Habitat and Biodiversity Information System
for the Columbia River Basin

FY 2008-2009

Project # 200307200

Statement of Work

August 27, 2007

Northwest Habitat Institute

Table of Contents:

Project Summary:

Though the Habitat and Biodiversity Information project is viewed as a wildlife core data source, it also contains habitat relationship information about Pacific Northwest fish as well. In 2003, this project was recommended for funding at $434,000, but because of unresolved funding and data management issues was only funded from the data management placeholder. In 2006, this project was again recommended for funding at $440,000 for FY 2007-2009. However, interim funding has been assigned to this project at $157,831 with an understanding that the Council will need to decide on the appropriate funding level pending the workshop where all tasks and budgets will be determined. Based on the workshop and other reviews that have taken place over the past year, a funding level is requested for the original recommendation of $440,000 plus an additional $152,181 for a total of $552,181.

The Statement of Work (SOW) presented here list the objectives, tasks and budget based on feedback received during several reviews of our proposal: a 2-day *Data Management Workshop: Identifying Priorities for StreamNet and Northwest Habitat Institute* held September 20-21, 2006 (summary found in Appendix A); Mainstem-Systemwide Review Team (MSRT) gave their recommendation on September 15, 2006; summary in Appendix B); and an Independent Scientific Review Panel (ISRP) review that stated: "Fundable...Among the database proposals, this is among the best justified" (ISRP review, Aug. 31, 2006; summary in Appendix B). Over the past year, SOW has also been reviewed by the Northwest Environmental Data-Network (NED), Columbia Basin Fish and Wildlife Authority's: Data Management Framework Subcommittee, Members Advisory Group and Wildlife Advisory Committee, and Northwest Power and Conservation Council staff.

Based on these reviews, the Northwest Habitat Institute (NHI) created this revised SOW to reflect the needs identified. **Objective 1** is for the operation and maintenance of IBIS, which is currently funded at $157, 831; an additional $72,850 is requested to fully fund IBIS. **Objective 2** is for multi-tiered mapping that supports subbasin planning and the Status of the Resource Report, also tied to PNAMP High Level Indicators (HLIs) $129,500 is requested. **Objective 3** is for wildlife habitat tools and services which are estimated at a total cost of $152,000; this objective builds upon the NED workplan ($78,500), PNAMP Action items, and lesson learned from subbasin planning ($73,500). **Objective 4** is for support for further testing and implementation of new Habitat Assessment protocols to evaluate mitigation and impact sites; $112,000 is the estimated costs, but this objective is under review by the ISRP and others. Thus, pending the completion of this process no immediate funding is requested. **Objective 5** is for developing methodologies to assess operational losses due to hydropower development; $40,000 is requested.

An overview of the budget can be found in Table 1 and a more detail breakout by Task is located in Table 2. This SOW reflects a total amount of $552,181 of which $157,831 is currently allocated; $394,350 is requested to meet the remaining data needs of objectives 1, 2, 3 and 5; $112,000 for objective 4, as mentioned, is not being requested at this time . This budget is based on data priorities suggested at the *Data Management Workshop* which are established to support subbasin planning, the Northwest Environmental Data Network (NED) work plan, and other reviews that have taken place over the past year. The five principal objectives to this SOW are summarized in the following section.

Table 1. Summary of primary project objectives.

Objectives	What Objective Supports	Wildlife Advisory Committee Priority	Costs			Additional funds requested	Comments
			Current Funding				
			Non-BPA funds	In-kind	Current BPA funds		
1) Operating and Maintaining the Regional Habitat and Biodiversity Information System (IBIS)	Subbasin planning and Regional Data Center	1	$21,000 FY 07	$35,000 FY07	$157,831	$72,850	Additional funding would complete baseline support for IBIS - [currently not fully funded]
2) Update and Refine Wildlife Basin, Ecoprovince, and Subbasin Habitat Maps	Subbasin planning, PNAMP Action #8 & 9, and Regional Data Center	3	$320,000 FY04-07	$40,000 FY 07	$0	$129,500	Mapping to meet the needs of subbasin planning, high level indicators, and the Status of the Resource Report.
3) Wildlife, Habitat and GIS Tools and Services	Subbasin planning, PNAMP Action #8, & 9, NED Work Plan and Regional Data Center	3	$46,000 FY 05-07	$30,000 FY05-07	$0	$78,500 (NED Work Plan) $73,500 (GIS Repository)	Data Collection Tool - NED Work Plan; GIS repository from lesson learned from subbasin planning)
4) Implement and update Habitat Assessment protocols	Habitat Evaluation	4*			$0	$112,000	Funding can be re-allocated; currently funding CBFWA & ODFW
5) Develop methodologies to asses operational losses	Subbasin planning; Research, Monitoring, Evaluation	2			$0	$40,000	New effort to assist with developing a consistent approach to assess operational losses
Total			$387,000	$105,000	$157,831	$394,350**	$552,181

* Wildlife Advisory Committee initially ranked this objective a 3 but because of a recent ISRP review that requested further information, the Committee lowered it's ranking

** Total does not include objective 4 because ISRP needs further information to make a determination.

Current Funding	New Support	Not Requested at this Time	Total Amount

Summary of Project Objectives

Objective 1.) Operating and maintaining the regional Interactive Habitat and Biodiversity Information System (IBIS). IBIS is an extensive collection of peer-reviewed regional information on wildlife species, habitats, and their relationships. These datasets are integral to subbasin planning efforts in that they provide species range maps, wildlife-habitat relationship maps and data. IBIS additionally serves as a source of core wildlife data that sets the foundation for a regional wildlife data repository, recommended as a role for NHI by *Data Management Workshop* feedback. Further, NHI is recognized as a "Core Program" by BPA, and IBIS is one of NHI's Core Program functions. It also addresses several issues in the NED Scope of Work (FY2007): obtaining at-risk data, bridging data gaps (also highlighted in CBFWA's State of the Resources report), and data standards. Improving accessibility, expanding data, and maintaining IBIS are the main tasks in Objective 1.).

