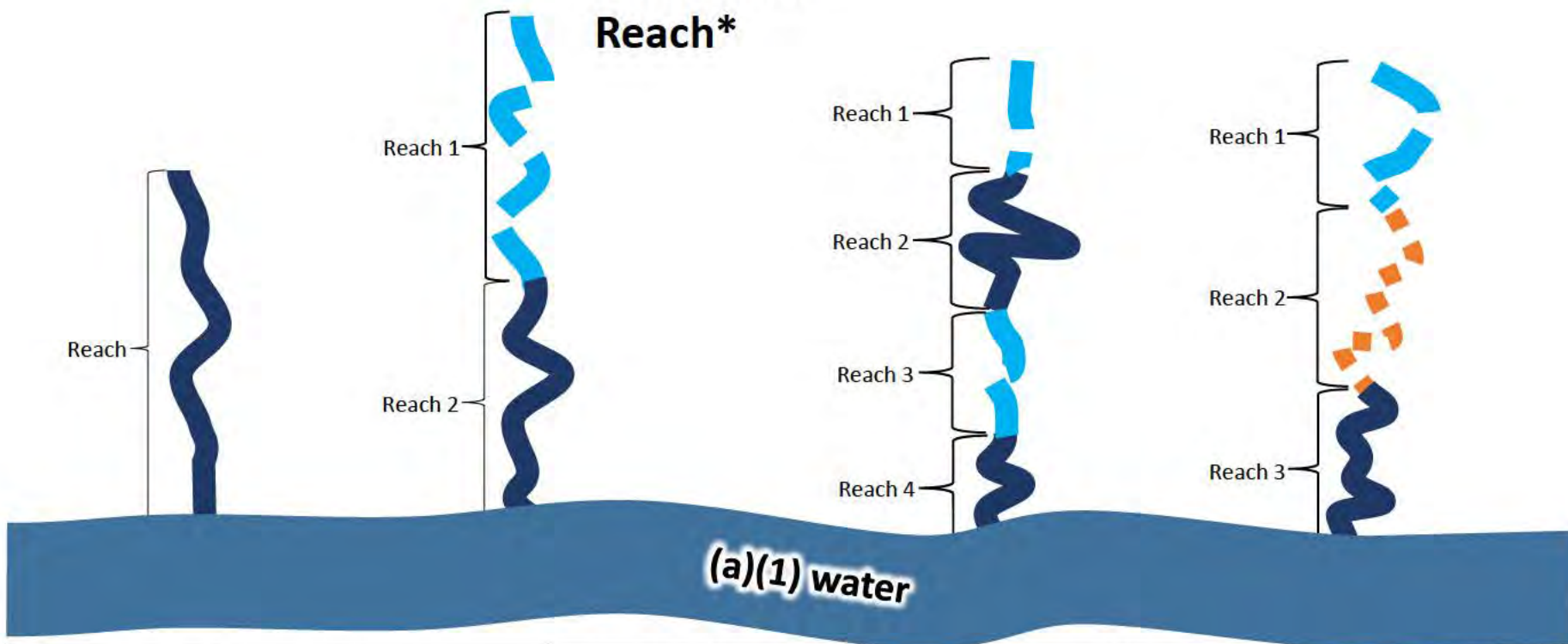
Intermittent Tributary¹ (jurisdictional)




Ephemeral Channel² (not jurisdictional)

¹The "tributary" definition contains no flow volume requirement, but only a requirement of perennial or intermittent flow and a contribution of surface water flow to a paragraph (a)(1) water in a typical year.

²While the channelized ephemeral feature is not itself jurisdictional, tributaries upstream of it do not lose jurisdiction so long as the channelized ephemeral feature contributes surface water flow in a typical year to a downstream jurisdictional water.

Tributaries - Reach*



-  Perennial Tributary (jurisdictional)
-  Intermittent Tributary (jurisdictional)
-  Ephemeral Channel (not jurisdictional)

*Tributary "reach" means a section of a stream or river along which similar hydrologic conditions exist, such as discharge, depth, area, and slope. If a perennial tributary becomes intermittent and then ephemeral and then perennial again, it may be viewed as four separate reaches (*e.g.*, perennial reach, intermittent reach, ephemeral reach, perennial reach), especially if they also share other similarities with respect to depth, slope, or other factors. In general, a reach can be any length of a stream or river, but the length is bounded by similar flow characteristics.

PHYSICAL ATTRIBUTES AND INDICATORS

- Documenting intermittent flows will rely on a combination of remote evidence and onsite physical indicators of sustained flow durations.
- Observations of persistent flows during dry times of the year could be a strong indicator of perennial or intermittent flows.
- Another indicator of intermittent flow would be observing flow in the channel (at any time of the year) so long as it hasn't rained very recently.
- Certain wetland hydrology indicators can help clarify whether water is present in the area only immediately following precipitation events, or whether longer-term saturation has likely occurred. An example of an indicator is the presence of oxidized rhizospheres along living root channels, which can take four to eight weeks of continuous saturation to form. This indicator alone cannot be conclusive of water flowing above the surface, but multiple positive indicators could provide an increased degree of confidence in these situations.



