Project Number: TCC-IQP1

AN ANALYSIS OF GRASSROOTS WATER ACTIVIST GROUPS IN THE COLORADO RIVER BASIN

An Interactive Qualifying Project

submitted to the Faculty

of the

WORCESTER POLYTECHNIC INSTITUTE

In partial fulfillment of the requirement for the

Degree of Bachelor of Science

By

_____

William West

Date: October 25, 2006

_____
Professor Theodore Crusberg, Advisor

1. environment
2. river conservation
3. grassroots

Abstract

Grassroots water activist groups which care about the Colorado River Basin were assessed. A survey of the groups was performed in order to ascertain what their goals tended to be, how they were linked, what their methods and motivations were, and which characteristics tended towards efficacy. It is critical for concerned scientists to understand these groups so that they know who to work with when conducting research, sharing results, and making recommendations.

Table of Contents

1 Introduction

The Colorado River system is one of the most regulated in the world primarily because of its economic importance; its waters are the lifeblood of the southwestern United States [1]. Though flow volume varies from year to year, the water in the system is ultimately a finite resource. To date, the flow is impounded, pumped, or otherwise consumed so completely that the flow at the mouth is ephemeral; this has severely impacted the once-lush delta region, drying out land and endangering local species [2]. Above the delta, riparian areas all along the banks of the Colorado and its tributaries are directly impacted by the presence of pumping stations, channels, grazing, and the introduction of non-native plant and fish species along the banks of the river and its tributaries. Finally, there is an increasing amount of concern and controversy surrounding the impact of industry and urban development on the watershed, the extent of which can be seen in Figure 1.

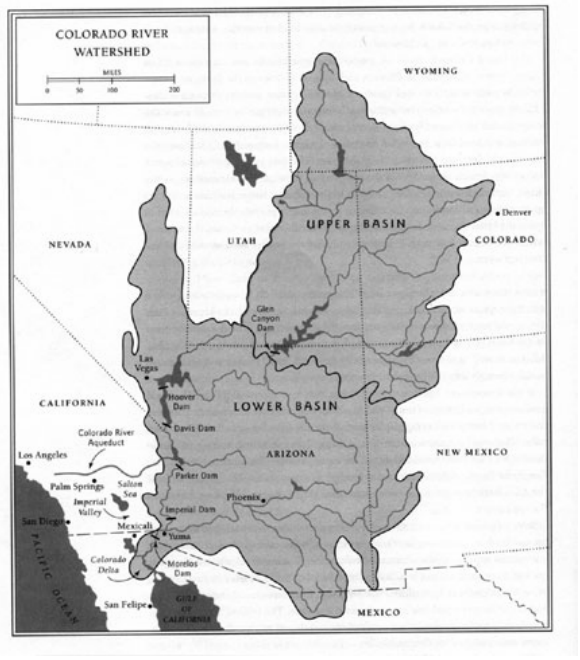

Figure 1 – Colorado River Watershed [10]

Strategic management of the water system is conducted under the auspices of the federal Bureau of Reclamation (BuRec), part of the U.S. Department of the Interior (DOI) [3]. The primary framework for water allocation and management is the 1922 Colorado River Compact, which divides the affected states into two groups: the Upper Basin states, consisting of Colorado, New Mexico, Utah, and Wyoming; and the Lower Basin states, which are: Arizona, Nevada, and California. [4]. Droughts, wilderness preservation, and concerns about regional economic stability have all contributed to the terms of the Compact being continually contested; additional acts and amendments have been introduced in the decades since the Compact's inception. Some are now speaking of a “third generation” era of water management typified by the reorganization of Colorado Basin resources into “water markets,” in which it is presumed economic rather than political forces will serve to settle issues of allocation [5]. A handful of markets have already been piloted, such as the nearby Arkansas water bank; if successful, it may only be a matter of time before such banks are all over the Colorado Basin [45].

Any change in how water is allocated and shared has the potential to be highly contentious. In 2000, protesters in Cochabamba, Bolivia successfully fought to block the government from continuing to allow the privatization of public water [6]. In a similar David-versus-Goliath incident, a federal judge withheld water for irrigation in the Klamath River Basin of California and Oregon to protect fish species endangered by the low water levels, pitting local farming interests against government enforcement of federal environmental rules [7]. Considering that both of these crises made international headlines, any water rights fight erupting over the much larger Colorado River system promises to be at least as high-profile and troublesome; and after a record breaking five-year drought that began in 2000, some believe that a water crisis is already imminent in the Colorado Basin if major steps are not taken to

avoid it [8].

In the Colorado watershed area, cross-governmental management coalitions and grassroots groups have formed around key areas and sub-basins as a reaction to the ever-increasing scarcity of water and contention over allocation, water quality, and priority of use. While the Compact and subsequent laws grant much power to the federal and state governments, grassroots groups have been particularly effective in shaping their policies to serve the demands of other interests, such as those of native tribes, indigenous wildlife, wilderness conservationists, recreational users, and owners of land adjacent to the streams.

Assuming there is indeed a crisis looming, and assuming there will continue to be a strong push for water markets and the subsequent overhaul of existing appropriation doctrine that might be required, it makes sense to study how these groups organize, what they care about, and how well they effect their desired changes. This is particularly important for scientists and engineers who wish to work on the technical and theoretical aspects of these issues, especially during highly charged crisis situations similar to the aforementioned event in the Klamath Basin [7].

1.1 Project Goals

This IQP attempted to survey and assess the constitution, motivations, and efficacy of grassroots groups in the Colorado Basin in anticipation of a conflict between local interests, industry, municipalities and federal government over the building crisis over the use of Basin resources and the subsequent impact on the water, people, economy, landscape and ecosystems. As a corollary, an attempt was made to ascertain the connections of these groups with one another, as well as with government and industry. Similar situations in other areas of the globe are also mentioned, insofar as they could

provide insight into the future development of a water crisis in the Colorado's watershed.

Because of the highly politicized nature of the issues surrounding the Basin, it is not always obvious what the underlying interests of these groups are. Those that attempt to work cooperatively with business and government can be even harder to pin down, because their commitment to a "multiple beneficial uses" paradigm renders them less likely to openly affiliate with groups who hold more absolute positions on highly polarized issues. Understanding both clear and latent motivations in these conservationist and management groups can be very useful to scientists studying the Basin. During any transfer of knowledge or technology, it may be useful to know which groups have logistical experience in an affected area. Social implications are also worth consideration to a scientist. Knowledge of the social and political climate could help better communicate findings, or it could help to know how to frame the defense of a particular result if it runs counter to any political interests. Finally, knowledge of the grassroots political landscape can help a scientist analyze other Basin-related science being conducted or neglected in the context of any potential political bias.

2 Background

Here, we review the rights and laws related to water allocation in the Colorado Basin. The focus is primarily on current or consistently high-profile issues rather than those that are less controversial or common.

2.1 Colorado River Basin

The Colorado River and its tributaries comprise a watershed that drains approximately 243,000 square miles of North America [9]. Nearly the entire watershed is in United States' territory, covering portions of Wyoming,

Colorado, Utah, Nevada, New Mexico, and California, and draining nearly all of Arizona. Seventy-five percent of U.S. Basin land is held by the federal government for wilderness, reservations for native peoples, and national parks [9].

The Basin can be further subdivided into smaller watersheds—many with their own unique local issues—each affecting the quality and flow of the rivers downstream. Some of the groups mentioned later in the text focus on these smaller watersheds. An overview showing the number and scale of these minor sub-basins can be seen in Figure 2.