Objective 2.) Updating and refining wildlife basin, ecoprovince, and subbasin habitat maps. Habitat mapping is an on-going need for subbasin planning, and was listed as a recommendation and "Customer Priority" for NHI by *Data Management Workshop* feedback. A hierarchical approach for habitat mapping is proposed by NHI with three levels: 1) Coarse-scale mapping of habitat types within the entire CRB; 2) finer-scale mapping of habitat types in high-priority areas (identified by CBFWA), such as riparian habitats, which require a finer mapping resolution; and 3) fine-scale site-specific mapping of habitat types, structural conditions and key environmental correlates in high-priority sites (identified by CBFWA and others). The implement levels 2 & 3, NHI will also work with the existing land managers and help train their staff to do the mapping. This way the finer resolution mapping can proceed at a much faster pace throughout the basin. This objective will also enable subbasin planners to track changes in habitat types over time. Further, habitat mapping is a Core Program function for NHI and will serve to expand information for a regional wildlife data repository. It also addresses several issues in the NED Scope of Work (FY2007): obtaining at-risk data, bridging data gaps (also highlighted in CBFWA's State of the Resources report), and data standards.

Objective 3.) Developing wildlife, habitat and GIS tools and services. Regarding the Role of Databases in RM&E, principle problem statements (as defined in the ISRP 2005 Retrospective Report) address the failure to provide RM&E data to databases. In principle, all data obtained through public funds should be available to the public and recorded in the region's databases. ISRP recommends that all projects be made available via the program's database projects. Because IBIS is identified by the NPCC, CBFWA, and BPA as a regional database, NHI suggests one way to approach these concerns is to have RM&E projects periodically make uploads to the regional databases such as IBIS; another way is via the development of accessible informational tools and services coupled with regional databases that allow information to be located, recorded, and visualized as part of the RM&E process. This type of an approach is a lynchpin activity linking data acquisition to the regional data sets. Objective 3.) offers the following "Tools and Services" to enable data acquisition and dissemination: 1) developing and maintaining Map Services (to support the NED Portal project); 2) developing and maintaining a Wildlife Data Collection Tool on the Internet; 3) organizing a regional GIS Repository for

Wildlife and Habitat Data (recognized as a need by the *Data Management Workshop*); and 4) providing GIS Support to State Agencies and Tribal Organizations.

Objective 4.) Develop, implement and support new Habitat Assessment protocols to evaluate mitigation and impact sites. Habitat Appraisal and Barter (HAB) is a current framework that exists in the Pacific Northwest to establish quantifiable values for the intrinsic worth of a piece of land to fish and wildlife. This methodology is currently being reviewed by the ISRP. The foundation of this approach involves a triad assessment of habitat, species, and functions (which has been developed by NHI), and uses the relationships between this triad to calculate a HAB value. Initial testing of this methodology in the Willamette Valley, Oregon was done in concert with the Columbia Basin Fish and Wildlife Authority and Oregon Department of Fish and Wildlife. BPA and others have suggested that the approach could be moved to the entire Columbia River Basin as a tool to help assist in mitigation acquisitions. Existing funding already occurs to support part of this endeavor, so the need is to re-appropriate these funds.

Objective 5.) Develop methodologies to assess operational losses due to hydropower development. During the 2-day workshop, the need to develop an approach for evaluating operational losses was identified. Currently, BPA project (#200201100) is beginning to examine how these impacts would be assessed and evaluated. NHI's is being asked to become involved with this project and work to develop methodology using the HAB approach that could be used basin wide. So, if there is a decision or program amendment to move forward and assess operational losses, a methodology will already be in place.

Table 2. Budget by project objective and tasks (5 pages total).

Objectives &Tasks	Objective Supports:			Objective Addresses:					Costs:		
	Subbasin Planning	NED	PNAMP Actions	Regional Data Center	Core Data Source	Data Standards	Gap Data	At Risk Data	Current Budget	Requested Addition	Total Requested Budget and Comments
Obj.1) Operating and Maintaining the Regional Habitat and Biodiversity Information System	**X**			**X**	**X**	**X**	**X**		**$157,831**	**$72,850**	**$230,681** **2007-2009 Proposal Work Elements – ISRP Review**
Task 1.1) Incorporate existing IBIS data into an improved database management system (DBMS) that is also geospatial with interactive Internet application									$68,973		
Task 1.2) Maintain existing subbasin information, and include other pertainent spatial and non-spatial data, and incorporate these into interactive									$32,784	$28,500	

