

National Water Quality Assessment Program  
(NAWQA)

Habitat Characterization--  
Linking Stream Habitat to  
Geomorphic Processes

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# Goals of the Habitat Protocol Revision

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Incorporate study unit experience

Set priority for habitat characteristics

Develop field forms consistent with data dictionary

Provide justification for each measurement and examples

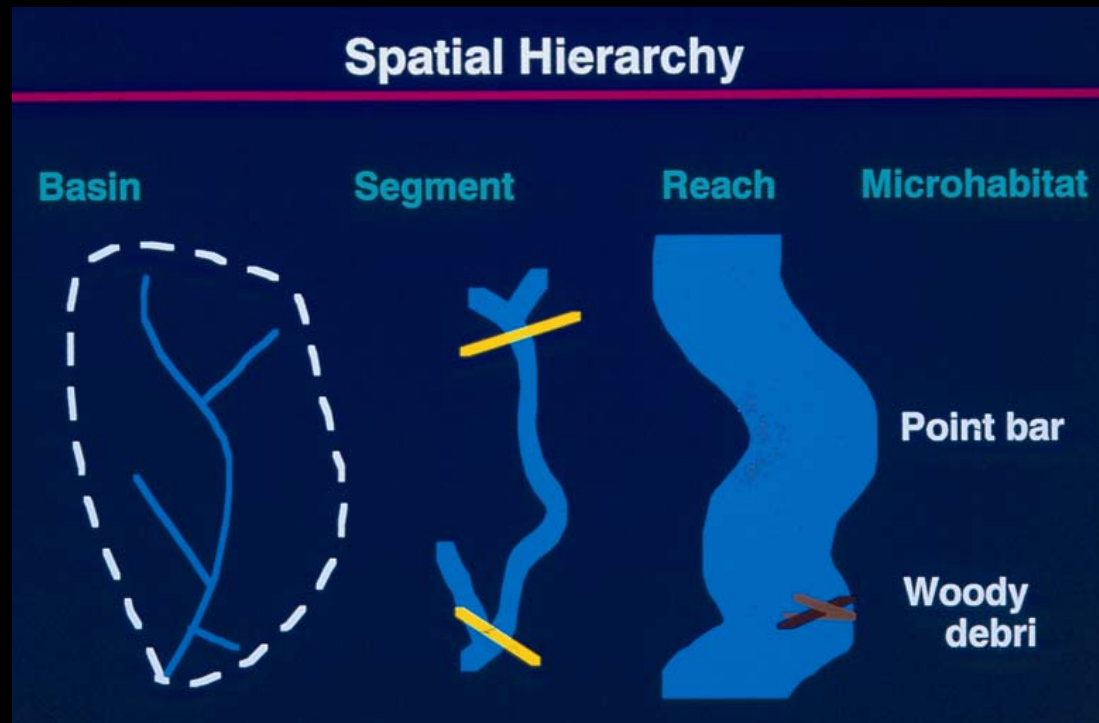
# Objectives of the NAWQA Habitat Characterization

- Applicable to a wide range of stream types
- Cover a wide range of stream sizes
- Data are reproducible and statistically sound
- Observer variability is low
- Time constraints are maintained



# Habitat Sampling Design

- Based on spatial hierarchy (Frissell and others, 1986)



# Reach Characterization

Determining reach length for nonwadeable streams:

- ✘ 20 X mean wetted channel width
- ✘ 500 to 1,000 meters
- ✘ instead of riffle/run/pool sequences look for inside/outside meander bends, crossovers, forewater and backwater side channel habitats

# Reach Characterization

## Habitat measures on wadeable streams

### ✉ General characteristics:

discharge, channel modification, reach length,

water-surface gradient, reach boundaries

type and length of GCU's

Map of reach (optional but do it anyway!)

# Reach Characterization

Habitat measures on wadeable streams (cont.) @ each transect:

- **bankfull and wetted channel width, channel features, canopy angle, riparian land use, riparian canopy, habitat cover features**
- **banks: angle, height (bankfull depth), vegetative cover, erosion, substrate**



# Indicators of bankfull stage

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1. Top of a point bar--minimum estimate
2. Breaks in slope
3. Changes in vegetation
4. Undercut banks--tops of undercuts



# Reach Characterization

## Habitat measures on wadeable streams (cont.)

- Measurements @ 3 points along a transect: depth, velocity, substrate, embeddedness, silt (optional)



# Reach Characterization

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## Additional optional measurements

- Channel cross-section surveys
- Riparian vegetation density, dominance, and biomass (point-centered quarter point)
- Vegetation plots
- Substrate characterization: pebble counts, particle-size determinations

# Reach Characterization

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## Habitat measures on nonwadeable streams:

- need boat and depth finder
- establish 11 transects as usual
- measure width, depth, riparian canopy, canopy angle, habitat cover
- Optional: additional equipment to measure location (GPS), velocity, substrate, and habitat features

# Typical method for collecting reach data (2 people)

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1. Recon stream and locate general position of reach
2. Measure wetted channel width and determine reach length, take general note of distribution of GCU's.
3. Determine spacing of 11 transects (reach length/10)
4. Identify reference location
5. Identify reach boundary closest to reference location and measure distance

# Typical method for collecting reach data (2 people)

6. Install semi-permanent marker at reach boundary
7. Proceed up/downstream and mark transect locations, measure GCU's, and draw map (put transect markers at about bankfull stage)--1st pass
8. At end of reach, turn around and measure characteristics at each transect and transect point (one person does point data, the other does bank/vegetation and records measurements)--2nd pass
9. Make 3rd pass at reach and measure gradient (if you have 3 people you can do this on 1st or 2nd pass)
10. Measure discharge

# Channel Cross-Sections

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Survey 5 cross-sections per reach every decade  
(optional but highly recommended!)

