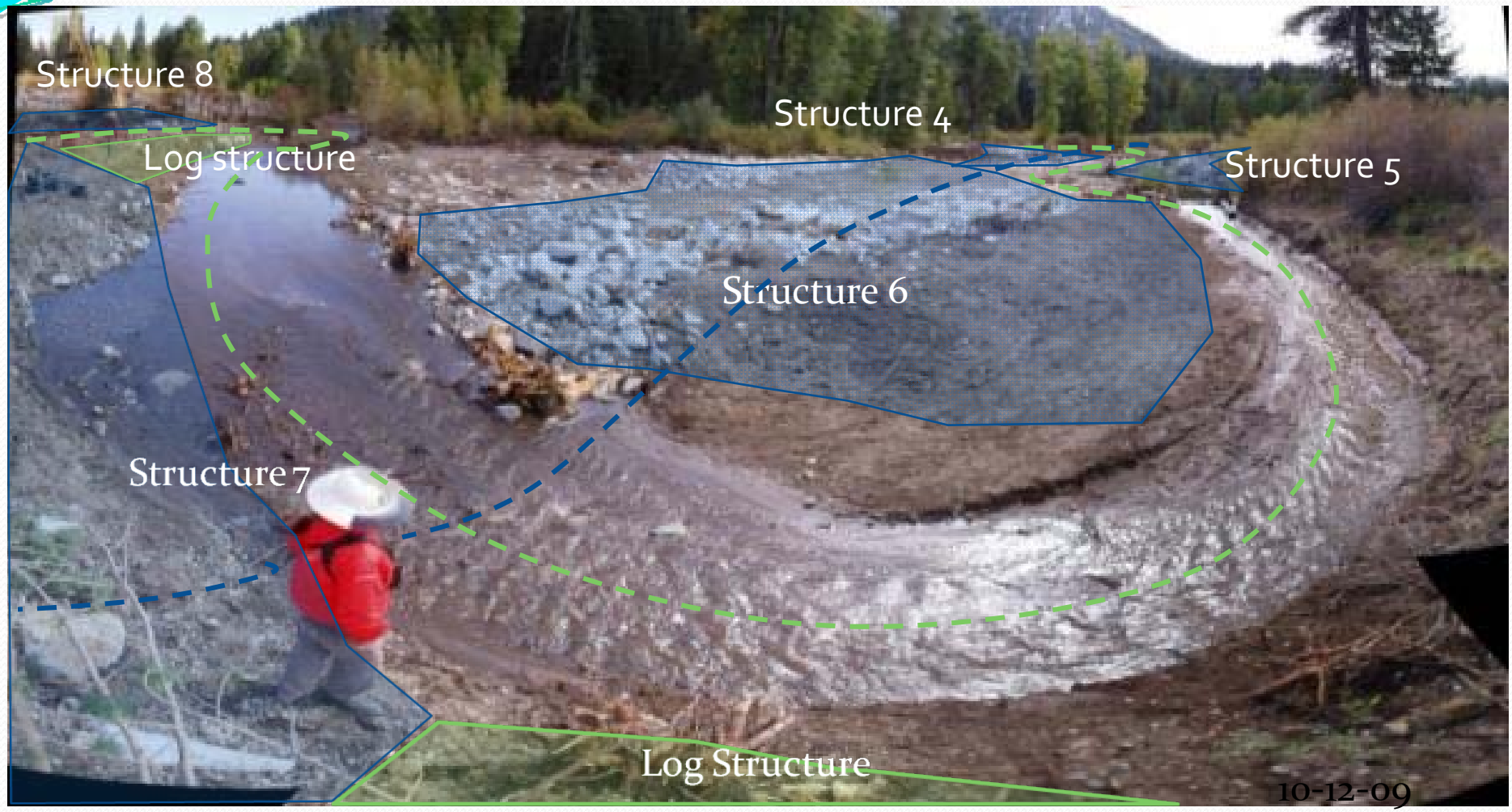
Phase IIIA- Completion of restoration actions, 2009

Phase IIIA - Post Implementation



Phase IIIA - Post Implementation Flood Response

10-12-09

10-27-09

~7" precip @ Ward snotel on 10/14
USGS real time @ Blackwood
20 to 100 cfs in 30 min.

Blackwood Phase I and II

Goal/Objectives 1: Remove in-channel structures, and create stable channel geomorphology with improved aquatic habitat.