Internet applications; coordinate with states (especially on their conservation strategies), federal, tribal organizations to acquire these data. Example - forest structural conditions throughout the ecoprovinces to allow for a more detailed look at the interactions between habitats, structural conditions and the relationships to fish and wildlife species at the ecoprovince level									
Task 1.3) Operate and maintain IBIS including Internet access, user technical support, web and application programmer, and systematic server and DBMS backups; evaluate IBIS use								$56,074	$44,350

										$129,500 2007-2009 Proposal Work Elements – ISRP Reviewed; Lesson Learned from Subbasin Planning; High Level Indicators PNAMP
Obj. 2) Update and Refine Habitat Information for Several Pilot Sub-basins Using a System Multi-Level Approach	X		X	X	X	X	X		$0	$129,500	
Task 2.1) Map Level 1 - Map areas of focus - specifically all habitats within Floodplains and adjacent upland habitats that occur within 1/2 to 3 miles of the Floodplain boundary									$0	$57,500	
Task 2.2) Map Level 2 - Map projects collecting habitat variables like water temperature, habitat enhancements, etc.; (this assumes Task 3.2 is being developed)									$0	$12,000	

Task									Cost	Amount	Notes
Task 2.3) Map Level 3 - Map surrogates for habitat variables like sediment - mining locations, recent logging or Large woody debris - riparian areas with medium and large trees; etc.									$0	$35,000	
Task 2.4) Map Level 4 - Map focal habitats and focal species									$0	$25,000	
Obj. 3) Wildlife Habitat and GIS Tools and Services	X	X	X	X		X	X	X	$0	$152,000	**$152,000** **NED Work Plan/ Data Management Workshop**
Task 3.1) Create Map Services for NED Portal									$0	$3,500	**NED Work Plan**
Task 3.2) Develop Wildlife Habitat Data Collection Tool to assist with developing the Status of the Resource Report that will spatially locate projects with identified high interest habitat variables like water temperature, sedimentation,									$0	$78,500	**NED Work Plan**

riparian restoration areas, etc. (also see Task 2.2 for collecting the informatiion)											
Task 3.3) GIS Repository for Wildlife and Habitat Data									$0	$70,000	**Data Management Workshop Recommendation**
Obj. 4) Implement and update Habitat Assessment protocols	**X**			**X**	**X**				$0	$112,000	**$112,000** **Current Need – ODFW & CBFWA**
Task 4.1) Identify Sites to Inventory in coordination with BPA, CBFWA, and ODFW									**$1,000**		
Task 4.2) Conduct Office Portion of HAB Appraisals									**$30,900**		
Task 4.3) Conduct Field Portion of HAB Appraisals									**$72,100**		
Task 4.4) Write Habitat Appraisal reports									**$8,000**		
Obj. 5) Develop methodologies to assess operational losses due to	**X**				**X**					$40,000	**$40,000** **Data Management Workshop**

hydropower development.												
Task 5.1) Coordinate and evaluate currently funded BPA project #200201100											$3,500	**Data Management Workshop Recommendation**
Task 5.2) Conduct necessary mapping and link IBIS data sets											$28,000	
Task 5.3) Run assessment and evaluate output											$4,000	
Task 5.4) Write Evaluation/ Protocol report											$4,500	

Color Codes:	Yellow	Tasks that build upon current projects
	Blue	Tasks that are new
	Green	Tasks funding need to be re-allocated
	Magenta	Funding Not Requested at this time

Statement of Work

Objectives and associated Tasks and Sub-Tasks needed to meet the needs that have been discussed or voiced as a concern include:

Objective 1. Operating and Maintaining the Regional Habitat and Biodiversity Information System (IBIS)

Method(s): In 2008-2009 the specific tasks for this objective are:

1.1 - Incorporate all existing IBIS data into an improved database management system (DBMS) and interactive Internet application;

1.2 - Maintain existing subbasin information, and include other pertinent spatial and non-spatial data, and incorporate these into interactive Internet applications; coordinate with states (especially on their conservation strategies), federal, tribal organizations to acquire these data. Example - forest structural conditions throughout the ecoprovinces to allow for a more detailed look at the interactions between habitats, structural conditions and the relationships to fish and wildlife species at the ecoprovince level;

1.3 - Operate and maintain IBIS including Internet access, user technical support, web and application programmer, and systematic server and DBMS backups; evaluate IBIS use;

Task 1.1 Incorporate existing IBIS data into an improved database management system (DBMS) and interactive Internet application

1.1.1 – [WE 160] Restructure existing wildlife-habitat information designing new relationships and improved integration with spatial data sets. Convert the current IBIS data sets to a more robust relational database management system (DBMS), Microsoft SQL Server 2005, in preparation for more dynamic query capabilities and integration with other organizations' data sets. Restructuring the database and updating the DBMS software will allow for more complex queries of the IBIS data, fix the concurrent user problem on the Internet site, allow updates to the database to be immediately reflected on the IBIS Internet site, facilitate integration with GIS data layers, and prepare the IBIS data for easier expansion and integration with other organizations' data sets.

1.1.2. - [WE 160] Define formats and create fish and wildlife species range maps for subbasin's focal species. ISRP's Retrospective Report (p.63) calls for knowing the distribution of species so that species of interest within a watershed are related to any proposed actions for them.

