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14 **BEFORE THE ARIZONA NAVIGABLE STREAM**
15 **ADJUDICATION COMMISSION**

16 In re Determination of Navigability of
17 the Salt River

18 No. 03-005-NAV
19 No. 04-008-NAV
20 (Consolidated)

21 **SALT RIVER PROJECT'S**
22 **PROPOSED FINDINGS OF FACT**
23 **AND CONCLUSIONS OF LAW**

24 Pursuant to the Chairman's Order,¹ the Salt River Project Agricultural Improvement
25 and Power District and Salt River Valley Water Users' Association (collectively, "SRP")
26 submit their proposed findings of fact and conclusions of law in this matter regarding the Salt
27 River ("Salt"). For purposes of this submission, exhibits from the hearings before 2015 are
referred to as "EI ___." Supplemental exhibits from the 2015/16 hearings are referred to as "C

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).

1 __.” Citations to the reporter’s transcript of proceedings at the hearings appear as “Tr.
2 [DATE]:[PAGE] (WITNESS).” A table of contents begins on page iii. SRP’s proposed
3 findings of fact begin on page 1. SRP’s proposed conclusions of law begin on page 217. A
4 list of evidence cited, including subsequent short cites used herein, is attached as Appendix 1.

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1 **FINDINGS OF FACT**

2 Based upon the evidence in the record, the Commission makes the following findings
3 of fact:

4 **SUMMARY OF EVIDENCE RECEIVED**

5 1. Pursuant to Title 37, Chapter 7, Arizona Revised Statutes, the Commission has
6 undertaken to receive, compile, review, and consider relevant historical and scientific data
7 and information, documents, and other evidence regarding the issue of whether the Salt was
8 navigable or non-navigable for title purposes on February 14, 1912. *See* A.R.S. §§ 37-1101 to
9 -1156.

10 2. In accordance with A.R.S. § 37-1123(B), the Commission gave proper public
11 notice of its intent to study the navigability or non-navigability of the Salt.

12 3. After collecting and documenting all reasonably available evidence received
13 pursuant to the Notice of Intent to Study and Receive, Review and Consider Evidence, the
14 Commission scheduled public hearings to receive additional evidence and testimony
15 regarding the Salt.

16 4. Public notice of these hearings was given as required by law pursuant to A.R.S.
17 § 37-1126 and, in addition, by mail to all those requesting individual notice and by means of
18 Commission website (<http://www.ansac.az.gov/>).

19 5. The Commission held hearings regarding the navigability of the Lower Salt on
20 April 7-8, 2003 (Phoenix). It held hearings regarding the navigability of the Upper Salt on
21 November 15, 2004 (Globe) and October 20, 2005 (Phoenix). On remand, the two cases were
22 consolidated and hearings were held on October 20-23, 2015; on November 17-20, 2015; on
23 January 26-29, 2016; on February 23-26, 2016; on March 10-11, 2016; on March 30-31,
24 2016; and on May 17-19, 2016 (Phoenix). The hearings held in 2015 and 2016 are referred
25 to herein as the “2015/16 Hearings.”

1 6. All parties were advised that anyone who desired to appear and give testimony
2 at any of the public hearings could do so and that, in making its findings and determination as
3 to the Salt, the Commission would consider all matters presented to it at the hearings, as well
4 as other information that had been submitted to the Commission at any time prior to the
5 hearing.

6 **WITNESSES DURING THE 2015/16 HEARINGS**

7 7. Mr. Fuller, a consultant for the Arizona State Land Department (“ASLD”)
8 testified during the 2015/16 Hearings. *See* Tr. 10/20/15:10 (Fuller). Prior to the 2015/16
9 Hearings, Mr. Fuller submitted two reports: (1) Fuller, et al., *Arizona Stream Navigability*
10 *Study for the Salt River: Granite Reef Dam to the Gila River Confluence* (April 2003) [Lower
11 Salt EI 30] (“Fuller Lower Salt 2003”); and (2) Fuller, et al., *Arizona Stream Navigability*
12 *Study for the Salt River: Granite Reef Dam to the Confluence of the White and Black Rivers*
13 (June 2003) [Upper Salt EI 27] (“Fuller Upper Salt 2003”).

14 a. Although Mr. Fuller did not submit any further reports during the
15 2015/16 Hearings, he submitted a number of PowerPoint presentations, including: (1) Fuller,
16 *Presentation to ANSAC: Salt River Navigability* (Oct. 15, 2015) [C030-ASLD364] (“Fuller
17 PowerPoint”); and (2) Fuller, *Presentation to ANSAC: Salt River Navigability—Rebuttal*
18 (May 2016) [C053-ASLD 385] (“Fuller Rebuttal”).

19 b. Mr. Fuller does not have a degree in history. *See* Tr. 10/23/15:962
20 (Fuller); *See* Tr. 5/19/16:5070-74 (Fuller).

21 c. Mr. Fuller does not have a degree in archaeology, has not taken in classes
22 in archaeology, and has no professional certification in archaeology. *See* Tr. 11/17/15:1098-
23 99 (Fuller).

24 d. Mr. Fuller relied primarily on Mr. Gilpin and his staff for the history and
25 archaeology portion of his report. *Id.*

1 e. Mr. Fuller testified that Mr. Gilpin was not directly involved in Mr.
2 Fuller's PowerPoints. *See* Tr. 10/23/15:966-67 (Fuller).

3 f. With regard to boats, Mr. Fuller testified that the Commission should
4 disregard the testimony of non-qualified boating experts. *See* Tr. 5/19/16:5087-88 (Fuller).
5 He agreed that the same standard should apply to history, archaeology, economics, Native
6 American studies and law. *Id.*

7 8. Tyler Williams, an author who writes paddling guidebooks and articles for
8 boating magazines, testified on behalf of the ASLD. *See* Tr. 10/21/15:274 (Williams).

9 9. Alex Mickel, a river outfitter who owns a business called "Mild to Wild
10 Rafting" based in Durango, Colorado, testified on behalf of the ASLD. He has been a
11 commercial recreational boating operator on the Upper Salt since 1998. *See* Tr. 10/21/15:380
12 (Mickel).

13 10. Brad Dimock, a river runner and boat builder, testified on behalf of the ASLD.
14 *See* Tr. 10/22/15:526 (Dimock).

15 11. Allen Gookin, a hydrologist, testified before the Commission on behalf of the
16 Gila River Indian Community ("GRIC"). *See* Tr. 11/18/15:1423 (Gookin).

17 a. Mr. Gookin is a professional engineer in civil engineering in Arizona,
18 California and Nevada. *Id.* He is a registered land surveyor in Arizona. *Id.* at 1424. He has
19 a Bachelor of Science in engineering. *Id.*

20 b. He has worked as a consulting engineer for 30-plus years. *Id.*

21 c. He has done extensive work on the Salt River watershed. *Id.* at 1428.

22 d. He submitted a report to the Commission: Gookin, *Navigability of the*
23 *Salt River* (July 27, 2015) [C022] ("Gookin Report"). He also submitted a PowerPoint
24 Presentation: Gookin, *Salt River Navigability* (November 2015) [C034] ("Gookin
25 PowerPoint").
26
27

1 12. Dr. Jack August, Jr. testified on behalf of the Cities of Phoenix, Tempe, and
2 Mesa. *See* Tr. 1/26/16:1864 (August).

3 a. At the time of the 2015/16 Hearings, Dr. August was a scholar-in-
4 residence at the Southwest Center for History and Public Policy. *Id.*

5 b. He got his undergraduate degree from Yale, his Master's in history at the
6 University of Arizona, and his Ph.D. from the University of New Mexico in History of the
7 American Southwest. *Id.* at 1864-65.

8 c. His Ph.D. dissertation was on water resource development in the
9 American Southwest, 1877 to 1934. *Id.*

10 d. The State of Arizona hired Dr. August as a Historian and director of
11 institutional advancement. *Id.* at 1866.

12 e. He has taught classes at the University of Arizona, Arizona State
13 University, Northern Arizona University, and the University of Houston, teaching classes
14 including the history of Arizona, history of the American West, history of the New West, 20th
15 Century West, American Indian history, and environmental history. *Id.*

16 f. He was a Fullbright Scholar to the University of Northern British
17 Columbia. *Id.*

18 g. Dr. August wrote the book entitled *Vision of the Desert: Carl Hayden*
19 *and Hydropolitics in the American Southwest*. *Id.* at 1870.

20 h. He also wrote a book entitled *Dividing Western Waters: Mark Wilmer*
21 *and Arizona versus California*. *Id.*

22 i. Dr. August considers his subspecialities in Southwest history to be
23 environmental history and water resource development in Arizona from the 1850s to present.
24 *Id.* at 1872-73.

25 j. He also submitted a report to the Commission: Dr. Jack August, *History*
26 *of the Lower Salt River prior to February 14, 1912* (2015) [C023] ("August Report").
27

1 13. Dr. Robert A Mussetter, a geomorphologist, testified before the Commission on
2 behalf of SRP. *See* Tr. 1/27/16:2228 (Mussetter).

3 a. He has worked in the field for his entire career and worked closely with
4 well-known geomorphologist, Dr. Stanley Schumm. *See* Tr. 1/27/16:2230-31 (Mussetter).

5 b. He has experience in hydrologic, hydraulic, sediment transport, scour
6 and other geomorphic processes. *Id.* at 2231.

7 c. He has a Bachelor of Science in civil engineering from Montana State
8 University, a Master of Science in civil engineering with an emphasis on hydraulic
9 engineering at Colorado State University, and a Ph.D. in hydraulic engineering from the
10 same. *Id.* at 2232.

11 d. He is a registered professional engineer in ten states, including Arizona.
12 *Id.* at 2232-33.

13 e. He has worked on a variety of rivers, including the Mississippi, the
14 Upper Rio Grande and Arizona rivers. *Id.* at 2234-35.

15 f. He has been qualified as an expert in hydrology, hydraulics, and river
16 mechanics in state courts. *Id.* at 2235-36.

17 h. Dr. Mussetter has experience and has given lectures on the impacts of
18 dams on downstream channel morphology. *Id.* at 2236-37.

19 i. Dr. Mussetter knew Dr. Schumm and reviewed his work on the Salt
20 River. *Id.* Dr. Mussetter applied the standards, as he understood them, of *Winkleman* and
21 *PPL Montana*. *Id.* at 2238; *State ex rel. Winkleman v. Arizona Navigable Stream*
22 *Adjudication Comm'n*, 224 Ariz. 230, 229 P.3d 242 (App. 2010); *PPL Montana LLC v.*
23 *Montana*, 132 S.Ct. 1215 (2012).

24 j. He conducted helicopter reconnaissance of the Salt River in November
25 2013. *See* Tr. 1/27/16:2238-39 (Mussetter).

26 k. He also lived in Tempe for a period of time. *Id.* at 2239.

27

1 l. In November 2015, Dr. Mussetter attempted to float Segment 5 of the
2 Salt in an inflatable packraft from Stewart Mountain Dam to the Verde confluence. *Id.* at
3 2239.

4 m. He also drove up the Apache Trail up past Roosevelt Dam. *Id.*

5 n. Dr. Mussetter submitted a declaration to the Commission: Mussetter,
6 *Declaration Navigability of the Upper and Lower Salt River* (Aug. 20, 2015) [C024]
7 (“Mussetter Declaration”).

8 o. He also submitted a PowerPoint presentation: Mussetter, *Salt River*
9 *Navigability* (Jan. 2016) [C039] (“Mussetter Presentation”).

10 p. Dr. Mussetter also presented the Commission with a significant number
11 of historical photographs. *See Historical Photograph PowerPoint Presentation*, at 62-65, 98-
12 104 (Dec. 7, 2015) [C038] (“Historical Photos”).

13 14. Rich Burtell, a hydrologist, testified on behalf of Freeport Minerals
14 Corporation. *See* Tr. 2/23/16:2749 (Burtell). He submitted a declaration to the Commission.
15 *See* Rich Burtell, *Declaration of Rich Burtell on the Non-Navigability of the Upper Salt River*
16 *at and Prior to Statehood* (July 2015) [C021–Freeport 1].

17 15. Dr. Doug Littlefield, a historian, testified on behalf of SRP. *See* Tr.
18 2/25/16:3270-71 (Littlefield).

19 a. Dr. Littlefield has a Bachelor of Arts in English from Brown University
20 and a Master’s degree in American history from the University of Maryland. *Id.*

21 b. He received his doctorate from the University of California at Los
22 Angeles, and his dissertation was entitled *Interstate Water Conflicts, Compromises, and*
23 *Compacts: The Rio Grande, 1880 through 1938*. *Id.*

24 c. His expertise is in “history of the American West, history of California,
25 water rights history, legal history and environmental history.” *Id.*

1 d. Dr. Littlefield's Master's thesis was entitled *A History of the Potomac*
2 *Company and Its Colonial Predecessors*. *Id.* at 3270-71 (Littlefield).

3 e. His thesis involved navigability because "[t]he goal of the company was
4 to clear obstructions from the Potomac River from its headwaters near the crest of the
5 Appalachian Mountains down to Georgetown and Alexandria." *Id.*

6 f. Dr. Littlefield took courses history methodology, which has two phases:
7 "One is to teach you techniques in archival research and how to be sure that your -- what you
8 are looking at is ultimately interpreted properly. And, secondly, as a second part of the
9 course, which are usually two-semester courses, you go out and do a research paper using
10 what you've learned in the first part of the course." *See* Tr. 2/25/16:3274-75 (Littlefield).

11 g. Dr. Littlefield is also trained in Historiography, which teaches a historian
12 not just to look at information factually, but also "how it was interpreted and shaped by the
13 times in which it was written." *Id.* at 3275-76.

14 h. Dr. Littlefield has published two books on history of the American West,
15 one entitled *Conflict on the Rio Grande: Water and the Law 1879 to 1938* and the other
16 entitled *The Spirit of Enterprise: A History of Pacific Enterprises, 1867 to 1989*. *Id.* at 3277.

17 i. He has also published a number of different scholarly articles. *Id.*

18 j. Dr. Littlefield opinion about navigability was based upon his education,
19 training and experience as a professional historian. *Id.* at 3282.

20 j. Dr. Littlefield considered "[m]any archival, government agency, and
21 published primary sources" that consisted of "records from archives and government agencies
22 in the following locations: 1) Phoenix, Prescott, and Tucson, Arizona; 2) Berkeley and
23 Riverside, California; 3) Denver, Colorado; 4) College Park, Maryland; and 5) Washington,
24 D.C. In addition, thousands of historical newspaper accounts and historical maps were
25 reviewed." *See* Littlefield Declaration, ¶ 12.

26 k. Dr. Littlefield wrote:
27

1 The fruit of that extensive historical research consists of tens of thousands of
2 pages of primary source records created by individuals and organizations who
3 were ‘on the scene’ and left first-person accounts regarding the Salt River over
4 many years between the midnineteenth century and the first few decades of the
5 twentieth century. Those descriptions, to a professional and scholarly historian,
6 convey the most accurate understanding of what the Salt River was like
7 historically.

8 *Id.*

9 l. In preparing his reports, Dr. Littlefield intended to address the
10 requirements of *Winkleman* and *PPL Montana*. See Tr. 2/25/16:3281 (Littlefield).

11 m. Dr. Littlefield knows that the Commission must consider the Salt in its
12 ordinary and natural condition. *Id.* at 3283.

13 n. Dr. Littlefield testified: “I think it’s useful for the Commission to
14 understand how historical parties at different points in time perceive the river in its ordinary
15 and natural condition . . . [p]articularly because *Winkleman* wanted an emphasis on what the
16 river may have been like before there were manmade structures on the river.” *Id.* at 3282-83.

17 o. Dr. Littlefield also published two detailed reports, one for the Upper Salt
18 and one for the Lower Salt. See Littlefield, *Revised and Updated Report: Assessment of the*
19 *Navigability of the Salt River Below Granite Reef Dam Prior to and on the Date of Arizona’s*
20 *Statehood, February 14, 1912* (June 8, 2014) [C001] (“Littlefield Lower Salt”); Littlefield,
21 *Revised and Updated Report: Assessment of the Navigability of the Upper Salt River Above*
22 *Granite Reef Dam Prior to and on the Date of Arizona’s Statehood, February 14, 1912* (Feb.
23 7, 2014) [C004] (“Littlefield Upper Salt”); Tr. 2/25/16:3280-81 (Littlefield).

24 p. He also submitted a declaration to the Commission summarizing his two
25 more detailed reports. See Littlefield, *Declaration of the Non-Navigability of the Salt River at*
26 *and Prior to Arizona’s Statehood on February 14, 1912* (July 11, 2015) [C020] (“Littlefield
27 Declaration”).

1 16. Mark Newell, Ph.D., RPA, testified before the Commission on behalf of SRP.
2 *See* Tr. 3/30/16:4153 (Newell).

3 a. He received his Ph.D. in anthropology and archaeology from the
4 University of St. Andrews in Scotland. *Id.* at 4156-66.

5 b. Dr. Newell has conducted an “intensive study of small riverine craft in
6 South Carolina,” as well as research on “oceangoing vessels in Bermuda.” *Id.*

7 c. Dr. Newell was involved with the discovery and excavation of the CSS
8 H.L. Hunley, “the very first submarine to sink an enemy vessel in combat, and . . . is an icon
9 in the history of submarine warfare and is famous worldwide for the fact that it was the very
10 first such vessel.” *Id.*

11 d. From 1983 to 1995, Dr. Newell was a member of the staff at the South
12 Carolina Institute of Archaeology & Anthropology. *Id.*

13 e. In 1988, Dr. Newell received a commendation from the U.S. Secretary of
14 the Navy for work relating to the preservation of timbers from the USS Constitution. *Id.*

15 f. For his dissertation, Dr. Newell studied a boat called a mountain boat,
16 which was used to navigate reaches of the upper Savannah River. *Id.*

17 g. Dr. Newell testified: “And I documented some of the first oral accounts,
18 oral histories of the use of the vessel. I found the first reports of descriptions of the vessel,
19 from which we could actually build a reproduction, and finally built a reproduction vessel and
20 sailed it down the Savannah.” *Id.*

21 h. Dr. Newell testified: “I would say the major portion of the research that
22 I’ve done has been on historic river boats of the riverine systems of America.” *See* Tr.
23 3/30/16:4167 (Newell).

24 i. Dr. Newell wrote a 120,000-word dissertation on the topic of
25 “Vernacular Craft of South Carolina.” *See* Tr. 3/30/16:4167 (Newell). “Vernacular craft
26 means, essential, unskilled craft. And vernacular boatbuilding is the kind of boatbuilding that
27

1 is done by people on plantations or riverside towns, carpenters that are capable of producing a
2 barn, a carriage, furniture, and they will build boats. And they're not necessarily built to
3 traditional standards or to traditional styles, which means that there's a great deal of variation
4 in style and look and construction." *Id.* at 4167-68. Dr. Newell's study of vernacular craft
5 "involved locating vessels in places where they were likely to have been abandoned or sunk
6 and then getting underwater and doing detailed measurements of the vessel, documenting
7 their construction, their size, everything I could gather in terms of the methods used to
8 construct them." *Id.* at 4168.

9 j. Dr. Newell has built three replica boats, including the reconstruction of
10 an 1870 57-foot Petersburg cotton boat. *See* Tr. 3/30/16:4169 (Newell). Dr. Newell designed
11 the reconstruction based on historical information and built the boat with the help of a
12 boatbuilder and several local carpenters. *Id.* Dr. Newell testified:

13 We launched the boat, first of all, in the Augusta Canal and tested it there; and
14 then following that, we hauled it out and launched it in the Savannah River and
15 then sailed it approximately a hundred-plus miles or 150 miles to Savannah. . . .
16 It was, in this particular case, fairly lightly loaded. We had a crew of about 10
17 people, supplies to last for a week or so, and ballast. And as that boat went
downriver, I was able to carefully perform its performance and how it worked
and what it actually did as it encountered various riverine conditions.

18 *Id.* at 4170. The boat is now on display at the Augusta Museum of History. *Id.*

19 k. Dr. Newell also built a replica "plantation flat," which was
20 "approximately 17 feet by 30 and was a very heavily built . . . typical plantation flat. It was
21 built on historic plantation on the Ashley River near Charleston. . . . We put it in the river
22 briefly, to see how it would perform, and then it was hauled back out and put on display at the
23 Magnolia Plantation in Charleston." *Id.* at 4171.

24 l. Dr. Newell also reconstructed a ferry craft that he put briefly on the river
25 and is now on display at the Museum of History in Conway, South Carolina. *Id.* at 4171-72.
26 It was a "very early style of ferry craft built from two -- from a cypress log, but essentially is
27

1 split in half, with planks put crosswise, essentially, between the two logs to create a ferry
2 craft. The logs themselves were almost 60 feet long, so this is a very, very large original
3 tree.” *Id.*

4 m. Dr. Newell testified: “I’ve sailed in tall ships, but I’ve also operated a
5 wide variety of small craft as part of my job working with the South Carolina Institute of
6 Archaeology.” *Id.* at 4171-73. Dr. Newell has spent “just about all” of his career around
7 rivers. *Id.* Dr. Newell has three decades of experience with vernacular craft and other
8 historic boats. *Id.* at 4179.

9 n. Dr. Newell was qualified as an expert in marine archaeology in the
10 United States District Court for the Eastern District of North Carolina, and the judge in that
11 case relied on Dr. Newell’s testimony to make findings of fact related to historic boats. *See*
12 *Tr.* 3/30/16:4173-79 (Newell); *North Carolina v. Alcoa Power Generating, Inc.*, No. 5:13-
13 CV-633-BO, 2015 WL 2131089, at *2-3 (E.D. NC 2015) (“The Court finds Dr. Newell’s
14 testimony persuasive and relies on it to make the following findings of fact.”).

15 o. Dr. Newell submitted a report to the Commission. *See Newell, Synopsis*
16 *of Historic Watercraft Operating In Southwestern States and the Salt River, Arizona* (2016)
17 [C044-SRP5] (“Newell”).

18 **SEGMENTATION**

19 **Methodology**

20 17. Mr. Fuller segmented the Salt River by “identify[ing] characteristics of the river
21 that are similar enough to be cohesive over some distance.” *See Tr.* 10/20/15:52 (Fuller);
22 Fuller PowerPoint, slide 50.

23 18. Mr. Fuller testified:

24 Why segment? Well, the river changes its characteristics. There are differences
25 in the density and the ratings of rapids that occur in some of the upper parts of
26 the river that changes the susceptibility to navigability -- susceptibility to
27 navigation. There are changes in flow rate that occur in the downstream
direction, generally increases in the downstream direction. There are changes in

1 the physiography of the river. There are bedrock canyons. There are valley
2 sections. There are wide alluvial sections, like we're familiar with down here in
3 Phoenix. And, in fact, if you read any descriptions of the Salt River, including
4 our own, you automatically find people just using the terms of upper reach,
5 canyon reach, valley reach. So it's pretty generally understood that there are
6 different segments of this river and different characteristics. Because of those
7 different characteristics, they deserve consideration separately.

8 Tr. 10/20/15:52-53 (Fuller); Fuller PowerPoint, slide 48.

9 19. Mr. Fuller testified that ASLD's segmentation of the Salt is based on the
10 ordinary and natural condition of the river and not human-constructed features. *See* Tr.
11 10/20/15:53 (Fuller); Fuller PowerPoint, slide 51.

12 20. Dr. Mussetter found it unnecessary to segment the Salt River because "no
13 significant segment of the river was navigable in its ordinary and natural condition." *See*
14 Mussetter Declaration, at 5 [C024].

15 21. For identification purposes, the Commission adopts the segmentation proposed
16 by the ASLD, with the exception that the Commission has concluded that it lacks jurisdiction
17 under the applicable Arizona statute to determine the navigability of Roosevelt Lake or the
18 portion of the former Salt laying beneath it. *See* Conclusions of Law Nos. 12-16.

19 Segment 1

20 22. ASLD's Segment 1 runs from the White/Black River confluence to Apache
21 Falls. Mr. Fuller testified that it includes class II-V rapids over 17% of the reach, or 69
22 "significant rapids," 44 of which are class III-V. *See* Tr. 10/20/15:54-55 (Fuller); Fuller
23 PowerPoint, slides 52, 54.

24 23. Mr. Fuller concluded that Segment 1 was **not navigable** at the time of statehood
25 in its ordinary and natural condition. *See* Tr. 10/20/15:61 (Fuller); Fuller PowerPoint, slide
26 57; Tr. 10/22/15:585 (Fuller).
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1 Segment 2

2 24. ASLD's Segment 2 goes from Apache Falls down to Sleeper Rapid. *See* Tr.
3 10/20/15:61 (Fuller); Fuller PowerPoint, slide 58.

4 25. ASLD's Segment 2 is a "whitewater" section of the river and includes Quartzite
5 Falls. *See* Tr. 10/20/15:61 (Fuller); Fuller PowerPoint, slide 58.

6 26. Segment 2 also includes forty-five rapids in thirty-three miles; nineteen Class
7 III Rapids, four Class IV rapids including "Sleeper Rapid," a Class III rapid; and Quartzite
8 Falls. *See* Tr. 10/20/15:62-67 (Fuller); Fuller PowerPoint, slide 58.

9 27. Regarding navigating the rapids of Segment 2 with a commercial load, Mr.
10 Fuller testified: "It depends on your skill level and what you were comfortable doing and the
11 exact flow rate that you're at on that day. So to get around these rapids if you say, 'You know
12 what? I've got a load of diamonds here that are really precious and the risk factor is too high,
13 I don't want to drop them in the river['] . . . I might choose to line my boat through there."
14 *See* Tr. 10/20/15:82-83 (Fuller).

15 28. Regarding Segment 2, Mr. Fuller testified : "Your experience is going to be a
16 little different at different flow rates, the number of times you might need to work around a
17 rock versus floating over the top of a rock. So you have different choices at different flow
18 rates." *See* Tr. 10/20/15:84 (Fuller).

19 29. Mr. Williams testified: "But I would think that if you -- if you had precious
20 cargo, that you were -- you really had strong motivation not to flip over your canoe, I would
21 think that you would perhaps line the Class IV rapids, of which there's three, four of those on
22 [Segment 2]." *See* Tr. 10/21/15:283 (Williams). He clarified that these were Maze Rapid,
23 Quartzite Falls Rapid, and Corkscrew Rapid. *Id.* at 284.

24 30. Mr. Fuller testified that there are limited diversions affecting flow in Segment 2
25 and that it is currently similar to its ordinary and natural condition. *See* Tr. 10/22/15:588
26 (Fuller); Fuller PowerPoint, slide 255.

1 31. According to Mr. Fuller’s own analysis, flatboats would be floatable in Segment
2 less than fifty percent of the time. *See* Tr. 10/22/15:588 (Fuller); Fuller PowerPoint, slide
3 255.

4 32. Despite “a lot of guidebooks” stating that Segment 2 is boatable only in the
5 Spring, Mr. Fuller testified that they are wrong. *See* Tr. 10/22/15:589 (Fuller); Fuller
6 PowerPoint, slide 255.

7 33. Mr. Fuller testified that he could “think of lots of boulders in the river” in
8 Segment 2. *See* Tr. 10/22/15:684 (Fuller).

9 34. With regard to Segment 2, Mr. Fuller testified:

10 Yeah, we have the bigger rapids in Segment 2. There are some rapids that most
11 people . . . would portage, I believe, under most conditions or under more
12 conditions, I guess would be a better way to say that; that being Quartzite in its
13 ordinary and natural condition. The canyon’s tighter than 3, probably similar to
14 4, a little more tortuous, a little more bends. But on the up side, we’ve got a
15 record, you know, of people that do boat it. I personally have boated it myself,
16 so I have a real good comfort level with being able to get through there,
17 particularly at low flow. So I guess the biggest difference would be the rapids
18 and the lack of history, I guess. We don’t have a lot of -- actually, I don't think
19 we have any historical accounts that go through Segment 2.

20 *See* Tr. 11/17/15:1155-56 (Fuller).

21 35. Mr. Fuller testified he did the hydrologic work on his 1993 Lower Salt report,
22 but a man named Brian Iserman did the hydrologic work on the Upper Salt report. *See* Tr.
23 11/18/15:1261-63 (Fuller). Mr. Fuller testified that he consulted Mr. Iserman and that most of
24 the answers to his question were: “Jon, that was 20 years ago. I don’t really remember.” *Id.*
25 at 1263.

26 36. Regarding Quartzite Falls, Dr. Mussetter testified:

27 [In] 1993, this was a big impediment to even whitewater recreational rafting.
People had died trying to traverse the area. The commercial outfitters had to
portage around this rapid. And so some individuals took it upon themselves to
try to remove part of the obstacle, and they went in and blew part of the rapid

1 up. And it's still a pretty significant rapid, but not nearly as significant as it was
2 prior to that happening.

3 *Id.* at 2261-62; *see also* Mussetter PowerPoint, slide 15.

4 37. "The Salt River Canyon is a very remote and potentially dangerous place. The
5 river is a solid Class III-IV run, and is not recommended for novices and beginners." *See* Tr.
6 1/27/16:2261-62 (Mussetter) (quoting the United States Forest Service's permitting website,
7 referring to Segment 2); *see also* Mussetter PowerPoint, slide 23.

8 38. Regarding Segment 2, Dr. Mussetter testified:

9 I imagine if you had a historical wooden canoe at median flow, loaded, you
10 would certainly portage Quartzite Falls, and I would not be at all surprised if
11 you would portage several other locations along there. I don't know that
12 specifically; but from what I know of the reach, what I see in the aerial
13 photographs and so on, it would be a very dicey proposition to take a loaded
14 historic wooden canoe through some of those rapids in the 250 to 300 cubic foot
per second range of flows. . . . I see some places here where safely floating a
boat through this area, a historic wooden -- loaded wooden canoe through this
area would be challenging at best.

15 *See* Tr. 1/29/16:2580-81 (Mussetter).

16 39. "At the end of the 1993 boating season, two men drowned at Quartzite Falls."
17 *See* Kristin Atwell, *Quartzite's Fall: A Wilderness Tale Film* (2001) [C027] (Mike Stamps);
18 Tr. 2/26/16:3535.

19 40. Mr. Fuller testified that the men who blasted Quartzite Falls did so because of
20 the wait times incurred by boaters waiting to portage. *See* Tr. 10/20/15:121 (Fuller); Fuller
21 PowerPoint, slide 214.

22 41. The portage at Quartzite Falls is around 100 feet. *See* Tr. 10/20/15:128 (Fuller).

23 42. Regarding the portage at Quartzite Falls, Mr. Fuller testified: "[I]f you're all by
24 yourself and you have a thousand-pound boat, chances are you're going to unload it and drag
25 your material over and then drag your boat over and reload it. If you've got five or six
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1 people, you have 500 pounds in your boat, you may elect just to carry it fully loaded and
2 packed.” See Tr. 10/20/15:128 (Fuller).

3 43. Regarding Quartzite Falls, Mr. Fuller testified:

4 Because of the recirculator and high flows. Reverse current. So it’s the kind of
5 thing if you got into it and your boat weren’t aligned correctly or your boat were
6 small enough, whatever, the size of the wave and you fell out, you would stay in
7 that and go down and up, down and up. It’s a drowning hazard at certain flow
8 rates.

8 Tr. 10/20/15:129 (Fuller).

9 44. Mr. Fuller testified that people have died at Quartzite Falls. See Tr.
10 10/20/15:130 (Fuller).

11 45. Regarding Quartzite Falls, Mr. Fuller testified:

12 The green canoe, which you see in the lower left, is upside down. They did not
13 make it. So I’m not particularly trying to hide anything here. As you go
14 through a rapid, there is a chance that you can upend a canoe. That’s not an
15 abnormal part of a canoe experience or a small boat experience. If you talk to
16 any boaters, a lot of times what they like to talk about is, “Oh yeah, do you
17 remember the time I flipped?” It’s a story. It’s not a trip-ending experience,
18 except in very rare cases. That’s why you strap your material in. So you catch
19 up to the boat in the pool, you flip it back over, drag it to the side, drain the
20 water out, and continue your trip.

18 Tr. 10/20/15:124 (Fuller); Fuller PowerPoint, slide 214.

19 46. Regarding Quartzite Falls, Mr. Fuller testified:

20 At certain flows, as I mentioned, the hydraulics were quite complex. There was
21 a recirculating current at certain flow rates, typically at higher than 2,000 cfs. I
22 had some friends who did this at 10,000 cfs and they flipped there and had a
23 long swim. And they lost some gear. So -- but the flow rates that I’m mostly
24 interested in are far less than that. But it is something when you go down the
25 river, you stop in Quartzite, you take a look at it. You think, well, how am I
26 gonna go through there? And you line yourself up.

25 Tr. 10/20/15:125 (Fuller); Fuller PowerPoint, slide 214.

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Segment 3

47. ASLD Segment 3 extends from Sleeper Rapid to approximately the location of Roosevelt Dam where the canyon begins. *See* Tr. 10/20/15:97-98 (Fuller); Fuller PowerPoint, Slide 66.

48. ASLD Segment 3 includes Roosevelt Lake. *See* Tr. 10/20/15:98 (Fuller).

49. Mr. Fuller testified that he does not know how long it would take to boat Segment 3 because the reach is largely inundated by Roosevelt Lake. *See* Tr. 10/20/15:99-100 (Fuller).

50. Segment 3 contains five named Class II rapids. *See* Tr. 10/20/15:100 (Fuller).

51. Mr. Fuller testified that Segment 3 is characterized as pool and riffle. *See* Tr. 10/20/15:100-102 (Fuller).

52. Mr. Fuller testified that the flat areas of Segment 3 outside of the Canyon are less steep, have less riffles, and are wider. Tr. 10/20/15:100-102 (Fuller).

53. Mr. Fuller testified that Segment 3 contains “splits” in the river. *See* Tr. 10/20/15:106 (Fuller).

54. With regard to the Salt at Roosevelt, Mr. Fuller testified that flow in normal conditions ranges from 159 to 2120 cfs, with a median discharge at 341. He states that these flows plot “in the range of meandering and then spills over into braided.” *See* Tr. 10/20/15:30 (Fuller). “So by this chart, there’s some tendency for the river to braiding.” *Id.*

55. Dr. Mussetter testified that the Reclamation map he included in his PowerPoint are “reasonable representation of what the bed of the reservoir looked like not long after the reservoir was constructed.” *See* Tr. 1/28/16:2311-12 (Mussetter); Mussetter Presentation, slide 53. It was the best information Dr. Mussetter could find. *See* Tr. 1/28/16:2314 (Mussetter). The map included penciled-in lines representing the channel alignment. *Id.* at

1 2318; Mussetter Presentation, slide 55. Regarding the channel alignment below Roosevelt
2 Reservoir, Dr. Mussetter testified:

3 And one interesting thing that we see in this image is the sort of multichannel
4 pattern that you see at the confluence of Tonto Creek coming in from the left,
5 and then the Salt River comes in from the right. And so there are obviously a
6 lot of, historically even before the reservoir, a lot of sedimentation in that area,
7 sort of an alluvial fan at the mouth of Tonto Creek. And that's what contributes
8 to that braiding effect.

9 *See* Tr. 1/28/16:2318 (Mussetter); Mussetter Presentation, slide 55.

10 56. Regarding the channel alignment below Roosevelt Reservoir, Dr. Mussetter
11 testified: "There's, again, a constriction. This is called Windy Hill at this location, according
12 to the map. And then you go up and there's a fairly broad floodplain here, and you see
13 multiple fingers and several flow splits, the way they've sketched it in, as we move farther up
14 in the reservoir." *See* Tr. 1/28/16:2320 (Mussetter); Mussetter Presentation, slide 56. "And
15 then we continue to move upstream towards the head of the reservoir; multiple fingers in this
16 area, a flow split." *See* Tr. 1/28/16:2321 (Mussetter); Mussetter Presentation, slide 58.

17 57. The Reclamation Service map of Roosevelt Reservoir from 1915 shows the
18 channel splitting in multiple locations. *See* Tr. 1/28/16:2321 (Mussetter); Mussetter
19 Presentation, slide 58-59.

20 58. Mr. Fuller testified that ASLD Segment 3 is close to its natural and ordinary
21 condition with the exception of the reservoir. *See* Tr. 10/22/15:591-92 (Fuller); Fuller
22 PowerPoint, slide 255.

23 **Segment 4**

24 59. ASLD's Segment 4 runs from Roosevelt Dam to Stewart Mountain Dam. *See*
25 Tr. 10/20/15:108-109 (Fuller); Fuller PowerPoint 74. Segment 4 has a pool and riffle pattern
26 within a bedrock canyon. *See* Tr. 10/20/15:109-10 (Fuller); Fuller PowerPoint, slide 76.

27 60. Mr. Fuller testified: "Historic descriptions . . . do describe some rapids, and
they talk about some boaters that actually had some issues with needing to get around rapids,

1 or they talk about drops, so we know that there were some kind of rapids in there.” *See* Tr.
2 10/20/15:118 (Fuller); Fuller PowerPoint, slide 86.

3 61. Mr. Fuller testified:

4 From the historical descriptions of the guys who did boat through it
5 successfully, they do describe some rapids and ones that they decided to carry
6 around, at least on certain trips. So that suggests that the rapids, at least for
7 their level of skill, might have been a little more challenging than what we
8 know to exist in 3. So there’s, I guess, the uncertainty factor, and my guess is
that the rapids were a little more challenging in 3, but, again, in my mind
they’re, you know, not really close to nonnavigable there.

9 *See* Tr. 11/17/15:1154-55 (Fuller); Tr. 10/22/15:688 (Fuller).

10 62. “Obstacles can be surmounted in many cases by portaging the boat around the
11 obstacle. This is possible where the floodplain is wide enough, and clear enough of
12 vegetation and rocks to make walking possible. If there are only a few portages needed, the
13 river remains boatable. When, however, the canyon walls rise steeply from the river, the area,
14 is too rocky or vegetation too dense for long stretches, the river becomes unboatable.” *See*
15 Stantech Consulting Inc., in Association with JE Fuller/Hydrology & Geomorphology, Inc.,
16 *Criteria for Assessing Characteristics of Navigability for Small Watercourses in Arizona*, at
17 38 (1998) (“Stantech 1998”) [Upper Salt EI11].

18 **Segment 5**

19 63. ASLD’s Segment 5 runs from Stewart Mountain Dam to Verde River
20 Confluence. *See* Tr. 10/20/15:131 (Fuller); Fuller PowerPoint, slide 87. Segment 5 is pool
21 and riffle pattern, through an alluvial valley with some local bedrock control and contains one
22 rapid. *See* Tr. 10/20/15:131-32 (Fuller); Fuller PowerPoint, slide 88.

23 64. Segment 5 is the portion of the Salt River where people go tubing. *See* Tr.
24 10/20/15:133 (Fuller).

25 65. Other than the sheriff and fish and wildlife activities, Mr. Fuller could not think
26 of any boating activity on Segment 5 that was not recreational. *See* Tr. 10/22/15:692 (Fuller).

1 66. Mr. Fuller testified that Segment 5 is between 50 and 150 feet wide. *See* Tr.
2 10/20/15:138 (Fuller).

3 67. Mr. Fuller testified that his depth estimates for Segment 5 may be lower than
4 Segment 4 because “Segment 5 is probably a little wider than – almost definitely, it’s a little
5 wider than Segment 4 was.” *See* Tr. 5/19/16:5079 (Fuller).

6 **Segment 6**

7 68. ASLD Segment 6 runs from the Verde confluence to the Gila Confluence. *See*
8 Tr. 10/20/15:147 (Fuller); Fuller PowerPoint, slide 97.

9 69. Mr. Fuller testified that Segment 6 is most like Segment 5 and has a pool and
10 riffle pattern a compound channel, through a “very broad miles-wide” alluvial valley. *See* Tr.
11 10/20/15:148 (Fuller); Fuller PowerPoint, slide 98.

12 70. Mr. Fuller testified that the reach between Stewart Mount Dam and Granite
13 Reef Dam is “very similar” and “substantively similar” to what it looked like in its ordinary
14 and natural conditions. And, “there are places there where there are splits in the main
15 channel.” *See* Tr. 10/20/15:29 (Fuller).

16 71. Mr. Fuller testified : “There’s certainly bedrock in the vicinity of the channel
17 near Tempe Butte that affects some characteristics of the flow and perhaps a little bit of the
18 freedom of the channel to move around.” *See* Tr. 10/21/15:486 (Fuller); Fuller PowerPoint,
19 slide 210.

20 72. Mr. Fuller testified that parts of Segment 6 are losing reaches. Specifically, it is
21 losing from “Granite Reef down to Tempe Butte, where there’s some gain, and then, again,
22 losing again as it gets down closer to the Gila River confluence.” *See* Tr. 10/21/15:491
23 (Fuller); Fuller PowerPoint, slide 223.

24 73. The bedrock at Tempe Butte “forces some ground water to the surface.” *See*
25 Fuller PowerPoint, slide 223.

1 74. Mr. Fuller testified: “In Segment 6, the active channel, which includes areas
2 outside the boating channel, become quite a bit wider in the downstream direction. The flood
3 channel becomes more braided, has a . . . more obviously compound channel geometry than it
4 is in Segment 5.” *See* Tr. 10/22/15:658 (Fuller).

5 75. “In keeping with this characteristic of the desert stream, the flow of the Salt
6 River through the Basin and Range regions, except in times of flood, was (even prior to dam
7 construction) generally underground through the Quaternary clastic deposits. In the area of
8 Tempe, however, bedrock lies close to the surface and the water may flow at the surface, but
9 elsewhere be subsurface.” *See* Troy L. Pewe, *Morphology of the Salt River: Stewart*
10 *Mountain Dam to Phoenix, Arizona*, at 1 (Oct. 24 1996) [C026-E] (“Pewe 1996”).

11 76. There are no large tributaries in Segment 6. *See* Tr. 2/26/16:3444 (Gookin).

12 77. Mr. Gookin testified that 200 cfs is lost from the top of Segment 6 to Hayden’s
13 Ferry because it seeps into the ground as a result of “gravelly sand, which means it’s mostly
14 coarse sand with some gravel mixed in, very porous material.” *See* Tr. 2/26/16:3488-89
15 (Gookin).

16 78. Mr. Fuller agreed that some water rises to the surface near Tempe Butte. *See*
17 Tr. 10/23/15:903 (Fuller). Mr. Fuller testified:

18 When we get below the location of about where Granite Reef is right, now I
19 would expect there to be some loss of surface water into the ground, as well as
20 some evaporation, evapotranspiration, and some decrease in flow, all other
21 things considered equal. There would be some return of that flow, I would
22 expect, by the time we got to Tempe Butte because of the shallow bedrock
23 there, some forcing of water back to the surface. But relative to the median
24 flow, I would expect that to be a minor amount. Passing Tempe Butte and the
25 shallow bedrock in the vicinity there, I would expect there to be losses of a
26 small amount in the downstream direction until you got closer to the Gila.

27 *Id.* at 907.

