WATER ALLOCATION COMPACTS IN THE WEST: AN OVERVIEW

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INTRODUCTION

In the American West, questions of allocation typically dominate interstate water disputes. There are two common approaches for resolving these conflicts.[2] First, as the holder of "original jurisdiction" in disputes among states, the U.S. Supreme Court is empowered to resolve interstate complaints. Traditionally, this has been done using the highly flexible doctrine of "equitable apportionment" in which considerations of equity and need are used to craft allocations that can be later revisited by the Court should conditions change. The initial use of equitable apportionment was on the Arkansas River between Colorado and Kansas in 1907, although the most celebrated case in 1931 concerned the Delaware River.[3]

The second and much more common approach for resolving interstate conflicts in the West has been the use of interstate compacts (McCormick, 1994). Compacts are legally binding agreements between states, as authorized by the compact clause of the Constitution. States generally prefer compacts over equitable apportionment proceedings since they can retain control over the dispute resolution process, the terms of the ultimate agreement, and the implementation arrangements. Compacts also allow allocations to occur long before needs materialize, which can greatly aid long-term planning and management programs. For these and other reasons, even the courts typically encourage compacts over judicial proceedings.[4]

Twenty-two interstate compacts containing a specific water allocation formula can be found west of the Mississippi River.[5] They are listed below:

1. Arkansas River Compact of 1948
2. Arkansas River Compact of 1965
3. Arkansas River Compact of 1970

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[2] Arguably, a third strategy also exists, but it is far from common: congressional apportionment. This approach is not included here because it has only been observed in one, highly unusual situation, and is generally not expected to emerge again as a means for interstate apportionment. The case in question involved allocation of the Lower Colorado River among Arizona, California, and Nevada, something that Congress effectively did (according to a later court decision) in the Boulder Canyon Project Act of 1928 (Getches, 1990).

[3] *Kansas v. Colorado*, 206 U.S. 46 (1907); *New Jersey v. New York*, 283 U.S. 336 (1931).

[4] For example, see: *Colorado v. Kansas*, 320 U.S. 383, at 392 (1943).

[5] This list is believed to be complete. Note that other compacts mention the subject of allocation (i.e., apportionment), but are omitted here if they do not provide a specific (quantified) allocation formula.

4. Bear River Compact of 1978 (originally 1955)
5. Belle Fourche River Compact of 1943
6. Big Blue River Compact of 1971
7. Caddo Lake Compact of 1979
8. Canadian River Compact of 1950
9. Colorado River Compact of 1922
10. Costilla Creek Compact of 1963 (originally 1944)
11. Klamath River Compact of 1957
12. La Plata River Compact of 1922
13. Pecos River Compact of 1948
14. Red River Compact of 1978
15. Republican River Compact of 1942
16. Rio Grande Compact of 1938
17. Sabine River Compact of 1953
18. Snake River Compact of 1949
19. South Platte River Compact of 1923
20. Upper Colorado River Compact of 1948
21. Upper Niobrara River Compact of 1962
22. Yellowstone River Compact of 1950

Interstate water allocation compacts are also becoming fashionable in the East, as found in the Delaware, Susquehanna, Apalachicola-Chattahoochee-Flint (ACF), and Alabama-Coosa-Tallapoosa (ACT) River Basins. The Delaware and Susquehanna compacts are unique in that they involve the federal government as a signatory and partner (so-called federal-interstate compacts) (GAO, 1981). The agreements in the ACT/ACF basins are unique in that they do not include allocation formulas, but rather establish commissions empowered to later devise allocation compacts—an ongoing exercise.

Typically, the negotiation and approval of interstate compacts has followed a 5-step process: (1) Congress authorizes the states to negotiate a compact, (2) state legislatures appoint commissioners, (3) the commissioners meet, usually aided by a federal chairman, to negotiate and sign the agreement, (4) the state legislatures ratify the compact, and (5) Congress ratifies the compact. Omitted from this description is the common role of federal water development in stimulating agreements, as the Department of the Interior typically required states to resolve interstate water allocation disputes prior to commencing federally funded river basin developments. The best example of this phenomenon occurred in the Upper Colorado River Basin, where a Bureau of Reclamation study identifying 134 potential projects prompted the basin states within four months to begin compact negotiations.

