The Ordinary High Water Mark: Concepts, Research, and Applications

Matthew K. Mersel

March 20, 2013

Under Section 404 of the Clean Water Act, the OHWM defines the lateral limits of Federal jurisdiction over non-tidal waters of the United States, in the absence of adjacent wetlands.

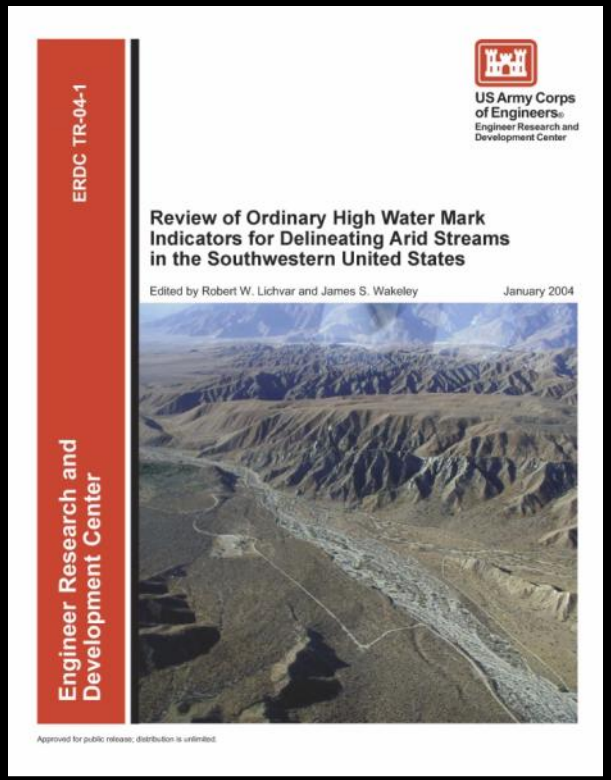
Federal regulations (33 CFR 328.3(e)) define the Ordinary High Water Mark (OHWM) as:

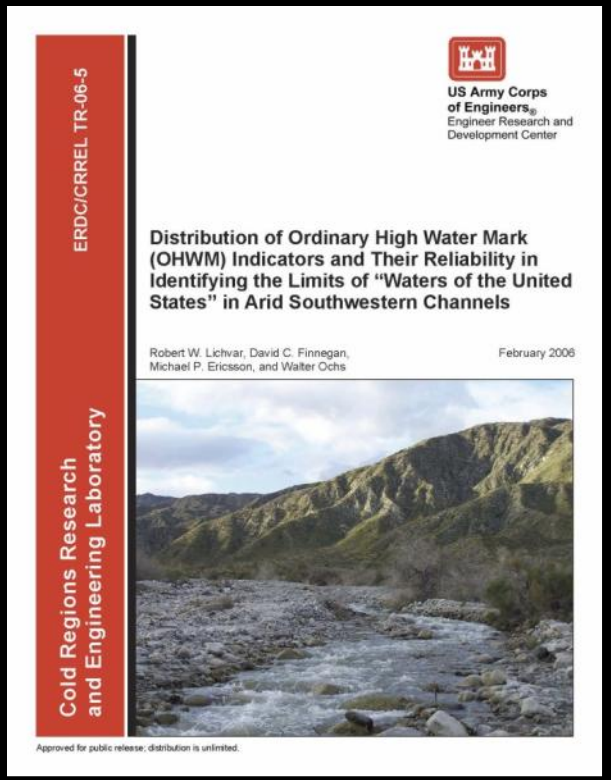
What is the Ordinary High Water Mark?

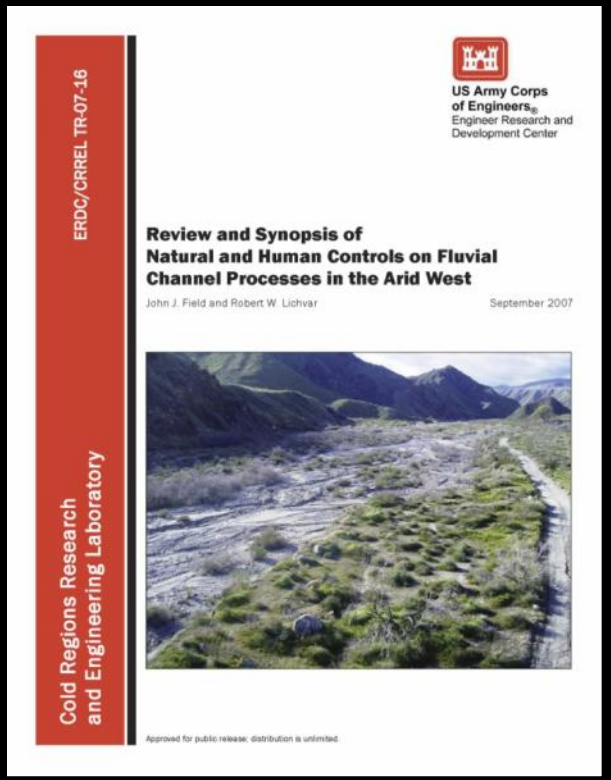
"...that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means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

It's a legal concept!