 79. “At this location [Jointhead Dam] the Salt River is a braided channel and is
noteworthy because of the shallow depth to bedrock and because of the radical increase in

1 width from points immediately upstream.” See William L. Graf, *The Salt and Gila Rivers in*
2 *Central Arizona A Geographic Field Guide*, at 113 (1988) [Lower Salt EI 23] (“Graf 1988”).

3 80. Modern photographs of Segment 6 show “evidence of the multiple channels, the
4 braid channels and so on, the very wide river. And that’s created by the flood flows that
5 comes through.” See Tr. 1/28/16:2443 (Mussetter); Mussetter Presentation, slides 115-16.

6 81. Historical aerial photographs of Segment 6 shows “[c]learly a very heavily
7 braided reach, wide, many channels, bars all the way across the river.” See Tr. 1/28/16:2446
8 (Mussetter); Mussetter Presentation, slide 123. Modern photographs show “more or less a
9 single-thread channel carrying the flow, a few sort of ponded area, a lot of vegetation in the
10 channel, and some, clearly, some shallow riffles in areas where it’s constricted down from the
11 deeper ponded areas.” See Tr. 1/28/16:2446-47 (Mussetter); Mussetter Presentation, slides
12 124-25.

13 **HISTORY OF THE SALT**

14 82. Mr. Dimock, an ASLD witness, agreed that, “if you had a stream that was
15 suitable for commercial navigation and there was a need for that commercial navigation, [his]
16 belief is some of those folks would have figured out a way to use the river. They would have
17 figured out a boat that would have worked for that purpose.” See Tr. 10/22/15:546 (Dimock).

18 83. Dennis Gilpin, another ASLD witness, testified: “I have to look at this in the
19 overall assemblage of accounts and recognize that people were looking for opportunities to
20 float the Upper Salt. They were investigating these opportunities and they were prepared to
21 take advantage of these opportunities.” See Tr. 10/20/05:16 (Gilpin). Mr. Fuller agreed with
22 this statement. See Tr. 10/23/15:970 (Fuller).

23 84. Mr. Gookin testified:

24 Civilization before railroads and airplanes and interstates focused on rivers and
25 seaports, and that’s why you see most major cities, particularly cities that were
26 major in historic times, unlike, say, Phoenix, which is very recent, are located
27 on seaports and river, and that’s because trade is pretty much essential to

1 civilization. And the reason is that travel by boat is so much cheaper and so
2 much faster if you have a navigable river.

3 *See* Tr. 11/19/15:1515 (Gookin).

4 85. Dr. August wrote in his report:

5 The unique environment of the Salt River, where multiple civilizations and
6 cultures have lived over centuries, enabled them to develop and subsist. The
7 Hohokam, successive Native American peoples, Spain, Mexico, and the United
8 States all exerted sovereignty over the Lower Salt River area, from where its
9 waters met and blended with the Verde River to its confluence with the Gila
10 River thirty-eight miles to the southwest. In none of the civilizations or cultures
11 that settled along the Lower Salt River in the area commonly known as the Salt
12 River Valley, was the river used for transportation, nor was it considered
13 susceptible for use as a route for trade or commerce.

14 *See* August Report, at 1[C023].

15 86. Dr. Littlefield testified:

16 Clearly, the people who were on the scene at the time were the ones who were
17 the most aware of what types of watercraft could or could not be used on the
18 Salt River. And I think when you look at the entire historical picture, it's clear
19 that the hundreds and hundreds of people who were there did not find reliable
20 navigation or they would have done a heck of a lot more of it, and nor did they
21 find the river susceptible of navigation or they would have done it much more
22 frequently.

23 *See* Tr. 3/10/16:3782 (Littlefield).

24 87. Dr. Littlefield wrote in his Lower Salt Report:

25 Taken as a whole, these records demonstrate that prior to and at the time of
26 Arizona's statehood in 1912 the Salt River was considered *not* navigable by
27 virtually every contemporaneous observer. While there were instances of boats
being floated on the Salt River, these were the exception rather than the rule due
to the extremely unpredictable nature of the river. Even when man-made
obstructions in the Salt River are taken into consideration, the historical record
amply demonstrates that the Salt River was highly erratic, subject to flooding
and major channel changes, and blocked by obstacles (both natural and man-
made). Moreover, the Salt River frequently sank beneath its bed, leaving a dry
channel for miles, and during floods the river became extremely dangerous,
carrying logs and other debris. In short, the Salt River was not navigable in its
ordinary and natural condition before or on February 14, 1912.

1 *See* Littlefield Lower Salt, at 1-2 [C001].

2 88. Dr. Littlefield testified:

3
4 It's overwhelming that this evidence -- no matter if you were to eliminate a
5 small number of these documents, for whatever reason, the sheer number that
6 suggests nonnavigability makes it, to me, and I think to any reasonable person
7 looking at the information, that there's only one possible conclusion; and that's
8 that the historical parties both did not navigate the river regularly and reliably
9 and nor did they consider it susceptible of regular and reliable navigability.

8 *See* Tr. 3/30/16:4149 (Littlefield).

9 89. Dr. Newell testified:

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

16 *See* Tr. 3/30/16:4289 (Newell). "The absence of data can be as significant as the presence of
17 data." *See id.* at 4247 (Newell).

18 90. Dr. Newell testified: "Frankly, from an archaeological point of view, I don't
19 understand why the issue of susceptibility ever arises. If a river is susceptible to navigation
20 and there are people present, they're going to navigate." *See* Tr. 3/31/16:4412 (Newell). Dr.
21 Newell testified: "[D]on't recall ever seeing a river that could be traveled that wasn't used for
22 commercial cargos as well." *Id.* at 4306-07.

23 91. Mr. Gookin testified: "There is no evidence that sustained trade and travel ever
24 occurred on the Lower Salt River, nor is there documented evidence that trade or travel
25 occurred in the upstream direction occurred on the river." *See* Tr. 11/19/15:1461 (Gookin)
26 (quoting Fuller). Mr. Gookin testified: "[Y]ou've got a river and there's two ends to it, and
27

1 you know that Yuma had river pilots and they had river boats. So Phoenix didn't need to
2 build them, and they didn't need to have a native river pilot. Yuma could have supplied
3 them." *See* Tr. 11/20/15:1746 (Gookin).

4 92. Dr. Littlefield testified that he has read tens of thousands of pages of documents
5 regarding the Salt. *See* Tr. 3/10/16:3747 (Littlefield). He testified:

6 It's led me to conclusions about how the local population perceived the river
7 prior to and at the time of statehood. . . . cumulatively, when you look at all of
8 that evidence, not just cherry-picked individual pieces, it's very clear that the
9 people who were on the river prior to and at the time of statehood only managed
10 to boat the river a minor number of times, and it was certainly nowhere near
enough time in order to reach the conclusion that the river was susceptible of
navigation, nor was it navigated on a regular and reliable basis.

11 *See* Tr. 3/10/16:3747-48 (Littlefield).

12 **Historic and Prehistoric Indian Use**

13 93. Mr. Fuller testified that the "Native American folks had some access to boats
14 and some familiarity with them." *See* Tr. 5/19/16:5043-44 (Fuller). He also testified that
15 there are "[n]o records of Native American [b]oat [u]se on the Salt." *Id.* "[W]e have no
16 definitive records of Native American boat use on the Salt." *See* Tr. 10/20/15:169 (Fuller);
17 Tr. 10/22/15:710-711 (Fuller); Fuller PowerPoint, slide 121.

18 94. Mr. Gilpin testified that there is no evidence of any sort of trade or travel or log
19 floating by Native Americans on the Upper Salt. *See* Tr. 10/20/05:28 (Gilpin).

20 95. Dr. August wrote:

21 During the last four centuries Athapaskans, Hispanics, Anglo Americans—
22 converged on what is now Arizona. Upon their arrival, they and the people
23 already living in Arizona—Hopis, Paiutes, River Yumans, Upland Pais, and
24 O'odahm—battled, slept, and traded with one another, exchanging ideas, rituals,
25 foodstuffs, seeds, ceramics, and genes. But none of the groups established
26 dominion over the entire area until the U.S. military subdued Arizona's Indian
27 population between the 1860s and 1880s. When Geronimo surrendered to
General Nelson Miles in 1886, this version of the Arizona frontier ceased to
exist.

1 *See August Report, at 1-2 [C023].*

2 96. Dr. August wrote:

3 Archeological evidence from approximately two thousand years ago suggests
4 that a proto-agricultural civilization arose in the Salt River Valley, known as the
5 Hohokam. Although their civilization was based on a mastery of canal
6 irrigation, the Hohokam and their predecessors traveled long distances by foot,
7 not by navigation of rivers. Arizona first inhabitants maintained active and
8 robust contact with peoples scattered across the Southwest and northern
9 Mexico. "It could be argued," one historian has written, "that travel was a
10 defining and central experience of Native American life." The Hohokam visited
11 and traded with other groups in present-day Mexico, California, Baja California,
12 New Mexico, and Colorado. The journeys were made for many different
13 reasons; they traded for shells, stones, minerals, bells, and figurines, and for
14 organic goods like herbs, animal hides, and feathers. They made spiritual
15 journeys to sacred locations where they gathered plants and minerals, captured
16 animals, and conducted ceremonies. And they carried out raids on neighboring
17 peoples, sometimes returning with captives. Although there is abundant
18 evidence that the Hohokam needed transportation for travel and trade, there is
19 no evidence that they navigated the Lower Salt or Gila rivers.

20 *See August Report, at 3-4 [C023] (citations omitted).*

21 97. Dr. August wrote: "Recent accounts have estimated that at its peak, Hohokom
22 culture in the Salt River Valley comprised one of the most densely populated areas in what is
23 now the American Southwest." *See August Report, at 4 [C023].*

24 98. When asked why the Hohokam traveled, Dr. August testified: "For a variety of
25 reasons; for trade, for foodstuffs, even spiritual activities, a wide variety of reasons that they
26 traveled. In fact, one of the writers that was cited in the State Transportation History said that
27 travel was an essential part of their existence; that they traveled a great deal." *See Tr.*
1/26/16:1884-85 (August). Dr. August was unaware of any evidence that the Hohokam
navigated the Salt or Gila rivers, that they floated on the Salt, or of Hohokam boats being
found. *Id.* at 1886. The Hohokam traveled by foot and a navigable river would have been
helpful to the Hohokam. *Id.* at 1886.

1 99. If the Salt had been navigable, Dr. August stated: “[T]hey may have survived
2 longer than they did, and they may have been able to trade more robustly with other peoples,
3 especially if they could flow down the river to the Gila and to the mouth of the Colorado; but
4 that’s speculation. *See* Tr. 1/26/16:1888-90 (August).

5 100. The Hohokam civilization declined between 1400 and 1450. *See* Tr.
6 1/26/16:1888-91 (August).

7 101. Dr. August testified that one of the factors that may have caused the Hohokam
8 civilization to decline was “erratic and unpredictable flow of the [Salt], followed by extended
9 periods of drought.” *See* Tr. 1/26/16:1888-92 (August).

10 102. While Mr. Fuller relied on Frank Hamilton Cushing’s work and speculation of
11 boating from some scholars who reviewed Cushing’s work, however the speculation was
12 actually of boating in Hohokam canals and, as to that speculation, prominent Arizona
13 archaeologist Emile Haury stated, “there is no justification for this view.” [C041]

14 103. The large population of the Hohokam, combined with the lack of evidence of
15 any Hohokam boating, completely undermines Mr. Fuller’s “population paradox.”

16 104. Based on the foregoing evidence, the Commission finds that Arizona Indian
17 populations never used the Salt for trade or travel by boat. The Commission further finds that
18 Arizona Indian populations did not use the Salt for trade or travel by boat because the Salt
19 was not susceptible to navigation in its ordinary and natural condition.

20 Spanish Explorers

21 105. Dr. August wrote:

22 As the area’s earliest European occupants, Spanish priests, soldiers, and civilian
23 explorers of the seventeenth and eighteenth centuries took note of the
24 inhospitable arid landscape and inadequate water supplies of the Salt and Gila
25 River systems and did not consider it susceptible for navigation. “With few
26 major exceptions,” according to the distinguished historian of Mexico, Michael
27 Meyer, “the water sources (the Rio Grande, the Colorado, the Fuerte, the Yaqui,
and the Gila being among the most notable) which the Spanish dignified with
the word “Rio” were scarcely rivers at all.” Not even the largest, the Rio

1 Grande, proved valuable for needed transportation or commerce either before or
2 after conquest. Although scientific evidence suggests that they carried a larger
3 flow than they do now, most rivers were not perennial; they ran only part of the
4 year, trying their best to carry the excess from an exceptional winter snow cover
5 in the surrounding mountains. The more common pattern was for the water that
6 reached them to sink quickly into the sandy bed within a short distance to
7 disappear from human sight. On occasion, however, they ran partly above
8 surface, then underground, protected from the evaporative powers of the
9 environment, to be forced to the surface again by the geological structure of a
10 given area.’ Such was the case with the Lower Salt River.

11
12 *See August Report, at 6-7 [C023] (citations omitted).*

13 106. Dr. August wrote: “There is no mention in the historic record that navigation
14 was even considered” on the Salt. *See August Report, at 8 [C023].*

15 107. Dr. August wrote:

16 Two generations after the disappearance of the Hohokam, Alvar Nunez Cabeza
17 de Vaca, one of four survivors of the shipwrecked Panfilo de Narvaez
18 expedition of 1527, was the first European to traverse what is now Arizona. He
19 and three companions somehow managed to make it back to Mexico City on
20 foot. During eight years of traveling through what later became the American
21 Southwest, Cabeza de Vaca became a slave trader and shaman to various
22 groups. Upon his arrival in Mexico City he told authorities there of the great
23 cities of the Southwest, which prompted the organization of an expedition into
24 the area crossed by the four castaways. Later in 1537, he wrote an account that
25 was first published in 1542, called *La Relacion (The Accounts)*. Notably, the
26 account did not promote or even suggest the possibility of navigating rivers for
27 exploration of the Southwest.

28 *See August Report, at 9 [C023] (citations omitted).*

29 108. Dr. August wrote:

30 [In the late 1600s], the first Jesuits were at work among some of the Lower
31 Piman peoples, but as the celebrated anthropologist Edward Spicer observed:
32 “There was no continuity of their work from the Lower to the Upper Pimas,” in
33 and around the Gila and Salt rivers. As the area of New Mexico to the east was
34 settled by Spanish colonists, missionaries, and military officials in the late
35 1500s and early 1600s, there was no Spanish exploration into the area of the
36 Lower Salt River during that time. Certainly the existence of a navigable river
37

1 in the Salt River Valley might have resulted in further exploration and
2 colonization.

3 *See August Report, at 10 [C023] (citations omitted).*

4 109. Dr. August wrote:

5 Indeed, from the time of Father Eusebio Francisco Kino's extension of the 'Rim
6 of Christendom' into the lower Santa Cruz and Gila Valleys in the 1690s, the
7 Salt and Gila, especially the latter, played prominent roles as land transportation
8 routes in furthering Spanish aims. Diarists often noted the remnants of the
9 Hohokam civilization that marked much of the lower reaches of the Gila from
10 its confluence with the Salt. Sergeant Juan Bautista de Anza (the elder), on a
11 reconnaissance of central Arizona in November 1697, took note of ruins on the
12 north side of the "irregular" river which was not described as navigable.
13 Although de Anza generally followed the course of the Salt and Gila on land, he
14 made no effort to travel on the river or report the possibility of the use of the
15 river for navigation.

16 *See August Report, at 11-12 [C023] (citations omitted).*

17 110. Dr. August wrote:

18 The so-called 'Padre on Horseback,' made a number of journeys to the Gila
19 between 1694 and 1701. Juan Mateo Manje, a Spanish military officer, usually
20 accompanied Kino on these expeditions. In their respective accounts, Manje
21 and Kino noted when Gila River Pimas, Opas [Maricopas], and Cocormaricopas
22 pledged fealty to Spain and received staffs of justice in return. How the Indians
23 interpreted such episodes remains a mystery. There was a notable absence in
24 the report of a river susceptible to navigation of any kind. The existence of such
25 a river surely would have been prominently featured in Manje and Kino's
26 accounts to the Spanish government or the Church. In the end the Spanish did
27 not establish a permanent missionary or military presence as far north as the
28 Gila Valley, because it was well-beyond their effective administration. The
29 lack of a navigable river certainly contributed to this conclusion.

30 *See August Report, at 12 [C023] (citations omitted).*

31 111. Dr. August wrote:

32 Father Kino drafted the first map of the river which was shown flowing south to
33 the Gila River. In 1702, after traveling through much of the province the
34 Spanish called Pimeria Alta (Upper land of the Pima), including a visit to the
35 confluence of the Salt and Verde in 1699, he produced the region's first

1 remotely accurate map. By this time cartography played a significant role in
2 Spanish exploration of the North American continent and Kino gained an
3 international reputation for his skill. It is also worth noting that he was the first
4 to demonstrate that California was not an island, one of those fanciful
5 cartographic notions that appeared in virtually every previous Spanish map of
6 the Southwest. On his 1702 map, Kino depicts a river entering the Gila from
7 the north but does not include a description that it was navigable, a fact which
8 certainly would have been included.

9 *See August Report, at 12-13 [C023] (citations omitted).*

10 112. Dr. August wrote:

11 Kino's brief encounter with the Salt River Valley region in general, and with the
12 Lower Salt in particular, offer no indication that he used the river for
13 transportation or commerce, nor do his diaries or accounts suggest that he
14 viewed the Salt River as susceptible for transportation or commerce. On the
15 contrary, if the Salt River were navigable, Kino would have hailed it as the
16 essential element to encourage the establishment of missions and military
17 installations to better administer the Pimeria Alta.

18 *August Report, at 12-13 [C023] (citations omitted).*

19 113. Dr. August wrote:

20 [Father Jacobo] Sedelmayr was known as the 'father of the Papago,' and
21 became in the 1740s, according to Spanish Borderlands historian John Francis
22 Bannon, the great Arizona traveler and explorer. As noted above, shortly after
23 his arrival into what is today southern Arizona in 1736, he had traversed the
24 land of the Papago (Tohono O'odham) and persuaded a number of this tribe to
25 settle near the mission at Tubutama. In 1743 he traveled north to the Gila. The
26 next year Sedelmayr went even further north which brought to the Spaniards the
27 first comprehensive knowledge of the trans-Gila area into the world of Spanish
28 cartography. His route on this 1744 expedition took him to the Casa Grande
29 ruins, thence directly north to the Salt River, then down the Salt, which he
30 called Rio de la Asuncion, to its confluence with the Gila. Sedelmayr walked or
31 rode his horse on the banks of the Lower Salt and did not use its waters as a
32 form of transportation. When he reached the confluence of the Salt and Gila, he
33 continued down the Gila and was the first person on record to explore the
34 'Bend' of the river. His route next led him across the desert, through the lands
35 of the Cocomaricopa, to the Colorado.

36 *See August Report, at 15 [C023] (citations omitted).*

1 114. Dr. August wrote:

2 Thus, through the 1730s and 1740s, the Jesuits attempted to push their sphere of
3 ecclesiastical influence north, beyond the Gila River. Based on the explorations
4 of the Jesuit explorers, Keller, Sedelmayr, and their military escort, Captain
5 Anza, the Salt River was not considered for or used as a stream for
6 transportation or commerce in the conditions observed during that time period.
7 In reality, after Father Sedelmayr's meandering along the Salt and Gila in 1744,
8 the Jesuits excused themselves from the enterprise of the Hopis and pressing to
9 the north, turning their attention instead toward the Gila and Colorado rivers.
10 While the Jesuits pressed toward the Colorado as the only navigable river in the
11 region, the rivers of Central Arizona, including the Gila and the Salt, were only
12 worthwhile as a clear path for overland travel with a source of water significant
13 enough for watering horses and men, not navigation.

14 *See August Report, at 15-16 [C023] (citations omitted).*

15 115. Dr. August wrote:

16 Shortly thereafter, in 1776, the mission of Tubac was moved forty miles north
17 to Tucson as part of the Bourbon Reforms. In 1780 the Spanish located a new
18 mission and colony in the lower Colorado near present day Yuma in an attempt
19 to secure the overland route pioneered by the Anza expeditions. Once again,
20 the Lower Salt River, whose waters flowed into the Gila, was beyond any
21 relevant consideration for transportation or commerce during the Anza
22 expeditions that focused on developing transportation routes in northern New
23 Spain.

24 *See August Report, at 18 [C023] (citations omitted).*

25 116. Dr. August wrote:

26 Indeed, the Spanish hold on Arizona was tenuous at best. Spanish presence
27 ranchers, miners, priests, soldiers--existed only in the valley of the Santa Cruz
River. In 1767, moreover, the Jesuits were expelled from New Spain and were
replaced by the Franciscans. Though the efforts to evangelize Indians
continued, overall the subsequent era of Franciscan hegemony (1767-1842) in
the mission effort was a period of decline. As the mission frontier receded,
there were no accounts of transporting goods or material along the Lower Salt
River.

See August Report, at 18 [C023] (citations omitted).

1 117. Dr. August wrote:

2 Based on the Spanish experiences in other parts of the Southwest, especially
3 along the California coast, a navigable river in the Salt River Valley would have
4 completely changed the course of Spanish exploration. The purpose of
5 exploration was to find suitable places to establish missions and natural
6 resources for exporting. While mineral deposits were known to the Spanish,
7 without a transportation route, there was no way to exploit those resources.
8 Without reliable methods of transportation, especially a direct route to or from
9 Yuma on the Gila and Salt Rivers, missions could not be supplied. While the
10 Apaches represented a deterrent to exploration in Central Arizona, the existence
11 of a navigable river would have resulted in the same type of military presence
12 and presidio construction that occurred in Tucson and Tubac, pushing back the
13 Apache in favor of colonization and commerce. In reality, those opportunities
14 simply did not exist.

15 *See* August Report, at 19 [C023] (citations omitted).

16 118. The Spanish controlled Central Arizona from 1598 to 1848. *See* Tr.
17 1/26/16:1894 (August).

18 119. Dr. August testified that it would have been important to the Spanish to
19 establish a presence for ecclesiastical purposes “especially along a navigable river.” *Id.* at
20 1895. “[I]f they had a navigable stream, that would have certainly encourage a mission, a
21 settlement, and attainment for those purposes.” *Id.*

22 120. In California, a majority of Spanish missions were near a navigable waterway.
23 *See* Tr. 1/26/16:1896 (August). If the Salt had been navigable, the Spanish would have built a
24 mission along the river. *Id.* at 1913.

25 121. Ecclesiastical Spanish explorers, Spanish military, and Mexican military kept
26 extensive records. *Id.* at 1897-99. It was the responsibility and purpose of Spanish
27 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.

1 122. In all of the Spanish accounts (primary and secondary) that Dr. August
2 reviewed, including conversation with natives people, not one mentions the use of boats on
3 the Salt. *Id.* at 1902-03.

4 123. The Spanish were familiar with water navigation and boat building. *Id.* at 1903-
5 04. Dr. August testified that, if the Salt had been navigable, the Spanish would have used it
6 for navigation. *Id.* at 1906.

7 124. The Spanish explorer Juan Bautista de Anza came to the Salt River Valley in
8 1697, but did not mention that the Salt was navigable or suitable for navigation, although he
9 would have if it had been. *Id.* at 1910-11. He followed the river on land. *Id.*

10 125. The Spanish Explorer Father Jacobo Sedelmayr did not note that the Salt was
11 navigable. *Id.* at 1922.

12 126. Dr. August testified that, if the Lower Salt had been navigable, it would have
13 altered the course and history of Spanish exploration in Arizona. *Id.* at 1923.

14 127. Mr. Fuller testified that the Spanish explorers boated on the Colorado River.
15 *See* Tr. 10/20/15:168 (Fuller).

16 128. Spanish explorers visited the Pimas, took detailed records of what they saw, and
17 did not record anything about boats. *See* Tr. 11/19/15:1461 (Gookin).

18 129. Based on the foregoing evidence, the Commission finds that the Spanish
19 explorers did not use the Salt for trade or travel by boat. Furthermore, the Commission finds
20 that they did not use the Salt for trade or travel because the Salt was not susceptible to
21 navigation in its ordinary and natural condition.

22 **American Trappers and Mountain Men**

23 130. Mr. Fuller testified that trappers came through the Salt River in the 1820s. *See*
24 Tr. 10/20/15:157 (Fuller); Fuller PowerPoint, slide 112.

25 131. James Ohio Pattie came up the Salt River beaver trapping in the 1820s on foot
26 or horseback. *See* Tr. 10/20/15:170 (Fuller).

27

1 132. Dr. August wrote: “Despite their business acumen as trappers, they did not use
2 the Salt River for commerce or travel for themselves. Instead, they sought out horses to
3 conduct their business in the river while on foot. The records do not reflect that they used or
4 considered using the Salt River for navigation.” *See* August Report, at 21 [C023] (citations
5 omitted).

6 133. Dr. August wrote:

7 In 1828, Ewing Young, referred to by Mexican authorities as ‘Joaquin Jon’ or
8 ‘Joaquin Joven,’ led a party to the Salt River to trap beaver. Young, a
9 Tennessee carpenter who crisscrossed Arizona more than anyone else, was
10 reviled as a smuggler and criminal by the New Mexican authorities, epitomized
11 the almost single minded ruthlessness of the trappers. He fought with Apaches
12 and Mohaves and quarreled constantly with Mexican authorities. He pioneered
13 a grueling overland trail up and down the Verde River and west to California
14 across the Mohave Desert. The lure of the beaver laden rivers, according to
15 historian Thomas Sheridan, ‘was too strong to be dampened by the danger of
16 Indian attack or the tenuous legality of Mexican claims.

17 *See* August Report, at 28 [C023] (citations omitted).

18 134. Dr. August wrote:

19 In October 1831, Young led another trapping expedition to the Salt River. He
20 followed his previous route via the Zuni Pueblo, continuing to the Salt, thence
21 followed that stream, setting traps as they progressed. Although there are diary
22 accounts navigation. The group also trapped for twelve days on the Verde
23 River. Significantly, in this, as in and previous trapping expeditions to the Salt,
24 the party did not use the stream for transportation, but instead extracted beaver
25 pelts from it.

26 *See* August Report, at 22-23 [C023] (citations omitted).

27 135. Dr. August wrote:

 The fur trade in the Southwest in general, and as practiced on the Salt River,
declined precipitously after 1833. In their wake the mountain men left streams
depleted of beaver. Moreover, their overall impact was not profound. Because
they exported their pelts through northern New Mexico or California, they had
little reason to visit Tucson or Tubac, the only two settlements in the area. As a
result, the trappers avoided confrontations with Mexicans along the Santa Cruz

1 and even though they decimated beaver populations along the Salt, Gila, and
2 Verde rivers, those beaver populations recovered by the mid-1840s when the
3 next swell of Anglo Americans surged across the area. The mountain men did
4 not stay in Arizona long enough to transform its economy or ecology. Nor did
5 they use the Salt River as a highway of transportation, trade, or commerce.
6 Whether they exported their pelts through New Mexico or California, they
7 moved through Arizona on foot or horseback. This was not simply a matter of
8 preference. Their horses were frequently stolen by the Apache and other local
9 tribes, so travel by boat - using the same rivers they trapped for pelts - would
10 have been preferable. In the mid to late 1830s, the beaver trade waned, in part
11 because of the Panic of 1837 and in part because of the vicissitudes of high
12 fashion. In an inexplicable turn noted earlier, silk hats replaced beaver hats as
13 objects of patrician desire in eastern urban areas and Europe.

14 *See August Report, at 23-24 [C023] (citations omitted).*

15 136. Dr. August wrote: “Though trapping continued well into the 1840s this
16 vanguard of American expansionism did not use boats for travel along the Lower Salt or other
17 streams, like the Gila and Verde, and instead traveled by horses, mules, wagon, or foot along
18 the sides of the rivers.” *See August Report, at 24 [C023] (citations omitted).*

19 137. Mountain men trapped along the Lower Salt in the early 1800s, but they did not
20 navigate the river and instead traveled by land. *See Tr. 1/26/16:1925-28 (August).* The
21 mountain men traveled overland, were familiar with various types of boats because they had
22 trapped on “more substantial rivers” where boats were used, and could have built boats, but
23 they did not use boats to trap on the Salt. *Id.*

24 138. The beaver trapping trade had declined by 1845. *See Tr. 1/26/16:1932*
25 *(August).*

26 139. Dr. August testified that canoes were available in Arizona around statehood, but
27 trappers did not use them on Segment 6. *See Tr. 1/26/16:2022 (August).*

140. In the southwestern United States, trappers and traders transported goods
overland using pack animals and eventually wagons, and beasts of burden were a necessity
for the fur trade. [C058]

1 141. The rivers in southern Arizona were too far south to be of any importance in the
2 fur trade. [C058]

3 142. Based on the foregoing evidence, the Commission finds that mountain men and
4 explorers did not use the Salt for trade or travel by boat. Furthermore, the Commission finds
5 that they did not use the Salt for trade or travel because the Salt was not susceptible to
6 navigation in its ordinary and natural condition.

7 **Military Expeditions**

8 143. The United States military came to Arizona in 1846. *See* Tr. 1/26/16:1932
9 (August).

10 144. Fort McDowell was founded in 1865. *See* Tr. 10/20/15:158 (Fuller); Fuller
11 PowerPoint, slide 112.

12 145. Although the military built boats, they were used as ferries and not to transport
13 goods and supplies. *See* Tr. 11/19/15:1466-67 (Gookin).

14 146. Dr. August wrote:

15 In Oscar Winther's pathbreaking study, *The Transportation Frontier: Trans-*
16 *Mississippi West, 1865-1890* researchers turn to "Arizona" in the index and find
17 "railroads in, 102; steamboats in 82; and wagon freighting in, 27." Winther
18 does not refer to any existing steamboats or other water transportation in the
19 Lower Salt or any other interior water courses, playing a role in the history of
20 transportation in Arizona during the period. As Winther suggests, the
21 development of transportation routes within Arizona Territory became
22 important both for the military commander and the civilian miner. In fact the
23 development of any type of transportation grid within the territory proved
24 extremely challenging. It seems likely that inhabitants would have considered
25 transportation along Arizona's streams if the streams were susceptible to
26 navigation.

23 *See* August Report, at 25 [C023] (citations omitted).

24 147. Dr. August wrote:

25 One of several factors that engendered the War with Mexico and the settlement
26 and development of the trans-Mississippi West, especially the Pacific Coast,
27 was the area's enormous cache of minerals. According to Rodman Paul, in his

1 classic account, *Mining Frontiers of the Far West, 1848-1880*, New Mexico and
2 Arizona were comparatively slow to begin vigorous development of their
3 natural resources. Unlike California and Nevada, for example, both were held
4 back by a highly adverse combination of poor transportation due to the fact that
5 they were largely bereft of navigable streams and overland trails, a geographic
6 environment made harsh by aridity, topography, mineral resources in which
7 complex and refractory ores were too prevalent for quick exploitation on an
8 isolated frontier, and, for a time, hostile Indians. Without a navigable river for
9 commerce or travel, the Americans did not see the point of overcoming the
10 other obstacles when reliable transportation was unattainable. A navigable river
11 in the Salt River Valley would have changed the landscape and development of
12 the area.

13 *See August Report, at 25-26 [C023] (citations omitted).*

14 148. Dr. August wrote:

15 Notably, western Arizona was not cut off from transportation. Today it is not
16 customary to think of the Colorado River as an artery of commerce, but prior to
17 railroads it was an important entrance into what was otherwise the landlocked
18 Southwest. In the 1860s sailing vessels made the long voyage of several weeks
19 from San Francisco down the coast of American California and Lower
20 California and up the Gulf of California to the mouth of the Colorado.
21 Subsequently, enough business was generated to justify putting steamers on this
22 coastal run. At the mouth of the Colorado, cargo and passengers were
23 transferred to shallow draft steamers that paddled up the Colorado at least as far
24 as the mining village of La Paz, more than one hundred miles above Yuma, and
25 during favorable seasons they went as far north as Callville, in southern Nevada,
26 now covered by the waters of modern-day Lake Mead. Unfortunately,
27 navigation was not possible to move commerce into or from the Salt River
Valley or other portions of Central Arizona.

See August Report, at 26 [C023] (citations omitted).

149. Dr. August wrote:

Eastward from the Colorado River, travel depended entirely upon pack animals
and freight wagon, and the further inland one traveled through the inhospitable
region the more hazardous passage became. New Mexico, for example, was
beyond the reach of the river's influence; the Salt was not considered a possible
route to travel northeast to Santa Fe. In Spanish and Mexican days (1598-1848)
its trade had to come from overland routes, such as the long road that struck
northward from Chihuahua, Mexico or the Santa Fe Trail that came
southwestward from the Missouri frontier. Such difficult overland routes would

1 not have been necessary if the Salt or Gila Rivers were navigable, opening the
2 way for commerce and settlement within the Salt River Valley. Significantly,
3 after New Mexico became part of the United States as part of the Mexican War
4 (1846-1848), the territory still had no alternative to lengthy and exclusively
5 overland approaches, which made for exceedingly expensive transportation
6 whenever a promoter sought to bring in the heavy, bulky equipment and
7 supplies required for any but very simple mining.

8 *See August Report, at 26-27 [C023] (citations omitted).*

9 150. Dr. August wrote:

10 In fact, in the War with Mexico (1846-1848) Arizona was never a prize in the
11 conflict. On the contrary, most Anglo pioneers and politicians in the East
12 considered it a wasteland, a desert, an Indian-infested obstacle between Santa
13 Fe and San Diego, utterly lacking in a reliable transportation route, especially
14 one as ideal as river navigation. As U.S. military expeditions passed through
15 the area on their way west, they did so as hastily as possible and few, if any,
16 stayed. General Stephen Watts Kearny, commander of the Army of the West,
17 led the first group of military through Arizona. Following the “Bloodless
18 Conquest” of Santa Fe, New Mexico, Kearny and his men left the capital city on
19 September 25, 1846. Kit Carson, who happened to be heading east toward
20 Santa Fe on his way back from California, was “impressed” into service sixty
21 miles south in Socorro. Carson was no stranger to Western exploration, from
22 river trips with John Fremont to trapping expeditions along Arizona’s rivers.
23 When he first met Kearny’s group, he tersely noted: “Kearny ordered me to
24 join him as guide. I done so.” General Kearny was seriously concerned about
25 the unmapped desert ahead of him, uncertain which route to take and whether
26 his animals could survive the journey. Carson, more than once, had crossed the
27 same withered terrain over which Kearny’s dragoons would be soon passing.
28 Carson knew the land, water courses, and the disposition of the Indians along
29 the route. He could tell Kearny which stretches were suitable for wagons and
30 rolling artillery pieces. Most importantly, he knew the best places to ford the
31 creeks and rivers. Kearny needed the former mountain man, Carson, whose
32 forays into Arizona a decade earlier imbued him with critical knowledge of the
33 terrain, water courses, and hostile Indians. Although he was familiar with
34 exploration using rubber boats during his time with Fremont in Utah, Carson
35 never navigated a river or even considered it viable as a guide through Arizona.

36 *See August Report, at 27-28 [C023] (citations omitted).*

37 151. Dr. August wrote:

1 Significantly, Carson swung south, guiding Kearny and his 100 dragoons on
2 what one member called “The Devil’s Turnpike,” avoiding the Salt River
3 because he knew it was not susceptible to serving as a transportation route. He
4 had trapped the river many times prior to the Mexican War and he knew its
5 canyons, braided reaches, and uneven flow. The Salt River clearly could not
6 serve as a possible waterway to move this contingent of military men to their
7 ultimate destination, California. Thus they headed south and west—avoiding
8 the Upper Salt—and struck the Gila River and then followed its course on foot,
9 horseback and mule through challenging canyons and land that was barren and
10 arid. In October and November 1846, they passed from the realm of the
11 Apaches into the territory of unknown tribes with names like Wolf Eaters, Dirty
12 Fellows, Club Indians, Pine Forest Dwellers, Tremblers, Albinos, and Fools,
13 informal names gleaned from Spanish interpreters and quickly scribbled down
14 in official American journals.

15 *See August Report, at 28 [C023] (citations omitted).*

16 152. Dr. August wrote:

17 Sergeant William Emory, of the Topographical Engineer Corps, accompanied
18 Kearny and was supposed to investigate the region for transportation routes. He
19 ruled out the water courses he encountered, including the Gila, declaring it was
20 impossible to put a decent thoroughfare through the ragged rock wasteland let
21 alone consider using the region’s water ways for transportation.

22 *See August Report, at 29 [C023] (citations omitted).*

23 153. Dr. August wrote:

24 The next military expedition through Arizona swung even more southerly,
25 rolling through Tucson on its way to California. This was the celebrated
26 Mormon Battalion, which marched 2,000 miles from Council Bluffs, Iowa to
27 Southern California. As has been well-documented, just two years after founder
and leader Joseph Smith was killed by a mob in Carthage, Illinois, new Mormon
leader Brigham Young sent more than five hundred Latter Day Saint soldiers on
a mission to serve in the U.S. Army in an effort to diffuse anti-Mormon
sentiment and raise funds for Mormon colonization of Utah. The central
purpose of their journey was to construct a transportation route across the
region. Lacking a navigable route, the Mormon Battalion was charged with
carving out a wagon trail across the southern Great Plains and into the
Southwest. When the battalion reached Santa Fe in October 1846, Lieutenant
Philip St. George Cooke took command and led it to San Diego. In November
1846 Cooke’s battalion moved through the Gila Valley south of the Salt River
Valley. Several members of this force left recollections of their stay in Pima

1 country. Robert Bliss judged that the Pima settlements extended about twenty-
2 five miles down the Gila and that the tribe had a sound economy. Nathaniel
3 Jones corroborated Bliss's description: "Their village extended some twenty-
4 six miles down this river and was very thickly settled." John Bigler wrote on
5 December 21, 1846, that the battalion camped in a Pima village. Like the others
6 Bigler estimated that the settlements extend down the Gila for about twenty-five
7 miles and that the Indians numbered around 5,000. They brought com, beans,
8 meal, and pumpkins to the Mormon camp to barter for clothes, buttons, needles,
9 and thread. The Pimas refused money for their agricultural goods because they
10 said it was no use to them." Although they were looking for viable
11 transportation routes, Bliss did not record the Salt or Gila rivers as suitable for
12 navigation.

13 *See August Report, at 30-31 [C023] (citations omitted).*

14 154. Dr. August wrote:

15 By 1849 a section of Cooke's road through southeastern Arizona was part of the
16 Gila Trail, which was the popular name for a series of roads that connected El
17 Paso with southern California. Because the Gila Trail was not a formally
18 developed road but rather a popular name for a travel route, there has always
19 been a degree of uncertainty about its specific location in Arizona. Some maps
20 show the Gila Trail passing through Apache Pass instead of Guadalupe Pass.
21 That caveat notwithstanding, for three decades, from the late 1840s to the late
22 1870s, the Gila Trail was the primary travel route across southern Arizona. It
23 was followed not only by miners and adventurers but also by settlers and
24 ranchers traveling from the east. The Salt River was bypassed as a watercourse
25 that could not serve as a transportation route for the increasing numbers of
26 travelers and settlers venturing through or settling in the region.

27 *See August Report, at 32 [C023] (citations omitted).*

155. Dr. August wrote:

The southern road, the El Paso-Fort Yuma Wagon Road, was begun in 1858. It
followed the route laid out by Parke in his 1854-1855 survey. After entering
southeastern Arizona near Apache Pass, the road headed directly west to the
San Pedro River, which it followed north to the Gila River. These roads were
important to Arizona. The El Paso-Fort Yuma road in particular helped connect
the Territory's far-flung settlements with each other, and it provided a much-
needed trade route to California, New Mexico, and Texas. Once again, the Salt
River was outside the area of consideration to serve as a route through Arizona
in the 1850s and into the Civil War years. A navigable Salt River, converging
with a navigable Gila River to Yuma would have provided a much simpler route

1 between New Mexico and California which was so desperately needed at the
2 time.

3 *See August Report*, at 33 [C023] (citations omitted).

4 156. Dr. August wrote: "The historical record of this period indicates that there was
5 a significant need for transportation in Central Arizona. In spite of this need, there is no
6 record the military or explorers of the era used, or considering using, the Salt River for
7 navigation." *See August Report*, at 34 [C023] (citations omitted). A navigable river would
8 have been very useful to early military settlements in Arizona for the movement of "men,
9 munitions, animals from . . . Camp Verde . . . to Fort Yuma. *See Tr. 1/26/16:1938 (August);*
10 *Tr. 1/26/16:1943 (August).*

11 157. The early military expeditions in Arizona would have made observations
12 regarding the navigability of the Salt if it had been navigable. *See Tr. 1/26/16:1936 (August).*
13 They would have made record of a navigable river even if they would not have navigated it.
14 *See Tr. 1/26/16:1936-37 (August).*

15 158. A navigable river would have been easier to travel by for military expeditions
16 than building roads. *See Tr. 1/26/16:1939-40 (August).*

17 159. As far as Dr. August knows, there is not a single military record or account that
18 suggests the use of the Salt for transportation. *Id.* at 1945.

19 160. Based on the foregoing evidence, the Commission finds that early military
20 expeditions did not use the Salt for trade or travel by boat. Furthermore, the Commission
21 finds that they did not use the Salt for trade or travel because the Salt was not susceptible to
22 navigation in its ordinary and natural condition.

23 **Settlers**

24 161. Dr. August wrote:

25 In the 1880s, the extractive phase of Arizona's history began in earnest as the
26 Southern Pacific and the Atlantic and Pacific (later known as the Santa Fe)
27 transcontinental railroads broke Arizona's isolation and bound it to the rest of
the nation. For the first time, capitalists in California, Illinois, the eastern

1 United States, and Western Europe were able to convert Arizona's resources
2 into commodities that could be transshipped for processing. Modes of
3 transportation therefore, played a significant role in the region, and how the
4 successive civilizations in Arizona approached transportation, was a central
5 theme in the area's growth and development.

6 *See August Report, at 2 [C023].*

7 162. Dr. August wrote:

8 In general, Arizona entered the 1870s without having conquered its biggest
9 obstacles to progress—hostile Indians and transportation. The Salt River, not to
10 mention the Gila, Verde, and other interior water courses, were not susceptible
11 to transportation or even considered as rivers of commerce, and thus provided
12 no incentive to overcome the hostile Indians. In a practical sense, the latter
13 need, transportation, was not met until the years 1878-1883, when the Santa Fe
14 and Southern Pacific built parallel railroad lines across Arizona and New
15 Mexico and at the same time they built a line down the Rio Grande Valley to El
16 Paso.

17 *See August Report, at 34 [C023] (citations omitted).*

18 163. Dr. August wrote:

19 At first, Arizona was little more than a footnote in a broad and lengthy
20 narrative. Without reasonable transportation routes, especially navigable rivers,
21 it was an obstacle to overcome rather than a destination to be reached. The first
22 survey, led by Lieutenant Amiel Weeks Whipple, crossed present-day
23 Oklahoma, the Texas Panhandle, and New Mexico, picking up mountain man
24 Antoine Leroux in Zuni. Over the next two years, the Army carried out six
25 surveys; two of them, the Whipple and the Parke surveys, crossed Arizona.
26 Although their purpose was to identify transcontinental railroad routes, the
27 surveys in fact first led to the construction of wagon roads. These surveys did
not consider the Salt, Gila, or other rivers in Arizona as relevant to the need to
improve communication or transportation as potential routes between the West
and the populated areas in the East. Finally connected to the East and West by a
viable transportation route, the region began to advance economically.