## Justification:

Monitor channel stability---vertical position, lateral migration, channel shape, movement of sediment (quantify channel response to environmental impacts)

Calculate bankfull flows for comparison of low-magnitude/high frequency floods

# Riparian Vegetation

## POINT-CENTERED QUARTER METHOD

measures riparian density, dominance, and species

provides information on long-term conditions and disturbance

useful for sites with woody vegetation

need to know tree/shrub species

takes some time

## DENSIOMETER

measures amount of canopy closure (sky area containing vegetation) and density (sky area blocked by vegetation)

density dependent on season

'quick and easy'

## CANOPY ANGLE

measure amount of sunlight entering stream

# For more information

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# Acknowledgments

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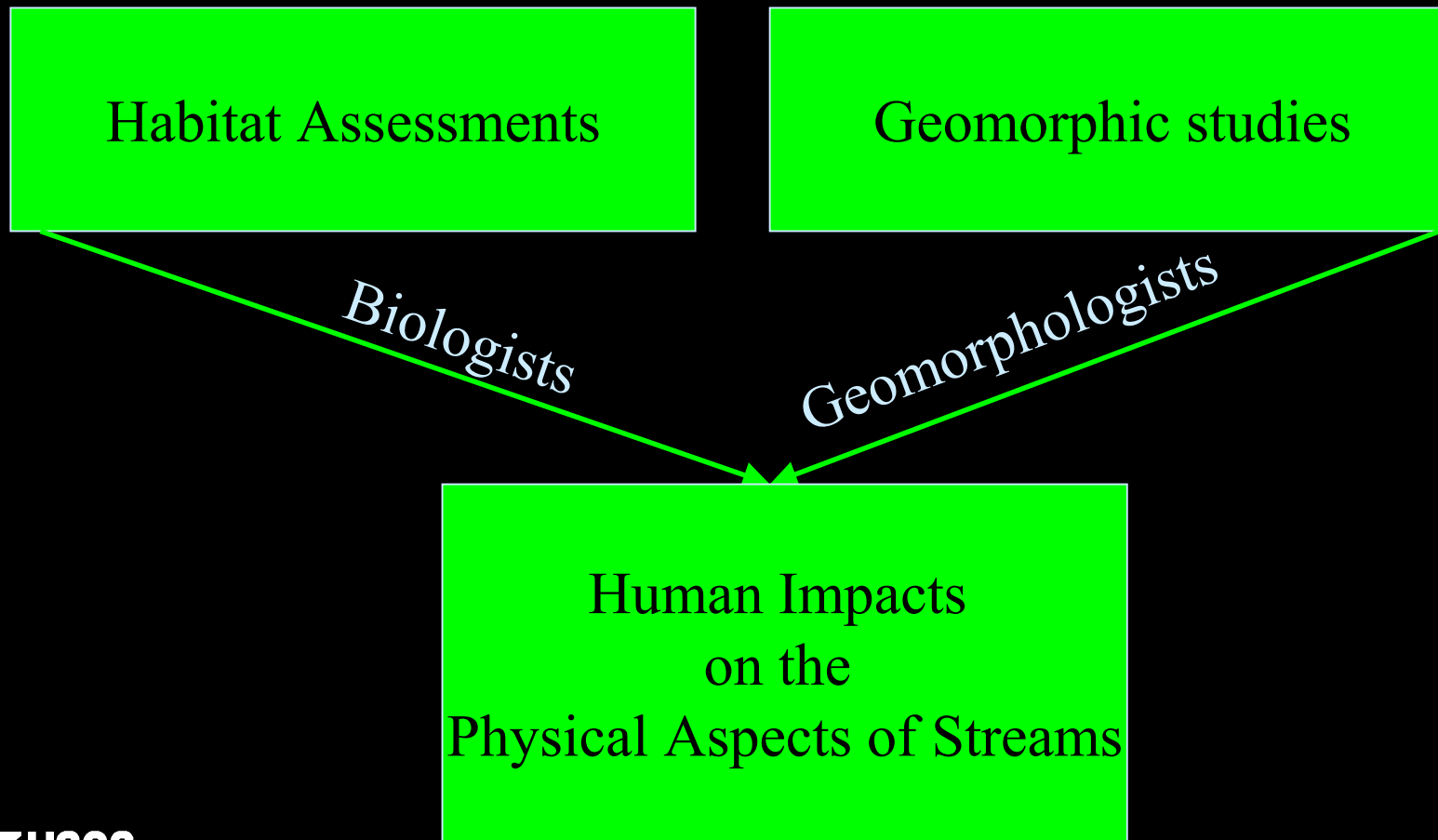
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# Two View Points, Similar Goals:



# Quantitative vs. Qualitative Assessments

## Quantitative

- Precise measurements
- Time consuming
- Unbiased
- Repeatable



## Qualitative

- Estimations, categorizations
- Quick
- Potential for observer bias
- Repeatable?



# Goal of the NAWQA Habitat Characterization

Quantify the most important environmental and physical characteristics that influence the biological and chemical conditions of streams sampled as part of the NAWQA program