1.1.3 – [WE 160] Optimize Internet and web site interfaces and develop the necessary programming and scripts to query the data sets.

1.1.4 – [WE 162] Evaluate integrity of interfaces and programming through iterative testing. NHI staff and its project partners will perform a series of tests checking the utility of the programming and scripts to interface with and display IBIS data using a variety of browsers, including Microsoft Explorer, Firefox, and Netscape, and other common Internet applications*.*

1.1.5 – [WE 160 & 162] Revise DBMS as needed based on sub-tasks 1.1.2-1.1.4.

1.1.6 – [WE 160&162] Establish interfaces and interactive modes. Institute the findings and changes identified in sub-task 1.1.3 and sub-task 1.1.4 above. This also includes establishing and updating keywords with search engines and prominent portals.

1.1.7 – [WE 160] Create and update metadata. Create the necessary metadata following the Federal Geographic Data Committee (FGDC) standard. This applies to all databases and spatial data.

Task 1.2 - Maintain existing subbasin information, and include other pertinent spatial and non-spatial data, and incorporate these into interactive Internet applications; coordinate with states (especially on their conservation strategies), federal, tribal organizations to acquire these data. Example - forest structural conditions throughout the ecoprovinces to allow for a more detailed look at the interactions between habitats, structural conditions and the relationships to fish and wildlife species at the ecoprovince level

Sub-tasks 1.2.1 – 1.2.7 correspond to Task 1.1, sub-tasks 1.1.1-1.1.7, but focus on incorporating additional habitat data with IBIS's existing wildlife-habitat information.

1.2.8 – Establish working collaboration with the states of Oregon, Washington, Idaho, and Montana, Columbia River Inter-Tribal Fish Commission, and federal agencies

Task 1.4 - Operate and maintain IBIS including Internet access, user technical support, web and application programmer, and systematic server and DBMS backups; evaluate IBIS use

1.4.1 – [WE 160&161] Maintain Internet access to disseminate IBIS information

NHI will host and maintain the IBIS DBMS and web server. NHI currently maintains Small Business Server 2003 Server with Apache Webserver installed which hosts the NHI (http://www.nwhi.org) and IBIS prototype (http://www.nwhi.org/index/ibis) web sites behind hardware and software firewalls via a DSL connection to the Internet. SQL

Server 2005 DBMS software has been installed on this server in anticipation of restructuring the IBIS DBMS. Additional web and application servers will be added if and as necessary in the future. Also, NHI will increase its DSL service speed or connect directly to a T1 or faster line in the future as necessary. NHI has a good working relationship with its Internet Service Provider (ISP), and its ISP typically responds to problems immediately.

1.4.2 – [WE 160] Provide Technical Support to users

1.4.3 – [WE 160] Provide for system and information backups and redundancies

1.4.4 – [WE 162] Evaluate use of queries, tools, pages, and formats

1.4.5 – [WE 160] Determine efficiencies of relationships to data versus delivery time to user (includes evaluating other computer programs and delivery software)

1.4.6 – [WE 141&132] Write reports documenting progress, use and findings

Objective 2. - Update and Refine Wildlife Basin, Ecoprovince, and Subbasin Habitat Maps

For these Work Elements there are no metrics needed beyond the deliverables/reports specified by contract.

Method(s): In 2007-2009 the specific tasks for this objective are developed taking a tiered or hierarchical approach to wildlife habitat mapping. Each of the following levels of mapping would be conducted in select "pilot" subbasins. Level 1 is coarse approach to updating floodplain areas within the Columbia River Basin for wildlife habitat types. Included in Level 1 are floodplains plus adjacent upland habitat. Level 2 is a more refined mapping of projects that are collecting habitat variables and enhancements (e.g. water temperature, sedimentation, LWD, etc.). Level 3 includes mapping of surrogates to habitat variables (e.g. agricultural land use as a surrogate to nutrient inputs and also sedimentation). Level 4 mapping includes focal habitats and species. Thus the four tasks are:

> 2.1 - Map Level 1 - Map areas of focus - specifically all habitats within Floodplains and adjacent upland habitats that occur within 1/2 to 3 miles of the Floodplain boundary;

2.2 - Map Level 2 - Map projects collecting habitat variables like water temperature, habitat enhancements, etc.; (this assumes Task 3.2 is being developed);

2.3 - Map Level 3 - Map surrogates for habitat variables like sediment - mining locations, recent logging or Large woody debris - riparian areas with medium and large trees; etc.; and

2.4 - Map Level 4 - Map focal habitats and focal species.

Task 2.1 - Map Level 1 - Map areas of focus - specifically all habitats within Floodplains and adjacent upland habitats that occur within 1/2 to 3 miles of the Floodplain boundary

2.1.1 – [WE 157] *Identify the floodplain plus adjacent upland habitats area in the pilot subbasin.* Using DEM, channel data, NRCS soils data, NWI, and FEMA flood plain data, floodplain areas will be identified.