OHWM in the Arid Southwest







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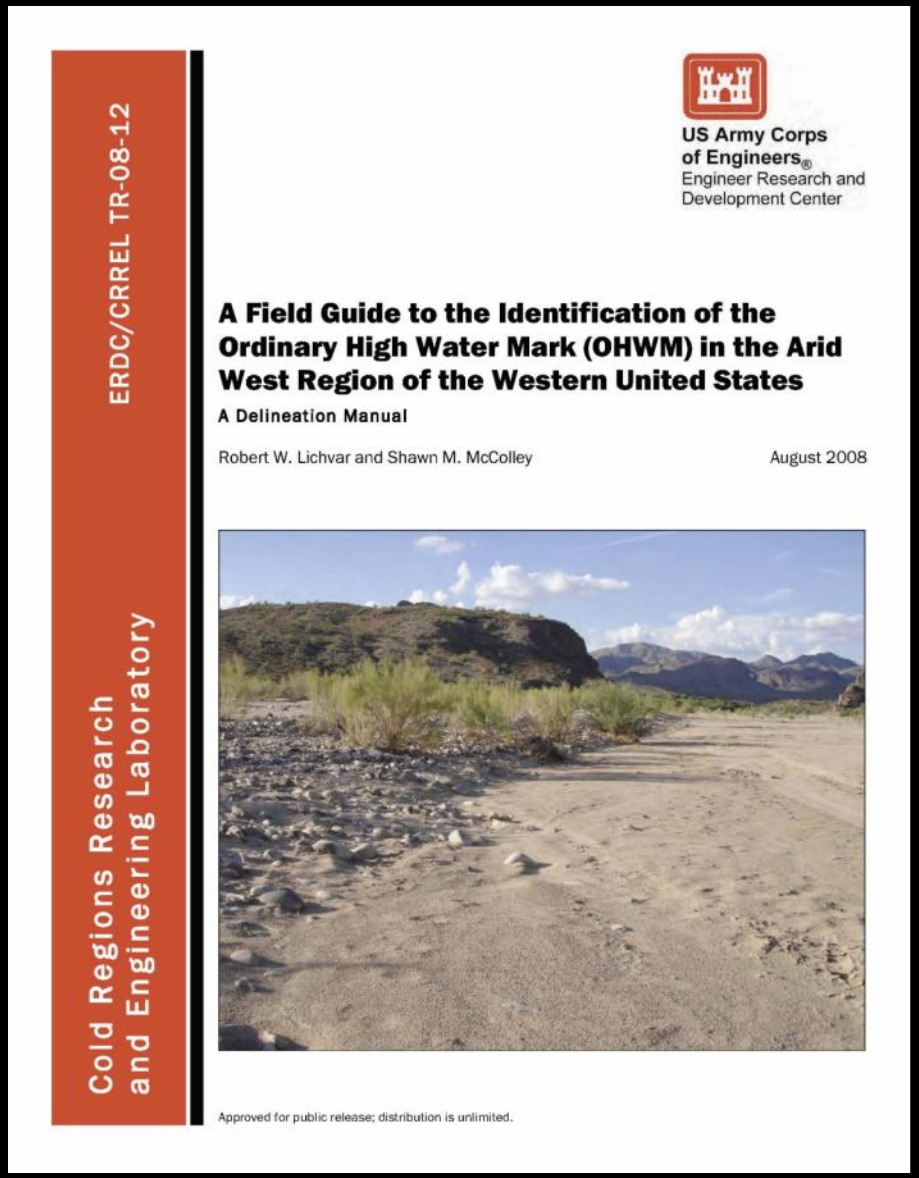

OHWM in the Western Mountains

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Wetland Regulatory Assistance Program

Ordinary High Water Mark Indicators in Non-perennial Stream Systems in the Western Mountain Region of the United States

Matthew K. Mersel, Robert W. Lichvar, Jennifer J. Gillrich, and Lindsey E. Lefebvre

DRAFT

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A Field Guide to Ordinary High Water Mark Delineation in Non-perennial Streams in the Western Mountain Region of the United States