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PHYSICAL ATTRIBUTES AND INDICATORS

- Other indicators may include biological markers such as the presence of macroinvertebrates. However, biological indicators may not be present due to other factors such as poor water quality.
- National and regional studies are currently underway to develop flow duration field indicators to aid in this flow regime assessment. The goal is to develop regionally-specific SDAMs (Streamflow Duration Assessment Methods) for nationwide coverage, which will promote consistent implementation across the United States. There are also existing regional methods that could be used where applicable.



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TRIBUTARIES – (a)(2) WATERS - DEFINITION

The term *tributary* means a river, stream, or similar **naturally occurring** surface water channel that contributes surface water flow to a water identified in paragraph (a)(1) of this definition in a typical year either directly or through one or more waters identified in paragraph (a)(2)-(a)(4) of this definition. A tributary must be perennial or intermittent in a typical year.



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TRIBUTARIES – (a)(2) WATERS NATURALLY OCCURRING

- The alteration or relocation of a tributary does not modify its jurisdictional status as long as it continues to satisfy the flow conditions of this definition (i.e. perennial or intermittent in a typical year).
- The term *tributary* includes a ditch that either relocates a tributary, is constructed in a tributary, or is constructed in an adjacent wetland as long as the ditch satisfies the flow conditions of this definition.



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WHAT IS A DITCH?

- A constructed or excavated channel used to convey water.
- Ditches are not a standalone category.
- Ditches may be jurisdictional or excluded.



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WHEN IS A DITCH A WATER OF THE US?

- When the ditch meets the conditions of an (a)(1) water
 - Territorial sea
 - Traditional Navigable Water (TNW)
 - Waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including waters which are subject to the ebb and flow of the tide.



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WHEN IS A DITCH A WATER OF THE US?

- When the ditch meets the flow conditions of an (a)(2) water - has perennial or intermittent surface water flow in a typical year **AND** contributes surface water flow to a jurisdictional water in a typical year, **AND**
 - Relocates a tributary,
 - Is constructed in a tributary, or
 - Is constructed in an adjacent wetland



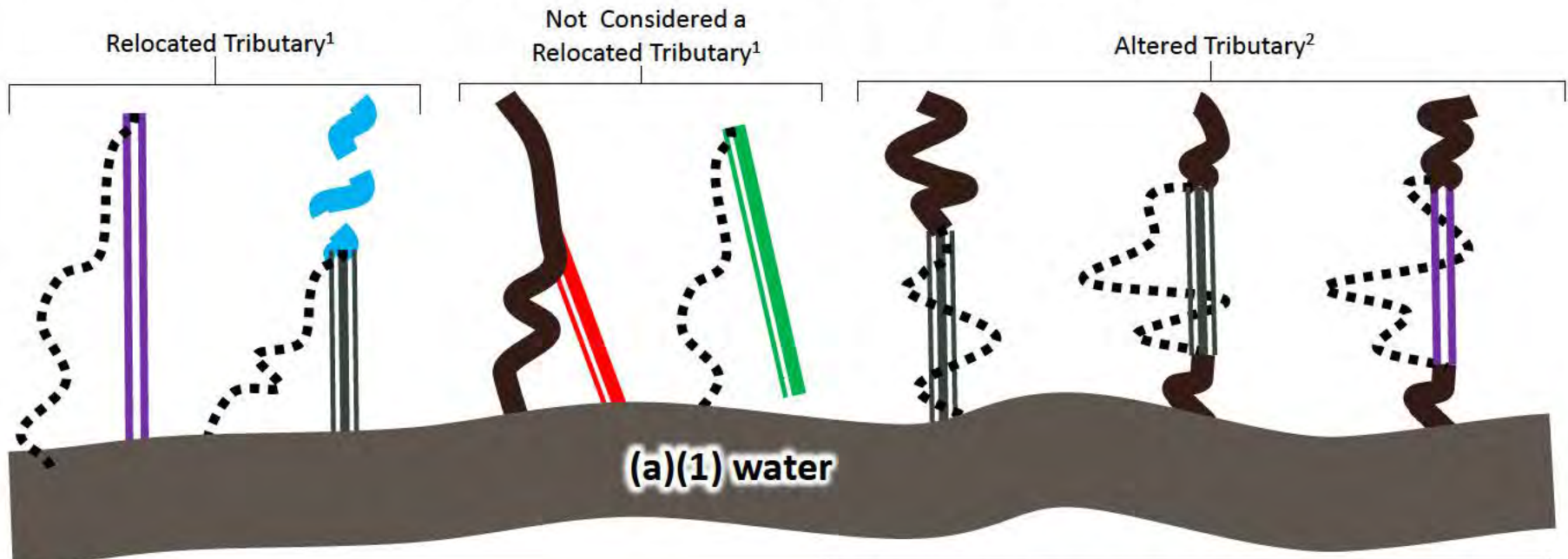
Construction in progress.
Natural tributary on the left.
Relocated ditch on the right.
Natural tributary to be filled in
after construction.