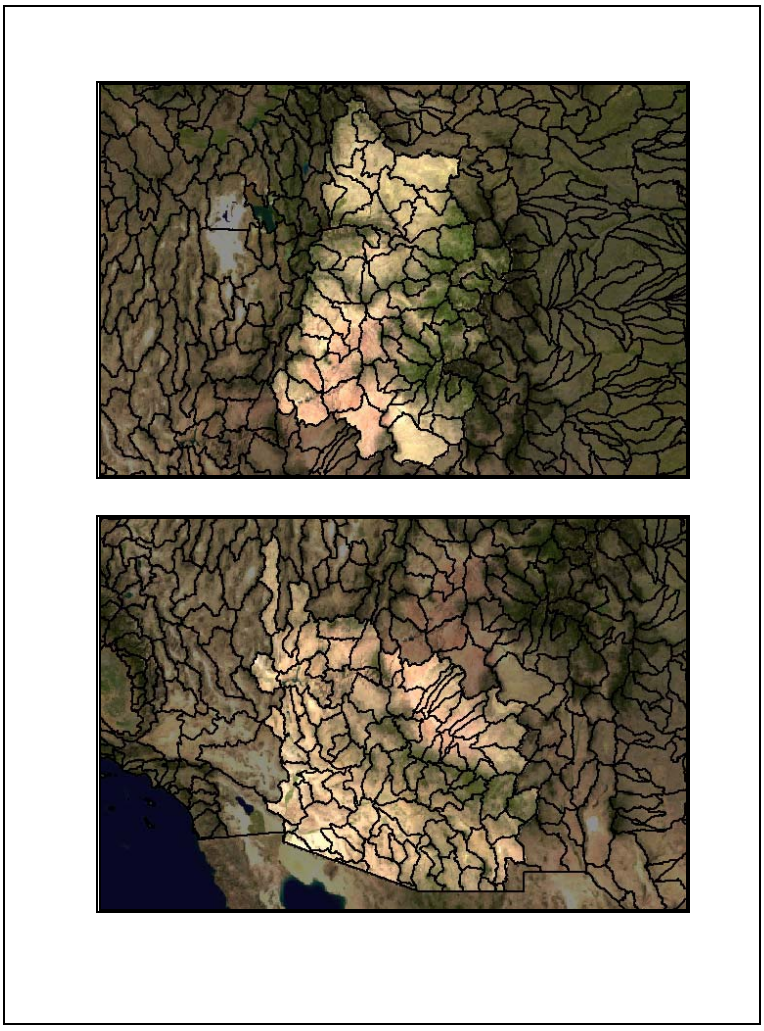

Figure 2 – Upper and Lower Colorado Sub-Basins [12]

2.2 The Colorado Compact

The Colorado River Compact of 1922 is the primary legal foundation for water allocation of Colorado River System water. The Compact divided the overall watershed into two zones—Upper and Lower Basins—the boundary can be seen in Figure 1. These basins comprise two distinct physiographic regions. The Upper Basin section of the Colorado and its tributaries drain a temperate mountainous zone, while the Lower Basin river system drains a vast desert area including the Sonoran, Mojave, and Great Basin deserts [11]. This natural geographic boundary roughly corresponds to the state boundaries: arid portions of Arizona, Nevada, New Mexico, and California are in the Lower Basin region, while Utah, Colorado and Wyoming comprise the Upper Basin states.

2.3 Water Rights

In this section, we briefly touch on the primary features of water rights as they generally exist in the Colorado Basin at the time of this writing. Currently, water rights are recognized according to the “prior appropriation” paradigm in the Colorado Basin; elsewhere in the Western world, water rights have traditionally been defined under “riparian doctrine,” in either written or common law.

2.3.1 Riparian Doctrine

Riparian doctrine provides for ownership of water based on ownership of land. One has a property stake in a water resource if he or she owns property adjacent to it (or containing it wholly). Thus, ownership of the water is tied to the adjacent property or properties. In the event of scarcity, water use is generally reduced in equal proportion for all land/water owners; initial share is determined by the amount of shoreline or stream bank owned [14].

Riparian doctrine evolved in places and times when water was not

perennially scarce. Therefore, it was not necessary to consider instances where water is moved to non-adjacent properties [13]. During the setting of the western United States, the limitations of riparian doctrine became apparent. In order for development to occur anywhere in the often arid surroundings of Colorado system streams, water would have to be pumped out and to developing areas, which would otherwise be too dry to sustain growth. Thus a doctrine evolved which divorced land rights from water rights in order to provide greater flexibility and the possibility for extended development beyond the riparian zones.

2.3.2 Prior Appropriation Doctrine

A newer water allocation system evolved from usage conventions in the American West by 19th century miners. Diversions from streams to distant mines were accepted by other miners as a first-come-first-serve right to water; this was later accepted by the local courts as well [13]. The “first use” aspect is fundamental to prior appropriations rights, as is the idea that the water was being put to some use; one could not simply start pumping water for no reason. Perhaps this made it easier to confirm water claims; it’s also possible that it was meant to prevent water speculators from monopolizing flows and thereby making mining less lucrative.

Another fundamental piece of prior appropriation doctrine is share allocation. According to riparian doctrine, shares are determined by the amount of land frontage. Since it has no adjacent land requirement, prior appropriation prioritizes allocation in order of the date of each claim. Earlier claimants hold “senior rights,” and later claimants have “junior rights.” Earlier claims have priority for their originally claimed allocation, which means that, unlike riparian doctrine, prior appropriation can result in junior rights not being realized. If a senior water claim is equal to or greater than the available flow during a drought, and it is fully exercised by the senior claimant, the junior

right may not be fulfilled at all.

Further complicating prior allocation doctrine is the fact that natives and environmental water needs were not considered as the doctrine was taking shape in the courts and in written law; and since the laws evolved locally, the details of the doctrine vary over state lines [13]. Federal mandates also occasionally conflict with the spirit of prior appropriation as codified by the states. These anomalies have contributed to the further evolution of the doctrine since its initial inception.

Finally, it's worth noting that in most of the state codes in the Compact states which define appropriation rights, the water is the property of the state; one cannot own the water; rather, one can only own the water right. Furthermore, not all of these rights are absolute; so-called "conditional rights" are undeveloped claims that must be periodically renewed or they are considered abandoned; this is the case in Colorado. In some states, beneficial use must be maintained or water rights can be taken away, although this does not frequently occur [17].

2.3.2.1 In-stream Flow Rights

In-stream flow rights are increasingly being introduced into the public laws of Compact states. In-stream flows are an extension of the prior appropriation doctrine covering benefits and uses that do not involve a diversion of a stream. Fisheries are a prime example of an in-stream use, but in general, in-stream rights have proven to be difficult to implement; part of the reason is that in the current culture, it is difficult to make the case for beneficial use of in-stream flows if such use is not agricultural or industrial in origin [17]. In fact, Wyoming's in-stream flow statute, passed in 1986, only fishery improvement is named as a valid in-stream flow benefit. Prior appropriation was created in the context of resource exploitation and agricultural development. Uses which do not have a proven, clear economic

benefit are not as readily accepted. It is partly due to this beneficial use paradigm that in-stream rights tend to be junior rights, and therefore subject to being superceded by existing water rights [54].

Despite the opposition, grassroots and conservationist groups advocate the use of in-stream flow rights as a mechanism for protecting environment, wild country, recreational interests and wildlife; these groups can be found behind many of the discussions and legislative proposals concerning the introduction, implementation and enhancement of in-stream flow rights. In-stream rights are seen as an improvement on pure prior appropriation, whose first-come, first-serve approach pays no heed to shifting public priorities for water use. Some see in-stream flows as a way to take back at least some of what was given away to private interests in ignorance [63].

