

Monitoring Article Discussion



Monitoring

Definition: “Collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective (Elzinga et al)







Restoration Design and Monitoring

A photograph of a stream flowing through a grassy field. The water is dark blue and reflects the sky. There are some rocks and logs in the stream. In the background, there is a small dam or structure. The text "MA DER" is visible in the bottom right corner of the image.

MA DER

Limiting Factor	Proposed Response	Desired Outcome

What do we monitor?

2009



2013



Resource Monitoring vs. Habitat Monitoring

- Resource monitoring – focused on a specific species
- Habitat monitoring – focused on the condition of the restored habitat





USFWS PFW Program

MONITORING

Level 1- COMPLIANCE



Level 2- BASIC BIOLOGICAL



Level 3- BIOLOGICAL OUTCOMES



SCALE

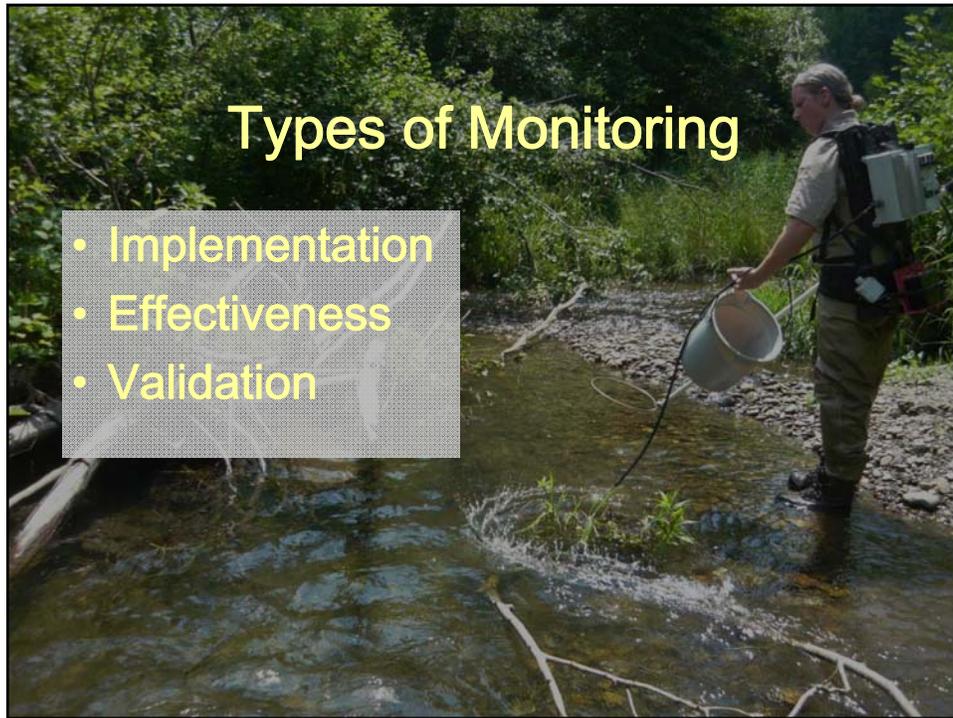
SITE

LOCAL

LANDSCAPE

PROBLEM- LEVEL 2 CONNECTING TO LEVEL 3

M. Filsinger



Without monitoring, you get this



Effectiveness



Validation



Monitoring Methodology

- Photo monitoring
- Vegetation plots
- Bird point counts
- Rare species
- Other (mammals, hydrology, etc.)