Matthew K. Mersel and Robert W. Lichvar

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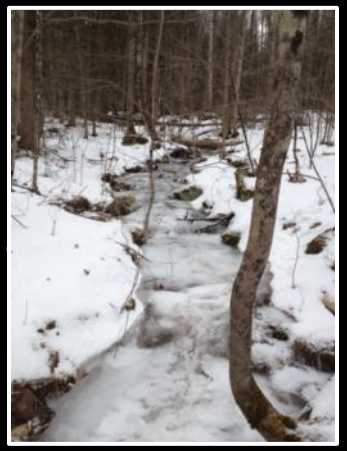
- Vague legal definition
- Applies to a wide variety of systems in a wide variety of landscapes:





- Inconsistent interpretations of “ordinary” and its indicators
- Inconsistent application

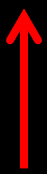
Common Assumption	Limitations
• The OHWM occurs at the stage of the 1.5- or 2-year annual peak return interval.	• Return intervals can be highly variable with respect to geomorphic features and OHWM indicators. • Hydrologically-based definitions are difficult to implement (i.e. delineate) in the absence of stream gages.
• The OHWM occurs at bankfull stage.	• Inconsistent definitions of bankfull and its indicators. • Questionable application to arid, non-perennial, or unstable streams.
• The OHWM occurs at the stage of effective discharge	• Difficult to validate or implement.
• The OHWM occurs at the vegetation scour line	• Vegetation is dynamic and varies spatially and temporally. • Many species can withstand periods of inundation (even trees!).
• The OHWM occurs at the transition from riparian to upland vegetation.	• Deep-rooted riparian species can occur well beyond the boundaries of a stream. • Riparian/upland transitions are often gradual.

One Law, Many Interpretations

One Law, Many Interpretations

All of these assumptions about the OHWM are limited in part or in whole by either their:

- legal defensibility
- scientific validity
- universal applicability
- practicability



So, how do we balance these limitations??

- OHWM studies generally rely heavily on investigator's subjective assessment of field indicators and interpretation of "ordinary"

- Testing of OHWM "accuracy" is difficult given its vague legal definition and an unclear hydrologic basis for the OHWM or the indicators used to identify it.

How to "test" the OHWM?

"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."

Working Concept:

The ordinary high water mark is the most spatially and temporally stable signature (i.e. a combination of physical and/or biological indicators) established and maintained by the fluctuations of water at a given location along a stream channel.

- Remains general enough to encompass the wide range of landscapes and stream types to which it applies, but provides a consistent concept and approach to OHWM delineation.
- Testable!!!

The OHWM "Signature"

"a <u>combination</u> of physical and/or biological indicators"

3 "primary indicators":

- break-in-slope
- change in sediment texture
- change in vegetation characteristics

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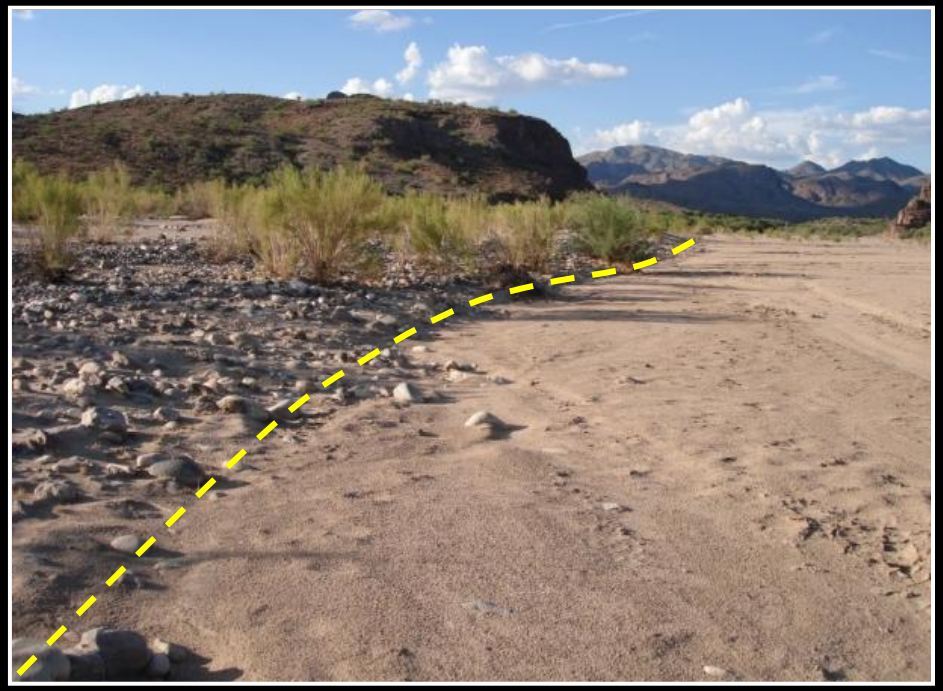


