

## Watershed Health Value and Threat Mapping Methodology

### Mapping Values

Through several stakeholder meetings, watershed health concerns and water supply values were identified. Several state, federal and local GIS datasets were also compiled as potential sources to assess current conditions in the Arkansas basin regarding watershed health values. Not all values documented during the stakeholder meetings had a direct relation to the Arkansas BIP. Furthermore, not all datasets were needed to display the relationships between water supply values, watershed health and threats.

The following outlines the steps taken to show the geographic relationship between watershed health values and threats. Figure 1 is a graphic representation of the work flow.

#### Step 1

For the purpose of the mapping process, a definition was established to better clarify the underlying purpose for watershed health planning, which is:

Protect the functional integrity of the hydrologic, biologic, physical and built environment depended on for water supply and quality.

#### Step 2

This step involved developing the “research” question that data would help answer. Three questions guided the filtering of data and information.

- What are the important values across water supply categories?
- What are the top risks to the functional integrity of watersheds?
- How are the threats and values juxtaposed on the landscape?

Watershed values and data identified on maps first had to have a relationship to water supply and water quality. Water Supply values were determined from Agriculture, Environment, Recreation, Municipal and Industrial user groups. Water Quality concerns included stream impairment, degradation and potential sources of contamination. There is consensus between all water supply categories that reservoirs, rivers, water quality and infrastructure, whether built or green, are the top priorities to protect.

#### Step 3

Threats to the functional integrity of watersheds include catastrophic fire, flooding (pre/post-fire), contamination and insects and disease. Multiple agencies have models for representing wildfire threats and risks. In general these models are constructed by using a combination of data on fuel loading, vegetation type, fire behavior, topography and location of life and property values, among others. The map documents provide a basis for understanding the proximity between threats and values. Maps were then presented to stakeholders to facilitate discussion on data accuracy and prioritizing values throughout the Arkansas basin.

### Map Documents

#### Agriculture

Values identified in the Agriculture water supply category included reservoirs, rivers, diversions, irrigated cropland, non-irrigated farmland and rangelands. Data for cropland is sourced from the USDA National Agricultural Statistics Service and irrigated cropland is available through the Colorado Division of Water Resources (DWR). DWR also tracks diversion points. However data does not indicate a

designated use, quantity or precise location for diversions. The category for “Active” diversions is used to provide perspective on number and general location of valuable infrastructure.

### M & I

Values identified in the Municipal and Industrial water supply category included reservoirs, rivers designated for drinking water supply, water provider diversions and infrastructure. Data is sourced from State databases such as Colorado Department of Public Health and Environment Source Water Program and DWR. Better data on groundwater aquifers, such as Upper Black Squirrel, could inform decisions concerning protection for aquifers depended on for drinking water and/or agriculture.

### Environment

Values identified in the Environment water supply category included reservoirs, rivers, riparian and wetland vegetation, potential conservation areas, T&E critical habitat, impaired streams and significant birding areas. Base data is from the National Wetland Inventory, Colorado Parks and Wildlife (CPW) riparian and species data, Colorado Natural Heritage Program and data generated during the Arkansas Basin Non Consumptive Needs Toolbox planning process. Other areas of concern for the Environment category include wildlife conservation areas, for example, important migratory corridors and winter range. This data is available through CPW data sets. It should be used for more detailed planning to help identify potential partners for mitigation projects.

### Recreation

Values identified in the Recreation water supply category included reservoirs, outstanding waters, fishing reservoirs, gold medal waters, stream fishing, flat and white water boating, recreation in-channel diversions (RICD), birding areas as well as waterfowl hunting areas. Important recreation areas include state parks, state wildlife areas, Upper Arkansas Recreation Area and the RICDs. Data was compiled from the Arkansas Basin Non Consumptive Needs Toolbox which used resources from Colorado Parks and Wildlife, National Hydrology Data Set, Audubon Society, Trout Unlimited and stakeholder input. Some raw data layers were combined to create common symbology across recreation categories.

### Watershed Threats

The threats identified include catastrophic wildfire, flooding (pre or post fire), contamination or degradation of water bodies, insects and disease (I&D). The Colorado State Forest Service (CSFS) created the Colorado Wildfire Risk Assessment Portal (CO-WRAP) as an online mapping tool to assist decision makers, community leaders, planners and citizens in determining wildfire risk and forest management actions. CSFS provided base data on wildfire risk and threat to overlay with water supply values. The data is presented in a broad spatial nature and is applicable throughout the entire state, in all vegetation types. For the Arkansas Basin maps the Medium, High and Very High Risk layers are displayed only. Risk is determined off of threat and has added values associated to life, property and water supply and quality. Threat represented a probability that a representative pixel would burn. Simplifying the maps to only display Wildfire Risk allows for planners to disseminate priority areas quickly. CO-WRAP offers consistency and a common platform for all basins across the state to consider while building collaborations around forest management. Historic fire perimeter data was used to show how past fires and threat have correlated.

The 100 year flood plain represents the zone of concern in regards to potential flooding impacts. The 100 year flood plain does not change between pre or post fire conditions however; the frequency of the 100 year flood plain being inundated does increase post fire. FEMA Flood Hazard Layer is only complete for Fremont, Teller, Elbert and Park counties. These layers are used to classify hazard zones. Lastly, I&D

invasions can result in large areas with high tree mortality which consequently can alter fire behavior and hydrologic function. Several agencies monitor I&D infestations, such as the USDA Forest Service and CSFS. The data set managed by CSFS is used for this project.

**Figure 1- Outline of value filters and the values per water supply use category.**

