2nd DRAFT

NPPC and NOAA Fisheries Columbia Basin Cooperative Information System (CBCIS) Project – Findings and Recommendations from the Science Applications International Corporation study.

Background

The history of information system development in the Columbia basin is, for the most part, ad-hoc. Typically, as different agencies, institutions or projects needed to manage information they mostly went about it independently, creating for example, their own databases, collection methods and reports[1]. While there were some efforts at consolidation or standardization they have not succeeded across the basin as a whole. These individual information systems are called disparate systems because they often don't share the same operating system or language, don't collect data of uniform quality or description and usually cannot "talk" directly to each other.

Over the last 15 years the Internet, geographical information systems, geographical positioning systems and advances in database technology have created ways to knit information from these disparate databases into common systems. With effort, organization and the adoption of information system standards and protocols it is now possible to create information systems that can "connect the dots".

The potential of these connected systems to inform and improve regional decision making and outreach is very high for: subbasin planning, project planning, salmonid recovery, water allocation and power generation and many other purposes. Many organizations and corporations have already recognized the benefits from adopting a "corporate" approach to information management. While the task is more difficult for a region, the long term benefits of improved decision-making and program accountability are expected to be substantial.

There is however, an important note of caution. Our institutional and organizational arrangements for using these technologies have not kept pace with the technology advances. To take full regional advantage of the technologies we also need organizational development, for example to develop agreements for system standards/protocols agreements, data sharing and a regional information system plan (or architecture).

Memorandum of Agreement (NPPC and NMFS - now NOAA Fisheries)

In April 2002 the NPPC and the NMFS signed a *Memorandum of Agreement for Cooperative Information System Development for the Columbia Basin*

The NPPC and the NMFS agreed to a cooperative approach, to plan and develop an information system…believing that the region is best served by a unified approach to meeting all data and information needs. The overall goal is to materially and demonstrably improve the quality, quantity and availability of data and related information in the Columbia Basin…."

[1] Columbia Basin agencies and institutions respond to many different responsibilities and mandates.

Contract with Science Applications International Corporation (SAIC)

To support the MOA, the Council, with input from the NMFS, engaged Science Applications International Corporation (SAIC) a consultant group with expertise in regional information system development to: survey the information requirements of all relevant stakeholders in the region and identify their existing information system capabilities. SAIC was also tasked to recommend the steps that would be necessary to produce a cooperative information management system for the region.

A Project Team (PT) to represent stakeholder types was established with membership as follows: NPPC (Cochair), NMFS (Cochair), PSMFC, EPA Region 10, CBFWA, BPA, USFWS, USFS-REO, CRITFC, WDFW and Colville Tribe.

SAIC worked with the PT to develop and complete detailed surveys and on-site focus group meetings across the basin. A short survey was mounted on the web and mailed to the NPPC mailing list. A long survey was also available. Following analysis and development of preliminary recommendations SAIC convened a joint meeting of the PT and available members of the Coordinating Committee (CC).

The Coordinating Committee[2], established to provide a reality check on the PT, comprised representatives from BPA, NMFS (region), regional timber, USFWS, Canadian DFO, Montana DFWP, NPPC, Washington DFW, Lower Columbia Regional Estuary Program, Washington Department of Ecology, Oregon Department of Environmental Quality, Bureau of Land Management, Columbia-Snake River Irrigators Association, Columbia Basin Trust, US BLM, DART, OWEB, Tribal Caucus CBFWA, Utility Consultant, Oregon Natural Heritage Program, Columbia Basin Trust, US BUREC, USACE, Idaho Office of Species Conservation, Oregon Governor's Natural Resources Office, PSMFC, USGS, USFS-NRIS, Defenders of Wildlife, Northwest Habitat Institute, and Save Our Wild Salmon.

The PT and SAIC also identified an extensive list of stakeholders. Invitations to participate and to complete surveys were extended to each stakeholder. Further outreach to the CC members and to other stakeholders needs to be a part of this ongoing effort.

Summary of SAIC Findings and Recommendations

SAIC identified many related information system problems, including:

[2] While all were contacted during the SAIC study, and we have no negative feedback concerning improved information systems in the Columbia, we do not have responses from all stakeholders. It is important, therefore, to continue outreach.

- There is no comprehensive, systematic, planned information system in the Columbia River Basin
- There are no common protocols for field collection of data
- The collected data are of variable quality and sometimes unknown quality
- There is no single inventory of available data or the location, and the data are kept in many different locations in different database systems
- Data analysis needed to create information is an inefficient and frustrating process
- When data can be located and extracted they often must be validated before they can be used
- Data consolidation is needed but the data quality issues and disparate systems compound this problem
- There are data gaps that are currently not being satisfied
- No single organization or authority has authority or responsibility for fixing this regional data management crisis

SAIC provided a substantial draft-final report that documented the problems, identified priority needs and a detailed set of recommendations necessary for the development of CBCIS, see below: Table 1 CBCIS Recommendations.