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Relocated¹ and Altered² Tributaries³



- Perennial Tributary (jurisdictional)
- Intermittent Tributary (jurisdictional)
- Perennial or Intermittent Ditch (jurisdictional)
- Intermittent Ditch (not jurisdictional- did not wholly relocate channel)
- Ephemeral Ditch³ (not jurisdictional)
- Relict Tributary Channel (not jurisdictional currently; formerly jurisdictional)
- Intermittent Ditch (not jurisdictional- no longer contributes flow to (a)(1))

¹A ditch is considered to have “relocated” a tributary when it moves the tributary channel to a different location. A ditch that relocates a tributary must continue to meet the flow conditions of the “tributary” definition and contribute surface water flow to a paragraph (a)(1) water in a typical year to remain jurisdictional.

²An altered tributary is one in which the flow or geomorphic conditions have been modified in some way.

³The alteration or relocation of a tributary does not modify its jurisdictional status as long as it continues to be perennial or intermittent and contributes surface water flow to a traditional navigable water or territorial sea in a typical year.



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WHEN IS A DITCH A WATER OF THE US?

- Constructed in an adjacent wetland
 - A ditch originating in or constructed entirely within an adjacent wetland.
 - A ditch constructed in an adjacent wetland that contributes less than perennial or intermittent flow to a paragraph (a)(1) water in a typical year and meets the definition of both “wetlands” under paragraph (c)(16) and “adjacent wetlands” under paragraph (c)(1).
 - Only the portion or portions of the ditch that meets the definition of “adjacent wetland” are jurisdictional.
 - Downstream portion could also be jurisdictional as a tributary as long as it contributes flow to another downstream WOTUS in a typical year and meets the flow conditions of paragraph (c)(12).



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WHEN IS A DITCH A WATER OF THE US?

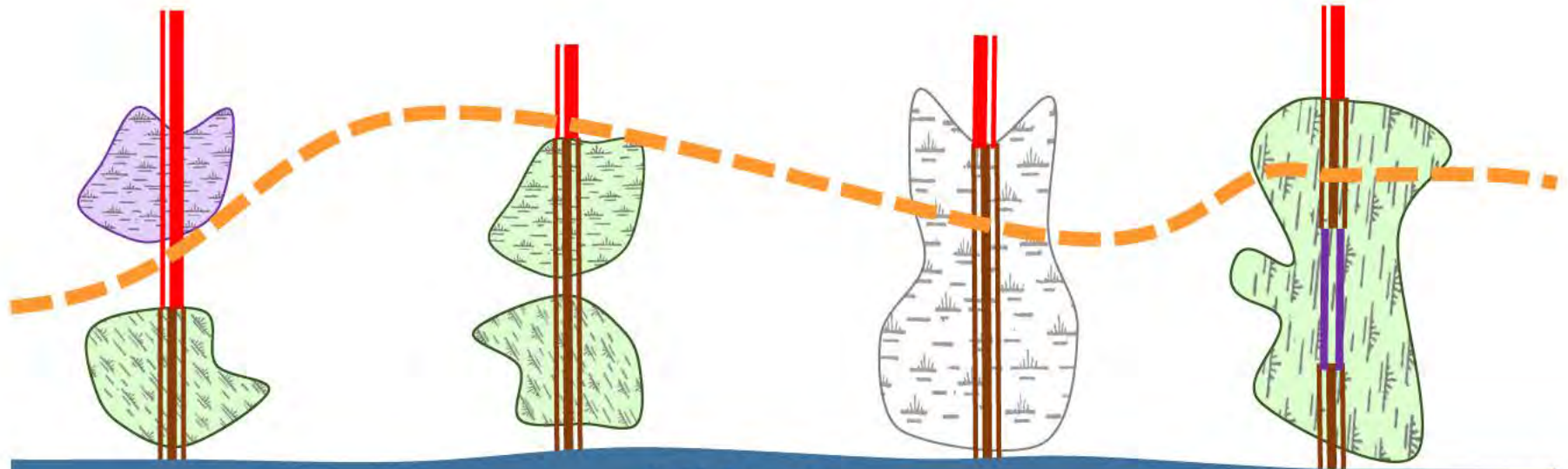
- Constructed in an adjacent wetland (Cont'd)
 - Could also include ditches that are constructed through adjacent wetlands, but jurisdiction over those ditches only includes those portions in adjacent wetlands and downstream to other jurisdictional waters, as long as those portions satisfy the flow conditions of paragraph (c)(12).
 - Jurisdiction does not extend to upland portions of the ditch before it enters the adjacent wetland



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Ditches Constructed in Wetlands



