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BEFORE THE ARIZONA NAVIGABLE STREAM ADJUDICATION COMMISSION

In re Determination of Navigability of the Salt River	No. 03-005-NAV No. 04-008-NAV (Consolidated) **SALT RIVER PROJECT'S OPENING MEMORANDUM**

Pursuant to the Chairman's Order,[1] the Salt River Project Agricultural Improvement and Power District and Salt River Valley Water Users' Association (collectively, "SRP") submit their opening memorandum in this matter regarding the Salt River ("Salt"). Based upon the evidence in the record and application of the appropriate legal test, the Commission should again find that the Salt is not navigable. The Commission need not address "segmentation" issues in detail because no significant portion of the Salt is navigable.[2]

A table of contents begins on page iii. For purposes of this memorandum, exhibits from the hearings before 2015 are referred as "EI __." Supplemental exhibits from the 2015/16 hearings are

[1] Scheduling Order Setting Dates for Submission of Evidence, Submission of Memoranda and Findings of Fact and Conclusions of Law, and Closing Argument on the Navigability of the Salt River (May 26, 2016).

[2] For purposes of this memorandum, SRP generally accepts the "segments" proposed by the Arizona State Land Department ("ASLD"), with the exception that the ASLD has wrongly included the lands beneath Roosevelt Lake, over which the Commission lacks jurisdiction. *See* Note 6, *infra*.

referred to as "C __." Citations to the reporter's transcript of proceedings at the hearings appear as "Tr. [DATE]:[PAGE] (WITNESS)."

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I. Introduction and Summary of Argument

On September 21, 2005, after a full evidentiary hearing, this Commission found: "[T]he Lower Salt River from Granite Reef Dam to its confluence with the Gila River was not used or susceptible of use for commercial trade or travel as of February 14, 1912 and therefore was not navigable as of that date nor was it susceptible to navigation."[3] Similarly, on December 13, 2007, the Commission made the same finding for the Upper Salt River from its confluence with the White and Black Rivers to Granite Reef Dam.[4]

The Commission's decision for the Lower Salt was appealed to the Arizona Court of Appeals, and on April 27, 2010, the Court determined that the Commission had failed to properly view the river in its "ordinary and natural condition" because it had not considered diversions of water prior to construction of Roosevelt Dam. *State ex rel. Winkleman v. Arizona Navigable Stream Adjudication Comm'n*, 224 Ariz. 230, 241-42, 229 P.3d 242, 253-54 (App. 2010) ("*Winkleman*"). The Court vacated the superior court's judgment upholding ANSAC's determination and remanded the case to ANSAC for further proceedings consistent with its decision. *Id.* at 245, 229 P.3d at 257.

In addition, the U.S. Supreme Court issued its opinion in *PPL Montana, LLC v. Montana*, 132 S.Ct. 1215 (2012), the first significant navigability case decided by that Court in several years. Although the flaws that the Arizona appellate court found in the Commission's 2005 Lower Salt Decision were not present in its 2007 Upper Salt Decision,[5] the parties agreed to remand the Upper Salt appeal (along with those for the Lower Salt and four other watercourses) to ANSAC, in order to give the Commission the opportunity to consider the evidence in light of *Winkleman* and *PPL Montana*.

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[3] ANSAC, *Report, Findings and Determination Regarding the Navigability of the Salt River from Granite Reef Dam to the Gila River Confluence*, at 45-46 (Sept. 21, 2005) ("2005 Lower Salt Decision"). "Lower Salt" refers to this stretch of the river.

[4] ANSAC, *Report, Findings and Determination Regarding the Navigability of the Upper Salt River from the Confluence of the White and Black Rivers to Granite Reef Dam*, at 64-65 (Dec. 13, 2007) ("2007 Upper Salt Decision"). "Upper Salt" refers to this stretch of the river.

[5] In the 2007 Upper Salt Decision, for instance, "the Commission considered the Upper Salt River streambed as it existed on February 14, 1912, in its ordinary and natural course under Canyon Lake, Apache Lake and Saguaro Lake, and found that the watercourse was not navigable." 2007 Upper Salt Decision, at 62.

On remand, the Commission consolidated the Upper Salt and Lower Salt cases, held an additional twenty-three days of hearings and reviewed thousands of pages of supplemental exhibits. This additional fact-finding, if anything, further emphasized the correctness of the Commission's prior decisions. No segment of the Salt has ever been a navigable watercourse that was or could have been used as a "highway for commerce." The Commission should again find the Salt non-navigable.[6]

II. Evidence in the Record

The Commission has, over more than a decade, continued to receive and review evidence regarding whether the Salt was navigable in its "ordinary and natural condition" on February 14, 1912. *See* A.R.S. §§ 37-1101 to -1156. The Commission held twenty-six days of hearings between 2005 and 2016. Despite these hearings, the proponents of navigability ("Proponents") have been unable to show that any segment of the Salt is or ever was navigable.

A. History of the Salt

1. Historic and prehistoric Indian use

"For more than 1,000 years, water from the Salt River has allowed civilizations to flourish in the Salt River Valley. . . . The Salt River Valley was one of the most densely populated areas in the prehistoric southwest and contained the most extensive irrigation system in prehistoric North America."[7] When Europeans arrived in the Valley, Hopis, Paiutes, River Yumans, Upland Pais, and O'odham were already living in the area, and they "battled, slept, and traded with one another, exchanging ideas, rituals, foodstuffs, seeds, ceramics, and genes." *See* August 2015, at 1-2.

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[6] SRP joins and incorporates by reference the Opening Memorandum of the Cities of Phoenix, Tempe, and Mesa and the Opening Memorandum filed by Cemex ("Cemex Memorandum"). SRP also incorporates by reference its previous memoranda regarding the Salt filed in 2003 (Lower) and 2006 (Upper). SRP reasserts its request that the Commission confirm its 2007 finding that it lacks statutory subject matter jurisdiction to determine the navigability of Roosevelt Lake and the portion of the former Salt River lying beneath Roosevelt Lake up to the 1912 height of Roosevelt Dam. *See* SRP's Renewed Motion for Finding of Lack of Jurisdiction to Determine Navigability of Roosevelt Lake and Former Salt River Beneath It (May 18, 2015).

[7] Fuller, et al., *Arizona Stream Navigability Study for the Salt River: Granite Reef Dam to the Gila River Confluence*, at 2-1 (April 2003) [Lower Salt EI 30] ("Fuller Lower Salt 2003"); *see also* August, *History of the Lower Salt River prior to February 14, 1912*, at 4 (2015) ("August 2015"); Tr. 2/26/16:3445 (Gookin).

"Although there is abundant evidence that the Hohokam needed transportation for travel, and trade, there is no evidence that they navigated the Lower Salt or Gila rivers."[8] In contrast, there is clear evidence of Native American navigation of the Colorado and other southwestern rivers.[9] "If the Hohokam had had a navigable river here, they would have turned out to be a very different culture. . . . So that complete absence of any kind of archaeological evidence of boat use on the river is very, very telling about the nature of the river even as far back as a thousand years."[10]

2. Spanish explorers

The Spanish controlled central Arizona from 1598 to 1848. *See* Tr. 1/26/16:1894 (August). Ecclesiastical Spanish explorers, Spanish military, and Mexican military kept extensive records. *Id.* at 1897-99. It was the responsibility and purpose of Spanish ecclesiastical and military explorers to "make observations about the natural resources, the topography, the general geographic features," and recording a navigable stream would have been "[e]xtremely important." *Id.* at 1900. It also would have been important to the Spanish to establish a presence for ecclesiastical purposes "especially along a navigable river." *Id.* at 1895. "[I]f they had a navigable stream, that would certainly encourage a mission, a settlement, and attainment for those purposes." *Id.* Moreover, the Spanish were very familiar with water navigation and boat building. *Id.* at 1903-04. For instance, they navigated the Colorado. *Id.* at 1904. If the Salt had been navigable, it would have altered the course and history of Spanish exploration in Arizona. *Id.* at 1923.

In all of the accounts that Dr. August reviewed, not one mentions the use of boats on the Salt. *See* Tr. 1/26/16:1902 (August). Even Mr. Fuller admitted that there is no evidence that Spanish

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[8] August 2015, at 3-4; Tr. 4/7/03:26-27 (Fuller); Tr. 10/20/15:169 (Fuller); Tr. 5/19/16:5043-44 (Fuller); Tr. 10/20/05:28 (Gilpin); Tr. 1/26/16:1884 (August) (The Hohokam traveled for a variety of reasons including trade, food stuffs, spiritual activities—"travel was an essential part of their existence.").

[9] Tr. 3/31/16:4471 (Newell); Newell, *Synopsis of Historic Watercraft Operating in Southwestern States and the Salt River, Arizona*, at 18 (2016) [C044] ("Newell").

[10] Tr. 3/30/16:4249 (Newell); *see also* Tr. 1/26/16:1888-90 (August) ("[T]hey may have survived longer than they did, and they may have been able to trade more robustly with other peoples, especially if they could flow down the river to the Gila and to the mouth of the Colorado.").

explorers ever navigated the Salt.[11] In contrast, Spanish explorers navigated the Colorado. *See* Tr. 10/20/15:168 (Fuller). Spanish explorers encountered the Pimas and took detailed records of what they saw, but there is no mention of boats in those records. *See* Tr. 11/19/2015:1461 (Gookin).

3. American trappers and mountain men

Trappers first came through the Salt River in the 1820s. *See* Tr. 10/20/15:157 (Fuller); Fuller PowerPoint, at 112. For instance, James Ohio Pattie, one of the trappers who documented his trips, did not use boats on the Salt. *See* Tr. 11/19/15:1465 (Gookin). Dr. August testified:

> The mountain men did not stay in Arizona long enough to transform its economy or ecology. Nor did they use the Salt River as a highway of transportation, trade, or commerce. Whether they exported their pelts through New Mexico or California, they moved through Arizona on foot or horseback. This was not simply a matter of preference. Their horses were frequently stolen by the Apache and other local tribes, so travel by boat - using the same rivers they trapped for pelts - would have been preferable. . . .

August 2015, at 23-24. "Though trapping continued well into the 1840s[,] this vanguard of American expansionism did not use boats for travel along the Lower Salt or other streams, like the Gila and Verde, and instead traveled by horses, mules, wagon, or foot along the sides of the rivers." *Id.* at 24. The mountain men traveled overland, were familiar with various types of boats because they had trapped on "more substantial rivers" where boats were used, and could have built boats, but they did not use boats to trap on the Salt. *See* Tr. 1/26/16:1925-28 (August); Tr. 11/20/15:1733 (Gookin).

4. Military expeditions

Fort McDowell was founded in 1865. *See* Tr. 10/20/15:158 (Fuller); Fuller PowerPoint, at 112. The early military expeditions in Arizona would have made observations regarding the navigability of the Salt if it had been navigable. *See* Tr. 1/26/16:1936 (August). They would have made record of a navigable river even if they did not navigate it. *Id.* at 1936-37. A navigable river would have been useful to early military settlements for the movement of "men, munitions, animals from . . . Camp Verde . . . to Fort Yuma." *Id.* at 1938.

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[11] *See* Tr. 10/22/15:710-711 (Fuller); Fuller, *Presentation to ANSAC: Salt River Navigability*, at 121 (Oct. 15, 2015) [C030-ASLD364] ("Fuller PowerPoint").

"The historical record of this period indicates that there was a significant need for transportation in Central Arizona. In spite of this need, there is no record the military or explorers of the era used, or considering using, the Salt River for navigation." August 2015, at 34. Although the military built boats, they were used as ferries and not to transport goods and supplies. *See* Tr. 11/19/15:1466-67 (Gookin). A navigable Salt would have been an easier mode of travel and moving supplies for military expeditions than building roads. *See* Tr. 1/26/16:1939-40 (August). There is not a single military record or account that suggests the use of the Salt for transportation. *See* Tr. 1/26/16:1945 (August); Newell, at 23-24.