Opponents of in-stream flow generally cite a lack of clear economic benefit: “you can’t eat scenery,” according to Wyoming rancher Dan Budd [55]. Budd argues that a recreation-based economy will never provide the tax base that an agriculturally-based economy can, and that it is this market reality that will limit the usefulness of in-stream flows. Meanwhile, municipalities eager to keep tourism and recreation industries healthy are looking for any method available, including in-stream flow rights, to keep the streams flowing for fishing and recreation.

Other municipalities are wary of the threat in-stream rights could pose to the prospect of water markets. In Wyoming, for example, the eastern part of the state is growing rapidly. Water to support this development could come from a trans-basin diversion from the Green River, as permitted by the Colorado Compact [55]. Establishment of in-stream flow rights in the Green, however, could prevent or limit such transfers, which puts a strain on the options available to planners in burgeoning population centers. This is, perhaps, the reason that in-stream flow laws are difficult to approve and change; Wyoming did not codify in-stream flows rights until much grassroots pressure, and then only in a limited fashion [33].

Wyoming may be having trouble getting its in-stream flow rights off the ground, but it's not the only state in the Compact: in-stream flows are recognized water rights in Colorado, Utah, and California; California, in particular, includes a wider range of defined beneficial in-stream uses [54] [56] [58]. Nevada and New Mexico are the only Compact states without in-stream flow legislation on the books; however, in-stream flows are permitted under the current judicial interpretations of case law [57] [59]. A BuRec-provided table showing the status of in-stream flow laws is shown in Figure 3 below.

State	Ownership	Authorization and Date	New Appropriation	Transfers	Beneficial Uses
Alaska	Public or Private	Statute - 1980	Yes, by reservation	Yes	Protection of Fish and Wildlife habitat; Recreation and parks; Navigation; Sanitation and water quality
Arizona	Public or Limited Private[1]	Statute - 1941[2]	Yes	Yes[3]	Wildlife; Fish; Recreation
California	Public or Private	Statute - 1991	No[4]	Yes	Wetland habitat; Fish and Wildlife; Recreation; Water Quality
Colorado	Colorado Water Conservation Board	Statute - 1973	Yes	Yes	"To preserve the natural environment", but to date only streams supporting fisheries have been protected
Idaho	Public or Limited Private[5]	Statute - 1974	Yes, by reservation	Yes, temporary[6]	Fish and Wildlife habitat; Aquatic life; Recreation; Aesthetic beauty; Navigation; Transportation; Water Quality
Montana	Public or Limited Private[7]	Statute - 1969	Yes, by reservation	Yes	Fisheries; Water Quality; Other uses that benefit the appropriator, other persons, or the public8
Nevada	Public or Private	Case Law - 1988	Yes	Yes	Wildlife; Recreation[9]
New Mexico[10]	Public or Private	Case Law - 1998	No	Yes	Fish and Wildlife Habitat; Recreation; (note: instream flow in itself is not a recognized beneficial use)
Oregon	Oregon Water Resource Department	Statute - 1915	Yes[11]	Yes	Recreation; Conservation; Fish and Wildlife; Ecological Values; Pollution Abatement; Navigation
Utah	Divisions of Wildlife Resources and Parks and Recreation	Statute - 1986	No	Yes	Propagation of Fish; Public Recreation; Preservation or Enhancement of the Natural Stream Environment
Wyoming	State of Wyoming	Statute - 1986	Yes	Yes	Only Fisheries

Figure 3 – In-Stream Flow Rights Status, Western U.S. [60]

2.3.2.2 Wilderness Rights

Another set of allocations pursued by grassroots groups are wilderness water rights; these are special federal appropriated rights that exist per a landmark 1908 court decision listed in Appendix F. This so-called "Winters doctrine" reasoned that when Congress reserves federal land for whatever purpose, be it native reservations, national parks, or wilderness areas, it also reserves a water appropriation sufficient to support the reserved land [61]. In

most cases, these rights, like state-based in-stream flow rights, are junior rights, and thus subject to available flow after senior rights get their appropriated diversions. This essentially gives these rights equal footing with private appropriations [62].

However, native wilderness water rights retroactively became senior to modern appropriated rights, since they have been using the water since “time immemorial.” As the greatest potential beneficiaries of the Winters opinion, native tribes successfully argued that they have an indisputable first-in-time claim to in-stream flows upon which they relied long before non-native settlers came to the area. As a matter of law, the dates of their water rights are coincident with the creation of their reservations [17], and are generally senior to any rights, even established beneficial-use diversions, which are dated after the formation of any reservation claiming a water right from the same flow.

Despite having these senior rights on paper, they were not enforced for most of the 20th century. Native tribes are only recently beginning to build the infrastructure necessary to exploit their water rights. Much of the delay has concerned debate and confusion over how much water is to be appropriated by native claims. Since the native claims are senior to most existing rights, current users are extremely wary about having their rights downgraded and possibly losing their water.

Grassroots groups, on the other hand, tend to back the native claims; perhaps this is simply because native uses include in-stream flows for wilderness preservation, fisheries, and priority rights for subsistence agriculture, which is generally more agreeable to most grassroots groups than diversion uses for ranching, large-scale farming, and mining. (Further exploration of the motivations of these groups in Section 3 may serve to confirm or refute this).

2.4 Clean Water Act

Aside from appropriation, the states in the Colorado Basin, like the rest of the states, territories, and tribes under U.S. control, are subject to the limitations imposed by the Clean Water Act [65].

Enforced by the executive Environmental Protection Agency (EPA), the Act was introduced in 1972 and sets minimum federal standards for daily effluent pollution of surface water from all point and non-point sources; the CWA is essentially a definition of how much one is allowed to pollute surface water [65]. Grassroots groups sometimes cite the act in order to push for action or cleanup in an affected area. The EPA under President Bush has been recommending relaxations in the Act by limiting its scope to a subset of surface water, a move which was met with opposition by environmental groups [26].

2.6 Government Roles

This section serves to outline critical government players in the Colorado Basin water game.

2.6.1 Federal

The federal government has three points of control over Basin water: land management, reclamation, and pollution control.

2.6.1.1 Bureau of Reclamation

The Bureau of Reclamation (BuRec), part of the Department of the Interior (DoI), is the most directly influential federal agency concerning Colorado Basin water; the bureau is chartered to oversee water management in the western United States. BuRec is responsible for most of the damming

and large-scale water management operations in the Colorado Basin, and is in charge of maintaining the systems it has put in place, for overseeing the continued realization of the interstate Compact, implementing wilderness water rights, preserving wild river areas, protecting native habitats and species, and seeing after tribal water interests.

2.6.1.2 BLM

The Bureau of Land Management (BLM) manages all public land and water, including surface water, and has broad latitude to protect and control that which it oversees [27], though its stated policy is to let the states manage their own water. BLM is a sister organization to the Bureau of Reclamation; both are part of the Department of the Interior (DoI).

2.6.1.3 EPA

The EPA, already mentioned, is an agency of the executive branch of the federal government. It was chartered primarily to define and enforce pollution limits [65]. It is primarily relevant to the Colorado Basin water because the EPA enforces the Clean Water Act (CWA) (see section 2.4). Pollution is a key issue for grassroots groups.

