INTRODUCTION TO THE NEW NATIONAL MANUAL ON THE ORDINARY HIGH WATER MARK

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March 29, 2023

WRAP WETLANDS REGULATORY ASSISTANCE PROGRAM
What is the Ordinary High Water Mark?

“The term ordinary high water mark means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.”

33 CFR 328.3(e)

*Physical characteristics listed in USACE RGL 05-05*
Joint public notice from USACE and EPA requests feedback from USACE districts, other practitioners, and public through December 1, 2023.

Link to public notice:

Link to Interim Draft National OHWM Manual:
https://hdl.handle.net/11681/46102
Why do we need a national OHWM field delineation manual?

One definition that is being applied to many different systems.
Why do we need a national OHWM field delineation manual?

We need:

1) a standardized language for communication among scientists, regulators, and the public

2) to focus on identifying characteristics of high flow rather than low flow

3) consistent OHWM identification despite differences in land use, season, or impacts from natural disturbances.

Assabett River, Massachusetts
Goals of the OHWM National Manual

1) Provide consistent, science-based definitions of OHWM indicators
2) Outline a clear decision-making process using the Weight-of-Evidence approach
3) Provide a form for rapid and consistent field data collection
4) Describe landscape-scale considerations for OHWM interpretation
5) Provide examples of case studies for difficult OHWM delineations
Case Study locations included in the OHWM National Manual

Alaska

Northwest

Hawaii

Southwest

Northern prairies

Southern prairies

Northeast

Southeast
Goal 1: Science of OHWM: What are high flows?

- Extreme flows (extreme flood flows)
- High flows (small flood flows)
- Moderate flows
  - Mean annual flow (boundary between moderate and low flows)
- Low and base flows

Cross section location

Key:
- Deciduous trees
- Woody shrubs
- Forbs
- Grasses
- Moss
- Gravel
- Sand

Same location on photo and cross section

Cross section location
Goal 1 | Science of OHWM: What are high flows?

- **Extreme flows** (extreme flood flows)
- **High flows** (small flood flows)
- **Moderate flows** (mean annual flow, boundary between moderate and low flows)
- **Low and base flows**

In the diagram:
- River left
- River right
- Cross section location
- Flow direction

Key:
- Deciduous trees
- Woody shrubs
- Forbs
- Grasses
- Moss
- Gravel
- Sand
- Same location on photo and cross section
Goal 1 | Science of OHWM: What are the scientific counterparts?

What is the floodplain?
A relatively flat sedimentary surface adjacent to the active channel that is built by river processes and inundated frequently.
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What is the floodplain?
A relatively flat sedimentary surface adjacent to the active channel that is built by river processes and inundated frequently.

What is the active channel?
Any portion of a valley bottom within channels defined by erosional and depositional features created by ongoing river processes with the exception of overbank sedimentation and as opposed to upland processes such as sheet flow or debris flow.
Goal 1 | Science of OHWM: What are the scientific counterparts?

What is the floodplain?
A relatively flat sedimentary surface adjacent to the active channel that is built by river processes and inundated frequently.

What is bankfull?
The boundary between the active channel and floodplain commonly exists as a clear, natural line impressed on the bank of a river (Wolman and Leopold 1957).

What is the active channel?
any portion of a valley bottom within channels defined by erosional and depositional features created by ongoing river processes with the exception of overbank sedimentation and as opposed to upland processes such as sheet flow or debris flow.
Goal 1 | Science of OHWM: What are the scientific counterparts?

**OHWM**

- [a] clear, natural line impressed on the bank, shelving
- “...changes in the character of soil”
- “…destruction of terrestrial vegetation”
- “…the presence of litter and debris”

**Bankfull**

The boundary between the active channel and floodplain commonly exists as a clear, natural line impressed on the bank of a river (Wolman and Leopold 1957).

The boundary between the active channel and surrounding floodplain creates hydraulic conditions that will cause a transition between river sediment and soils on an adjacent floodplain (Leopold and Skibitzke 1967).