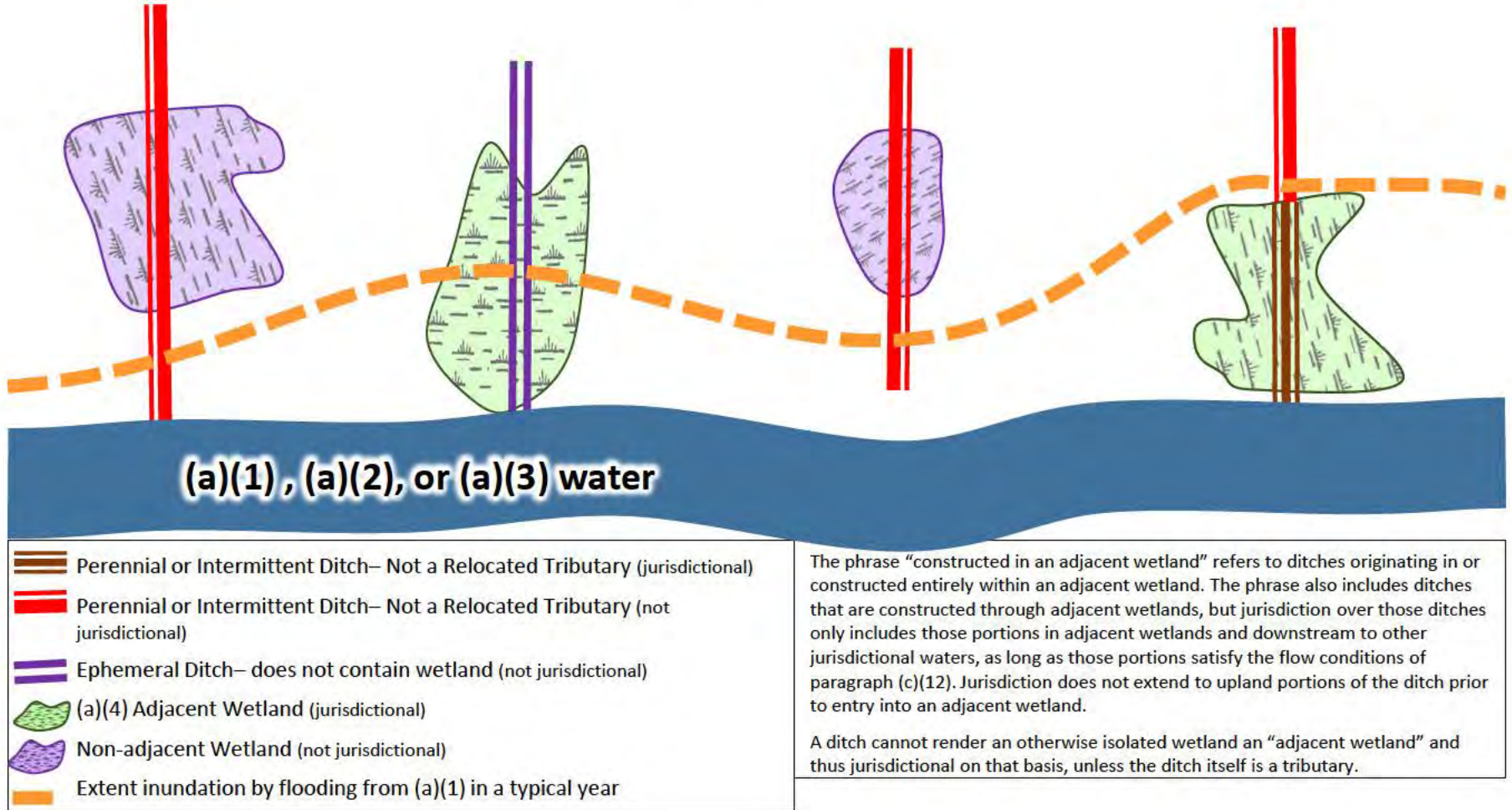
(a)(1) water

-  Perennial or Intermittent Ditch- Not a Relocated Tributary (jurisdictional)
-  Perennial or Intermittent Ditch- Not a Relocated Tributary (not jurisdictional)
-  Ephemeral Ditch- does not contain wetland (not jurisdictional)
-  (a)(4) Adjacent Wetland (jurisdictional)
-  Non-adjacent Wetland (not jurisdictional)
-  Extent inundation by flooding from (a)(1) in a typical year
-  Former (a)(4) Adjacent Wetland that no Longer Exists (non-jurisdictional)

The phrase “constructed in an adjacent wetland” refers to ditches originating in or constructed entirely within an adjacent wetland. The phrase also includes ditches that are constructed through adjacent wetlands, but jurisdiction over those ditches only includes those portions in adjacent wetlands and downstream to other jurisdictional waters, as long as those portions satisfy the flow conditions of paragraph (c)(12). Jurisdiction does not extend to upland portions of the ditch prior to entry into an adjacent wetland.

