RIVERSIDE

Flood DSS Memorandum

To: Carolyn Fritz - Colorado Water Conservation Board (CWCB)
From: Jay Day -Riverside
Subject: Flood DSS Kickoff Meeting Memo
Date: 5/29/2009

Introduction

The purpose of this memo is to summarize the issues discussed at the Flood DSS Kickoff Meeting that may impact the development and implementation of the Flood DSS. The agenda included a review of the prototype Flood DSS previously developed and discussion of issues associated with each task in the scope of work. A PowerPoint presentation was made available to CWCB.

In attendance at the meeting were:

CWCB – Ray Alvarado, Carolyn Fritz, Joe Busto, Chris Sturm, and Susan Lesovsky
Riverside – Jay Day, Amy Volckens, Steve Malers, Nils Babel, and Amnon Nevo
AMEC – Graeme Aggett, Ian Hanou, and Shelby Hudson

Prototype Review

- It was mentioned that Thuy Patton wanted to show preliminary DFIRMs to communities via a protected site.
- It was discussed that the Flood DSS could direct users to the FEMA site for LOMRs; however, this site does not always provide good documentation about the products.
- CWCB has FIRMs available as PDFs in LaserFiche.
- Joe mentioned that users need some way to access model data that were used in DFIRM production (possibly a FTP site).
- Internal users for defining Flood DSS requirements were identified to be Carolyn, Joe, Chris, and Tom Browning. Carolyn will serve as the collector of CWCB review comments. The flood section will have decision-making power for interface decisions.

Task 2 – Level of Data Collection

Riverside will assess the level of data collection primarily through a user needs assessment:

- Riverside will interview a maximum of 15 stakeholders to gather input on data sources, data products, high priority geographic regions, and system requirements. Riverside will collect samples of data products if possible. Riverside will conduct the interviews in person if multiple can be scheduled in one day. Chris Sturm offered to help schedule the CWCB interviews.
- Riverside will integrate and prioritize the results from the needs assessment, considering the project schedule and implications for system development in addition to the user input.

- Riverside will summarize the results of the user needs assessment in a memorandum and will review the results with CWCB before proceeding to the data inventory task.

Riverside intends to begin work on this task immediately following the project kickoff meeting as follows:

- Riverside will begin assembling a list of topics and questions to guide the interviews. Riverside will submit this to CWCB for review and input. Riverside anticipates having different questions for CWCB staff and external stakeholders. The questions for external stakeholders will be more focused to manage expectations about the Flood DSS.
- CWCB will identify flood section personnel for the interviews. Riverside will conduct these interviews before interviewing external stakeholders.

Related points of discussion:
- CWCB is interested in high priority flood alerts and warnings, as well as radar precipitation, from the NOAA data systems. This topic will be pursued during the user needs assessment.
- CWCB employees identified as potential candidates for the user needs assessment include Tom Browning, Chris Sturm, Kevin Houck, Joe Busto, Thuy Patton, and Cristina Martinez.
- External stakeholders identified as potential candidates for the user needs assessment include Doug Bausch (FEMA Region 8, HAZUS contact), Urban Drainage and Flood Control District, and Dave Gochis (NCAR).
- The Drought and Flood Task Forces use the SNODAS maps.
- Additional topics for the user needs assessment include security/public access, a review of the prototype data inventory, expectations, quantitative success measures, and critical infrastructure – buildings, fire and police stations, etc.

Potential Issues
- Integrating all user input despite conflicting priorities and perspectives
- Scheduling user interviews during the summer when many people take vacation

Task 3 – Evaluate Alternative Technologies

- DNR IT staff representatives were not present and Carolyn indicated that in general they have limited ability to support GIS applications. DNR IT will likely not have strong opinions on the solution and will rely on CWCB to maintain it.
- It was understood that ArcGIS Server is the likely recommendation for the server solution, based on work to date, current DNR capabilities, and future direction. Follow-up with Carolyn indicated that the ArcGIS Server license from the USGS grant is Version 9.3 Advanced Enterprise. Version 9.3.1 is desirable but Carolyn is unsure whether that will be available.
- As anticipated, there is general concern that the technologies be maintainable and understandable by staff, if necessary with ESRI training (Riverside needs to provide direction).
- The point was made that all browser solutions involve JavaScript libraries and custom development. Most web applications use JavaScript. Riverside evaluated various technologies for the prototype and confirmed that basic Flood DSS web application