See August Report, at 35 [C023] (citations omitted).

164. Dr. August wrote:

The war also gave rise to the creation of Arizona Territory, which was
established in 1863. Federal officials were concerned that the Confederacy
might try to break the Union blockade of the South by occupying New Mexico
Territory thereby establishing a trade route across the Southwest. By creating a

1 new territory that encompassed just Arizona, Congress could bring greater
2 federal authority to the region—a move favored by Arizona residents. As
3 suggested above, the vast majority of residents in the new territory agreed that
4 Arizona’s most pressing need was for wagon roads. A navigable Salt River
5 would have served the few residents without the pressing need for wagon roads.
6 The landscape of Arizona would certainly be different if residents were able to
7 use boats as opposed to or in addition to wagon roads. However, navigable
8 rivers were not available for viable boat traffic.

9 *See August Report, at 36 [C023] (citations omitted).*

10 165. Dr. August wrote:

11 In terms of access to Arizona via rivers and streams, freight and passengers had
12 been able to reach the western boundary of Arizona by boat since 1852, when
13 steamboat service was established on the lower Colorado River. But travel
14 inland from the river still required a difficult and time-consuming journey by
15 horse or stagecoach, one made worse by the poor condition of the few existing
16 roads. However, when the Territorial Legislature met for the first time in 1864,
17 at the new Territorial capital in Prescott, it passed only one measure related to
18 roads or transportation. Legislators approved a resolution declaring the already-
19 built Woolsey Trail, which connected Prescott with the Pima Villages, to be
20 Arizona’s first public road. In addition, the Territorial Legislature petitioned
21 Congress for funds to improve navigation on the Colorado River, and in the
22 petition the Legislature declared that the Colorado River was the only navigable
23 stream in the territory. No contemporary observer thought that the Salt River
24 was navigable in 1864. Considering the Territorial Legislature’s request for
25 funding for navigation, and the fact that settlers were beginning to recognize the
26 value of the agriculture in the Salt River Valley, mention of a navigable Salt
27 River would have been included, as well as a possible request for funding to
improve navigation to this inland destination. However, in that first meeting of
the Territorial Legislature of Arizona, no mention of the Salt River as a highway
of commerce or transportation appears in the record.

28 *See August Report, at 36 [C023] (citations omitted).*

29 166. Dr. August wrote:

30 During the 1860s and 1870s, Arizona was too isolated and dangerous to enable
31 any major industries to develop, so the scale of the territory’s economy
32 remained small. Transportation was difficult on roads and non-existence by
33 river navigation. Livestock remained the prey of the Apaches while agriculture
34 began to flourish around Yuma, Tucson, Florence, Wickenburg, and Prescott.
35 The military and mines were part of this incremental growth but the markets

1 were local, not even regional. Technological innovation had not transformed
2 copper mining to allow the extraction of low-grade ore. Thus, unless one struck
3 it rich in the goldfields, the only way to make a sound living even a fortune—on
4 the Arizona frontier was long-distance freighting. Virtually everything,
5 including basic foodstuffs, had to be imported from outside the territory. Wheat
6 and com, for example, came from Sonora and Chihuahua while manufactured
7 goods arrived from the eastern states. Not surprisingly, Army posts were the
8 Territory's biggest markets and they received their clothing and equipment from
9 San Francisco. But even those supplies could be carried by ship around the
10 Baja peninsula to the Colorado River and upriver by steamboat. Significantly,
11 goods and clothing destined for Arizona's inland Army posts had to be hauled
12 by wagon or mules across hundreds of miles of desert and mountains. Indeed,
13 the inland rivers, including the Salt, were not considered in the equation of
14 transportation or commerce during this juncture of the military, civilian, mining,
15 and agricultural expansion of the territorial economy.

16 *See August Report, at 41 [C023] (citations omitted).*

17 167. Dr. August wrote:

18 Given Arizona's size, the lack of navigable rivers and the poor condition of its
19 existing roads, progress in building the new Territorial system was slow. Most
20 travelers in Arizona noticed few real improvements. Isolated sections of
21 roadway were graded, drained, and surfaced with crushed gravel, but they were
22 still interspersed with long sections of roadway that had been built with nothing
23 more than dirt and other local materials. For more significant road
24 improvements, Arizonans would have to wait for assistance from the federal
25 government, which did not come until after Arizona attained statehood. From
26 1863 to 1912, territorial and county administrators wrestled with transportation
27 in Arizona. The absence of the Lower Salt River in transportation records
suggests that officials viewed the Salt River as a non-navigable stream nor even
susceptible to navigation. It was, as the Salt River Valley grew and developed,
an obstacle to cross when flowing. When dry, pedestrians crossed it by foot.
But just four years after the creation of Arizona Territory, its primary historical
use was revisited as settlers began diverting its waters for irrigation.

28 *See August Report, at 43 [C023] (citations omitted).*

29 168. Dr. August wrote:

30 The completion of the Arizona Canal in 1885 and the spur line from Tempe to
31 Maricopa in 1887 fueled a population influx and agricultural revolution by the
32 mid-1890s. Development of the Salt River's water flows was essential for

1 sustainability and continued growth. If there was concern or debate about the
2 impacts on navigability by diverting the Salt River for irrigation, there is no
3 historical record of it. The Salt River, as it descended from the mountains to the
4 Salt River Valley, was never viewed by these 19th century American pioneers
as a river of travel and commerce, it was, however, the essential factor in
irrigated agriculture.

5 *See August Report, at 48-49 [C023] (citations omitted).*

6 169. Dr. August wrote:

7 The environmental and economic challenges of the 1890s, “one of the darkest
8 decades in this history of the United States,” had a significant impact on Salt
9 River Valley residents. In 1891 Congress appropriated \$50,000 to the
10 Geological Survey to gauge stream flows in order to determine the water supply
11 in the U.S. and to prepare reports on the best uses for water in the nation’s arid
12 and semi-arid regions. The second of these reports was on irrigation near
13 Phoenix, Arizona. Meanwhile, the federal government made incremental
14 inroads into discussions surrounding the Salt River. In *the Thirteenth Annual*
15 *Report of the US Geological Survey*, hydrologist Frederick H. Newell, who
16 studied the river in 1891-1892 found the Salt River “An extremely difficult
17 stream from which to divert a canal, owing to the irregularity of its discharge.
18 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.” Notably, Newell did not mention the Salt River as a possible
conduit for transportation or commerce. The chief purpose of this and other
similar investigations were twofold: to gather scientific and technical data for
planning reclamation projects and to publicize potential reservoir sites to
Congress.

19 *See August Report, at 49 [C023] (citations omitted).*

20 170. Dr. August wrote:

21 Shortly after President Roosevelt signed national irrigation legislation into law,
22 stakeholders formed an organization which could deal with the government
23 implementing the National Reclamation Act to benefit the Salt River Valley.
24 Among the most difficult issues in the construction of Roosevelt Darn was
25 construction of a road from the Valley to the Tonto Basin. The construction of
26 the road further reinforced the notion that the Salt was not suitable for
27 transportation. Federal workers needed an overland transportation route to
access the darn site. The Salt River itself was not viewed as a possible
transportation route for the transfer of supplies to the dam site.

1 *See August Report, at 50 [C023] (citations omitted).*

2 171. Dr. August wrote:

3 Not surprisingly, as another outgrowth of the construction of Roosevelt Dam,
4 the promise of regulated flood control and irrigation fueled a population boom
5 and scramble for irrigable land below the dam. Therefore, federal land patents
6 to private parties demonstrated contemporary views that the Salt River was non-
7 navigable. With the U.S. Land Office implementing an orderly system for
8 federal disposition of the public domain in the Territory of Arizona prior to
9 1912 federal and state officials were challenged by the Byzantine process of
10 settlers applying for land patents. Nineteenth century homestead laws, like the
11 Homestead Act (1862) and the Desert Land Act (1877) required settlers to file
12 applications that described their patents by township, range, and section, within
13 each six-hundred-forty-acre section the Salt River flowed through the parcel and
14 was navigable, federal officials would not have granted title of the bed of the
15 stream since the State of Arizona would own it due to the state's sovereignty.
16 Thus a patent to a quarter section would have been recorded with fewer acres,
17 taking into account the streambed. If the river had been considered navigable,
18 an irregularly-shaped parcel next to the river would have been identified as a
19 "government lot." Significantly, none of the federal patents that overlay the
20 Salt River-regardless of the filing dates-contain any provision for reserving the
21 bed of the stream to the State of Arizona.

22 *See August Report, at 54 [C023] (citations omitted).*

23 172. Dr. August wrote:

24 During this period in which modern Arizona began and the Salt River was
25 captured behind Roosevelt Dam, there is no record of any consideration of the
26 impacts the dam might have on the river's navigability or use as a potential
27 route for commerce. When construction of the dam was undertaken, there is no
record of any consideration of transporting the workers or the building materials
up any part of the Salt River. In fact, the record reflects that, in the opinion of
the residents of Arizona just before statehood, the Salt River was not navigable,
and there is no indication that the residents believed the river to be susceptible
to navigation.

28 *See August Report, at 55 [C023] (citations omitted).*

29 173. Swilling's ditch, the first modern irrigation in the Salt River Valley, was dug in
30 1868. Tr. 10/20/15:158 (Fuller); Fuller PowerPoint, slide 112.

1 174. According to Mr. Fuller, there was some mining in the 19th century in the
2 vicinity of the Salt River in Segments 1-4. *See* Tr. 10/20/15:158-59 (Fuller). According to
3 census data in 1890, the population of Maricopa County was 11,000, Gila County was 2,000,
4 and there were 707 people living near Roosevelt. *Id.* at 160; Fuller PowerPoint, slide 115.

5 175. According to Mr. Fuller, there was some mining in the 19th century in the
6 vicinity of the Salt River in Segments 1-4. *See* Tr. 10/20/15:158-59 (Fuller).

7 176. In the late 19th century, there was a salt mine on Segment 2 called King
8 Woolsey Salt Works, and the material was packed out by mule. *See* Tr. 10/20/15:163
9 (Fuller).

10 177. If the Salt had been navigable to move ore for the mining companies, it would
11 have been used. *See* Tr. 1/26/16:1958 (August).

12 178. Mr. Fuller admitted that there was no regular use of the Salt for transportation
13 or crops for commerce prior to 1900. *See* Tr. 10/23/15:826-27 (Fuller).

14 179. The railroad came to Phoenix in 1887. *See* Tr. 11/19/15:1648 (Gookin).

15 180. Mr. Gookin testified that there were enough people living along the Salt in the
16 1860s and 70s that would have boated on the Salt if they could have. *See* Tr. 11/19/15:1663
17 (Gookin).

18 181. Mr. Fuller agreed that his “population paradox” (the argument that when the
19 river was in its natural condition, there were no people, and when there were people there was
20 no water because of diversions) does not consider native populations. *See* Tr. 10/22/15:708-
21 09 (Fuller).

22 182. Dr. August testified that modern diversions of the Lower Salt began in 1867.
23 *See* Tr. 1/26/16:1880 (August).

24 183. Ferries on the Salt were not used at all times and would be out of service
25 “during flood periods and during when the river was dry.” *See* Tr. 1/26/16:1945 (August).

26
27

1 184. John Y.T. Smith arrived in the Salt River Valley in 1865 and provided the
2 military with hay he grew in Phoenix to Fort McDowell. *See* Tr. 1/26/16:1950-54 (August).
3 He knew of the Salt but took his hay overland. *Id.* He hired local workers to create a road
4 instead. *Id.* If the Salt had been navigable, he would have navigated it. *Id.*

5 185. The Stoneman Road, which allowed travel to Fort Apache from Phoenix, was
6 expensive to construct. *See* Tr. 1/26/16:1955-59 (August). If the Salt had been navigable,
7 Stoneman Road would not have been built. *Id.*

8 186. The Salt River Valley was a difficult area to travel across, and the difficulty of
9 transportation impeded commerce in Arizona prior to the railroads. *See* Tr. 1/26/16:1959-60
10 (August).

11 187. If the Salt had been susceptible to use as a highway of commerce prior to 1867,
12 it would have been used for travel and commerce because “[i]t was a more efficient and less
13 labor-intensive, easier way to move from the center of the territory to points west.” *See* Tr.
14 1/26/16:1960-61 (August).

15 188. The railroad was a “big game-changer” for the development of the Salt River
16 Valley. *See* Tr. 1/26/16:1961-62 (August). There was no highway for commerce in the Salt
17 River Valley prior to the railroad, even though other parts of the American Southwest
18 (including California and New Mexico) had been settled. *See* Tr. 1/26/16:1962-63 (August).

19 189. Dr. Newell testified: “[T]he moment the railroad reached Yuma, there was a
20 huge effort to build a road from Phoenix to Yuma, which, of course, would not have been the
21 case had they been able to travel on the Salt to Yuma. Clearly, they needed the road to get
22 commercial cargos down to Yuma to take advantage of the railhead.” *See* Tr. 3/31/16:4405
23 (Newell).

24 190. If the Salt had been navigable, it would have changed the rate of development in
25 the Salt River Valley. *See* Tr. 1/26/16:1997-98 (August).

1 191. Dr. Littlefield studied the history of the Salt from the mid-nineteenth century,
2 “when there were only a minimal number of man-made obstructions on the Salt, to the years
3 shortly after Arizona’s statehood on February 15, 1912.” *See* Littlefield Declaration, ¶ 6.

4 192. Dr. Littlefield testified:

5 [T]here was a considerable amount of conflict, if you will, between the
6 Reclamation Service and some of the local citizens in the Phoenix area about
7 how parts of the Salt River Project were going to be financed. And there were a
8 lot of hearings and discussions and protests about one of the proposals, which I
9 don’t remember the details of right now, about the financing of this project.
10 And all of that information is very highly documented in the Reclamation
11 Service’s files in the National Archives in Denver. There is no comparable
12 group of documents discussing protests by navigation interests. In fact, there’s
13 nothing that suggests there were any protests by navigation interests about
14 building Roosevelt Dam or Granite Reef Dam or how that would impact the
15 river.

16 *See* Tr. 2/25/16:3406-07 (Littlefield).

17 193. With regard to how supplies were brought to the Roosevelt damsite, Dr.
18 Littlefield testified:

19 They originally took the supplies by way of Globe, but that was quite a
20 roundabout way to get the supplies in there. Very early on, as construction
21 started on Roosevelt Dam, the Reclamation Service decided to build a road
22 from the Phoenix-Mesa area up -- if you’re going upstream, up the right-hand
23 side of the Salt River to the Roosevelt area in order to bring supplies both up to
24 Roosevelt, as well as to bring materials back down from Roosevelt.

25 *See* Tr. 2/25/16:3408 (Littlefield).

26 194. Dr. Littlefield testified: “To the contrary. There were hundreds of pages of
27 documents that talked about building the road to take goods up and goods down from the
Roosevelt area; but there was not even one document that mentioned, other than the one that
you’ve talked about here, using the river in any way for carrying goods to or from Roosevelt.”
See Tr. 2/25/16:3408-09 (Littlefield); Littlefield Declaration, at B-42-45.

1 195. Dr. Littlefield testified: “Not only did the Reclamation Service have to haul
2 supplies up to Roosevelt, but the Service also had to carry concrete from Roosevelt, where the
3 Reclamation Service’s concrete plant was located. The river was not used to convey
4 materials in either direction.” *See* Tr. 2/25/16:3412 (Littlefield); Littlefield Declaration, at B-
5 42-45.

6 196. Dr. Littlefield testified:

7 [T]he Reclamation Service met with multiple parties who were interested in
8 what was taking place on the river, particularly before they began construction
9 of Granite Reef Dam and then also Roosevelt Dam; and despite the fact that
10 there were a lot of concerns voiced by parties, particularly in relation to
financing, no one complained that these activities by the Reclamation Service
were going to have a potential detrimental impact on navigation.

11 *See* Tr. 3/30/16:4035 (Littlefield).

12 197. Regarding the construction of Apache Trail, Dr. Littlefield testified: “[I]t was
13 an exceedingly difficult road to build, and because my reports, as I’ve explained, overlap with
14 the Lower Salt, running from roughly Roosevelt all the way down to the Gila, it was relevant
15 to the Lower Salt as a demonstration of the time and expense that went into building this road;
16 whereas it would have been far simpler, if the river was navigable, to take things up and down
17 the river by boat.” *See* Tr. 3/30/16:4041-42 (Littlefield).

18 198. If the Reclamation Service had been able to use the Salt to bring supplies to
19 Roosevelt, Dr. Littlefield believes they probably would not have built a road. *See* Tr.
20 3/30/16:4134-35 (Littlefield).

21 199. Based on the foregoing evidence, the Commission finds that early European
22 settlers did not use the Salt for trade or travel by boat. Furthermore, the Commission finds
23 that they did not use the Salt for trade or travel because the Salt was not susceptible to
24 navigation in its ordinary and natural condition.

1 **USGS Land Surveys**

2 200. Mr. Fuller testified that in 1868, the Salt was “probably” close to its ordinary
3 and natural condition.” *See* Tr. 10/23/15:868-69 (Fuller).

4 201. Dr. Littlefield wrote:

5 When the United States took control of the vast territory acquired from Mexico
6 in 1848 at the end of the Mexican-American War, federal officials were anxious
7 to determine the value of what the U.S. had gained, and they wanted to prepare
8 the region for orderly occupation by American settlers. Therefore, to record the
9 lands’ characteristics and to prepare the region for homesteading, the U.S.
10 Government undertook formal cadastral surveys to establish township, range,
11 and section lines. Because those surveys were highly detailed, the original plats
of the area near the Salt River and the related field notes contain a wealth of
information about the nature of that stream and its navigability or non-
navigability.

12 *See* Littlefield Declaration, ¶ 18.

13 202. Dr. Littlefield wrote:

14 Due to the need for accuracy and consistency in carrying out the federal
15 surveys, the U.S. Government issued a series of manuals designed to direct
16 surveyors’ work. These manuals first were begun to be published in 1851
17 (before then, instructions were issued separately to individual surveyors), and
18 revisions were issued periodically. To grasp the significance of these manuals
in relation to establishing whether bodies of water were deemed navigable or
non-navigable, it is important to understand the books’ provisions and how they
changed over time.

19
20 *See* Littlefield Declaration, ¶ 19.

21 203. Dr. Littlefield wrote:

22 There were seven surveyors’ manuals issued by the U.S. General Land Office
23 between the middle of the nineteenth century and 1912, when Arizona became a
24 state. These manuals appeared in 1851, 1855, 1864, 1881, 1890, 1894, and
25 1902. Although all the manuals specifically directed federal surveyors to
“meander” all navigable bodies of water – meaning to measure the sinuosities of
26 waterways by degree bearings and distances – over the years after 1851, newer
versions of the manuals gradually added instructions to meander some
27 nonnavigable bodies of water under specific circumstances. For example, these

1 additions included when non-navigable streams were used to define routes for
2 internal communication such as roads or trails paralleling waterways (the 1881
3 manual) or when non-navigable rivers were more than three chains (198 feet)
4 wide (the 1890 manual). Nevertheless, the instruction to meander all navigable
5 waterways remained intact throughout all surveying manuals.

6 *See Littlefield Declaration, ¶ 20.*

7 204. Dr. Littlefield wrote:

8 Prior to Arizona's statehood in 1912, the U.S. General Land Office conducted
9 surveys (and some limited resurveys) in the entire lower Salt River area below
10 Granite Reef (a large outcropping of bedrock in the Salt River's course where
11 Granite Reef Dam is located today) in 1868, 1888, 1899, and 1910-1911. In the
12 upper Salt River region, many areas were never surveyed or were surveyed after
13 statehood, although pre-statehood surveys were conducted in 1868 (the area
14 around Granite Reef Dam), 1881 (some lands later inundated by Theodore
15 Roosevelt Lake), and 1911 (the area near the confluence of the Verde and Salt
16 Rivers).

17 *See Littlefield Declaration, ¶ 21.*

18 205. Dr. Littlefield wrote:

19 [T]he interiors of the townships through which the Salt River flows between the
20 confluence with the Gila River and Granite Reef initially were surveyed in 1868
21 by the brothers Wilfred F. Ingalls and George P. Ingalls (Wilfred Ingalls
22 undertook the surveys for township 1 north, ranges 1 to 5 east, and George
23 Ingalls surveyed township 2 north, ranges 5 and 6 east). These surveys were
24 carried out under the terms of the 1855 federal surveyors' manual as modified
25 by the 1864 handbook. There were relatively few man-made obstructions along
26 the Salt River at the time of the Ingalls' surveys, and thus, their descriptions of
27 the Salt River are particularly important in relation to that stream's navigability
or non-navigability.

See Littlefield Declaration, ¶ 22.

206. Dr. Littlefield wrote:

[Significantly], although the Ingalls brothers surveyed the interior section lines
of seven different townships between the Gila River and the future location of
Granite Reef Dam, they carried out no meanders whatsoever of the Salt River in
any of those townships. Moreover, the brothers did not indicate on the survey
plats that meanders had been conducted. Had such meanders been performed,

1 those measurements would have been shown on the plats as angled lines along
2 the Salt River, and the precise measurements would have been presented in a
3 table on the right side of the plat containing the meander degree-bearing data.
4 Furthermore, the manual directing the Ingalls' surveys required them to
5 described the Salt River in their field notes where their section line surveys
6 crossed the Salt River "on line." Rather than noting any characteristics that
7 might have been consistent with navigability, the Ingalls brothers described the
8 Salt River as being in some places relatively shallow and having multiple
9 channels.

10 *See Littlefield Declaration, ¶ 23.*

11 207. Dr. Littlefield wrote:

12 While the entire lower Salt River between that stream's confluence with the
13 Gila River and the future location of Granite Reef Dam was surveyed in 1868
14 by the Ingalls brothers, parts of those townships were resurveyed in 1888 by
15 L.D. Chillson, in 1899 by Herbert R. Patrick, and in 1910-1911 just before
16 Arizona statehood by Robert A. Farmer. These resurveys were all done to
17 define the boundaries and interior section lines of either the Salt River Indian
18 Reservation or the Gila River Indian Reservation, and thus meanders along the
19 Salt River were run to identify the edges of those reservations. In addition, the
20 descriptions offered in the field notes and the details on the plats further
21 indicated that the Salt River was a non-navigable body of water – as had been
22 the conclusion of the Ingalls brothers in 1868.

23 *See Littlefield Declaration, ¶ 24.*

24 208. Dr. Littlefield wrote:

25 Before Arizona's statehood in 1912, the interiors of the townships (or parts of
26 those townships) through which the Salt River flows between Granite Reef and
27 the upper limits of Theodore Roosevelt Lake's inundation area were surveyed
by federal surveyors in 1868 (the area around Granite Reef – discussed above in
relation to the Ingalls brothers' 1868 surveys), 1881 (lands later inundated by
Theodore Roosevelt Lake), and 1911 (the area near the confluence of the Verde
and Salt Rivers).

See Littlefield Declaration, ¶ 25.

209. Dr. Littlefield wrote:

In the reach of the Salt River just above Granite Reef, meanders were done of
the right bank (going downstream) in townships 2 and 3 north, range 7 east, as

1 part of those townships' exterior boundary surveys in 1887 and a resurvey in
2 1911 of the boundaries of township 2 north, range 7 east (which also included
3 the northwest corner of the interior of that township). Those meanders,
4 however, were conducted because the upper Salt River forms the southern
boundary of the Salt River Indian Reservation (and hence, was the northern
edge of the public domain), not because the upper Salt River was navigable.

5 *See Littlefield Declaration, ¶ 26.*

6 210. Dr. Littlefield wrote:

7 The most upstream portions of federal surveys in the upper Salt River area were
8 conducted in the area later flooded by present-day Theodore Roosevelt Lake.
9 These lands were in township 4 north, ranges 12 and 13 east. The interior
10 subdivision lines of this township were surveyed in late April and early May
11 1881 by Deputy Surveyor Theodore S. White under his contract dated August
12 27, 1880, and the survey and related plat were approved by the Surveyor
13 General on December 14, 1881. As the 2014 Littlefield Upper Salt River Report
illustrates, White did not meander any portion of the Salt River in these
townships. At each crossing of the upper Salt River in this township, Deputy
Surveyor White noted that he only measured across the stream as survey
instructions provided when encountering non-navigable bodies of water.

14 *See Littlefield Declaration, ¶ 27.*

15 211. Dr. Littlefield concluded:

16 [F]ederal government surveyors were specifically charged with the task of
17 identifying navigable streams as part of their surveying duties, and the manuals
18 and instructions under which they carried out their work were very precise
19 about how navigable bodies of water were to be distinguished from non-
20 navigable waterways. As part of the U.S. Government's surveying efforts, the
21 area along the Salt River was surveyed and resurveyed many times in the years
22 before Arizona's statehood in 1912 (except for portions above Granite Reef,
23 some of which were never surveyed or were surveyed after statehood).
24 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. In most cases,
federal surveyors did not meander the Salt River, and in those few instances
where meanders were run, they were to define the borders of Indian reservations
and not because the surveyor believed the Salt River to be navigable

25 *See Littlefield Declaration, ¶ 28.*

26 212. Dr. Littlefield wrote:
27

1 Since modern settlement began in the Salt River Valley in the mid-nineteenth
2 century, there have been a multitude of documents created describing that
3 stream. These cover a wide spectrum of published and unpublished sources,
4 including federal and state (and territorial) materials, newspaper accounts,
5 diaries, journals, reminiscences, historical photographs, and other archival
6 records.

7 *See* Littlefield Declaration, ¶ 61.

8 213. Dr. Littlefield wrote:

9 Some of the most important sources for ascertaining the nature of the Salt River
10 prior to and at the time of Arizona's statehood in 1912 are survey field notes
11 and plats created by U.S. Government surveyors as they carried out their
12 responsibilities mapping Arizona. Directed by manuals conveying precise
13 instructions, surveyors were to make careful notes of the region in which they
14 were working, and they were provided with specific instructions about how to
15 record the presence of navigable bodies of water. The area through which the
16 Salt River flows below Granite Reef Dam and the confluence with the Gila
17 River was fully surveyed in 1868, and resurveys were done for sections of the
18 river in 1888, 1899, and 1910-1911. Significantly, although these surveys were
19 undertaken by different parties at different times and under various seasonal
20 conditions, none of the federal surveyors indicated in his field notes or on the
21 related plats that the Salt River was navigable. On the contrary, the field notes
22 and plats illustrated a stream that varied enormously in flow, that had a
23 constantly changing channel, and that sank into the bed in places only to
24 reemerge slightly downstream. Moreover, the notes and plats contain
25 references to roads paralleling the Salt, suggesting that transportation was
26 carried out on land and not on the river.
27

28 *See* Littlefield Declaration, ¶ 62.

29 214. Dr. Littlefield wrote:

30 Supporting the U.S. Government surveys' determination that the Salt River was
31 not navigable are federal government homestead patents, U.S. grants to
32 Arizona, and Arizona's disposition of those lands. Over two hundred patents
33 were issued by the U.S. Government Land Office to parcels of land through
34 which the Salt River ran. In every single case when these patents were
35 formalized, the United States made no effort to deny title to the applicants for
36 the Salt River's bed based on a possible claim of ownership due to Arizona's
37 sovereignty. In addition, in some cases the patent files that accompanied the
38 applications made it clear that what the prospective homesteader wanted was
39 the actual bed of the river itself. Furthermore, when lands were granted to

1 Arizona through which the Salt River flowed, the State made no effort to obtain
2 in-lieu selections for the acreage covered by the stream's bed – as it would have
3 been entitled to do had the Salt River been navigable at the time of statehood.
4 And, when Arizona subsequently disposed of lands it had acquired from the
5 federal government through which the Salt River ran, the State made no
6 indication that it was withholding the bed of the river due to navigability.

7 *See* Littlefield Declaration, ¶ 63.

8 215. Dr. Littlefield testified that the United States conducted surveys for three
9 reasons: “One was that the United States government would know what it held in its public
10 domain. And with regard to the American West, that was particularly true in relation to the
11 territory that was acquired from Mexico in 1848 at the end of the United States-Mexico War.”
12 *See* Tr. 2/25/16:3296-97 (Littlefield). “The second reason was to provide a means for
13 homesteading in these areas that would be reliable and accurate by being able to carve up the
14 land into easily identified parcels.” *Id.* “13 colonies became the owners of navigable
15 waterways when the 13 states became independent, and because of the same footing doctrine,
16 which says new states join the union on the same footing as the original 13, officials in the
17 United States government understood that as new states were created, any body of water that
18 was navigable at the time of statehood would become the property of that particular state. So
19 it was important to identify navigable streams and set those aside, so they then would not be
20 patented out to individuals who wanted to settle on the land.” *Id.*

21 216. Prior to 1851, there was no standardized manual. *See* Tr. 2/25/16:3298
22 (Littlefield). The first survey manual was produced in 1851, and subsequent manuals were
23 published in 1855, 1864, 1881, 1890, 1894, and 1902. *Id.*

24 217. “The earliest manuals, being the manuals in 1851 and 1855, instructed
25 surveyors to meander only navigable bodies of water.” *See* Tr. 2/25/16:3300 (Littlefield).

26 218. “The 1864 manual added, in addition to navigable bodies of water, if surveyors
27 found a waterway that acted as sort of a natural corridor, not in terms of boats, but, for

1 example, like the Gila Trail, where parties followed it for certain reasons, then they were to
2 meander that body of water on one bank only.” *See* Tr. 2/25/16:3300 (Littlefield).

3 219. “[I]n 1890 a new purpose of meandering was set forth, which in 1890 the
4 surveyors were instructed to meander nonnavigable bodies of water in addition to navigable,
5 but the nonnavigable bodies of water had to be over 3 chains wide.” *See* Tr. 2/25/16:3300-01
6 (Littlefield). “[B]y 1890, not only navigable bodies of water were to be meandered on both
7 banks, but nonnavigable bodies of water on one bank if they were serving as sort of a path, if
8 you will. And then in 1890, nonnavigable bodies of water were added to be on both banks if
9 the river was more than 3 chains wide.” *Id.* at 3301.

10 220. Dr. Littlefield testified: “[T]he fact that the surveyors did meanders for various
11 reasons is very significant with regard to the question of navigability of the rivers, because
12 these were professionals and they were offering their view of a particular waterway at a
13 certain point in time.” *See* Tr. 2/25/16:3302 (Littlefield).

14 221. “The Ingalls brothers used 1855 survey manual as modified by the 1864
15 manual.” *See* Tr. 2/25/16:3304 (Littlefield). “[T]here were, in essence, two requirements that
16 the Ingalls brothers were supposed to follow. One was to meander both banks if the body of
17 water was navigable; and, secondly, to meander one bank if it was a path for internal
18 communication.” *Id.* at 3305.

19 222. Deputy surveyors would swear under oath that that the surveyor had done his
20 job correctly. *See* Tr. 2/25/16:3308 (Littlefield).

21 223. Dr. Littlefield testified: “[N]owhere on the Salt River did I find any indication
22 that a Federal surveyor had carried out meanders for reasons of navigability anywhere on the
23 Salt River.” *See* Tr. 2/25/16:3310 (Littlefield).

24 224. “[T]here were three resurveys that were done of the Lower Salt River before
25 statehood . . . [in] 1888, 1899, and 1910 through 1911.” *See* Tr. 2/25/16:3315-16 (Littlefield).

26
27

1 “[S]ome of these resurveys were one-bank meander surveys, and they were done because of
2 the presence of the Salt River Indian Reservation.” *Id.*

3 225. Regardless of the changes in the survey manuals over time, there was never any
4 provision of the survey manuals that indicated that a one-bank meander would be done on a
5 river that the surveyor thought was navigable. *See* Tr. 2/25/16:3319 (Littlefield).

6 226. Surveys of the Upper Salt are “relatively limited, because certain portions of the
7 Upper Salt River were either initially deemed too rugged to carry out surveys or they weren’t
8 surveyed until very much after statehood or because the area was flooded by Roosevelt lake.”
9 *See* Tr. 2/25/16:3320 (Littlefield).

10 227. “The surveys that were done under what is now Roosevelt Lake were done
11 under the requirement that both banks of navigable waterways be meandered. And both of
12 those townships were done by the same surveyor at roughly the same time, and Surveyor
13 White did not do meanders of either bank of the Salt River under what is today Roosevelt
14 Lake.” *See* Tr. 2/25/16:3322 (Littlefield).

15 228. In his opinion as a professional historian with decades of experience in dealing
16 with Federal surveys, Dr. Littlefield testified:

17 I think they’re overwhelmingly persuasive, because there were many different
18 surveyors who surveyed different parts of the Salt River before 1912. They did
19 so under the instructions of different manuals, depending on what year they did
20 them in, but they all had the requirement of meandering both banks of navigable
21 bodies of water. That requirement was specifically set forth in their manuals.
22 They had examples of how those meanders were to be carried out. But despite
23 the fact that they crossed and crisscrossed the Salt River in probably hundreds
24 of locations, all of which I have looked at in terms of the field notes and the
25 plats, I think it’s significant that there was not one instance where any of the
26 surveyors of the Salt River indicated, because of meandering, that the Salt River
27 was -- in their view, was navigable.

25 *See* Tr. 2/25/16:3322 (Littlefield).

1 229. Dr. Littlefield has examined every survey plat along the Salt from the Gila
2 confluence to the inundation lines of Roosevelt Lake, as well as all the field notes and
3 resurvey notes, and the contracts under which the surveyors did their work on behalf of the
4 General Land Office. *See* Tr. 2/25/16:3325-26 (Littlefield). Dr. Littlefield testified: “They
5 indicate overwhelmingly that from the perspective of the surveyors, the river was not
6 navigable when they did their surveying work.” *Id.*

7 230. The field notes for the 1868 interior survey of township 1 north, range 2 state:
8 “Throughout much of this township, the Salt River was divided into two channels, the north
9 and south branches, although the two combined briefly between sections 22 and 23 before
10 splitting again into a north and south channel. There were also places where sloughs split off
11 from one of the main channels and then rejoined that channel further downstream.” *See*
12 Littlefield Lower Salt, at 32 [C001]. Moreover, in the field notes, Ingalls’ characterization of
13 the North Branch indicates that it probably was not navigable: “18.50 [chains] To left bank of
14 North channel of Salt River – low sandy banks constantly shifting [river] runs S85W.” *Id.* at
15 33. With regard to the South Branch, he wrote: “34.10 [chains] To South Channel of Salt
16 River. 3.20 chs wide runs west – not too deep to prevent measuring across it on line.” *Id.*
17 These field notes were written in the month of March, 1868. *Id.*

18 231. With regard to the 1868 interior survey of township 1 north, range 3 east, Dr.
19 Littlefield wrote: “Throughout this entire township (which today includes downtown
20 Phoenix), the Salt River flowed in two channels, identified by Ingalls respectively as the
21 North Channel and the South Channel.” *See* Littlefield Lower Salt, at 35 [C001]. Ingalls
22 himself wrote: “Land on line bet secs 16 & 21 sandy – subject to overflow and unfit for
23 cultivation a large portion of it being washed or shifted about every season more or less.” *Id.*
24 He also wrote: “Note: The line bet secs 15 & 22 running some distance in the river . . .
25 subject to overflow and unfit for cultivation interspersed with numerous sloughs from the
26 river. I do not run it.” *Id.* at 36. Dr. Littlefield concluded: “Such descriptions indicate that
27

1 navigation on this part of the river would probably have been difficult, if not impossible.” *Id.*
2 Ingall’s general description of the township reads: “Salt River separates in two channels
3 called North and South Channels with numerous sloughs running from one to the other runs
4 through a loose sandy [illegible in original] in the middle of the township from East to west –
5 It is continually washing away and changing its course. This Township is made fractional in
6 consequence of the land bet the North and South channels being sandy and constantly washed
7 and shifted by the river and unfit for cultivation.” *Id.* These notes were written in March. *Id.*

8 232. “The plat of township 1 north, range 3 east, which was filed with the surveyor
9 general on December 2, 1870 [], illustrated the Salt River flowing in a westerly direction
10 through the middle of the township in two channels and several sloughs.” *See* Littlefield
11 Lower Salt, at 37 [C001].

12 233. With regard to the 1868 survey of township 1 north, range 4 east, Ingalls wrote:
13 “The North and South channels of Salt River are now of about equal size – but as they run
14 through sandy soil are constantly changing position and size.” *See* Littlefield Lower Salt, at
15 42 [C001].

16 234. With regard to the 1868 survey of township 2 north, range 5 east, Ingalls wrote:
17 “Its banks are generally low and sandy and it often shifts its bed during a very high stage of
18 the waters.” *See* Littlefield Lower Salt, at 44 [C001].

19 235. The 1868 Ingalls survey maps of the Lower Salt clearly show a braided river
20 with multiple channels. *See* Littlefield Lower Salt, at 28-48 [C001].

21 236. Ingalls would have had to cross the Salt “somewhere around 30 times” just to
22 survey township 1 north, range 2 east (about six miles from the confluence with the Gila).
23 *See* Tr. 3/30/16:4136-39 (Littlefield); Littlefield Declaration, at B-3 [C020]. Dr. Littlefield
24 estimated there were seventy-five to one hundred crossings of the Salt River in the Ingalls
25 surveys. *See* Tr. 3/30/16:4136-39 (Littlefield).

1 237. Based on the foregoing evidence, the Commission finds that the early USGS
2 surveyors in the area determined that the Salt was not a navigable river. Furthermore, the
3 Commission finds this to be persuasive evidence that the Salt was not susceptible to
4 navigation in its ordinary and natural condition.

5 **Federal Patents**

6 238. Dr. Littlefield wrote:

7 In addition to U.S. General Land Office survey plats and field notes, a second
8 group of archival documents – federal patents and their supporting files – shed
9 considerable light on whether the Salt River was navigable or non-navigable
10 before or at the time of Arizona’s statehood in 1912. In the mid-to-late
11 nineteenth century, the U.S. Congress passed a variety of homesteading statutes
12 designed to facilitate settlement of the American West, and those laws resulted
13 in thousands of federal patents being issued to settlers determined to establish
14 homes and farms in the American West. Over two hundred of these federal
15 patents touched or completely overlay the Salt River.

16 *See* Littlefield Declaration, ¶ 29.

17 239. Dr. Littlefield wrote:

18 In order to determine the precise location of all federal patents along the Salt
19 River, legal descriptions of those records close to the Salt River were obtained
20 from the Bureau of Land Management’s Historical Indices and Master Title
21 Plats – documents that show how the U.S. Government disposed of or otherwise
22 encumbered the public domain. The patents were then compared to two sets of
23 historical maps to determine which patents actually touched or overlay the Salt
24 River. Two types of historical maps were necessary due to the possibility that
25 the Salt River might have changed channel over time or due to different
26 historical cartographic techniques. The first set of historical maps consisted of
27 the U.S. General Land Office survey plats described earlier in this declaration.
The second set consisted of the historical U.S. Geological Survey topographic
maps of the region through which the Salt River flows between Granite Reef
and the Salt’s confluence with the Gila River. The earliest of those topographic
maps are: 1) “Phoenix, Arizona,” (1912), 2) “Mesa, Arizona,” (1913), 3)
“Desert Well, Arizona” (1906), and 4) “Fort McDowell, Arizona,” (1906).

See Littlefield Declaration, ¶ 31.

1 240. Dr. Littlefield wrote: “Had the Salt River been navigable, federal land office
2 officials would not have patented that land because of the future state ownership of the bed
3 when Arizona joined the Union.” *See* Littlefield Declaration, ¶ 33.

4 241. Dr. Littlefield wrote:

5 Significantly, with over two hundred federal patents awarded that overlay or
6 touched the lower Salt River between Granite Reef and the Gila River, in not
7 one instance did the United States Government withhold any acreage due to the
8 potential navigability of the Salt River – and hence, potential ownership by the
State of Arizona. Indeed, many of the patent files for these patents specifically
noted that the land being sought included the bed of the Salt River itself.

9 *See* Littlefield Declaration, ¶ 34.

10 242. Dr. Littlefield wrote: “Moreover, there were also federal Desert Land Act
11 patents awarded along the lower Salt River. The *Desert Land Act* of 1877 required that a
12 settler reclaim and cultivate arid acreage through irrigation before a final patent would be
13 awarded. The law also specified that the water had to come from a non-navigable stream.”
14 *See* Littlefield Declaration, ¶ 35.

15 243. Dr. Littlefield wrote:

16 In the townships along the Salt River from the confluence with the Gila River to
17 Granite Reef, there were forty-one applications for patents under the *Desert*
18 *Land Act*. According to the patent application files, all of the applicants
19 intended to obtain water from the Salt River, and all forty-one applications were
20 accepted by the U.S. General Land Office in Phoenix. The logical conclusion
21 from these applications is that the Salt River (as the source of water for these
22 lands) must have been considered non-navigable by the applicants as well as by
23 the administrators of the U.S. General Land Office. Although many of the
24 applications were subsequently canceled or relinquished due to failure to fulfill
the *Desert Land Act’s* requirements, the mere fact that the applications were
initially accepted indicates a belief that the Salt River was not navigable when
those applications were made. There is no indication the cancellations or
relinquishments were due to the navigability of the Salt River.

25 *See* Littlefield Declaration, ¶ 36.
26
27

1 244. Dr. Littlefield wrote: “Much like the lower Salt River, there were also federal
2 patents along the upper Salt River above Granite Reef . . . including five *Desert Land Act*
3 patents. The pre-statehood patents, however, were far fewer in number because of the
4 presence of national forests or other federal acreage not available for homesteading.” *See*
5 Littlefield Declaration, ¶ 37.

6 245. Dr. Littlefield wrote:

7 Several upper Salt River patents later were flooded behind Roosevelt Dam
8 (completed in 1910), yet – like the lower Salt River patents – they also provide
9 information about the Salt River’s navigability or non-navigability when they
10 were awarded. The locations of those parcels can be seen on sketch maps by
11 the U.S. Geological Survey drawn in 1903-1904 showing areas that would be
12 needed for Roosevelt Lake. The Geological Survey’s land ownership sketch
maps subsequently were combined in 1904 into one map showing all parcel
ownerships above Roosevelt Dam and indicating minor corrections from the
original sketch maps.

13 *See* Littlefield Declaration, ¶ 38.

14 246. Dr. Littlefield wrote:

15 There were over two hundred patents issued by the United States that either
16 touched or overlay the Salt River between that stream’s confluence with the
17 Gila River upstream to the inundation lines of Roosevelt Lake. In making
18 application to obtain these lands, homesteaders were aware of the river’s
19 presence, as were the federal authorities who granted the patents. In not one
20 instance was any acreage withheld from these patents due to the navigability of
21 the Salt River. Moreover, nearly fifty of these patents were *Desert Land Act*
patents, which had to be irrigated by water from a non-navigable river or
stream. The files for these *Desert Land Act* patents contain no indication that
U.S. officials believed the Salt River was navigable, and hence, that a *Desert*
Land Act patent should not be awarded.