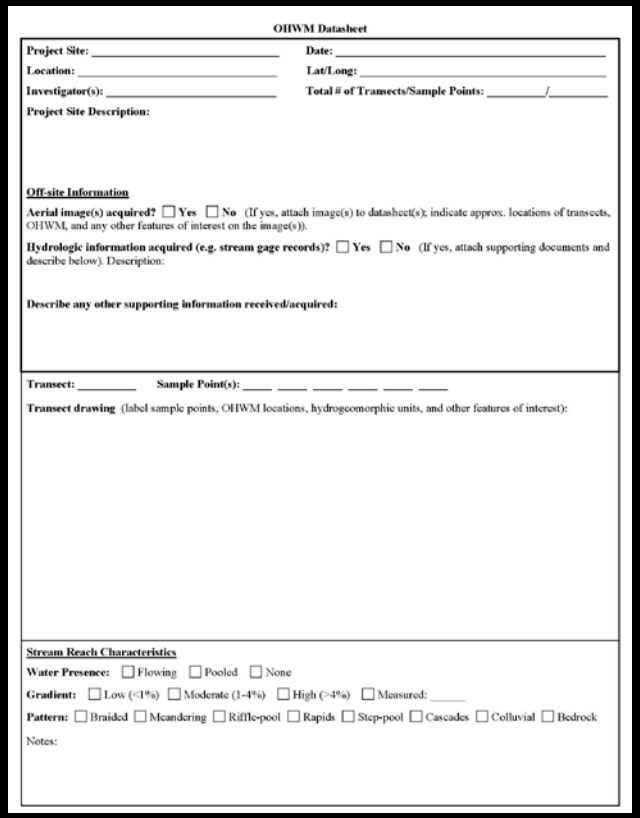
National OHWM Delineation Manual

USACE Wetland Delineation Manual Regions

Northeastern OHWM Study Design

- Develop a regional stream classification (or borrow from existing).
- Choose a variety of study sites that cover the range of stream types in the region. Use gaged sites where possible.
- Record all potential OHWM indicators at each site, seasonally.
- Assess the stability of potential indicators over time.
- Assess relationships between indicators and hydrology (at gaged sites).
- Assess variability in OHWM indicators with regard to stream type, landscape, climate, etc.
- Potentially apply this sampling strategy to other parts of the country.

OHWM Datasheet



OHWM Datasheet

Project Site: _____ **Date:** _____

Location: _____ **Lat/Long:** _____

Investigator(s): _____ **Total # of Transects/Sample Points:** _____/_____

Project Site Description:

Off-site Information

Aerial image(s) acquired? ☐ **Yes** ☐ **No** (If yes, attach image(s) to datasheet(s); indicate approx. locations of transects, OHWM, and any other features of interest on the image(s)).

Hydrologic information acquired (e.g. stream gage records)? ☐ **Yes** ☐ **No** (If yes, attach supporting documents and describe below). Description:

Describe any other supporting information received/acquired:

Transect: _____ **Sample Point(s):** ____ ____ ____ ____ ____ ____

Transect drawing (label sample points, OHWM locations, hydrogeomorphic units, and other features of interest):