5. Settlers

Swilling's Ditch, the first modern irrigation in the Salt River Valley, was dug in 1868. *See* Tr. 10/20/15:158 (Fuller); Fuller PowerPoint, at 112. Early Anglo settlers to the Valley used the river for irrigation but did not boat it. *See* Tr. 1/26/16:1945 (August). Mr. Fuller argued that, when the river was in its natural condition, there were no people to boat it; and, when people finally settled in the Valley, the river was no longer natural because of diversions. *See* Tr. 10/22/15:708-09 (Fuller). On cross-examination, however, Mr. Fuller admitted that his "population paradox" argument does not consider native populations. *Id.*

Mr. Fuller testified that there were nine ferries in Segment 6 and three in Segment 3. *See* Fuller PowerPoint, at 195-96. "The flow pattern of the Salt and Gila Rivers was seasonal. During most of the year, the rivers were easily forded either on foot, on horseback, or in wagons. During periods of high water, roughly one or two months of the year, ferries were used to cross the rivers at various locations."[12] Dr. Newell testified that ferries were "part of a road system. In fact, if you have a lot of ferries, that's a good indication that the river they cross is surrounded by a network of roads. That in itself indicates the river's probably not being used for trade and transportation." Tr. 3/30/16:4229 (Newell). "[I]f a stagecoach company needed to get passengers across a river, a ferry at sometimes was the only way to do it." *Id.* at 4230.

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[12] Lacy, *A Historical Analysis of Portions of the Salt and Gila Rivers, Arizona*, at 32 (Feb. 1987) [Lower Salt EI12, Part 2, Tab 2] ("Lacy 1987"); Tr. 1/26/16:1945 (August).

"[T]he U.S. Reclamation Service itself constructed a lengthy road, now known as the Apache Trail, through extremely difficult terrain to the Roosevelt Dam site in the early twentieth century to carry supplies to and from the reservoir rather than using the Salt River to transport those materials. Furthermore, a ferry boat to be used on the lake behind Roosevelt Dam was hauled overland in 1908 from Mesa, Arizona, rather than using the Salt River to get the ferry to the lake."[13]

6. Federal land surveys

After acquiring a vast territory in the Southwest following the Mexican-American War, federal officials were eager to determine the value of the land they had obtained, including the area around the Salt. *See* Littlefield 2015, ¶ 18. The U.S. General Land Office ("GLO") sent surveyors across the territory to take detailed surveys of the newly acquired land. *Id.* The surveys and accompanying field notes provide a "wealth of information about the nature of the stream and its navigability or non-navigability." *Id.* Under the guidance of survey manuals, the GLO surveyors were tasked with specifically delineating navigable rivers by "meandering" or detailing the sinuosities of navigable waterways. *Id.* ¶ 20.

Prior to Arizona statehood, the GLO conducted surveys of the Lower Salt in 1868, 1888, 1899, and 1910-11. *See* Littlefield 2015, ¶ 21. As for the Upper Salt, surveys were conducted in the area around Granite Reef Dam in 1868, some of the area now inundated by Roosevelt Lake in 1881, and the Verde confluence in 1911. *Id.*

In 1868, a time when Mr. Fuller testified that the Salt was "probably" close to its ordinary and natural condition,[14] the Ingalls brothers surveyed the area along the Salt between Granite Reef and the Gila confluence. *See* Littlefield 2015, ¶ 22. Those surveyors would have had to cross the Salt "somewhere around 30 times" just to survey one township. *See* Tr. 3/30/16:4136-39 (Littlefield); Littlefield 2015, at B-3. Dr. Littlefield estimated there were seventy-five to one hundred crossings of the Salt in the Ingalls brothers' surveys. *Id.* "Rather than noting any characteristics that might have

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[13] Littlefield, *Declaration of the Non-Navigability of the Salt River at and Prior to Arizona's Statehood on February 14, 1912*, ¶ 48 (July 11, 2015) [C020] ("Littlefield 2015").

[14] *See* Tr. 10/23/15:868-69 (Fuller). According to Ingalls' notes, there were fifty people residing in the Phoenix area as of 1868. *See* Tr. 10/20/15:158-59 (Fuller).

been consistent with navigability, the Ingalls brothers described the Salt River as being in some places relatively shallow and having multiple channels." Littlefield 2015, ¶ 23. Moreover, they did not conduct any meanders on any of their surveys of the Salt. *Id.*

Dr. Littlefield carefully examined all of the surveys and accompanying field notes for every survey touching the Salt conducted prior to Arizona's statehood and concluded:

> [F]ederal government surveyors were specifically charged with the task of identifying navigable streams as part of their surveying duties, and the manuals and instructions under which they carried out their work were very precise about how navigable bodies of water were to be distinguished from non-navigable waterways. . . . Significantly, while the federal surveys were done in varying seasons, in different years, and by several individuals, all of the descriptions and plats consistently portrayed the Salt River as a non-navigable stream. . . .

Littlefield 2015, ¶ 28.

7. Federal and state land patents

In the mid-nineteenth century, Congress passed a variety of homesteading statutes to facilitate settlement of the West. *See* Littlefield 2015, ¶ 29. Over two-hundred federal patents that touched or overlaid the Lower Salt were issued pursuant to these statutes. *Id.* "The patents themselves and the related patent files were then examined to determine if federal authorities had set aside acreage from the parcels due to the navigability of the Salt River. Had the Salt River been navigable, federal land office officials would not have patented that land because of the future state ownership of the bed when Arizona joined the Union. . . ." *Id.* ¶¶ 33-34. Dr. Littlefield concluded:

> There were over two hundred patents issued by the United States that either touched or overlay the Salt River between that stream's confluence with the Gila River upstream to the inundation lines of Roosevelt Lake. In making application to obtain these lands, homesteaders were aware of the river's presence, as were the federal authorities who granted the patents. In not one instance was any acreage withheld from these patents due to the navigability of the Salt River. . . .

Littlefield 2015, ¶ 40. Between applicants, witnesses, and government officials, approximately 800 individuals made either an explicit or implicit decision that the Salt was not navigable. *See* Tr. 2/25/16:3337 (Littlefield).

Upon statehood, Arizona received significant acreage by congressional grants to support certain public objectives, acreage that included lands that touched or overlay the Salt. *See* Littlefield

2015, ¶ 41. Subsequently, state officials were tasked with disposing of these lands. *Id.* ¶ 42. Regarding state patents, Dr. Littlefield concluded: "While all state patents through which the Salt River flowed were issued post-statehood, it is significant to note that in granting fifteen such patents, Arizona's land officials did not reserve any acreage due to the Salt River's navigability, thus indicating that at the time those patents were awarded, officials of the Arizona State Land Department did not consider the Salt River to be navigable." *Id.* ¶ 43.

8. Boating attempts

Relying primarily on historical newspaper articles, Mr. Fuller tabulated less than thirty historical boating attempts on the Salt between May 1873 and June 1919. *See* Tr. 3/10/16:3600-01 (Littlefield). According to Dr. Littlefield:

> [I]f the Salt River had been reliable for transportation, I would have expected to have seen many, many more newspaper articles about it, including advertisements for carrying goods on the river, frequency of departures, which you see all the time in the Yuma newspapers. And so the fact that there are, on average, less than one article per year underscores to me how unusual these boating attempts or events were.

Id.[15] Mr. Fuller, who does not have any training in history, Tr. 10/23/15:962 (Fuller), came to radically different conclusions regarding these attempts than the trained historians and archaeologists like Dr. Littlefield, Dr. Newell, and Dr. August who testified.[16]

From a historian's perspective, old newspaper articles from the period prior to, during, and shortly after Arizona's statehood have a number of reliability problems. For instance, Mr. Fuller conceded that a number of the newspaper accounts do not have an attributed author, so it is impossible to know how the information was collected. *See* Tr. 10/22/15:724-25 (Fuller).

Moreover, newspapers in the West at this time regularly engaged in "boosterism." As a result, historical newspapers need to be "viewed critically and analytically" with "healthy skepticism." *See* Tr. 1/26/16:1877-78 (August). Oftentimes, newspaper editors themselves carried "personal vendettas" and "political etiologies." *Id.* Along with providing information, western newspapers in

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[15] *See also* Lacy 1987, at 32; Tr. 1/27/16:2137 (August).

[16] *See* Littlefield 2015, at Appendix A [C020]; Curricula Vitae of Mark Newell, at 1 [C043]; August 2015, at Vitae.

this era also were advertisements for their communities— "if the Salt River were navigable, they would have certainly been touting its navigability." *Id.*; Tr. 3/10/16:3568 (Littlefield). Boosterism was particularly prevalent in Arizona. *See* Tr. 1/27/16:2208 (August). According to Dr. Littlefield:

> With communities such as Phoenix relatively isolated in the period before statehood – at least more isolated than today – newspapers played key roles in attracting settlers and businesses by detailing regional attributes available to potential newcomers. Thus, the local press emphasized the fertility of the soil, the types of existing businesses, the accessibility of schools, the numbers and types of houses of worship, and myriad other benefits of the area.

Littlefield 2015, ¶ 52; Tr. 3/10/16:3568 (Littlefield). Phoenix newspapers often promoted transportation infrastructure like roads and railroads, yet rarely discussed the Salt as an option for navigation. *See* Littlefield 2015, ¶ 53. Instead, the small number of articles discussing boats on the Salt were reported because of their novelty rather than their reliability. *Id.* The Colorado, in contrast, was constantly promoted as a uniquely navigable stream in the region that was attractive to business.[17]

Newspapers also attempted to be provocative. Newspaper editors in the 1880s "wanted to attract readers. They were always very chancy and iffy fiscal propositions, and so the more eyeballs you got and the more you sold, the better." Tr. 1/26/16:1984 (August). This often led to inaccuracies, as Dr. August testified: "[T]he references in the newspaper accounts were episodic and sometimes incorrect. . . . [T]hese are great accounts and entertaining, but sometimes you have to really look at those sources and think about their accuracy and look at them skeptically, but not cynically." Tr. 1/26/16:2009 (August). Dr. Littlefield testified that some of the details in these accounts are "[a]bsolutely" incorrect or exaggerated. *See* Tr. 3/10/16:3602 (Littlefield).

Another important consideration when reading historical newspapers is the proximity of the writer to the actual event, both geographically and chronologically. "[T]he closer in time that the article is to when the event occurred, the probability goes up that the article is most likely reliable."

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[17] *See* Littlefield 2015, ¶ 54; Tr. 3/10/16:3573-74 (Littlefield) ("[T]he Yuma papers routinely talked about boat traffic on the Colorado River, and there just was nothing similar in the Phoenix area newspapers."); *see also* Tr. 3/30/16:4271-72 (Newell).

Tr. 3/10/16:3598-99 (Littlefield). The greater the geographic distance between where a newspaper is published and the event described, the less reliable the newspaper article tends to be. *Id.* at 3600.

Mr. Fuller painted a particularly rosy picture of historical boating on the Salt. For instance, he concluded that only two of these accounts were failures. *See* Tr. 10/20/15:262 (Fuller); Fuller PowerPoint, at 204. He also testified that none of the historical boating attempts were trips that encountered "undue difficulty" or where the length of "time was undue." *See* Tr. 10/23/15:782-83 (Fuller). Despite this gloss of optimism, however, none of the boating attempts Mr. Fuller discussed was ever repeated, and none of them turned into a regular form of commerce. *Id.* at 789.[18]

Mr. Fuller testified that he did not include in his table of historical boating attempts: "1. Boats used in construction of dams (Roosevelt, irrigation dams); 2. Boats used during floods; 3. Boats used on canals; 4. Ferry trips across river . . . ."[19] According to Mr. Fuller, he eliminated attempts in his list that occurred "during floods, [or] specifically mentioned that it was a flood."[20] A number of these attempts occurred during floods as explicitly stated in the article, however, and Mr. Fuller still included them. *See* Cemex Memorandum.

Mr. Fuller's standard for a successful boating attempt is remarkably low. It requires three things: (1) The boat, the boater, and the cargo arrive at the destination; (2) no deaths or serious injury occur due to boating; and, (3) the boaters themselves call it a success. *See* Fuller Rebuttal, at 48. Mr. Fuller's standard does not include distance traveled, difficulties encountered, economics, or time taken. *Id.* On cross-examination, however, Mr. Fuller conceded that the trip should cover a "meaningful distance" to support a navigability finding. *See* Tr. 5/19/16:4999-5000 (Fuller). He also

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[18] Based upon one clause in one sentence in one newspaper article, Mr. Fuller concluded that the Day brothers' trip had been repeated by one of the brothers. *Id.*

[19] *See* Fuller, *Presentation to ANSAC: Salt River Navigability—Rebuttal*, at 46 (May 2016) [C053-ASLD 385] ("Fuller Rebuttal").