ALLOCATION FORMULAS

The key element in interstate water allocation compacts is the mathematical formula used to apportion flows. The treatment of two related variables best explains the different approaches seen in allocation formulas: (1) the type of hydrologic standards used, and (2) the time scale over which the hydrologic variables are measured:

- **Hydrologic Standards**: Four general approaches can be identified pertaining to the type of hydrologic standards used: (1) systems based on maintaining minimum flow levels at state lines (or other useful gauging stations), (2) approaches based on reservoir storage, (3) formulas allocating fixed or percentage-based rights to consumption or diversion, and (4) a requirement for upstream states to deliver downstream a minimum *volume* (rather than a constant *flow* rate) over a lengthy time period.

- **Time Scale**: Four general approaches can be identified pertaining to the time scales employed in operation of the allocation formula: (1) constant requirements (same standard in effect at all times); (2) seasonal requirements, (3) annual requirements (i.e., typically a "water year" standard); and (4) a multi-year requirement.

Another parameter occasionally of concern is the type of information required as inputs for formula operation, in part because this has great implications for administrative arrangements. Some approaches require daily measurements or calculations; others only require this information periodically or under special circumstances; while others—such as those limiting the construction of storage capacity—do have require any field monitoring. As a practical matter, information needs are primarily a function of the hydrologic standards and time scales employed.

Table 1 provides a summary of the approaches used in the 22 compacts studied. (All tables are provided at the end of the document.)

ADMINISTRATIVE ARRANGEMENTS

Administering compact allocations and resolving conflicts are duties frequently delegated to compact commissions formed by the interstate agreements. Eighteen of the 22 compacts either establish, or provide for the establishment of, a compact commission. When a commission is established, a key decision is whether or not a federal member should be included, and if so, whether that member should have full voting rights in the decision making of the body. Fourteen of the 22 compacts studied have a federal member, but only in one case—the Upper Colorado River Commission—does that member have a vote. This information is summarized in Table 2.

PROBLEMS WITH INTERSTATE COMPACTS

Several compacts have been highly problematic. Examples include those for the La Plata, Pecos, Canadian, Arkansas, Rio Grande, and Colorado Rivers. Problems usually stem from noncompliance with compact terms, incorrect assumptions about precipitation and runoff levels, the omission of key factors in the apportionment formula (e.g., the failure to consider surface water/groundwater connections), and growth of water demands in some areas beyond compact apportionments (Kenney, 1996). Most of these problems can be avoided in new compacts by basing apportionments on percentages (rather than absolute values), utilizing good scientific data, providing a strong Commission and related means of administration and dispute resolution, and by broadening the scope of the agreement somewhat to include related topics influencing, and influenced by, the apportionment.

COMMON OMISSIONS

A growing concern in many of the western water allocation compacts is their narrow focus, which is problematic given the salient impact of water allocation on other facets of water management. For this reason, these compacts are often felt to have serious substantive omissions. One of the easiest ways to document these omissions is to search the text of the agreement for key terms. Some of the more potentially serious omissions are discussed below, and summarized in Table 3.

GROUNDWATER (search terms: groundwater, ground water, aquifer)

A failure to consider the groundwater/surface water connection is at the heart of many problematic compacts. Any reference to groundwater occurs in only three of the 22 compacts studied: the Bear River Compact (1955, 1978), the Klamath River Compact of 1957, and the Upper Niobrara River Compact of 1962. More often than not, these few references sidestep the issue of groundwater/surface water connections, defining some groundwater as outside the scope of the agreement, and postponing any action on groundwater to a future negotiation following technical studies:

- In two instances, the Bear River Compact (1955, 1978) mentions groundwater: once to clarify that tributary groundwater is part of a specific apportionment rule, and once to mention that both surface water and groundwater used for small-scale domestic and stock watering purposes are outside the scope of the compact apportionment.