Terrestrial vegetation is commonly destroyed by the hydraulic forces associated with frequent flows below bankfull discharge (Leopold and Skibitzke 1967).

Litter and debris will likely be deposited and persist above bankfull discharge (Leopold and Skibitzke 1967).
Goal 1 Science of OHWM: What are the scientific counterparts?
Goal 1 | Science of OHWM: What are the scientific counterparts?

**OHWM** bankfull, and active channel in same location

**OHWM** and bankfull in same location; active channel in different locations

Braided

Anastomosing

Stream-wetland complex

Deciduous trees
Woody shrubs
Grasses
Forbs
Ferns

Depositional bedded indicators
Erosional bedded indicators
Organic litter
LW
Ponded water

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Goal 1 | Science of OHWM: identifying stream characteristics

**OHWM Indicators** – physical and vegetative indicators consistent with recurring high flows:

⇒ **Geomorphic Indicators**:
  - Break in bank slope (i.e., “top of bank”) – limited to relatively stable systems with active floodplain
  - Upper limit of point bars/lateral bars

⇒ **Vegetation Indicators**:
  - Transition in vegetation type and/or density
  - Exposed roots below intact soil layer

⇒ **Sediment Indicators**:
  - Change in sediment texture and/or soil development
  - Change in character of soil

⇒ **Ancillary Indicators**:
  - Wracking/presence of organic litter
  - Leaf litter disturbed or washed away

*Rivanna River, Virginia*
Goal 1 | Key points about science of OHWM

Linking regulatory concept of OHWM to science of streams provides common language for communication about OHWM between practitioners and public.

- Bankfull stage and the active channel limits are scientific counterparts to the regulatory concept of the OHWM.
- River and stream morphologies are shaped by relatively infrequent flows that typically occur on the order of several times per year to several times per decade.
- The relationships between streamflow and stream characteristics are highly variable in time and space.

OHWM delineations should utilize robust indicators of recurring high flows.
Goal 2 | Weight-of-Evidence Procedure

Assemble evidence

⇒ Assemble = gather evidence at the site
⇒ What are the surrounding landscape characteristics that may influence both observations and interpretation of flow indicators?

Weight the Evidence

⇒ Weight
⇒ Relevance – Is the indicator left by low, high, or extreme flows?
⇒ Strength – Is the indicator persistent at the same elevation across multiple locations of the reach?
⇒ Reliability – Will the indicator persist over time?
Goal 2 | Weight-of-Evidence Procedure

Weigh Body of Evidence

⇒ Weigh = arrive at a final decision

⇒ What combination of high flow indicators represent the OHWM?

Schematic of site on day of field visit

Schematic showing hypothetical high flow that connects OHWM indicators
Goal 3 | OHWM Delineation Data Sheet and Field Procedure

Data Sheet: Step 1

https://www.erdc.usace.army.mil/ohwm/

Field Procedure: Step 1
Goal 3 | Summary: Field Procedure for the OHWM

When faced with multiple possibilities for OHWM, apply the WoE method to draw a logical conclusion

Step 1: Site overview from remote and online resources

Why?

Provides landscape context
Goal 3 | Summary: Field Procedure for the OHWM

When faced with multiple possibilities for OHWM, apply the WoE method to draw a logical conclusion.

Step 1: Site overview from remote and online resources
Why? Provides landscape context

Step 2: Describe site conditions during field assessment
Why? Assembling evidence
When faced with multiple possibilities for OHWM, apply the WoE method to draw a logical conclusion.

**Goal 3 Summary: Field Procedure for the OHWM**

1. **Step 1:** Site overview from remote and online resources
   - Why? Provides landscape context

2. **Step 2:** Describe site conditions during field assessment
   - Why? Assembling evidence

3a. **Step 3a:** Check boxes next to indicators used to identify the OHWM.
   - Why? Assembling evidence

3b. **Step 3b:** Weight each line of evidence and weigh body of evidence.
   - Why? Eliminate lines of evidence that are not relevant
Goal 3  Summary: Field Procedure for the OHWM

When faced with multiple possibilities for OHWM, apply the WoE method to draw a logical conclusion

Step 1: Site overview from remote and online resources

Why? Provides landscape context

Step 2: Describe site conditions during field assessment

Why? Assembling evidence

Step 3a: Check boxes next to indicators used to identify the OHWM.

