Attachment B
IDWR Water Transactions Program
Monitoring and Evaluation Protocol

Monitoring protocols are described that evaluate the effectiveness of the WTP primary project objective: increased instream flows. WTP project objectives do not include habitat improvement per se, but increases in habitat availability in association with increased flows are assumed and will be assessed where feasible.

Effectiveness Monitoring

The primary objective of WTP projects is "acquisition" (through leases, donations etc.) of water to enhance flows at critical times. Monitoring methods listed below are ranked according to complexity (and therefore represent increasing cost and labor requirements.

1. Stream Miles –determine miles of stream above the diversion where additional habitat has been made available through reconnecting the stream at critical times (use for reconnects only, based on GIS query)
2. Photo Points – points established during the initial baseline assessment are continuously monitored and recorded to demonstrate stream reconnects and to show increase in available habitat over the season (greater access to pools, off channel habitat availability, greater depth of water, etc.). Baseline points must include the condition of the dewatered/low flow segment and points below and above prior to water transaction (i.e., must show low flow condition during irrigation season, prior to flow enhancement, as a basis for comparison).
3. Site visits will be made to ground truth satellite interpretations and assure compliance with contracts.
4. Water Measurement – Establish temporary or permanent stream gage measurement sites. Measurement should be continuous throughout the time period of enhanced flows for larger streams/rivers. Measurement methodology is variable and dependent on stream size and priority ranking. Use staff gage, current metering, or continuous recorder (i.e. pressure transducer with data logger) for measurements. Cross section measurements will be required for all three (to establish stage-discharge relationship or cross section area) unless control sections are available.
5. Satellite Technology-Satellite photos will be used to corroborate that leased water rights result in the target fields not being irrigated.
6. Habitat Availability – flow characterization – evaluate flow enhancement in relation to habitat needs -- develop velocity/depth relationships of stream and relate to habitat suitability, estimate flows needed to achieve targeted habitat availability and determine if flow enhancement achieved target during critical stages-use of Physical Habitat Simulation (PHABSIM) model initialized with data gathered from field— and coordinate with other agencies. PHABSIM uses field-measured hydraulic parameters (water depth, flow velocity, substrate, and cover) at different flow levels and relates them to known preferences of different species and life stages (most limiting is usually selected as target). A minimum of one

transect at three different flow levels will be established (better with at least three transects). Sites should be representative and include critical habitat elements.

7. MIKE BASIN Modeling- Mike Basin models are being developed for the Stanley Basin and Pahsimeroi basins. The Mike Basin Model is a surface water budget model that can be used to predict the effect of a change in irrigation practice on downstream flows.

PHABSIM

PHABSIM is part of a wider conceptual and analysis framework (IFIM, Instream Flow Incremental Methodology), that provides a process for resolving water resource issues in stream and rivers. PHABSIM was designed to provide a tool that characterizes the physical habitat structure of a stream or river and evaluate the flow dependent characteristics of physical habitat in light of the biological needs of selected target species and life stages. In applying PHABSIM, the assumption is made that flow dependent physical habitat may either limit or increase carrying capacity and therefore can be used as an index to assess the needs or impacts of flow variations on fish or other aquatic organisms **(***T. Hardy, 2002, The Theory and Application of PHABSIM for Windows***).** The model can evaluate the impact of stream flow augmentation (or deletion) and is therefore valuable for high priority WTP project assessment.

The U.S. Forest Service, the U.S. Geological Survey and the U.S. Bureau of Land Management have PHABSIM data for many streams in the Upper Salmon River Basin including Fourth of July Creek, Beaver Creek, Champion Creek, Big Hat Creek and other potential priority candidates for transactions. We can use much of the available data to assess habitat enhancement for specific projects. At some sites, such as the Pahsimeroi River at Furey Lane where PHABSIM data does not exist, we may need to contract to have the data collected to evaluate the benefits of a transaction using this process.

General Procedure:

Project Scoping
Develop statement of study objectives, outputs and requirements. Identify impacted area/study area. Confirm that physical habitat is a limiting factor of target species, and identify any other limiting factors.

Selection of Target Species and Suitability Curves
Identify target species and life stages to evaluate, based on available fisheries data, as well as seasonal use. Use existing suitability curves.

Study Section Selection and Habitat Mapping
Identify critical reach and select transect(s) within specific habitat types, utilize representative reach approach. At the simplest level, habitat mapping will involve a visual assessment of types and conditions of habitat present, and study transects will be selected to represent these habitat types.

Cross Section Selection and Field Data Collection

- Identify representative reach (s) and select transects within different microhabitats
- For each X-section, measure water surface elevation and velocity, will need calibration at three different discharge levels.
- Select proper number of intervals to adequately represent the channel. If possible, collect substrate and cover data at each point where bed elevation is taken.
- Determine average velocity at each interval, and measure depth.

Modeling

Proper calibration is essential to accurate hydraulic simulation. First step is calibration and simulation of surface water elevation. Water surface elevations are assumed to not vary across the cross section. Utilize stage-discharge or Manning's equation approach (must use latter approach if have only one flow discharge measurement). Velocity distributions within the cross section are then simulated based on measured velocity. Habitat modeling takes the information collected on channel structure, modeled water surface levels, and simulated velocities and then combines it with habitat suitability information to obtain an index of the quantity and quality of available habitat (often expressed as WUA, Weighted Useable Area).

Modeling results can be used to determine minimum flows required and how much additional habitat is made available through increased instream flows afforded by the WTP project during critical periods.