- The Klamath River Compact of 1957 essentially defines groundwater as outside the scope of the agreement, which is confined to water "appearing on the surface of the ground in streams, lakes or otherwise, regardless of whether such waters at any time were or will become *ground water*, but shall not

include water extracted from underground sources until after such water is used and becomes surface return flow or waste water" (emphasis added).

- The Upper Niobrara River Compact of 1962 apportions surface water, but recognizes a desire to later apportion groundwater pending further study. Specifically, the states of "Nebraska and Wyoming recognize that the future use of ground water for irrigation in the Niobrara River basin may be a factor in the depletion of the surface flows of the Niobrara River, and since the data now available are inadequate to make a determination in regard to this matter, any apportionment of the ground water of the Niobrara River basin should be delayed until such time as adequate date [data] on ground water of the basin are available."

NATIVE AMERICAN WATER INTERESTS (search terms: Indian, tribe, tribal, Native American, indigenous)

Nine compacts make at least a reference to Native American interests in the waters apportioned: the Bear River Compact of 1955 (and 1978), the Canadian River Compact of 1950, the Colorado River Compact of 1922, the Klamath River Compact of 1957, the Rio Grande Compact of 1938, the Snake River Compact of 1949, the Upper Colorado River Compact of 1948, the Upper Niobrara River Compact of 1962, and the Yellowstone River Compact of 1950.[6] In each case, however, no meaningful effort is made to quantify or include tribal water rights into the apportionment.

Regarding Indian water rights, the compacts use remarkably similar, "boilerplate," language. The language of the Colorado River Compact of 1922 established the standard that the others closely follow: "Nothing in this compact shall be construed as affecting the obligations of the United States of America to Indian tribes." By identifying tribal water rights as a federal obligation, the apportionment among the states is, presumably, unaffected. The Snake River Compact of 1949, however, recognizes an important but normally unspoken caveat of the apportionment that is likely true in the other compacts: "The water required to satisfy these rights shall be charged against the allocation made to the state in which the Indians and their lands are located."

ENVIRONMENTAL PROTECTION (search terms: environment, environmental)

The term "environment" or "environmental" shows up in two of the 22 compacts: the Red River Compact of 1978, and the Caddo Lake Compact of 1979. However, since the Caddo Lake Compact is a further refinement of the apportionment already described in the Red River Compact, these two references could arguably be viewed as one. (Note that these are two of the three youngest of the 22 compacts.)

[6] The phrase "reserved rights" does not appear in any of the 22 compacts.

The Caddo Lake Compact articulates a desire to "preserve and protect Caddo Lake as a valuable *environmental*, cultural and natural resource and enhance water resource and recreational potentials, while allowing its utilization for water needs of adjacent portions of Louisiana and Texas" (emphasis added). (It also contains a stray reference to the National Environmental Policy Act.) The Red River Compact, meanwhile, contains references to the problem of water pollution, and its potential to result in "adverse social, economic, and *environmental* impacts" (emphasis added).

FISH AND WILDLIFE (search terms: fish, fishery, fisheries, wildlife, wildfowl)

References to fish and/or wildlife occur in only four of the 22 compacts: the Big Blue River Compact of 1971, the Klamath River Compact of 1957, the Red River Compact of 1978, and the Snake River Compact of 1949.

- The Big Blue Compact apportions water supply storage limits that are exclusive of storage needed for "improvement of water quality, for *fishery*, *wildlife*, or recreation purposes" (emphasis added).

- The scope of the Klamath Compact includes the "use of water for domestic purposes; the development of lands by irrigation and other means; the protection and enhancement of *fish, wildlife* and recreational resources; the use of water for industrial purposes and hydroelectric power production; and the use and control of water for navigation and flood prevention" (emphasis added). To the extent that insufficient water is available to satisfy all uses, the compact further states that fish and wildlife issues will be given priority over industrial and hydroelectric uses, but will be junior to domestic uses and irrigation.

- The Red River Compact mentions adverse impacts to "fish and other aquatic life" as one example of pollution.