Why? Assembling evidence

Step 3b: Weight each line of evidence and weigh body of evidence.

Why? Eliminate lines of evidence that are not relevant

Step 4: Determine if additional information is needed.

Why? Other resources such as remote/online tools can help support information observed on the ground.
Goal 3 | Summary: Field Procedure for the OHWM

*When faced with multiple possibilities for OHWM, apply the WoE method to draw a logical conclusion*

- **Step 1:** Site overview from remote and online resources  
  Provides landscape context

- **Step 2:** Describe site conditions during field assessment  
  Assembling evidence

- **Step 3a:** Check boxes next to indicators used to identify the OHWM.  
  Assembling evidence

- **Step 3b:** Weight each line of evidence and weigh body of evidence.  
  Eliminate lines of evidence that are not relevant

- **Step 4:** Determine if additional information is needed.  
  Other resources such as remote/online tools can help support information observed on the ground.

- **Step 5:** Describe rationale for location of OHWM  
  Weigh the strength and reliability of the relevant indicators to identify the location of the OHWM.
Goal 3 | Key points about field procedure for the OHWM

✓ Assemble and list evidence

✓ Consider the following types of indicators:
  Geomorphic, Vegetation, Sediment, Ancillary

✓ Look for a “signature” of recurring fluvial action

✓ Consider relevance, strength, and reliability of each indicator (weight evidence and weigh body of evidence)

✓ Remember stream channels are in a constant state of flux
Goal 4 | Landscape-scale considerations for interpreting OHWM indicators

- Landscape Characteristics
  - Climate
  - Geology
  - Topography
  - Land Use

- Watershed Characteristics
  - Sediment, Water, Soils, and Vegetation
    - (e.g., ecoregions)
    - (e.g., geomorphic provinces)

- Sediment Regimes X Flow Regimes
  - Watersheds
    - (e.g., major US watersheds)

- Stream Form
  - High Flow Indicators

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Goal 4 | Key points about OHWM and surrounding landscape

✓ Satellite imagery, lidar, and other spatial data can aid in recognizing significant controls on channel form both before and after a site visit.

  - Anthropogenic controls on channel form include dams, culverts, bridges, and other significant land use changes.

  - Natural controls on channel form include underlying geologic characteristics

**Supporting material: **Technical note recently released on “Remote Sensing Tools to support OHWM”, Haring, C. Gordon, K., Darby, T., 2023, ERDC/TN WRAP-23-1, [https://hdl.handle.net/11681/46448](https://hdl.handle.net/11681/46448)
Goal 5 | Case studies for difficult OHWM delineations

Southwest: San Antonio River
Goal 5 | Case studies for difficult OHWM delineations
Goal 5 | Key points about case studies

✓ Provide examples for how disturbance from either human-induced or natural causes can affect observation of OHWM.

✓ Provide discussion of complex channel types including stream-wetland complexes and beaver-meadow complex.

✓ Human-induced disturbances include:
  • Flow regulation
  • Culverts
  • Mining
  • Agriculture and livestock
  • Urbanization

✓ Natural disturbances include:
  • Fires and debris flows
  • Extreme flood flows
Supporting documents

Additional research available at: www.erdc.usace.army.mil/ohwm
Summary

Goal 1: Provides a better scientific understanding of OHWM.

Goal 2: The Draft Manual provides a decision-making process through the WoE procedure.

Goal 3: Provides details on applying the WoE procedure with accompanying field procedure and data sheet.

Goal 4: Provides information on interpreting OHWM indicators based on landscape context of the site.

Goal 5: Provides case studies to better understand how to interpret indicators at difficult sites.
Thank you!

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www.erdc.usace.army.mil/ohwm