A ditch cannot render an otherwise isolated wetland an “adjacent wetland” and thus jurisdictional on that basis, unless the ditch itself is a tributary.

Ditches Constructed in Wetlands



HOW TO DETERMINE IF A DITCH IS A WOTUS.

- Burden of proof lies with the agencies
- Absent evidence, the agencies will determine the ditch is non-jurisdictional
- Potential resources to use when determining whether a ditch was constructed in or relocated a tributary or was constructed in an adjacent wetland:
 - Historic aerials
 - Quadrangle topographic maps. Topography may show crenulations and contours.
 - Certain hydrogeomorphological or soil indicators
 - Surface water management plans
 - National Hydrography Datasets (NHD)
 - National Wetland Inventory (NWI)



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TOOLS FOR DETERMINING FLOW

Point-in-time data sources

- LIDAR/DEM data
- USGS topographic maps
- NHD
- NWI
- Soil surveys (current and historic)
- Aerial photographs (current and historic)
- Stream gage data
- Previous agency determinations
- Other data



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DISCLAIMER

- Most of these tools/data are available in each District's Regulatory Viewer. If your District doesn't have a viewer, sign up for the GIS for Regulators Course.
- These resources will not tell you if a tributary is intermittent or ephemeral, they are tools to help you make a determination based on all available data.
- USACE and EPA are currently working on field based tools (e.g. SDAMs) to help determine flow regime.
- Caution should be exercised to ensure typical year conditions have been met when using remote tools.



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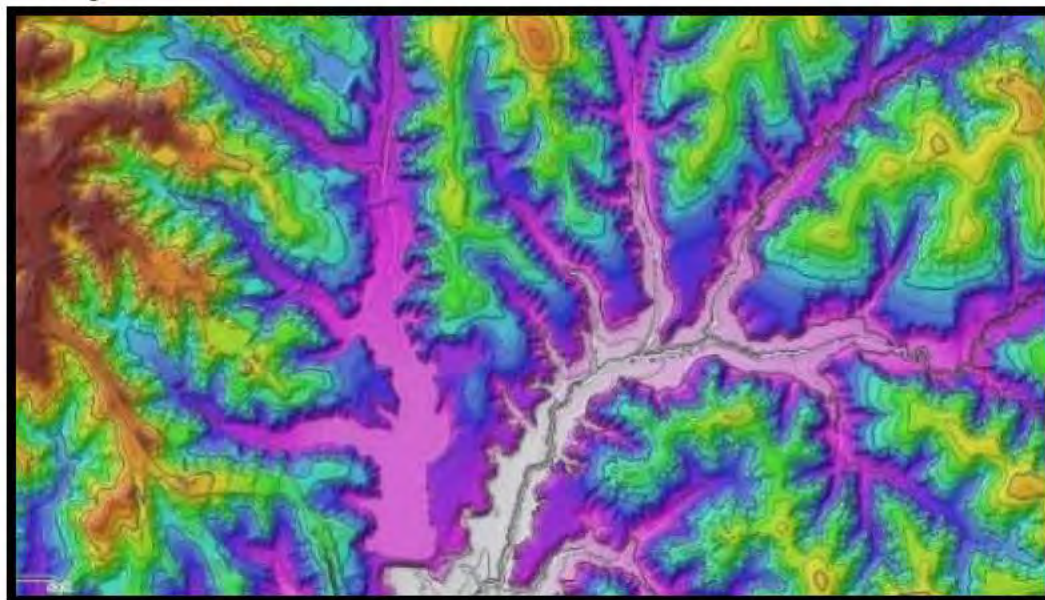


LIDAR/DEM DATA

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LiDAR and DEM data, when combined with other appropriate remote sensing tools, are generally good sources for identifying

- Whether a tributary is present
- Drainage area
- Relief/slope within the drainage area
- Obstructions within a tributary
- Presence of head-cuts
- Tributary sinuosity
- Dams/breaks
- Elevation changes
- Etc.