2.6.2 State

The states themselves have great latitude to make and enforce water policy within their own borders and within the terms of the 1922 Compact. Each has its own water legislation, adjudication procedures, and water bureaucracies. These disparities primarily impact grassroots groups by making interstate cooperation more difficult; since laws tend to vary greatly across state lines, groups tend to specialize and focus on in-state issues. This is reflected by a dearth of interstate affiliation between groups which might

otherwise be eager to connect across state lines, since the watersheds are connected.

3 Grassroots Organizations

Only non-profit groups from the Colorado Basin are surveyed here; furthermore, each group included is concerned with Basin water. All groups considered are non-profit groups which have partial grassroots elements or purely grassroots organization; that is, they have and recruit individual volunteer members who are interested in the water as private citizens with shared ideals, and not merely as agents of a government agency or a business. Grassroots groups as defined here may have some private industry or government participants, but they must not consist of these alone. Pure industry consortiums and inter-district/inter-state government agencies are not included. Such groups are listed here by state (CA includes Baja California, Mexico):

WY

Group	*Web Site*	*Water Issues*
Wyoming Outdoor Council	http://wyomingoutdoorcouncil.org	CBM Trans-basin diversion
Upper Green River Valley Coalition	http://uppergreen.org	CBM
Wyoming Conservation Voters	http://www.wyovoters.org/	In-stream flows
Sierra Club, Wyoming Chapter	http://wyoming.sierraclub.org/index.html	
Greater Yellowstone Coalition	http://www.greateryellowstone.org	CBM

Jackson Hole Conservation Alliance	http://www.jhalliance.org	Scenic Rivers

CO

Group	Web Site	Water Issues
Colorado Water Protection Project	http://www.ourwater.org http://www.awarecolorado.org	NPS Education
Gunnison Selenium Task Force	http://seleniumtaskforce.org	NPS
Colorado Watershed Network	http://www.coloradowatershed.org	River monitoring, education
Water Information Program	http://waterinfo.org (San Juan, Dolores / CO)	Education, Coordination
Roaring Fork Conservancy	http://www.roaringfork.org	Preservation, Wilderness protection, Recreation, Trans-basin diversion
Friends of the Animas	http://www.foar.org/ (defunct?)	
Colorado Watershed Assembly	http://www.coloradowater.org/	Organization,Fundraising, Outreach, education
Sierra Club, Rocky Mountain Chapter	http://www.rmc.sierraclub.org	Sustainable water management
CO Trout Unlimited	http://www.cotrout.org/	Fisheries
Colorado Environmental Coalition	http://www.ourcolorado.org	Sustainable use
Colorado Environment	http://www.environmentcolorado.org	Urban water sustainability
San Juan Citizens Alliance	http://www.sanjuancitizens.org/	Recreation, sustainability, restoration
High Country Citizens Alliance	http://www.hccaonline.org	Trans-basin, in stream flow, quality, protection
Western Colorado Congress	http://www.wccongress.org/	Conservation, continuous flow, coordination,

		drilling
Western Slope Environmental Resource Council	http://www.wserc.org/	Water pollution, organization, Wilderness rights
Sheep Mountain Alliance	http://sheepmountainalliance.org	Wilderness preservation, including watersheds
North Fork River Improvement Association	http://www.nfria.paonia.com/	Sustainable use

UT

Group	Web Site	Water Issues
Utah Wilderness Coalition	http://www.protectwildutah.org	Wilderness water rights
Utah Rivers	http://www.utahrivers.org	Wild and Scenic Rivers
Virgin River Runners	http://virginriver.org/	Recreational uses
Glen Canyon Institute	http://www.glencanyon.org/	Riparian restoration
Southern Utah Wilderness Alliance	http://www.suwa.org	

NM

Group	Web Site	Water Issues
Upper Gila Watershed Alliance	http://www.ugwa.org/	wilderness, wildlife preservation
Gila Resources	http://www.gilaresources.info	Sustainable planning
Sonoran Institute	http://www.sonoran.org	Sustainable use, riparian

	restoration

AZ

Group	Web Site	Water Issues
Verde River Citizens Alliance	http://www.verderivervrca.org/	Perennial flow
Little Colorado Watershed Project	http://www.littlecolorado.org	Organization, sustainable use
Grand Canyon Wildlands Council	http://www.grandcanyonwildlands.org/	Protection, restoration, organization, outreach
Grand Canyon National Park Foundation	http://www.gcnpf.org/	
Yuma County Education Service Agency	http://www.yumaedsuport.org/	Education, conservation
Little Colorado River Plateau Conservancy	http://www.littlecolorado.org/	Organization, sustainable use
Prescott Creeks Preservation Association	http://www.prescottcreeks.org/	Riparian restoration
Arizona Wilderness Coalition	http://www.azwild.org	Wild and scenic rivers, organization
Upper Verde Water Issues	http://upperverdewaterissues.org/	Perennial flow
Citizens Water Advocacy Group	http://cwagaz.org/	flow, sustainable, protection, pollution
Verde Watershed Association	http://www.vwa.org	sustainability

NV

Group	Web Site	Water Issues

Nevada Wilderness Project	http://www.wildenevada.org	
Las Vegas Wash Coordination Committee	http://lvwash.org/	Public Involvement Authorities Coordination (LV Wash)
Nevada Audubon	http://www.wildenevada.org	Riparian preservation

CA

Group	Web Site	Water Issues
Asocacion Ecologican de Usarios del Rio Hardy-Colorado	http://www.aeurhyc.org/somos/visionymision.htm	Sustainable use, riparian restoration
Pacific Institute	http://www.pacinst.org/	Sustainable use, riparian restoration

Interstate & National

Group	Web Site	Water Issues
Clean Water Network	http://www.cwn.org/cwn/about/memberlist/index.cfm	
River Network	http://www.rivernetwork.org/partners/partnerlist.cfm	Organization, outreach, education, riparian restoration
American Rivers	http://www.americanrivers.org	Water quality, sustainable use, perennial flow, urban sprawl, organization, education
American Whitewater	http://www.americanwhitewater.org	Recreational uses
American Wilderness	http://www.americanwilderness.or	

Coalition	g	
Campaign for America's Wilderness	http://www.leaveitwild.org/psapp/	Auxiliary goal to protect AZ watershed
The Wilderness Society (MT office)	http://www.wilderness.org	CBM
Clean Water Action	http://www.cleanwateraction.org	Urban efficiency, protection, in stream use
Western Watersheds/RangeNet	http://www.westernwatersheds.org http://www.rangenet.org	Watershed restoration, direct legal action
Forest/Watershed Guardians	http://www.fguardians.org	Wild and scenic rivers
Sage Brush Sea	http://www.sagebrushsea.org	Water use as it pertains to wildlife protection
Great Old Broads For Wilderness	http://www.greatoldbroads.org	in stream flows, grassroots outreach
Colorado River Water Users' Association	http://www.crwua.org	Non-partisan planning, advisory
Pacific Institute	http://www.pacinst.org/	Delta, markets, conservation
Trout Unlimited	http://www.tu.org/index.asp	Fisheries
Environmental Defense Fund	http://www.environmentaldefense.org	Delta
Nature Conservancy	http://www.lastgreatplaces.org/	Riparian preservation sustainability San Pedro CO water caucus NM Riparian preservation
Audubon	http://www.audubon.org/	CO water legislation
Western Resource	http://www.westernresourceadvoc	sustainable water management,

3.1 Grassroots Concerns

3.1.1 Coalbed Methane Development

One of the more common grassroots causes in the Basin is concern about the impact of coalbed methane (CBM), an industry which is experiencing a boom in and around the Colorado system watershed. Buried coal seams containing methane are relieved of water, which allows embedded methane to flow up the mine straw to the surface [35]. The current mining method drills in several places in a seam to remove water and methane, creating many potential points of wastewater effluence; it is this wastewater that has the most significant potential for impact of surrounding areas [66]. The effect can be compounded by the use of hydraulic fracturing, which is a process by which rock in a CBM well is forcibly cracked to ease the retrieval of the contents; it employs chemical agents which can leech into and contaminate adjacent freshwater aquifers. [24]

Such mining methods can affect groundwater as well as surface water: if the water table is lowered by the large-scale dewatering of local aquifers, access to groundwater could be reduced or lost on nearby ranch land. Re-injection into used aquifers may prevent wholesale runoff, but the potential still exists for contamination of groundwater (and streams), and does not solve the excessive lowering of previously usable aquifers. Anti-mining activists also fear that CBM runoff or contamination could threaten fish and other species downstream [23].