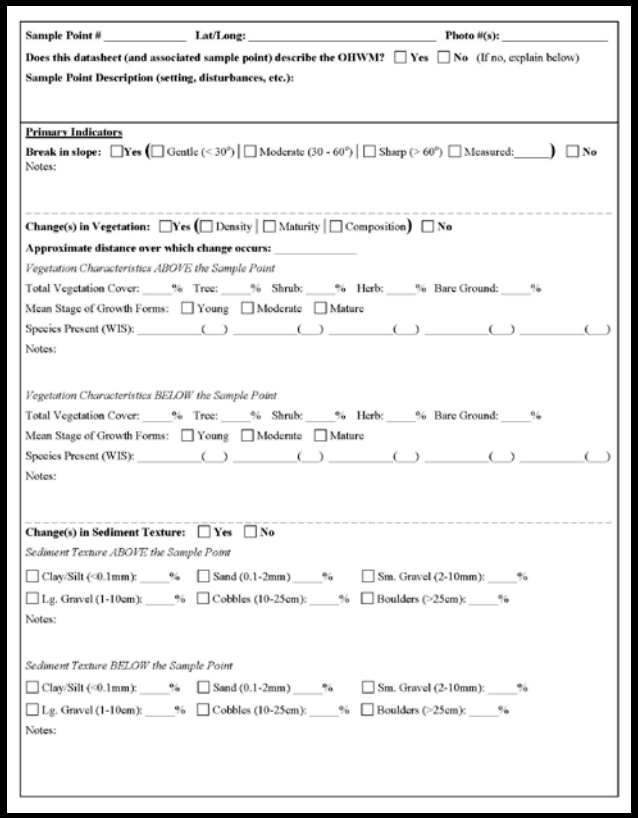
Stream Reach Characteristics

Water Presence: ☐ Flowing ☐ Pooled ☐ None

Gradient: ☐ Low (<1%) ☐ Moderate (1-4%) ☐ High (>4%) ☐ Measured: _____

Pattern: ☐ Braided ☐ Meandering ☐ Riffle-pool ☐ Rapids ☐ Step-pool ☐ Cascades ☐ Colluvial ☐ Bedrock

Notes:



Sample Point # _____ **Lat/Long:** _____ **Photo #(s):** _____

Does this datasheet (and associated sample point) describe the OHWM? ☐ **Yes** ☐ **No** (If no, explain below)

Sample Point Description (setting, disturbances, etc.):

Primary Indicators

Break in slope: ☐ **Yes** (☐ Gentle (< 30°) | ☐ Moderate (30 - 60°) | ☐ Sharp (> 60°) ☐ Measured: _____) ☐ **No**

Notes:

Change(s) in Vegetation: ☐ **Yes** (☐ Density | ☐ Maturity | ☐ Composition) ☐ **No**

Approximate distance over which change occurs: _____

Vegetation Characteristics ABOVE the Sample Point

Total Vegetation Cover: ____% Tree: ____% Shrub: ____% Herb: ____% Bare Ground: ____%

Mean Stage of Growth Forms: ☐ Young ☐ Moderate ☐ Mature

Species Present (WIS): _____(__) _____(__) _____(__) _____(__) _____(__)

Notes:

Vegetation Characteristics BELOW the Sample Point

Total Vegetation Cover: ____% Tree: ____% Shrub: ____% Herb: ____% Bare Ground: ____%

Mean Stage of Growth Forms: ☐ Young ☐ Moderate ☐ Mature

Species Present (WIS): _____(__) _____(__) _____(__) _____(__) _____(__)

Notes:

Change(s) in Sediment Texture: ☐ **Yes** ☐ **No**

Sediment Texture ABOVE the Sample Point

☐ Clay/Silt (<0.1mm): ____% ☐ Sand (0.1-2mm) ____% ☐ Sm. Gravel (2-10mm): ____%

☐ Lg. Gravel (1-10cm): ____% ☐ Cobbles (10-25cm): ____% ☐ Boulders (>25cm): ____%

Notes:

Sediment Texture BELOW the Sample Point

☐ Clay/Silt (<0.1mm): ____% ☐ Sand (0.1-2mm) ____% ☐ Sm. Gravel (2-10mm): ____%

☐ Lg. Gravel (1-10cm): ____% ☐ Cobbles (10-25cm): ____% ☐ Boulders (>25cm): ____%