prototype features could be implemented (navigation, map displays, etc). The bigger issue may be the ability to integrate the mapping solution with other system components, such as LaserFiche, real-time data (e.g., flow), multiple snapshots of data (e.g., SNODAS). Therefore further evaluation will take into consideration the requirements of other system components and also input from the needs assessment. However, evaluation cannot wait until the needs assessment is completed. Therefore, initial information from the needs assessment will be considered in recommendations for the technologies.

Task 4 – Data Inventory

Potential data sources for inclusion in the Flood DSS will be identified through the user needs assessment, the prototype inventory, CWCB input, and county/local data contacts. The data sources will be further evaluated in terms of availability, updating frequency, collection effort, and system integration effort. Attribute information will be collected (e.g., data format). Given the project resources, the data sources will be prioritized, both for inclusion in Phase I as well as future efforts. Riverside will produce a summary memo and spreadsheet documenting the results of the data inventory and identifying data collection recommendations. Riverside will review the memo with CWCB before beginning the data collection task. Riverside will work with CWCB to ensure the data prioritization and collection strategy will result in a Flood DSS that supports decision-making in addition to being a data repository.

- Chris indicated that we should rely on web services as much as possible to minimize the data maintenance burden on CWCB.
- Christine visits communities every 3 years for the Community Assistance Program (CAP). This can be a mechanism to help collect user needs and reduce costs.
- Joe Busto is interested in using radar precipitation to help indicate stream conditions. Flood DSS should limit links to external sites or use the NOAA "FX" network feed.
- Chris recommended waiting until the CWCB interviews to review the prototype data inventory.
- The public Flood DSS site should be informational and include DFIRMs, but not alerts or warnings due to liability issues.

Task 5 – Data Collection

Statewide Data Collection

Riverside will collect statewide data for the Flood DSS. This will consist mostly of existing GIS data:

- The main data layers include CDSS data, aerial photography, elevation data, land cover data, weather modification data, and flood warning and flood threat bulletins.
- Riverside will utilize existing web services as much as possible when appropriate.
- Joe Busto will be the contact for the weather modification data. Chris Pacheco at NRCS provides a supporting data product to Joe. Joe can provide an example product.
- Joe Busto purchases data from the Colorado Avalanche Information Center on snow loads at highway passes. We need to determine if avalanche threat information is a user requirement.

- The flood bulletins are weekly forecasts with daily updates. They are produced from May through September.
- Bill Badini is a contact at HDR for the flood threat bulletins. Riverside should coordinate collecting flood outlook products with Kevin Houck. The spatial data in the bulletins should be available in GIS format.

County Data Collection

AMEC will contact counties and local governments in order to determine types of flood hazard data available, and the process to obtain these data:

- AMEC's focus is on collecting flood hazard data from counties/local government.
- AMEC will request from CWCB contact information for county representatives known by CWCB to be flood data 'keyholders', including local government managers, CASFM members (CFMs), emergency managers, floodplain managers, and GIS managers.
- AMEC will develop a Data Collection Questionnaire to distribute to counties. This questionnaire will assist counties understand the type and form of data we are searching for and allow us to document contact with and response from counties. CWCB expressed interest in reviewing and contributing to a draft form of the questionnaire. AMEC will circulate the questionnaire to CWCB and Riverside for input prior to distribution to counties.
- AMEC will gather information on 'data update frequency', i.e. the regularity with which an agency updates data. A request for this information will be included in the questionnaire.
- CWCB currently has no plan for how to update data sources or how often. As the project moves ahead, AMEC will provide the state with recommendations for how the data update process might be simplified for CWCB.
- CWCB agreed AMEC should begin contacting local government entities prior to completion of the user / stakeholder assessment interviews.
- CWCB will contact counties (probably via CASFM) to introduce the Flood DSS project as a 'news item' in early June 2009. This will allow local government staff to feel more comfortable with the data requests because they would have heard about the project.
- AMEC will develop a list (and map) that prioritizes data collection at the county level and shows data collection progress over time.
- AMEC will develop a list of six representative counties on which to focus initial data collection efforts. Once AMEC have put in a sustained effort on collecting from these counties (~1.5 months) they will report details of the data and data collection experience so the project team understands the likely issues we can anticipate for remaining counties, as well as view the data we can anticipate collecting statewide.