- The Snake River Compact identifies certain types of reservoirs where releases—not to exceed 5 cubic feet/second—are required, as necessary, to maintain fish and wildlife and for stock water use.

In no case is the protection of fish and wildlife a serious area of focus, and only in the Klamath Compact are fish and wildlife issues mentioned several times. "Biodiversity" is never mentioned in the 22 compacts.

WATER QUALITY (search terms: water quality, pollution)

The 22 western compacts selected for study are those featuring water allocation formulas. Some compacts lacking allocation formulas but dealing with pollution exist, but are generally found in the eastern United States. Of the 22 western compacts, 6 (of the mostly younger compacts) mention water quality and/or pollution: the Arkansas River

Compact of 1965, the Arkansas River Compact of 1970, the Big Blue River Compact of 1971, the Caddo Lake Compact of 1979, the Klamath River Compact of 1957, and the Red River Compact of 1978.

Most of these compacts are similar in structure (and language) regarding pollution, identifying deteriorating water quality as a problem of mutual concern, and committing to an active pollution-abatement program. The relevant commissions are instructed to collect information, promote coordination among existing pollution control organizations, and in rare occasions, to take regulatory action. For example, the Klamath Commission, is empowered, when necessary, to issue binding and legally enforceable pollution control regulations. Similarly, under very specific and limited conditions, the Red River Commission can litigate to ensure full compliance with existing regulations.

DROUGHTS AND RELATED EMERGENCIES (search terms: climate, drought)

Few compacts make specific references to drought conditions, perhaps because well-designed allocation formulas anticipate shortages. Nonetheless, it is odd that only one of the 22 compacts studied mentions the term "drought."[7] That reference occurs in the Upper Colorado River Basin Compact of 1948, which merely empowers the Commission to "Make findings of fact in the event of the occurrence of extraordinary drought or serious accident to the irrigation system in the upper basin…"

The issue of drought management is more explicitly addressed in two of the three compacts that feature the term "emergency." The Caddo Lake Compact of 1979 empowers the Commission to authorize diversions during an emergency or other catastrophic event, "such as destruction of a municipality or political subdivision's other water supply source or a drawdown which is more severe than the critical drawdown of record." A much more precise strategy is outlined in the Bear River Compact of 1978, which provides a specific apportionment schedule for times of water emergency, defined in terms of flows below a given theshold. The other compact mentioning emergencies, the Klamath River Compact of 1957, is simply in reference to a temporary waiving of the public hearing requirement as part of rulemaking.

In contrast, note that *floods* are mentioned in 8 compacts, and mentioned repeatedly in two compacts: the Pecos River Compact of 1948, and the Red River Compact of 1978. These references are necessary to account for excess flows that can be subject to further apportionment.

OTHER PROBLEMS WITH COMPACTS

These "omissions" can hinder the utility of compacts as the basis for interstate water management. In addition to the problems associated with the substantive omissions, compacts can raise other concerns and problems—e.g.:

[7] None of the compacts mentions the word "climate."

- While water allocation compacts often provide an element of certainty, stability, and civility in interstate water issues, this certainty can be somewhat counterproductive, in that it can eliminate the need and opportunity for continued interaction among the basin states. With the very limited exception of periodic meetings of compact commissioners, so-called "successful" compacts generally do not require interstate coordination or ongoing cooperation, and provide little reason for one state to be concerned with the water needs of the other.

- Similarly, the stability offered by a compact apportionment can, in certain circumstances, be viewed as inflexibility. Unlike an equitable apportionment, compacts cannot be modified unilaterally except, perhaps, by congressional action—and no congress has demonstrated an interest in testing that power. Additionally, unlike intrastate water rights administered under a prior appropriation scheme, compact water rights are generally not believed to be marketable at the interstate scale. No western compact mentions interstate marketing. While this "omission" is generally viewed as desirable by the signatory states, it is nonetheless a source of inflexibility in water systems that are generally acknowledged to need greater flexibility. For these and related reasons, compacts should only be considered as useful tools for allocation, not reallocation.