Planned CBM mines in the Upper Green River valley include the prospect of the processing of 14 trillion gallons of water. The scale is of great concern to

grassroots activist concerned with the potential effects this will have on groundwater levels, stream quality, and groundwater quality [25]. Figure 4 shows a CBM well on the bank of the Green River.

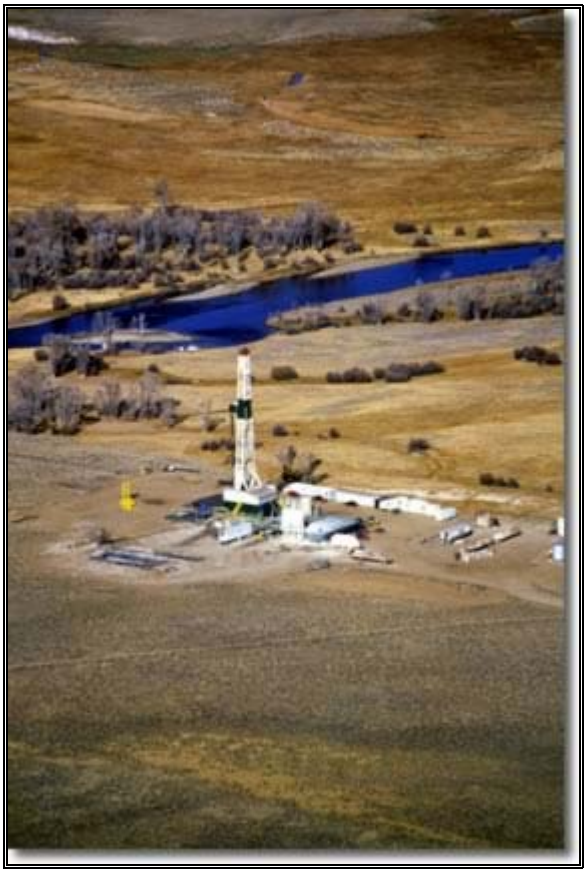

Figure 4 – Coalbed methane well next to the Green River [21]

3.1.2 Riparian Protection and Restoration

Reclamation and the introduction of non-native plant and animal life have dramatically changed the character of many streams and riparian areas in the Colorado watershed, from the headwaters to the delta region. Many groups aim to bring these areas closer to their original state for purposes of recreation, esthetics, or protection of endangered species. These varied aims

mean that many types of groups end up working together; for example, whitewater recreation and fishing enthusiasts both want increased in-stream appropriation rights to ensure perennial flow to support their respective hobbies. Wildlands preservationists and wildlife conservationists also generally support in-stream flows for the purpose of saving endangered species and habitats.

3.1.3 Non-native Fisheries Stocking

The introduction of non-native species, such as the stocking of game fish, is also a common complaint by grassroots groups [31].

3.1.4 Non-Point Sources of Pollution

Many groups concern themselves with so-called non-point sources of effluence, or NPS pollutants. NPS pollutants are those which are difficult or impractical to trace to a single source, or represent a well-distributed share of responsibility over a large group, such as a large area of households or farms. Grassroots groups are rather naturally paired with such issues, because they are collective problems by nature and they tend to be local to a particular watershed. Since no one actor makes a significant contribution to a true NPS pollution problem, solving it requires collective participation by the watershed community at large.

3.1.5 Recreation Usage Preservation

There are a number of groups whose primary issue is the preservation or establishment of recreational uses of river water, including river running with personal watercraft, sport fishing, and swimming. These groups typically pair

individual enthusiasts with recreation and tourist industry players, which have a stake in the recreational uses of river flows. Recreational use advocates are usually natural allies with riparian preservationists, since both generally require in-stream flow rights on par with more traditional flow uses. However, sometimes these groups collide. For example: sport fishers who enjoy angling for rainbow trout may not appreciate the efforts by restoration groups to eliminate dams, raise river temperature and sediment, and favor the reintroduction of native species over the popular but non-native sport species.

3.1.6 Sustainable Use

Many groups concern themselves with the sustainable use of water resources. Though varying on what constitutes sustainability, the general idea set forth by these groups is that all stakeholders should have some say in how finite water resources should be allocated, and that all should be involved in making decisions that maximize the benefit to all users. This typically involves giving representation to stakeholders during planning discussions, judicial deliberations and legislative hearings. These groups generally support heavy regulation and limits on allocation and pollution, which contrasts with the typical corporate position favoring deregulation and commoditization of water resources in the belief that market forces will best determine allocation. Sustainable use advocates generally reject the notion that market forces can lead to truly sustainable use, fearing that some uses and groups will be completely eliminated and disenfranchised, respectively.

3.2 Motivation

Of the groups listed, common mission themes can be recognized. Even though there is a variety of local laws and circumstances, the goals of grassroots environmental groups tend to be constrained to a relatively short

list of issues, from which an overriding motivating philosophy can be surmised.

Groups are generally interested in progressive resource policies—those which favor conservation or noteworthy land features and wildlife, minimal disruption of natural habitats, sustainable development of resources, animal rights, and a view that access to natural resources for ordinary people is a fundamental human right that is not trumped by the right to develop those resources for economic gain.

3.3 Strategy

Strategies of these groups vary, but ultimately yield a modest taxonomy when the groups are compared independently of their motivations. There are: true grassroots groups, canvassing groups, and organizational groups.

Grassroots groups are alike in that they organize around emergent issues; they tend to persist in areas where similar issues recur. These groups coalesce locally to deal with specific emergencies, and then monitor their shared area for new emerging threats to their goals. They use their collective power to initiate monitoring, to lobby for specific judicial or enforcement actions, and to conduct campaigns and referenda. Grassroots groups work mainly from the bottom up; that is, they tend to start with the people and end with some sort of interdiction of threats. Examples include the Wyoming Outdoor Council, the Jackson Hole Alliance, and the San Juan Citizens Alliance. Grassroots groups tend to divide into two sub-groups: those like the Utah Wilderness Coalition, who cast themselves in a David-versus-Goliath role (e.g., “fighting the opponents of wilderness”), and those who take a more conciliatory or less biased stance in order to appeal to a broader set of interests, such as the Colorado Watershed Network or the North Fork River Improvement Association [68] [67] [74].