Wetland Assessment, Restoration and Management

U.S. Fish and Wildlife Service, National Conservation Training Center

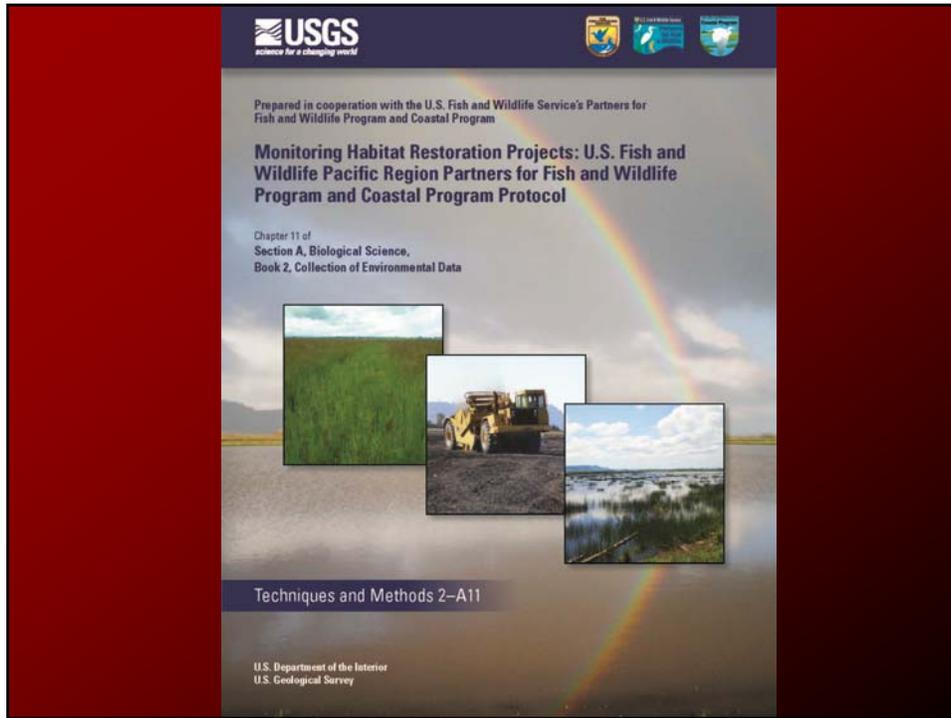


Table 2.1 Example biological and physical goals with example objectives, indicators, and desired state of indicators through time that would indicate that the project is fully successful.

Illustrative goals with example objectives	Indicator	Baseline	Post project	Mid-agreement	End agreement
Improve stream habitat					
Example: Increase stream habitat diversity by placing sufficient LWD to achieve an abundance of A pieces/m of B species and C diameter.	Pieces/m	B pieces/m	X pieces/m	No less than Y pieces/m	No less than Z pieces/m
Example: Improve stream habitat by excavating to reduce width/depth to A.	Width/depth	W/D = B	W/D = X	W/D no more than Y	W/D no more than Z
Improve/restore fish passage					
Example: Restore fish passage by installing A diameter culvert and removing outlet drop.	Outlet drop	B outlet drop	0 outlet drop		No more than X cm outlet drop
Improve riparian habitat					
Example: Reduce riparian plant species composition from 90 percent non-native to 90 percent native by removing invasives and planting natives.	Plant composition	Non-native blackberry and thistle dominant species (90-100 percent)	Blackberry and thistle cleared, native trees (spruce, hemlock, willow) and native shrubs (rinebark and towberry) planted	Native trees and shrubs now dominant species with less than 10 percent non-native blackberry and thistle	Native trees and shrubs now dominant species with less than 10 percent non-native blackberry and thistle
Example: Plant deciduous riparian trees to create A percent cover for stream shade during summer.	Cover after leaf-out	B percent cover during summer	Too early to evaluate	At least Y percent cover during summer	At least Z percent cover during summer
Establish/promote native vegetation structure, composition, and diversity in wetland habitat					
Example: Remove reed canary grass from edge of pond	Cover of invasive	B m ² of invasive	0 m ² of invasive	No more than X m ² of invasive	No more than Y m ² of invasive
Establish/improve wetland size and/or hydrology					
Example: Excavate pond of A depth and B surface area to create nesting habitat for C species	Depth in mid-summer	No pond	X m deep	At least Y m deep in mid-summer	At least Z m deep in mid-summer
Improve/restore coral reef habitat					
Example: Install buoy lines to reduce coral reef damage by boat anchors to less than 10 percent	Percent cover of freshly damaged corals within a 50-m radius of the mooring buoy	No mooring buoy in place, more than 25 percent of coral cover within 50-m of the buoy are freshly broken or damaged	Mooring buoy in place, too early to see any beneficial effects	Mooring buoy intact, no freshly damaged coral observed within 50-m of the mooring buoy	Mooring buoy intact, less than 10 percent of coral within 50-m radius show fresh anchor damage