[20] *See* Tr. 10/22/15:722-23 (Fuller). Mr. Fuller claimed: "All the boating accounts that we presented occurred within the ordinary flow range. We eliminated accounts that occurred on floods, where the said newspaper account said there was a flood and someone went out in a boat on those, because we do not believe that to be part of the ordinary and natural condition." Tr. 5/17/16:4502-03 (Fuller).

conceded that he could see "an issue of time potentially affecting whether somebody would call [a boating attempt] a success or not." *Id.* at 5001-02.

In addition to being unreliable from an evidentiary standpoint, even the facts in the accounts themselves support a finding that the Salt never has been navigable. The various historical accounts of boating upon which Mr. Fuller and the ASLD relied are summarized in the Cemex Memorandum. The underlying facts relating to those boating accounts will be addressed in more detail in SRP's proposed findings of fact and conclusions of law due to be filed on August 17, 2016.

9. Other historical descriptions of the river

Other historical accounts of the Salt support a finding of non-navigability. For instance, the early territorial government did not consider the Salt navigable:

> [T]erritorial and county governments determined that the Salt River was non-navigable at the time of Arizona statehood. Perhaps the most significant of these concerned the construction of a bridge across the Salt River at Central Avenue in Phoenix. The issue of navigability was a significant one for the proponents of the bridge, because if the Salt River was considered navigable construction of the bridge could have an impact on river transportation. . . . Subsequent to the territorial legislation and in conformance with its terms, citizens of Maricopa County petitioned their Board of Supervisors for construction of several bridges. These included one 'across the Salt River, a non-navigable stream' at the foot of Center Street (later Central Avenue) in Phoenix.

Kupel, *Historical and Scientific Evidence Concerning Navigability of the Lower Salt River*, at 5-6 (April 2003) [Lower Salt EI 29].

During the preliminary phases of planning for the construction of Roosevelt Dam, no Arizona officials objected to its construction on the basis that it would obstruct navigation. *See* Littlefield 2015, ¶ 47. Perhaps more importantly, the Arizona Territorial Legislature in 1865 declared the Salt non-navigable, specifically finding that the Colorado was "the only navigable water in this Territory." *Id.* ¶ 49. Furthermore, the earliest judicial decisions regarding the Salt in Arizona (the "Kibbey" and "Kent" Decrees) declare it an unnavigable stream. *Id.* at ¶ 50.[21]

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[21] *See also* Littlefield, *Revised and Updated Report: Assessment of the Navigability of the Salt River Below Granite Reef Dam Prior to and on the Date of Arizona's Statehood, February 14, 1912*, at 119-20 (June 8, 2014) [C001] ("Littlefield Lower Salt") (citing and quoting Eleventh Annual Report of the U.S. Geological Survey (1891)); *id.* at 123 (citing and quoting Thirteenth Annual Report of the U.S. Geological Survey (1893)).

B. Hydrology of the Salt

The hydrologic evidence shows that the Salt was not susceptible to being used as a "highway for commerce" in its ordinary and natural condition. Historical records indicate that the Salt was "erratic," fluctuating between flood, even flow, and dryness. *See* Tr. 1/26/16:1978 (August).[22] Early government reports such as the Thirteenth Annual Report of the U.S. Geological Survey (by hydrologist Fredrick H. Newell, who studied the river in 1891-92) found the Salt to be "[a]n extremely difficult stream from which to divert a canal, owing to the irregularity of its discharge. As a consequence of this erratic discharge, the riverbed itself is very wide, and a long and expensive diversion weir is required in order to procure stability and permanence." August 2015, at 49.

The scientific record supports the historical record. Snowmelt and monsoon discharge varied erratically from year to year.[23] Dr. Mussetter compared the annual and seasonal discharge of several years, and although they had similar total discharge, the seasonal variation was erratic. *See* Tr. 1/27/16:2295 (Mussetter); Mussetter Presentation, at 31-47. For instance, Mr. Fuller's annual median discharge of 511,000 acre-feet per year ("AFY") is based on the period of record from 1913 to 1986. *See* Tr. 1/27/16:2283 (Mussetter); Mussetter Presentation, at 31. The full period of record up until 2016, however, provides a median of 462,000 AFY—ten percent lower due to variability in annual discharge. *Id.* In some years, the annual discharge was as high as 2.4 million AFY. *Id.*

Historically large floods occurred in the years leading up to Arizona's statehood. As Dr. Mussetter writes: "The largest annual flows (and presumably, largest annual peaks) occurred in WY1891 and WY1905-WY1907, when there were no significant upstream diversions and prior to completion of the water storage projects that include Roosevelt Dam." Mussetter, *Declaration Navigability of the Upper and Lower Salt River*, at 264 (Aug. 20, 2015) [C024] ("Mussetter Declaration"); Mussetter Presentation, at 94.

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[22] *See also* Tr. 3/11/16:3924 (Littlefield) ("[I]t was unpredictable in terms of floods or dry periods. It was unpredictable in terms of possible channel changes. Not only unpredictable on a long-term basis, but also on a short-term basis, such as days or months.").

[23] *See* Tr. 1/27/16:2295-96 (Mussetter); Mussetter, *Salt River Navigability*, at 31-47 (Jan. 2016) [C039] ("Mussetter Presentation").

In the alluvial valleys below the canyons in Segments 5 and 6, much of the water began to flow underground:

> In keeping with this characteristic of the desert stream, the flow of the Salt River through the Basin and Range regions, except in times of flood, was (even prior to dam construction) generally underground through the Quaternary clastic deposits. In the area of Tempe, however, bedrock lies close to the surface and the water may flow at the surface, but elsewhere be subsurface.

Pewe, *Morphology of the Salt River: Stewart Mountain Dam to Phoenix, Arizona*, at 1 (Oct. 24 1996) [C026-E].[24]

Even in its natural state, the Salt in Segment 6 would occasionally run dry.[25] Charles Hayden described the Salt "one time with rather pungent language when it flooded and how much damage it caused, and other times he cursed it because . . . it was dry." Tr. 1/26/16:1973-74 (August). "Flood flows and dry river were part and parcel of his existence, and it was Carl [Hayden]'s experience too as a little kid." *Id.*

Dr. Littlefield described the relationship between the hydrology of the Salt and its susceptibility to navigability:

> [T]he state of boating technology as it was used on the Colorado River around the turn of the century makes it clear that the Salt River was not susceptible to navigation before or at the time of Arizona's statehood. The historical accounts show that the erratic and irregular flow in the Salt was not consistent enough to support boats used for transporting commerce such as those used by Ives, Powell, and Wheeler. A dependable and reliable draft of two feet could not be had in a river that was sometimes only a few inches deep, although at flood stage, the Salt could contain very deep water. Then, however, the raging torrents were too dangerous to be navigated. Based on historical accounts, even the dories used by John Wesley Powell to go down the Colorado River in 1869 and 1871-1872 or the rowboats used in the Wheeler expedition in 1871 likely would have had a difficult time using the Salt River on a regular basis, if at all. Furthermore, the Salt's shifting nature made its course undependable as well as dangerous. The status of watercraft at the time of Arizona's statehood in 1912 – as described in historical literature and illustrated in photographs – make it clear that no such vessels could have been utilized on a regular and dependable basis on the Salt River.

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[24] *See also* Tr. 10/21/15:491 (Fuller); Fuller PowerPoint, at 223; Tr. 11/19/15:1461 (Gookin) ("[T]here's a lot of gravel, very porous soil that takes the water down to the Gila, where it reemerges either before or after the confluence.").

[25] *See* Tr. 1/26/16:1947 (August) (a dry river in Segment 6 was "one of the natural states of the river"). Historical photographs show an occasionally dry river. *See* Littlefield 2015, at B:24-25, 51, 52, 61; Historical Photograph PowerPoint Presentation, at 62-65, 98-104 (December 7, 2015) [C038] ("Historical Photos").

Littlefield 2015, at ¶ 58.

The U.S. Supreme Court has been clear: "While . . . a river need not be susceptible of navigation at every point during the year, neither can that susceptibility be so brief that it is not a commercial reality." *PPL Montana*, 132 S. Ct. at 1234. The Salt fails this test. Regarding the canyon-bound reach between the White and Black River confluence and the head of Roosevelt Lake, the hydrological and geomorphological conditions are similar to its ordinary and natural condition. *See* Mussetter Declaration, at 12. "The period of the year when there is sufficient water to permit even whitewater boating is very limited, generally extending only from March 1 through May 15 in normal years, and even shorter periods in dry years."[26]

The "General Information" section at the beginning of the modern boating guide by Whitis and Vinson (2014) states: "Just a short . . . drive from central Phoenix is a special river that relatively few boaters get to enjoy, mainly due to its short unpredictable season. . . . The boating season for the Salt typically begins in early March and runs through April with anything from dangerously high water to rock-scraping low water possible." Whitis & Vinson, *Guide to the Upper Salt River, Arizona*, at 1 (2013)[C018-ASLD 199]; Mussetter Declaration, at 19. As recently as 2014, commercial rafting operations had to cancel their entire season because of low water conditions. *See* McAuley, "Rafting the Salt River," *Globe Miami Times* (Jan. 14, 2015) [C031]. According to one commercial operator, rafters "need an absolute minimum of 400 cfs to get the boats out without having to drag it over the rocks." Mussetter Declaration, at 19-20. "Based on the data from the Salt River near Roosevelt and Salt River near Chrysotile gages . . . that are located near the Highway 288 and Highway 60 Bridges, respectively, the discharge in this part of the reach is less than 400 cfs about 60 percent of the time, on average, over the entire year and about 20 percent of the time during the

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[26] Mussetter Declaration, at 19; *Paddling Arizona*, at 208 [C018-ASLD 200] (describing the "likely season" for the "daily reach' as "February-early May/Heavy monsoon years provide flows in August and September" and for the "wilderness" reach "March-May") (written by Mr. Williams, ASLD's boating witness); Tr. 10/20/15:44 (Fuller) ("So if you were to try to pick a boatable time of the year, you would be thinking about wintertime and early-late winter, early spring."); Fuller PowerPoint, at 39. The Southwest Paddler's guide for the Salt "from US Highway 60 to SH 288" describes the Salt as "a seasonal stream that is usually navigable from March through May, depending upon snowpack in the mountains and rainfall within the drainage basin." *Southwest Paddler's Guide; Upper Salt River*, at 1 (2003) [C018-ASLD28].

typical rafting season." *Id.* Trips on the Upper Salt by Mr. Mickel (ASLD's witness and a commercial rafting operator) do not operate beyond the February/March to May/June season because it is unpredictable. *See* Tr. 10/21/15:388 (Mickel). Mr. Mickel testified that the rafting season can be as short as "just March and into early April." *Id.* at 405. In comparison, Mr. Mickel's rafting operations on the Lower Animas River in Colorado can run from mid-April through October. *Id.* at 406. His operation on the Upper Animas River runs from August 1 to mid-May. *Id.* His operation on the Colorado River runs from April to October, but some companies go even longer. *Id.* at 407.

According to the United States Forest Service:

> There are a relatively small number of days per year when the water level itself would have been suitable to allow a canvas, metal, or wooden boat to attempt to travel down this river, even if its gradient would have allowed it. The theoretical "window of opportunity" could occur in almost any month of the year, but it is impossible to predict and thus impossible to plan ahead for. There are entire years when the water never reaches those levels. The Salt River Project's streamflow gages also show that this river can go from a few hundred cubic feet per second (c.f.s.) to over 100,000 c.f.s. in a few short hours. To have been caught on this river making the required multi-day trip, while attempting to use this wild river as a highway of commerce, would have been disastrous. Luckily, there is no record that anyone was stupid enough to try such a trip during or before 1912, nor for many years afterwards.

U.S. Forest Service, *Evaluation of Navigability at the Time of Statehood Salt River*, at 3 (January 1998) [Upper Salt EI08] ("USFS 1998"). The hydrologic evidence shows that the Salt was not susceptible to navigation in its ordinary and natural condition.

C. Geomorphology of the Salt

The Commission also received a substantial amount of evidence regarding the geomorphology of the Salt and natural impediments to navigation. The upper ninety-three miles of the Upper Salt (Segments 1, 2, and most of 3) between the head of Roosevelt Lake and the Black and White confluence flows through a narrow, bedrock canyon. *See* Mussetter Declaration, at 4. The slope in this portion of the river is very steep, ranging from approximately twenty-two feet per mile to fifty-four feet per mile. *Id.* Moreover, it contains numerous rapids that would have made navigation "impossible, or at the very least extremely dangerous" in statehood-era craft. *Id.* at 4, 8.

