Atlas Exec Summary:

Since the last ISRP review of habitat projects in 2006, experience has been gained in restoration techniques, research and monitoring programs have gathered additional data and are able to draw conclusions from that data, and new planning documents have been published. BPA in cooperation with basin partners are coordinating efforts to leverage existing scientific data and physical information for development of a strategic, prioritized restoration implementation strategy: The Atlas Process. The Atlas will not replicate previous planning efforts including Sub-Basin plans, Recovery Plans, etc. but will synthesize critical information (limiting factors, EDT, activity categories, etc.) from these previous efforts to strategically identify prioritized locations and restoration activities required to recover and enhance aquatic habitats for at risk fish species. The Atlas will assist Basin managers in: 1) prioritizing the appropriate types of restoration activities in strategically defined locations to address key limiting factors 2) will provide the transition from the current model of opportunistic restoration and enhancement to focused restoration of key reaches containing critical ESA habitat and facilitate collaborative, focused, and value added restoration projects. The Atlas will centralize data and maps related to limiting factors, life history requirements, biologically significant reaches, habitat restoration opportunities, conceptual restoration templates consistent with local geomorphology, and a scoring and ranking matrix which will be collectively vetted by local and regional experts that participate on committees to develop the Atlas.

The Atlas Process involves gathering existing planning documents, results of research and monitoring, and pertinent scientific literature to identify specific criteria for the preferred biological and physical habitat for focus species within a basin. Data and information are presented in a spatial context through GIS to evaluate species utilization, stream reach subdivision (Biologically Significant Reaches (BSR) and perform a limiting factors assessment. This process results in the identification of specific restoration activities as linked to limiting factors for the individual BSR's. The GIS and remote sensing data are then utilized to strategically identify these specific restoration types and opportunities within the watershed. These opportunities, once identified through Atlas mapping will be categorized and ranked within a BSR specific implementation prioritization matrix relative to a number of factors influencing both the *habitat benefits* and *feasibility* for identified project opportunities.

Methods:

Assemble a Technical Advisor Committee (TAC). The Atlas Process involves two technical advisory committees with differing roles.

1. The **Science TAC** is a small working group of local biologists and outside the basin experts with knowledge and familiarity of focal species utilization within the specific

stream system. The Science TAC performs the initial evaluation of spatial data layers to interpret how fish are using specific river reaches, identify the primary limiting factors by reach, and recommend restoration activity types that have the greatest ability to address those key limiting factors. The Science TAC member composition is focused on the fisheries biologist discipline with representation from the fields of restoration practitioners, researchers and monitoring coordinators. Team composition represents a tactical decision in grounding the process on the biological needs of the fish species and defining the habitat and activity types that can best address the key limiting factors affecting those species. Outcomes from the Science TAC effort include the specific reaches, limiting factors and habitat action types that will be utilized by geomorphologists and engineers in the project opportunity and identification phase of Atlas preparation.

2. The **Stakeholder TAC** is a larger group of team members including policy advisors, members of the public with interests in the basin, professionals with expertise in other restoration fields (hydrologists, engineers, water transactions, funding agencies, etc), outreach specialists and other basin stakeholders. This group will review the Science TAC products and outcomes and contribute expertise and recommendations on feasibility criteria that influence the ability to implement specific restoration opportunities.

Gather Available Biological Data and Input into a GIS Framework. Presenting spatial data sets including EDT, aquatic inventory, RM&E, StreamNET and other geospatial fisheries information to the Science TAC will allow for a transparent and accountable decision making process. A GIS platform is used by the Science TAC to display and analyze available data in a spatial context for the assessment of existing limiting factors relative to species use and to make decisions and recommendations on appropriate habitat activities.

The prioritized habitat restoration activity types are then used to asses potential project opportunity locations along the river and floodplain corridor using the GIS platform with supporting additional geomorphic, modeling and physical data sets. The amount of information available is variable among geographic regions and will determine the resolution with which potential project opportunities can be identified. However, the use of available data, (at the highest resolution available) will still allow the assessment and ability to make restoration decisions and identify critical data gaps that could be supported with tactical RM&E. For example, some basins may have EDT layers from Subbasin Plans and a local Watershed Assessment, in other areas, research and monitoring data, Subbasin Plans, Recovery Plans, and physical assessments such as Bureau of Reclamation (BOR) Tributary and Reach Assessments may be available. The increased resolution of geospatial data will support an enhanced ability to identify restoration actions at a higher level of refinement.

In summary, GIS will be used, 1) to determine and identify the biological needs of fish species and prioritize which types of restoration actions can provide the greatest benefit by limiting factor and reach and; 2) to identify opportunities on the landscape to address the identified limiting factors.

Convene Science TAC to Evaluate Fish Data using GIS format.