- *Is channel form evolving from the constructed step/pool channel to a riffle/pool form, and is the channel horizontally and vertically stable while evolving into the desired form?*

- *Are constructed flood protection berms preventing headcutting and outflanking, and are grade control weirs maintaining their cross section shape, when exposed to high flows?*

Goal/Objectives 2: Restore connectivity of stream channel to the adjacent floodplain, resulting in fine sediment deposition, and promoting recovery of stream bank and floodplain riparian vegetation.

- *Is riparian vegetation increasing along stream banks and the adjacent floodplain?*

Phase I and II - Relatively Simple Metrics/Indicators:

•Visual observations/photos after 3+ year frequency flood event

Approximately 5 year intervals:

•Photopoints

•Channel and floodplain cross sections and longitudinal profiles .

Phase I & II Interim Monitoring results (USFS, 2009)

Channel Form and Stability

- Fish ladder and Bridge Sites: longitudinal profile surveys and photos show that after early adjustments, the channel is now vertically stable. Photos show that cross-sectional shape is stable but will likely continue to experience minor adjustments. Sediment deposition from upstream transport suggests that the trend from step/pool toward riffle/pool channel forms may have started.

Vegetation Colonization

- Fish ladder site is underperforming because the new constructed channel does not have a large enough floodplain to allow flows to spread and reduce velocities which would result in sediment deposition (planned for additional restoration in Blackwood Phase IIIB project
- Bridge site, it is too early to evaluate trends given the below-average flow conditions in 2007 and 2008. Because of the larger floodplain area present at the bridge site, conditions are expected to improve once higher flows occur.

Blackwood Phase IIIA – Reach 6

Goal/Objectives 1: Create stable channel geomorphology, resulting in improved water quality and aquatic habitat.

- *Is the channel able to maintain the design slope of 0.0056 and sinuosity of ≥1.6 (TMDL target), and the geomorphic characteristics of a pool-bar-riffle channel form?*

- *Are flow deflection structures successful in keeping erosive channel flows away from high terrace floodplain banks, preventing wide spread terrace bank collapse, and maintaining 80% stable streambanks throughout the project area (TMDL target)?*

- *Is caddis fly diversity and abundance increasing post restoration?*

Blackwood Phase IIIA- Reach 6

Goal/Objectives 2: Restore connectivity of stream channel to active incised floodplain, resulting in improved water quality and promoting recovery of stream bank and floodplain riparian vegetation.

- *Are active floodplain surfaces inundated with water every 3 to 5 years?*

- *Are fine sediments being deposited and retained on floodplain surfaces?*

- *Is revegetation recovery trending towards the following 20Yr TMDL target? Floodplain vegetation -50 percent or more of the relative cover is later seral with similarity to potential natural community). Diversity of age classes of hardwood shrubs is present and regeneration is occurring. Vegetative rooting occurs throughout the soil profile; root masses stabilize stream banks against cutting action.*

Phase III – Combination of simple and more intensive metrics.
Actual scale and scope will depend on available budgets at time.

•Visual observations/photos after 3+ year frequency flood event

•Following at approximately 5 year intervals:

•Aerial photos and photopoints

•Stream Channel Condition Inventories (SCI) – variety of geomorphic metrics (bankfull w/d, entrenchment ratio, pool/riffle ratios, bank stability rating, pebble counts) Region 5 USFS Technical Guide, 2005.

•Additional cross sections and longitudinal profiles.

•Macroinvertebrate Sampling (3 year intervals, 2 yrs in a row)

•Vegetation Plots

•Floodplain sediment mapping (in conjunction with aerial photos).

•Water Quality Data from USGS Blackwood LTIMP site (annual)

Historic USFS Challenges:

•USFS implementation and monitoring staff were disconnected. Therefore well developed, and realistic monitoring plans were typically not produced before project is implemented, and pre-project monitoring was deficient (to much or to little).

•Funding for long term monitoring is not secure, therefore what actually gets done may differ then what was intended, depending on available budgets and current priorities.

•Long intervals between effectiveness monitoring data collection is difficult to track, particularly with staff turnover.

•Even when keep up with data collection, neglect to program useful analysis and reporting efforts.

•Poor coordination between staff areas, when multiple staff areas are responsible for different monitoring components (ie. wildlife biologists, botonists, hydrologists).

Solution:

•Staff responsible for restoration implementation, also responsible to design, plan, and implement monitoring.

•Requires diligent and focused effort to develop realistic monitoring plans, based on project goals and design approach prior to project implementation, with appropriate revisions right after construction, and revisions as needed after periodic analysis and reporting.

•Monitoring plans must provide thorough well organized documentation, so that program staff can track monitoring requirements (data collection and reporting) over long time periods.