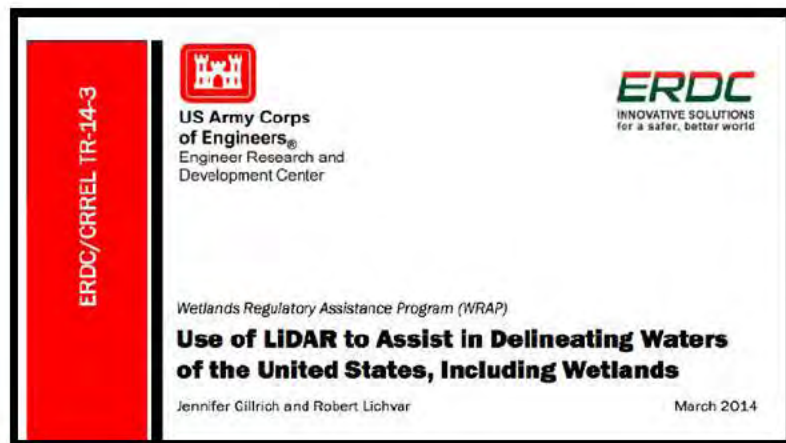


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LIDAR DATA

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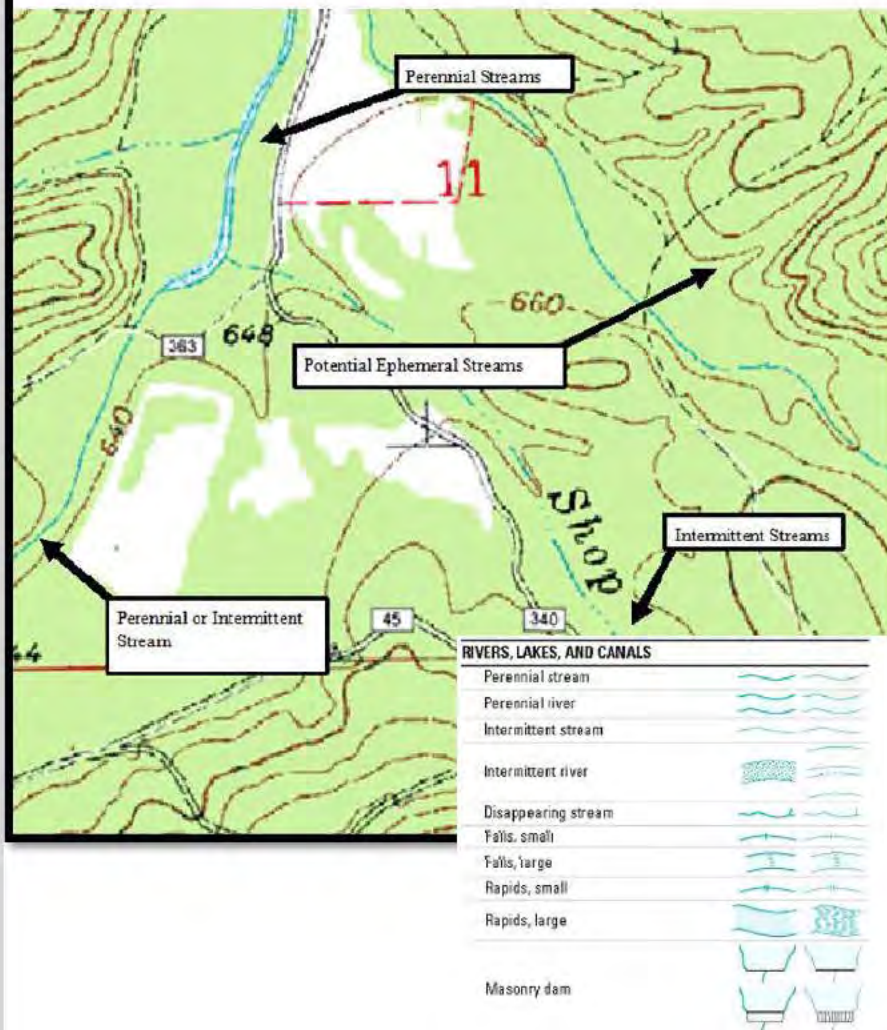


- Limited data availability; great potential as coverage and resolution increase
- *“Use of LiDAR to Assist in Delineating Waters of the United States, Including Wetlands”* (Gillrich and Lichvar, 2014)
 - List of LiDAR sources
 - Information on potential uses of LiDAR for regulatory purposes
- GRiD – USACE LiDAR repository (<http://griduc.rsgis.erdcdren.mil/griduc>)
 - Must register account with .mil email address

TOPOGRAPHIC MAPS

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USGS Topographic Maps (7.5 minute 1:24,000)



- Where a topographic map has indicated a 'blue-line' stream, there is an indication that the feature may be a tributary
- Many intermittent and ephemeral streams are absent from topographic maps
- Contours may provide evidence of additional tributaries not depicted on topographic maps, NHD, or other resources
- Downloadable from the USGS National Map Viewer



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GOOGLE EARTH TOPO Layer

- USGS topographic maps displayed as a continuous layer in Google Earth

<http://www.earthpoint.us/TopoMap.aspx>



Adjustable
transparency



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NATIONAL HYDROGRAPHY DATASET (NHD)

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- Indicates features within a drainage network including Hydrologic Unit Codes (HUC), rivers, streams, ponds, dams, and similar features.
- Information such as waterbody presence, waterbody type, tributary type, stream flow duration and flow direction.
- Does not identify all streams, and many streams, particularly small headwater streams, may be absent from the dataset.
- During flow regime, the NHD maps should be used in conjunction with other remote tools and on-site assessments to determine if the tributary is identified correctly.



* HD is not a regulatory dataset. For a discussion of the limitations of the NHD, including that the NHD at High Resolution does not distinguish intermittent from ephemeral features in most parts of the country and may not accurately identify on-the-ground flow conditions, see the Resource and Programmatic Assessment supporting the Rule.