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22 Monitoring Habitat Restoration Projects

Table 21. Guidelines for specific types of photo monitoring.
(Compiled from Staff and others (2007) and Oertlein and Kischer (2005))

Riparian Habitat/Streambank Stabilization Projects		
Restoration Action	Pre-project Photographs	Post-project Photographs
Livestock fencing	Photograph should capture representative streambank profiles prior to fencing.	Post-project photographs should show fencing, changes in vegetation and streambank erosion.
Riparian planting (planting survival/ change in wet stage)	Pre-project photographs should capture future planting location before site preparation. From opposite bank where possible.	Post-project photographs should document changes in riparian vegetation.
Non-native plant management	Pre-project photograph should capture site conditions prior to treatment. Channel photograph documents enough of conditions to detect visual change in the vegetation, that is, landscape photography.	Post-project photographs include the identical area captured by the pre-treatment photograph.
Riparian planting (increased canopy cover, improved riparian corridor continuity and pinch sites)	Photographs taken from mid-channel of riparian vegetation on left bank, right bank, channel upstream, channel downstream and overhead.	Photographs at same location after treatment.
Properly installed streambank stabilization with preserved integrity	Photographs taken from opposite bank and mid-channel looking across channel to where treatment is to be placed.	Photographs taken from opposite bank and mid-channel looking across channel at the treatment. Photograph taken from the bank with the treatment looking down on the treatment.
Improved channel geometry, reduced bank erosion, increased riparian vegetation	Photographs of channel upstream and downstream of future treatment location. Photograph of channel at future treatment location from opposite bank.	Photographs of channel upstream and downstream of treatment. Photograph of channel at treatment location from opposite bank.
Wetland Habitat Projects		
Restoration Action	Pre-project Photographs	Post-project Photographs
Reestablishment of wetland hydrology	Photograph area in landscape style where hydrology will be restored. Make sure to take a photograph during same time during the growing season.	Photograph area in landscape style after hydrology is restored. Make sure to capture enough of the site to detect change post-project. Several years of repeat photography may illustrate project success better than one year post-project.
Hazing	Pre-project photographs should capture the future planting location before site preparation.	After planting, take photographs that show changes in the vegetation structure. Several years of repeat photography may be more illustrative than one post-project year.
Non-native plant management	Photograph area to be treated. Make sure you capture enough of the treatment area in the photograph to detect change in post-project photography.	Photograph area after the treatment is complete.
Instream Habitat Projects		
Restoration Action	Pre-project Photographs	Post-project Photographs
Large wood boulder placement	Photographs taken from mid-channel looking upstream and downstream from each future structure location and photographs taken from either right or left bank looking down upon the future structure.	Photographs taken from mid-channel looking upstream and downstream from each structure location and photographs taken from either right or left bank looking down upon structure.
Increase in targeted habitat units (for example, pools, gravel bars)	Habitat at future location of each structure.	Habitat formed by each structure (pool, shoals, undercut banks, gravel, side channels, etc.)
Wetland control	Take pre-project photographs from mid-channel looking upstream and downstream from each structure location. Take more photographs from either bank looking down upon structure.	Take post-project photographs from mid-channel looking upstream and downstream from each structure location. Take more photographs from either bank looking down upon structure.
Bank stabilization	Take pre-project photographs from the opposite bank and from mid-channel, looking across stream to future treatment location.	Take post-project photographs from the opposite bank and from mid-channel, looking across stream to treatment location.

Case Study on Monitoring