- **Display Map of Stream System with Overlay of Fish Use.** Data on fish use by life stage will be displayed on a GIS map to determine where, when and how species are using different reaches within the focus river system. From this data a fish periodicity table (example below) can be developed to guide discussions of appropriate biological reach breaks and refinement of limiting factors identified in existing planning documents.

		Jan		Feb		Mar		Apr		May		June		Jul		Aug		Sept		Oct		Nov		Dec	
Species	Life Stage	1-15	16-31	1-15	16-28	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-31	1-15	16-31	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31
Steelhead	Adult migration/holding																								
	Adult Spawning																								
	Incubation/emergence																								
	Juvenile Rearing																								
	Juvenile/adult emigration																								
Chinook Salmon	Adult migration/holding																								
	Adult Spawning																								
	Incubation/emergence																								
	Juvenile Rearing																								
	Juvenile/adult emigration																								
Bulltrout	Adult migration/holding																								
	Adult Spawning																								
	Incubation/emergence																								
	Juvenile Rearing																								
	Juvenile/adult emigration																								

- **Divide Stream into Biologically Significant Reaches (BSRs).** Using the fish periodicity tables alongside GIS referenced biological data, the stream system can be divided into Biologically Significant Reaches which are defined as *reaches of stream with common fish use and limiting factors*. These reached represent the "fish's view of the river". For example, a section of river that is used for spawning and incubation requires specific biological parameters to be functional. If these conditions are not available, they will limit the species survival. Another reach of the river system may be identified as primarily juvenile summer rearing habitat, resulting in a different set of parameters necessary for survival. In each case, to realize the highest benefit for fish, we would expect restoration actions to be different between these sections of river thereby resulting in separate Biologically Significant reach Definitions.

- **Determine Limiting Factors by BSR.** Once the BSRs have been identified and mapped, additional biological data can be used to fine tune limiting factors that have been previously identified within higher level planning documents (Sub-basin plans, Recovery Plans, Expert Panels, etc.). Temperature, flow, habitat surveys and other data sets are

presented within GIS relative to existing BSR breaks to update or confirm previously determined limiting factors at a finer resolution.

- **Identify Restoration Activity Types that will most effectively address identified limiting factors.** With the fish use and limiting factors identified by BSR, biologists can identify the types of restoration actions that can most effectively benefit the species and life stage by BSR.

It is anticipated the above described data analysis will take part over several working sessions with the Science TAC, and is meant to be a first cut at documenting the biological needs of fish species. Once the Science TAC biologists have a draft statement of biological needs, other experts in the basin will be sought to help develop viable solution recommendations. For example, when the biologists determine that in a particular reach, flow is the primary limiting factor, partners with expertise in water transactions or experts in on-field water saving mechanisms will be solicited for input.

Products from the Science TAC work sessions will be provided to the larger Stakeholder TAC for review and comment to assure that important information hasn't been missed and to provide a transparent check and balance of different viewpoints.

GIS Mapping: Opportunity Identification Phase. Once the biological needs of fish have been identified, a second phase of GIS mapping will begin. The second phase will use physical stream data to identify where opportunities to implement the TAC agreed upon activity types could occur. For example, in reaches where instream complexity was identified as a need, GIS terrain layers could be used to determine opportunities for levy setback, or where old meander scrolls are still present to be reactivated. If flow or temperature is a priority, PODs (Points of Diversion) can be identified or FLIR data used to identify cool water spring locations so that restoration opportunities can be focused in those areas. What will result is a map (Atlas) of potential project opportunities. This draft Atlas will be reviewed by both TACs and revised per their comments.

Develop a Ranking and Prioritization Matrix of Project Opportunities. Up and to this point all project opportunities have been evaluated for and identified as those that biologically provide the most benefit for fish. But implementation of restoration actions (especially on private land) is often constrained by other factors. The Atlas Process will incorporate a Feasibility Score, along side the biological benefit (Biological Integrity) score in order to more accurately evaluate the implementation potential of a potential project.

TACs will provide input to the criteria and weighting used within the ranking and prioritization matrix. Biological Integrity will incorporate factors such as ability to address multiple limiting

factors, number of species and life stages benefitted, and whether the project is located within or adjacent to anchor habitats. Feasibility will take into account: Landowner willingness, site accessibility, construction cost, area of habitat gained/cost, level of design risk. By combining these 2 scores a more accurate picture of available opportunities is produced.

Conclusion:

With the Atlas Process, a strategic approach that facilitates the allocation of funds to the more value added actions will ensure a prioritized, benefit oriented restoration strategy. Products of the Atlas Process will includes a map(s) of restoration opportunities that incorporate a scoring and ranking matrix, vetted through an open and transparent evaluation of existing data by local and regional experts.

This map and its background data layers will be stored within a publicly accessible data base to help inform stakeholders and restoration implementers. As well, it will have the ability to be updated as new information is gathered or projects are implemented in order to help adaptively manage habitat programs into the future.