The area now inundated by Roosevelt Lake was a wide, alluvial floodplain with "a wide, braided character that also would have made navigation impractical" in statehood-era craft. *See* Mussetter Declaration, at 28. According to pre-dam maps, Dr. Mussetter testified: "There's, again, a constriction. This is called Windy Hill at this location, according to the map. And then you go up and there's a fairly broad floodplain here, and you see multiple fingers and several flow splits, the way they've sketched it in, as we move farther up in the reservoir." Tr. 1/28/16:2320 (Mussetter); Mussetter Presentation, at 56. The Reclamation Service map of Roosevelt Reservoir from 1915 shows the channel splitting in multiple locations. *See* Tr. 1/28/16:2321 (Mussetter); Mussetter Presentation, at 58-59. Pre-dam historical photographs also support this conclusion.[27]

The fifty-three mile reach now inundated by Apache, Canyon, and Saguaro Lakes (Segment 4) is also canyon-bound, similar to the upstream canyon containing "rapids and shallow riffles that would have made navigation impractical" in statehood-era craft. *See* Mussetter Declaration, at 4.

The thirteen-mile portion of the Upper Salt between Stewart Mountain Dam and Granite Reef Dam (Segment 5) is less confined than the upstream, bedrock controlled canyon, and takes on a wide, braided character across the entire alluvial valley. *See* Mussetter Declaration, at 4. A number of large floods occurred during the period between the late-1890s and 1912, which scoured the area of its riparian vegetation and eroded banks, changing the channel into a wide, braided, multi-channel configuration, "a condition that would have made navigation impossible, or at least very impractical, during significant portions of the year when flows in the river were low." *Id.* The effects of floods like these are part of the ordinary and natural condition of the Salt. *Id.* at 10, 28; Tr. 10/22/15:671 (Fuller). Pre-dam historical photographs also support this conclusion.[28]

Segment 6 runs through a "very broad miles-wide" alluvial valley. *See* Tr. 10/20/15:153 (Fuller); Fuller PowerPoint, at 108. Segment 6 was subject to vast periodic flooding, which produced

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[27] *See* Tr. 1/28/16:2340-43 (Mussetter); Historical Photos, at 8-20, 27-28.

[28] *See* Tr. 1/28/16:2377 (Mussetter); Historical Photos, at 162-63, 175-79.

a disturbance regime that created a braided channel. *See* Mussetter Declaration, at 4. In low-flow conditions, the river consisted of one to several "relatively small, shallow low-flow channels." *Id.*

D. Impediments to Navigation

1. Sand Bars: In its ordinary and natural condition, the Lower Salt (Segments 5 and 6) had sand bars. *See* Tr. 10/20/15:48 (Fuller); Fuller PowerPoint, at 44. Dr. Mussetter presented a 1926 map of the Salt between Mormon Flat Dam and Stewart Mountain Dam. *See* Tr. 1/28/2016:2330-32 (Mussetter); Mussetter Presentation, at 67-73. The map shows "sand and gravel bars," "split channels," "secondary channels," and "sand and gravel islands" in many locations. *Id.*

2. Gravel Bars: Even within the box canyons, gavel bars could provide obstacles to navigation. "Coarse-grained sediment and debris delivered from the tributaries and side canyons often creates alluvial fans and bars that constrict the river, forming rapids that also severely limit navigability." Mussetter Declaration, at 8. The 1926 map of the Salt between Stewart Mountain Dam and Mormon Flat Dam presented by Dr. Mussetter shows gravel bars. *See* Tr. 1/28/16:2330-32 (Mussetter); Mussetter Presentation, at 67-73. Pre-dam historical photographs show gravel bars from the Roosevelt Dam Site to the Mormon Flat Dam Site.[29]

3. Braided Channels: In the Salt River Valley and other areas that were not confined by bedrock canyon (e.g., Segments 5, 6, the Tonto Basin, and Gleason Flat), the Salt spread widely across alluvial valleys running through braided channels established by the last large flood event.[30] A braided river is generally more difficult to navigate because you can read the river incorrectly and choose the wrong channel.[31] Mr. Fuller testified that the 1868 Ingalls map shows a

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[29] *See* Tr. 1/28/16:2340-43 (Mussetter); Historical Photos, at 36-38. A February 21, 1906 photograph shows claybeds along the Salt. *See* Tr. 1/28/16:2353-54 (Mussetter); Historical Photos, at 59-61. The flow was high at 1,500 cfs. *Id.* Despite the high flow, the picture shows large gravel bars on both sides of the channel. *Id.* A 1921 photograph of the Mormon Flat damsite shows a "very shallow, rocky riffle area next to the gravel bar there." Tr. 1/28/16:2385 (Mussetter); Historical Photos, at 211-15.

[30] Maps and photographs in Mr. Fuller's own presentation as well as the Historical Photos show a braided river in Tonto Basin as well as Segments 5 and 6. *See* Fuller PowerPoint, at 16, 17, 19-20, 27, 31-36, 73, 94-96, 103, 106, 130, 145-46, 150, 155, 158, 211, 216, 220, 242, 245 & 248; *see also* Littlefield Declaration, at B:2-22, 30, 32-33, 38, 47, 50, 51, 52; C:2-10, 12-14, 18-19, 36; Historical Photos, at 4-34, 36-42, 46-55, 58-81, 89-90, 97-116, 120-25, 131-32, 135-37, 139-41, 144-46, 156-96, 204-08, 238-41.

[31] *See* Tr. 10/21/15:289 (Williams); Tr. 1/27/16:2254 (Mussetter); Mussetter Presentation, at 10.

split channel for half of the reach and even had a triple channel in some places. *See* Tr. 10/20/15:41-42 (Fuller); Tr. 11/17/15:1072 (Fuller); Fuller PowerPoint, at 35; *see also* Littlefield Lower Salt, at 28-48 [C001]. Mr. Fuller agreed that the river was close to its "ordinary and natural condition" in 1868. *See* Tr. 10/23/15:868-69 (Fuller). "Particularly during the floods and the subsequent recovery periods following the floods, the multiple, individual channels in the braided planform tend to be very shallow and unstable." Mussetter Declaration, at 10.

Segment 5 "is generally braided, with the braiding corridor occupying much or all of the valley bottom." Mussetter Declaration, at 22. Mr. Fuller testified: "In Segment 6, the active channel, which includes areas outside the boating channel, become[s] quite a bit wider in the downstream direction. The flood channel becomes more braided, has a . . . more obviously compound channel geometry than it is in Segment 5." Tr. 10/22/15:658 (Fuller); Tr. 10/22/15:660 (Fuller). Mr. Fuller's cross-sections of Segment 6 also demonstrate a braided river. *See* ASLD 2003 Report, at 7-24 [Lower Salt EI30].

4. Shifting Channels: In its ordinary and natural condition, the braided portions of the Salt were unstable and shifting, especially in response to larger flood events. Changing channels "would make it more difficult to navigate with a boat, either up or down the river, if you couldn't depend on the channel remaining in place." Tr. 3/30/16:4031 (Littlefield).

According to Dr. Mussetter: "The available historic data shows that the low-flow channel occupied nearly every position within the high-flow channel at some point in time back to at least the mid-1800s. The physical characteristics of the river strongly suggest that the unpredictable location of the low-flow channel likely persisted prior to modern human influences." Mussetter Declaration, at 5. The low-flow channel "could shift laterally by thousands of feet during a single flood event." *Id.* Mr. Fuller testified: "[The l]ocation of the low flow channel, indeed, may be different after a flood."[32] "[S]urveys of portions of the Salt and Gila Rivers undertaken between 1868 and 1883

[32] Tr. 10/22/15:666, 676 (Fuller). A chart from Mr. Fuller's 1987 thesis shows that the low-flow channel running through Tempe and Phoenix "has been [at] virtually every location across the high flow corridor" between 1868 and 1952. *See* Tr. 1/28/16:2449 (Mussetter); Mussetter Presentation, at 132.

indicate that the Salt River had shifting, sandy channels, often overflowed its banks, was easily forded, and was used for irrigation purposes as early as 1868." Lacy 1987, at 32.

Dr. Mussetter also presented a pre-reservoir Reclamation Service map from 1908. *See* Tr. 1/28/16:2324 (Mussetter); Mussetter Presentation, at 61. The river is depicted as braided and includes a label: "River bottoms of shifting sand changing channels." *See* Tr. 1/28/16:2325 (Mussetter); Mussetter Presentation, at 61.

5. Rapids: While braided, shifting, sandy channels dominated the portions of the Salt in alluvial valleys, rapids dominated the bedrock-confined canyons (Segments 1, 2, parts of 3, and 4). "As is the case at many locations along the Upper Salt River, the bedrock can cause sharp breaks in the longitudinal profile that create waterfalls and rapids that can make navigation very challenging and dangerous, and in some cases, impossible." Mussetter Declaration, at 5. "During subsequent lower flows, the river is constricted to a relatively narrow channel along the sides (or in some cases, across the middle) of the bars, forming rapids or shallow riffles . . . . In many instances, large boulders that have fallen from the bedrock valley walls in the above-described areas create additional roughness and hazards to navigation. In all cases, the rapids and riffles represent significant impediments to navigation by the watercraft that were in use at and prior to the time of Arizona's statehood." *Id.* at 12. Mr. Mickel's company advertises the Upper Salt River as containing "[m]ore rapids per mile than any other Arizona river." Tr. 10/21/15:420 (Mickel).

The U.S. Forest Service's boating guide includes descriptions of twenty-three named rapids in the thirty-six mile reach downstream from Highway 60. *See* Mussetter Declaration, at 19. According to Mr. Fuller, Segment 2 contains rapids "that most people would portage . . . under most conditions." Tr. 11/17/15:1155-56 (Fuller). Comparing Segment 2 to other canyon reaches, Mr. Fuller testified: "The canyon's tighter than 3, probably similar to 4, a little more tortuous, a little more bends. But on the up side, we've got a record, you know, of people that do boat it. . . . I don't think we have any historical accounts that go through Segment 2." Tr. 11/17/15:1155-56 (Fuller).

One particular rapid, Quartzite Falls, is notoriously dangerous even to whitewater boaters and required a difficult portage. *See* Mussetter Declaration, at 19.[33] Quartzite Falls is in Segment 2. *See* Tr. 10/20/15:60 (Fuller). Segment 2 also includes forty-five rapids in thirty-three miles, nineteen Class III Rapids, and four Class IV rapids. *See* Tr. 10/20/15:62-67 (Fuller); Fuller PowerPoint, at 60.

Although now inundated by reservoirs, Mr. Fuller testified that historic descriptions of Segment 4 include rapids and that "some boaters . . . had some issues with needing to get around rapids, or they talk about drops." Tr. 10/20/15:118 (Fuller); Fuller PowerPoint, at 86; Tr. 10/22/15:688 (Fuller). The higher class rapids are more dangerous, but Dr. Mussetter testified that Class I and II rapids also can be a limit to navigability because they suggest shallow depths. *See* Tr. 1/29/16:2589-90 (Mussetter).

E. Ordinary and Natural Condition

Winkleman requires that the Commission evaluate the Salt in its ordinary and natural condition. 224 Ariz. at 241, 229 P.3d at 253. According to *Winkleman*, ordinary conditions occur when the river is neither in flood nor drought. *Id.* Mr. Fuller originally defined "ordinary" flows between the 10 and 90 percent range of median daily flows. *See* Tr. 10/23/15:980-81 (Fuller).[34] Thus, according to Mr. Fuller, the Commission should disregard the lowest average ten percent flows on the Salt, but also the highest ten percent flow or approximately thirty-six days of a typical year on both ends. *See* Tr. 5/19/16:5114 (Fuller). Given that the typical "boating season" on the Salt is just over two months, *see* Section II(B), *supra*, approximately half of the boating season is outside of the Salt's ordinary condition. *See Winkleman,* 224 Ariz. at 241, 229 P.3d at 253 ("recognizing 'an

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[33] Quartzite Falls was blasted in 1998 by boating guides based upon public safety concerns after a number of people drowned at the rapid. *See* Mussetter Declaration, at 12. Exhibit C027 is a movie relating to the dangers of Quartzite Falls in its natural condition, the 1998 blasting, and the subsequent prosecution of the perpetrators. *See also* Tr. 2/26/2016:3532-38.