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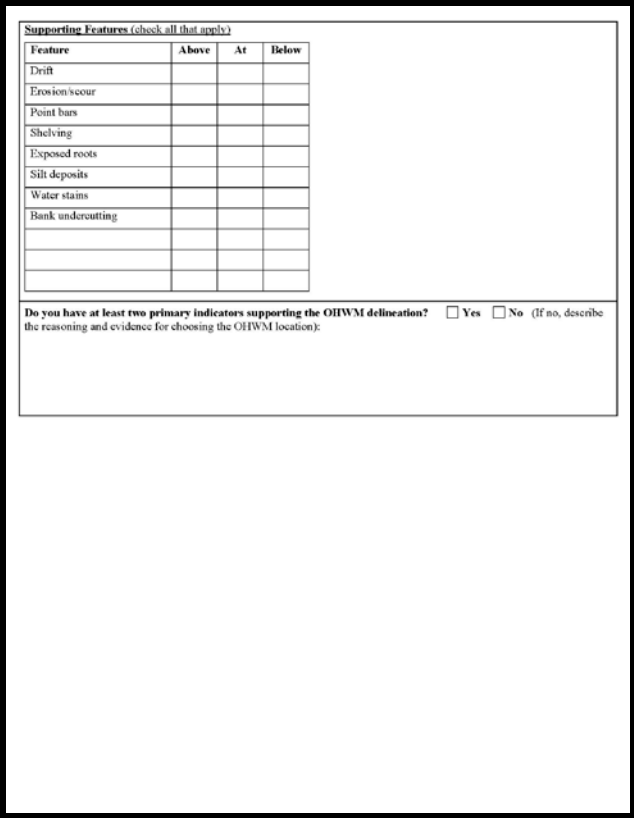
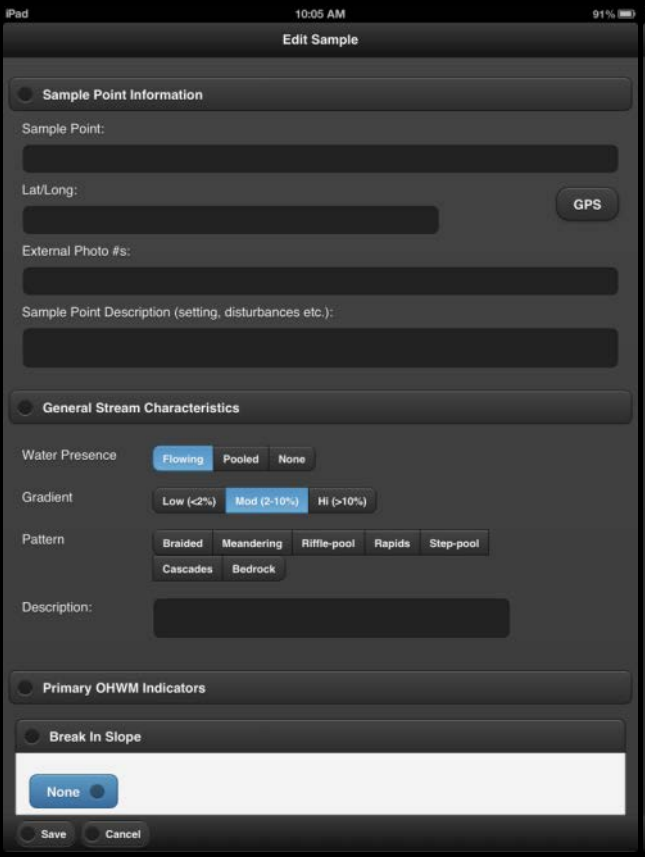


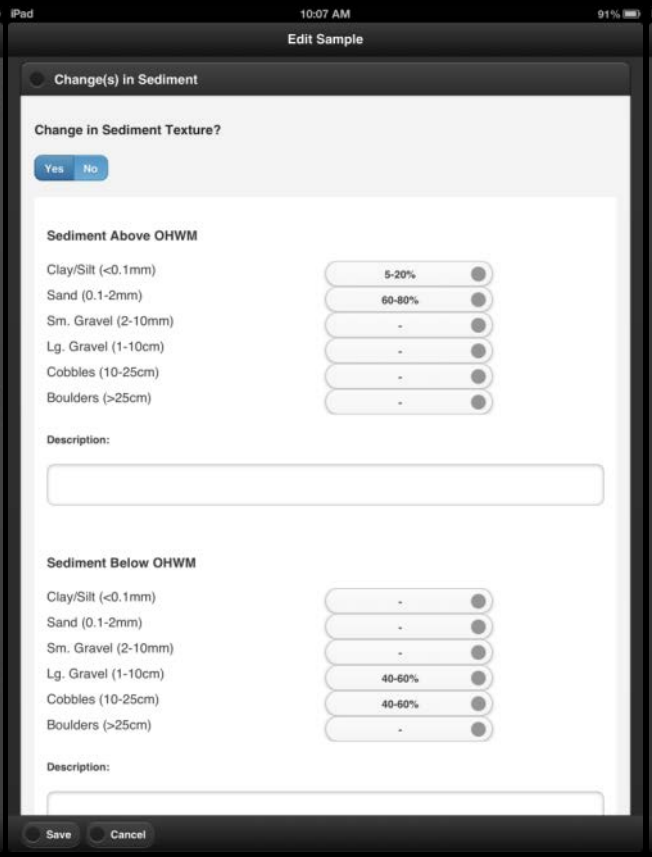
Supporting Features (check all that apply)