Canvassing groups, in contrast to true grassroots groups, tend to

operate from the top down: a political arm, usually collocated with the relevant government agencies, courts or legislative bodies, works to lobby the government and voters using various tactics, including (but not limited to) public research, open proposals, and political scorecards. These groups solicit funds from the grassroots, either by partnering with local interests or setting up field offices in areas of interest. Voters and individual donations are sought in relation to the issues being lobbied and discussed in the political office. These groups differ from the local groups by having a deeper organizational hierarchy, generally more connections to other groups, a greater tendency for coalition membership, and a higher focus on an overriding philosophy versus the more narrow scope of interests pursued by purely grassroots groups. Colorado Trout Unlimited, Southern Utah Wilderness Alliance, and the Wyoming Voters Association are examples of this group type [69] [70] [71].

Organizational groups come into existence primarily as administrative and fund pooling bodies for groups with similar motivations and missions. Like the true grassroots groups of which they consist, organizational groups can be roughly divided into two subgroups: consensus-building groups, which take a more conciliatory tone in their literature, like the Colorado Foundation for Water Education, a self-billed non-advocacy group, and those who are geared more for building coalitions for adversarial work, such as the Sierra Club, who like to “watch and counter moves of economic developers.” [72] [73]. The latter type tends to be driven more by overall philosophy than by specific issues, and as such they can overlap in classification with broad-based canvassing groups. The primary identifier of an organization group, in the end, is the fostering of cooperation of different locales and groups in order to streamline common efforts and give greater voice to smaller local groups; the Colorado Watershed Assembly states as much in their charter [75], as does the Upper Green River Valley Coalition in their mission statement [20].

3.4 Tactics

3.4.1 Public Relations / Outreach

One tactic used by grassroots groups is to attempt to make it easier for stakeholders to provide input to responsible agencies when an issue of concern arises. For example, the Wyoming Outdoor Council (WOC) proposed rules mandating public hearings for petitioners to the pollution control agency [32]. Groups use other means as well, such as targeted education and information campaigns, newsletters, and get-together events like clean-ups and monitoring expeditions. WOC, for example, provides a citizen's guide to the Clean Water Act [30]. Most of the organizational groups and the non-adversarial grassroots groups engage heavily in this type of outreach; information is provided and the (typically more diverse) target audience is largely left to do what they will with the information provided.

3.4.2 Coordination with Other Groups

A good example of a successful group taking advantage of synergies with other organizations is the ever-present Trout Unlimited; they manage to partner with many other groups. If those groups can work together to get people to accept and demand beneficial-use status for in-stream flows, then they stand a better chance of achieving the goal; results tend to scale well with increased head-count and money devoted toward an issue, and Trout Unlimited appears to have been very successful using this tactic; they have managed to lease water appropriations for in-stream flows, and they have influenced state legislation in the Basin to recognize in-stream beneficial uses [46]. Fishery improvements are legally recognized almost everywhere in the

Compact states as beneficial, as can be seen in Figure 3.

This tactic extends to land as well—the grassroots group Colorado Open Lands (COL) offers to buy conservation easements to protect contiguous open space and watersheds in order to support their goal of protecting wildlife habitats, perennial flow and recreation in the Gunnison [48]. Great Outdoors Colorado, which has somewhat more general goals than COL, offers grants for similar purposes: appropriations for in-stream flow, land easements, and habitat improvement projects.

3.4.3 Proximity to Government

Some groups opt to keep a presence near relevant legislative bodies and lobby to the limit of the law, while providing contact information to make it easier for members to get in touch with their representatives [26] [40].

Proximity to government also occurs when groups engage in watchdog tactics. As a precursor to direct action and other forms of interdiction, groups may monitor executive agencies, legislatures, courts, and individual politicians to track their activities and stances relating to the core concerns of the grassroots group. Such monitoring is particularly important for canvassing groups, but it is not exclusively their tactic. In fact, it is so widely employed that some governments are fighting back with laws that seem tailored to hamper watchdog activity [38]. In Wyoming, the pollution control agency meets with public groups at its own discretion [32].

One of the more effective and confrontational methods used vis-à-vis government is the legislative scorecards, which rate how well elected officials, parties, or candidates for elected office support a particular agenda [41]. Top-down lobby groups tend to use this most often, but it is also employed by the specialized groups with local interests.

3.4.4 Direct Action

Groups that opt to take direct action on hot issues do so through a few primary methods: involvement with or pursuit of judicial litigation, involvement or pursuit of enforcement actions in coordination with agencies like the EPA, and acquisition of land, easements and/or water rights. Direct legal action tends to be used in cases where groups see a threat of long-term or irreversible damage to their interests; suits are threatened and filed against state agencies, ranchers, and business entities [42].

In 2001, the Wyoming Outdoor Council was involved in efforts by the EPA and the state of Montana to force Wyoming authorities to follow existing procedures on effluent discharge by CBM installations; up until then, Wyoming's department in charge of effluent permits had been allowing permit-free creation of surface reservoirs and runoff for CBM waste-water, which is a pollutant [22]. In the same year, the Council intervened in a successful dismissal of a CBM industry lawsuit against the BLM, which had imposed limitations on the miner's operations in order to mitigate risk to the surrounding water and land [27].

3.4.5 Education Initiatives

Most groups contribute to or spread educational material to constituents and stakeholders. The intent is to empower them with facts and information that might help further the groups' goals and strategies. This ranges from online libraries to organized training (both in-person and online) in relevant areas of study. Groups may offer training on organization, fundraising, riparian science, and environmental law; they may also provide child and family-friendly educational brochures.

Grassroots groups will often consist of or solicit the help of scientific

experts in the fields of hydrology or soil science; this can, at the very least, give the perception of credibility, and at best can act as an asset for groups who need to maintain a technical dialog with industry and managing government agencies [36]. Naturally, groups also monitor research in fields that concern their particular watershed issues with the intention to apply these results toward their activist efforts [37]. Finally, non-aligned groups use scientific data and education as a common, neutral language to foster dialog between disparate interests.

3.4.6 Fundraising

Most groups solicit donations from the public and from private interests. Some groups, like the Rocky Mountain Initiative (RMI), feel that forging relationships with those in power is as important as community outreach. They aim their reporting and consultancy at state and federal agencies. They prepare reports directly for the EPA as well as business leaders, reasoning that these are the people who are best positioned to effect change [50]. CRWUA seems to have either a similar policy or a smaller core grassroots constituency—many of their established partner organizations are municipal, state, and federal agencies, with only a handful of grassroots connections [51]. Both the RMI and CRWUA give the impression of being much less antagonistic toward those in power without rejecting the grassroots needs. This is very unlike groups like the Colorado Riverkeepers, who reject the entire basis for the current bureaucracies, saying that the reservoirs need to be drained and the entire conservation and allocation paradigm must be rewritten. It is possible this is why they advertise fewer successes; realization of radical changes certainly would involve more difficulties than working within the established systems where possible [52].

Other major fundraising is done through organized grants, solicitations from private and individual donors, and through targeted campaigns to address

a specific issue or fundraising goal.

3.4.7 Staffing

Recruitment and staffing are critical tools used by groups who are trying to get started and maintain momentum as issues come and go. Often, groups form around a specific crisis or individual inspiration and realize that their challenges are not unique and tend to be perennial. Staffing is inevitably needed to carry on work in perpetuity; this is done through volunteer recruitment as well as the creation of paid positions within incorporated non-profit organizations.

Another important aspect to staffing and recruitment is the existence of programs of individual recognition. These exist with the intention of motivating those already involved and inspiring people on the fringes to get involved with the group cause.

3.4.8 Organizing and Development

Institutional improvements are not automatic in grassroots groups; many groups include them as part of their core mission. This typically includes the deliberate and regular review of overall strategy and measured evaluation of how effective existing efforts are at furthering the strategy. Part of ongoing strategy seems to be the development of new tactics and the re-shaping of a group's public image in direct response to measures of success; the Utah Rivers Council states as much in their strategy outline, where they tie the size of membership and the influx of funds to their efforts to cast the group as a "stable, respected organization" [76].