SAIC also identified the relative importance of different types of data within the Columbia Basin. This is shown below: Table 2 CBCIS Summary Information Needs

Overall, SAIC interviewed some 120 people with knowledge of regional information systems. All supported the need for the development of CBCIS. At the Project Team meetings and at the joint meeting of the Project Team and the Coordinating Committee there was consensus on the need for CBCIS.

The SAIC report emphasized that the development of a Columbia Basin Cooperative Information System will require substantial consultation with the stakeholders in the Columbia basin, a multi-step and multi-year commitment, the formality of memoranda of agreements, the establishment of dedicated funding and the creation of an independent CBCIS administrative framework.

Recommendations to the Council from the NPPC and NOAA Fisheries

While the SAIC CBCIS report provides a detailed list of information system challenges and recommendations it is now necessary for the NPPC and NOAA Fisheries to explore the level of regional support, consider the feasibility of the recommendations, and develop alternatives.

Therefore the NPPC and NOAA Fisheries proposes, under the existing MOA, to seek support from the Council to adopt a phased approach to regional information system development:

1) Make the SAIC report available for public comment, collect and review comments.

2) Develop a summary PHASE I CBCIS work plan including: a new draft CBCIS MOA to accommodate the interests of other partners, a draft administrative framework, and draft cost-sharing proposal.

3) Consult with stakeholders in the Basin to evaluate the level of commitment for the draft CBCIS proposal: the willingness of stakeholders to support a Regional MOA and support cost share proposals.

4) Coordinate with other programs with regional information management needs such as: Research Monitoring and Development for the FCRPS, Subbasin Planning, the Federal Caucus Habitat Team, Intergovernmental Resource Information Coordinating Council, Oregon Watershed Enhancement Board, and Washington Comprehensive Monitoring Strategy, and others.

5) Re-convene and reform (as needed) the existing CBCIS Project Team and CBCIS Coordinating Committee to provide input and guidance to this process.

6) Report to NPCC and NOAA Fisheries on the outcome of this effort and options concerning the feasibility of proceeding with the development of CBCIS.

7) Staff this PHASE I effort through the existing NPPC and NOAA Fisheries MOA.

Table 1 CBCIS Recommendations

FOSTER INTEGRATION, COLLABORATION, AND COMMUNICATION
1. Formalize an accountable CBCIS administrative framework.
2. Expand CBCIS outreach efforts to seek buy-in from other key decision-makers and stakeholders in the Basin. Develop targeted outreach and education materials for key CBCIS participants and supporters that clearly outline the need for CBCIS and describe the benefits and costs for such an endeavor. Ensure this outreach approach addresses the need for long-term support for CBCIS to succeed.
3. Develop CBCIS conceptual design and demonstration package (interactive presentation).
4. Establish a high-level agreement (MOU or stronger document) endorsing CBCIS and pledging signatory support.
5. Develop a CBCIS working prototype.
6. Identify a CBCIS Coordinator and Project Manager.
7. Develop communication and coordination hub of CBCIS.
INTEGRATE INFORMATION MANAGEMENT WITH BASIN GOALS AND PERFORMANCE MEASURES
Basinwide Goals, Objectives, Measures:
8. Develop basinwide goals, objectives and measures (e.g., performance measures, indicators) that cut across and integrate individual agency missions and mandates.
9. Develop an overall basin management strategy.
10. Develop a process for evaluating proposed project relevance to goals as part of the grant and contract process.
Information Needs:
11. Complete the preliminary inventory of information resources in the Columbia River Basin.
12. Further evaluate CBCIS information needs against available information resources to develop acquisition strategy.
13. Write a long-term regional information system development plan.
Research and Monitoring:
14. Establish a Basinwide research and monitoring strategy.
15. Develop an online, interactive research and monitoring inventory.
DEVELOP BASINWIDE INFORMATION MANAGEMENT PROTOCOLS
16. Research and post inventory(ies) of existing standards and protocols in the Columbia River Basin.
17. Develop and implement CBCIS-specific metadata tools.
18. Develop and post on CBCIS standards for reporting geographic data: latitude and longitude; map coordinate datum; and map coordinate projection.
19. Develop Basinwide monitoring protocols and data standards addressing data collection, storage and analysis.