[34] On rebuttal, Mr. Fuller testified that, over the course of these hearings, he shifted his "ordinary" range of flows from a range of 10% to 90% to a range of 10% to a two-year flood event, contrary to his testimony in all of the other ANSAC proceedings. *See* Tr. 5/19/2016:5114 (Fuller). Thus, according to Mr. Fuller's new position, the Commission should ignore all low water conditions that occur, typically thirty-six days out of every year, but only disregard high water conditions that occur once every two years. Mr. Fuller's new position is remarkably biased toward navigability. If it is Mr. Fuller's contention that low flow conditions that occur for over a month every year should be disregarded, the same percentage of high flow conditions also should be disregarded (i.e., nearly half of the typical "boating season" on the Salt).

occasional tendency to emphasize the exceptional conditions in times of temporary high water and to disregard the ordinary conditions prevailing throughout the greater part of the year'") (quoting *Oklahoma v. Texas*, 258 U.S. 574 (1992)).

According to *Winkleman*, a river is in its "natural condition" when it is "untouched by civilization, i.e., man-made diversion." 224 Ariz. at 241, 229 P.3d at 253. Mr. Fuller testified that the Salt existed in its "natural condition" between the 1800s and the 1860s. *See* Tr. 10/20/15:46 (Fuller); Fuller PowerPoint, at 40. The 93-mile, canyon-bound reach between the White and Black River confluence and the head of Roosevelt Lake has changed little since statehood because there is little in the way of diversions and it is bedrock controlled, meaning it is less prone to flood-driven changes evident in the alluvial reaches of the Salt. *See* Mussetter Declaration, at 12. In contrast, the condition of Segments 3 through 6 have been significantly altered by the construction of Roosevelt, Horse Mesa, Mormon Flat, Stewart Mountain, and Granite Reef Dams and other human activities.

The portions of the Salt now inundated by reservoirs are considerably more navigable because they are now calm reservoirs, rather than box canyon river. Segments 5 and 6 also have become more navigable for a variety of reasons. First, as detailed above, Segments 5 and 6 were dominated by sandy, shifting, braided channels driven by floods in their natural condition. *See* Section II(D), *supra*. The upstream dams regulate the flow in Segments 5 and 6 that significantly reduce the large peak discharges that maintained the disturbance regime, removed vegetation, and drove the braiding process. *See* Mussetter Declaration, at 22. According to gage data, however, the total amount of water that flows through Segment 5 each year has not significantly changed. *Id.* While the peak flows have reduced, the consistency and duration of flows in the intermediate range have increased. *Id.*; Tr. 10/23/15:973 (Fuller). Under natural conditions, flows were elevated above baseflow during March, April, and early-May because of snowmelt upstream, while monsoonal events periodically increased discharge for short periods during the late-summer and early-fall. *See* Mussetter Declaration, at 32. Under modern conditions, the dams capture the snowmelt and storm events after which the water is released at lower rates (above natural baseflow) but for a longer period of time from early-March to late-November. *Id.* This prolonged flow can be steady around 1,000 to 1,500

cfs through much of the spring and summer. *See* Tr. 1/28/16:2423-24 (Mussetter); Mussetter Presentation, at 96.[35]

The same prolonged and sustained flow creates a condition that promotes significant riparian vegetation that is no longer blown out by the peak flows trapped behind the dams. *See* Mussetter Declaration, at 28. This vegetation helps to stabilize the banks of the river, causing it to channelize. *Id.* at 32. Historical photographs, topographical maps, and GLO surveys from 1870 confirm this. *Id.* at 39; Tr. 10/23/15:975 (Fuller). The effect of increased vegetation has been compounded by the arrival of invasive species like Tamarisk that have thrived on the Lower Salt. *See* Tr. 10/23/15:977 (Fuller); Tr. 11/19/15:1549-50 (Gookin). This creates "much more of a tendency for a single thread, less . . . laterally dynamic channel." Tr. 1/28/16:2431-2 (Mussetter).

Moreover, large flood events are responsible for providing the finer sediment, such as sand and silt, that created the sandbars and unstable streambeds responsible for the braiding. *See* Tr. 1/28/16:2428 (Mussetter); Mussetter Presentation, at 97. After dams are built and the peak flows are dampened, that fine sediment gets trapped behind the dams. *See* Tr. 11/19/15:1475-76 (Gookin).[36] The large quantity of sediment stored behind the dams has "a substantial impact on the morphology of the channel down in [Segment 5]." Tr. 1/28/16:2427 (Mussetter); Mussetter Presentation, at 97. While downstream reaches are deprived of the fine sediment necessary to create the unstable, braided channel that occurred under natural conditions, the water released from the dam in an elevated, sustained manner strips the downstream reaches of any remaining fine sediment that it may have had. *See* Tr. 11/19/15:1475-76 (Gookin); Tr. 11/18/15:1332 (Fuller). As a result of this process, Segments 5 and 6 now have primarily gravel and cobble streambeds that are much less dynamic and resistant to

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[35] Mr. Fuller agreed that the dams have raised the median daily flow, meaning that there are more days per year that are above the natural and ordinary median than before the dams were constructed. *See* Tr. 5/19/16:5091-92 (Fuller); Fuller Rebuttal, at 118. He testified: "I will fully grant you that there are more days, on average, in the modern conditions." Tr. 5/19/16:5091-92 (Fuller).

[36] There is currently nearly 200,000 acre-feet of sediment stored behind Roosevelt that would have been carried downstream under natural conditions. *See* Tr. 1/28/16:2426 (Mussetter); Mussetter Presentation, at 97.

braiding.[37] The combination of less dynamic flows along with sediment deprivation encourages the formation of a single channel. *See* Tr. 1/28/16:2433 (Mussetter); Mussetter Presentation, at 101. The removal of the fine sediment also makes the river deeper due to downcutting. *See* Tr. 11/19/15:1551, 1475-76 (Gookin).[38]

"While there is little doubt that modern, shallow-draft watercraft can, and are, used for recreational purposes on portions of the Lower Salt River today, the natural river was considerably less boatable than it is under modern conditions." Mussetter Declaration, at 39. "Thus, the river may well be easier to navigate now than at statehood." Tr. 11/19/15:1551 (Gookin); *see also* Tr. 1/28/16:2555 (Mussetter).

F. Boating

1. Historical vessels

The boats available in the Southwest at the time of Arizona's statehood were dugout canoes, wood and canvas canoes, flatboats, pirogues, skiffs, rowboats, bateaus, keelboats, mountain boats, barges, steamboats, and ferries. *See* Newell, at 7-17. Although there are some isolated accounts of dugout canoes, canoes, flatboats, skiffs, rowboats on the Salt, these incidents were either failures or trips for local transportation, recreation, and subsistence. *Id.* at 11; *see also* Cemex Memorandum.

Moreover, just because a certain type of craft was used in a commercial manner at some prior point in history does not mean that the craft was a customary mode of trade and travel in 1912. *See PPL Montana*, 132 S.Ct. at 1233 (requiring that craft be meaningfully similar "to those in customary

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[37] *See* Mussetter Declaration, at 5, 31-32; Tr. 10/20/15:185 (Fuller); Fuller PowerPoint, at 137 ("dams deprived reach of sediment, making it more cobbly and less vegetated than before dams). Photographs from Dr. Mussetter's boating/hiking trip confirm this. *See* Fuller PowerPoint, at 100-11.

[38] Historical maps and photographs demonstrate these effects. *See* Mussetter Declaration, at 22. Mr. Gookin highlighted several places where the Salt was more braided in Segment 5 around the time of statehood. *See* Tr. 11/19/15:1554 (Gookin). Modern photographs of Segment 6 show "evidence of the multiple channels, the braid channels and so on, the very wide river. And that's created by the flood flows that comes through." Tr. 1/28/16:2443 (Mussetter); Mussetter Presentation, at 115-16. Historical aerial photographs of Segment 6 show "[c]learly a very heavily braided reach, wide, many channels, bars all the way across the river." Tr. 1/28/16:2446 (Mussetter); Mussetter Presentation, at 123. Modern photographs show "more or less a single-thread channel carrying the flow, a few sort of ponded area[s], a lot of vegetation in the channel, and some, clearly, some shallow riffles in areas where it's constricted down from the deeper ponded areas." *See* Tr. 1/28/16:2446-47 (Mussetter); Mussetter Presentation, at 124-25.

use for trade and travel at the time of statehood"). "Temporal context and economics are . . . factors influencing the function and design of riverine craft in the American colonies and emerging states." Newell, at 5-6. Due to the growth in mature and frontier economies, as well as the change over time in demand for goods, the nature of commercial transportation changed. *Id.* As population centers developed along with commercial transportation, the cargo loads in riverine craft necessary to sustain a "commercial reality" grew larger and larger. *Id.*; *PPL Montana*, 132 S.Ct. at 1234. "As the States pushed the frontier westward, . . . [t]he types of small craft used for subsistence and exploration on rivers in eastern States in the eighteenth century were employed for the same purposes in the rivers of new territories in the nineteenth century." Newell, at 6.

Mr. Fuller and the ASLD seem particularly fixated on canoes, but canoes were not the type of craft that was used as customary modes of trade or travel on February 14, 1912. "Canoes . . . were not the customary modes of travel at the time of statehood or before it in Arizona. There's no evidence that they used them for that purpose." Tr. 11/20/15:1735 (Gookin). Dr. Newell explained:

> In 1700, for example, a 200-pound load of furs would be an economically viable cargo. You could get downriver with those furs, make enough money to buy some goods, ammunitions, hatchets, all kinds of supplies, and bring them back upriver. So in that case you have an example of a canoe being used for trade and transportation. By 1900, the dynamics of trade and transportation on rivers had changed very much, and if you're going to have a viable cargo, you needed 15 tons of lumber or 15 tons of wheat or 15 tons of ore. Whatever you could get in a canoe by that time would not be a commercially viable cargo of any kind. So I don't see canoes being used for trade and transportation that much in the states by that time.

Tr. 3/30/16:4197 (Newell). Dr. Newell testified that he saw no evidence of canoes being used for commercial trade and transportation on the Salt. *Id.* at 4197-98.

Dr. Newell testified: "In terms of time, in the colonial period a smaller cargo could be profitable. In the late 19th century you would pretty much need a large cargo to be profitable, when of course, the evidence bears that out." Tr. 3/31/16:4302 (Newell). But, Dr. Newell saw "no evidence of small cargos ever being used on the Salt." *Id.* According to Dr. Newell, by the late 1800s in the Southwest, keelboats, steamboats, and mountain boats would have been typical for commercial trade and travel. *Id.* at 4223-24. There is no evidence that boats of this size were ever used on any portion of the Salt. *Id.*

There was evidence of ferries on the Salt, but "[b]y very definition, these flat or barge hull derived craft are part of a road transportation system. Their very existence, especially in large numbers within a given geographic area, is often an indication that the river they cross is not being used as a major route for trade and transportation." Newell, at 17.

2. Vessel Draft and Channel Depth

Mr. Fuller's testimony focused on the "draft" of various craft.[39] But, according to Dr. Newell, "there is a significant difference between a vessel's draft and its operating depth." Newell, at 22. "Draft" refers to the distance between the surface of the water and the bottom of the hull "based on the impact of load on the waterline in **calm or stable water**." *Id.* (emphasis in original); Tr. 11/20/15:1753 (Gookin). In calm water, draft can be reliable; in high-energy environments, however, safe operating depth becomes "totally unpredictable," and channel depth must be "significantly greater than vessel draft." Newell, at 22. "Change this environment to a fast running, high-energy river channel strewn with rocks and rock ledges and displacement depth alters dramatically."[40] Heavy loads relative to the size of the craft can "drive" the hull of the boat much deeper than operating depth especially when going over a drop. *See* Newell, at 23. Dr. Newell testified: "There would be no relationship between that scenario [i.e., calm and stable water] and trade and transportation on a river with rapids and current, no relationship at all." Tr. 3/30/16:4240-41 (Newell).

The phenomenon applies also to kayaks and canoes. *See* Tr. 3/30/16:4240 (Newell). Dr. Newell testified: "Even a kayak . . . with a load in it, as it comes down a river, you're going to get

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[39] *See, e.g.*, Fuller, *Boating in Arizona ca. 1912*, at 76 (2014) [C018-ASLD 149]. Mr. Fuller based his depth estimates on the Hyra method, which was developed for recreational boating. *See* ASLD Report 2003, at 8-1 [Lower Salt EI30]; Tr. 10/23/15:820-21 (Fuller). They were not written for commercial boating operations with significant cargo.