In addition to internal improvements and evolving charters, connections with other groups is often of primary importance--especially those

who have similar goals or have experience with a particular issue. When the CBM industry set its sights on Wyoming, the Wyoming Outdoor Council teamed up with another grassroots group from an established CBM region, and was able to leverage its experience to curtail additional CBM permits until certain conditions were met by the applicants [37]. Other groups have either formed coalitions or become loosely networked with other groups having similar goals; examples are provided in the earlier section on group strategy and taxonomy.

3.5 Efficacy / Appeal

Success is measured in many ways by these groups, but internally, the primary quantitative metrics of each group's success seem to be membership numbers and financial support; e.g., "grow budget by 5% annually" or "increase membership contributions from 46% to 50% by 2010" [76] [68]. Qualitative measures include success stories from past projects and interdictions.

The groups in this study are not easily compared side-by-side. While it would be trivial to rank the groups by revenue, it is far more difficult to compare how much they accomplished per dollar when it is taken into consideration that while philosophies of groups may match precisely, no two groups have identical goals; or if they do, they soon merge to form a larger group with more bargaining power; this is a common theme in the histories of groups in the Basin and represents a reasonable explanation as to why the landscape of groups appears as it does (many small watershed groups isolated by local/state issues, strong local coalitions and more tenuous cross-regional networking) [69] [77] [78].

4 Summary

This project surveyed grassroots, non-profit activist groups concerned

with Colorado Basin water. The groups were listed by state and analyzed to reveal a rough taxonomy containing three basic classifications: true (bottom-up) grassroots, canvassing (top-down) grassroots, and organizational grassroots groups, as well as a distinction between adversarial, litigious groups advocating a philosophy and non-aligned groups which de-emphasize the needs of any one type of stakeholder.

We also identified the major issues in the Basin, which turn out to be dominated by a conflict between industrial exploitation of natural resources, particularly in pursuit of coal bed methane and continued agricultural development, and those who maintain a progressive environmental policy focused on wilderness preservation, conservation, sustainable/minimal use, and civil (non-private) control of natural resources, especially water and flow rights.

We examined what tactics the groups use to greatest effect. During the course of the study (less than 1 year), several groups became defunct. It stands to reason that remaining groups are employing strategies and tactics that are effective, at worst, at merely maintaining the groups' existence; analysis of the overall strategies indicate that groups that can show qualitative success gain membership, that membership yields funding, and that funding, combined with a niche purpose, keeps groups alive. Weaker groups with non-unique goals tend to be swallowed by larger groups. Groups that coalesce around emergent issues disband unless the issues recur in the region on a regular basis.

References

[1] http://www.azwater.gov/dwr/Content/Find_by_Program/Colorado_River_Management/default.htm
[2] http://www.ag.arizona.edu/colorado_river_delta/delta/intro.html
[3] http://www.crwua.org/colorado_river/reclamation.htm
[4] http://en.wikipedia.org/wiki/Colorado_River_Compact
[5] http://ag.arizona.edu/AZWATER/arroyo/101comm.html
[6] http://en.wikipedia.org/wiki/Cochabamba_protests_of_2000
[7] http://www.klamathbasincrisis.org/esa/esanotresourcecommkfpr062104.htm
[8] http://www.uswaternews.com/archives/arcsupply/3intsec5.html

[9] http://www.desertusa.com/colorado/coloriv/du_coloriv.html

[10] http://www.azhumanities.org/movingwaters/exhibitgallery/exhibit6.html

[11] http://www.hcn.org/servlets/hcn.Article?article_id=3754

[12] http://wrc.iewatershed.com/index.php?pagename=ow_regionalWatersheds_14 – maps, watershed issues overview

[13] http://www.waterencyclopedia.com/Po-Re/Prior-Appropriation.html - prior appropriation doctrine explained

[14] http://www.ecy.wa.gov/pubs/98152/ - riparian doctrine explained

[15] http://www.water.utah.gov/DroughtConditions/BasinDroughtReports/default.asp - map of Utah basins and reports

[16] http://www.waterquality.utah.gov/watersheds/state.htm - Utah watershed management

[17] http://focuswest.org/water/tribalclaims.cfm - tribal claims talk

[18] http://www.fs.fed.us/ngp/draft/Erata_Sheet.pdf - watershed category definitions

[19] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2001d/water.php - water quality category definitions WY

[20] http://www.uppergreen.org/library/docs/SP.overview_factsheet.pdf - coal-bed methane development in south piney pumps water up, disturbing aquifers, surface hydrological characteristics, etc.

[21] http://www.uppergreen.org/gallery/map_large.php?print_id=13 – image credit; gas mine on the bank of the Green River

[22] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2001a/h2o.php - WOC success story against CBM industry polluting

[23] http://www.uppergreen.org/library/docs/SP.values_factsheet.pdf - more info on coal-bed methane in south piney drilling effect on water supply

[24] http://www.uppergreen.org/library/docs/SP.CBM-splitestate_factsheet.pdf - south piney coalbed background, info on split-estate ownership schemes

[25] http://planetjacksonhole.com/klobnak/klobnak_2006_02_01_red.html - Pinedale rmp for piney, red desert cbm expansion

[26] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2003b/cwa.php - clean water act. Issue affecting Colorado streams

[27] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2002b/pinedale.php - CBM company loses suit against BLM office… BLM use of public participation lauded by court

[28] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2002a/epaaudit.php - if you believe WOC's take, the state agencies are inadequate at protection conservation interests. The EPA investigates in response to conservationist petitioning (the same EPA which recommends dismantling the CWA and giving much control back to the states).

[29] http://www.wyomingoutdoorcouncil.org/programs/water/index.php - WY watershed protection

[30] http://www.wyomingoutdoorcouncil.org/programs/water/resources.php - WY watershed protection references

[31] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2004a/greenriver_fish.php - good explanation of the native fish issues

[32] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2003c/water.php - dealing with lackluster state protection agencies on water issues

[33] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2003c/instream.php - republican state senator talks about in stream flow law in WY

[34] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2002c/watersheds.php - possible green river dam initiative rumor, WY water management gov organization details

[35] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2002b/cbmpollution.php - CBM effluents information

[36] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2000d/cbmh2o.php - CBM salinity reference

[37] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2000c/woccbmprotest.php - 2000 victory against CBM saline water polluters in WY

[38] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2000b/credibledata.php - alleged attempts to curtail/ignore citizen monitoring of water quality/polluters WY

[39] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2000b/waterpollution.php - pollution restrictions relaxed... The tiny WY environmental quality bureaucracy is delineated

[40] http://www.wyomingoutdoorcouncil.org/programs/legislature/index.php - WOC lobbying

[41] http://www.wyovoters.com/ - WY conservation voters, legislative scorecards

[42] http://www.wyomingoutdoorcouncil.org/about_woc/docs/report_2004.pdf - WOC annual glossy

[43] http://www.ourwater.org/materials/webfactsheet.1.html - fact reference, general

[44] http://water.usgs.gov/wsc/map_index.html - online USGS watershed maps

[45] http://www.coloradowaterbank.org/ - water bank experiment – bid/post water rights

[46] http://www.tu.org/site/pp.asp?c=7dJEKTNuFmG&b=275420 – trout unlimited lists riparian restoration successes in Colorado Basin

[47] http://www.greenkarat.com/about/miningtech/wmap_2005_summary_of_work.pdf - AZ UT NM victory stories against mining industry

[48] http://www.coloradoopenlands.org/content/view/52/90/ - Gunnison water storage info… but this group only cares about water insofar as it can be used to keep the land and river untapped

[49] http://ciruli.com/goco/s-a-protect.html#int-1 – GOCO strategic plan for protecting river corridors

[50] http://www.rmi.org/sitepages/pid120.php - Rocky mountain institute strategy for water management

[51] http://www.crwua.com/colorado_river/tentribes.htm - info on the coalition of 10 tribes and their senior water rights

[52] http://www.livingrivers.org/campaigns/index.cfm - living rivers/Colorado riverkeepers mission statement UT AZ

[53] http://www.nvgroundwaterproject.com/html/water_rights.html - info on NV water rights law

[54] http://www.cotrout.org/instream_flow.htm - In stream flow law, prior appropriations law explained.