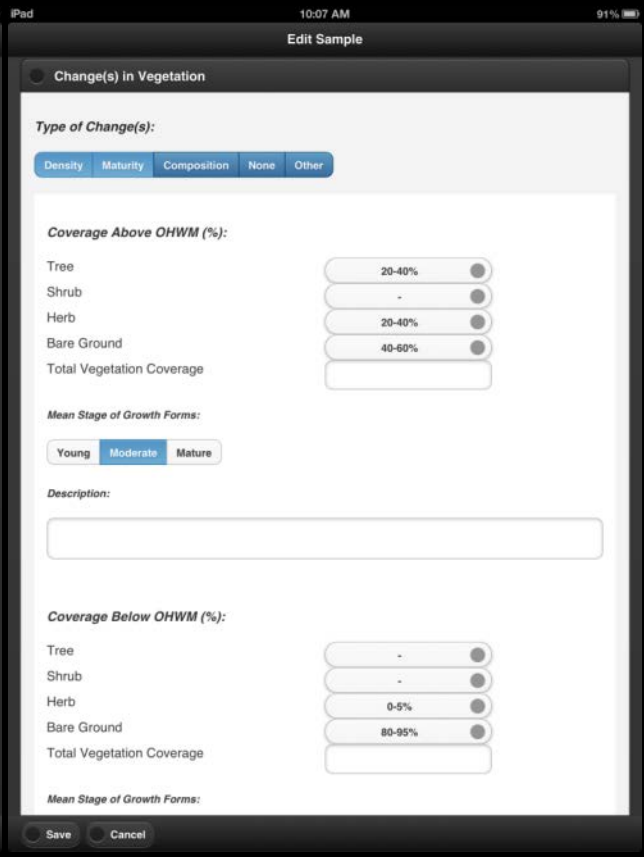
Feature	Above	At	Below
Drift			
Erosion/scour			
Point bars			
Shelving			
Exposed roots			
Silt deposits			
Water stains			
Bank undercutting			

Do you have at least two primary indicators supporting the OHWM delineation? ☐ **Yes** ☐ **No** (If no, describe the reasoning and evidence for choosing the OHWM location):

OHWM Smartphone App







Apple and Android versions

Summary

- Problem: The OHWM is poorly understood, and delineation practices are inconsistent nationally.

- Goals: Develop a defensible and universally applicable concept of the OHWM. Develop standardized, consistent, and validated procedures and methods for delineating the OHWM nationally.

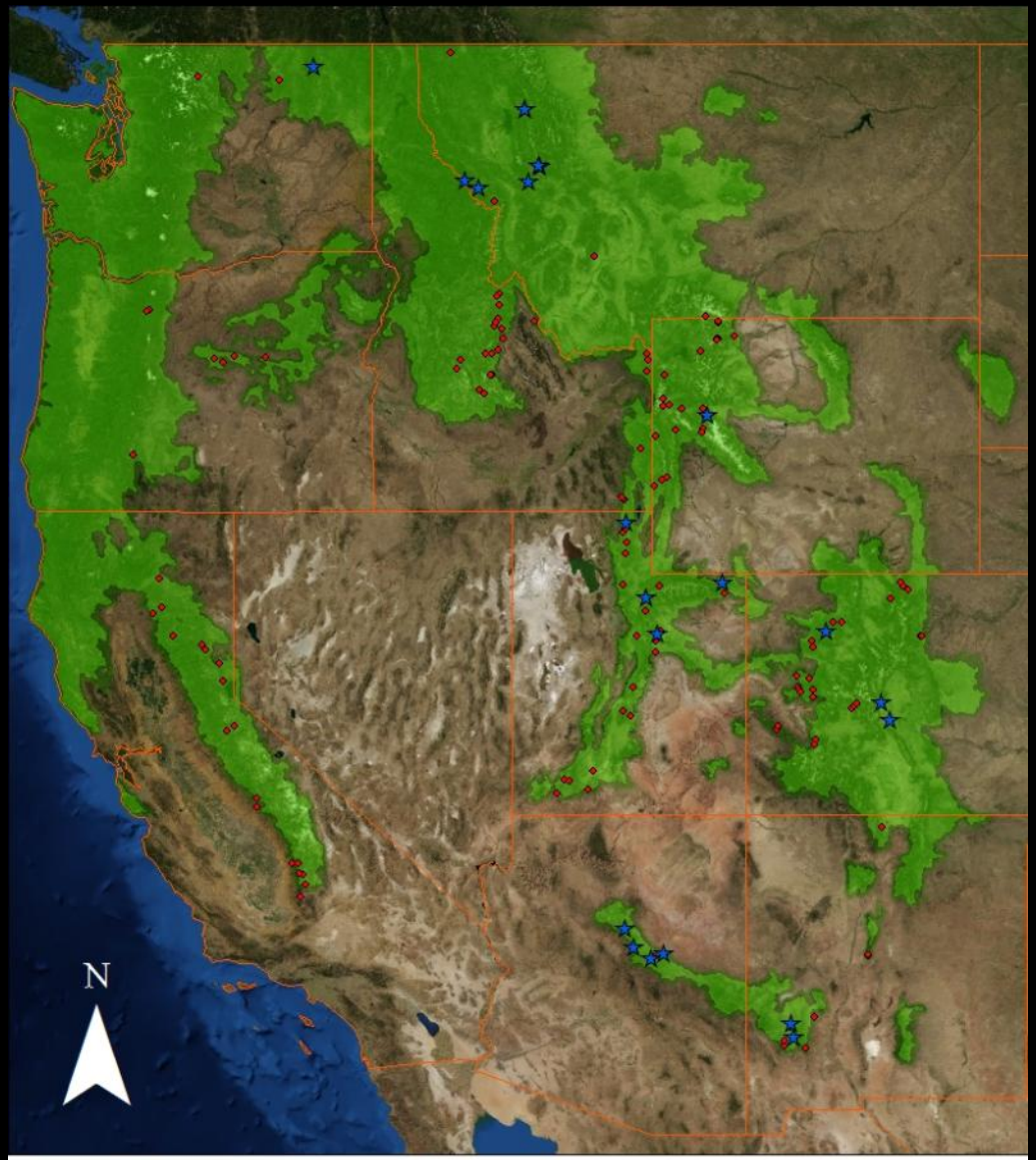
- We have a universally applicable and testable working concept of the OHWM based on the identification of a physical and biological “signature” characterized by three “primary indicators” – break-in-slope, change in sediment texture, and change in vegetation characteristics.