[40] Newell, at 23. "Draw is a good indication of required depth, but not equivalent to it, as the needs of the paddler must be considered as well as the ability to avoid rocks on the bottom." *See* Stantech Consulting Inc., in association with JE Fuller/Hydrology & Geomorphology, Inc., *Criteria for Assessing Characteristics of Navigability for Small Watercourses in Arizona*, at 37 (1998) [Upper Salt EI11] ("Stantech 1998"). Mr. Gookin testified: "[D]raw does not indicate the depth required by a boat. You have to leave some room for things like there's a small boulder at the bottom of that river. There might be vegetation that causes -- could tangle you. . . . You don't know what's down there." Tr. 11/19/15:1533-34 (Gookin).

water over the bow of the kayak, as everybody knows." *Id.* "Professional river guides with high Desert Adventures, St. George Utah, say they would not choose to take a canoe very far in less than one foot of depth because of the need to control the boat by dipping the paddles deeply into the water without obstructions. They also point out that depth needed depends on how heavily the boat is loaded." Stantech 1998, at 36-37.

III. The Proponents of Navigability Bear the Burden of Proving that the Salt is Navigable.

The Arizona courts have long held that the proponents of navigability bear the burden of proving that a river is navigable.[41] The Arizona statutes further support this allocation of the burden. In order for the Commission to determine that a particular watercourse or segment thereof is "navigable," Proponents must establish that fact by a "preponderance of the evidence." *See* A.R.S. § 37-1128(A). If sufficient evidence is not presented to show navigability for a particular watercourse or segment, the Commission must find that watercourse or segment non-navigable. *Id*

IV. *PPL Montana* is Instructive with Regard to the Salt.

The U.S. Supreme Court's 2012 *PPL Montana* decision is particularly persuasive on the issue of the Salt's navigability (or lack thereof). The Court's opinion in that case is consistent with and strongly supports this Commission's conclusions in its 2005 Lower Salt and 2007 Upper Salt Decisions.

Proponents of navigability often have referred to the *PPL Montana* opinion as a "segmentation" case, in an apparent effort to downplay the importance of that Court's decision on other issues. The Court's decision in that case did address "segmentation" issues, but it also did a lot more. For instance, the Court took the opportunity to clarify and restate the law of navigability from its prior decisions and to rein in the more "liberal" and expansive constructions of that law proffered by some state and lower federal courts in recent years, including:

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[41] *See Land Dep't v. O'Toole*, 154 Ariz. 43, 46 n.2, 739 P.2d 1360, 1363 n.2 (App. 1987); *Arizona Ctr. for Law in the Public Interest v. Hassell*, 172 Ariz. 356, 363 n.10, 837 P.2d 158, 165 n.10 (App. 1991); *Defenders of Wildlife v. Hull*, 199 Ariz. 411, 420, 18 P.2d 722, 731 (App. 2001); *Winkleman*, 224 Ariz. at 238, 229 P.3d at 250.

1. Reaffirming that the navigability for title test is applied as of the date of statehood. 132 S. Ct. at 1227-28. "Upon statehood, the State gains title within its borders to the beds of watercourses then navigable. . . ." *Id.*

2. Reiterating that the basis for a determination of navigability is use or susceptibility for use of the watercourse as highway for commerce. 132 S. Ct. at 1230. "By contrast, segments that are nonnavigable at the time of statehood are those over which commerce could not then occur. Thus, there is no reason that these segments also should be deemed owned by the State under the equal-footing doctrine." *Id.*

3. Confirming its prior pronouncements that the test relates to use or susceptibility to use for commerce as of the date of statehood. 132 S. Ct. at 1233. "Navigability must be assessed as of the time of statehood, and it concerns the river's usefulness for 'trade *and* travel,' rather than for other purposes." *Id.* (emphasis added) (clarifying that simple travel on a river is not enough, there must also be a commercial component). "Mere use by initial explorers or trappers who may have dragged their boats in or alongside the river despite its nonnavigability in order to avoid getting lost, or to provide water for their horses or themselves, is not enough." *Id.*

4. Clarifying that post-statehood use of the river can be considered only if that use involves the same river conditions and the same types of boats that existed at statehood. 132 S. Ct. at 1233. The party seeking to prove navigability must show that "the watercraft are meaningfully similar to those in customary use for trade and travel at the time of statehood." *Id.* "If modern watercraft permit navigability where the historical watercraft would not, . . . then the evidence of present-day use has limited or no bearing on navigability at statehood." *Id.* at 1233-34.

5. Reiterating and clarifying its prior opinions regarding seasonal use and its ability to prove navigability. 132 S. Ct. at 1234. Focusing on the commercial aspects of the transportation, the Court stated: "While the Montana court was correct that a river need not be susceptible of navigation at every point during the year, neither can that susceptibility be so brief that it is not a commercial reality." *Id.*

V. Based upon the Evidence in the Record, the Salt is Not "Navigable."

A watercourse can meet the test for "navigability" under the Arizona statute and the case law if it satisfies either of two elements: (1) If it was actually used as a "highway for commerce" or (2) if it was "susceptible to being used" as a "highway for commerce." *See* A.R.S. § 37-1101(5). In making such determinations, "all evidence should be examined during navigability determinations and no relevant facts should be excluded." *Defenders of Wildlife*, 199 Ariz. at 425, 18 P.2d at 736. "[A] river is navigable in law when it is navigable in fact." *Muckleshoot Indian Tribe v. FERC*, 993 F.2d 1428, 1431 (9th Cir. 1993). Thus, the Commission must consider all of the evidence in the record before it. When the Commission reviews the evidence, it should determine that the Salt never has been used or susceptible to being used as a "highway for commerce."[42]

A. The Salt has never actually been used as a "highway for commerce."

No evidence exists of any prehistoric boating or flotation of logs on the Salt. *See* Section II(A)(1), *supra*. Likewise, no credible evidence exists that the early explorers or soldiers ever used the river—for "commerce" or otherwise. *See* Sections II(A)(2)-(5), *supra.* Mr. Fuller's evidence of the isolated accounts of attempted boating does not establish that the river was used for any type of sustained trade or travel. In fact, it demonstrates quite the opposite. *See* Section II(A)(8), *supra*; Cemex Memorandum. There is a "remarkable lack of evidence" of navigation on the Salt. *See* Tr. 3/30/16:4247 (Newell). "The absence of data can be as significant as the presence of data." *Id.* As Dr. Newell testified:

> There's a complete absence of evidence of archaeological remains of boats or anything related to boats in the archaeological record, not one. . . . Because in my experience, in navigable rivers that are used for trade and transportation, there is a plethora of evidence, of archaeological evidence of just about every kind of -- every kind of boat ever used on that river, from dugouts used 2,000 years ago to recent craft. I mean rivers are just full of the wreckage of their constant use. The total absence of any such evidence on the Salt speaks extremely strongly to its lack of use or ability to use, susceptibility, as far back as the Hohokam period.

[42] The Court of Appeals' decision in *Winkleman* remains subject to review by the Arizona Supreme Court following these proceedings on remand. In making the arguments presented in this Memorandum, SRP does not waive its right to contend before the appellate courts that *Winkleman* applied an incorrect legal standard.

Id. at 4289.

B. The Salt has never been "susceptible to being used" as a "highway for commerce."

Because the river was not actually used as a "highway for commerce," the only way it can be considered navigable is if it was "susceptible" to such use. Insufficient evidence exists in the record to show that the river, in any condition at any time, was capable of acting as "a corridor or conduit within which the exchange of goods, commodities or property or the transportation of persons may be conducted." A.R.S § 37-1101(3) (defining "highway for commerce").

1. If the Salt had been "susceptible" to navigation, people would have navigated it.

Although the Salt existed in close proximity to much of the exploration and settlement in early Arizona, it was never used for any type of regular trade or travel. In order for the Commission to determine that the river was susceptible to being used as a highway of commerce, it must find that the prehistoric inhabitants, the Spanish explorers, the American trappers and mountain men, the military personal in the area, and the thousands of citizens who resided along the river and in the general area prior to statehood simply failed to comprehend the potential usefulness of the river as an avenue for navigation. No evidence exists to support such a finding. Efficiency and easy of transportation was a constant concern for civilizations along the Salt for thousands of years. *See* Section II(A), *supra.*

It might be theoretically possible that, on one or more occasions in particular years, it would have been feasible for a person to float a small boat down some portion of the river. Occasional use in exceptional times does not, however, support a finding of navigability. "The mere fact that a river will occasionally float logs, poles and rafts downstream in times of high water does not make the river navigable." *United States v. Crow, Pope & Land Ents., Inc.*, 340 F. Supp. 25, 32 (N.D. Ga. 1972) (citing *United States v. Rio Grande Dam & Irr. Co.*, 174 U.S. 690 (1899)). "The waterway must be susceptible for use as a channel of useful commerce and not merely capable of exceptional transportation during periods of high water." *Id.* (citing *Brewer-Elliott Oil & Gas Co. v. United States*, 260 U.S. 77 (1922)).

No government agency, including the federal land surveyors, ever indicated that the Salt was navigable.[43] No federal or state land patent indicated that the Salt was navigable.[44] The early descriptions of the river by those who were present at the time describe a river that was erratic in its flow; was full of sand bars, gravel bars, boulders and rapids; and was not conducive to navigation. *See* Section II, *supra*. People did not navigate the Salt because it was not navigable.

2. Evidence of modern-day recreational boating on the Salt does not satisfy the *PPL Montana* criteria for indicia of "navigability" for title.

The U.S. Supreme Court in *PPL Montana* specifically found that post-statehood use of the river can be considered in determining navigability for title only if that use involves the same river conditions and the same types of boats that existed at statehood. 132 S. Ct. at 1233; Sections II & IV, *supra*. As part of the evidence Mr. Fuller used to determine that the Salt was navigable, he relied heavily upon his opinion that the river is still navigable. Modern recreational boating on the Salt is not evidence of navigability for title under the *PPL Montana* standard, however, for several reasons.

Boating and boat building technology is lightyears ahead of where it was in 1912. "Boat making technology has improved since the times of statehood, with the use of inflatable rafts, inflatable and hard-shell kayaks becoming one of the preferred modes of travel." *See* Fuller Lower Salt Report 2003, at 8-4 [Lower Salt EI 30]. Modern boating technology is so advanced that contemporary kayakers can slide off roofs into swimming holes, jump wakes while being towed by a

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[43] *See generally* Section II, *supra*; *see also United States v. Oregon*, 295 U.S. 1, 23 (1935) (courts should consider government's treatment of watercourse as non-navigable in their analysis of navigability); *see also Washington Water Power Co. v. Federal Energy Regulatory Comm'n*, 775 F.2d 305, 332 (D.C. Cir. 1985) (government's, including Army Corps of Engineers', description and treatment of river is relevant to determination of river navigability).

[44] *See* Section II, *supra; see also Lykes Bros., Inc. v. Corps of Eng'rs*, 821 F. Supp. 1457. 1460 (M.D. Fla. 1993), *aff'd*, 64 F.3d 630 (11th Cir. 1995) (court found actions by State show that, for many years, it considered river non-navigable, e.g., land bordering river had been deeded to private ownership and owners paid taxes); *Koch v. Department of Interior*, 47 F.3d 1015, 1019 (10th Cir. 1995) (because Federal Government did not express intent to retain island in non-navigable river, title to island passed to patent holder).

speedboat, and navigate Class VI rapids and drops of over forty feet.[45] When asked why modern recreational boats are capable of such activity, Mr. Fuller testified: "Because of its durability and design, . . . some of them are designed to take high impact." Tr. 5/19/16:5054 (Fuller).

Durability is one of the major reasons why modern recreational craft are not meaningfully similar to historical craft in 1912. Comparing historical wooden dories at the time of statehood to modern rubber rafts, Mr. Dimock testified: "Durability, I will say modern rafts take a beating for a lot longer than a wood boat . . . ." Verde Tr. at 3/31/15:2841 (Dimock) [C018-ASLD 146]. "[A]fter a couple generations of plastic ones, . . . they were pretty much unbreakable. They're like Tupperware." *Id.* at 2888.[46]

Not only are modern plastic boats more durable, they also move over rocks and sand easier. Mr. Slingluff, who previously testified on behalf of the ASLD, in an article written for *The Southwestern Sportsman National Magazine*, wrote:

> Shallow creeks and rivers are boatable in many different canoes, but aluminum, **canvas, and wood boats are easily damaged and difficult to repair**. Plastic canoes are durable, slide easily over rocks, slip quietly through the water, and do not conduct heat or cold. **Plastic canoes can open areas to sportsmen that are otherwise only a wish.**

Slingluff, *Shallow Streams: Liquid Paths Into Wilderness*, The Southwestern Sportsman National Magazine, at 16 (Winter 1990-91) [C059] (emphasis added); Tr. 5/19/16:5051-52 (Fuller).