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NATIONAL WETLAND INVENTORY (NWI)

- Provides detailed information on the abundance, characteristics, and distribution of US wetlands.
- Current information on the status, extent, characteristics and functions of wetlands, riparian, and deepwater habitats
- Wetland classification codes can provide information on flow regime.

R2UBHx Description:

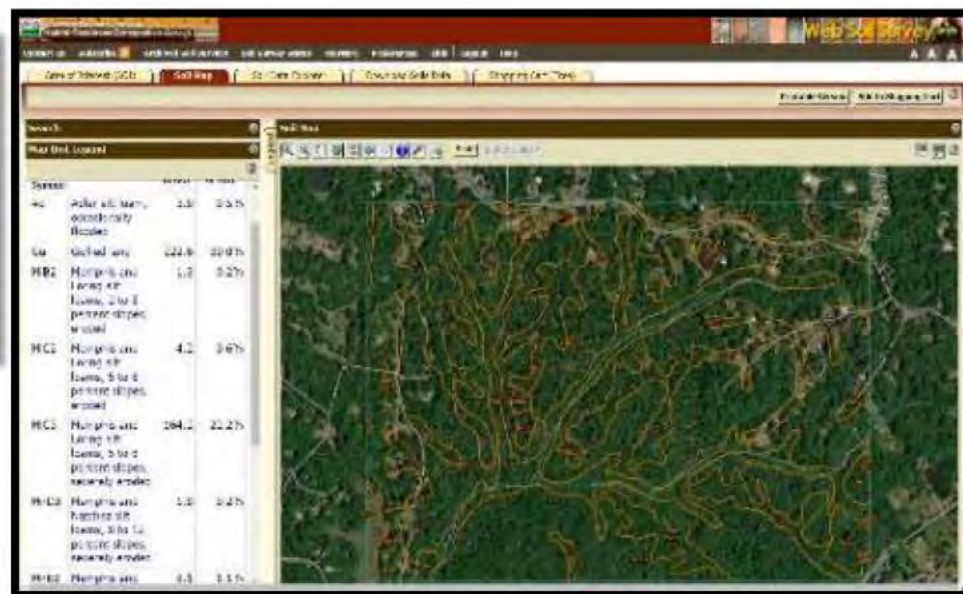
- Periodically or continuously contains moving water
- Low gradient.
- No tidal influence, and some water flows all year, except during years of extreme drought.
- Water covers the substrate throughout the year in all years.
- Channels that were excavated by humans



CURRENT AND HISTORIC SOIL SURVEYS

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- May provide current and historic evidence of drainage patterns that may indicate the potential presence of a tributary
- May help inform some existing and historic flow regimes (intermittent and perennial).
- In some cases, the changes in soil type in and around drainages may provide evidence that a channel exists.
- Soil Survey maps are often overlaid on more historic aerial images, providing insight as to the past conditions of an area, which can be useful in a variety of ways.



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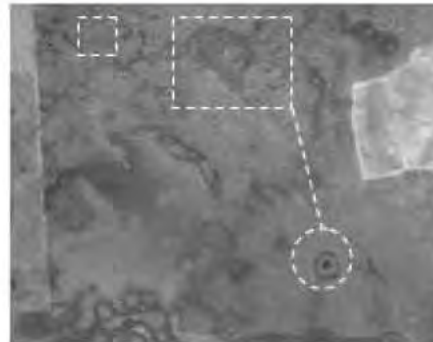


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AERIAL PHOTOGRAPHS (CURRENT AND HISTORIC)

50

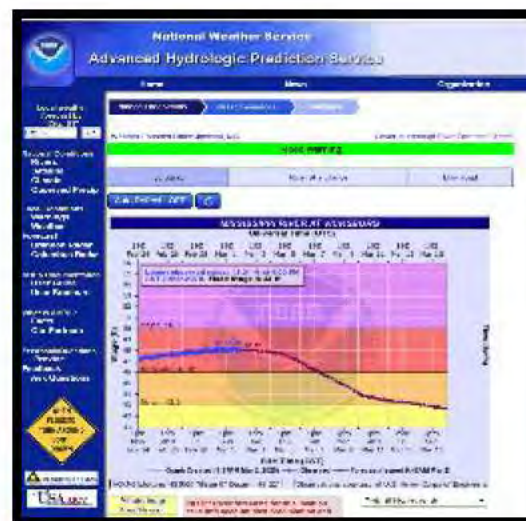
- Aerial photographs can be examined to identify whether there are visible signatures that indicate the presence of a potential tributary and may provide evidence of a features flow regime.
- High resolution photography captured during leaf off is generally more accurate than leaf on imagery when used for the identification of a tributary, ditch, or flow regime. If dense shrub and tree cover are present it may reduce the aerial visibility making it more difficult to identify features on the ground.
- Conclusions from photos should be coupled with typical year determinations to put the observations in context.