A number of focused points, issues, and directions, as well as more general comments, were raised during the discussion on data collection:

- While the DNR projection/datum is NAD83 Zone 13 N, Carolyn indicated we could use Geographic WGS84 to improve web performance.

- LOMRS & CLOMRS will be accessed through external links, while DFIRM GIS layers will be hosted internally or obtained via web services. One possible solution is to host final DFIRMs but link to preliminary maps.
- AMEC should harvest as much DFIRM data as possible, even if preliminary.
- For high-risk counties, where no DFIRM data exists, AMEC will supplement with HAZUS Level-1 spatial data.
- AMEC should pursue non-spatial flood data from local governments. However, CWCB advised the project team against 'data overload' during the Inventory task (i.e. focus on key data first, then secondary data once all key data are collected).
- CWCB would like all data that are gathered to be delivered to them, even if the data are not included in the Flood-DSS. These data could be organized / automated for later inclusion in the DSS, or for other uses.
- Where possible the project team should obtain (access) data directly from external websites. This will allow for faster access for large raster files, and reduce the burden of data update.
- When encountering data sensitivity concerns from local government, AMEC should report and discuss this at the next progress meeting in order that CWCB can make decisions on how to deal with the concern. In some cases this might require someone from CWCB to sign a release form with conditions of use.
- When encountering costs associated with data, AMEC should report and discuss this at the next progress meeting in order that CWCB can make decisions on the importance of a particular dataset and willingness to pay for the information.
- When encountering general resistance to discussing and/or sharing data, AMEC should report and discuss this at the next progress meeting in order that CWCB can provide AMEC guidance on how to proceed. In some cases CWCB staff may determine someone from CWCB should contact the local government agency.

Data Digitization

The approach will be to collect as much data as possible, but digitize only what is required. CWCB may have internal resources to help with digitization.

Task 6 – Data Processing

Real-Time Flow Data

- The point was made that we have several proven alternatives based on previous work. Riverside will implement something in an early release, and respond to feedback.
- Having the data available in the system sooner rather than later would allow for early use of the system. Most extreme events occur due to seasonal rains (not snowmelt).

Flood Outlook, SNODAS, SNOTEL Automation

Riverside will develop automated procedures for collecting flood outlook/flood bulletins, SNODAS data, and SNOTEL data. Automated routines will be developed and implemented at the State's facilities to update the data. The Flood DSS development may identify some new

database requirements for CWCB. Some questions that resulted from the kickoff meeting that need to be answered include:

- How long of an archive should be stored for certain data products such as SNODAS?
- What kind of value-added products should be produced from SNODAS? Basin averages? Weekly change?
- How can we automate the flood outlook data layers to ensure that the least human involvement is needed?

CWCB wants guidance on file management and directory structures. The team is not sure if CWCB or DNR has file management responsibility for GIS data.

SMS Alert System

- CWCB was not aware of any development of the Alert System since it was utilized for the Instream Flow DSS. An initial activity will be to review the existing system offered by DWR to confirm understanding of its use for this project.
- CWCB does get email alerts to cell phones but a review of the alert configuration is needed.
- It was suggested that flood warnings should not be available on the public site because CWCB does not want to be liable for public response. A follow-up question is to determine if any flood products should be provided to the public (e.g., Flood Outlook).
- Riverside mentioned that TSTool now includes routing capabilities and it would be possible to route flows to ungaged locations and perform checks at those locations. There was some interest in this but utilizing this feature is probably a Phase 2 activity.
- Joe made the point that there was no need to try to forecast floods based on real-time data. The focus should be on providing observations, i.e., streamflow and surrounding precipitation data.

Data Quality Assessment and Utility of Data for Web Serving

- The Riverside team will assess the data that are obtained from various sources and evaluate it for use in the Flood DSS.
- The data must be documented and possess metadata.
- The metadata should include update frequency in addition to standard metadata requirements.
- If the data cannot confidently be kept current for the Flood DSS than it will not be used.
- The State will be made aware of all available data even they are not used in the Flood DSS.