22 *See* Littlefield Declaration, ¶ 40.

23 247. Dr. Littlefield wrote:

24 The federal and state grant and patenting process is significant in relation to
25 determining the Salt River’s navigability because with so many different parcels
26 and transfers of land involved, a large number of parties ultimately reached the
27 same conclusion – that the Salt River was not navigable. Each applicant who
requested land through which the river flowed implicitly asserted the river’s

1 non-navigability; each federal official approving a homestead application or
2 grant to Arizona reached the same conclusion, as did each State authority who
3 sold Arizona's federally-granted lands. Not only did many individuals all
4 indicate the same finding with regard to the Salt River's non-navigability, but
5 they did so over a lengthy span of time beginning in the nineteenth century and
6 continuing well past statehood. In addition, their actions covered a large and
7 diverse geographic area along the Salt.

8 *See* Littlefield Declaration, ¶ 64.

9 248. Dr. Littlefield obtained and reviewed all of the over 200 Federal patents along
10 the Lower Salt. *See* Tr. 2/25/16:3332 (Littlefield).

11 249. Along with examining the patents themselves, Dr. Littlefield reviewed the
12 supporting documents. *See* Tr. 2/25/16:3335 (Littlefield).

13 250. Dr. Littlefield did not find anything in the patents or patent files that suggested
14 that anyone considered the Salt navigable. *See* Tr. 2/25/16:3336 (Littlefield).

15 251. “[I]n some cases the patentee expressly either acknowledged that he or she
16 was getting part of the bed of the river, or in a few cases they actually indicated that they
17 wanted the bed of the river for gravel or sand or something like that.” *See* Tr. 2/25/16:3337
18 (Littlefield).

19 252. Dr. Littlefield testified:

20 When you consider that there were 200 patents and that there was at least one
21 applicant, usually two witnesses, and then there would have been a government
22 official who would okay the patent, we're talking about a minimum of four
23 people who would have implicitly, and in some case explicitly, made a
24 judgment about the navigability of the Salt River. And so we're looking at
25 probably 800 or so individuals

26 *See* Tr. 2/25/16:3337 (Littlefield).

27 253. Patent applicants would typically go out to the land to stake out the land they
wanted. *See* Tr. 2/25/16:3338 (Littlefield).

254. Dr. Littlefield testified that the Desert Land Act explicitly requires that the land
be irrigated with water from a non-navigable stream. *See* Tr. 2/25/16:3339 (Littlefield).

1 255. “There were 41 or so Desert Land Act patents that were awarded on the Lower
2 Salt River, and every single one of those had to indicate that the water going onto the land
3 came from a nonnavigable body of water.” *See* Tr. 2/25/16:3341 (Littlefield).

4 256. There were fewer patents issued along the Upper Salt for “several reasons.” *See*
5 Tr. 2/25/16:3342 (Littlefield). “First of all, some of the Salt River going down below
6 Roosevelt Dam was very rugged and just simply not very susceptible to even being settled by
7 settlers. Secondly, some of the land was withdrawn for National Forests. Thirdly, some of
8 the land, particularly up around what became Roosevelt Lake and then up into the higher
9 lands around Roosevelt Lake was withdrawn from settlement once the Reclamation Act
10 kicked in and people started thinking about building Roosevelt.” *See* Tr. 2/25/16:3342
11 (Littlefield).

12 257. In the patents Dr. Littlefield reviewed on the Upper Salt, none indicated that the
13 river was navigable. *See* Tr. 2/25/16:3342-43 (Littlefield).

14 258. Dr. Littlefield testified that the Federal homestead patents issued before 1912
15 and even earlier are helpful in determining the ordinary and natural condition of the river. *See*
16 Tr. 2/25/16:3348 (Littlefield).

17 259. Dr. Littlefield testified:

18 I think what is significant about them is that they reflected the views of many
19 hundreds of individuals, including the people who applied for the patent, the
20 witnesses that they brought back with them when they came back a couple years
21 later to, as the phrase went, prove up, as well as the U.S. Federal General Land
22 Office officials that would sanction the approval of the patent.

22 *See* Tr. 3/10/16:3767 (Littlefield).

23 260. Samuel Mahan filed a patent application for lands containing the bed of the
24 Lower Salt on May 1913. *See* Littlefield Lower Salt, at 89 [C001]. His application was
25 protested. *Id.* In a deposition, one witness stated: “The 40 acres is traversed by the Salt
26 River, and when flood waters come, as they frequently do, when it rains, the pits made in
27

1 taking the sand out, are filled up, the sand restored, and as the sand and gravel is only thig of
2 value that the ground furnished . . . it being simply River Bed Wash.” *Id.* at 90. Another
3 witness stated: “We know the land in controversy, and we know that is River Bottom land,
4 and chiefly valuable for the Sand and Gravel upon it, it is not valuable or to any extent useful
5 for farminfg [sic] purposes, its value is in the grade of sand and gravel it furnishes, and it is
6 inexhaustible, because the River floods restore the Sand and Gravel removed.” *Id.*

7 261. George T. Kimbell applied for a patent containing the bed of the Salt in 1912.
8 *See Littlefield Lower Salt*, at 98 [C001]. Kimbell wrote a letter to the U.S. Secretary of the
9 Interior, dated February 20, 1912. *Id.* He wrote:

10 Years ago before Granite Reef [Dam] was put in about miles above here, and
11 the Roosevelt dam was put in, The water, from the Verde River and Salt River
12 above the Roosevelt dam, would, when the rains and snow was great up there,
13 come down the river and spread out over the valley about 4 miles above here
14 and cut chanals thru the valley, thru these two sections I speak of, and the
15 sections closest to the river up to about 40 miles above here. The worst damage
16 the water done to this part of the land was when the water cut in east of Tempe
17 and extended up the river to about 4 miles above here. The water run over all
18 the low places of these sections mentioned and caused the people of Tempe and
19 the people along this land mentioned to put rock and brush levies across the
20 washes that was made by the water that come out of the river on the south side
21 of river.

22 *Id.* at 98-99 (transcribed as originally written).

23 262. Based on the foregoing evidence, the Commission finds that the early
24 homesteaders and federal officials determined that the Salt was not a navigable river.
25 Furthermore, the Commission finds this to be persuasive evidence that the Salt was not
26 susceptible to navigation in its ordinary and natural condition.

27 **State Patents**

263. Dr. Littlefield wrote:

Arizona, like other public land states, obtained acreage by Congressional grants
to support certain public interest objectives prior to and following statehood.
Some of this acreage included lands that touched or overlay the lower Salt

1 River. Grants to Arizona covered a variety of purposes. For example, prior to
2 statehood, Congress reserved for Arizona sections sixteen and thirty-six in each
3 township for the purpose of supporting public schools. At statehood, sections
4 two and thirty-two were added (also for schools), with all four sections totaling
5 8,093,156 acres. In addition to this land, 1,446,000 more acres were given to
6 Arizona instead of the internal improvement, swamp, saline, and agricultural
7 college land grants provided to other states. Moreover, an additional one
8 million acres were granted to Arizona to pay for bonds issued by certain
9 counties, thus bringing the total lands granted to Arizona to over ten and a half
10 million acres.

11 *See Littlefield Declaration, ¶ 41.*

12 264. Dr. Littlefield wrote: “In the years following statehood in 1912, Arizona’s
13 officials confronted the daunting task of issuing state patents disposing of the millions of
14 acres given to the state by Congress. Some of this acreage included lands through which the
15 Salt River flowed.” *See Littlefield Declaration, ¶ 42.*

16 265. Dr. Littlefield wrote:

17 While all state patents through which the Salt River flowed were issued post-
18 statehood, it is significant to note that in granting fifteen such patents, Arizona’s
19 land officials did not reserve any acreage due to the Salt River’s navigability,
20 thus indicating that at the time those patents were awarded, officials of the
21 Arizona State Land Department did not consider the Salt River to be navigable.

22 *See Littlefield Declaration, ¶ 43.*

23 266. In all of the state patents Dr. Littlefield reviewed, no land was withheld because
24 of the potential navigability of the river. *See Tr. 2/25/16:3347 (Littlefield).*

25 267. Based on the foregoing evidence, the Commission finds that the early Arizona
26 and federal officials determined that the Salt was not a navigable river. Furthermore, the
27 Commission finds this to be persuasive evidence that the Salt was not susceptible to
navigation in its ordinary and natural condition.

1 **Boating Attempts**

2 268. Mr. Fuller testified that he considers only two of the boating accounts failures.
3 Tr. 10/20/15:262 (Fuller); Fuller PowerPoint, slide 204.

4 269. Mr. Fuller claimed: “All the boating accounts that we presented occurred
5 within the ordinary flow range. We eliminated accounts that occurred on floods, where the
6 said newspaper account said there was a flood and someone went out in a boat on those,
7 because we do not believe that to be part of the ordinary and natural condition.” See Tr.
8 5/17/16:4502-03 (Fuller); *see also* Tr. 10/22/15:722-23 (Fuller).

9 270. Mr. Fuller testified that he did not include, in his table of historical boating
10 attempts: “1. Boats used in construction of dams (Roosevelt, irrigation dams); 2. Boats used
11 during floods; 3. Boats used during floods. 4. Ferry trips across river [].” See Fuller
12 Rebuttal, at slide 46 [C053–ASLD 385].

13 271. Mr. Fuller testified that none of the historical boating accounts were trips where
14 “time was undue.” See Tr. 10/23/15:782-83 (Fuller).

15 272. Mr. Fuller testified that none of the historical boating accounts were trips with
16 “undue difficulty.” See Tr. 10/23/15:783 (Fuller).

17 273. Mr. Fuller testified that the factors of time, difficulty, and damage to a boat are
18 considerations for a commercial enterprise. See Tr. 10/23/15:784 (Fuller).

19 274. Mr. Fuller testified that he was “advised” on navigability for title by the Arizona
20 Attorney General’s office, which represents the ASLD in these proceedings. See Tr.
21 10/20/15:13-14 (Fuller). This included instructions that “small boats” can prove navigability,
22 that “occasional obstacles” do not defeat navigability, that “modern recreational boating . . .
23 may be considered” in determining navigability. *Id.*

24 275. Regarding his personal definition of a “successful boating account,” Mr. Fuller
25 testified:

26 My definition is, I put in the past if boat and boater made it downstream, then it
27 was a successful trip. I don’t view the fact that somebody has a little difficulty

1 along the way as a failure. As a boater, I can tell you that it's pretty certain that
2 most boaters you'll talk to and hear from, if they flip a canoe, that is not an
3 abject failure, and they don't say, "Oh, my goodness, I flipped my canoe. I'll
4 have to go home now. I'll never boat again." It's part of the experience. It's
5 not the desired part of the experience, but it is something that occasionally
6 happens, not very often. You empty out your boat and you move on. So the
7 vast majority of these accounts are successes. Boat and boater did arrive at the
8 destination.

9 *See* Tr. 10/20/15:261-62 (Fuller); Fuller PowerPoint, slide 204.

10 276. Mr. Fuller reiterated his definition of a successful boating attempt: "The boat
11 and the boater and the materials in it -- well, boat and the boater got to the bottom with the
12 boat or in the boat." *See* Tr. 11/18/15:1422 (Fuller).

13 277. Mr. Fuller admitted that navigation on a river must be for a "meaningful
14 distance" to support a finding of navigability. *See* Tr. 5/19/16:4999-5000 (Fuller).

15 278. Mr. Fuller's standard for a successful boating attempt does not include the time
16 spent. *See* Tr. 5/19/16:5001-02 (Fuller). Mr. Fuller testified, however: "I can see an issue of
17 time potentially affecting whether somebody would call [a boating attempt] a success or not."
18 *See Id.*

19 279. Mr. Fuller's standard for a successful boating attempt does not incorporate cost.
20 *See* Tr. 5/19/16:5001-02 (Fuller).

21 280. Mr. Fuller agreed that recreational boaters might have a different standard for
22 success than "someone who's trying to ship precious cargo or take passengers down a river."
23 *See* Tr. 5/19/16:5048-49 (Fuller). He testified: "They might have an economic thing that
24 they would add to that; but I think that if your cargo and your boat got there, that would be a
25 big part of it." *Id.*

26 281. Other experts came to drastically different conclusions from Mr. Fuller:

27 a. "There were isolated attempts to navigate long stretches of the Salt and
Gila Rivers during periods of high water. The Salt River was dry or had miniscule amounts
of water most of the time, and the Gila was easily forded. The fact such attempts were

1 recorded in the local newspapers shows that such incidences were rare, often dangerous, and
2 thus newsworthy.” See Larry J. Richmond, Ph.D., *A Historical Analysis of Portions of the*
3 *Salt and Gila Rivers, Arizona*, at 32 (February 1987) (“Richmond 1987”) [Lower Salt E112,
4 Part 2, Tab 2].

5 b. Dr. August testified: “My preliminary analysis is that they were outliers;
6 that it was uncommon, and, therefore, they were reported as something odd or entertaining.
7 And that was -- it did not indicate a pattern of the use of the river for commerce.” See Tr.
8 1/27/16:2137 (August).

9 c. Dr. Mussetter testified: “In my view, the accounts that I hear about
10 sound like sort of one-off attempts that, by and large, were not very successful, that had
11 issues. And I’m not at all surprised to hear that, based on the technical data that I reviewed,
12 analyzed to develop my testimony.” See Tr. 1/28/16:2489 (Mussetter); Mussetter
13 Presentation, slides 150-55.

14 d. Dr. Littlefield concluded that “the Salt River was not navigable before or
15 at the time of Arizona’s statehood in 1912.” See Littlefield Declaration, ¶ 16. Dr. Little field
16 wrote:

17 Despite the presence in the historical record of some boats and ferries on the
18 Salt River, when considered in the context of literally thousands of historical
19 documents demonstrating the Salt’s non-navigability, the few boating instances
20 have to be seen as outliers and as exceptions rather than the rule. This is
21 particularly true when considered in light of the fact that many of these boating
22 events ended in failure with some individuals injured or killed and with
23 watercraft being damaged or destroyed. Moreover, the lack of a consistent
24 pattern of regular and reliable boating illustrates that the overwhelming majority
25 of historical parties did not consider the Salt River to be navigable – individuals
26 who were ‘on the scene’ and were not reconstructing history from a presentist
27 point of view.

24 *Id.* The boating attempts Mr. Fuller described in his testimony range in dates from May 1873
25 to June 1919, and include approximately thirty accounts. *Id.* Dr. Littlefield testified: “[I]f
26 the Salt River had been reliable for transportation, I would have expected to have seen many,
27

1 many more newspaper articles about it, including advertisements for carrying goods on the
2 river, frequency of departures, which you see all the time in the Yuma newspapers. And so
3 the fact that there are, on average, less than one article per year underscores to me how
4 unusual these boating attempts or events were.” See Tr. 3/10/16:3600-01 (Littlefield).

5 e. Dr. Newell examined “the recorded instances of attempted historic vessel
6 use on the Salt River with respect to how such use indicates the viability of the river as a
7 reliable route for commerce and transportation.” See Newell, at 3 [C044-SRP5]. He
8 concluded: “[T]here is . . . a preponderance of evidence to the contrary. It is concluded that
9 the minimal use of trade vessels that did occur shows a history of failed experiments. Also,
10 that there is no correlation between the uses of specialized craft for exploration, and of later
11 craft for recreation, to the use of the Salt River as a viable route for the commercial
12 transportation of products and people at any time in its history.” *Id.*

13 282. Mr. Fuller testified: “[I]nstances are a clue that help us with the susceptibility.
14 If all of the instances of people attempting to boat the river ended in failure or a river in
15 failure, I think that would inform on the susceptibility analysis.” See Tr. 5/19/16:5002-03
16 (Fuller).

17 **Historical Newspapers**

18 283. Dr. Littlefield wrote:

19 But newspapers are not only important because they related events in the Salt
20 River area and contained descriptions of that stream. They are also vital to
21 understanding the Salt River’s navigability or non-navigability due to the role
22 newspapers played in being local community boosters. With communities such
23 as Phoenix relatively isolated in the period before statehood – at least more
24 isolated than today – newspapers played key roles in attracting settlers and
25 businesses by detailing regional attributes available to potential newcomers.
26 Thus, the local press emphasized the fertility of the soil, the types of existing
27 businesses, the accessibility of schools, the numbers and types of houses of
28 worship, and myriad other benefits of the area.

26 See Littlefield Declaration, ¶ 52.

1 284. Dr. Littlefield wrote:

2 Importantly, the press near the Salt River also stressed the availability of
3 transportation such as roads and railroads for carrying crops to market or
4 bringing in supplies from other areas. It is significant to note that while much
5 was made in the local newspapers regarding roads and railroads, there was little
6 discussion of using the Salt River for boating purposes nor were there any
7 reports of protests by boating interests to the construction of diversion dams or
8 Roosevelt Dam. There were a few mentions of local parties attempting to boat
9 on the Salt River, but these articles emphasized the novelty of those events, not
10 the reliability of regular boating on the Salt River.

11 *See Littlefield Declaration, ¶ 53.*

12 285. Dr. Littlefield wrote:

13 Newspapers and additional historical photographs also support the conclusion
14 that the Salt was not navigable before or at statehood. While there were stories
15 in the Arizona press about boating on the river, those articles emphasized how
16 unusual such activities were, not how regularly they happened. Moreover, the
17 press stressed that roads and railroads carried commerce in the Salt River
18 region, not the stream itself. And, of course, the newspapers took note of the
19 tremendously destructive Salt River floods and how those altered the channel
20 and surrounding landscape. Historical photos back up the press's observations.

21 *See Littlefield Declaration, ¶ 66.*

22 286. Regarding the phenomenon of “boosterism,” Dr. Littlefield testified:

23 One has to project themselves back in time to a day when there was no radio
24 and no television. The only source of information for people who were
25 interested in current events or anything else at that time were historical
26 newspapers. So historical newspapers were widely read by many, many people,
27 perhaps more so than today. But the local press, especially in the American
28 West, really wanted to emphasize why people should move to a particular area,
29 bring their businesses, bring their families. And so the newspapers were
30 historically booster newspapers, and I use the term essentially to mean
31 promoting the community. And in that context the newspapers routinely would
32 report on anything that they thought would be a useful attribute for someone
33 considering moving to a particular community. . . . So newspapers would
34 typically report on, for example, the numbers and types of religious institutions
35 that there were in a particular area, the types of businesses that there were in a
36 particular area, access to transportation, railroads, roads, navigable waterways,

1 such as we would see a lot of that in the Yuma newspapers, but not so much in
2 the Salt River newspapers.

3 *See* Tr. 3/10/16:3568 (Littlefield); Tr. 3/10/16:3568 (Littlefield).

4 287. Dr. Littlefield did not see any boosterism in Arizona newspapers bragging about
5 the potential use of the Salt as a means of regular transportation of goods or services. *See* Tr.
6 3/10/16:3573-74 (Littlefield). In contrast, however, “the Yuma papers routinely talked about
7 boat traffic on the Colorado River, and there just was nothing similar in the Phoenix area
8 newspapers.” *Id.* If the Salt had been navigable, newspapers would have talked about it. *Id.*

9 288. Dr. Newell wrote:

10 Newspapers over the historic period will show advertisements for shipping
11 schedules, vessel arrival and departure times, factoring services, warehousing
12 services, cartage and stevedoring. The news sections of the press will also show
13 stories related to the commercial activity of the river. These typically range
14 from arrival and departure of prominent individuals, arrivals of new machinery,
15 new supplies, military and Native Indian activity, new vessel arrivals, vessel
disasters, accidents etc. There is an almost complete absence of these trade and
transportation indicators in the cartographic and archival records of the Salt
River and the city of Phoenix.

16 *See* Newell, at 23-24 [C044-SRP5]

17 289. Dr. Newell wrote:

18 Every community seeking to establish itself in the southwest over time actively
19 promoted itself as a center of good living, commerce, trade and industry. This
20 is the function of the modern chamber of commerce in every city in the US
21 today. During the nineteenth century popular and common ‘promotion’
22 techniques were “aerial maps” of cities. The maps were drawn by local artists,
23 and featured a street layout and, significantly, vignettes of features considered
24 vital to the promotion of the city. In 1885, artist C. J. Dyer produced such a
25 map [] of Phoenix. It shows various commercial enterprises in the city, wagon
trains and parts of the canal system. None of the canal views show locks
through which vessels could travel. None of the vignettes promote the Salt
River as a trade and transportation route. The text on the map also makes no
mention of such routes.

26 *See* Newell, at 23-24 [C044-SRP5].

1 290. Dr. Newell testified:

2 [*I*]n a city by a river where you have active pre-commercial trade and
3 transportation, you have, over a period of time, a huge volume of
4 advertisements that do everything from announce schedules of arrivals and
5 departures of vessels, the arrival of merchandise that is then for sale in stores,
6 the services of factors that sell everything from fur to cotton to whiskey coming
7 back upriver. This is a huge amount of evidence that is indicative of a city that
8 has an active river for trade and transportation. There is a total absence, a total
9 absence, of any of that kind of information in the newspapers of the era around
10 the 1900s. Even more importantly, the total absence of any archaeological
11 evidence of navigation, of boat use, by the Hohokam is very significant.

12 *See* Tr. 3/30/16:4248 (Newell); *id.* at 4271-72.

13 291. Dr. Newell testified: “Had there been commercial activity on the Salt, it would
14 have generated a wealth of additional data beyond newspapers; personal letters, personal
15 contracts, business contracts, advertisements in newspapers that I’ve referred to before.
16 There’s a huge amount of data that is generated, that is both public and private, when
17 commercial boating activity occurs. As I mentioned, I found no such evidence of that at all
18 with respect to the Salt.” *See* Tr. 3/31/16:4365 (Newell). Dr. Newell testified: “The fact is,
19 I’ve reviewed 34 accounts. None of them represent repetitive commercial trade and
20 transportation on the river. Each one of them appear to be an experiment or an exploit that
21 failed. None of them met my criteria for trade and transportation.” *Id.* at 4375.

22 292. Dr. August testified:

23 There’s a wonderful book published by the Arizona Historical Society Press
24 called *Those Old Yellow Dog Days: Frontier Journalism in Arizona, 1859 to*
25 *1912*. And Professor Lyon does a nice job in assessing the role that journalism
26 played in territorial Arizona. And I wouldn’t say he is cynical, but I think he
27 advises and concludes that we should read those materials with a healthy
28 skepticism. And oftentimes newspaper editors had personal vendettas. They
29 represented political etiologies. They were boosters. They wanted people to
30 come to their communities. And often, as I looked at some of these materials, if
31 the Salt River were navigable, they would have certainly been touting its
32 navigability.

1 *See* Tr. 1/26/16:1877-78 (August). Dr. August testified: “[N]ewspapers are to be viewed
2 critically and analytically in terms of what they represent.” *Id.* at 1878.

3 293. Boosterism was an important part of early Arizona. *See* Tr. 1/27/16:2208
4 (August).

5 294. Richard C. McCormick (the editor of the Prescott Miner) was known for
6 boosterism, as well as other editors. *See* Tr. 1/27/16:2206-07 (August).

7 295. Newspaper editors in the 1880s “wanted to attract readers. They were always
8 very chancy and iffy fiscal propositions, and so the more eyeballs you got and the more you
9 sold, the better.” *See* Tr. 1/26/16:1984 (August).

10 296. Regarding the historical boating attempts detailed in newspaper articles, Dr.
11 August testified:

12 [T]he references in the newspaper accounts were episodic and sometimes
13 incorrect. I read one account, for example, and I think it’s just prior to 1890,
14 where some kids stole a guy’s boat and sailed down the river a ways, and then
15 the article ended saying they got -- they somehow were -- didn’t get it all the
16 way to Tucson. Well, and I said, well, that river doesn’t go to Tucson. And
those kinds of issues. That’s why I think these 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.

17 *See* Tr. 1/26/16:2009 (August).

18 297. When asked if he thinks some of the details in the newspaper articles describing
19 the boating attempts have details that are “likely incorrect or exaggerated,” Dr. Littlefield
20 responded “[a]bsolutely.” *See* Tr. 3/10/16:3602 (Littlefield).

21 298. Dr. August testified that, in this instance, he considers the primary source
22 material and secondary source material more reliable than the newspaper boating accounts.
23 *See* Tr. 1/26/16:1879 (August).

24 299. Mr. Fuller testified that it “can be” a problem that a newspaper account of
25 boating is second hand. *See* Tr. 10/22/15:724 (Fuller).

26
27

1 300. Mr. Fuller conceded that a number of the newspaper accounts do not have an
2 attributed author, so it is impossible to know how the information was collected. *See Tr.*
3 *10/22/15:724-25 (Fuller).*

4 301. Dr. Littlefield testified:

5 The closer chronologically in time that a particular event is covered by a
6 newspaper, the general supposition is, is that it's probably going to make the
7 article more reliable; but, again, as I said earlier in my testimony, you would
8 need to take into consideration looking at multiple other historical documents
9 even to test that reliability. . . . And so you need to corroborate them very
carefully. But, generally speaking, the closer in time that the article is to when
the event occurred, the probability goes up that the article is most likely reliable.

10 *See Tr. 3/10/16:3598-99 (Littlefield).*

11 302. The greater the geographic distance between where a newspaper is published
12 and the event described, the less reliable the newspaper article tends to be. *See Tr.*
13 *3/10/16:3600 (Littlefield).*

14 **Five Tons of Wheat**

15 303. The first boating attempt on Mr. Fuller's list (Fuller PowerPoint, slide 364
16 [C030-ASLD 364]), he entitled "5 Tons of Wheat." *See Tr. 3/10/16:3602 (Littlefield);*
17 *Compilation of Boating Accounts, at 1 (2015) [C048] ("Compilation").* Mr. Fuller cites the
18 *Weekly Arizona Miner* from May 3, 1873 for this account. *See Tr. 3/10/16:3603-07*
19 *(Littlefield); Compilation, Tab 1.*

20 a. The entire account consists of one sentence that is six lines in one
21 paragraph. *Id.*

22 b. The *Weekly Arizona Miner* was based in Prescott. *Id.*

23 c. The heading at the top of the column indicates that the article was based
24 on correspondence with someone in Maricopa County. *Id.*

1 d. Dr. Littlefield testified: “[I]t would have been extremely rare for them to
2 have fact-checked it. They would just take this material from Maricopa County and print it
3 verbatim.” *Id.*

4 e. Because it was correspondence, Dr. Littlefield testified the actual trip
5 occurred “certainly sometime in April,” rather than the May as Mr. Fuller stated. *Id.*

6 f. Salt River flows are typically higher in April than they are in May. *Id.*

7 g. Dr. Littlefield testified:

8 I wanted to comment that that six-line, one-sentence description is a very
9 sweeping statement, and it’s essentially wishful thinking. It’s typical of the
10 boosterism that I’ve commented on before. It doesn’t necessarily mean that the
11 river was completely navigable. It just means that the newspaper editor, or
12 whoever wrote the letter, was hoping that this might be an indication that it
13 might be navigable. . . . It was wishful thinking and something that the
14 newspaper would want to brag about if it potentially became true.

13 *Id.*

14 304. “During his boyhood in Connecticut he saw the potential of using flatboats to
15 haul goods. Before the Hayden Mill was already to grind wheat, a flatboat loaded with five
16 tons of grain at Hayden’s Ferry was floated down the Salt to the point where the Swilling
17 Canal took off from the north bank of the river, and then was poled along that canal for
18 delivery to Helling’s Mill at the present state asylum. It was a unique effort, possibly one of
19 the few times when canals in Arizona were used to transport farm produce.” *See* Bert M.
20 Fireman, *Charles Trumbull Hayden*, *The Smoke Signal* (1969), at 202-04 [C044-SRP3].

21 305. Mr. Fuller testified:

22 The earliest account we have is from 1873. That’s in Segment 6. And it’s a
23 short article that says the Salt River’s navigable for small craft. Two men took
24 five tons of wheat in a flat boat from Hayden’s Ferry to Swilling’s canal. So
25 they boated a short segment of the Salt River which, according to the maps at
26 the time, consisted of one of those braids or split channels, if you will.

26 *See* Tr. 10/20/15:199-200 (Fuller); Fuller PowerPoint, slide 158.

1 306. Mr. Fuller testified that five tons of wheat would require a flat boat that would
2 be ten feet long by five feet wide and four feet high. *See* Tr. 11/18/15:1316 (Fuller).

3 307. Mr. Gookin measured the length of the trip as two miles, which is too short of a
4 distance to qualify as proof as navigability. *See* Tr. 11/19/15:1479 (Gookin). He also
5 testified: “[W]e have no idea what the flows was on that date. It could have been during a
6 flood. It could have been on the worst day of all time. We just don’t know. So it doesn’t tell
7 us whether or not the flow was ordinary at the time it occurred.” *See* Tr. 11/19/15:1479
8 (Gookin).

9 308. Dr. Newell testified: “For example, the 5 tons of wheat; 2 miles, 5 tons, in a
10 boat capable of carrying more than that. It didn’t bring flour back from the mill. It went in
11 one direction. It was 2 miles out of 200. It was never repeated. Clearly that was a failed
12 experiment. . . . [T]he actual account shows that it was an experiment to determine if
13 repetitive trade and travel on the river was possible. It was never repeated. Clearly it was a
14 failure.” *See* Tr. 3/31/16:4320-21 (Newell). He also testified: “Specifically, that it was an
15 incredibly short distance, that it was a very light load for a vessel that could have carried a
16 great deal more, and specifically that no flour was brought back. So it wasn’t a commercial
17 trip in order to accomplish processing of a product and to bring it back upriver. In every
18 respect it was a failure.” *Id.* at 4371.

19 309. On rebuttal, Mr. Fuller agreed that the account occurred in April, not May. *See*
20 Fuller Rebuttal Presentation, slide 5 [C053–ASLD 385].

21 310. Dr. Newell wrote:

22 The historical record shows that there were attempts to travel on sections of the
23 river, and sometimes the entire river. These attempts utilized small craft built
24 specifically for the purpose of white water travel. The transport of the
25 Vandermark and Kilgore wheat cargo is one instance of an attempt to use a flat
26 for the commercial transportation of a bulk cargo – albeit for a distance of less
27 than four miles. Hayden experimented with floating logs down the Salt and
even made a ‘canoe’ from a Ponderosa pine log - it was destroyed by boulders

1 in the river []. The logs could not be floated on the river and Hayden
2 abandoned the effort as impractical.

3 *See* Newell, at 25 [C044-SRP5] (citations omitted).

4 311. Mr. Williams testified that he is surprised that a boat carrying a load of 10,000
5 lbs navigated a portion of the Salt: “It’s just 10,000 pounds of wheat is -- it’s a big load. I’m
6 surprised someone took that down the Salt.” *See* Tr. 10/21/15:380 (Williams).

7 312. Hellings & Company was the *Arizona Daily Miner’s* largest advertiser, was the
8 *Miner’s* largest advertiser and the *Miner* gave Hellings free publicity. [C058]000. This trip
9 was not a meaningful length, was replicated and, based upon the total amount of flour milled
10 by Hellings in 1873, the amount transported would represent .003% of the flour made by the
11 mill in 1873. [C058]

12 313. Use of the Salt River for transporting wheat was not commercially viable at or
13 prior to Statehood in Arizona.

14 **Hayden Log Float**

15 314. The next boating attempt on Mr. Fuller’s list is entitled “Hayden.” *See* Tr.
16 3/10/16:3609 (Littlefield); Compilation, at 1 [C048]. Mr. Fuller cites three articles for this
17 account: (1) *The Arizona Citizen* dated June 14, 1873; (2) *The Arizona Weekly Miner* dated
18 June 21, 1873; and (3) *The Arizona Weekly Miner* dated June 28, 1873. *See* Tr. 3/10/16:3609-
19 13 (Littlefield); Compilation, at Tab 2 [C048].

20 315. With regard to the first article, *The Arizona Citizen* dated June 14, 1873:

21 a. The Hayden log float trip was a “reconnaissance trip” rather than an
22 actual commercial log float. *See* Tr. 3/10/16:3609-14; Compilation, at Tab 2 [C048].
23 Specifically, the article states that the purpose was “examining the country and the river with
24 a view of floating saw logs down to his ferry.” *Id.*

1 b. The page of the newspaper with the article on it includes a schedule for
2 freighting between San Francisco and Yuma on the Colorado. *Id.* Dr. Littlefield testified that
3 this was a normal occurrence for navigable rivers, unlike the Salt. *Id.*

4 c. The article states that Hayden thought that floating logs on the Salt was a
5 feasible endeavor; Dr. Littlefield believes that particular line was boosterism. *Id.*

6 d. Even Mr. Fuller believes that this trip was a failure. *Id.*

7 e. Given that the article was published on June 14, 1873, Hayden must have
8 returned to Tucson sometime prior to that date. *Id.*

9 316. With regard to the second article, *The Arizona Weekly Miner* dated June 21,
10 1873:

11 a. *Arizona Weekly Miner* was a Prescott paper. *See* Tr. 3/10/16:3614-18;
12 Compilation, at Tab 2 [C048]. The article was published as correspondence from the Salt
13 River Valley. *Id.* Dr. Littlefield testified that it was “[h]ighly unlikely” that the editor of the
14 newspaper would have fact checked the correspondence. *Id.*

15 b. Charles Hayden did not stay with the party to float the logs down the
16 river, instead he returned home to Tucson (where he lived at the time), along with a man
17 named S.D. Sugert. *Id.* Sugert provided the details of the story to the correspondent. *Id.*

18 c. Mr. Fuller presented the attempt as occurring in June; however, this is
19 when the article was published. *Id.* Before the article could be published, Hayden and Sugert
20 would have had to return over land through Camp Apache, San Carlos, and Camp Grant; they
21 would have had to have provided details to the correspondent; and the mail would have had to
22 arrive in Prescott. *Id.* There is no way of knowing how long that process would have taken.
23 *Id.*

24 d. The newspaper page this article appears on, once again, has an
25 advertisement for moving goods from the ocean up the Colorado. *Id.*

1 e. Dr. Littlefield opined that Sugert, at the time he provided the
2 correspondent with the details of this trip, probably had not heard back from the party that
3 actually drove the logs down the river and, thus, was maybe still optimistic. *Id.*

4 317. With regard to the third article, *The Arizona Weekly Miner* dated June 28, 1873:

5 a. This article states that the party that actually attempted to float the logs
6 down the river had returned and “pronounced the scheme a failure.” *See* Tr. 3/10/16:3618-22;
7 Compilation, at Tab 2 [C048].

8 b. Moreover, it states: “With much toil and difficulty, on account of rapids
9 and boulders in the river, they descended a long way, when, having lost their arms,
10 ammunition and provisions, excepting flour, they arrived at canon so narrow as not to admit
11 the passage of a log and were compelled to abandon their boat and foot it.” *Id.*

12 c. The newspaper page this article appears on also discusses steamers
13 operating on the Colorado. *Id.*

14 318. Mr. Fuller testified: “[S]ix men, and some logs, who made a canoe from a tree
15 and then tried to come down the river. They found that did not work very well, and they
16 ended up abandoning the boat. They had difficulty with rapids and boulders. They lost some
17 gear. And they got to a canyon they described as being too narrow to admit the passage of a
18 log.” *See* Tr. 10/20/15:202 (Fuller); Fuller PowerPoint, slide 159. Mr. Fuller testified that
19 Charles Hayden determined that the attempted log float was a failure. *See* Tr. 10/20/15:202
20 (Fuller); Fuller PowerPoint, slide 159.

21 319. “In July, [Charles] Hayden made a second expedition to the mountains in
22 pursuit of timber. This trip apparently was unsuccessful, too.” *See* Earl Zarbin, “Pioneers
23 tried to float logs down Salt River for sawmill in Valley,” *Arizona Republic* (Dec. 22, 1985)
24 (“Zarbin”) [C02–ASLD 42].
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1 320. Although Mr. Fuller testified that Charles Hayden determined that logs “float
2 best at high water,” the newspaper article actually stated that Hayden determined that logs
3 “could only be floated when the river was in flood.” *See* Tr. 5/19/16:5111-12 (Fuller).

4 321. Mr. Fuller believes the log float occurred in Segment 1 or on either the White or
5 Black River. *See* Tr. 10/20/15:203 (Fuller); Fuller PowerPoint, slide 159. Mr. Fuller did not
6 consult Mr. Gilpin in forming his opinion that the Hayden log float was on Segment 1 or on
7 the White or the Black. *See* Tr. 11/17/15:1118 (Fuller). Mr. Fuller testified that he had
8 recently made this assumption and did not testify to that effect in 2003. *Id.* Mr. Fuller
9 testified that he knows that the Hayden log floating expedition started on the White or the
10 Black with “a reasonable degree of scientific certainty.” *See* Tr. 5/19/16:4920 (Fuller).

11 322. Dr. Newell wrote: “In 1874, a logging expedition led by C.T. Hayden is
12 reported to have built a pine dugout in the Sierra Anchas. According to later reports, boulders
13 on the Salt River destroyed the dugout and the project was deemed a failure.” *See* Newell, at
14 8 [C044-SRP5].

15 323. “Even before the flour mill was in operation at Tempe, Hayden had led a party
16 eastward along the Salt River into the *Sierra Anchas* to put logs and float them down the Salt
17 River to Tempe. He hoped to have the Hayden Ditch at the same time provide water power
18 for the flour mill and a sawmill. High up-river the men cut Ponderosa pine logs. They
19 fashioned one into a canoe, then took to the canyons of the Salt in an attempt to drive the logs
20 down the Salt River Valley. The effort failed, the narrow canyons and boulders of the river
21 jamming and tearing the logs and upsetting the improvised canoe. Ever resourceful, Hayden
22 turned up the Verde, thinking it the next-best stream to provide logs for the needs of central
23 Arizona. When this effort failed also, he salvaged part of the idea, at least, by devising a
24 power take-off at the mill to operate power saws in his carpenter shop.” *See* Bert M. Fireman,
25 *Charles Trumbull Hayden, The Smoke Signal*, at 202 (1969) [C044-SRP3].
26
27

1 324. There is harvestable timber in the Sierra Anches above the Tonto/Salt
2 confluence. *See* Tr. 11/17/15:1125-26 (Fuller). It is actually the place where timber was cut
3 for the construction of Roosevelt Dam. *Id.*

4 325. “A Phoenix newspaper, *The Arizona Gazette*, said, ‘The absence of drift and the
5 general character of the canon [sic] demonstrates most fully that such a project may be
6 successfully undertaken. This . . . will open to the Valley the timber belt of the Sierra
7 Anche.’” *See* Zarbin, at 1 [C02–ASLD 42].

8 326. Charles Hayden attempted to float logs to the Salt River Valley from near
9 Roosevelt, and it did not work. *See* Tr. 1/26/16:1968 (August). This attempt was for personal
10 use for construction purposes. *Id.*

11 327. Dr. August testified that Carl Hayden told the story of his father attempting to
12 float logs “many times” but never mentioned the White or Black rivers. *See* Tr. 1/26/16:1970
13 (August). Carl Hayden was familiar with that region of Arizona. *Id.*

14 328. Charles Trumbull Hayden arrived in the Lower Salt River Valley in 1866 or
15 1867. *See* Tr. 1/26/16:1964 (August).

16 329. Charles Hayden was a transportation and freighting expert for his time. *See* Tr.
17 1/26/16:1965-66 (August). Charles Hayden used Murphy wagons and not the Salt for
18 freighting. *See* Tr. 1/26/16:1967 (August). He was very familiar with the Salt and built
19 Hayden’s Mill at Tempe Butte. *Id.*

20 330. If Charles Hayden had been able to use the Salt as a highway of commerce, he
21 would have. *See* Tr. 1/26/16:1972 (August).

22 331. “Although Hayden declined to serve as Road Commissioner in 1877 [], he was
23 an unwavering advocate for road construction to open new markets to struggling
24 communities.” *See* Archaeological Consulting Services, Ltd., *Hayden Flour Mill:
25 Landscape, Economy, and Community Diversity in Tempe, Arizona*, VOLUME 1:
26
27

1 Introduction, Historical Research and Historic Architecture, at 61 [C018–ASLD 15]
2 (“Archaeological Consulting Services”).

3 332. “[A]lthough Hayden used water transportation to bring goods to ocean ports
4 near Arizona, he did not use the Salt River for transportation. . . . Hayden, who already was
5 in the freighting business, never utilized the Salt River for carrying goods, which would have
6 been much more economically efficient had the Salt River been navigable. He also did not
7 use the Salt River to deliver flour from his mill adjacent to the river to other regions.” *See*
8 Littlefield Declaration, at 17.

9 333. On February 3, 1916, Carl Hayden gave a talk to the House of Representatives
10 in which he described his boyhood experiences and considered the Salt River a nonnavigable
11 stream. *See* Tr. 1/26/16:1984 (August). This was based, in part, on his personal experience.
12 *Id.* at 1986.

13 334. “Through most of the year, the river was seldom more than a foot deep, and
14 could easily be crossed at the fords []. However, spring freshets could last several days, and
15 the current generally ran faster and higher throughout the spring. A few boats were kept near
16 the river in the late 1860s, and John Smith briefly operated a ferry at McDowell Crossing.
17 Hayden established a more permanent ferry at the Tempe Crossing in 1871[]. These ferries
18 were seasonal and could only run during times of high water.” *See* Archaeological
19 Consulting Services, at 65 [C018–ASLD 15].

20 335. Dr. Littlefield testified that 1874, when Charles Hayden began his mill
21 operation, was prior to “a lot of diversion dams existed.” *See* Tr. 3/10/16:3578-79
22 (Littlefield).

23 336. Fort McDowell and Camp Verde are both upstream from Hayden’s Mill on the
24 Salt and Verde Rivers. *See* Tr. 3/10/16:3579 (Littlefield). The Salt River Pima Indians were
25 upstream from Hayden’s Mill on the Salt. *See* Tr. 3/10/16:3579 (Littlefield). “In early
26 territorial days the product of this mill was carried in freight wagons and by pack-trains to
27

1 most of the mining camps and military posts in the Territory and its output was estimated in
2 millions of dollars. Army government contracts running into hundreds of thousands of dollars
3 were filled from this mill and Hayden Flour was known in every town and mining camp in
4 Arizona. The Salt River Pima Indians grew wheat which they brought to the mill by
5 horseback.” See *City of Tempe, Hayden Flour Mill and Silos*, at 17 [C018–ASLD 14].

6 337. There would have been an economic benefit if Carl Hayden had been able to
7 use the Salt to move wheat to his mill and move flour to his customers. See Tr. 3/30/16:4134
8 (Littlefield).

9 **Hamilton, Jordan, and Halesworth**

10 338. The next boating attempt on Mr. Fuller’s list is entitled “Hamilton.” See Tr.
11 3/10/16:3622 (Littlefield); Compilation, at 1 [C048]. Mr. Fuller cites an article from the
12 *Arizona Sentinel* dated January 25, 1879. See Tr. 3/10/16:3622-28 (Littlefield); Compilation,
13 at Tab 3 [C048].