- Compacts also do not usually reconcile hydrologic and political regions. While the signatories to a compact may collectively encompass the entire drainage basin of a particular river, the boundaries of those states do not follow the actual contours of the river basin. Consequently, within states, issues arise about whether to use compact apportionments within the basin itself, or in areas outside the basin. Many of the largest users of the Colorado River, for example, lie outside the topographic bounds of the river basin (e.g., Los Angeles), but are within the states recognized in the compacts. Issues of intrastate allocation normally fall to other state law and political processes.[8]

CONCLUSIONS AND RECOMMENDATIONS

Water allocation compacts in the West have been effectively used to resolve (and preempt) dozens of interstate water conflicts. This is a significant accomplishment, and suggests an ongoing need for compacting processes. Yet, it is important to realize the limitations of the compact approach. Many compacts are problematic in various ways, and few offer any basis for truly integrated management at the basin scale. In part, this is a reflection of the circumstances and era in which most of the compacts were negotiated: most were enacted to clear the way for dam-building projects, and only 2 of the compacts, for example, were enacted (in their original version) after passage of the Clean Water Act in 1972. Compacts aggressively addressing issues such as water quality

[8] There are exceptions. The Klamath River Compact, for example, explicitly provides priority to users of Klamath River water in California that reside within the drainage basin.

management, flood control and planning, and project integration are relatively common, but are generally confined to the Midwest and East, and are generally distinct from the western agreements focused on allocation (Muys, 1971). Similarly, only in the East do you see the federal-interstate compacts (that include the federal government as a signatory and equal partner), and in no circumstance do you see a significant effort to include tribal interests in these regional agreements. And compact commissions, where they exist, are usually very modest organizations with very narrow functions and authorities. Thus, while there is no reason why water allocation compacts cannot be a stepping-stone to more integrated and sophisticated regional water management, that is simply not what has happened in practice. If additional compacts are to be crafted in the future, it would be reasonable to demand a little more ambition from the negotiators.

Despite these concerns about the limited scope of most compacts, the fact remains that the success of future water allocation compacts is still primarily tied to the quality of the allocation formulas crafted. A good formula is normally one based on accurate and complete information, easily measured hydrologic parameters, and that anticipates all relevant complicating factors—such as the surface/ground-water connection. The design should reflect the physical and institutional features in the basin, including the infrastructure of water projects and gauges, the availability of information (and technical understanding), the water needs of the residents, and the current and emerging water management challenges.

Prior to enactment, draft formulas should be evaluated with respect to the following questions (Kenney, 1996):

- Could special situations arise in which the allocation formula is simply not functional, or confusion exists in the apportionment of limited (or excessive) flows?

- Will the Commission (or other administrative body) be expected to make decisions based on incomplete or poor information, or be expected to frequently make "judgment calls"?

- Could one of the following factors or events disrupt the functioning of the allocation formula:
    - changes to the physical system through natural processes;
    - new water developments or uses;
    - situations in which water quality influences water supply;
    - natural depletions, including environmental needs;
    - interbasin transfers;
    - exercise or redefinition of tribal water rights or federal reserved rights;
    - extreme events (droughts and floods) and long-term climatic change;
    - surface water/groundwater interactions.

- Will the proposed formula create any special problems for, on demands on, water administrators?

- Will the Commission (or similar body) lack adequate access to resources, expertise and authority?

- Does the agreement lack a dispute resolution mechanism?

- Does the agreement violate norms of fairness and political expertise?

If the answer to any of these questions is “yes,” then additional work is required.