Regarding modern recreational canoes and kayaks, Dr. Newell (a Ph.D. marine archaeologist) testified that "construction materials are so much better than they would have been in the historic canoe." Tr. 3/31/16:4350 (Newell). Other differences include "durability, weight, ability to survive impacts." *Id.* According to the United States Forest Service:

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[45] *See* Dungan, "Up a creek, with a paddle: Desert kayakers chase the water," *The Arizona Republic* (April 29, 2016) [C054-C]. Mr. Fuller agreed that the recreational boaters that take 40-foot drops, wipeouts, and navigate Class V and VI rapids can meet his definition of a "successful boating account" for the purposes of navigability—the boat, the passenger, and the gear made it to the destination. *See* Tr. 5/19/16:5055-56 (Fuller). This illustrates just how meaningless Mr. Fuller's standard is for assessing a stream's navigability.

[46] Mr. Fuller testified: "The difference is some improved durability. But I readily recognize – really don't need to argue about the fact that the plastic boats that are made today are more durable. You can beat on them, you can abuse them, you can be a lot less skilled and get away with some things that you might have had to stop and repair." Tr. 10/22/15:624-25 (Fuller); Fuller PowerPoint, at 286.

> Although the 48-mile section of river within the Salt River Canyon has been regularly recreationally boated for the past 25 years using technologically advanced inflatable rafts/kayaks as well as plastic/fiberglass canoes and kayaks, even these boats regularly fall victim to the river. . . . River-runners today, with their high-tech equipment and improved techniques, simply cannot be compared with the situation in 1912; to do so would be like comparing a delicate, bruise-prone apple with a thick-skinned, practically indestructible orange. Proof that boaters have run this river in the recent past is simply not directly relevant to the criteria for navigability . . . .

USFS 1998, at 7.

Moreover, the things that make rivers attractive to recreational boaters are also the things that would make a river impractical for commercial trade and travel. Mr. Fuller's experience on the Salt is purely recreational; he has no experience carrying commercial cargo. *See* Tr. 5/19/16:4974 (Fuller). Mr. Fuller also has no experience in historical boats. *See* Tr. 11/18/15:1286 (Fuller) ("[A]ll of my boats are professional whitewater quality boats."). The mindset of modern recreational boaters, like Mr. Fuller, is far removed from a commercial boater in 1912 or the 1800s. For instance, Mr. Fuller testified:

> As you go through a rapid, there is a chance that you can upend a canoe. That's not an abnormal part of a canoe . . . or a small boat experience. If you talk to any boaters, a lot of times what they like to talk about is, "Oh yeah, do you remember the time I flipped?" It's a story. It's not a trip-ending experience, except in very rare cases.

Tr. 10/20/15:124 (Fuller); Fuller PowerPoint, at 214. Mr. Mickel testified: "The customers want rapids . . . they want splashes and waves." Tr. 10/21/15:420-21 (Mickel). Mr. Fuller agreed that recreational boaters might have a different standard for success than "someone who's trying to ship precious cargo or take passengers down a river." Tr. 5/19/16:5048-49 (Fuller). Mr. Fuller also agreed that, if a person hired a commercial transportation on a river, a boat flipping over would not be part of the experience the person paid for. *See* Tr. 5/19/16:5050 (Fuller). Mr. Fuller testified: "I don't think, if you were being transported, you would be specifically looking to get flipped out." *Id.*

Mr. Fuller's prior reports to this Commission have portrayed recreational boating in a different manner. For instance, his 2003 Lower Salt Report recognizes: "While **modern boat use of a river does not provide proof of susceptibility of a stream to navigation at statehood**, it is evidence that is readily available for consideration." Fuller Lower Salt Report 2003, at 8-4 [Lower

Salt EI 30] (emphasis added). Rather than portraying canoes as capable whitewater craft, another report (on which Mr. Fuller was a listed author) states that canoes at the time of statehood were made of wood and were usable on "[l]akes and calm rivers for fishing, recreation, travel." *See* Stantech 1998, at 31; Tr. 11/19/15:1502 (Gookin).

The technological advancements in boating (including modern rubber rafts and plastic and inflatable kayaks) were crucial to the proliferation of recreational boating on Arizona rivers:

> Commercial recreational rafting started in the 1930s, but developed in the 1970s, on the Colorado River (especially upstream in Utah) and later on the Salt, Gila, and Verde Rivers. The development of durable small boats – plastic, fiberglass and other modern types of canoes and kayaks, inflatable boats for single paddlers and for groups – all contributed to the rising popularity of river running in Arizona especially on rivers not previously considered boatable, or boatable only very rarely because of low water.

Stantech 1998, at 32. "Some daring adventurers traveled on the Gila and other rivers throughout the historic period, but rivers were not generally used for recreational travel until the development of new materials such as fiberglass and artificial rubber after World War II." *Id.* at 33. One key reason the Salt is so popular for recreational boating now is due to developments in boating technology:

> There is a bit of revolution in river running going on in the state that makes it hard to give definitive information. Boaters who aren't content to resign themselves to **a few days of fun per year on most of the state's rivers** have started using **durable plastic canoes and single person inflatables to run them at levels well below what was in the past has been considered boatable**. These seemingly stubborn individuals may end up **dragging their boats over a riffle too shallow to float once in a while** but to pay that small inconvenience for the reward of a day in the river is well worth it in their eyes.

Id. at 36.

Finally, modern recreational boating on Segments 5 and 6 is not evidence of navigability because the Salt in those segments is considerably more navigable now than it was in its ordinary and natural condition. *See* Section II(E), *supra*. Dr. Mussetter testified: "In my view, the recreational boating that occurs in Segment 5 of the Salt River is not particularly informative with respect to the question of navigability. . . . Partly because or largely because the flows that occur in that reach during the recreational boating season are certainly on the high end of anything that could be

considered an ordinary flow under natural conditions. The flows are quite elevated because of the releases from Stewart Mountain Dam." Tr. 1/29/16:2693 (Mussetter).

3. The *Edith*'s staged 2015 trip does not demonstrate navigability.

On August 31, 2015, Mr. Dimock took his historical replica of the *Edith* out on the Lower Salt from below Stewart Mountain Dam to Granite Reef at a flow rate of approximately 650 cfs. *See* Tr. 10/22/15:532-33 (Dimock). The ASLD has attempted to use this trip on flow-regulated Segment 5 and a small portion of Segment 6 to demonstrate that those segments were navigable in their "ordinary and natural condition." This endeavor fails, for at least three reasons. First, Segment 5 is more navigable now than it was in its ordinary and natural condition. *See* Section II(E), *supra*; Tr. 1/28/16:2541 (Mussetter). As Dr. Mussetter testified: "[T]he character of the river that I saw when I went out last November, the character of the river that Mr. Fuller and his crew saw when they took the Edith down is very different from what it would have been here under natural conditions." Tr. 1/28/16:2547-48 (Mussetter); Graf, *Flood-Related Channel Change in an Arid-Region River*, at 127 (1983) [C042].

Second, Mr. Dimock admitted that, on at least two separate occasions, he was forced to get out of his boat and push it because it had gotten stuck on a rapid. *See* Tr. 10/22/15:535-36 (Dimock). This occurred on a portion of the river that, according to Mr. Dimock, "braids into a few channels in the lower velocity channel." *Id.* The day Mr. Dimock took his *Edith* replica on the river, the flow was 653 cfs, which is "substantially higher than the median flow." *See* Tr. 11/19/15:1549 (Gookin). Mr. Dimock did not discuss putting his *Edith* replica in any section of the Salt other than Segment 5 and the extreme upstream portion of Segment 6. *See* Tr. 10/22/15:551 (Dimock).

Third, Dr. Newell testified regarding the Kolb brothers' boat, of which Mr. Dimock's *Edith* is a replica. *See* Tr. 3/30/16:4259-60 (Newell). Dr. Newell testified:

> The Kolb brothers used a version of a Galloway boat, which was first created by Nathaniel Galloway in the mid 19th century. That was essentially a dory, but it was reinforced with a bow and a stern and built specifically for the purpose of exploring or negotiating rapids and cataracts. **It was not a boat that was designed for regular trade and transportation up and down a river.**

Id. (emphasis added). Regarding the load, Dr. Newell testified: "According to Dimock, it could carry about a ton of cargo, and I think that's very optimistic. I would say maybe half a ton; and even at that, I wouldn't want to go down a cataract in a . . . Kolb boat with a ton . . . or a half a ton of cargo. It's built primarily to survive cataracts and to carry supplies for exploration and subsistence." *Id.*

4. Mr. Fuller's hydrologic analysis is flawed.

During his direct testimony, Mr. Fuller presented a series of "median" flows for Segments 1-6. *See* Fuller PowerPoint, at 228. Mr. Fuller presented a median flow of 199 cfs for Segment 1; a median flow of 266 cfs for Segment 2; a median flow of 341 cfs for Segments 3 and 4; a median flow of 992 cfs for Segment 5; and a median flow of 1230 cfs for Segment 6. *Id.*; Tr. 10/20/15:145-46 (Fuller).

For Segments 1-4, Mr. Fuller used historical long-term gage data to calculate median daily flows. *See* Tr. 5/19/2016:5081-82 (Fuller). For Segments 5 and 6, however, Mr. Fuller took a different approach. *See* Tr. 10/21/15:500-01 (Fuller); Fuller PowerPoint, at 228. According to Mr. Fuller:

> The median flow rate [for Segment 6], what I did there was looked at the USGS estimate when they published Thomsen and Porcello in 1991, published a flow reconstruction for predevelopment conditions on the Salt River at the Salt River Pima-Maricopa Indian Community, and their estimate they had in the Land Department report was reported at 1230 [cfs].

Tr. 10/21/15:500-01 (Fuller); Fuller PowerPoint, at 228. This explanation was, at best, misleading. Mr. Fuller used the Thomsen & Porcello paper[47] to derive what he labeled a "median" flow rate in his presentation. *See* Tr. 11/17/15:1041(Fuller); Fuller PowerPoint, at 228. Thomsen & Porcello, however, did not produce the 1,230 cfs figure. *See* Tr. 11/17/15:1041 (Fuller). Mr. Fuller used Thomsen & Porcello's median **annual** discharge of 950,000 AFY to derive his "median" flow rate. *See* Tr. 11/17/15:1041-44 (Fuller). Mr. Fuller testified that he took this number, converted it to cubic-feet and divided it by the number of seconds in a year to get cfs. *Id.* In reality, what Mr. Fuller did

[47] Thomsen & Porcello, *Predevelopment Hydrology of the Salt River Indian Reservation, East Salt River Valley, Arizona* (Nov. 1991) [C002-ASLD 44] ("Thomsen & Porcello").

was take the median year from the period of record and calculate the average or "mean" flow rate for that year. *See* Tr. 10/23/15:860 (Fuller).

Although Mr. Fuller vehemently denied that his "median" was actually a mean, Tr. 11/17/15:1048 (Fuller), he later testified that he would perform the same calculation to determine the average flow rate for a given year.[48] Using a mean instead of a median is a "pitfall" because "the average really skews your perception of what would typically be there, because it's really weighted to the really big events and so the averages tend to be quite high."[49] Mr. Fuller later admitted that, by using these figures in a chart of actual daily median flows, he was "mixing [ ] apples and oranges."[50] As a result, Dr. Mussetter testified that Mr. Fuller had exaggerated median flows by a factor of nearly two and a half. *See* Tr. 1/28/16:2402 (Mussetter); Mussetter Presentation, at 81.[51] Mr. Fuller testified that 1,230 cfs "sounds right" for the natural median flow in Segment 6. *See* Tr. 11/17/15:994 (Fuller).