20. Develop and post on CBCIS Quality Assurance and Quality Control procedures and protocols.
21. Develop documentation standards for data processing and analysis.
22. Develop system security protocols.
23. Incorporate CBCIS requirements into future grants and contracts.
24. Develop and post common database designs for similar information types.
25. Develop and post a CBCIS guidance manual that documents everything needed to become a CBCIS participant.
COLLABORATE WITH THE FULL SPECTRUM OF INFORMATION USERS
26. Develop management and public information/communications work groups as part of the CBCIS administrative structure.
27. Expand CBCIS outreach and investigation to other segments of the CBCIS community not included in the original requirements analysis.
28. Conduct Basinwide public workshops to advertise and seek feedback on CBCIS recommendations.
29. Develop a CBCIS public outreach strategy.
ENSURE LONG-TERM SUPPORT AND COMMITMENTS
30. Develop a long-term resource plan (staff and dollars) for CBCIS.
31. Develop a funding and resource support workgroup.
32. Support CBCIS using financial arrangements and participation incentives.
33. Develop CBCIS as a base funding category, not to be recompeted on an annual basis.
34. Develop a strong operations and maintenance plan.
35. Conduct an annual Basinwide CBCIS workshop.
MOVE TOWARD A DISTRIBUTED SYSTEM ARCHITECTURE, USING AN ENTERPRISE APPROACH
36. Develop CBCIS using a distributed system architecture based on an enterprise approach.
37. Establish guidelines for becoming a CBCIS node.
38. Redirect resources to support development of CBCIS nodes at originating data sources.
39. Develop CBCIS technical assistance.
40. Develop CBCIS data repositories.
DESIGN AND DEVELOP INFORMATION SEARCHING (DATA INDEXING) TOOLS
41. Develop tools that will enable searching, accessing, acquiring, sharing, and contributing information resources about the Columbia River Basin resource management efforts.
42. Develop a means to compile historic metadata.
DESIGN AND DEVELOP DECISION-SUPPORT TOOLS LINKED TO BASIN GOALS, OBJECTIVES AND MEASURES
43. CBCIS should provide access to modeling information and basic analytical tools to perform user-defined queries, simple statistics, and trend analyses against databases available through CBCIS.
44. Develop WWW-enabled interactive mapping tool.
EVALUATION AND FEEDBACK

45. Conduct periodic evaluations of CBCIS implementation.
46. Conduct periodic evaluation of the relationship between goals and information management

Table 2 CBCIS Summary Information Needs

Environmental Data			**74**
Hydrological		**24**	
Flow	7		
Operation of river system (elevation, spill, outflow, etc.)	2		
Hydrologic data	2		
Real-time Canadian outflow/inflow	1		
Water management	1		
Water availability	1		
Hydro layer for streams/lakes	1		
Delineation of record size finer than HUC6	1		
Water quantity	1		
Historical/observed flood control rule curves for federal dams	1		
Physical stream data	1		
Mainstem hydro	1		
Stream channel morph and riparian	1		
Bathymetry	1		
Hydrography	1		
Hydrologic units	1		
Water Quality		**20**	
Water quality	9		
Stream temperature	2		
Pollution sources	1		
Sediment data	1		
Nutrients	1		
Light attenuation data	1		
Turbidity	1		
Parameters to meet state water quality standards	1		
CWA information	1		
Real-time data	1		
TDG temperature	1		
Habitat		**14**	
Habitat information	6		
Watershed conditions	2		
Ocean	2		
CR estuary information	1		
Tributary information	1		
Environmental conditions	1		
National/Local Wetland Inventory	1		
Energy		**6**	

Table 2 CBCIS Summary Information Needs

Point source facility locations and outfall information	1		
Dam locations	1		
Generation data	1		
Hydropower related information	1		
Renewable energy	1		
Energy transportation networks	1		
Meteorology		**4**	
Meteorological data	2		
National WS forecast outflow and elevation data	1		
Regional climatic trends	1		
Geological		**3**	
Geomorphologic information	1		
Soils	1		
Geology	1		
Transportation		**3**	
Road density/location (disturbance history, riparian reserves)	1		
Road data	1		
Transportation networks	1		
Fish			**71**
Abundance		**24**	
Fish abundance	5		
PITTAG, CWT, Radio tag information	4		
Fish populations	2		
Fish spawning success	1		
Natural spawners	1		
Life stage timing	1		
Juveniles out	1		
Smolt monitoring program	1		
Adult return	1		
Escapement	1		
Redd count	1		
Age composition	1		
Sex composition	1		
Natural fish production	1		
Fish demographics	1		
Fish distribution	1		
Hatcheries		**15**	
Hatchery fish releases	2		
Hatchery fractions	2		
Hatchery returns and composition	2		