2.1.2 - [WE 157] *Map current habitat types using existing fish and wildlife habitat mapping protocols.*

2.1.3 - [WE 162] *Crosswalk the GNN data along with other ancillary data sets to the Johnson and O'Neil wildlife habitat types to help refine habitat type mapping.* One benefit of the GNN method is that classifications of pixels are not grouped into predetermined categories. Instead, the method models the occurrence of vegetation and structural conditions for each individual pixel in the map. In effect, each pixel in the map has a complete stand-level set of attributes associated with it. This will greatly enhance the ability to cross walk to the established NHI wildlife habitat types. There are a few identified shortcomings to the GNN method, specifically that the classification of pixels is based on existing plot data. This works well for areas where plot data is available such as forested lands (i.e., CVS and FIA plots) However, it is less reliable in areas where plot data does not exist such as the non-forested lands in the high desert regions of the Pacific Northwest. For these areas, other datasets such as those created by the SAGEMAP project, will be explored for their utility in classifying wildlife habitat types more accurately.

2.1.4 [WE 162] *Generate accuracy assessment reports for this map product.* The dataset produced using the GNN method will already have had an accuracy assessment performed on it. NHI will collate and generate a report of the crosswalking effort in conjunction with any accuracy assessment information of other datasets used in the classification.

Task 2.2 - Map Level 2 - Map projects collecting habitat variables like water temperature, habitat enhancements, etc.; (this assumes Task 3.2 is being developed)

2.2.1 [WE 157] *Identify and map projects within the pilot subbasin that are collecting specific habitat variables and enhancements.* Examples of habitat variables include: water temperature, sedimentation, LWD, Fence Installment/removal, vegetation plantings, invasive species control, Instream flow and nutrient inputs.

2.2.2 [WE 162] *Generate accuracy assessment reports for this map product.*

Task 2.3 - Map Level 3 - Map surrogates for habitat variables like sediment - mining locations, recent logging or Large woody debris - riparian areas with medium and large trees; etc.

2.3.1 [WE 157] *Identify and map surrogate for specific habitat variables within the pilot subbasin.* Examples of surrogates include: land susceptible to landslides or recent logged areas (surrogates for sedimentation), riparian areas with medium or large trees (surrogate for LWD), agricultural land use and salmon carcass/spawning areas (surrogate for nutrient inputs).

2.3.2 [WE 162] *Generate accuracy assessment reports for this map product.*

Task 2.4 - Map Level 4 - Map focal habitats and focal species.

2.4.1 - [WE 157] *Collect the necessary datasets to facilitate mapping of high priority habitats in high priority areas.* Once the mapping efforts in tasks one and two are completed, there still exists a need for fine-scale mapping of high priority wildlife habitats such as riparian and wetland habitat types. These habitat types are traditionally hard to map and are often not delineated very accurately on regional scale maps. To help improve this situation, NHI will utilize both the coarse and mid-level map products from tasks 2.1-2.3 as a base for the Level 4 mapping. The high priority areas will be driven by field crews and habitats manually identified with the help of high resolution imagery and other ancillary datasets.

2.4.2 - [WE 162] *Determine which areas and habitats are considered high priority and refine the maps.* NHI will work with CBFWA to identify those site specific areas and habitats that are considered high priority. Delineations will be refined to match features visible in the imagery.

 2.4.3 [WE 162] Generate accuracy assessment reports for this map product.

Objective 3. - Wildlife Habitat and GIS Tools and Services

Method(s): In 2007-2009 the specific tasks for this objective were developed based on the Role of Databases in RM&E. Principle problem statements (as defined in the ISRP 2005 Retrospective Report) address the failure to provide RM&E data to databases. In principle, all data obtained through public funds should be available to the public and recorded in the region's databases. ISRP recommends that all projects be made available via the program's database projects. Because IBIS is identified by the NPCC, CBFWA, and BPA as a regional database, NHI suggests one way to approach these concerns is to have RM&E projects periodically make uploads to the regional databases such as IBIS; another way is via the development of accessible informational tools and services coupled with regional databases that allow information to be located, recorded, and visualized as part of the RM&E process. This type of an approach is a lynchpin activity linking data acquisition to the regional data sets. Objective 3 offers the following "Tools and Services" to enable data acquisition and dissemination: 1) developing and maintaining Map Services (to support the NED Portal project); 2) developing and maintaining a Wildlife Data Collection Tool on the Internet; and 3) organizing a regional GIS Repository for Wildlife and Habitat Data (recognized as a need by the *Data Management Workshop*).

The following tasks are associated with this objective:

  3.1 - Create map services for NED Portal;

  3.2 – Develop Wildlife Habitat Data Collection Tool;

  3.3 – GIS Repository for Wildlife and Habitat Data; and

Task 3.1 - Create map services for NED Portal
NHI proposes to create and maintain OGC standard Web Mapping Services (WMS) for the data and associated metadata of geographic information stored and disseminated via our GIS data store. Creating and maintaining these map services will also support the NED portal and its deployment.

[WE 161 Disseminate Raw/Summary Data and Results]. OGC compliant WMS connector technology using ArcIMS will be used to distribute metadata and maps via the internet. This will support the efforts by the NED group to develop a data portal. The WMS connector will allow for URL's to be distributed to the portal to facilitate access to the appropriate metadata and map information. This format enables NHI to locally manage and maintain its data while providing users with search capabilities via portals and the internet.