14 a. Dr. Littlefield testified: “This is almost exclusively about the Gila River.
15 In fact, the main title is ‘Phoenix to Yuma By Water,’ but the subheading says ‘The Gila
16 River navigable’ question mark. . . . [I]t only talks about on the Gila, and one could interpret
17 that to mean that they built [a skiff] in Phoenix and then hauled it to the Gila.” *Id.*

18 b. Although the article states that Phoenix citizens should attempt to ship
19 goods to Yuma, Dr. Littlefield testified: “[I]t’s typical of the kind of boosterism or optimistic,
20 wishful thinking that characterized newspapers of this time.” *Id.* This also demonstrates that
21 people were not shipping goods to Yuma by boat at this time. *Id.*

22 c. The newspaper page that contains this article also includes a schedule for
23 trains and boats on the Colorado. *Id.*

24 d. The article states: “By demonstrating that [Phoenix] has water
25 communication with the markets of the world, Phoenix can just make Prescott turn green and
26 bust with envy; by doing this she can oppose a check on the exactions of the ‘monster
27

1 monopoly;’ if her citizens will not stand the extortionate fares (ten cents a mile by rail, twenty
2 by stage) they can navigate the Gila or walk.” *Id.* Regarding this passage, Dr. Littlefield
3 opined: “To me, that’s important because it stresses that water transportation would be far
4 preferable to wagons or railroads from Phoenix, if you could do that, because the prices of the
5 railroad and stages were so high.” *Id.*

6 339. Regarding the *Arizona Sentinel*, January 25, 1879 article describing the
7 Hamilton, Jordan, and Halesworth account, Mr. Fuller testified: “What we do know from this
8 article is – again, not a lot of information in these articles, but we have – they had built a skiff
9 for \$10 and they are intending to go down to Yuma, which they did.” *See* Tr. 10/20/15:207
10 (Fuller); Fuller PowerPoint, slide 161.

11 340. The account does not mention the Salt at all. *See* Tr. 10/22/15:738 (Fuller).

12 341. Mr. Gookin testified that the trip was not commercial, and there was no
13 evidence that anyone ever followed up and started floating anything down to Yuma. *See* Tr.
14 11/19/15:1479-80 (Gookin).

15 **James Stewart**

16 342. The fourth boating attempt on Mr. Fuller’s list is entitled “Stewart.” *See* Tr.
17 3/10/16:3628-29 (Littlefield); Compilation, at 1 [C048]. Mr. Fuller cites an article from the
18 *Arizona Republican* dated October 2, 1920. *See* Tr. 3/10/16:3628-33 (Littlefield);
19 Compilation, at Tab 4 [C048].

20 a. This article appears under the heading “Forty Years Ago Today.” *Id.*
21 Thus, it was written long after the fact. *Id.* Dr. Littlefield testified: “[G]iven that the event
22 happened 40 years before this newspaper article was published, I would immediately want to
23 try and confirm the accuracy of the event with some more contemporaneous papers around
24 the time when the event supposedly occurred.” *Id.*

1 b. The entire relevant text reads: “Supt. James Stewart of the stage
2 company will launch his boat in the Salt river tonight.” *Id.* There is no way of knowing if
3 this trip actually occurred. *Id.*

4 c. Given that Stewart was the superintendent of the stage coach company,
5 Dr. Littlefield testified that is possible the boat was “[t]o take their passengers or goods across
6 the river in case the river was too high to ford.” *Id.*

7 343. Mr. Fuller testified that the October 2, 1920, *Arizona Republican* article was
8 written 40 years after the attempt allegedly occurred and that the article only states: “Will
9 launch his boat on Salt River tonight.” *See* Tr. 10/20/15:208 (Fuller); Fuller PowerPoint,
10 slide 162.

11 344. Mr. Gookin testified: “It’s just a statement of intent, with no statements that it
12 actually happened.” *See* Tr. 11/19/15:1481-82 (Gookin).

13 **Cotton and Bingham**

14 345. The next boating attempt on Mr. Fuller’s list is entitled “Cotton and Bingham.”
15 *See* Tr. 3/10/16:3633 (Littlefield); Compilation, at 1 [C048]. Mr. Fuller cites an article from
16 the *Arizona Gazette* dated February 17, 1881. *See* Tr. 3/10/16:3633-36 (Littlefield);
17 Compilation, at Tab 5 [C048].

18 a. The entire article is a single paragraph of eight lines. *Id.*

19 b. The article is not an account of an actual boating attempt, but of two
20 individuals’ intention to launch a boat. *Id.* We have no way of knowing if the trip ever
21 actually occurred. *Id.*

22 c. The article states that the boat was specially constructed for the potential
23 trip so that it would “draw very little water” and would be “very strong and durable, and able
24 to stand a pretty sever buffering.” *Id.*

25 d. Salt flows are typically higher in February. *Id.*

1 346. Mr. Fuller testified that the article only discusses an intention to launch, not an
2 actual boating trip. *See* Tr. 10/20/15:209 (Fuller); Fuller PowerPoint, slide 163.

3 347. While Mr. Fuller referred to the success of this trip as “unknown,” he
4 previously classified it as a “success” in the Gila River proceedings and in his initial slide
5 show for the Salt River, but changed it to unknown, stating that he did so because, “I hoped to
6 avoid having this conversation with you.” *See* Tr. 10/22/15: 740-743 (Fuller).

7 **Yuma or Bust**

8 348. The next boating attempt on Mr. Fuller’s list is entitled “Yuma or Bust.” *See*
9 Tr. 3/10/16:3636 (Littlefield); Compilation, at 1 [C048]. Mr. Fuller cites two articles from the
10 *Phoenix Gazette*, dated November 30 and December 3, 1881. *See* Tr. 3/10/16:3636-41
11 (Littlefield); Compilation, at Tab 6 [C048].

12 a. The first article from November 30, 1881, is only seven lines long. *Id.*

13 b. The article states that the participants were “all waiding [sic] in mud and
14 water up to their knees, pulling the boat, and apparently as happy(?) as mudturtles.” *Id.* The
15 fact that the participants were wading and pulling the boat rather than actually boating is
16 telling. As a result, Dr. Littlefield does not consider this trip successful. *Id.*

17 c. The second article from December 3, 1881 is another one-paragraph
18 article. *Id.*

19 d. The article states: “We have advices, however, that the boat reached
20 Gila bend and ‘busted.’” *Id.*

21 e. The article also stated that the participants were “enduring great
22 hardships, being compelled to wade in the water the greater portion of the time and push the
23 craft ahead of them.” *Id.*

24 f. Despite these accounts, Mr. Fuller presented this attempt as a “success.”
25 *Id.*

1 349. Mr. Fuller testified: “There’s some dispute in the paper whether they made it to
2 Yuma or they only made it to Gila Bend. There’s no dispute that they left the Salt and entered
3 Gila. There is some discussion of them pushing their boats and being up to their knees in
4 water. And whether that constitutes success or boating, I’ll leave it to other folks.” *See* Tr.
5 10/20/15:210 (Fuller); Fuller PowerPoint, slide 164.

6 350. Mr. Fuller testified there were discrepancies between the different newspaper
7 articles regarding the “Yuma or Bust” boating attempt, specifically with regard to dates. *See*
8 Tr. 10/23/15:758-59 (Fuller).

9 351. Mr. Fuller agreed that the depth of “[k]nee deep flow” would depend on if you
10 are standing on rock or mud and the “Yuma or Bust” article discussed muddy conditions. *See*
11 Tr. 11/17/15:1128 (Fuller); Fuller PowerPoint, slide 164.

12 352. Dr. Newell testified: “They ended up pushing their boat through the mud.
13 That’s not exactly a successful experiment of trade and travel or commerce.” *See* Tr.
14 3/31/16:4321 (Newell).

15 **Willcox and Andrews**

16 353. The next boating attempt on Mr. Fuller’s list is entitled “Willcox and Andrews.”
17 *See* Tr. 3/10/16:3641 (Littlefield); Compilation, at 1 [C048]. Mr. Fuller cites an article from
18 the *Arizona Gazette* dated February 14, 1883. *See* Tr. 3/10/16:3641-44 (Littlefield);
19 Compilation, at Tab 7 [C048].

20 a. This article is only one paragraph long. *Id.*

21 b. We do not know how long the trip was geographically, but it was within
22 the Salt River Valley. *Id.*

23 c. The article states that the trip took eighteen hours. *Id.*

24 d. The article refers to the participants as “jolly mariners.” *Id.* Dr.
25 Littlefield opined: “It’s sarcasm or just sort of trying to highlight the uniqueness of the
26 article.” *Id.*

1 e. The first line of the article states: “The Salt River is a navigable stream
2 and should be included in the river and harbor appropriation bill.” *Id.* Dr. Littlefield testified:
3 “I would take this as sarcasm that sort goes hand in hand with the term ‘jolly mariners.’ It’s
4 just sort of making a little bit of fun of what the article is talking about.” *Id.*

5 f. The Salt River was not included in the river and harbor appropriation
6 bill. *Id.*

7 g. February typically has higher flows on the Salt. *Id.*

8 354. Mr. Fuller testified: “Again, this is February, so it’s during the high flow
9 portion of the river.” *See* Tr. 10/20/15:213 (Fuller); Fuller PowerPoint, slide 165.

10 355. Dr. August testified that the portion of the article stating that the Salt should be
11 “included in the river and harbor appropriation bill” was “tongue-in-cheek.” *See* Tr.
12 1/26/16:1981-82 (August); Compilation, at Tab 7 [C048]. Dr. August does not believe that
13 the request was a “serious consideration” but was “light hearted” and “entertaining.” *See* Tr.
14 1/26/16:1983-84 (August).

15 **Meadows**

16 356. The next boating attempt on Mr. Fuller’s list is entitled “Meadows.” *See* Tr.
17 3/10/16:3645 (Littlefield); Compilation, at 2 [C048]. Mr. Fuller cites an article from the
18 *Arizona Republican* dated October 4, 1909. *See* Tr. 3/10/16:3645-49 (Littlefield);
19 Compilation, at Tab 8 [C048].

20 a. The article is about a former pioneer, Jim Meadows, who had come
21 through town and told of his experiences twenty-seven years prior. *Id.* Dr. Littlefield
22 testified: “[Credibility] depends a lot on what people’s memories were and/or the accuracy of
23 their research in finding this information. So as I indicated at the beginning of our newspaper
24 testimony, the further you get in time or geographic distance from a particular event, the more
25 suspect you need to be about the accuracy of the information.” *Id.*

1 b. The article states that the attempt occurred in 1883, but does not indicate
2 what month it took place in. *Id.*

3 c. The article states that it was the first attempt to navigate the Salt. *Id.*

4 d. The article states that one of the participants was “scared stiff.” *Id.*

5 e. The article states: “In passing through the second box they got hung up
6 on rocks and had to roll more rocks into the water to raise the water high enough to float the
7 boat clear.” *Id.*

8 f. Mr. Fuller presented this boating account as “commercial,” yet nothing
9 in the article states that it was a commercial trip. *Id.*

10 357. Mr. Fuller testified: “He described one boater having been scared at one point
11 and the boat getting stuck on the rocks at one point, and then later they were able to float it off
12 by rolling rocks into the river. In this Meadows’ account, it doesn’t give us the month or the
13 year, so we really can’t guess as to the flow or what season of the year it was.” *See* Tr.
14 10/20/15:215 (Fuller); Fuller PowerPoint, slide 167.

15 358. Mr. Gookin testified: “[T]he real problem with it was that the report isn’t until
16 1909. It’s the memories of an old-timer, and I know what my memory is like at this point in
17 my life, and it has some similarities with the Burch trip. So we’re not sure.” *See* Tr.
18 11/19/15:1469 (Gookin). He also testified:

19 As to the boat getting stuck on the obstruction, it didn’t just float off. They
20 didn’t just wait and the river took it off a little later. They had to go down and
21 modify the river by pushing rocks and boulders into it until they could get the
22 water level backed up high enough to remove it from the rock. Very innovative
23 solution, but it didn’t make it in its ordinary or natural condition. They had to
24 do manmade adjustments to it.

25 *Id.*

26 **Burch**

27 359. The next boating attempt on Mr. Fuller’s list is entitled “Burch.” *See* Tr.
3/10/16:3649 (Littlefield); Compilation, at 2 [C048]. He cites five articles: (1) *Arizona*

1 *Gazette* dated June 3, 1885; (2) *Arizona Gazette* dated June 5, 1885; (3) *Arizona Gazette*
2 dated June 6, 1885; (4) *Arizona Gazette* dated June 8, 1885; and (5) *Arizona Gazette* dated
3 June See Tr. 3/10/16:3649-70 (Littlefield); Compilation, at Tab 9 [C048].

4 a. The first article dated June 3, 1885, is from the *Arizona Gazette*. *Id.*

5 b. The article claims that this was the first time someone attempted to
6 navigate the Salt River Canyon. *Id.*

7 c. The article states: “The rapids with numerous projecting boulders make
8 the trip a hazardous one, but the party have a staunch craft, 18 feet long by five feet wide, and
9 are confident of accomplishing the passage of the canyon without any mishaps.” *Id.*

10 d. This article states that there were five participants. *Id.*

11 e. This article also states that they started “yesterday,” meaning the trip
12 occurred on June 1, 1885. *Id.*

13 f. The second article is from the *Arizona Gazette* dated June 5, 1885. *Id.*

14 g. Contrary to the first article, this article states that there were 4
15 participants. *Id.*

16 h. The article states: “[O]n one occasion they were wrecked, losing
17 provisions, fire arms, etc.” *Id.*

18 i. This article also states that the first article was actually an “excerpt” from
19 the *Arizona Silver Belt*. *Id.* Dr. Littlefield testified: “Again, this is from a Globe paper. So
20 this is one of the problems with historical newspapers. This is a paper quoting a newspaper --
21 or not quoting; relaying information that another newspaper has sent to them. And that may
22 be part of the reason why we’re not seeing a consistency in the number of days involved.” *Id.*

23 j. The article states: “If experience should demonstrate that saw logs can
24 be successfully floated from the timber regions to this portion of the Salt river, then the
25 benefits derived from this exploration cannot be over-estimated.” *Id.* There is no evidence
26 that anyone ever used the Salt to float logs. *Id.*

27

1 k. The third article is from the *Arizona Gazette* dated June 6, 1885. *Id.*

2 l. This article states that the trip took five days. *Id.*

3 m. This article states: “Timber exists in the Four Peak range in large
4 quantities.” *Id.* It also states: “This in itself is an important discovery, for the reason that it
5 will open to this valley the timberbelt of the Sierra Anche, which is undoubtedly the best and
6 most extensive in the area.” *Id.* The Sierra Anchas are near Roosevelt Lake. *Id.*

7 n. The article also states:

8 [T]he voyage . . . was not without its excitement and pleasures as well as
9 dangers. They were exploring a section man never before penetrated. Dashing
10 along in a frail craft in some instances at a rate of twenty miles an hour and the
11 banks of the stream rising above them on either side to a hight [sic] of 1,000
12 feet, is of course sufficiently exciting to satisfy the most adventurous. They
13 expected every minute to strike a waterfall and have their boat dashed to pieces
14 as they feared when they shot the cave. On one occasion their boat upset and
15 much of their supplies were lost. In case of losing their vessel in the canon but
16 one recourse would be left, that of swimming down the stream to a break in one
17 bank or another and that might not be encountered for a distance of 20 miles.

18 *Id.* It also described the trip as a “desperate undertaking.” *Id.*

19 o. This article says the trip took five days. *Id.* Regarding this discrepancy,
20 Dr. Littlefield testified: “[T]hat’s why you need to corroborate any given article, either with
21 multitudes of other articles or with other historical documents, to flesh out what is the most
22 likely date or information involved.” *Id.*

23 p. The fourth article is from the *Arizona Gazette* dated June 8, 1885. *Id.*

24 q. This article tells of an earlier trip through the Salt River Canyon on foot.
25 *Id.*

26 r. The article states that during that earlier trip, “[t]here was much less
27 water in the stream than at present,” implying that there was relatively more water in the river
at the time of the 1885 boating attempt. *Id.*

1 s. The fifth article from the *Daily Herald* dated June 9, 1885 has nothing to
2 do with the boating attempt. *Id.*

3 360. Mr. Fuller testified:

4 It took either four or five men -- probably four, depending on which account
5 you're looking at. And it describes some hazards that they came across. There
6 was numerous projecting boulders, so there were some boulders that they
7 needed to maneuver around. They also describe the boat was upset once. Not
8 exactly sure what that means. Later accounts or another account describes the
9 boat as being upset but not having tipped over. So this one says they lost some
10 gear, so apparently it got tipped either over or tipped up at an angle and some
11 stuff fell off and they lost it.

12 *See* Tr. 10/20/15: 219-220 (Fuller); Fuller PowerPoint, slide 168.

13 361. Mr. Fuller suggested that the Burch account may be the same as the Meadows
14 account due to some similarities and stated: "I think you can make arguments on either side."
15 *See* Tr. 10/20/15:223-224 (Fuller); Fuller PowerPoint, slide 168; Tr. 11/17/15:1130 (Fuller).

16 362. Mr. Fuller testified:

17 Day three, the way I interpret it is they were on the footprint of Canyon Lake.
18 The river becomes more winding. They describe some occasional large rocks
19 mid-channel, and those would seem, to me, to be similar to the kind of thing
20 that exists in some areas. For instance, a very large rock in a very narrow
21 channel would be Granite Rapid in Segment 2, so we might see something like
22 that. They did describe the current as being rapid. And they describe some
23 cascades and falls. Again, that's a word some people use for rapids. That the
24 boat shot over, bumping rocks occasionally.

25 *See* Tr. 10/20/15:225 (Fuller); Fuller PowerPoint, slide 169.

26 363. Mr. Fuller testified: "Then on day -- continuing on day three and moving on to
27 Slide 170, this is where they describe getting stuck on a mid-channel rock they didn't see.
That's exactly the description of a sleeper. And they swam ashore and spent the night.
Meadows had went downstream to cut some poles and then they used it to pry off the boat."
See Tr. 10/20/15:225 (Fuller); Fuller PowerPoint, slide 170.

1 364. Mr. Fuller agreed that Mr. Burch already had a sawmill on the Salt River when
2 he attempted to float logs and had a reason to float logs down the Salt. *See* Tr. 11/17/15:1130
3 (Fuller).

4 365. Mr. Gookin testified: “I conclude that the trip was unsuccessful, because they
5 upset the boat and lost the gear. They encountered what they called swift and dangerous
6 rapids.” *See* Tr. 11/19/15:1471 (Gookin).

7 **Spaulding**

8 366. The next boating attempt on Mr. Fuller’s list is entitled “Spaulding.” *See* Tr.
9 3/10/16:3670 (Littlefield); Compilation, at 2 [C048]. Mr. Fuller cites an article from the
10 *Phoenix Daily Herald* dated December 12, 1888. *See* Tr. 3/10/16:3670-72 (Littlefield);
11 Compilation, at Tab 10 [C048].

12 a. Major Spaulding’s gun accidentally discharged while carrying his canoe
13 over Mesa dam, and he was killed. *Id.*

14 b. The article does not state where this trip started; it merely states that
15 Major Spaulding was Commandant at Ft. McDowell. *Id.*

16 367. With regard to the Spaulding boating attempt, Mr. Fuller testified that the flows
17 were 2100 cubic-feet per second (“cfs”) in Segment 6 which were not “low.” *See* Tr.
18 10/23/15:764-66 (Fuller).

19 368. Mr. Fuller acknowledged that the only reference to the Salt in the Spaulding
20 account article was that the ferry had previously been used on the Salt. *See* Tr. 10/23/15:764-
21 65 (Fuller).

22 369. Mr. Fuller testified that the length of Spaulding account was “in the
23 neighborhood of 10 miles.” *See* Tr. 11/17/15:1133 (Fuller).

24 370. Mr. Gookin testified that the Spaulding account was over a very short reach and
25 was recreational. *See* Tr. 11/19/15:1484 (Gookin).

1 **Gentry and Cox**

2 371. The next boating attempt on Mr. Fuller’s list is entitled “Gentry and Cox.” *See*
3 Tr. 3/10/16:3703 (Littlefield); Compilation, at 3 [C048]. Mr. Fuller cites an article from the
4 *Tombstone Daily Prospector* dated January 24, 1889. *See* Tr. 3/10/16:3703-06 (Littlefield);
5 Compilation, at Tab 17 [C048].

6 a. This “boating account” was an attempt to move a “large ferry boat which
7 had been used for years on the Salt River at the Maricopa crossing . . . with the purpose of
8 taking her to the Gila Bend crossing.” *Id.*

9 b. The boat broke apart on the Gila River because “[t]he current of the river
10 being about at the rate of fifteen miles per hour the five men lost control of her and she struck
11 the snag. She was cut in two parts as if she had come across a buzz saw.” *Id.*

12 c. The boat was valued at \$1,000. *Id.*

13 d. The Maricopa Crossing was approximately where Seventh Avenue in
14 Phoenix intersects the Salt River today. *Id.* The distance from there to the Gila is “just a few
15 miles.” *Id.*

16 372. Mr. Fuller testified:

17 It says that they intended to go down to Gila Bend in this boat, and that some 40
18 miles downstream of Phoenix, which would be about 20-plus miles away from
19 downstream of the confluence of Gila -- so they were clearly on Gila -- the boat
20 hit a snag in high current and broke apart. So they made the very short trip on
21 the Salt that they have. They got on the Gila, which may well have been in
higher flow conditions, maybe a small flood, and got into conditions that were
not suitable for the boat, got caught up and the boat broke apart.

22 *See* Tr. 10/20/15:229 (Fuller); Fuller PowerPoint, slide 174.

23 373. Mr. Gookin testified that the Gentry and Cox account occurred during “very
24 high flows.” *See* Tr. 11/19/15:1485-86 (Gookin).

1 **Sykes and Mclean**

2 374. The next boating attempt on Mr. Fuller’s list is entitled “Sykes.” *See* Tr.
3 3/10/16:3672 (Littlefield); Compilation, at 2 [C048]. Mr. Fuller cites an article from the
4 *Coconino Sun* dated September 7, 1945. *See* Tr. 3/10/16:3672-78 (Littlefield); Compilation,
5 at Tab 11 [C048].

6 a. The title of this article is: “Story of Boating Trip across Desert Told by
7 Local Oldtimer.” *Id.* The “Oldtimer,” Stanley Sykes, did not know exactly what year the trip
8 occurred, but the article quotes him: “I think it was about 52 years ago.” *Id.* He also stated
9 that the trip occurred “[a]bout Christmas time or maybe in early January. *Id.*

10 b. The two men built a boat “somewhere near Phoenix” and then, according
11 to Sykes: “We got a man with a wagon and team to haul our boat, bedding and grub to the
12 nearest point on the river that would float the boat. As I remember it, he left us at a place
13 where the water was about 15 or 20 feet wide and a foot or so deep.” *Id.*

14 c. The article states:

15 Fortunately[,] the boat was of light construction, which we found later was
16 what saved the situation. For after eating our breakfast and loading the duffle
17 into what might have well been christened “The Pride of the Salt River” and
18 shoving off, the river went dry on us. After riding for half a mile we were dry
19 —in fact dusty—sand. Nothing but sand of the most parched variety down the
20 river bed as far as we could see. We camped and prospected ahead, finally
21 locating a trickle of water about a mile farther down so we carried the boat and
22 things to the water. There wasn’t enough water to float the boat with us in it,
23 but by walking along each side and helping the craft over the shallower places
24 we managed to make some progress.

22 *Id.*

23 d. In retrospect, Sykes writes:

24 Perhaps to anyone else the obvious thing to have done would be to make an
25 inspection of the wetness of the river at Phoenix before starting to build the
26 boat. I admit that idea has some logic behind it. But if Charlie and I had done
27 that perhaps we wouldn’t have built the boat and lost out on a very fine trip.

1 And just how many others have made the trip from Phoenix to Yuma by boat in
2 the nineteenth century or for that matter the Twentieth—I wouldn't know.

3 *Id.*

4 e. Mr. Fuller presented this as a “successful” boating attempt. *Id.* Dr.
5 Littlefield disagrees. *Id.*

6 375. Mr. Fuller testified:

7 And the flow was depleted to some degree, and they ended up walking beside
8 their loaded boat, and they must have had it very heavily loaded indeed. In fact,
9 if the water was 1 to 2 feet deep and 20 feet wide, it's hard to imagine why a
10 canvas boat could be drawing any more than a foot. So perhaps they did not
11 pick the best design. We don't know much more about that.

12 *See* Tr. 10/20/15:230 (Fuller); Fuller PowerPoint, slide 175.

13 376. Mr. Fuller testified:

14 We also don't know where they started. We do know that they took several
15 days to reach the Gila, which kind of suggests that they started upstream of
16 Phoenix. Mona McCrosky, in her report that's been submitted to this
17 commission previously, said they started at Gila confluence. I don't know the
18 basis for that, but that's how she described it. We also don't know what month
19 or days or years or what flow rates they had or design of their boats. We do
20 know they made it to their destination, and they had to do a fair bit of dragging,
21 at least in some parts. And they do describe that diversion dams had dried up
22 the river. They had one instance on either the Salt or the Gila where they had
23 flipped trying to run a dam. We know a little bit about it but not a lot.

24 *See* Tr. 10/20/15:230-31 (Fuller); Fuller PowerPoint, slide 175.

25 377. Mr. Fuller testified: “[S]omeone who prepared the report previously, Mona
26 McCaskey, I think her name was, and she suggested that they started at the Gila confluence,
27 which is what I mentioned. But the description describes *dry reaches until they reached the*
Gila confluence, so -- but I'm not sure how to jibe those two facts.” *See* Tr. 10/23/15:766-67
(Fuller) (emphasis added). Mr. Fuller described this as a successful boating attempt on
Segment 6. *Id.*

1 378. Mr. Gookin testified:

2 This report is 50 years after the fact, and it allegedly occurred in 1890. But,
3 again, when you're reminiscing 50 years later, it's hard to be very sure about
4 anything. There's very many unknowns from the article. We think it was in the
5 winter. We don't know where he put in or where he took out. We do know that
6 it was recreational and that he had to carry or drag the boat for various reaches,
7 and the boat capsized.

8 *See* Tr. 11/19/15:1485-87 (Gookin).

9 **Day Brothers**

10 379. The next boating attempts on Mr. Fuller's list is entitled "JK Day." *See* Tr.
11 3/10/16:3678 (Littlefield); Compilation, at 2 [C048]. Mr. Fuller cites an article from the
12 *Arizona Sentinel* dated April 4, 1893. *See* Tr. 3/10/16:3678-83 (Littlefield); Compilation, at
13 Tabs 12 & 13 [C048].

14 a. Mr. Fuller bases five of his successful boating accounts on a single two-
15 paragraph article. *Id.* This is based on the line "The distance traveled by the Messrs. Day by
16 the river is a trip over 800 miles, and is the fifth one made by J.K. Day." *Id.* The article states
17 that the trip was "over 800 miles," even though they allegedly started at Camp Verde and
18 arrived in Yuma. *Id.* This distance is inaccurate. *Id.*

19 b. All the article says about the Days' boat was that it was "small." *Id.*

20 c. The article provides no detail regarding the conditions or difficulties of
21 the sixth-month trip. *Id.*

22 d. Dr. Littlefield testified: "[O]ne of the questions this article raised in my
23 mind is why did it take them so long. You know, even if they were trapping, it struck me as a
24 rather long period of time to come from the Verde all the way down to Yuma." *Id.*

25 380. Mr. Fuller uses a single article stating that the Day Brothers' trip was the "fifth"
26 trip to account for five "successful" boating trips. *See* Tr. 10/20/15:231-32 (Fuller); Fuller
27 PowerPoint, slide 176.

 381. Mr. Fuller testified:

1 We know some information. We know that in 1892, they arrived in Yuma and
2 said they had boated down from the Verde Valley area via the Salt and the Gila.
3 Their boat, all we know is that it's a small boat. And that they started their trip
4 in September. They were trapping, so it involves a fair amount of stopping and
5 catching of beavers. They don't just jump into your boat. It involves some
6 stopping to skin and stake the furs. They also don't jump in and strip off their
7 furs. It also mentions this is their fifth trip, and that they plan to go again next
8 November.

9 *See* Tr. 10/20/15:231-32 (Fuller); Fuller PowerPoint, slide 176.

10 382. Mr. Gookin testified: "[T]he trip took six months, and there's no indication
11 where they boated what in that six-month period." *See* Tr. 11/19/15:1488 (Gookin).

12 383. Mr. Gookin testified that the Day brothers probably dragged their boat. *See* Tr.
13 2/26/16:3488-89 (Gookin).

14 384. Dr. Newell testified: "They did say they planned to come back the following
15 September. There's no evidence they ever did. It was a one-way trip. Doesn't smack of
16 trade and transportation, to me." *See* Tr. 3/30/16:4268-69 (Newell). With regard to the claim
17 that they made a profit, Dr. Newell testified:

18 I very much doubt if they were making a lot of money. 1850, beaver pelts were
19 regulated because the beaver population was almost decimated. As a result of
20 that, the fashion industry switched from beaver to silk. So beaver pelts weren't
21 anywhere near as valuable as they were in, say, 1700, when they pulled 20
22 shillings a pelt. So I doubt if those guys were really making a really good
23 living.

24 *Id.*; Tr. 3/30/16:4270 (Newell).

25 385. Mr. Fuller has no evidence either of the Day brothers took more than one trip
26 other than one clause in the single newspaper article. *See* Tr. 5/19/16:4954-55 (Fuller).

27 386. When asked whether any of the trips on the Salt turned into a regular
commercial enterprise on the Salt River, Mr. Fuller initially answered, "we have no evidence
of that." *See* Tr. 10/23/15: 790 (Fuller).

1 **Hudson Reservoir and Irrigation Co.**

2 387. The next boating attempt on Mr. Fuller's list is entitled "Hudson [Reservoir]
3 Co." See Tr. 3/10/16:3683 (Littlefield); Compilation, at 2 [C048]. Mr. Fuller cites an article
4 from the *Arizona Republican* dated June 2, 1893. See Tr. 3/10/16:3683-89 (Littlefield);
5 Compilation, at Tab 14 [C048].

6 a. The article was written based on a "private letter" received by the
7 *Arizona Republican* from W. A. Farish, the chief engineer on the Hudson Reservoir and
8 Irrigation Company's survey. *Id.*

9 b. The letter detailed the "adventures and difficulties attending the passage
10 of the eighteen miles of canyon between the diversion dam and the exit of the river from
11 Tonto Basin." *Id.*

12 c. The article states: "Last Monday afternoon one of the canvas boats
13 employed in the passage was overturned and the occupants were thrown into the water. When
14 the boat was finally recovered two of the ribs were found to be smashed and the boat was
15 nearly rendered unserviceable." *Id.*

16 d. Mr. Fuller presented this boating attempt as "successful." *Id.*

17 e. The article states that the correspondence was received "yesterday,"
18 which would have been June 1, 1883. *Id.* Although Mr. Fuller presented this boating attempt
19 as if it had happened in June 1883, it was almost certainly in May or earlier. *Id.*

20 f. The article is entitled: "Adventurous Passage: The Trials of the
21 Engineering Party." *Id.*

22 388. Mr. Fuller testified:

23 It says they were using canvas boats, and the boats were used in some kind of
24 commercial survey of the riverbed. One of the boats had a problem. It flipped,
25 the people in the boat flew into the river and swam. Two of the ribs of the boat
26 -- if you recall from the boating presentation how those canvas boats were
27 made, they were stretched canvas over ribs -- made the boat nearly
unserviceable. So I read into that it was serviceable, but damaged.

1 See Tr. 10/20/15:234 (Fuller); Fuller PowerPoint, slide 178.

2 389. Mr. Fuller testified that it is not clear on which segment the boating attempt
3 occurred. See Tr. 10/20/15:235 (Fuller); Fuller PowerPoint, slide 178.

4 390. Mr. Fuller agreed that “one of the boats overturned and the occupants were
5 thrown in the water,” that “[t]wo of the ribs were found to be smashed on the boats,” and “the
6 boat was rendered nearly unserviceable.” See Tr. 10/23/15:768-69 (Fuller).

7 391. Mr. Gookin testified: “[T]he occupants ended up in the river and the boat was
8 damaged, almost unserviceable, and it was difficult to find a camping spot. . . . [T]he
9 occupants were thrown into the river is not a good thing; and the boat being severely damaged
10 tends to indicate against success.” See Tr. 11/19/15:1472 (Gookin).

11 **Lieutenant Robinson**

12 392. The next boating attempt on Mr. Fuller’s list is entitled “Robinson.” See Tr.
13 3/10/16:3689 (Littlefield); Compilation, at 3 [C048]. Mr. Fuller cites an article from the
14 *Bisbee Daily Review* dated October 6, 1909. See Tr. 3/10/16:3689-93 (Littlefield);
15 Compilation, at Tab 15 [C048].

16 a. This article was published in Bisbee, which is geographically removed
17 from the Salt. *Id.*

18 b. This article was written sixteen years after the alleged trip. *Id.*

19 c. The only reference to the Salt in the article is a single sentence: “The
20 lieutenant and two companions left Phoenix going down the Salt River by boat to Yuma and
21 to Tiburon via the Colorado.” *Id.*

22 d. The article states that a trip from Bisbee will, in the future, be attempting
23 a trip to Tiburon, but there is nothing to suggest they would navigate the Salt. *Id.* In fact, the
24 article states: “The party will proceed by train to Guayamas.” *Id.*

25 e. The article does not mention what time of year the previous expedition
26 occurred. *Id.*

27

1 393. Mr. Fuller testified: “We don’t know anything about the boat type.” *See* Tr.
2 10/20/15:237 (Fuller); Fuller PowerPoint, slide 178.

3 394. Mr. Gookin testified: “[T]he article appears in the Bisbee Daily Review, of all
4 places, some 16 years later. Also, we don’t know when they floated, what the flows were,
5 what the cargo was, if there was cargo, what the route was or where they started. So it really
6 doesn’t tell us much of anything.” *See* Tr. 11/19/15:1494 (Gookin).

7 395. Lt. Robinson was a known “news fakir” and planted false stories in newspapers,
8 with at least one newspaper reporting that the news of his death was a hoax. [C058]

9 **Adams and Evans**

10 396. The next boating attempt on Mr. Fuller’s list is entitled “Adam and Evans.” *See*
11 Tr. 3/10/16:3694 (Littlefield); Compilation, at 3 [C048]. Mr. Fuller cites three articles: (1)
12 An article from the *Phoenix Herald* dated February 18, 1895; (2) an article from the *Phoenix*
13 *Herald* dated February 25, 1895; and, (3) an article from the *Arizona Sentinel* dated March 9,
14 1895. *See* Tr. 3/10/16:3694-3703 (Littlefield); Compilation, at Tab 16 [C048].

15 a. The first article is from the *Phoenix Daily Herald* dated February 18,
16 1895. *Id.*

17 b. The article details the participants’ trip from Clifton to Sacaton on the
18 Gila. *Id.* According to the article: “There they disembarked and hauled their boat to Phoenix
19 and after laying in provisions, etc., will leave tomorrow on the Salt river to the Gila thence to
20 the Colorado , and by that stream to the Gulf.” *Id.*

21 c. The article does not state where they would put their boat on the Salt. *Id.*
22 Dr. Littlefield testified: “[T]hey could very well have changed their mind and decided to have
23 it hauled back to the Gila and continue on the Gila, without doing any boating on the Salt.”
24 *Id.*

25 d. The second article is from the *Phoenix Daily Herald* dated February 25,
26 1895. *Id.*

1 e. This article states that they passed through the Salt River Valley in
2 February. *Id.* If they had boated the Salt, it was likely during higher flows. *Id.*

3 f. The third article is from the *Arizona Sentinel* dated March 9, 1895. *Id.*

4 g. The only relevant sentence in this article reads: “J.W. Evans and Amos
5 Adams, arrived here last Sunday from Morenci, Ariz., after a two months voyage down the
6 Gila river.” *Id.*

7 397. Mr. Fuller testified:

8 We’ve talked about this account because it’s primarily a Gila River boating trip
9 where they got down to Sacaton and hauled their boat up to Phoenix. It doesn’t
10 say why they wanted to come to Phoenix, whether they were resupplying or
11 visiting or whatever. And the purpose of this trip was travel. Just getting down
12 to Yuma from Clifton. And it just mentions that they boated from Phoenix to
13 Yuma, so the only way to boat from Phoenix to Yuma is to go down the Salt
14 River. So they probably did the latter part and lower part of Segment 6.

13 *See* Tr. 10/20/15:237 (Fuller); Fuller PowerPoint, slide 179.

14 398. Adams & Evans boating attempt occurred between late January and mid
15 February, part of the “high water season.” *See* Fuller PowerPoint, slide 180.

16 399. Only one of the four articles cited in support of the trip mentions the Salt.

17 **Shively**

18 400. The next boating attempt on Mr. Fuller’s list is entitled “Shively.” *See* Tr.
19 3/10/16:3715 (Littlefield); Compilation, at 3 [C048]. Mr. Fuller cites the articles from the
20 *Arizona Republican* dated March 24, 29, and April 3, 1905. *See* Tr. 3/10/16:3715-24
21 (Littlefield); Compilation, at Tab 21 [C048].

22 a. This first article is from the *Arizona Republican* dated March 24, 1905.
23 *Id.*

24 b. Nothing in the article mentions the Salt; only the Gila is mentioned. *Id.*

25 c. The tone of the article lacks seriousness. For instance, the article reads:
26 “But there was launched here yesterday something that may make the eyes bug out for it was
27

1 ostensibly a house boat thought it may be a torpedo boat in disguise or some new manner of
2 war vessel that has been constructed here on the quiet for the Russians with a view of
3 attacking Togo's fleet in the rear while he is busy heading off Rojestvensky's Baltic Squadron
4 as it enters Chinese waters. *Id.*

5 d. The article also reads: "It will at the same time be a matter of news to
6 Phoenix people to know that this city has a real ship yard and that the product of it is already
7 in evidence." *Id.* Dr. Littlefield testified: "These are the local views, and it shows people
8 were surprised that anyone would try to build a boat for use on the Salt or the Gila." *Id.*

9 e. The article reads: "The master mind of this shipbuilding enterprise is a
10 Mr. Jacob Shively who came here not long ago from Ashland, Oregon. While Phoenix was
11 standing around in open mouthed water, not imagining before that there was so much water in
12 the world. Mr. Shively was engaged on plans to make some use of it." *Id.*

13 f. The boat, in this attempt, was loaded onto a horse-drawn wagon, as the
14 article states: "The boat was finished yesterday morning and the dry dock being some
15 distance from the harbor a two horse wagon was pressed into service to assist in the
16 launching." *Id.* Dr. Littlefield testified that we have no way of knowing where the launch
17 was, whether it be on the Gila or the Salt. *Id.*

18 g. The article concludes: "There are fears in some quarters that the boat
19 may prove to be a submarine before it leaves American waters." *Id.*

20 h. The second article is from the *Arizona Republican* dated March 29, 1905.
21 *Id.*

22 i. Like the first, this article also does not mention the Salt. *Id.*

23 j. This article uses tongue-in-cheek phrases, such as "Phoenix
24 Shipbuilding yards," "marine reporters," "lower river ports," "Arlington Coast," and
25 "Buckeye coast." *Id.*

1 k. The article states: “The captain reported having encountered rough water
2 and for a time the boat was semi-submarine. As a precaution against more billows side
3 boards were put on somewhere along the Buckeye coast.” *Id.* Dr. Littlefield testified: “It
4 sounded like the boat took on a lot of water periodically.” *Id.*

5 l. The third article is from the *Arizona Republican* dated April 3, 1905. *Id.*

6 m. It is entitled “Gila River Navigation.” This article, like the two
7 preceding it, does not mention the Salt. *Id.*

8 n. It purports to be the “Official log of Capt. Jacob Shively’s Recent
9 Expedition.” *Id.*

10 o. The article clearly states that they lost their cargo. *Id.*

11 p. Dr. Littlefield testified that the tone of this article is “tongue-in-cheek”
12 and “it stresses how unusual this type of event was.” *Id.*

13 q. Dr. Littlefield testified that, according to historical photographs, “there
14 was a tremendous amount of water in the river just a few days before the Shively boating
15 account took place, if it happened on the Salt River at all.” *Id.*; Historical Photos, slide 57
16 [C038–D].

17 401. Mr. Fuller testified that the boat took on water and only boated the last part of
18 Segment 6. *See* Tr. 10/20/15:239-40 (Fuller); Fuller PowerPoint, slide 182.

19 402. Mr. Fuller testified:

20 Boy . . . there’s a lot of tongue in cheek here. I interpreted it as they were
21 having some fun. They apparently knew the guy, and they were having a good
22 laugh about his trip down the river. But I did not interpret it as a made-up story
23 that, “Let’s just write a fictional account of this little guy who builds boats and
24 moves on downstream.” So I think there’s some fun in there. I think there’s
25 some truth in there. . . . Well, clearly there’s statements that are just obviously
26 jokes, making fun, calling it semisubmarine, then calling him a captain and the
27 Buckeye coast. There are just kind of fun statements. . . .

26 *See* Tr. 10/23/15:773-74 (Fuller).

1 403. Mr. Gookin testified that the article is “entertaining” and “tongue-in-cheek.”
2 *See* Tr. 11/19/15:1495-96 (Gookin).

3 404. Mr. Gookin testified that the attempt was during high flows. *See* Tr.
4 11/19/15:1495-96 (Gookin); Gookin PowerPoint, slide 86.

5 405. The boating attempt was during a “sustained flood” according to Mr. Fuller.
6 Fuller PowerPoint, slide 185.

7 **Hauling Freight to Roosevelt**

8 406. The next boating attempt on Mr. Fuller’s list is entitled “Roosevelt Freight.”
9 *See* Tr. 3/10/16:3706 (Littlefield); Compilation, at 3 [C048]. Mr. Fuller cites an article from
10 the *Arizona Republican* dated April 30, 1905. *See* Tr. 3/10/16:3706-10 (Littlefield);
11 Compilation, at Tab 18 [C048].

12 a. The first line of the article reads: “The recent rains have put the Salt
13 River in the raging torrent class, although at this time the water is receding.” *Id.*

14 b. The article states: “[A]t the time of the heavy rains and floods, the
15 nearest the Mesa stage could get to Roosevelt was Rotticher’s camp, some four miles down
16 the canyon, the balance of the distance being over trail, and all freight came over via the pack
17 train, or else was hauled up the river in a boat, both modes of transportation of but little
18 comfort to the traveler and expensive.” *Id.*

19 c. There were large floods in April and February of 1905. *Id.*

20 d. The trip, if it actually occurred, was only four miles. *Id.*

21 407. Mr. Fuller testified:

22 The next account on Slide 183 relates to hauling freight up to Roosevelt in
23 Segment 4. Article that was again just recently found, and the segment that’s
24 circled there, said that the road had failed due to some storms and flooding.
25 And the freight came over via pack train or else it was hauled up the river in a
26 boat, both modes of transportation, but of little comfort to the traveler and
27 expensive. So something happened to the transport up to the dam site, and they
were loading material onto pack trains and also onto boats and then hauling the
river -- hauling the boats up the river -- gear up the river in a boat. So this was

1 upstream travel, delivering goods to the Roosevelt. They described it
2 Botticher's Camp to Roosevelt about 4 miles when the road washed out.