Data Pre-Processing

Riverside will prepare all data to be used in the Flood DSS. Map documents will be created and layers will be symbolized during the data assessment phase. These map documents will be the starting point for the Flood DSS map services.

Task 7 – Implement Access to Non-Spatial Data

- CWCB will help provide links to sites that they use in decision making.
- We agreed that it is important that external site navigation not be cumbersome. It is desirable to use external information in a streamlined way during decision making, therefore it is important to understand the process that users follow and how external data are used in that process.

Task 8 – Implement Map Links to LasherFiche Data

- The point was made that Riverside will review the current LaserFiche tools for integration. Susan indicated that the State owned the "latest" version of the software but she was not sure whether they were going to move to it.
- The Instream Flow DSS access to LaserFiche works with the current system.
- Riverside made the point that it is desirable to automate checks of the system, for example to identify cities that do not have expected documents in LaserFiche and to identify documents that have no links to them. CWCB staff acknowledged that this is an ongoing challenge. Hopefully the system will help improve integration with and use of the document management system.

Task 9 – Installation and Testing

Riverside will develop the web mapping application in increments. In each development iteration, Riverside will implement a single feature of the application, test the implementation, and make the incremental release available for CWCB to review on a client site at Riverside. Carolyn will coordinate the reviews: Riverside will notify Carolyn of a new release, Carolyn will notify the reviewers, get and organize their comments, and provide the comments to Riverside. Riverside will respond to comments from CWCB on the release. This will complete a development iteration.

After the first iteration is complete, the system will be installed at DNR. This will allow resolution of any inconsistencies between the development and the deployment environments early in the project. The next deployment will occur when Riverside delivers the complete system, unless there are major changes to the configuration of the server in either location and the compatibility needs to be tested again.

CWCB indicated that their preferred server-side technology is ArcGIS Server. ArcGIS Server is installed at the DNR IT group. There is a concern that the IT group does not have an ArcGIS Server administrator. Carolyn said that Deb Bell from DRMS (DNR's Division of Reclamation Mining and Safety) might help with the Web site installation.

Carolyn confirmed with the IT group that they have ArcGIS Server 9.3 Advanced Enterprise edition. It is not clear yet whether DNR will upgrade to 9.3.1. We also need to confirm the version of .net on the Web server. If the current version is 2.0 we need to check if they will upgrade to 3.5.

Susan Lesovsky will provide technical support for linking the web application to the CWCB document management system LaserFiche.

Priorities for data collection should account for software development dependencies, i.e., if development of a specific feature requires specific data for testing, the data should be available at the time the feature is implemented to avoid the need to generate fake data.

Sharing data between the Flood DSS Map Viewer and the CDSS Map Viewer may be difficult because each application is implemented with a different server technology (ArcGIS Server and ArcIMS, respectively), the data are stored on two separate servers, and the servers exist on different network domains.

Task 10 – Training and Documentation

- Riverside recommended that perhaps a smaller group of users could be trained with an early version of the system to accelerate adoption of the system into operations for a core group, thus allowing for feedback and ultimately facilitating sign-off on deliverables. CWCB staff supported the recommendation, but this will be revisited later in the project.
- The point was made again by Ray Alvarado that clear documentation needs to be provided to facilitate maintaining and operating the system. Steve mentioned the Instream Flow DSS documentation, which provides detailed information on setting up the system and updating system components, including data layers.
- Susan suggested that on-line help be considered for Flood DSS.

Task 11 – Evaluation

- It was agreed that ongoing evaluation is important and will help resolve system issues (e.g., differences between development and deployed environments, CWCB network problems).
- Interim review meetings could occur via conference call, in conjunction with progress meetings, or visits to Denver.
- Feedback to Riverside is welcome at all times and will be categorized and prioritized relative to the scope.

Performance Measures

- Project team needs to develop and provide quantitative performance measures.
- For example, to evaluate usability, pick several key users and indicate the system is "highly usable" when the users provide feedback that it is so. Although this is subjective, it narrows the feedback.