Task 3.2 – Develop Wildlife Habitat Data Collection Tool

A data collection and reporting tool prototype called the Environmental Location & Visualization Information System (ELVIS) is being proposed. The purpose of this tool is to assist with developing the Status of the Resource Report that will spatially locate projects with identified high interest habitat variables like water temperature, sedimentation, and riparian areas (see also Task 2.2). The tool will also address Data Collection Standards by enabling spatial and temporal data to be collected and reported using a standard scheme, against a backdrop of existing up-to-date spatially-referenced datasets. This tool will be built in phases (based on geographic scope), with this prototype acting as phase 1 and implemented in a select subbasin (phase 2 will expand geographic scope). The prototype will allow multiple spatial data sets (i.e. GIS data) to be displayed at various scales, and allow users to 1) record wildlife location(s) and sighting(s) information; and 2) record spatial and temporal project information (highlighted as a need by BPA). ELVIS would act to resolve deficiencies in data standards by incorporating built-in standards, following the "Best Practices for Reporting Location and Time-Related Data" (NED White Paper, May 2006).

This tool specifically addresses the NED Work Plan task #2.4 which states "Develop and maintain tools that can support scientific and resource decision makers".

3.2.1 - Develop, Collaborate and Retrieve Wildlife Data [WE 159-Submit/Acquire Data]
    -Coordinate with partners to design modules in ELVIS with integrated data-standards (proposed initial modules for prototype: observational data location module; restoration project location module)
    -Coordinate with partners to develop list of spatial data to incorporate into ELVIS for each module (these would be the data-backdrop onto which observational data locations would be recorded)
    -Obtain data from Oregon (if not already housed at NHI)
    -Obtain data from Washington (if not already housed at NHI)

3.2.2 - Create, manage, and maintain data-collection tool [WE 160-Create/Manage/Maintain Database; WE 161- Disseminate Raw/Summary Data and Results]
    -System Administration
    -Development of applications and interfaces (including hardware/software) required for functional tool
    -Manage data content

Task 3.3 - GIS Repository for Wildlife and Habitat Data
The Northwest Habitat Institute has been building access to another informational tool: regional wildlife and habitat GIS data. The effort to collect and serve these GIS data by NHI began with the final submittal of Subbasin Plans whereby it was decided by the NWPCC and NED that GIS used in the subbasin plans needed to be retrieved and linked with their appropriate subbasins. Building upon this momentum and the fact that a regional wildlife and habitat GIS data repository is desired (based on feedback from participants of the Data Workshop, September 2006), NHI is poised to serve this need.

A regional wildlife and habitat GIS data repository would help support the chain-of-custody of these data as well as making them available to future efforts (e.g. future subbasin plans).

GIS data that will be compiled will follow NED's Best Practices for Incorporating Spatial and Temporal Data for Tracking Environmental Project and Sampling Efforts into Non-Spatial Databases (Paulus and Toshach 2005), and FGDC metadata standards (1998).

3.3.1 - Obtain wildlife and habitat GIS data for repository [WE 159-Submit/Acquire Data]
        -develop check-in process
        -identify list of agencies/tribes/orgs to contact
        -contact agencies/tribes/orgs to request data
        -uploading platform design
        -coordination staff

3.3.2 - Develop and employ data certification process for newly obtained GIS data
[WE 159-Submit/Acquire Data; WE 160-Create/Manage/Maintain Database; WE 161-Disseminate Raw/Summary Data and Results]
        -development/application of data exchange protocols/data certification design
        -metadata check
        -Data dictionary compatibility: continuation and refinement of the Pacific Northwest Habitat Classification Systems database for the purpose of cross-walking between data definitions. This task is fulfilled under the NED Work Plan task 4.4.1, which states: "Facilitate compilation of consistent data definitions for aquatic, riparian and upland species".
        -QA/QC
        -Metadata check
        -Certification/data operations staff

3.3.3 - Develop "data store" application for GIS data [WE 160-Create/Manage/Maintain Database; WE 161-Disseminate Raw/Summary Data and Results]
        -Data Store web design
        -Data posting on Data Store
        -Data maintenance/version control?
        -Web design staff

Objective 4. - Implement and update Habitat Assessment protocols

Method(s): In 2006, the Oregon Department of Fish and Wildlife began to develop an approach to assess habitats to mitigate for the loss statement that was conducted in 1985 for the Willamette Basin. The approach requires a crosswalk to the prior U.S. Fish and Wildlife Service's Habitat Evaluation Procedures (HEP) method that was used to determine the loss statement. To meet this need, NHI is working with the Regional HEP team to develop an approach that would allow HEP habitat units (HUs) to be determined. This approach is referred to as CHAP – Combine Habitat Assessment Procedure, which uses that Habitat Appraisal and Barter (HAB) method that is crosswalked back to HEP's HUs. In 2008-09 the following tasks are associated with this objective:

> 4.1 - Identify Sites to Inventory in coordination with BPA, CBFWA, and ODFW

> 4.2 – Conduct Office Portion of HAB Appraisals

> 4.3 – Conduct Field Portion of HAB Appraisals

> 4.4 - Write Habitat Appraisal reports

Task 4.1 – Identify Sites to Inventory in coordination with BPA, CBFWA, and ODFW

4.1.1. Hold a coordination meeting(s) with BPA, CBFWA, and ODFW to develop criteria or guidelines to help identify sites to inventory [WE 189 Regional Coordination]

Task 4.2 – Conduct Office Portion of HAB Appraisals

4.2.1. Obtain high resolution geo-referenced aerial photo imagery for site [WE 159- Submit/Acquire Data]
.
4.2.2. Delineate habitat types within site using visual differences in land formations, vegetation, and structural conditions using GIS [WE 160-Create/Manage/Maintain Database].