3 See Tr. 10/20/15:241 (Fuller); Fuller PowerPoint, slide 183.

4 408. Mr. Fuller testified: "There was a very large flood in 1905. And that flood had
5 velocities that damaged the road itself, and would have probably had greater flow depths and
6 velocities than would have occurred in typical median conditions." See Tr. 10/20/15:242
7 (Fuller); Fuller PowerPoint, slide 183.

8 409. Mr. Fuller testified: "It's not -- it's nobody's Ph.D. dissertation on this. It's just
9 a couple of lines in their article." See Tr. 10/20/15:243 (Fuller); Fuller PowerPoint, slide 183.

10 410. Mr. Fuller testified: "[T]here were some boats that were used in the
11 construction of dams. In my view, those don't really count for boating in the ordinary and
12 natural conditions." See Tr. 10/20/15:258 (Fuller); Fuller PowerPoint, slide 200.

13 411. Mr. Fuller cut off the top of the article on his slide, which states: "The recent
14 rains have put the Salt river in the raging torrent class, although at this time water is
15 receding." See Fuller PowerPoint, slide 183. Even the portion that he put on his slide states
16 that the trip occurred "at the time of the heavy rains and floods." *Id.* Nevertheless, Mr. Fuller
17 extrapolated from this language that the Salt was not in a flood. See Tr. 11/17/15:1135
18 (Fuller).

19 412. Mr. Gookin testified that the length of 4 miles was not a "meaningful distance."
20 See Tr. 11/19/15:1476 (Gookin).

21 **Advertisement**

22 413. The next boating attempt on Mr. Fuller's list is entitled "Advertisement." See
23 Tr. 3/10/16:3710 (Littlefield); Compilation, at 3 [C048]. Mr. Fuller cites an advertisement
24 from the *Arizona Republican* dated May 23, 1905. See Tr. 3/10/16:3710-12 (Littlefield);
25 Compilation, at Tab 19 [C048].

1 a. The entirety of this “boating account” reads: “A PARTY is now forming
2 to make a trip down the river on flat-boat from Phoenix to Yuma—‘first come, first served.’
3 Apply at boat, foot of Seventh street. The chance of a life time for big game—mountain
4 lions, wild cats and other big game; fishing, etc. Leave Wednesday or Thursday.” *Id.*

5 b. There is no way of knowing of this trip ever occurred; the advertisement
6 was prospective, and there is no further evidence. *Id.*

7 c. The advertisement does not even mention the Salt. *Id.*

8 414. Mr. Fuller testified: “It just says they’re planning on leaving on Wednesday or
9 Thursday. And they were advertising for that on Tuesday, which doesn’t leave people a lot of
10 advance warning for a trip, but so be it. That’s the information we have. We don’t know
11 whether they launched, we don’t know whether they got there.” *See* Tr. 10/20/15:244
12 (Fuller); Fuller PowerPoint, slide 186; Tr. 10/23/15:776 (Fuller).

13 415. Mr. Fuller admitted that he included in his list of boating accounts this
14 advertisement for someone building boats of an unknown type as a boating attempt. *See* Tr.
15 10/23/15:777 (Fuller).

16 416. “The Arizona Republic of March 30, 1905, reported somewhat tongue-in-cheek
17 that a 76-year-old man, Jacob Shively, built a boat at the Chamberlain Lumber Company in
18 Phoenix, and carried it to the river in a two horse wagon with the intention of sailing the boat
19 to Yuma. There is nothing further on the story in succeeding issues; if Mr. Shively had
20 successfully completed the voyage it would have been newsworthy.” *See* Richmond 1987, at
21 12 [EI12, Part 2, Tab 2].

22 417. Mr. Gookin testified that this article for the “Advertisement” that Mr. Fuller
23 counted in his “Historical Boating Accounts” “doesn’t tell us much of anything.” *See* Tr.
24 11/19/15:1496 (Gookin).

1 **Reclamation Service Engineers**

2 418. The next boating attempt on Mr. Fuller's list is entitled "USRS." *See* Tr.
3 3/10/16:3712 (Littlefield); Compilation, at 3 [C048]. Mr. Fuller cites an article from the
4 *Arizona Republican* dated December 9, 1905. *See* Tr. 3/10/16:3710-19 (Littlefield);
5 Compilation, at Tab 20 [C048].

6 a. The article details the attempt by Reclamation Service engineers to
7 inspect diversion facilities on the Salt after a flood using a boat. *Id.*

8 b. The article states: "Immediately after luncheon they started down the
9 river in a boat toward the head of the Consolidated canal. They found the Salt river a poor
10 stream for navigation, however, and in the voyage of a mile they were shipwrecked twice,
11 though without the loss of life or property. In the first accident the boat went on a rock in a
12 rapid and the next time struck on a sandbar." *Id.*

13 c. According to the article, the engineers "finally made a landing" above
14 the consolidated canal and walked a mile until they found someone to drive them back. *Id.*

15 d. Mr. Fuller does not consider this a successful boating trip. *Id.*

16 419. Mr. Fuller testified: "They decided to come down the river in a boat, and they
17 described getting -- or, this portion of the short section of Segment 6, getting shipwrecked
18 twice in a mile but no loss. And their shipwrecks are described as hitting a rock in a rapid and
19 getting stuck in a sandbar." *See* Tr. 10/20/15:245 (Fuller); Fuller PowerPoint, slide 187.

20 420. Although it was not on his slide, Mr. Fuller agreed that, in the article describing
21 the boating attempt he entitled "Reclamation Service Engineers," the two boaters stated that
22 they found the Salt River to be a "poor stream for navigation." *See* Tr. 11/17/15:1136
23 (Fuller); Fuller PowerPoint, slide 187. Mr. Fuller also agreed that it was a week after a flood
24 of 195,000 cfs. *Id.*

25 421. Mr. Gookin testified that "they had a lot of problems," and it "was a failure."
26 *See* Tr. 11/19/15:1496 (Gookin).

27

1 **Rains**

2 422. The next boating attempt on Mr. Fuller’s list is entitled “Rains.” *See* Tr.
3 3/10/16:3724 (Littlefield); Compilation, at 4 [C048]. Mr. Fuller cites an article from the
4 *Arizona Republican* dated April 29, 1909. *See* Tr. 3/10/16:3724 (Littlefield); Compilation, at
5 Tab 22 [C048].

6 a. This article tells the story of some children who stole a boat and went for
7 a joy ride. *Id.*

8 b. The article is entitled “An Act of Piracy on the Raging Salt.” *Id.*

9 c. The article states that the boys “found the boat anchored to a sand bar.”
10 *Id.*

11 d. It also states: “They worked the craft down through the shoals and rapids
12 for a distance of two miles.” *Id.*

13 e. Dr. Littlefield testified that, before it was stolen, the boat probably was
14 used to ferry across the river during high water. *Id.*

15 423. Mr. Fuller testified that “they did a nine-mile segment of the river downstream
16 of 7th Avenue, which takes them somewhat close to the Gila River confluence.” *See* Tr.
17 10/20/15:245 (Fuller); Fuller PowerPoint, slide 189.

18 424. Mr. Fuller testified that the “Tom Rains, Boat Theft” account occurred when the
19 Salt River was at a flow of 5,500 cfs. *See* Tr. 11/17/15:1137-38 (Fuller); Fuller PowerPoint,
20 slide 189. The title of the article states: “An Act of Piracy on the Raging Salt.” *Id.* Mr.
21 Fuller attributed these descriptions to “fanciful language.” *Id.*

22 425. Mr. Gookin testified that it was a “joyride,” “[t]hey did not have supplies,” and
23 “they went home for dinner.” *See* Tr. 11/19/15:1496-97 (Gookin).

24 **Selly**

25 426. The next boating attempt on Mr. Fuller’s list is entitled “Selly.” *See* Tr.
26 3/10/16:3727 (Littlefield); Compilation, at 4 [C048]. Mr. Fuller cites an article from the
27

1 *Arizona Republican* dated June 27, 1909. *See* Tr. 3/10/16:3727-31 (Littlefield); Compilation,
2 at Tab 23 [C048].

3 a. This “boating attempt” is merely a report that a local man was building
4 boats for various individuals. *Id.* It does not mention where the boats were intended to be
5 used or for what purpose. *Id.*

6 b. The byline of the article reads: “Roosevelt, Ariz. June 24.” *Id.*
7 According to Dr. Littlefield, this means the article was actually written at Roosevelt, as
8 Roosevelt Dam was under construction. *Id.*

9 c. One of the individuals who purchased a boat was “Dan Goggins, chief
10 electrician for J. M. O’Rourke & Company.” *Id.* O’Rourke & Company was a contractor
11 working on the dam. *Id.*

12 d. Dr. Littlefield testified that it was most likely that the boat builder was at
13 Roosevelt rather than Phoenix. *Id.*

14 e. Mr. Fuller listed this as a “successful boating account.” *Id.* Not only
15 that, but he counts it as a successful boating account in Segments 3-6. *Id.* Dr. Littlefield
16 testified that it was most likely that any boating was in Segment 3 on the reservoir. *Id.*

17 427. Mr. Fuller testified: “It’s just announced in the paper he was a boat builder and
18 he’s recently completed two boats in June of 1909, and he has orders for some more and apt
19 to be kept busy for some time. Doesn’t say the boats -- where they’re going to be used.” *See*
20 Tr. 10/20/15:247-48 (Fuller); Fuller PowerPoint, slide 190.

21 428. Mr. Fuller agreed that the article does not mention the Salt and that it is
22 unknown where these boats would be used. *See* Tr. 11/17/15:1139-40 (Fuller); Fuller
23 PowerPoint, slide 190. Mr. Fuller admitted that the boats could have been used to cross the
24 river or on Roosevelt Lake as it filled. *Id.* Mr. Gookin testified that article is “just an
25 indication he’s building boats.” *See* Tr. 11/19/15:1497 (Gookin).

1 **Thorpe and Crawford**

2 429. The next boating attempt on Mr. Fuller’s list is entitled “Thorpe and Crawford.”
3 *See* Tr. 3/10/16:3731 (Littlefield); Compilation, at 4 [C048]. Mr. Fuller cites an article from
4 the *Arizona Republican* dated June 28, 1910. *See* Tr. 3/10/16:3731-38 (Littlefield);
5 Compilation, at Tab 24 [C048].

6 a. This article, like some others, claims it was the “first trip ever made from
7 Roosevelt to Mesa by way of boat.” *Id.* The article states that it is “a route that is seldom
8 frequented and also attempting a feat which has never yet been accomplished.” *Id.*

9 b. The article states:
10 The row boat which was used throughout the journey was in a very dilapidated
11 condition at the end of the trip. Before the start was made three bottoms had
12 been placed on the craft and one of those had been worn through by the constant
13 friction with the boulders and sands found in shallow waters. Many times the
 men were compelled to lift their craft from the water and carry it over obstacles
 and at other times had to haul it along the stands.

14 *Id.*

15 c. The article also states: “One incident of the trip was that just prior to
16 leaving Roosevelt one of the men exchanged a faithful dog to which he had become attached,
17 for a puppy. The idea being that the older dog would be entirely too heavy for the craft.” *Id.*
18 Dr. Littlefield testified: “It sounds like he believed the boat needed to be extremely light to
19 even attempt going down the river.” *Id.*

20 d. The article also mentions “falls this side of Mormon Flat” that would
21 “offer many obstacles.” *Id.*

22 e. The article concludes: “The men are well pleased with their adventure,
23 but have no serious intention of attempting to go into competition with the stage company.”
24 *Id.*

1 f. Dr. Littlefield testified: “My understanding is that the Reclamation
2 Service started making releases from Roosevelt sometime before the dam was completed, as
3 the reservoir was capable of storing more and more water.” *Id.*

4 g. The subheading of this article states: “Another Story of Two Men Not
5 Including the Dog. The Route is not recommended for General travel.” *Id.*

6 h. Mr. Fuller presented this article as a “successful boating attempt.” *Id.*

7 430. Mr. Fuller testified: “They did drag their boat many times, even in this below-
8 normal condition, and that one of the bottoms of their boats had been damaged -- one of the
9 three bottoms that they put on there. So it sounds like they built kind of a heavy boat. And
10 they dragged it a little bit, and they bounced on some rocks, dragged it over some rocks, and
11 did damage to the bottom of their boat.” *See* Tr. 10/20/15:249 (Fuller); Fuller PowerPoint,
12 slide 191.

13 431. Mr. Fuller admitted that one of the three bottoms they had put on the boat had
14 worn through on their trip and “many times the men were compelled to lift their craft from the
15 water and carry it over obstacles and at other times they had to haul it.” *See* Tr. 10/23/15:779
16 (Fuller). Mr. Fuller acknowledged that these instances of carrying the boat constituted
17 “portages.” *Id.* With regard to the Thorpe and Crawford boating attempt, Mr. Fuller admitted
18 that the weight of a dog would “be too much for their boat.” *See* Tr. 10/23/15:780 (Fuller).
19 Mr. Fuller labeled this trip a “success.” *Id.*

20 432. Mr. Gookin testified:

21 The rowboat they used was in a very dilapidated condition at the end of the trip.
22 They stated before the start was made, three bottoms had been placed in the
23 craft and one of these had been worn through by the constant friction of the
24 boulders and sand found in shallow waters. They also stated that many times
25 the men were compelled to lift their craft from the [river] and carry it over
26 obstacles or portage around rapids and waterfalls. The men were pleased with
27 their adventure but had no intention of attempting to repeat it or to go into
competition with the stage company.

1 See Tr. 11/19/15:1473 (Gookin). Mr. Gookin testified the trip demonstrated that commerce
2 on the Salt was “uneconomical by boat” because the boat was damaged and they had to drag
3 the boat. See Tr. 11/19/15:1474 (Gookin).

4 **Ensign and Scott**

5 433. The next boating attempt on Mr. Fuller’s list is entitled “Ensign and Scott.” See
6 Tr. 3/10/16:3738 (Littlefield); Compilation, at 4 [C048]. Mr. Fuller cites an article from the
7 *Arizona Republican* dated June 28, 1919. See Tr. 3/10/16:3738-45 (Littlefield); Compilation,
8 at Tab 25 [C048].

9 a. Mr. Fuller characterized this trip as having happened in June. *Id.* The
10 article is based on a speech given by the two participants at a Rotary Club luncheon. *Id.*
11 There is no way of knowing when the actual boating attempt occurred. *Id.*

12 b. The article states: “The cone [sic] in which the trip was made was built
13 expressly for that purpose and was made extra strong although light in order to be easily
14 transported around rapids that could be navigated.” *Id.*

15 c. The article also states: “The first few rapids were taken all right, Robert
16 Ensign told the Rotarians. Then the boys had their first upset. . . . It was not long after
17 righting the boat that they went over again. There are some rapids that they dared not
18 attempt to run.” *Id.*

19 d. The article concludes: “The description of the canoe trip from Roosevelt
20 lake to Phoenix was a veritable classic, it being so unusual and probably will be the cause of
21 several similar trips.” *Id.* Dr. Littlefield testified that he saw no other evidence in the
22 historical record of people taking similar trips. *Id.*

23 e. The trip occurred after Roosevelt Dam was completed and regulating the
24 flows of the river. *Id.* Flows in May or June 1919 likely would have been higher than under
25 natural conditions, due to releases from the dam. See Mussetter Declaration, at 32 [C024].
26
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1 434. Mr. Fuller testified: “They had built themselves a canoe or had a canoe built
2 that was strong and light for easy transport around the rapids. So it sounds like they saw
3 some rapids, that they took the option of walking around, and it’s probably due to on day 1,
4 they flipped in a rapid.” *See* Tr. 10/20/15:251 (Fuller); Fuller PowerPoint, slide 192.

5 435. On rebuttal, Mr. Fuller agreed the account may have been in May instead of
6 June. *See* Fuller Rebuttal Presentation, slide 38 [C053–ASLD 385].

7 **Greenwald**

8 436. The article describing the “Historical Boating Account” that Mr. Fuller labeled
9 as “George Greenwald,” states: “The timber is carried from the road that runs to the river.
10 Just above the tunnel to the tunnel’s mouth by means of a raft.” *The Arizona Republican*,
11 Growing Structure of Roosevelt Dam, at 3 (Feb. 19, 1908) [C018–ASLD 252]. With regard
12 to the distance of this trip, Mr. Fuller testified: “That it’s not far.” *See* Tr. 11/17/15:1141-42
13 (Fuller); Fuller PowerPoint, slide 201. Mr. Fuller testified that he had no argument against
14 the trip being around two or three hundred feet.” *See* Tr. 11/17/15:1144-45 (Fuller); Fuller
15 PowerPoint, slide 201. He agreed that water was beginning to pool behind Roosevelt dam at
16 the time of this account. *Id.*

17 437. Mr. Fuller testified that the George Greenwald boating account belongs in
18 Segment 4, not Segment 3. *See* Tr. 11/17/15:1144 (Fuller); Fuller PowerPoint, slide 201.

19 **Logan**

20 438. During his rebuttal, Mr. Fuller added a new boating attempt. *See* Carl T.
21 Hayden, *Charles Trumbull Hayden Pioneer*, at 42-43 (1972) [C053–ASLD 392]. The
22 account reads: “A highly skilled Scotch carpenter named Logan, who had been employed at
23 Fort Apache, built a stout boat with watertight compartments at each end. When rain and
24 melting snow caused a spring flood, he and three others came down the White and Salt Rivers
25 to Hayden’s Ferry.” *Id.* It includes no details of the trip whatsoever. *Id.* It does include
26 further details of the Hayden log floating expedition. *Id.* The account reads: “As a result of
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1 this trip, Mr. Hayden decided that logs would lodge in the canyons and could only be floated
2 when the river was in flood, but that at such times it would not be possible to hold them by a
3 boom in the river.” *Id.*

4 439. Mr. Fuller testified that the flow was “>400 cfs” during the Logan trip, even
5 though he did not know what year the trip occurred and there were no flow records for that
6 time period. *See* Tr. 5/19/16:5108-09 (Fuller); Fuller, *Salt River Rebuttal: Rating Curves*, at
7 10 (Table 4) (2016) [C053–ASLD 397] (“Fuller Rating Curves”). When asked how he came
8 up with that number, Mr. Fuller testified: “Just looking at the curves and thinking about
9 spring floods. I’m not trying to say it was as low as 400 cfs, but there needed to be some kind
10 of a bump up from normal in order to qualify it as the spring flood, as he called it, or spring
11 runoff, as I would call it.” *Id.*

12 440. Mr. Fuller testified that he removed all boating accounts that occurred on floods
13 “with the exception of the Logan one and maybe another one.” *See* Tr. 5/19/16:5110 (Fuller);
14 Fuller Rating Curves, at 10 (Table 4) [C055–ASLD 397].

15 441. While Hayden—who knew what a flood was—identified this as a flood
16 account, Mr. Fuller testified unilaterally determined that it was spring runoff. *See* Tr. 5/19/16:
17 4982-4983 (Fuller)

18 **Two Trappers**

19 442. On rebuttal, Mr. Fuller also included a new “boating account” of two trappers
20 who had trapped in Alaska for six years. *See Arizona Republican*, at 2 (Feb. 11, 1894)
21 [C053–ASLD 383]. Despite the fact that the article states only that the brothers were building
22 a boat, Mr. Fuller presented the account as a “successful” boating attempt. *See id.*; Tr.
23 5/19/16:4994 (Fuller). Moreover, despite the fact that the brothers were building their boat,
24 Mr. Fuller testified that the phrase, “[i]t was they said possible to drift in their canoe for
25 whole days and never see a sign of human habitation” referred to Arizona. *Id.* The article
26
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1 offers nothing in the way of detail as to how successful that potential boating attempt may
2 have been, or if it even happened. *Id.*

3 **Globe Power Company**

4 443. On rebuttal, Mr. Fuller presented a new “boating attempt” regarding engineers
5 from the Globe Power Company. *See Arizona Silver Belt*, at 3 (July 12, 1906) [C053–ASLD
6 384]. In the account, a boat used by the Globe Power Company to survey the Salt from the
7 mouth of Cherry Creek to Redman Flat was washed away by a “sudden rise in the river.” *Id.*
8 There is no detail in the article regarding any actual navigation of the Salt. *Id.* Mr. Fuller
9 called this boating attempt a “success” because “[t]hey had been using the boat. They
10 intended to get a new one to continue their work. That implies success to me.” *See Tr.*
11 *5/19/16:4996-97* (Fuller). Mr. Fuller admitted that the boat may have been used just to cross
12 the river. *Id.*

13 444. Mr. Fuller testified: “[T]here were some boats that were used in the
14 construction of dams. In my view, those don’t really count for boating in the ordinary and
15 natural conditions.” *See Tr. 10/20/15:258* (Fuller); Fuller PowerPoint, slide 200.

16 445. Based on the foregoing evidence, the Commission finds that, taken as a whole,
17 the historical accounts of boating do not demonstrate that the Salt was navigable in fact or
18 susceptible to navigation. To the contrary, these accounts demonstrate that the Salt was not
19 susceptible to navigation in its ordinary and natural condition.

20 **Other Historical Descriptions**

21 446. “In addition to prior judicial determinations, territorial and county governments
22 determined that the Salt River was non-navigable at the time of Arizona statehood. Perhaps
23 the most significant of these concerned the construction of a bridge across the Salt River at
24 Central Avenue in Phoenix. The issue of navigability was a significant one for the proponents
25 of the bridge, because if the Salt River was considered navigable construction of the bridge
26 could have an impact on river transportation. . . . Subsequent to the territorial legislation and
27

1 in conformance with tis terms, citizens of Maricopa County petitioned their Board of
2 Supervisors for construction of several bridges. These included one ‘across the Salt River, a
3 non-navigable stream’ at the foot of Center Street (later Central Avenue in Phoenix). The
4 issue of navigability was significant one for proponents of the bridge, because of the Salt
5 River was considered navigable construction of the bridge could have an impact on river
6 transportation.” Douglas E. Kupel, Ph.D., *Historical and Scientific Evidence Concerning*
7 *Navigability of the Lower Salt River*, at 5-6 (April 2003) [Lower Salt EI 29].

8 447. “T. 1 N., R. 5 E., was originally surveyed in 1868 by W. F. Ingalls, Deputy
9 Surveyor, as shown upon the official plat approved October 22, 1868. The field notes and
10 plat depict the presence of Salt River in the northwesterly portion of the township, flowing in
11 a general WSW direction, through *two distinct and separate channels for almost the entire*
12 *distance*. The channels are labeled respectively, ‘North Channel of the Salt River’ and ‘South
13 Channel of Salt River.’ The intervening island area is $\frac{1}{2}$ to $\frac{3}{4}$ miles in width. Upon the plat
14 this island area carries the notation, ‘Land sandy subject to overflow, Soil, 3rd rate.’ The
15 original survey did not meander or segregate the river channels or island area and their
16 representation upon the plat is by sketching, coordinating with the recorded section line
17 crossings? . . . At the time of the original survey, and on the date of Arizona’s admission into
18 the Union, Salt River would have to be considered as a non-navigable stream.” *See*
19 *Memorandum from Director, U.S. Dept. of Interior, Bureau of Land Management* (May 15,
20 1964), [Lower Salt EI 12, Part 2, Tab 1] (emphasis added). Mr. Fuller agreed with this
21 statement. *See* Tr. 10/23/15:884-88 (Fuller).

22 448. “The Salt River is not now and never has been a navigable river.” *Salt River*
23 *Pima Indian Community v. Arizona Sand & Rock Co.*, Consolidated Pretrial Order, No. CIV-
24 72-376-Phx, at 11 (D. Ariz., March 12, 1976). The Arizona Department of Transportation
25 was a party to that litigation. *See* Tr. 10/23/15:893 (Fuller).

1 449. “A series of 5 dams, Roosevelt, Horse Mesa, Mormon Flat, Stewart Mountain,
2 and Granite Reef, with a total reservoir capacity of 374,755 acre feet, cause the river in this
3 reach to be without water most of the time. Prior to the construction of the dams and the river
4 was also classed as unnavigable.” *See* Pewe 1996, at 1 [C026–E].

5 450. Arizona’s First Territorial Legislature in 1863-1864 filed a request for funding
6 from the Rivers and Harbor Act for the Colorado, but not the Salt. *See* Tr. 1/26/16:1980-81
7 (August).

8 451. Dr. Littlefield wrote: “[N]one of the federal officials who wrote about the Salt
9 River prior to the time of Arizona’s statehood in 1912 gave any indication that navigation
10 interests objected to the development of many diversion dams along the Salt River or to the
11 plans of the Reclamation Service to construct Roosevelt Dam, which obviously would
12 interfere with any potential navigability by storing waters that might contribute to regular and
13 reliable boating.” *See* Littlefield Declaration, ¶ 47.

14 452. Dr. Littlefield wrote:

15 [T]wo Arizona court decisions both declared that the Salt River was not
16 navigable. The first, *M. Wormser, et al., v. The Salt River Valley Canal*
17 *Company, et al.*, which was heard in Arizona’s Second Judicial District Court in
18 1892, stated unequivocally that the Salt River was an “unnavigable river.” The
19 second Arizona court case, decided in 1910, was *Patrick T. Hurley v. Charles F.*
20 *Abbott, et al.* The court’s opinion in that case by Judge Edward Kent reviewed
the principles of prior appropriation in Arizona, and he observed that those
principles applied to non-navigable streams such as the Salt River.

21 *See* Littlefield Declaration, ¶ 50; *Wormser v. Salt River Valley Canal Co.*, 2nd Jud. Dist. of
22 Territory of Ariz., No. 708, at 5 (March 31, 1892) (“Kibbey Decree”) [Lower Salt EI06];
23 *Hurley v. Abbott*, 3rd Jud. Dist. of Territory of Ariz., No. 4564, at 3 (March 10, 1910) (“Kent
24 Decree”) [Lower Salt EI06].

25 453. Dr. Littlefield wrote: “[T]he Arizona Territorial Legislature, seeking funds
26 from Congress to clear obstructions from the Colorado River as one of its first official acts,
27

1 declared in 1865 – a year that was prior to the construction of many diversion dams on the
2 Salt River – that ‘the Colorado River is the only navigable water in this Territory[.]’” See
3 Littlefield Declaration, ¶ 49.

4 454. Mr. Fuller testified that he did not put much weight in the 1865 declaration by
5 the Arizona Territorial Legislature that declared the Colorado as the only navigable stream in
6 the territory. See Tr. 10/23/15:870 (Fuller).

7 455. In the *Eleventh Annual Report of the U.S. Geological Survey* (1891), John
8 Wesley Powell wrote:

9 In this basin are found rivers most difficult and dangerous to examine and
10 control, differing in character and habit from those of the North as widely as in
11 geographic position. In place of the regularly recurring annual floods of spring
12 and early summer, so strongly marked on the discharge diagrams of other
13 basins, these rivers show conditions almost the reverse, being at that season at
14 their very lowest stages – even dry – and rising in sudden floods at the
15 beginning of and during the winter. These floods are of the most destructive
16 and violent character; the rate at which the water rises and increases in amount
17 is astonishingly rapid, although the volume is not always very great. . . . From
18 this it will be recognized that the onset of such a flood is terrific. Coming
19 without warning, it catches up logs and boulders [sic] in the bed, undermines
20 the banks, and, tearing out trees and cutting sand-bars, is loaded with this mass
21 of sand, gravel, and driftwood – most formidable weapons for destruction.

22 See Littlefield Lower Salt, at 119-20 [C001].

23 456. The *Thirteenth Annual Report of the U.S. Geological Survey*, published in 1893
24 states: “The nonperiodic oscillations give rise to the greatest concern on the part of the
25 engineer and the irrigator, for while he can be reasonably certain regarding the character of
26 the periodic variation, he must at all times be on the watch for extraordinary occurrences for
27 which there are no analogies. The rivers and lakes may for a time increase in volume or may
apparently shrink so greatly as to cause serious alarm as to their permanence.” See Littlefield
Lower Salt, at 123 [C001].

1 457. In 1905, the U.S. Geological Survey published *Water Supply Paper No. 136*,
2 *Underground Waters of Salt River Valley, Arizona*, which states:

3 Changes in the river's course over an aggrading area are the rule rather than the
4 exception. Old channels, therefore, which do not correspond with the present
5 river's course are to be expected in the valley fill. . . . The old debris-filled
6 channels may be narrow like the present channel of the Salt River near the
7 upper end of the valley, or may be miles in width according to circumstances. . .
8 . As the river swung from side to side of the valley, gravel and boulder [sic]
9 beds were always left in its wake; furthermore – and this is the key to the
10 problem – wherever a boulder [sic] bed was formed a boulder [sic] train filling
11 the old channel connected and probably still connects this bed with the mouth of
12 Salt River Canyon, whence the water, together with its debris, issued then as it
13 does now.

14 *See Littlefield Lower Salt*, at 131 [C001].

15 458. In 1905, the *U.S. Geological Survey published Water Supply Paper No. 136*,
16 *Underground Waters of Salt River Valley, Arizona*, which states:

17 There is a permanent water supply in [the river] from the head of the valley to
18 the Tempe canal, north of Mesa. Below the head-gates of the Tempe canal a
19 short space occurs in which the river is practically dry for the greater part of the
20 year. Farther downstream underground water returns to the river bed; that is,
21 the river cuts beneath the water table and the underflow returns in part, making
22 a surface flow of something like 35 second-feet. . . . North of Mesa the river
23 bed is at the same elevation as the water table, while at Tempe the river bed is
24 below the water table. This explains the return of the underflow to the surface,
25 making a perennial stream at Tempe, while the river bed both east and west of
26 Tempe is dry.

27 *See Littlefield Lower Salt*, at 132 [C001].

28 459. “The First Annual Report of the Reclamation Service (1903) noted that
29 irrigation in the drainage basin of the Gila and Salt rivers had already been developed to a
30 point that there was insufficient water for the all farmlands, and the report added that ‘[t]he
31 situation in this respect, while not peculiar, is most extreme as regards the entire West, the
32 fluctuations of flow of the rivers being most marked and the effect upon the population most
33 disastrous.’” *See Littlefield Lower Salt*, at 134 [C001]. Moreover, the report states: “The

1 sources from which water may be obtained for reclamation of the arid lands in Arizona are,
2 taken as a whole, the most erratic or irregular in the entire country. There are comparatively
3 few rivers which flow throughout the year. Most of the tributaries of Gila River, beginning in
4 the mountains as perennial streams, lose their waters in the broad, open valleys.” *Id.*

5 460. A September 3, 1905, letter written by Reclamation Service employee Louis
6 Hill to Arthur P. Davis, then Assistant Chief Engineer, states:

7 It may interest you to know something of the traffic passing over the
8 Roosevelt Road even now, before the contractor has fairly begun hauling in
9 his material and before the oil outfit has begun to deliver even one-half the
10 amount which is demanded from them when we are running at full blast. The
11 amount of freight hauled daily and delivered to the United States . . . to the
12 people living in Roosevelt, those up the Salt River Valley to the Tonto Valley
13 and further on toward Holbrook demands a daily payment to the freighters of
14 at least \$750. A low estimate of the value of this freight is \$250,000 a month.
15 It hardly seems possible that that much material and provision is used in the
16 district tributary to the road.

17 *See Littlefield Lower Salt, at 149-50 [C001].*

18 461. An unpublished Reclamation Service report by Gerard H. Matthes entitled
19 *Recent Conditions in Salt River Valley, Arizona* reads:

20 The ranches of Salt River Valley sustained damage in many different ways; one
21 after another of the diversion dams maintained across Salt River by the various
22 irrigation enterprises were washed out, and when the waters finally commenced
23 to subside, the owners found themselves confronted with difficult problems
24 regarding the reconstruction of these dams the majority of which had been of a
25 more or less temporary character. All along the river sweeping changes
26 occurred in the river bed, and in more than one instance the new channel was
27 found to be located a long distance away from the old canal head. . . . The
protracted floods on Salt River in addition to destroying the works of man, did
incalculable damage to lands along the river, through the shifting of the river
bed and the caving of the banks. At numerous points along the river ravages of
this nature assumed large proportions – ranches of large acreage being cut down
to small holdings, and in some cases entire ranches disappeared little by little,
inclusive of barns and buildings, leaving the owners destitute. At Tempe the
river cut into the banks east of the Tempe Buttes which protected the town on
the north side of the river, carrying away many acres of valuable farm lands.

1 Considerable apprehension has been entertained by the citizens of that locality,
2 who fear that the river will form a new channel to the south of the Buttes and
through the heart of the community.

3 *See Littlefield Lower Salt, at 155-56 [C001].*

4 462. W.H. Code's *Report of Irrigation Investigations for 1900, Office of*
5 *Experiment Stations, Irrigation in the Salt River Valley* wrote:

6 [T]o the river channel an enormous amount of debris such as brush, limbs,
7 stumps, and whole trees, but creates many canyons and chasms, some of them
8 of dizzy proportions when it is considered that their inception was perhaps due
9 to an innocent appearing cattle trail leading to the river. The products of such
10 erosions are deposited in the river channel to be swept down to this valley with
11 subsequent heavy floods, together with the debris before mentioned, viz, dead
limbs, stumps, trees, etc. The latter are a menace to all irrigation structures
12 along the river, while the heavy sand and fine gravel are deposited in the heads
of our canals, seriously diminishing their capacities and entailing great expense
in subsequent removal.

13 *See Littlefield Lower Salt, at 155-56 [C001].*

14 463. Alfred J. McClatchie's *Utilizing Our Water Supply*, published by the Office of
15 Experiment Stations in 1902, states:

16 The Salt River, like all streams having a watershed with many steep slopes, is
17 subject to great variations in its flow . . . [and] conditions combine to make a
18 great difference between the winter and the summer flow. After heavy rains in
19 the mountains, especially during the winter, the Salt River is sometimes
unfordable for weeks, while during the hot, dry weather of summer it is
20 sometimes reduced to a mere brook, the flow during the winter months of some
years being ten to twenty times what it is during some months of the following
21 summer.

22 *See Littlefield Lower Salt, at 163 [C001].*

23 464. One of the earliest Department of Agriculture documents to be published about
24 the Salt River region was Thomas H. Means' *Soil Survey in the Salt River Valley, Arizona*,
25 which appeared as a result of field operations of the Division of Soils in 1900. It states:

26 Water is found everywhere in the gravels beneath the valley, the depth and
27 amount of matter in solution varying greatly. The level of standing water and

1 its character have no doubt been much changed during the years in which
2 irrigation has been practiced. Little is known of the condition existing before
3 irrigation, except that the water was deeper than now. . . . All the streams are
4 dry most of the year, except in places where the bed rock is near the surface of
5 the ground. For example, the Salt River at McDowell's Butte and for 5 or 6
6 miles below always contains water, but immediately northwest from Mesa the
7 stream bed is dry during part of the year. At Tempe the water again rises and
8 for a mile the river is above ground. South of Phoenix the stream bed is
9 generally dry, but about 8 miles southwest of Phoenix the water again rises, and
10 from that point the Salt and Gila rivers are above ground for 50 miles or more.
11 The constant flow of the streams when above ground clearly shows that there is
12 a constant flow under the ground through the gravels and sands.

13 *See Littlefield Lower Salt, at 161 [C001].*

14 465. Mr. Fuller was unable to name any official government document declaring the
15 Salt River navigable outside of his own. *See Tr. 10/23/15:895-96 (Fuller).*

16 466. If one assumed the success of Mr. Fuller's thirty-one boating accounts between
17 1873 and 1919, those boating accounts collectively amount to less than one boating account
18 per year (.67) for all segments of the Salt River.

19 467. The actual rate of "success" would be significantly lower if the accounts are
20 divided by segments and percentage of segment actually boated (calculations that were not
21 performed by Mr. Fuller).

22 468. For all of the historical accounts discussed by Mr. Fuller, he indulged every
23 possible inference in favor of the "success" of any boating trip and included accounts that
24 clearly did not meet his criteria.

25 469. Based on the foregoing evidence, the Commission finds that, taken as a whole,
26 the historical descriptions of the Salt do not demonstrate that the Salt was navigable in fact or
27 susceptible to navigation. To the contrary, these descriptions demonstrate that the Salt was
not susceptible to navigation in its ordinary and natural condition.

1
2 **HYDROLOGY OF THE SALT**

3 **Variability**

4 470. According to the historical record, the Salt was an “erratic” river in its ordinary
5 condition, fluctuating between flood, even flow, and dryness. *See* Tr. 1/26/16:1978 (August).

6 471. Dr. Mussetter compared the annual and seasonal discharge of several years. *See*
7 Tr. 1/27/16:2295 (Mussetter); Mussetter Presentation, slides 31-47. Although they had
8 similar total discharge, the seasonal variation was erratic. *See* Tr. 1/27/16:2295 (Mussetter);
9 Mussetter Presentation, slides 31-47.

10 472. Snowmelt and monsoon discharge varies erratically from year to year. *See* Tr.
11 1/27/16:2295-96 (Mussetter); Mussetter Presentation, slides 31-47.

12 473. Dr. Littlefield testified: “That it was unpredictable in terms of floods or dry
13 periods. It was unpredictable in terms of possible channel changes. Not only unpredictable
14 on a long-term basis, but also on a short-term basis, such as days or months.” *See* Tr.
15 3/11/16:3924 (Littlefield).

16 474. Historical photographs show an occasionally dry river. *See* Littlefield
17 Declaration, at B:24-25, 51, 52, 61; Historical Photos, slides 62-65, 98-104.

18 475. From his understanding of the Salt, Dr. August testified that a dry river in
19 Segment 6 was “one of the natural states of the river.” *See* Tr. 1/26/16:1947 (August); *see*
20 *also* Tr. 1/27/16:2189-90 (August).

21 476. Charles Hayden described the Salt “one time with rather pungent language
22 when it flooded and how much damage it caused, and other times he cursed it because [] it
23 was dry.” *See* Tr. 1/26/16:1973-74 (August). “Flood flows and dry river were part and parcel
24 of his existence, and it was Carl’s experience too as a little kid.” *Id.*

25 477. Based on the foregoing evidence, the Commission finds that the Salt was too
26 erratic to support commercial navigation in its ordinary and natural condition.
27

1 **Mr. Fuller's Flawed Hydrological Analysis**

2 478. During his direct testimony, Mr. Fuller presented a series of “median” flows for
3 Segments 1-6. *See* Fuller PowerPoint, at 228. Mr. Fuller presented a median flow of 199 cfs
4 for Segment 1; a median flow of 266 cfs for Segment 2; a median flow of 341 cfs for
5 Segments 3 and 4; a median flow of 992 cfs for Segment 5; and a median flow of 1230 cfs for
6 Segment 6. *Id.*; Tr. 10/20/15:145-46 (Fuller); Tr. 10/21/15:500-01 (Fuller); Fuller
7 PowerPoint, slide 228; Tr. 10/23/15:854-55 (Fuller); *see also* Tr. 11/19/15:1453-54 (Gookin).

8 479. Dr. Mussetter recalculated Mr. Fuller's flow estimates for the gages at the
9 White and Black Rivers, Chrysotile, and Roosevelt using the full period of record and
10 provided corrected medians: White and black – 171 cfs (Fuller – 199 cfs), Chrysotile 246 cfs
11 (Fuller – 266 cfs), Roosevelt 316 cfs (Fuller – 341 cfs). *See* Tr. 1/28/16:2395-96 (Mussetter);
12 Mussetter PowerPoint, slide 76. Mr. Fuller used the record only up until 1996 when he
13 drafted his report. *Id.*

14 480. Mr. Fuller testified that 1,230 cfs “sounds right” for the natural median flow in
15 Segment 6. *See* Tr. 11/17/15:994 (Fuller).

16 481. For Segments 1-4, Mr. Fuller used historical long-term gage data to calculate
17 median daily flows. *See* Tr. 5/19/16:5081-82 (Fuller).

18 482. For Segments 5 and 6, however, Mr. Fuller took a different approach. *See* Tr.
19 10/21/15:500-01 (Fuller); Fuller PowerPoint, at 228. According to Mr. Fuller:

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

24 Tr. 10/21/15:500-01 (Fuller); Fuller PowerPoint, at 228.

25 483. Mr. Fuller used the Thomsen & Porcello paper to derive what he labeled a
26 “median” flow rate in his presentation. *See* Tr. 11/17/15:1041(Fuller); Fuller PowerPoint, at
27

1 228; Thomsen & Porcello, *Predevelopment Hydrology of the Salt River Indian Reservation,*
2 *East Salt River Valley, Arizona* (Nov. 1991) [C002-ASLD 44] (“Thomsen & Porcello”).
3 Thomsen & Porcello, however, did not produce the 1,230 cfs figure. *See* Tr. 11/17/15:1041
4 (Fuller).

5 484. Mr. Fuller used Thomsen & Porcello’s median annual discharge of 950,000
6 acre-feet per year (“AFY”) to derive his “median” flow rate. *See* Tr. 11/17/15:1041-44
7 (Fuller). Mr. Fuller testified that he took this number, converted it to cubic-feet and divided it
8 by the number of seconds in a year to get cfs. *Id.* In reality, what Mr. Fuller did was take the
9 median year from the period of record and calculate the average or “mean” flow rate for that
10 year. *See* Tr. 10/23/15:860 (Fuller).

11 485. Although Mr. Fuller denied that his “median” was actually a mean, Tr.
12 11/17/15:1048 (Fuller), he later testified that he would perform the same calculation to
13 determine the average flow rate for a given year. *See* Tr. 11/17/15:1100 (Fuller); *see also* Tr.
14 11/18/15:1441-42 (Gookin) (“[Y]ou’re coming up with the average daily flow in the median
15 year, which is just kind of a kludge number . . . and the mean flow overstates what you would
16 expect to find on the 50 percent day of the median day.”).

17 486. Using a mean instead of a median is a “pitfall” because “the average really
18 skews your perception of what would typically be there, because it’s really weighted to the
19 really big events and so the averages tend to be quite high.” *See* Tr. 1/27/16:2278
20 (Mussetter); *see also* Mussetter Presentation, at 30, 80; Tr. 1/28/16:2405-06 (Mussetter).

21 487. According to Mr. Fuller, medians are “more reflective in the ordinary condition
22 in every reach of the stream just because of the seasonality of the flow and the strong
23 influence of floods — you know, large flood volume that would steer the mean upward. So
24 the median is much — probably more reflective of the ordinary condition.” *See* Tr.
25 10/21/15:494-95 (Fuller); Fuller PowerPoint, at 225.

1 488. Mr. Fuller testified: “So in arid regions, rivers tend to be flood-dominated,
2 which means we have very large floods compared to the normal flows conditions.” *See* Tr.
3 10/20/15:36-37 (Fuller). Mr. Fuller agreed that average annual flow rates “are skewed due to
4 high flood flow volumes relative to . . . typical flow rates.” *See* Tr. 4/7/03:62-64 (Fuller).