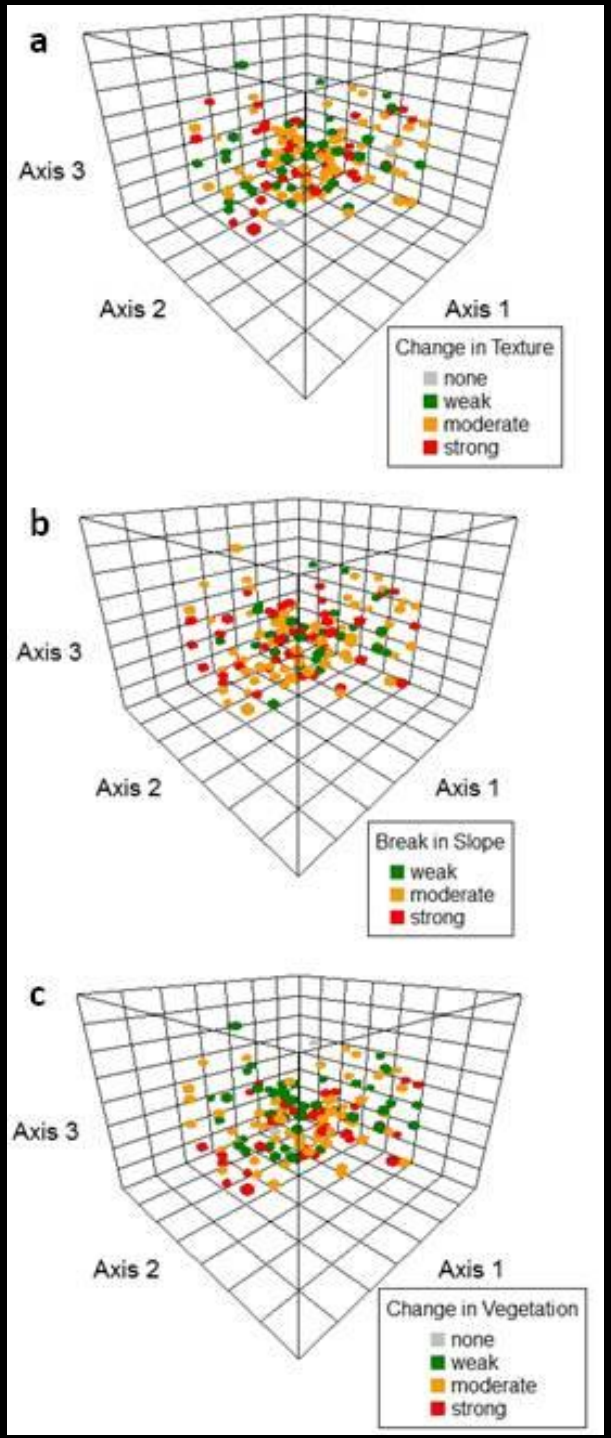
- A rigorous OHWM sampling strategy is in prep for the northeastern U.S., emphasizing the spatial and temporal stability of potential field indicators.

- Potential to apply developed sampling strategy to other regions in support of national OHWM delineation manual development.

Questions?

- How do the various state agencies interact with the OHWM?
- What are some common issues concerning OHWM delineation in your states?
- Sources of inconsistency?
- Problematic stream types / circumstances?





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