4.2.3 Produce preliminary map of the site with initial habitat types delineated as polygons [WE 160-Create/Manage/Maintain Database]

Task 4.3 – Conduct Field Portion of HAB Appraisals

4.3.1. Visit the assessment site to check and refine habitat-type polygons and assess any structural conditions that were difficult to determine using aerial imagery [WE 159- Submit/Acquire Data].

4.3.2. Within each polygon record invasive plant abundance and other environmental stressors [WE 159-Submit/Acquire Data].

4.3.3. Record Key Environmental Correlates (KECs) or fine featured habitat elements that occur within each polygon and if needed detailed vegetation structure using stratified random transects [WE 159-Submit/Acquire Data].

4.3.4. Produce a refined map with actual habitat-types and structural conditions delineated as polygons; completed datasheets for each polygon including: invasive species presence, KECs, and detailed structural condition of habitat vegetation [WE 160-Create/Manage/Maintain Database].

4.3.5. Produce a potential species list based on range maps, habitat types, structural conditions, KECs, and life history characteristics (i.e. elevation range); circulate list for comments [WE 160-Create/Manage/Maintain Database & WE-161 Disseminate Raw/Summary Data & Results].

4.3.6. Produce Key Ecological Functions (KEFs) based on potential species list for the site [WE 160-Create/Manage/Maintain Database]

4.3.7 Create habitat value score using species-habitat-functions for each polygon; apply discounting for invasive, adjacency and other stressors [WE 160-Create/Manage/Maintain Database].

Task 4.4 - Write Habitat Appraisal reports

4.4.1. Generate site specific reports that are ecologically based and can be used for habitat impact and mitigation and habitat change [WE 161. Disseminate Raw/Summary Data & Results].

Objective 5. – Develop methodologies to assess operational losses

Method(s): During the 2-day workshop, the need to develop an approach for evaluating operational losses was identified. Currently, BPA project (#200201100) is beginning to examine how these impacts would be assessed and evaluated. NHI's is being asked to become involved with this project and work to develop methodology using the HAB approach that could be used basin wide. So, if there is a decision or program amendment to move forward and assess operational losses, a methodology will already be in place.

The following tasks are associated with this objective:

5.1 – Coordinate and evaluate currently funded BPA project #200201100

5.2 – Conduct necessary mapping and link IBIS data sets

5.3 – Run assessment and evaluate output

5.4 – Write Evaluation/Protocol report

Task 5.1. Coordinate and evaluate currently funded BPA project #200201100

5.1.1. Meet with project sponsors to gain an understanding of BPA project #200201100 (Kootenai Floodplain Operational Loss Assessment) [WE 189 Regional Coordination].

5.1.2 Examine proposed methodology from BPA project #200201100 (Kootenai Floodplain Operational Loss Assessment) to evaluate potential impacts by hydropower development [WE 159-Submit/Acquire Data].

5.1.3. Incorporate NHI's Habitat Appraisal and Barter (HAB) methodologies into BPA project #200201100[WE 160-Create/Manage/Maintain Database].

5.2 – Conduct necessary mapping and link IBIS data sets

5.2.1. Map all habitat types, structural conditions, and key environmental correlates within proposed sites of interest [WE 160-Create/Manage/Maintain Database].

5.2.2. Link proposed sites with current IBIS data sets to evaluate existing wildlife-habitat information [WE 160-Create/Manage/Maintain Database] .

Task 5.3 – Run assessment and evaluate output

5.3.1. Conduct HAB multi-step assessment of mapped habitat types within sites under investigation. HAB assessment allows the documentation of current and baseline habitat conditions along with the ability to apply and intrinsic value to individual habitat types [WE 160-Create/Manage/Maintain Database].

5.3.2. Utilize output from HAB assessment to evaluate current habitat conditions, compare management strategies/actions to assess future conditions, and develop dataset in order to cross-walk past habitat assessment methods and results [WE 160-Create/Manage/Maintain Database].

5.4 - Write Evaluation/Protocol report

5.4.1 Synthesis HAB output to create a project evaluation report based on current habitat conditions [WE 161. Disseminate Raw/Summary Data & Results].

5.4.2. Create protocols with the evaluation report to perform several HAB assessments over time to detect any temporal changes from proposed operations [WE 161. Disseminate Raw/Summary Data & Results].