5 489. Mr. Fuller later admitted that, by using these figures in a chart of actual daily
6 median flows, he was “mixing [] apples and oranges.” *See* Tr. 5/19/16:5081-82 (Fuller); Tr.
7 11/17/15:1049 (Fuller); Fuller PowerPoint, at 238; Fuller Lower Salt 2003, at 7-17 [Lower
8 Salt EI 30].

9 490. As a result, Dr. Mussetter testified that Mr. Fuller had exaggerated median
10 flows by a factor of nearly two and a half. *See* Tr. 1/28/16:2402 (Mussetter); Mussetter
11 Presentation, at 81. Dr. Mussetter calculated the median flow for Segment 5 using Mr.
12 Fuller’s period of record and the full period of record: 361 cfs and 348 cfs, respectively. *See*
13 Tr. 1/28/16:2407-08 (Mussetter); Mussetter Presentation, at 81. These numbers are
14 approximately one-third of what Mr. Fuller presented in his direct testimony to this
15 Commission. *Id.*

16 491. Mr. Fuller testified that 1,230 cfs “sounds right” for the natural median flow in
17 Segment 6. *See* Tr. 11/17/15:994 (Fuller). Mr. Fuller testified that his flow estimates were
18 “[c]onservative on the low end.” *See* Tr. 10/21/15:503 (Fuller); Fuller PowerPoint, slide 228.

19 492. Mr. Fuller further compounded this error by using his Segment 6 “median” flow
20 figure to produce his Segment 5 “median” figure. *See* Tr. 11/19/15:1458 (Gookin). Mr.
21 Fuller took his exceedingly high mean flow rate from Segment 6 and subtracted the baseflow
22 contribution of the Verde using gage data to arrive at a figure of 992 cfs for the Segment 5
23 median. *See* Tr. 10/21/15:500-01 (Fuller); Fuller PowerPoint, at 228; Tr. 10/20/15:145-46
24 (Fuller).

1 493. Mr. Fuller testified that he was not instructed to speak to his conclusion on
2 navigability in his reports in 1996 and 2003; he was advised that his role was “simply to
3 present facts” to the Commission. *See* Tr. 10/20/15:18-19 (Fuller).

4 494. Mr. Fuller originally reported a median range of 360 to 580 cfs for the reach of
5 the river from Stewart Mountain to Granite Reef. *See* Fuller Upper Salt 2003, at 5-20 [Upper
6 Salt EI 27]. Mr. Fuller’s “median” number for Segment 5 (992 cfs) is higher than his mean
7 calculation using gage data of 896 cfs. *See* Tr. 11/19/15:1564-68 (Gookin). As Mr. Gookin
8 testified, it is not possible for a true median to be higher than a mean flow rate on a desert
9 river with characteristics like the Salt, and that should have been a red flag for Mr. Fuller. *Id.*

10 495. Mr. Fuller’s median flow calculations jump from 341 cfs in Segment 4 to 992
11 cfs in Segment 5. Mr. Fuller’s “reconstructed” “median” flow is nearly double the actually
12 measured combined gage data above the dams and diversions, which is 581 cfs (including
13 flows from both the Salt and Verde). *See* Tr. 11/17/15:1050 (Fuller). Mr. Fuller credits this
14 651 cfs difference to missed downstream drainage and “tributaries.” *See* Tr. 11/17/15:1051
15 (Fuller). The 581 cfs includes 239 cfs coming into the Salt at Roosevelt, and 238 cfs coming
16 into the Salt at the Verde confluence, meaning 649 cfs would have to come from other
17 “drainage” and “tributaries” between Roosevelt Dam and the Verde confluence, as well as
18 human diversions. *See* Tr. 11/17/15:1051-53 (Fuller). Essentially, Mr. Fuller believes (or at
19 least testified) that more water comes into the Salt between Roosevelt Dam and the Verde
20 confluence than all the water coming from the White Mountains and Mogollon Rim
21 combined. *See* Tr. 11/17/15:1053 (Fuller); Tr. 11/19/15:1459 (Gookin).

22 496. Mr. Gookin calculated that “[u]nder virgin conditions, assuming the dams
23 weren’t there, . . . the flow would increase about 13 percent.” *See* Tr. 11/18/15:1439
24 (Gookin). “In reality, the river inflows below Roosevelt are much smaller. They’re
25 ephemeral streams, and so . . . most of the time they flow in during floods, which won’t affect
26 the median daily flow. And even if they do, it’s a lot less per square mile of drainage area
27

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

6 497. Mr. Fuller’s median numbers also are inflated because he used the period of
7 record that Thomsen & Porcello used, which stopped at 1991. *See* Tr. 1/27/16:2283
8 (Mussetter); Mussetter Presentation, at 31.

9 498. Dr. Mussetter calculated the median annual flow using the full period of record
10 and determined that the annual median flow was 462,000 AFY rather than Mr. Fuller’s
11 511,000 AFY. *Id.*

12 499. Mr. Fuller’s errors carried over into his rating curve and depth analysis because
13 he used his median flow numbers in those calculations. *See* Fuller PowerPoint, at 236-38.

14 500. Mr. Fuller used only two cross-sections for Segments 1-4 that he claims are
15 “representative of the ordinary and natural conditions,” but could not (or would not) provide
16 the locations of those cross-section to verify that assertion. *See* Tr. 10/21/15:506-07 (Fuller);
17 Fuller PowerPoint, at 232; Tr. 11/17/15:1018-19 (Fuller).

18 501. For Segments 5 and 6, Mr. Fuller used a 1907 topographic map developed by
19 the U.S. Reclamation Service with five-foot contour intervals. *See* Tr. 10/21/15:508 (Fuller);
20 Fuller PowerPoint, at 234. The use of five-foot contour maps has “significant limitations.”
21 *See* Tr. 1/28/16:2472 (Mussetter). Because of this, any given measurement could be off by up
22 to 5 feet. *See* Tr. 1/28/16:2473 (Mussetter). Dr. Mussetter testified: “In my view, this is a
23 very sketchy analysis to begin with. . . . [W]e’re taking about flow depths that are
24 considerably less than the resolution of the mapping that we’re using to estimate those
25 depths.” *Id.*

1 502. During his direct testimony, Mr. Fuller testified that his median flow
2 calculations and rating curves provided “average” depths of 2.1 feet for Segment 2 (in a sheer
3 canyon), depths of 5.0 feet for Segment 2 (with gravel bars), depths of 2.3 feet for Segments 3
4 and 4 (in a sheer canyon), depths of 5.5 feet for Segments 3 and 4 (with gravel bars), 3.8 feet
5 for Segment 5, and 5.3 feet for Segment 6. *See* Fuller PowerPoint, at 236-38. Mr. Fuller
6 claimed that he “verified” his depth estimates in Segments 2, 3, and 5 during boating trips and
7 using historical descriptions. *See* Tr. 10/21/15:513 (Fuller); Fuller PowerPoint, at 239.

8 503. Although Mr. Fuller labeled these depths “average,” they actually represented
9 “maximum depths” as he intended to calculate them. *See* Tr. 11/17/15:1015, 1035-36
10 (Fuller); Tr. 11/17/15:1015 (Fuller). Mr. Fuller testified that his “average” depth estimates
11 are based on choosing the deepest of multiple channels in his cross-sections. *See* Tr.
12 11/17/15:1013 (Fuller) (discussing Cross-Section 3); Fuller Lower Salt 2003, at 7-24 [Lower
13 Salt EI 7-24].

14 504. For Segment 5, Dr. Mussetter used Cross-Section 6 to calculate depth. *See* Tr.
15 1/28/16:2475-76 (Mussetter); Mussetter Presentation, slide 148.

16 a. For the ninety percent flow, he used 160 cfs instead of Mr. Fuller’s 159
17 cfs and found a depth of 1.3 feet instead of Mr. Fuller’s 1.4 feet, a velocity .9 feet per second
18 instead of Mr. Fuller’s 1.4 feet per second, and a width of 280 feet instead of Mr. Fuller’s 175
19 feet. *Id.*

20 b. Dr. Mussetter used 348 cfs for the median instead of Mr. Fuller’s 348
21 cfs. *Id.*

22 c. For the median flow, Dr. Mussetter used 348 cfs instead of Mr. Fuller’s
23 348 cfs and found a depth of 1.5 feet instead of Mr. Fuller’s 3.8 feet, an average velocity of 1
24 feet per second instead of Mr. Fuller’s 22.5, and a width of 290 feet instead of Mr. Fuller’s
25 215 feet. *Id.*

1 d. For the ten percent flow, Mr. Fuller used a flow rate of 2,240 cfs instead
2 of Mr. Fuller's 2120 cfs and calculated a depth of 4.7 feet instead of Mr. Fuller's 5 feet, an
3 average velocity of 2 feet per second instead of Mr. Fuller's 3 feet per second, and a width of
4 480 feet instead of Mr. Fuller's 300 feet. *Id.*

5 505. On rebuttal, Mr. Fuller recommended the median flows of:

- 6 a. 165 cfs for Segment 1;
- 7 b. 277 cfs for Segment 2;
- 8 c. 385 cfs for Segment 3;
- 9 d. 405 cfs for Segment 4;
- 10 e. >405 cfs for Segment 5; and
- 11 f. 819 cfs for Segment 6.

12 *See Fuller Rebuttal, slide 85 [C053-ASLD 385].*

13 506. Despite the fact that Mr. Fuller could not provide the location of the cross-
14 sections he used to calculate depths in Segments 5 and 6, Dr. Mussetter was able to use
15 topographic maps to generally identify the locations of his cross-sections, determine the slope
16 at those cross-sections, and estimate the Manning's N value. *See Tr. 1/28/16:2467-68*
17 *(Mussetter); Mussetter Presentation, at 144-45.*

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

22 508. Using his own median estimate of 358 cfs instead of Mr. Fuller's 992 cfs, Dr.
23 Mussetter determined a maximum depth across the cross-section in Segment 5 of 1.5 feet
24 instead of Mr. Fuller's 3.8 feet. *See Tr. 1/28/16:2475-76 (Mussetter); Mussetter Presentation,*
25 *at 148.*

1 a. Using his own median flow rate estimate of 554 cfs instead of Mr.
2 Fuller's 1,230 cfs, Dr. Mussetter determined a maximum depth in Segment 6 of 1.9 feet
3 instead of Mr. Fuller's 5.3 feet. *Id.*

4 b. Mr. Fuller testified that his 5.3-foot "average" depth estimate for
5 Segment 6 was incorrect because he "read the curve wrong when [he] was preparing the
6 slide." Tr. 11/17/15:1009 (Fuller).

7 c. On cross-examination, he conceded that his "average" depth estimate
8 was off by half. *Id.* at 1008; Tr. 11/17/15:1010 (Fuller).

9 509. Regarding the verification of Mr. Fuller's depth calculations, Mr. Fuller
10 testified: "And we're coming up with depth estimates in the neighborhood of 5 feet, so that
11 would be consistent with not wanting to drag a chain across. Because I would expect
12 moderate velocities, you know, 3 to 5 feet per second, in the Salt River at that time and that
13 flow rate." *See* Tr. 10/21/15:515 (Fuller); Fuller PowerPoint, slide 239. Mr. Fuller testified
14 that his "average" 5.3 ft depth is "just an error." *See* Tr. 11/17/15:1009 (Fuller).

15 510. Four of Mr. Fuller's six cross-sections in Segment 6 show at least two and up to
16 five channels (depending on flow).

17 a. For Cross-Section 1, the water-surface elevation lines show four
18 inundated channels at the high line and "at least two" for the lower line. *See* Tr.
19 11/17/15:1029 (Fuller).

20 b. Mr. Fuller testified that Cross-Section 2 shows four channels for the
21 higher water elevation. *Id.* at 1030-31.

22 c. Cross-Section 3 shows five channels at the higher water elevation mark.
23 *Id.* at 1031.

24 d. Cross-Section 4 shows one channel at the higher water elevation mark.
25 *Id.* at 1032.

1 e. Cross-Section 5 shows two channels at the higher water elevation mark.
2 *Id.* at 1033.

3 d. Cross-Section 6 shows one channel at the higher water elevation mark.
4 *Id.*

5 511. Despite the fact that many of Mr. Fuller’s cross-sections show multiple
6 channels, Mr. Fuller assumed all the water was in only one channel, thus increasing depths.
7 Regarding Cross-Section 5, Mr. Gookin testified with regard to Mr. Fuller’s analysis: “The
8 cross section that he put in the computer model only modeled the left channel. . . . He didn’t
9 consider the fact that the water was flowing in two channels, not one. He put all the water in
10 one channel, which makes it a lot deeper.” *See* Tr. 11/19/15:1542 (Gookin). Mr. Fuller
11 modeled only the right-hand channel in Cross-Section 1. *Id.* at 1543.

12 512. Mr. Gookin testified: “The second thing [Mr. Fuller] did wrong was he didn’t
13 model the river correctly in the lower reaches, in some of the reaches, to find the depth that
14 really would have been there. Even though he had two channels that would both be carrying
15 low flows, he assumed it all went into one channel and ignored the second one.” *See* Tr.
16 11/20/15:1755-56 (Gookin).

17 513. Mr. Fuller testified: “I would agree that the lowest depths are the lowest depths,
18 and the lower the depth, the more limiting it is. So in that sense, yes. But one location of a
19 lower depth, that may indicate a point of difficulty that may represent less than a percent of
20 the river’s length. So I don’t think it’s a full description of your experience.” *See* Tr.
21 5/19/16:5078-79 (Fuller). Although Mr. Fuller testified that maximum depth is what one
22 should examine in determining navigability, he agreed that the “maximum depth” portions of
23 pools do not always connect in one continuous trench and to get to the maximum depth
24 portion of a cross section may require traversing a shallower area. *See* Tr. 5/19/16:5075-76
25 (Fuller). He testified: “It’s possible, maybe even probable, that at any given point there’s a
26
27

1 deeper spot off to the right or left, but you're looking for someplace that connects, a
2 sufficiently deep spot." *Id.*

3 514. Mr. Fuller's rating curve depth analysis was wrong because the cross-sections
4 he selected "definitely do not represent the locations most limiting to navigation." Mussetter
5 Presentation, at 149 (emphasis in original).

6 515. Mr. Fuller testified that "depth is going to be the limiting factor every time over
7 width." *See* Tr. 10/20/15:195 (Fuller).

8 516. The shallowest portion of a river is the most limiting factor for navigation. *See*
9 Tr. 11/19/15:1531 (Gookin). Dr. Mussetter testified:

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

17 Tr. 1/28/16:2479-80 (Mussetter); Mussetter Presentation, at 148. Mr. Fuller did not analyze
18 the most limiting sections of Segment 6, so Dr. Mussetter created four more cross-sections at
19 steeper parts of the reach. *See* Tr. 1/28/16:2481-83 (Mussetter); Mussetter Presentation, at
20 150-54.

21 517. The Hyra depth estimates were developed exclusively for recreational boating.
22 ASLD Report 2003, at 8-1 [Lower Salt EI30]; *See* Tr. 10/23/15:820-21 (Fuller).

23 518. Mr. Fuller agreed that the Hyra report states you should measure the cross-
24 section at the shallowest part of the stream. *See* Tr. 10/23/15:823 (Fuller). He also agreed
25 that the depths reported are "minimum but wouldn't provide an ideal experience if the entire
26 river was at that depth." *Id.* at 824.
27

1 519. Using Dr. Mussetter’s median flow calculation, the depths calculated by Dr.
2 Mussetter’s new cross-sections were much more shallow than those presented by Mr. Fuller,
3 in the range of one foot. *See* Tr. 1/28/16:2487 (Mussetter); Mussetter Presentation, at 150-55.

4 520. Based on the foregoing evidence, the Commission finds that the hydrology
5 evidence submitted by Mr. Fuller does not support the State’s claims to title to the bed of the
6 Salt. The hydrologic analysis by Dr. Mussetter, Mr. Gookin, and Mr. Burtell demonstrates
7 that the Salt was not susceptible to navigation in its ordinary and natural condition.

8 **GEOMORPHOLOGY AND IMPEDIMENTS TO NAVIGATION**

9 **General Information**

10 521. According to Dr. Mussetter:

11 With the exception of the approximately 3-mile portion of the reach know as
12 Gleason Flat, that is located about 100 miles upstream from Granite Reef Dam,
13 the upstream approximately 93 miles of the Upper Salt River between the head
14 of Roosevelt Lake and the Black and White River confluence flows through a
15 narrow, bedrock canyon. This portion of reach is steep (~22 ft/mi in the 53-
16 mile reach between the head of Roosevelt Lake and Highway 60, about 26 ft/mi
17 between Highway 60 and the Black and White River confluence, including an
18 approximately 6-mile reach between Highway 60 and Walnut Canyon having an
19 even steeper slope of about 54 ft/mi), which alone would make navigation
20 challenging, under the best of circumstances. Of more importance, however,
21 this reach contains numerous rapids that would have made navigation
22 impossible, or at the very least extremely dangerous, with the watercraft that
23 were in customary use at and prior to the date of Arizona’s Statehood in
24 February 1912.

25 *See* Mussetter Declaration, at 4 [C024].

26 522. According to Dr. Mussetter:

27 The characteristics of the approximately 13-mile portion of the Upper Salt River
between Granite Reef Dam and Stewart Mountain Dam is less confined than the
upstream, bedrock-controlled reach, which allows for a wide, braided character.
The historic braiding corridor occupied essentially the entire valley bottom.
This portion of the reach has a single thread channel under current conditions
due to the regulating effects of the upstream reservoirs.

See Mussetter Declaration, at 4 [C024].

1 523. With regard to the portion of the Upper Salt River between Granite Reef Dam
2 and Stewart Mountain Dam, Dr. Mussetter wrote:

3 [S]imilar to the Gila River, a series of large floods occurred during the period
4 between the late-1880s and 1912 that likely scoured away much of the riparian
5 vegetation, caused extensive bank erosion and channel widening, and
6 maintained a wide, braided, multi-channel planform, a condition that would
7 have made navigation impossible, or at the very least impractical, during
8 significant portions of the year when flows in the river were low.

9 *See* Mussetter Declaration, at 2 [C024] (citations omitted).

10 524. Dr. Mussetter wrote: “Granite Reef and Roosevelt Dams were completed in
11 1908 and 1911, respectively. These structures would have been a man-made impediment to
12 navigation at the date of Arizona’s statehood.” *See* Mussetter Declaration, at 4 [C024].

13 525. Dr. Mussetter wrote:

14 The majority of the approximately 53-mile reach that is mostly inundated by
15 Roosevelt, Apache, Canyon and Saguaro Lakes is canyon-bound, similar to the
16 upstream reach. This reach would most likely have had similar geomorphic
17 characteristics to the upstream canyon-bound reach, including rapids and
18 shallow riffles that would have made navigation impractical with the watercraft
19 that were in customary use at and prior to the date of Arizona’s statehood.

20 *See* Mussetter Declaration, at 4 [C024].

21 526. Mr. Fuller testified that Segments 1-4 are primarily bedrock canyon, while
22 segments 5-6 are primarily alluvial valley. *See* Tr. 10/21/15:485-86 (Fuller); Fuller
23 PowerPoint, slide 210.

24 527. Dr. Mussetter wrote:

25 Contrary to previous testimony before the ANSAC on behalf of the State of
26 Arizona that the Gila and Verde Rivers were boatable using small, modern,
27 shallow-draft watercraft, and the anticipated similar testimony with regard to
the Lower Salt River, the highly-unpredictable hydrology, the braided nature of
the high-flow channel, and small size and dynamic nature of the low-flow
channel, including the tendency to shift laterally by thousands of feet during a
single flood event, strongly suggest that use of the Lower Salt River as a
highway for commerce in customary modes of trade and travel on water would
have been impractical.

1 *See* Mussetter Declaration, at 5 [C024].

2 **Shifting Channels**

3 528. With regard to the Lower Salt River, Dr. Mussetter wrote: “The available
4 historic data shows that the low-flow channel occupied nearly every position within the high-
5 flow channel at some point in time back to at least the mid-1800s. The physical
6 characteristics of the river strongly suggest that the unpredictable location of the low-flow
7 channel likely persisted prior to modern human influences.” *See* Mussetter Declaration, at 5
8 [C024].

9 529. Dr. Mussetter wrote:

10 With respect to the portions of the Upper and Lower Salt River that are not
11 bedrock-confined, Graf (1983) argued that alluvial dryland river channels are
12 not equilibrium forms. The morphology of the channel at any point in time is
13 inherited from the last significant, flood-driven alteration, and this controls the
14 channel form during the subsequent recovery period. Following the channel-
15 altering flood event, the river channel returns to its pre-disturbance condition
16 (i.e., it recovers) relatively slowly compared to the rate of adjustment during the
17 flood through sedimentation in low energy areas and re-establishment of
18 riparian vegetation on the surfaces that were disturbed by the flood. As a result,
19 it is not possible to define a dominant discharge, because the larger, more
20 infrequent flows are more geomorphically effective than the frequently
21 occurring flows. During floods, the flows are so powerful that they can rapidly
22 and significantly alter the channel and adjacent overbanks. The amount of
alteration depends on many factors, including the magnitude and duration of the
flows, the inflowing sediment load, the characteristics of the bed and bank
material and riparian vegetation, and the degree to which the channel has
recovered from the last major event. During the recovery periods of low- to
moderate sustained flows, the channel form tends toward a single-thread,
sinuous configuration within the overall wider cross section created by the
disturbance flows.

23 *See* Mussetter Declaration, at 8 [C024] (citations omitted).

24 530. Mr. Fuller testified: “[T]here is a potential for the low flow channel to move
25 more significantly in Segments 5 and 6 probably because of the lack of bedrock control.” *See*
26 Tr. 10/21/15:486 (Fuller); Fuller PowerPoint, slide 210. “[The] [l]ocation of the low flow
27

1 channel, indeed, may be different after a flood.” *See* Tr. 10/22/15:666 (Fuller); Tr.
2 10/23/15:916-17 (Fuller). Mr. Fuller agreed that the effects of a flood can last longer than the
3 period of flooding itself. *See* Tr. 10/22/15:671 (Fuller).

4 531. A portion of the disclaimer in Mr. Williams’s book reads: “Nature is constantly
5 changing, Rockslides occur, floods change river and creek channels, beaches erode away, and
6 earthquakes create new rain altogether. Therefore, any information contained herein should
7 be considered out of date and possibly incorrect.” *See* Tyler Williams, *Paddling Arizona*
8 (2006), at iv (“Paddling Arizona”) [C018–ASLD 200]. Mr. Williams testified that he has
9 seen the channel of the Salt change because of floods: “I’ve seen gravel bars move and
10 disappear and reemerge.” *See* Tr. 10/21/15:300 (Williams).

11 532. “The Salt River Project operated a gage at this site [Jointhead Dam] to monitor
12 the flow of the Salt River. The length of the record was substantial, but the SRP officials
13 considered the data inaccurate due to the frequent shifting of the main channels through this
14 braided reach.” *See* Graf 1988, at 116 [Lower Salt EI 23].

15 533. “Topographical surveys of portions of the Salt and Gila Rivers undertaken
16 between 1868 and 1883 indicate that the Salt River had shifting, sandy channels, often
17 overflowed its banks was easily forded, and was used for irrigation purposes as early as
18 1868.” *See* Richmond 1987, at 32 [EI12, Part 2, Tab 2].

19 534. A chart from Mr. Fuller’s 1987 thesis shows that the low-flow channel running
20 through Tempe and Phoenix “has been [at] virtually every location across the high flow
21 corridor” between 1868 and 1952. *See* Tr. 1/28/16:2449 (Mussetter); Mussetter Presentation,
22 slide 132.

23 535. Dr. Littlefield testified that shifting channels “would make it more difficult to
24 navigate with a boat, either up or down the river, if you couldn’t depend on the channel
25 remaining in place.” *See* Tr. 3/30/16:4031 (Littlefield).

1 536. “During this period from 1868 to 1926, wide fluctuations occurred in the lateral
2 position of the channel, with lateral movements of about 1.5 km (0.9 mi) occurring near
3 Country Club crossing. Between 1926 and 1961 much less movement was evident, but a
4 special characteristic appeared in the 1937 channel: it was highly sinuous and exhibited an
5 unusually pronounced meander near Tempe Butte. During this period phreatophyte growth
6 was more dense than at any other time during the period of record. . . . Most of the channel
7 stability in the later part of the record is probably due to intensive degradation of the main-
8 flow channel that began 1965 and continued in subsequent floods.” See William L. Graf,
9 *Flood-Related Channel Change in an Arid-Region River* (1983), at 128 [C042] (“Graf 1983”).

10 537. Dr. Mussetter testified:

11 And that is very consistent with statements that I made that, you know, it’s a
12 braided channel, it’s laterally unstable, particularly during flood flows. I also
13 testified about differences in the modern channel to what would have been
14 present, certainly prior to construction of the upstream dams. And one of the
15 arguments I made was that because of the changes in the flow regime and the
16 more regular flows that you see in that reach, there is a tendency for growth of
17 riparian vegetation, somewhat narrowing of the channel. . . . [T]he dams have
18 had a significant effect, dams and other factors. . . . [S]ediment trapping is also
19 a contributor to much of the stability that you see in the modern channel.

20 See Tr. 5/17/16:4493-94 (Mussetter).

21 538. In his investigation of 112 years of change on the Lower Salt, Professor Graf
22 concluded that because of floods channels on the Salt River have relocated and migrated up to
23 one mile, leading to stable and unstable zones along the general flow area. [C042]

24 539. Based on the foregoing evidence, the Commission finds that Segments 5 and 6
25 (as well as portions of Segments 3 and 4) were too unstable to be susceptible to navigation in
26 their ordinary and natural condition.

27 Braiding

 540. Mr. Fuller testified: “But it’s the ordinary floods that shape the low flow
channel. And those -- marks of those floods can persist in the landscape for decades, in some

1 cases centuries, depending on the size of the flood and the amount of low flow that occurs in
2 the river.” *See* Tr. 10/20/15:36-37 (Fuller).

3 541. Mr. Fuller testified that Surveyor Ingalls’ map, one of the first recorded maps of
4 the Salt River, shows a split channel for half of the reach and even had a triple channel in
5 some places. *See* Tr. 10/20/15:41-42 (Fuller).

6 542. “The Lower Salt River was subject to periodic flooding, and this flooding
7 produced the disturbance regime that created a braided planform. Based on the historical
8 information, the bankfull capacity of the high-flow channel (~175,000 cfs) was exceeded
9 about once in 40 years, on average.” *See* Mussetter Declaration, at 4 [C024].

10 543. Dr. Mussetter wrote:

11 In summary, alluvial rivers in the arid southwestern U.S. experience cycles of
12 low (or non-existent) to moderate flows punctuated by large, infrequent,
13 monsoon-driven flood events. During the low to moderate flow periods, they
14 tend toward a single-thread, meandering planform, and during the infrequent,
15 large floods, they can rapidly transform into a wide, braided, multi-channel
16 planform in which the flow depths are highly irregular, both spatially and
17 temporally. Both conditions are ordinary and natural conditions of the river.
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.

18 *See* Mussetter Declaration, at 10 [C024].

19 544. “Chuang and Figueredo (1998) determined that the portion of the Lower Salt
20 River channel between Phoenix (48th Street) and Tempe (Priest Drive) consisted of about 14
21 percent low-water channel, 54 percent high-water channel, and 32 percent islands and bars in
22 1935, typical of a braided channel []. Based on historical aerial photographs and river
23 characteristics shown on the earlier mapping, the relative proportions of these features was
24 probably very similar under natural conditions throughout the unconfined portions of the
25 Lower Salt River. Remnants of the braided pattern persist today [].” *See* Mussetter
26 Declaration, at 34 [C024].

1 545. “Through the study area, the Salt River divides into two distinct channels
2 farther eastward than in 1868. The location of South channel, along the boundary of Sections
3 14 and 15, has not noticeably changed since the Ingall’s survey; however, Indian Slough has
4 moved somewhat southward. Along the boundary of Sections 13 and 14 (present location of
5 Hayden Road), Indian Slough now occupies the single stream channel of 1868, while a south
6 channel is located approximately ½ section southward of Indian Slough. West of the study
7 area the Salt River becomes a single channel, but in 1868 the river in this region flowed in
8 two widely separated channels.” *See* Paul F. Ruff, *A History of the Salt River Channel in the*
9 *Vicinity of Tempe, Arizona 1858-1869*, at 8 (1971) [Lower Salt EI 23] (“Ruff 1971”)
10 (describing 1903-04).

11 546. A map submitted by the ASLD shows multiple channels at several locations
12 near Fort McDowell. *See* USGS Historical Maps, Map 4 [C018–ASLD 246]; *see* Tr.
13 11/17/15:1070 (Fuller). Mr. Fuller conceded that the map shows the channels splitting into
14 two or three channels in multiple locations. *See* Tr. 11/17/15:1070-71 (Fuller). Another map
15 submitted by the ASLD shows multiple channels at several locations near Salt River Indian
16 Reservation. *See* USGS Historical Maps, Map 5 [C018–ASLD 246]; *see* Tr. 11/17/15:1071
17 (Fuller).

18 547. Mr. Fuller agreed that the bankfull discharge is between a 1.5-year event a 10-
19 year event, which would put the Salt “clearly into the braided category.” *See* Tr.
20 11/17/15:1071 (Fuller); Fuller PowerPoint, slide 15.

21 548. Mr. Fuller agreed that Ingalls’ 1868 survey plat map shows multiple channels
22 on the Salt near the Gila confluence. *See* Tr. 11/17/15:1072 (Fuller); Fuller PowerPoint, slide
23 35. Mr. Fuller agreed that, at this time, the river was “close to its ordinary and natural
24 condition.” *See* Tr. 11/17/15:1072 (Fuller).

25 549. Dr. Mussetter testified:

26 So we’ve heard testimony that channel pattern is not relevant to the question of
27 navigability, and I want to reiterate that I take exception to that. Braided

1 channels tend to be quite wide. They tend to be relatively shallow compared to
2 meandering-type rivers. They also tend to have very high variability in the
3 depth along the streamline of a river. So you find one place where it's maybe
4 suitable to float a craft for commercial purposes, and a very short distance
5 downstream you would run aground, that sort of thing.

6 *See* Tr. 1/27/16:2254 (Mussetter); Mussetter Presentation, slide 10.

7 550. Dr. Mussetter testified: "I know we have had a lot of discussion about the fact
8 that, yes, the flood channel of the Salt River was braided during and after floods, but then it
9 settles down to a single-thread channel. That is probably an exaggeration. There are many
10 places along there where there was more than one channel." *See* Tr. 1/27/16:2254
(Mussetter); Mussetter Presentation, slide 10.

11 551. Maps and photographs in Mr. Fuller's own presentation as well as the Historical
12 Photos show a braided river in Tonto Basin as well as Segments 5 and 6. *See* Fuller
13 PowerPoint, at 16, 17, 19-20, 27, 31-36, 73, 94-96, 103, 106, 130, 145-46, 150, 155, 158, 211,
14 216, 220, 242, 245 & 248; *see also* Littlefield Declaration, at B:2-22, 30, 32-33, 38, 47, 50,
15 51, 52; C:2-10, 12-14, 18-19, 36; Historical Photos, at 4-34, 36-42, 46-55, 58-81, 89-90, 97-
16 116, 120-25, 131-32, 135-37, 139-41, 144-46, 156-96, 204-08, 238-41.

17 552. Dr. Mussetter testified: "[T]he same process happens in the Salt as does on the
18 Gila River. You get big floods. So it goes along for a period of time. You have a fairly
19 narrow channel that settles down to the lower flows, and then it gets hit by larger floods and
20 the channel widens out, the vegetation blows out, the channels shift around; and then over
21 time it sort of recovers back to a more narrower width." *See* Tr. 1/28/16:2415 (Mussetter);
22 Mussetter Presentation, slide 88.

23 553. Dr. Mussetter testified that it's "common sense" that two split channels would
24 be shallower than a single channel. *See* Tr. 1/28/16:2535-36 (Mussetter). "[A]n example
25 would be the cross sections that we looked at right at the very end of my testimony. We
26 talked about one area where there was a flow split. It bifurcated into two channels. And that
27

1 was the shallowest of all of the cross sections that we looked at, based on the rating curves.
2 There's less water in the channel. It's bound to be shallower." *Id.*

3 554. With regard to paddling a braided river, Mr. Williams testified: "Well, it
4 requires you to read the water and read the depth of the channel. And normally, there's
5 always a channel that accommodates most boats, the deepest channel. So -- so -- yeah,
6 sometimes you guess wrong, or sometimes you don't read the river correctly. But it's just a
7 matter of reading the -- reading the current and assessing the channel and proceeding." *See*
8 *Tr. 10/21/15:289 (Williams).*

9 555. "An indication of the nature of Salt River at the time of Arizona statehood can
10 be obtained from the 1903-1904 topographic maps []. On these maps, a single low-water
11 channel is identified by the blue color, and this channel lies within a stippled pattern
12 representing the sand and gravel-bedded flood channel. The pattern suggests a river width
13 often in excess of one mile, but the blue pattern indicates a much narrower low-water channel.
14 General Land Office surveys conducted in 1870 show that the Salt River consisted of multiple
15 channels that occupied essentially the entire width of the stippled pattern shown on the 1903-
16 1904 maps. The low-water channels shifted within the main channel, and often more than
17 one low-water channel was present." *See Mussetter Declaration, at 39 [C024].*

18 556. The Lower Salt has been characterized by nearly every expert witness in these
19 proceedings as a braided river with islands and multiple or compound channels which shift
20 following flood events.

21 557. Based on the foregoing evidence, the Commission finds that the braiding in
22 Segments 5 and 6 (as well as portions of Segments 3 and 4) would have been an impediment
23 to navigation in the river's ordinary and natural condition.

24 **Steep Slope**

25 558. Regarding the 93-mile, canyon-bound reach between the White and Black River
26 confluence and the head of Roosevelt Lake, Dr. Mussetter wrote:
27

1 The overall gradient of the river in the canyon-bound reach is relatively steep
2 (~22 ft/mi in the 53-mile reach between the head of Roosevelt Lake and
3 Highway 60, and about 26 ft/mi between Highway 60 and the confluence of the
4 Black and White Rivers) []. The approximately 6-mile reach between Highway
5 60 and the mouth of Walnut Canyon is about twice as steep as the remainder of
6 the reach, at about 54 ft/mi. For comparison, the average gradient of the
approximately 64-mile reach between the mouth of the Verde River and Pinal
Creek that is mostly inundated by the series of existing reservoirs is about 14
ft/mi.

7 *See* Mussetter Declaration, at 12 [C024].

8 559. “The 48 miles of river upstream from Roosevelt Lake (known as the ‘Upper
9 Salt River’) is known nation-wide as a first-class whitewater river. The gradient of the river
10 is one of the reasons for the wild ride encountered by today’s boaters.” *See* U.S. Forest
11 Service, *Evaluation of Navigability at the Time of Statehood Salt River (Roosevelt Dam*
12 *upstream to the Eastern Boundary of Tonto National Forest)*, at 2-3 (January 1998) [Upper
13 Salt EI08] (“USFS 1998”).

14 560. “The slope (determined by average number of feet per mile the river drops)
15 determines how fast the river flows downstream – the faster the flow, the more difficult rapids
16 are to maneuver. The slope of rivers usually changes throughout the river, with nearly calm
17 areas intermixed between moderate or extreme rapids. Where a slope suddenly becomes
18 close to vertical, a waterfall occurs with few would dare to run. While average slope gives
19 quite a bit of information, it does not tell the whole story since sharp drops in a river with low
20 average gradient can make a river hazardous.” *See* Stantech 1998, at 37 [Upper Salt EI11].

21 561. Dr. Mussetter testified: “[S]teeper slope generally implies lower depths, higher
22 velocities. But there are many, many other factors that also impact that, so you can’t look at
23 slope singularly and make a determination about that.” *See* Tr. 1/29/16:2556 (Mussetter).

24 562. Based on the foregoing evidence, the Commission finds that Segments 1
25 through 4 are relatively steep, which would have been an obstacle to navigation on the Salt in
26 its ordinary and natural condition.

1 **Marshes**

2 563. “In the nineteenth century, the river flowed continually and moved unrestricted
3 in its valley. The land area immediately bordering the Salt River near Tempe was described
4 as ‘. . . swampy; and populated with cottonwood and mesquite trees, and will brush.” *See*
5 Ruff 1971, at ii [Lower Salt EI 23].

6 564. “The Salt River flows on two distinct channels as it crosses the present location
7 of Scottsdale Road (section line between Sections 14 and 15). The south channel, designated
8 as ‘Indian Slough,’ is approximately twice the width of the north channel, which is referred to
9 as the ‘Salt River.’ Mr. W. H. Ingalls, responsible for the cadastral surveys of the region,
10 describes the area along the boundary between Sections 11 and 14 as, ‘. . . low and inclined to
11 be swampy; with timber cottonwood along banks, and mesquite and will brush.” *See* Ruff
12 1971, at 8.

13 565. Mr. Gookin testified: “[T]he Salt River in Townships 1 North and South,
14 Range 1 West was, according to the USGS, primarily marshland, which I think would create
15 vegetation-choked areas.” *See* Tr. 11/19/15:1546 (Gookin).

16 566. Based on the foregoing evidence, the Commission finds that portions of
17 Segment 6 were marshy in the river’s ordinary and natural condition, which would have been
18 an obstacle to navigation.

19 **Sandbars**

20 567. Mr. Fuller testified that there were probably “some sandbars” on the lower Salt.
21 Tr. 10/20/15:48 (Fuller); Fuller PowerPoint, slide 44.

22 568. Mr. Williams testified that Segment 3 might have more gravel bars than
23 Segment 2 because it is flatter and has “a few less rapids.” *See* Tr. 10/21/15:289 (Williams).

24 569. Mr. Fuller testified that there are gravel and cobble bars in all six segments and
25 sand bars in Segment 6. *See* Tr. 10/21/15:491-92 (Fuller); Fuller PowerPoint, slide 223.

1 570. Mr. Fuller agreed that the depth of the Salt can be very shallow at rock bars,
2 even if the average depth is higher. *See* Tr. 11/17/15:1148-49 (Fuller).

3 571. One type of river that is “unboatable” includes: “In low desert regions, small
4 low elevation watershed, usually dry except in rare flood events, sandy or rocky bottom, very
5 shallow, low slope, possible sand bars.” *See* Stantech 1998, at 35 [Upper Salt EI11].

6 572. Dr. Mussetter presented a 1926 map of the Salt between Stewart Mountain Dam
7 and Mormon Flat Dam. *See* Tr. 1/28/16:2330-32 (Mussetter); Mussetter Presentation, slide
8 67-73. The map shows “sand and gravel bars,” “split channels,” “secondary channels,” “sand
9 and gravel islands,” in many locations. *Id.*

10 573. Based on the foregoing evidence, the Commission finds that sand and gravel
11 bars throughout the entirety of the Salt would have been obstacles to navigation in its ordinary
12 and natural condition.

13 Rapids

14 574. Dr. Mussetter wrote:

15 The Upper Salt River flows through a narrow, bedrock-confined canyon over
16 much of its length. Canyon-bound rivers of this type are strongly controlled by
17 the characteristics of the bedrock that provide both lateral and vertical control
18 on the form of the river, and by coarse-grained sediment and debris that is
19 delivered to the river by floods and debris flows from the side canyons and by
20 colluvial processes (i.e., gravity) from the canyon walls. These rivers are
21 typically supply-limited, which means that they can transport considerably more
22 sediment than is being supplied from upstream. As a result, the sediment load
23 has little influence on the overall form of the river, at least during flows up to
24 moderate-magnitude floods. As is the case at many locations along the Upper
25 Salt River, the bedrock can cause sharp breaks in the longitudinal profile that
26 create waterfalls and rapids that can make navigation very challenging and
27 dangerous, and in some cases, impossible. 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.

25 *See* Mussetter Declaration, at 8 [C024] (citations omitted).

1 575. Regarding the 93-mile, canyon-bound reach between the White and Black River
2 confluence and the head of Roosevelt Lake, Dr. Mussetter wrote:

3 Within the canyon-bound reach, bedrock is exposed in both the bed and banks
4 of the river in many locations, providing direct vertical and lateral control that
5 creates steep drops in the river bed elevation that form rapids []. In many other
6 locations, large caliber sediment and debris from the adjacent side canyons
7 constrict the river []. The large, mostly immobile debris controls the vertical
8 profile, creating steep drops in bed elevation and rapids. In still other locations,
9 constrictions in the valley width and bends in the valley alignment create
10 upstream backwater[] conditions at high flows when coarse-grained sediment is
11 being transported, causing the transported sediment to deposit and form large
12 cobble bars. During subsequent lower flows, the river is constricted to a
13 relatively narrow channel along the sides (or in some cases, across the middle)
14 of the bars, forming rapids or shallow riffles []. In many instances, large
15 boulders that have fallen from the bedrock valley walls in the above-described
16 areas create additional roughness and hazards to navigation. In all cases, the
17 rapids and riffles represent significant impediments to navigation by the
18 watercraft that were in use at and prior to the time of Arizona's statehood.

19 *See* Mussetter Declaration, at 12 [C024].

20 576. Regarding the 93-mile, canyon-bound reach between the White and Black River
21 confluence and the head of Roosevelt Lake, Dr. Mussetter wrote:

22 The USFS (1995) guide contains descriptions of at least 23 named rapids in the
23 approximately 36-mile reach downstream from Highway 60. One of these
24 rapids (Quartzite Falls []) is notoriously dangerous, even for skilled whitewater
25 boaters. This rapid required a difficult portage to pass prior its being
26 surreptitiously modified by blasting in 1998, an act for which eight men were
27 convicted for damaging government property. The individuals responsible for
the blasting allegedly did so to remove the impediment to navigation out of
concern for public safety, as a number of people had drowned attempting to
navigate the rapid. Even after the blasting, this rapid remains one of the most
challenging on the river.

See Mussetter Declaration, at 19 [C024].

 577. While discussing why the river was not used to deliver construction materials,
Mr. Fuller testified:

1 I would suggest that one big reason is the conditions of the Salt River, the rapids
2 and the riffles, flow velocities and, to a minor degree, the depths, were not
3 really conducive to heavily-loaded deep-draft boats, which is not the nature to
4 the river. That's not the case that the State is making right here. You're not
going to be hauling ore boats or boats that have tons and tons of material, large
boats, barges. It's just not conducive.

5 *See* Tr. 10/20/15:260 (Fuller); Fuller PowerPoint, slide 203.

6 578. "All natural rivers curve and twist to some extent, but some are so contorted as
7 to make river running very difficult if not impossible. A narrow winding stream especially if
8 strewn with boulders, may be boatable by personal inflatable watercraft but nothing larger, for
9 example, or it may be completely unboatable." *See* Stantech 1998, at 34 [Upper Salt EI11].