Mr. Fuller further compounded this error by using his Segment 6 "median" flow figure to produce his Segment 5 "median" figure. *See* Tr. 11/19/15:1458 (Gookin). Mr. Fuller took his exceedingly high mean flow rate from Segment 6 and subtracted the baseflow contribution of the Verde using gage data to arrive at a figure of 992 cfs for the Segment 5 median. *See* Tr. 10/21/15:500-01 (Fuller); Fuller PowerPoint, at 228. Mr. Fuller originally reported a median range of 360 to 580 cfs for the reach of the river from Stewart Mountain to Granite Reef. *See* Fuller Upper Salt Report, at 5-20 [Lower Salt EI 27]. Mr. Fuller's "median" number for Segment 5 (992 cfs) is

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[48] *See* Tr. 11/17/15:1100 (Fuller); *see also* Tr. 11/18/15:1441-42 (Gookin) ("[Y]ou're coming up with the average daily flow in the median year, which is just kind of a kludge number . . . and the mean flow overstates what you would expect to find on the 50 percent day of the median day.").

[49] Tr. 1/27/16:2278 (Mussetter); Mussetter Presentation, at 30, 80; Tr. 1/28/16:2405-06 (Mussetter). According to Mr. Fuller, medians are "more reflective in the ordinary condition in every reach of the stream just because of the seasonality of the flow and the strong influence of floods — you know, large flood volume that would steer the mean upward. So the median is much – probably more reflective of the ordinary condition." Tr. 10/21/15:494-95 (Fuller); Fuller PowerPoint, at 225; *see also* 2005 Lower Salt Decision, at 38.

[50] Tr. 5/19/16:5081-82 (Fuller); Tr. 11/17/15:1049 (Fuller); Fuller PowerPoint, at 238; Fuller 2003, at 7-17 [Lower Salt EI 30].

[51] Dr. Mussetter calculated the median flow for Segment 5 using Mr. Fuller's period of record and the full period of record: 361 cfs and 348 cfs, respectively. *See* Tr. 1/28/16:2407-08 (Mussetter); Mussetter Presentation, at 81. These numbers are approximately one-third of what Mr. Fuller presented in his direct testimony to this Commission. *Id.*

higher than his mean calculation using gage data of 896 cfs, which makes no sense whatsoever. *See* Tr. 11/19/15:1564-68 (Gookin). As Mr. Gookin testified, it is not possible for a true median to be higher than a mean flow rate on a desert river with characteristics like the Salt, and that should have been a huge red flag for Mr. Fuller. *Id.* Mr. Fuller either did not realize that, or he simply ignored it.

The flaws in Mr. Fuller's analysis also answer one other question: Why do Mr. Fuller's median flow calculations jump from 341 cfs in Segment 4 to 992 cfs in Segment 5? Mr. Fuller's "reconstructed" "median" flow is nearly double the actually measured combined gage data above the dams and diversions, which is 581 cfs (including flows from both the Salt and Verde). *See* Tr. 11/17/15:1050 (Fuller). Mr. Fuller credits this 651 cfs difference to missed downstream drainage and "tributaries." *See* Tr. 11/17/15:1051 (Fuller). The 581 cfs includes 239 cfs coming into the Salt at Roosevelt, and 238 cfs coming into the Salt at the Verde confluence, meaning 649 cfs coming from other "drainage" and "tributaries" between Roosevelt Dam and the Verde confluence, as well as human diversions. *See* Tr. 11/17/15:1051-53 (Fuller). Essentially, Mr. Fuller believes (or at least testified) that more water comes into the Salt between Roosevelt Dam and the Verde confluence than all the water coming from the White Mountains and Mogollon Rim combined. *See* Tr. 11/17/15:1053 (Fuller); Tr. 11/19/15:1459 (Gookin). This, again, makes no sense.

Mr. Gookin calculated that "[u]nder virgin conditions, assuming the dams weren't there, . . . the flow would increase about 13 percent." Tr. 11/18/15:1439 (Gookin). "In reality, the river inflows below Roosevelt are much smaller. They're ephemeral streams, and so . . . most of the time they flow in during floods, which won't affect the median daily flow. And even if they do, it's a lot less per square mile of drainage area than it is in the headwaters of the Salt."[52]

Mr. Fuller's median numbers also are inflated because he used the period of record that Thomsen & Porcello used, which stopped at 1991. *See* Tr. 1/27/16:2283 (Mussetter); Mussetter Presentation, at 31. Dr. Mussetter calculated the median annual flow using the full period of record

[52] Tr. 11/19/15:1459 (Gookin); Tr. 1/28/16:2412-13 (Mussetter) ("So based on these numbers and the relative drainage areas, it makes absolutely no sense that the median flow would increase by a factor of two and a half to three when you go from around the Roosevelt Dam area down to the lower end of Segment 4, Segment 5, above the Verde.").

and determined that the annual median flow was 462,000 AFY rather than Mr. Fuller's 511,000 AFY. *Id.*

Mr. Fuller's errors carried over into his rating curve and depth analysis because he used his median flow numbers in those calculations. *See* Fuller PowerPoint, at 236-38. But the median flow numbers are only one of several problems with this analysis. First, Mr. Fuller used only two cross-sections for Segments 1-4 that he claims are "representative of the ordinary and natural conditions," but could not (or would not) provide the locations of those cross-section to verify that assertion. *See* Tr. 10/21/15:506-07 (Fuller); Fuller PowerPoint, at 232; Tr. 11/17/2015:1018-19 (Fuller).

For Segments 5 and 6, Mr. Fuller used a 1907 topographic map developed by the U.S. Reclamation Service with five-foot contour intervals. *See* Tr. 10/21/15:508 (Fuller); Fuller PowerPoint, at 234. The use of five-foot contour maps has "significant limitations." *See* Tr. 1/28/2016:2472 (Mussetter). Because of this, any given measurement could be off by up to 5 feet. *See* Tr. 1/28/2016:2473 (Mussetter). Dr. Mussetter testified: "In my view, this is a very sketchy analysis to begin with. . . . [W]e're taking about flow depths that are considerably less than the resolution of the mapping that we're using to estimate those depths." *Id.*

During his direct testimony, Mr. Fuller testified that his median flow calculations and rating curves provided "average" depths of 2.1 feet for Segment 2 (in a sheer canyon), depths of 5.0 feet for Segment 2 (with gravel bars), depths of 2.3 feet for Segments 3 and 4 (in a sheer canyon), depths of 5.5 feet for Segments 3 and 4 (with gravel bars), 3.8 feet for Segment 5, and 5.3 feet for Segment 6. *See* Fuller PowerPoint, at 236-38. Mr. Fuller claimed that he "verified" his depth estimates in Segments 2, 3, and 5 during boating trips and using historical descriptions. *See* Tr. 10/21/15:513 (Fuller); Fuller PowerPoint, at 239. Although Mr. Fuller labeled these depths "average," they actually represented "maximum depths" as he intended to calculate them. *See* Tr. 11/17/15:1015, 1035-36 (Fuller).

Despite the fact that Mr. Fuller could not (or would not) provide the location of the cross-sections he used to calculate depths in Segments 5 and 6, Dr. Mussetter was able to use topographic maps to generally identify the locations of his cross-sections, determine the slope at those cross-

sections, and estimate the Manning's N value.[53] Dr. Mussetter testified that Mr. Fuller's depth calculations were incorrect. Mr. Fuller used discharges that "were two and a half to three times too high on the discharge to represent the median flow." *See* Tr. 1/28/16:2450-51 (Mussetter); Mussetter Presentation, at 133. As a result, Mr. Fuller's depths are "considerably higher than they should be." *Id.*

Using his own median estimate of 358 cfs instead of Mr. Fuller's 992 cfs, Dr. Mussetter determined a **maximum** depth across the cross-section in Segment 5 of 1.5 feet instead of Mr. Fuller's 3.8 feet. *See* Tr. 1/28/16:2475-76 (Mussetter); Mussetter Presentation, at 148. Using his own median flow rate estimate of 554 cfs instead of Mr. Fuller's 1,230 cfs, Dr. Mussetter determined a **maximum** depth in Segment 6 of 1.9 feet instead of Mr. Fuller's 5.3 feet. *Id.* [54]

Additionally, four of Mr. Fuller's six cross-sections in Segment 6 show at least two and up to five channels (depending on flow).[55] This supports Dr. Mussetter's testimony that Segments 5 and 6 contained multiple channels in their ordinary and natural condition. *See* Section II(C), *supra.* Despite the fact that many of Mr. Fuller's cross-sections show multiple channels, Mr. Fuller assumed all the water was in only one channel, thus further artificially increasing his estimated depths. *See* Tr. 11/19/15:1542, 1543 (Gookin).

Finally, Mr. Fuller's rating curve depth analysis was wrong because the cross-sections he selected "definitely do not represent the locations most limiting to navigation." Mussetter Presentation, at 149 (emphasis in original). The shallowest portion of a river is the most limiting factor for navigation. *See* Tr. 11/19/15:1531 (Gookin). Dr. Mussetter testified:

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[53] *See* Tr. 1/28/16:2467-68 (Mussetter); Mussetter Presentation, at 144-45.

[54] Mr. Fuller testified that his 5.3-foot "average" depth estimate for Segment 6 was incorrect because he "read the curve wrong when [he] was preparing the slide." Tr. 11/17/15:1009 (Fuller). On cross-examination, he eventually conceded that his "average" depth estimate was off by half. *Id.* at 1008.

[55] For Cross-Section 1, the water-surface elevation lines show four inundated channels at the high line and "at least two" for the lower line. *See* Tr. 11/17/15:1029 (Fuller). Mr. Fuller testified that Cross-Section 2 shows four channels for the higher water elevation. *Id.* at 1030-31. Cross-Section 3 shows five channels at the higher water elevation mark. *Id.* at 1031. Cross-Section 4 shows one channel at the higher water elevation mark. *Id.* at 1032. Cross-Section 5 shows two channels at the higher water elevation mark. *Id.* at 1033. Cross-Section 6 shows one channel at the higher water elevation mark. *Id.*

> [I]f we're talking about navigability along the system, we should be looking at the limiting areas. If we're going to float a boat through there, I recognize that there will be pools and deeper zones where you can float a boat; but there are also areas that would occur in the steeper segments that would limit your ability to effectively float down through the reach. And so if we're going to look at navigability of one segment of the channel as defined, then we need to look at the areas that would limit your ability to float through the reach. It's the steep zones.

Tr. 1/28/16:2479-80 (Mussetter); Mussetter Presentation, at 148. Mr. Fuller did not analyze the most limiting sections of Segment 6, so Dr. Mussetter created four more cross-sections at steeper parts of the reach. *See* Tr. 1/28/16:2481-83 (Mussetter); Mussetter Presentation, at 150-54. Using Dr. Mussetter's median flow calculation, the depths calculated by Dr. Mussetter's new cross-sections were much more shallow than those presented by Mr. Fuller, in the range of one foot. *See* Tr. 1/28/16:2487 (Mussetter); Mussetter Presentation, at 150-55.

Mr. Fuller let his zeal for a finding of navigability get in the way of his professional judgment. Perhaps even more so than his interpretations of the historical record, the repeated errors and unsupported assumptions in his hydrology and geomorphology work (e.g., his outlandish testimony that the "average" depth in Segment 6 under "ordinary and natural conditions" was 5.3 feet) severely diminish any weight that the Commission should put on his testimony. The evidence submitted by Mr. Fuller, the ASLD's "expert for all seasons," does not support the State's claims to title to the bed of the Salt River. [57]

VII. Summary and Requested Action

The Commission was right in 2005 and 2007. Even after many more hearing days and thousands of pages of more evidence, the record still does not support a finding that the Salt is or ever was navigable. The Commission should find the Salt non-navigable.

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[57] The Salt was not navigable in its "ordinary and natural condition." SRP does not waive its right to contend before the appellate courts that the extensive federal involvement in pre-statehood activities on the Salt created special circumstances that should be considered in applying the navigability test. Arizona courts must apply the federal test of navigability in consideration of pre-statehood actions by the United States pursuant to the 1902 Reclamation Act and the effect of those actions on the river as of 1912. *See* Act of June 17, 1902, c. 1093, 32 Stat. 388, *codified as amended at* 43 U.S.C. §§ 371 to 600e. Before 1912, the United States had "the entire dominion and sovereignty, national and municipal, federal and state" over the area. *Shively v. Bowlby*, 152 U.S. 1, 48 (1894). During that time, Congress passed the 1902 Reclamation Act, and the United States proceeded to construct Roosevelt Dam and Granite Reef Diversion Dam to carry out the "public purposes appropriate to the objects for which the United States [held] the territory." *See id.*

DATED this 18th day of July, 2016.

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