Appendix A: Data Management Workshop Comments

Habitat/Wildlife Issues and Recommendations for Northwest Habitat Institute

Since few of the workshop participants were familiar with NHI's services, NHI discussions did not reach the same level of detail as those for StreamNet. The following were the major areas of discussion (note that recommendations were not developed for all areas):

a. Customer Priorities for NHI: Participants identified habitat characterization to support the sub-basin-planning process as a priority area for NHI**.**

> Recommendation: NHI focus should be on providing Habitat characterization to support the sub-basin-planning process.

b. Challenges in determining habitat changes. Only limited habitat characterizations were conducted in the first round of sub-basin plans. In many cases there will have been major changes/ improvements in both the basis data and the methodologies in use for the habitat characterizations. This will complicate estimation of habitat changes since the last sub-basin plan. Participants are interested in the NHI's approach to dealing with these challenges (see following issue).

c. There is strong interest by participants in being aware of, and understanding the basis for NHI's habitat designations, especially how and where those designations have been calibrated and refined using actual population occurrence information. Participants discussed that, unlike most StreamNet data, NHI's habitat information consists of estimates and projections derived from underlying data (from many sources) using a peer-reviewed process. Participants were especially interested in better understanding the precision of those estimates and how and where the estimates are being calibrated or refined using actual population occurrence data, and how such calibrations could be better supported through better management/linkage of that population data (see following issue).

d. From the Regional Data Management perspective, who should be the keeper of wildlife (fur & feathers) and non-fish aquatic population abundance and occurrence data? StreamNet has traditionally been the regional repository/keeper of fish data. Many actors, including workshop agencies and NHI (e.g. in the course of its habitat characterization projects) collect wildlife and no-fish aquatic population data, but there is currently no obvious regional repository/keeper for this information. NHI is poised to serve this need.

e. Some State and Tribal wildlife managers are not aware of NHI or other regional data projects---if they are to be engaged, these projects must be made more relevant to those managers' work. Related topics discussed were:
- Possible support by NHI on application of HEP (Habitat Evaluation Procedures)

- Better linkage/support for the "Habitat Loss Ledger"
- Better incorporation of wildlife data into regional planning efforts (see comment above)
- Coordination of NHI activities with State "Wildlife Action Plans"

NHI staff indicated that they have included "data coordination and outreach" activities in their current council proposal, which might address some of these issues. In addition, NHI solicited priority habitat information interest from their State counterparts. These were not discussed at the workshop, but the states of Oregon and Washington voiced the need for Internet tools to capture information.

Appendix B: Reviews and Recommendations

NPCC Final Funding Recommendations (October 23, 2006) [Full NPCC Council Recs]

FY 2007 NPCC Rec $157,831	FY 2008 NPCC Rec $157,831	FY 2009 NPCC Rec $157,831	Total NPCC Rec $473,493
Budget Type:	Expense		
Budget Category:	Basinwide		
Recommendation:	Fund		

NPCC Comments: Interim funding pending Council review of data priorities. The Council will need to decide on the appropriate interim funding level pending further action on recommendations from the data management workshop.

NPCC Draft Funding Recommendations (September 15, 2006) [Full NPCC Council Recs]

FY 2007 NPCC Rec $157,831	FY 2008 NPCC Rec $157,831	FY 2009 NPCC Rec $157,831	Total NPCC Rec $473,493
FY 2007 MSRT Rec $440,000	FY 2008 MSRT Rec $440,000	FY 2009 MSRT Rec $440,000	Total MSRT Rec $1,320,000
Budget Category:	Basinwide		

NPCC Comments: Interim funding pending Council review of data priorities. Committee decided to hold to "current" level. The budget number represents the FY 2006 working budget for the NHI contract. The current project proposal may contain data management elements funded through other contracts in the past. If so, a staff estimate of holding all of these tasks to a "current" level is $185k per year. The Council will need to decide on the appropriate interim funding level pending the workshop where all tasks and budgets will be determined.

Local or MSRT Comments: IBIS should be closely coordinated with StreamNet. This project should be coordinated with the Data Management Placeholder, in case additional funding is required. Any discussions of a regional data center should also occur in the context of the data management proposals. CBFWA should host a workshop to develop priorities for the data management projects. (see comments in final MSRT report) . This project was funded out of the datamanagement placeholder in FY 2006.

Independent Scientific Review Panel Final Review (August 31, 2006) [Download full document]

Recommendation: Fundable

Comments: This is a detailed and thorough proposal for a big project. Among the database proposals, this is among the best justified. It includes an excellent recounting of the history of this effort, but little is said about how results have guided work in the Columbia River Basin, or how they solicit and utilize regular feedback on their products. Are all the users happy with the way

habitats are quantified and displayed? As an example consider the following comment from the ISRP's review of the Flathead and Kootenai Subbasin Plans: "Planners used a biome approach informed by IBIS to assess wildlife. Specifically, they developed the Terrestrial Biome Assessment (TBA) tool to get to a finer level of analysis than that provided by IBIS, which is limited to qualitative measurements. The Terrestrial Biome Assessment includes both quantitative and qualitative data fields." www.nwcouncil.org/library/isrp/isrp2004-7.pdf. IBIS has likely progressed and can get to finer scales.

The rationale and significance to subbasin plans and regional programs is clearly and exhaustively described. Data developed by this proposal relate to the Fish and Wildlife Program, BiOp, and the ISRP retrospective report. This project provides data to, or works directly with, a wide range of projects. The proposal provides a good description of connections to many projects, BPA funded and otherwise.

The objectives and work elements are clearly described. The sponsors propose new decision support tools using data from the RME process: ELVIS (to provide guidance on wetland vegetation planning and monitoring protocols). Project effectiveness monitoring is proposed, as are quality control checks and data refinements.

Information transfer includes a website to disseminate habitat and biodiversity information and performance tools to support decision making, presentations at meetings, professional material development, peer reviewed publications, and an education outreach effort in a habitat assessment course offered at PSU.