[55] http://focuswest.org/water/budd.htm - Green is the only basin in the compact that allows trans-basin diversion. Wanted by Eastern WY municipalities.

[56] http://www.blm.gov/nstc/WaterLaws/utah.html - Utah in stream flow law info.

[57] http://www.blm.gov/nstc/WaterLaws/nevada.html - Nevada in stream flow info.

[58] http://www.blm.gov/nstc/WaterLaws/california.html - CA in stream flow info.

[59] http://www.blm.gov/nstc/WaterLaws/newmexico.html - NM in stream flow court precedent

[60] http://www.blm.gov/nstc/WaterLaws/pdf/StateFlowSummary.pdf - in stream flow summary

[61] http://www.protectwildutah.org/faq/waterRights.html - wilderness water rights info

[62] http://www.blm.gov/nstc/WaterLaws/fedreservedwater.html - federal reserved water rights

[63] http://www.npr.org/templates/story/story.php?storyId=1414565 – NPR water series

[64] http://www.sierraclub.org/rcc/southwest/coreport/background.asp#Tribal%20Water%20Claims – sierra club info on tribal claims and plans

[65] http://www.epa.gov/watertrain/cwa/ - clean water act overview

[66] http://www.wyomingoutdoorcouncil.org/news/newsletter/docs/2000b/ - CBM overview

[67] http://www.coloradowatershed.org/Staff.htm - Colorado Watershed Network Strategy and Staff Overview

[68] http://www.protectwildutah.org/about/index.html - Utah Wilderness Coalition Strategic Stance

[69] http://www.cotrout.org/AboutUs/tabid/76/Default.aspx - Colorado Trout Unlimited

[70] http://www.suwa.org/page.php?page_name=about_intro – Southern UT Wilderness Alliance

[71] http://www.wyovoters.org/AboutUs/AboutUs.htm – Wyoming Voters Strategy

[72] http://cfwe.org/Membership/memfaq.asp - Colorado Foundation for Water Education Member FAQ

[73] http://www.rmc.sierraclub.org/water – Sierra Club Rocky Mountain Chapter

[74] http://www.nfria.paonia.com/ - North Fork River Improvement Association Home

[75] http://www.coloradowater.org/about.htm - Colorado Watershed Assembly

[76] http://www.utahrivers.org/finalstrategicplan.pdf - Utah Rivers Strategy Statement

[77] http://www.livingrivers.org/history.cfm - Living Rivers, Colorado Riverkeepers history

[78] http://www.coloradowatershed.org/Staff.htm - Colorado Watershed Network, contains project history

Appendix

A. Partial Colorado Tributaries Hierarchy

- Colorado
  - Green
    - Price
    - Whiterocks
    - White
    - Yellowstone
    - Uinta
    - Barrier Creek
    - Yampa
    - San Rafael
    - Ashley Creek
    - Duchesne
    - New Fork
  - Roaring Fork
    - Fryingpan
    - Crystal
  - Gunnison
    - Taylor
    - East
    - North Fork of the Gunnison
    - Uncompahgre
  - Paria
  - Little Colorado
  - Muddy River
    - Meadow Valley Wash
  - Virgin
    - East Fork Virgin
    - North Fork Virgin
    - Santa Clara
  - Gila
    - Salt
      - White
      - Black
      - Verde
    - San Pedro
  - Dirty Devil
    - Fremont
    - Muddy Creek

- Dolores
  - San Miguel
- Escalante
- Kanab
- San Juan
  - Animas
  - Cottonwood Creek
- Bill Williams
- Eagle

B. Canyons List

Grand Canyon
Glen Canyon
Marble Canyon
Paria Canyon

C. Dam and Diversion List

Blue Mesa Dam
Crystal Dam
Davis Dam
Flaming Gorge Dam
Fontanelle Dam
Glen Canyon Dam & Lake Powell
Granby Dam & Lake Granby
Hoover Dam & Lake Mead
Imperial Dam
Laguna Dam & Reservoir
Morelos Diversion Dam
Morrow Point Dam
Navajo Dam
Palo Verde Dam
Parker Dam & Lake Havasu
Shadow Mountain Dam & Reservoir
Colorado River Aqueduct
San Diego Aqueduct
Central AZ Aqueduct
All-American Canal
Coachella Canal
Colorado-Big Thompson Project/Alva B. Adams Tunnel
Gunnison Tunnel

D. Other Important Watershed Features

Grand Lake
Sonoran Desert
Mojave Desert
Imperial Valley
Colorado Plateau
Colorado River Delta Region

E. Landmark Legislation, Decisions and Treaties

1908 Winters Doctrine (Winters v. US)
1922 Colorado River Compact
1928 Boulder Canyon Project Act (Hoover Dam)
1931 California 7-Party Agreement
1944 US-Mexico Allocation Treaty
1948 Upper Colorado River Basin Compact
1953 McCarran Amendment (water adjudication)
1956 Colorado River Storage Project Act
1964 SCOTUS Ruling on Arizona vs. California
1968 Colorado River Basin Project Act
1968 Wild And Scenic Rivers Act (PL 90-542)
1970 The Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs
1972 Clean Water Act
1973 Endangered Species Act
1973 US-Mexico Salinity Agreement
1974 Colorado River Basin Salinity Control Act
1992 Increased Appropriations for Central Utah Project, Canceled Funding for 1956 Act
2003 Zuni Indian Tribe Water Rights Settlement Act
2004 Arizona Water Settlements Act
2006 Compact States River Interim Operations Agreement (Feb 3 – recommendation from states to Reclamation)

F. Watershed Classification Guidelines

Class I Watershed: The watershed has high soil and water integrity relative to its natural potential condition. Disturbance does not compromise soil-hydrologic function or soil/stream resilience. No stream segment is damaged by physical,

chemical, or biological impacts such that any designated beneficial use is not fully supported or any resource value is seriously degraded.

Class II Watershed: The watershed has moderate soil and water integrity relative to its natural potential condition. Disturbance partly compromises soil-hydrologic function or soil/stream resilience. Recovery can occur naturally or through revised management with minimal capital investment. A minor part (less than 20%) of the steam segment miles are damaged by physical, chemical, or biological impacts such that nay designated beneficial use is not fully supported or any resource value is seriously degraded.

Class III Watershed: The watershed has low soil and water integrity relative to its natural potential condition. Disturbance widely compromises soil-hydrologic function or soil/stream resilience. Recovery requires capital investments and revised management. Land-disturbing actions are precluded, but must complement recovery. A major part (more than 20%) of the steam segment miles are damaged by physical, chemical, or biological impacts such that any designated beneficial use is not fully supported or any resource value is seriously degraded.