STREAM GAGE DATA

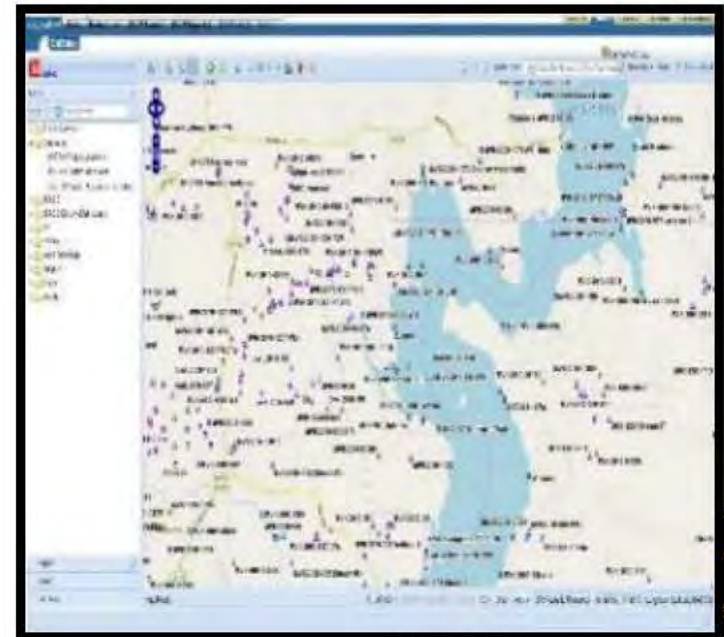
- Stream gage data can provide information on the magnitude, duration, and frequency of flow along a given stream.
- The availability of stream gage data across the United States is highly variable, and in many cases may not be available, particularly for intermittent and ephemeral streams. However, nearby stream gages may be helpful for understanding the timing and frequency of flow events for a given stream.
- Care should be taken to ensure that any stream gage data used is reflective of the current hydrologic regime and typical precipitation periods.

Illinois River Water Management District, York, Illinois, MS Station Name: York Gage Station No.: 7777, N-7777 River Name: York River Type: River River Length: 10.0 mi River Width: 100 ft River Depth: 10 ft River Flow: 100 cfs River Velocity: 10 ft/s River Discharge: 1000 cfs River Elevation: 100 ft River Coordinates: 100, 100 River Status: Active River Notes: York Gage is located on the York River, which is a tributary of the Illinois River. The gage is used to monitor the flow of the river and to provide data for the York River Water Management District.	
Time	Flow (cfs)
11:00 AM	100
12:00 PM	100
1:00 PM	100
2:00 PM	100
3:00 PM	100
4:00 PM	100
5:00 PM	100
6:00 PM	100
7:00 PM	100
8:00 PM	100
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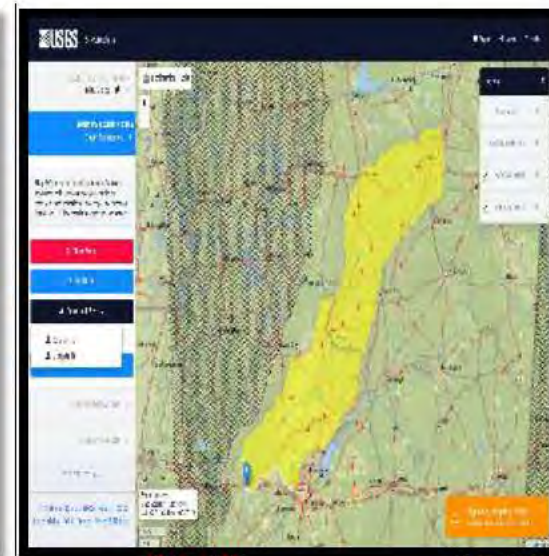
PREVIOUS AGENCY DETERMINATIONS (ORM DATA)

- Agency determinations are valuable tools that can aid in determining the flow regime of a particular tributary.
- ORM data can be used to examine if a particular tributary has been previously identified and what flow regime was assigned to such tributary. Then the file can be reviewed for the supporting information.
- When reviewing past determination you should refer to the previous decision and pull the information from that decision to help inform the current one.



OTHER DATA

- Other information not specifically addressed here may be available to assist in remote identification of tributaries, ditches, and flow regime:
 - flood predictions (e.g., from StreamStats),
 - regional regression equations for streamflow and/or channel dimensions (e.g., bankfull regional curves), and
 - hydrologic and hydraulic models (e.g., the Hydraulic Engineering Center Hydrologic Modeling System (HEC-HMS) or River Analysis System (HEC-RAS)).



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QUESTIONS FROM THE FIELD

•Topics for questions include, but are not limited to, the following:

- Ditches
- Tributaries
- Flow Regimes
- Downstream flow contribution
- Adjacency
- Lakes and ponds, and Impoundments
- Inundation by flooding
- Typical year
- Exclusions
- Compliance/enforcement
- Compensatory mitigation
- Uplands



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