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TABLE 1. WATER ALLOCATION COMPACTS IN THE WEST: ALLOCATION FORMULAS

Compact			Hydrologic Standard Used				Time Scale of the Hydrologic Standard			
Basin	Signatory States	Year	Minimum Flows	Reservoir Storage	Consumptive Amount	Delivery Volume (annual or longer)	Constant	Seasonal	Annual	Multi-Year
Arkansas	CO, KS	1948		X				X		
Arkansas	KS, OK	1965		X			X			
Arkansas	AR, OK	1970			X				X	
Bear	ID, UT, WY	1955, 1978		X	X		X			
Belle Fourche	WY, SD	1943			X		X			
Big Blue	NE, KS	1971	X	X			X	X		
Caddo Lake	LA, TX	1979			X			X		
Canadian	NM, TX, OK	1950		X			X			
Colorado	WY, CO, UT, NM, NW, AZ, CA	1922				X				X
Costilla Creek	CO, NM	1944, 1963			X			X		
Klamath	OR, CA	1957			X		X			
La Plata	CO, NM	1922	X				X	X		
Pecos	NM, TX	1948	X		X					X
Red	TX, OK, AR, LA	1978			X				X	
Republican	CO, NE, KS	1942			X				X	
Rio Grande	CO, NM, TX	1938				X			X	
Sabine	TX, LA	1953	X		X		X		X	
Snake	WY, ID	1949			X				X	
South Platte	CO, NE	1923	X				X	X		
Upper Colorado	WY, CO, UT, NM	1948			X				X	
Upper Niobrara	WY, NE	1962		X					X	
Yellowstone	WY, MT, ND	1950			X				X	

TABLE 2. WATER ALLOCATION COMPACTS IN THE WEST: ADMINISTRATIVE ARRANGEMENTS

Compact			Commission Exists		Federal Member	
Basin	States	Year	Yes	No	Yes	No
Arkansas	CO, KS	1948	X		X	
Arkansas	KS, OK	1965	X		X	
Arkansas	AR, OK	1970	X		X	
Bear	ID, UT, WY	1955, 1978	X		X	
Belle Fourche	WY, SD	1943		X		No commission
Big Blue	NE, KS	1971	X		X	
Caddo Lake	LA, TX	1979	X			X
Canadian	NM, TX, OK	1950	X		X	
Colorado	WY, CO, UT, NM, NW, AZ, CA	1922		X		No commission
Costilla Creek	CO, NM	1944, 1963	X			X
Klamath	OR, CA	1957	X		X	
La Plata	CO, NM	1922	X			X
Pecos	NM, TX	1948	X		X	
Red	TX, OK, AR, LA	1978	X		X	
Republican	CO, NE, KS	1942	X		X	
Rio Grande	CO, NM, TX	1938	X		X	
Sabine	TX, LA	1953	X		X	
Snake	WY, ID	1949		X		No commission
South Platte	CO, NE	1923	X			X
Upper Colorado	WY, CO, UT, NM	1948	X		X	
Upper Niobrara	WY, NE	1962		X		No commission
Yellowstone	WY, MT, ND	1950	X		X	

TABLE 3. WATER ALLOCATION COMPACTS IN THE WEST: SCOPE

Compact			The following terms (and their variants) appear in the text:					
Basin	States	Year	Ground-water	Indian Rights	Environment	Fish & Wildlife	Water Quality	Drought
Arkansas	CO, KS	1948						
Arkansas	KS, OK	1965					X	
Arkansas	AR, OK	1970					X	
Bear	ID, UT, WY	1955, 1978	X	X				
Belle Fourche	WY, SD	1943						
Big Blue	NE, KS	1971				X	X	
Caddo Lake	LA, TX	1979			X		X	
Canadian	NM, TX, OK	1950		X				
Colorado	WY, CO, UT, NM, NW, AZ, CA	1922		X				
Costilla Creek	CO, NM	1944, 1963						
Klamath	OR, CA	1957	X	X		X	X	
La Plata	CO, NM	1922						
Pecos	NM, TX	1948						
Red	TX, OK, AR, LA	1978			X	X	X	
Republican	CO, NE, KS	1942						
Rio Grande	CO, NM, TX	1938		X				
Sabine	TX, LA	1953						
Snake	WY, ID	1949		X		X		
South Platte	CO, NE	1923						
Upper Colorado	WY, CO, UT, NM	1948		X				X
Upper Niobrara	WY, NE	1962	X	X				
Yellowstone	WY, MT, ND	1950		X				