Table 2 CBCIS Summary Information Needs

Disposition of hatchery fish	1		
Hatchery data (tagging)	1		
Brood stock collections	1		
Brood stock composition	1		
Hatchery information (general)	1		
Hatchery evaluation	1		
Fisheries research information	1		
Mark rates of hatchery fish	1		
Coop releases	1		
Passage		**12**	
Barriers	3		
Fish passage information	3		
Screens	2		
Gas bubble trauma	1		
Delayed mortality	1		
Fish transportation data	1		
Travel time analysis	1		
Fish: General		**11**	
Stock status by life stage	2		
Routine fish management questions and information	2		
Stock assessment	1		
Functional relationships between habitat and fish	1		
Spawner recruit	1		
Location heuristics	1		
Technical recommendations to salmon manager	1		
Fish sampling	1		
Biological information	1		
Harvest		**5**	
Harvest by different stocks	2		
Fish catch data	1		
Assig. of catch to stocks	1		
Harvest	1		
Survival		**4**	
Survival	3		
Carcass recovery	1		
Regulatory Data			**23**
Regulatory: General		**23**	
T&E species critical habitat locations	3		
NEPA compliance/permitting	1		
Action relationship to performance (interim performance, biological	1		

Table 2 CBCIS Summary Information Needs

performance)			
T&E species recovery standards and goals	1		
ESA status	1		
ESA issues	1		
Existing laws, mandates, and policies	1		
StreamNet	1		
Oregon Plan	1		
Subbasin planning	1		
Watershed assessments	1		
TMDL	1		
CWA	1		
Management plans	1		
Native fish conservation policy	1		
Government/legal requests	1		
NW Power Act	1		
Political boundaries	1		
Reporting requirements	1		
Permit information	1		
A-16 geospatial data regulations	1		
Land Classification			**21**
Land Use		**14**	
Land use	6		
Recreational information	2		
Cultural resources	2		
Spatial indicator of logging history (harvesting patterns)	1		
Land ownership	1		
Timber sales/treatments	1		
Land use plans	1		
Land Cover		**7**	
Impervious surface	1		
Structure information	1		
Cadastral information	1		
Information for fire risk reduction	1		
Base resource information	1		
Vegetation change detection and type	1		
Salable, leasable commodities	1		
Project Management Data			**21**
Project Performance		**5**	
Project accomplishment (what was delivered)	1		
Project compliance (at implementation and over time)	1		

Table 2 CBCIS Summary Information Needs

Cross compare and benchmark across investments, categories, biological outcomes	1		
Project effectiveness/usefulness	1		
BMP effectiveness	1		
Project Tracking		**4**	
Project deliverables	1		
Project finances/budget	1		
Pace of investment/accruals	1		
Project tracking	1		
Project: General		**4**	
Project cost	2		
Project relationship to similar kinds of projects	1		
Project relationship to BiOp performance	1		
Project Location		**3**	
Project geographical relationship to other projects in region	2		
Project location	1		
Project Scope		**3**	
Project - how extensive?	1		
Project approach	1		
Project operation information	1		
Project Description		**2**	
Project type	1		
Project information	1		
Other Flora and Fauna			**14**
Biodiversity		**12**	
Biology	1		
Species counts	1		
Key ecological functions/species	1		
Species life history	1		
Biological response performance	1		
Genetic	1		
Biological/inventories/ distributions	1		
Non-native organisms	1		
Biological information (about water bodies)	1		
Field level biological inventory	1		
Biological survey	1		
Invasive species information	1		
Threatened and Endangered Species		**2**	
T&E species distributions	2		
Information Management Data			**9**

Table 2 CBCIS Summary Information Needs

Mapping and GIS		**9**	
Maps	2		
Geographical coordinates	1		
National SDI	1		
Imagery	1		
High resolution terrain data	1		
High resolution DEMs	1		
Homeland security/National Map Project	1		
Remote sensing	1		
Socioeconomic			**3**
Socioeconomic: General		**3**	
Socioeconomic	2		
Demographic information	1		
Miscellaneous			**15**
Objectives, measurements performance standards	2		
Metadata	2		
Report/data inventory	2		
Common standards measurements protocols	1		
Document location and delivery	1		
Cataloguing and classification	1		
Indexed bibliographic information	1		
Research/gray literature results	1		
Routine, shared, etc. - communications and products	1		
Explanation of protocols	1		
Identify base funding sources for CBCIS	1		
Mapping tools	1		