10 579. "Rapids occur when the slope of the river suddenly increases, often because of
11 increased slope, decreased width, and/or the presence of rocky areas (sometimes due to
12 landslides). Rapids increase the excitement and thrill of river running, but can be so
13 dangerous as to make a river unrunnable. In Arizona, the amount of water in the stream can
14 vary so greatly throughout the year that the scale is difficult to apply, as a river may be Class I
15 at some times of the year and Class II – IV at others, for example, whether or not one large
16 boulder is visible or submerged is considered a test of boatability during spring run off.
17 Boulders that are fully submerged by plenty of water can be avoided, while boulders
18 emerging from the water can lead to crashes. Sandbars can make the river unrunnable if too
19 extensive. Even a small man-made dam can be a sever hazard to boats." *See* Stantech 1998,
20 at 37 [Upper Salt EI11].

21 580. Regarding Mr. Fuller's argument that rapids are only a small percentage of the
22 Salt, Dr. Mussetter testified:

23 But I would liken that to -- I find that kind of a frustrating argument and a
24 disingenuous argument. I would liken it to a highway system. If you take the
25 number -- the length, his length of rapids, Class III and Class IV, that I think
26 most people at least would agree would be challenging using the boats that were
27 customarily used at the date of statehood, there are 33 of those rapids. If you
divide that into the length, you get a rapid about every 1.4 miles. Would we say
that a highway system is open for commerce if you had a bridge out or some

1 really significant challenging crossing every 1.4 miles along that highway
2 system? I hardly think so.

3 *See* Tr. 1/27/16:2297 (Mussetter); Mussetter Presentation, slide 49.

4 581. Dr. Mussetter testified that even Class I and II rapids can be a limit to
5 navigability because they suggest shallow depths. *See* Tr. 1/29/16:2589-90 (Mussetter).

6 582. Mr. Dimock testified: “When you’re running rocky rivers, sometimes you have
7 to err on the side of caution and unload the boat or drag them around. That’s how they did.
8 People didn’t start running rapids without taking cargo out until 1920s, really.” *See* Tr.
9 10/22/15:562-63. (Dimock).

10 583. Mr. Williams testified that the Upper Salt River is about thirty percent rapids.
11 *See* Tr. 10/21/15:378 (Williams).

12 584. Dr. Newell testified: “Any portage prohibits navigation, so any distance at all
13 where you have to be able to pick up a boat and carry it around an obstacle prevents
14 navigation. It also prevents any kind of sizable cargo being carried too.” *See* Tr.
15 3/31/16:4393-94 (Newell).

16 585. Mr. Williams testified that decision to unload a boat while lining “depends how
17 confident you are in your lining skills.” *See* Tr. 10/21/15:283 (Williams).

18 586. Based on the foregoing evidence, the Commission finds that rapids in Segments
19 1 through 4 would have been obstacles to navigation in the Salt’s ordinary and natural
20 condition.

21 **Beaver Dams**

22 587. In 2003, Mr. Fuller’s testified that, “in times where I canoed on rivers with
23 beaver dens, that’s the place where you have to get out and lift your boat over it.” *See* Tr.
24 4/7/2003:30 (Fuller). Mr. Fuller testified that his opinion regarding beavers was based, in
25 part, on conversations a member of his staff had with a professor in Utah that he could not
26 name. *See* Tr. 10/23/15:865-66 (Fuller).

1 588. “Obstacles include boulders, overhanging branches, beaver dams, sand bars or
2 man-made obstacles such as dams or barbed wire fences. Some of these obstacles are more of
3 a problem at some times of the year than others. On the Virgin River, for example, whether
4 or not one large boulder is visible or submerged is considered a test of boatability during
5 spring runoff. Boulders that are fully submerged by plenty of water can be avoided, while
6 boulders emerging from the water can lead to crashes. Sandbars can make the river
7 unrunnable if too extensive. Even a small man-made dam can be a severe hazard to boats.”
8 *See* Stantech 1998, at 37 [Upper Salt EI11].

9 589. In 1867, the Lower Salt had beaver dams “in some places every few hundred
10 yards.” *See* Tr. 11/19/15:1547 (Gookin). This created marshy areas. *Id.*

11 590. Other factors that Mr. Gookin believes are impediments to navigation in
12 Segment 6 include “very sudden flash floods,” “heavy marshes,” and beaver. *See* Tr.
13 2/26/16:3472 (Gookin).

14 591. Mr. Mickel testified that he has seen “evidence” of beaver on the banks of the
15 Salt, including their dwellings. *See* Tr. 10/21/15:401 (Mickel).

16 592. Based on the foregoing evidence, the Commission finds that beaver dams would
17 have been obstacles to navigation in the Salt’s ordinary and natural condition.

18 **MODERN BOATING**

19 **Recreational Nature of Boating Accounts**

20 593. Modern recreational craft are not meaningfully similar to historical craft used in
21 customary modes of trade or travel. *See* Findings of Fact Nos. 593-798, *infra*.

22 594. “Although the 48-mile section of river within the Salt River Canyon has been
23 regularly recreationally boated for the past 25 years using technologically advanced inflatable
24 rafts/kayaks as well as plastic/fiberglass canoes and kayaks, even these boats regularly fall
25 victim to the river []. River-runners today, with their high-tech equipment and improved
26 techniques, simply cannot be compared with the situation in 1912; to do so would be like
27

1 comparing a delicate, bruise-prone apple with a thick-skinned, practically indestructible
2 orange. Proof that boaters have run this river in the recent past is simply not directly relevant
3 to the criteria for navigability” See USFS 1998, at 7 [Upper Salt EI08].

4 595. Mr. Fuller agreed that modern boats “allow you to boat places you couldn’t in
5 historic boats” in “some places.” See Tr. 5/19/16:5051 (Fuller). Mr. Fuller agreed that
6 modern plastics slide easier over rocks compared to wood and canvas canoes. *Id.* at 5052. He
7 testified: “Somewhat more easily, depending on the condition of them. As a general rule, I
8 would say that’s probably true.” *Id.*

9 596. “It can be hard to find good places to kayak in Phoenix. Cody Howard and his
10 pals have done their best. They’ve slid their boats off tile roofs into swimming pools.
11 They’ve paddled in irrigation canals, at night. They’ve jumped wakes and done stunts on
12 Bartlett Lake, a speedboat dragging them along.” See Ron Dungan, “Up a creek, with a
13 paddle: Desert kayakers chase the water,” *The Arizona Republic* (April 29, 2016) [C054–C].

14 597. “Definitions of creek boating, also known as steep creeking, or creeking, vary,
15 but it generally involves launching a kayak down a high-running creek, a steep section of
16 river. Elite creek boaters look for Class 5 or Class 6 rapids, waterfalls, deep cauldrons. They
17 plunge over drop-offs 20 feet of water. Thirty. Forty. More. They ping-pong off stony
18 chutes, down unknown chasms and nameless runs where logs and undercuts lie waiting and
19 the whitewater runs brown.” *Id.* When asked why modern recreational boats are capable of
20 such activity, Mr. Fuller testified: “Because of its durability and design, designed to take --
21 some of them are designed to take high impact.” See Tr. 5/19/16:5054 (Fuller).

22 598. Mr. Fuller agreed that the recreational boaters that take 40 foot drops, wipeouts,
23 navigate Class V and VI rapids meet his definition for successful boating accounts that he
24 applied in his work on this case. See Tr. 5/19/16:5055-56 (Fuller).

25 599. Mr. Fuller agreed that modern recreational boats are built for a different purpose
26 than boats that were historically built to haul ore. See Tr. 5/19/16:5057 (Fuller). He testified:
27

1 “Certainly. It’s a different purpose to haul ore, but the basic purpose of boats carries people
2 and load.” *Id.*; Tr. 5/19/16:5058 (Fuller).

3 600. When asked what about modern boats allowed modern boaters to navigate
4 streams that were not navigable in historic boats, Mr. Fuller testified: “[T]he things about the
5 boats that people take down [the East Verde River or Burro Creek] that are different from
6 historic boats would be some elements of their design. Typically, people are using very small
7 boats, you know, basically, a bathtub-sized kayak or something similar to that, certainly
8 constructed of highly durable materials, plastic or high glean or one of those things like that.”
9 *See* Tr. 5/19/16:5051 (Fuller).

10 601. Mr. Fuller testified that some statehood-era boats are meaningfully similar to
11 modern boats, but “some aren’t.” *See* Tr. 10/20/15:16 (Fuller).

12 602. Mr. Fuller testified that he has boated the Salt River below Stewart Mountain
13 Dam at 8 cfs. *See* Tr. 10/20/15:23 (Fuller). He also testified that he has boated rivers in
14 Arizona that the ASLD has not claimed are navigable. *Id.* at 24. Mr. Fuller agreed that just
15 because someone can boat the Salt in modern times does not mean they could have boated it
16 in 1912. Tr. 4/7/03:69 (Fuller). Mr. Fuller testified: “I would say that the boats that are able
17 to successfully navigate Segment 1 are not meaningfully similar to boats that were available
18 as of the time of statehood, at least under ordinary flow conditions.” *See* Tr. 10/22/15:680
19 (Fuller).

20 603. With regard to the difference between historic boats and modern boats, Mr.
21 Williams testified: “They’re like any technology; they’re always evolving.” *See* Tr.
22 10/21/15:294 (Williams). He agreed that inflatable kayaks are “a lot better” for low water
23 conditions. *Id.* at 305.

24 604. Mr. Fuller testified that the boat-specific depth estimates in the ASLD report
25 were “developed primarily for recreational boating.” Fuller Lower Salt 2003, at 8-1 [Lower
26 Salt EI30]; *see* Tr. 10/23/15:820-21 (Fuller). Mr. Fuller agreed that at least, “in some
27

1 circumstances,” some aspects of a river are good for recreation when they are not good for
2 other types of commercial boating. *See* Tr. 10/23/15:829-30 (Fuller).

3 605. “When determining boatability, the intended kind of boat and purpose need to
4 be considered. A river that is boatable by a neoprene raft or fiberglass canoe may not be
5 boatable by wooden rowboats, for example. Man-made lakes in Arizona are boatable by
6 sailboats, but small streams are not.” *See* Stantech 1998, at 33-34 [Upper Salt EI11]; Tr.
7 11/19/15:1502 (Gookin).

8 606. Mr. Gookin testified:

9 [M]odern recreational criteria are not based on whether or not it’s a highway of
10 commerce; but, instead, it’s based on trying to be thrilling. As an engineer,
11 taking the criteria used for a roller coaster is not a good idea to build a highway.
12 They’re for different purposes and they have different designs. Similarly, with
13 evaluating a river, what you like for a thrill ride is different than what you want
14 for commerce, because you don’t want the passengers to be too excited if it’s
15 not recreation.

16 *See* Tr. 11/19/15:1531 (Gookin). Mr. Gookin does not believe that modern recreational boats
17 are meaningfully similar to boats at the time of Arizona’s statehood. *See* Tr. 11/19/15:1639
18 (Gookin).

19 607. Dr. Littlefield testified:

20 I looked at the types of boats that had been used, and I compared those boats to
21 the descriptions of the Salt River and reached the conclusion that those types of
22 boats could not have been used on the Salt River during the time period that my
23 reports cover. . . . They could have been if it was navigable, but they weren’t.
24 So it indicates to me that nobody thought it was possible to do that or -- and
25 they didn’t do it on a regular and reliable basis.

26 *See* Tr. 3/30/16:4119 (Littlefield).

27 608. Dr. Newell testified that there is “no meaningful relationship at all” between
modern recreational craft and the historic watercraft he listed in his report. *See* Tr.
3/30/16:4246 (Newell).

1 609. The vast majority of Mr. Williams' boating experience involved kayaks,
2 although he has "paddled a whitewater canoe on a couple of occasions." *See* Tr.
3 10/21/15:276-78 (Williams).

4 610. Explaining why he has not seen historic flatboats on the Salt River, Mr. Fuller
5 testified: "The same reason that I very rarely see a 1900 vintage car on the highway.
6 Technology has improved. It's easier to use and they're more readily available." *See* Tr.
7 10/22/15:617 (Fuller); Fuller PowerPoint, slide 281.

8 611. Mr. Fuller testified: "[A]ll of my boats are professional whitewater quality
9 boats." *See* Tr. 11/18/15:1286 (Fuller). Mr. Fuller testified: "[T]here's definitely a step up in
10 cost and design to get a whitewater boat. And the same for canoes. In fact, the same for
11 canoes. There are canoes that are not well-designed, they're cheap construction. And then
12 there are canoes that are built for taking on whitewater streams." *See* Tr. 11/18/15:1287
13 (Fuller). Mr. Fuller testified:

14 But typically what goes in a whitewater boat these days is you might have some
15 kind of flotation, so you have inflatable airbags that go in the end that give you
16 slightly more buoyancy if you flip over. But, mostly, they displace water, so
17 that if you do take on water, there's less volume to be held in your boat, so it
18 means there's going to be less weight that you're carrying. And if water sloshes
19 around and you get it in the canoe, if it gets too deep, then it makes controlling
20 it more of a challenge. Other design aspects of whitewater quality canoes, for
21 instance, is they tend to have what's called rocker. So from front to back they
22 have a -- they kind of bend so the middle part is generally deeper than the ends,
23 and that enables you to turn quicker.

24 *See* Tr. 11/18/15:1287-88 (Fuller).

25 612. Mr. Fuller uses a personal flotation device and has flotation bags in his canoe.
26 *See* Tr. 11/18/15:1291 (Fuller).

27 613. "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

1 types of canoes and kayaks, inflatable boats for single paddlers and for groups – all
2 contributed to the rising popularity of river running in Arizona especially on rivers not
3 previously considered boatable, or boatable only very rarely because of low water.” *See*
4 *Stantech 1988*, at 32 [Upper Salt EI11].

5 614. “Twenty rivers [in Arizona] are reported to be used frequently in the spring high
6 water season by boaters and a few more are boated occasionally.” *Id.* at 32.

7 615. “Recreational boating became popular on man-made lakes starting in the 1880s,
8 and accelerated with the construction of man-made lakes starting in the 1880s, and
9 accelerated with the construction of large dams such as Roosevelt.” *Id.* at 33.

10 616. “Some daring adventurers traveled on the Gila and other rivers throughout the
11 historic period, but rivers were not generally used for recreational travel until the
12 developments of new materials such as fiberglass and artificial rubber after World War II.”
13 *Id.*

14 617. Dr. Mussetter testified:

15 In my view, the recreational boating that occurs in Segment 5 of the Salt River
16 is not particularly informative with respect to the question of navigability. . . .
17 Partly because or largely because the flows that occur in that reach during the
18 recreational boating season are certainly on the high end of anything that could
19 be considered an ordinary flow under natural conditions. The flows are quite
20 elevated because of the releases from Stewart Mountain Dam.

21 *See Tr. 1/29/16:2693 (Mussetter).*

22 618. Dr. Newell is generally familiar with modern recreational craft used on the Salt.
23 *See Tr. 3/30/16:4232 (Newell).* Dr. Newell testified: “By no stretch of the imagination can I
24 think that modern craft in any way relate to, for example, a keelboat hauling 15 tons on a river
25 or even a smaller boat carrying a substantial cargo. You know, these modern boats don’t have
26 any relationship to that activity at all.” *Id.* at 4232-33.

27 619. Dr. Newell testified: “[M]odern day kayak or plastic canoe is specifically
designed to withstand the kinds of impacts on cataracts and rapids which it can negotiate. A

1 canoe carrying a similar load would not be able to negotiate a similar kind of environment.”
2 *Id.* He also testified: “I’ve seen rivers you could use a kayak on today that you could not
3 navigate in the historic period with a commercial load.” *See* Tr. 3/31/16:4306 (Newell). Dr.
4 Newell testified that modern canoes that weigh the same as a historical canoe is still not
5 meaningfully similar because “construction materials are so much better than they would have
6 been in the historic canoe.” *Id.* at 4350. Other differences include: “durability, weight,
7 ability to survive impacts.” *Id.*

8 620. Based on the foregoing evidence, the Commission finds that evidence of
9 modern recreational boating on the Salt does not support a finding that the Salt was
10 susceptible to navigation in its ordinary and natural condition.

11 **Mr. Mickel’s Boating Operation**

12 621. Alex Mickel, a river outfitter who owns a business called Mild to Wild Rafting
13 based in Durango, Colorado. *See* Tr. 10/21/15:380 (Mickel). He has been a recreational
14 boating tour operator on the Upper Salt since 1998. *Id.*

15 622. Mr. Mickel’s company offers trips on the Upper Salt with rafts with
16 approximately six people on a raft, but there is often a second raft carrying gear for the trip.
17 *See* Tr. 10/21/15:387-88 (Mickel).

18 623. Mr. Mickel testified that, with regard to his rafting operation on the Upper Salt,
19 “[w]e hope for three months and that predictable season where we can deliver the experience
20 that we’re advertising.” *Id.* at 405; *see also* Mild 2 Wild website (2015) [C031–SRP 2]. Mr.
21 Mickel testified that the rafting season can be as short as “just March and into early April.”
22 *See* Tr. 10/21/15:405 (Mickel). In comparison, Mr. Mickel also runs rafting operations on the
23 Lower Animas River in Colorado that can run from mid-April through October. *Id.* at 406.
24 His operation on the Upper Animas River runs from August 1 to mid-May. *Id.* His operation
25 on the Colorado River runs from April to October, but some companies go even longer. *Id.* at
26
27

1 407. Mr. Mickel testified that some rafting operations didn't even run rafting trips on the Salt
2 River in 2014 due to low water conditions. *Id.* at 420-27.

3 624. Mr. Mickel's trips on the Upper Salt do not operate beyond the February/March
4 to May/June season because it is unpredictable. *Id.* at 388. Mr. Mickel's company does not
5 operate trips outside of the high water season because "[t]he waves get smaller as the river
6 goes down. And it's not as wet and thrilling." *Id.* at 388-89. "The customers want rapids . . .
7 they want splashes and waves." *Id.* at 420-21.

8 625. Regarding Segment 2, Mr. Mickel testified:

9 It would all vary a little bit depending on water levels. You know, every rapid
10 is a little different at each water level, so you would be considering it as you
11 move downstream. There's -- I guess, the biggest areas of concern at lower
12 flows outside of the pre-mentioned ones of Black Rock, Corkscrew, Quartzite,
13 and The Maze would be Rat Trap Rapid above Gleason. And that would be
14 primarily a concern of lower flows with a sharp, short ledge. That would
15 probably -- that would be easily portaged on river right. And if I go back
16 upstream, there's gonna be -- it just varies so much on water level and hazards
17 as you're coming down. There's no major -- there's no place that -- what I
18 would call ideal flow -- if I was in a flatboat and it was around 5- to 600 cfs, I
19 would be deathly worried about -- you know, especially on the day stretch above
20 Cibecue. As you got further downstream, you know, I would proceed with
21 caution at Quartzite and Black Rock. I would probably scout them and pick a
22 line on the way through. Quartzite, preexisting the dynamiting of Quartzite
23 Falls, depending on the water flow level, you would probably want a line or
24 portage.

25 *Id.* at 394-95.

26 626. Mr. Mickel portaged Quartzite Falls before it was blasted. *Id.* at 395.

27 Regarding portaging Quartzite Falls, Mr. Mickel testified:

Well, it entailed some labor. Used to portage on the river left and you
take your gear up and over, and then you would take your raft up and over on
river left at high flows. At lower flows, it was much easier to line. But the few
times I was there, prior to it being dynamited, the river was in -- one time in
excess of 7,000 cfs, another time in excess of 3,000, and at those flows, we
deemed it safer to portage on the river left rather than deal with the historic
lining -- place of lining on the river right.

1 *Id.* at 396.

2 627. Regarding floating historic flatboats on Segment 2, Mr. Mickel testified: “I
3 think you would damage it regularly and have to repair it.” *Id.* at 399. “[Y]ou would
4 practically rebuild boats sometimes on those historical trips, from the accounts that I’ve read.”
5 *Id.*

6 628. When asked if he had ever seen split channels on the Upper Salt, Mr. Mickel
7 testified: “Sure. Three-Way Rapid is a very good example of one on the day stretch on the
8 first 10 miles. Just below Cibecue, river comes down and splits into three ways. The middle
9 channel is the one you generally take.” *Id.* at 402.

10 629. Mr. Mickel has boated the Salt only above Highway 288. *Id.*

11 630. Mr. Mickel testified that he advertises his trips as adventurous because
12 sometimes people find easy trips “boring.” *Id.* at 409-10.

13 631. Mr. Mickel’s company advertises the Upper Salt River as containing “[m]ore
14 rapids per mile than any other Arizona river.” *Id.* at 420.

15 632. Mr. Mickel’s company uses satellite communication systems, four wheel
16 vehicles, helmets, wetsuits, splash jackets, well trained guides (with CPR training), and
17 “state-of-the art self-bailing rafts.” *Id.* at 420-27.

18 633. Mr. Mickel testified: “I’ve had to stop and repair a raft, yes, and have to camp
19 because of it, repair it, and then proceed downstream the next day.” *Id.* at 434. Mr. Mickel is
20 a member of the American Canoe Association and the Colorado Outfitters Association, and
21 one of the reasons he testified before the Commission is to support river access. *Id.* at 465-66.

22 634. Mr. Mickel uses online snow report data to predict the season. *Id.* at 467.

23 635. Regarding the condition of rapids at 300 cfs, Mr. Mickel testified:

24 Most of them become sharper, so the whitewater features that we sell in
25 our trips, the waves and the splashy big holes and stuff like that, they dissipate
26 and you get more ledge to the rapids. So Rat Trap’s the best example. That
27 becomes a very -- kind of just a sharp, 7-foot ledge or so. . . .

1 You know, you have to take each rapid individually. Some are easier
2 when there's more water, some are easier when they're lower. I can't just shoot
3 out each rapid that we just looked at and tell you which one is easier when it's
4 higher and which one is easier when it's lower. Every rapid has its ideal level.

5 But generally, what happens is a lot of the rapids can be equally difficult
6 or even sometimes a little more difficult in some ways when they're lower, but
7 the consequences of having any difficulty is much minimized -- more minimal.
8 So we're concerned about rafting in high water more because -- not because it's
9 harder, but because if something goes wrong, there's a lot more consequence
10 involved.

11 *Id.* at 474-75.

12 636. Mr. Mickel testified:

13 But below where we stop rafting around 350 cfs, it's more of a placid
14 experience and, you know, you're going to do more scooching, shoving,
15 bouncing. That's what they're talking about in that guide when they're talking
16 about bouncing to get off a rock and stuff like that. That's when that's gonna
17 start to be more of the experience, is you're going to get stuck on some shoals
18 and have to scoot your way off or possibly get out and push the boat over a
19 shoal, so forth.

20 *Id.* at 476.

21 637. Based on the foregoing evidence, the Commission finds that Mr. Mickel's
22 testimony does not support a finding that the Salt was susceptible to navigation in its ordinary
23 and natural condition.

24 **Temporal Element of Commercial Trade and Travel**

25 638. Dr. Newell wrote:

26 Temporal context and economics are [] factors influencing the function and
27 design of riverine craft in the American colonies and emerging states. Riverine
trade in the early seventeenth century east coast Colonies would have included a
significant number of lone trappers earning subsistence income from small
loads of beaver pelts carried in birch canoes or dugouts. Business enterprises
and plantations using large capacity vessels moving huge quantities of raw and
finished goods up and down rivers dominated riverine trade by the end of the
nineteenth century. These temporal changes reflect the growth of both mature
and frontier centers of population and the change over time in demand for
goods. Early communities needed survival and subsistence materials from axes

1 to ammunition. Later, mature communities demanded more manufactured
2 goods to support increasingly sophisticated lifestyles such as porcelain,
3 carriages and silverware. By the same token, the nature of products shipped
4 from these communities also changed over time. Mature centers of population
5 were seeking to export bulk goods from cotton and tobacco to wheat and
6 lumber. The economics of transportation also demanded larger vessels and
7 larger cargoes in order to generate significant profits.

8 *See Newell, at 5-6 [C044-SRP5].*

9 639. Dr. Newell wrote:

10 A variety of other smaller craft have been used on the Salt for purposes other
11 than trade and transportation. Some of these were purpose built for exploration,
12 the majority for recreational use. Historic recreational activity is difficult to
13 separate from subsistence activity, such as fishing for example. In all cases, the
14 craft involved do not appear to have been used to demonstrate the viability of
15 the river for use as a reliable route for trade and transportation.

16 *See Newell, at 21 [C044-SRP5].*

17 640. Dr. Newell wrote:

18 A [] major factor driving vessel form and function was the nature of the
19 containers needed for the products these small craft were required to transport to
20 market towns and coastal ports. The canoe form, for example, was ideal for the
21 transportation of small bundles of beaver pelts. The transportation of tobacco
22 barrels or cotton bales, often from inland and upland plantations, needed a very
23 different solution and required much larger and heavier vessel forms.

24 *See Newell, at 5 [C044-SRP5].*

25 641. Dr. Newell wrote:

26 The canoe and variants such as imported canvas canoes were valuable for their
27 portability, an important factor where travellers on rivers had to negotiate falls
and rapids. Portage usually allowed for only small, light cargoes, a limitation
that precluded commercial trade and transportation based on the needs of the
later nineteenth century. While there is evidence that conventional canoes and
canvass canoes were used on the Salt for recreational purposes, they do not
appear to have had any other function.

See Newell, at 21 [C044-SRP5].

642. Dr. Newell wrote:

1 A few accounts of log rafts and commercial logging attempts have also
2 appeared in the Salt River historical record, mostly in the context of failed
3 attempts to determine if the river could be used to float logs for industrial use.
4 A raft, of course, is not a vessel and would not be a viable vehicle in any swift
5 current or white water. They could be used on deep, slow moving rivers such as
6 the Mississippi, for example. Logs float at varying depths depending upon
7 whether or not they are hardwood, softwood or waterlogged. Successful
8 commercial logging requires the floating of vast quantities of lumber. There is
9 no evidence in the historical record that this was ever done on the Salt. Logging
10 expeditions again appear to have been failed attempts to investigate the
11 possibility of using the Salt as a transportation route (such as the Hayden Sierra
12 Anchas attempt) and were not repeated on a regular basis

13 *See* Newell, at 21-22 [C044-SRP5].

14 643. The canoes available from Sears catalogues were expensive and were not “large
15 enough for a freight canoe.” *See* Tr. 11/19/15:1511 (Gookin). Mr. Gookin testified that
16 canoes were not used for commercial purposes in 1912. *See* Tr. 11/19/15:1653 (Gookin).

17 644. Mr. Gookin testified: “Canoes, I say, were not the customary modes of travel at
18 the time of statehood or before it in Arizona. There’s no evidence that they used them for that
19 purpose.” *See* Tr. 11/20/15:1735 (Gookin). Mr. Gookin testified: “And I went through the
20 beaver trappers didn’t use canoes except as a ferry on the San Pedro and as an escape hatch on
21 the Colorado River. The Pimas didn’t use canoes. The Hohokam didn’t use canoes. And
22 Hayden tried a canoe, and it failed. . . . Utah doesn’t even consider canoes in its list of
23 commercial craft. So I’m not convinced that a canoe is a commercial craft in the sense of the
24 legal standard.” *See* Tr. 2/26/16:3445 (Gookin).

25 645. “The state of boating technology around the turn of the century makes it clear
26 that the Salt River was not susceptible to navigation before or at the time of Arizona’s
27 statehood.” *See* Littlefield Lower Salt, at 246 [C001].

646. Dr. Newell testified: “A boat has to be designed to carry the particular cargo
that is typical of an area in which it operates.” *See* Tr. 3/30/16:4190-91 (Newell). Moreover,
“the vessel has to also conform to the conditions of the rivers on which they operate.” *Id.*

1 647. With regard to canoes, Dr. Newell testified:

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

12 *See* Tr. 3/30/16:4197 (Newell).

13 648. With regard to canoes, Dr. Newell testified: “[I]n the very early stages of
14 colonization of the Eastern Coast, as I've mentioned, the rivers were really the only routes in
15 which to travel inland and back to a coast. The canoe was very -- already being used for that
16 purpose by the native populations. It was readily adapted by the pioneers, the early settlers,
17 and for that reason, was a very well-utilized craft for carrying small loads up and down
18 rivers.” *See* Tr. 3/30/16:4263-64 (Newell); Tr. 3/30/16:4266 (Newell).

19 649. Dr. Newell testified: “In terms of time, in the colonial period a smaller cargo
20 could be profitable. In the late 19th century you would pretty much need a large cargo to be
21 profitable, when of course, the evidence bears that out.” *See* Tr. 3/31/16:4302 (Newell). But,
22 Dr. Newell saw “no evidence of small cargos ever being used on the Salt.” *Id.*

23 650. When asked what his criterion craft he considered for commercial use of a river,
24 Dr. Newell testified: “By the end of the 19th century, you're looking at large keelboats or
25 mountain boats carrying 10, 15, 20 tons or steamboats carrying hundreds of tons or large
26 passenger component.” *See* Tr. 3/31/16:4302-03 (Newell). But, he also looked for evidence
27 of craft other than these boats. *Id.*

 651. Dr. Newell said that canoes may have been used for commercial activity “[i]n
the early historic period,” but he “wouldn't call it worthwhile commercial activity in 1900s at

1 all.” *See* Tr. 3/31/16:4308-09 (Newell). He also testified that one could not make a profit on
2 a canoe full of beaver pelts 1890, 1891 or 1910. *Id.* “I would say after 1850 the value of
3 beaver pelts was rapidly declining.” *Id.*

4 652. Dr. Newell testified that the use of a river for subsistence purposes is “by
5 definition” not commercial trade or transportation. *See* Tr. 3/31/16:4309 (Newell).

6 653. Based on the foregoing evidence, the Commission finds that small craft like
7 canoes, dories, and flatboats were not used in customary modes of trade and travel at the time
8 of Arizona’s statehood.

9 **Operating Depth vs. Draft**

10 654. Dr. Newell wrote: “Previous discussion concerning the use of vessels on the
11 Salt River has focused on the draft of craft ranging from canoes to flats and how this relates to
12 the depth of channel required on the river for safe transportation of goods and passengers.
13 There is a significant difference between a vessel’s draft and its operating depth.” *See*
14 Newell, at 22 [C044-SRP5].

15 655. Dr. Newell wrote:

16 The draft of a vessel is the distance between the surface of the water to the
17 bottom of the hull []. It will vary depending upon the load of the vessel. All
18 formal definitions of draft are based on the impact of load on the waterline in
19 **calm or stable water**. This is because variations in draft depend entirely upon
20 the state of the water through which the vessel travels. Calm waters allow
21 reasonable decisions to be made as to a draft’s safe operating depth, but the
22 moment any energy is imparted to the water the safe operating depth becomes
23 totally unpredictable. This means that in high-energy water environments
24 channel depth needs to be significantly greater than vessel draft.

25 *See* Newell, at 22 [C044-SRP5] (citations omitted) (emphasis in original).

26 656. Dr. Newell wrote:

27 Assume, for example that a canoe with a load of 800lbs has a draft of six inches
in calm water. The canoe could easily travel across a still pond with a depth of
nine inches. Change this environment to a fast running, high-energy river
channel strewn with rocks and rock ledges and displacement depth alters
dramatically. The bottom configuration produces rises and falls in the surface

1 of the water. This energy is imparted to the hull of the canoe. When the water
2 surface lifts the 800 pound load, it responds by falling after the rise – and the
3 load ‘drives’ the hull much deeper into the water. The displacement depth is
4 much deeper than the draft. If the channel depth is shallow, the vessel strikes the
5 bottom.

6 *See* Newell, at 23 [C044-SRP5].

7 657. Dr. Newell wrote:

8 This effect becomes critical when the vessel involved may be 50 feet long and
9 carries 15 tons of cargo. Cotton boats of these sizes and with these loads
10 operated on the upper Savannah River in Georgia. Floating in static water these
11 fully loaded craft had a draft of 12” to 20.” When travelling on rapids, they
12 needed a channel depth of at least 30” to 40.” The author personally observed
13 this effect during the testing of a replica cotton boat built as a research project in
14 1993. The 57’ cotton boat was loaded with approximately 3,000lbs of cargo
15 and ballast. With this small load the craft had a draft of four to five inches – but
16 even when travelling over small drops in the river, the bow would plunge to a
17 depth of 14” as a result of the energy imparted by the load. Clearly a greater
18 operating depth would be needed with a 15-ton load.

19 *See* Newell, at 23 [C044-SRP5].

20 658. Dr. Newell wrote: “[Operating depth] becomes an important factor when trying
21 to compare modern recreational craft such as rubber rafts and kayaks, with load carrying
22 vessels engaged in trade and transportation. It can be readily seen that recreational craft have
23 no significant bearing on the nature of historic river use.” *See* Newell, at 23 [C044-SRP5].

24 659. Mr. Fuller testified that the distribution of weight in a boat can shift one side
25 down several inches and not affect the other side. *See* Tr. 10/23/15:862 (Fuller).

26 660. “The draw of the boat varies with the amount of load, so that a boat used for a
27 single run on the river carrying few supplies draws less than one loaded for a long journey.”
See Stantech 1998, at 34 [Upper Salt EI11].

661. “Charts are available which indicate minimum width and depth for various
kinds of boats, but there is little agreement on the actual figures.” *See* Stantech 1998, at 36
(1998) [Upper Salt EI11].

1 662. “Professional river guides with high Desert Adventures, St. George Utah, say
2 they would not choose to take a canoe very far in less than one foot of depth because of the
3 need to control the boat by dipping the paddles deeply into the water without obstructions.
4 They also point out that depth needed depends on how heavily the boat is loaded.” *See*
5 *Stantech 1998*, at 36-37 [Upper Salt EI11].

6 663. “Draw is a good indication of required depth, but not equivalent to it, as the
7 needs of the paddler must be considered as well as the ability to avoid rocks on the bottom.”
8 *See Stantech 1998*, at 37 [Upper Salt EI11].

9 664. Mr. Gookin testified that Mr. Fuller’s draw estimates are not sufficient to
10 determine navigability because you need “a safety margin.” *See Tr. 11/20/15:1752 (Gookin)*.
11 “[W]hen you measure from the waterline down to the bottom of the keel, bottom, whatever
12 the lowest bottom is, that’s the draw of the boat, and it varies on how loaded it is. The depth
13 of water has to be greater than the draw, because you’re not in a flat, nicely sculptured, clean
14 canal. You’re in a river.” *Id.* at 1753.

15 665. Regarding the effect of cobbles on depth, Dr. Mussetter testified: “They stick up
16 into the flow, and so if there’s so many of them across an area that you’re trying to pass with
17 your boat, you would have a really hard time getting through that area without at least
18 damaging your boat, banging into the rocks, or you may actually run aground if you can’t fit
19 between the rocks.” *See Tr. 1/28/16:2481 (Mussetter)*; *Mussetter Presentation*, slide 149.

20 666. Mr. Gookin testified: “A small boat loaded with goods would be deeper than a
21 small boat loaded without goods, depending on how many goods you put into the small boat.”
22 *See Tr. 2/26/16:3521-22 (Gookin)*.

23 667. More depth is necessary to float a boat than just what would normally be
24 considered the draft or draw. *See Tr. 3/30/16:4235 (Newell)*. Dr. Newell testified:

25 Draft or draw of a boat is confusing for a lot of people that haven’t operated a
26 boat or don’t understand boat dynamics. Draft of a boat is usually measured in
27 calm, still water and reflects the depth of the hull in the water compared to the
load it’s carrying. You can only measure that in calm conditions, and obviously

1 you cannot predict what other conditions that load would be in, so you can't
2 really predict a measurement. Once you get a boat with a given load in an
3 active environment, it's going to behave very differently than it would in still
4 water where you might be measuring the draft. The load of the cargo, the
5 weight of the cargo is imparted a lot of energy by the speed at which it travels.
6 In rough water a boat will rise or fall, and if you're taking 15 tons 10, 12 inches
7 up into the water on a rapid, it's going to sink, when it comes off of that rise, to
8 a deeper depth, and sometimes a much deeper depth if the cargo is substantial.

9 *See* Tr. 3/30/16:4235-36 (Newell). The geomorphology of a specific river system affects how
10 different boats are designed and built "in a very dynamic way." *See* Tr. 3/30/16:4190-91
11 (Newell).

12 668. Regarding the sitting water drafts other experts have mentioned, Dr. Newell
13 testified: "There would be no relationship between that scenario and trade and transportation
14 on a river with rapids and current, no relationship at all." *See* Tr. 3/30/16:4240-41 (Newell).

15 669. Dr. Newell testified: "And I think it's fairly safe to say that the difference
16 between draft and operating depth can be very significant, and that you need a great deal more
17 than [] a few inches more than draft . . . to operate a boat on a river like the Salt." *See* Tr.
18 3/30/16:4240-41, 4247 (Newell).

19 670. Dr. Newell testified that the draw of a canvas canoe can range from a few
20 inches to eight inches depending on load and conditions. *See* Tr. 3/31/16:4313-14 (Newell).

21 671. Dr. Newell testified: "Draft is typically lighter in a much lighter boat. I mean a
22 plastic canoe is going to have a lighter draft than a birch bark canoe or a wooden canoe." *See*
23 Tr. 3/31/16:4347-48 (Newell).

24 672. Dr. Newell testified that even in calm water rivers "at least another foot"
25 beyond the draft of the boat to operate. *See* Tr. 3/31/16:4445-46 (Newell).

26 673. Mr. Gookin testified:

27 [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. And so you need a safety margin. In the East the Army Corps of
Engineers says that the safety margin is you take the draw and you add -- or the

1 draw should not be more than 75 percent of the total depth. And I think that's
2 probably not sufficient here, but it may be.

3 *See* Tr. 11/19/15:1533-34 (Gookin).

4 674. Mr. Gookin testified: “[R]ivers vary in depth. They are not canals. They are
5 not uniform bottoms. It can be 3 feet at the gage and be less than 6 inches in a rapid.” *See* Tr.
6 11/19/15:1534 (Gookin).

7 675. Dr. Newell’s replica Petersburg boat had a standing draft of 4 inches. *See* Tr.
8 3/30/16:4236-39 (Newell). When Dr. Newell took his replica on the Savannah River with a
9 two ton load, the draft was four inches. *Id.* But, going over a sandbar, the boat would drive
10 into the water as much as 14 inches. *Id.* Dr. Newell testified: “Had that been 15 tons, I could
11 very easily see why the bow of the boat itself would be underwater for a brief instant.” *Id.* If
12 it had been loaded with five tons, giving it a draft of five inches, five inches of depth would
13 not be sufficient and “especially at any kind of speed . . . [y]ou would destroy the boat very
14 rapidly.” *Id.*

15 676. The phenomenon applies also to kayaks and canoes. *See* Tr. 3/30/16:4240
16 (Newell). Dr. Newell testified: “Even a kayak . . . with a load in it, as it comes down a river,
17 you’re going to get water over the bow of the kayak, as everybody knows.” *Id.*

18 677. Based on the foregoing evidence, the Commission finds that draft or draw, as
19 discussed by Mr. Fuller, is not a reliable measure to determine whether a river is susceptible
20 to navigation.

21 **Durability**

22 678. Comparing historical wooden dories at the time of statehood to modern rubber
23 rafts, Mr. Dimock testified:

24 Durability, I will say modern rafts take a beating for a lot longer than a wood
25 boat, but modern rafts are designed to be used over and over and over and over
26 and over again; whereas the wood boats in those days were maybe going to do
27 one trip, because there’s nobody there in their car to drive them back to the put-

1 in. They would probably build another boat. So in terms of durability, they
2 would last a trip or two, no problem.

3 *See Verde Tr. at 3/31/15:2841 (Dimock) [C018-ASLD 146].*

4 679. When asked if boats in 1912 were meant to last only a trip or two, Mr. Dimock
5 testified: “They would last until you wreck them, but they would certainly last a trip or two,
6 yes. Again, I mean, you can wreck anything. But a wood boat won’t last as long as a rubber
7 boat.” *See Verde Tr. at 3/31/15:2910 (Dimock) [C018-AALSD 146].*

8 680. Mr. Dimock testified: “And the modern boats, you know, you can land in the
9 rocks, you can park in the rocks, you can bounce off rocks and walls. And the wood boats
10 you can’t do those things. So, you know, people who aren’t really into wood boats think it’s
11 really silly to run them anymore, and they would rather run an inflatable. It’s easier.” *See*
12 *Verde Tr. at 3/31/15:2869 (Dimock) [C018-ALS 146].* “They were cheaper and they were
13 more durable. The fiberglass boats will shatter if you hit a rock hard enough; and the plastic
14 ones, after a couple generations of plastic ones, they got them to where they were pretty much
15 unbreakable. They’re like Tupperware.” *See Verde Tr. at 3/31/15:2888 (Dimock) [C018-*
16 *ALS 146].* Mr. Dimock testified that neither fiberglass nor plastic boats were available in
17 1912. *See Verde Tr. at 3/31/15:2888 (Dimock) [C018-ALS 146].*

18 681. Regarding the differences between historical boats and modern boats, Mr. Fuller
19 testified:

20 The difference is some improved durability. But I readily recognize – really
21 don’t need to argue about the fact that the plastic boats that are made today are
22 more durable. You can beat on them, you can abuse them, you can be a lot less
23 skilled and get away with some things that you might have had to stop and
24 repair. But that is not to say that these boats were not durable, that they fell
25 apart at the slightest impact or a scratch would cause you to cancel your trip. So
26 yes, they are improved durability, much like my car today is improved in its
27 durability from cars that were available in 1912.

See Tr. 10/22/15:624-25 (Fuller); Fuller PowerPoint, slide 286.

1 682. Regarding durability as a factor to evaluate when determining if modern boats
2 are meaningfully similar to historical boats, Mr. Fuller testified: “In some situations,
3 durability can be very important. It’s one of a number of characteristics of a boat that are of
4 interest and important, yeah.” *See* Tr. 11/17/15:1151 (Fuller). “So durability is one of those
5 characteristics. If you’re thinking about what’s similar, that’s something that has been
6 improved. So with time marches on, people build boats that are more durable. New materials
7 become available.” *See* Tr. 11/18/15:1363 (Fuller). “[D]urability can be a factor on some
8 rivers, and that’s one of the reasons that I believe Segment 1 is not navigable, one of the
9 reasons; not the only reason. It’s a factor. . . . I do believe that historic boats would have
10 difficulty in that segment.” *Id.* at 1363-64.

11 683. Mr. Fuller testified that plastic is more durable and flexible than wood. *See* Tr.
12 11/18/15:1365 (Fuller).

13 684. Mr. Gookin testified:

14 [T]he newer canoes are substantially more durable, and I suggest, as a result,
15 could handle a lot more abuse, shallow waters, whatever. Fiberglass, as I
16 indicated in my Santa Cruz report, can withstand 30,000 psi pressures. Cedar,
17 which is the wood of choice in the Sears catalog for the boats, only handles 920
18 when it’s hit perpendicular to the grain. It’s stronger if you hit it head on, but if
it’s a collision on the side of the canoe, it’s only 920. Aluminum handles about
40,000 psi.

19 *See* Tr. 11/19/15:1503 (Gookin). “[T]he evidence pretty clearly shows that fiberglass and
20 aluminum were not available in 1912; and that when they came out, they virtually replaced
21 wood canoes.” *Id.* “[C]anvas was different in 1912 than canvas is today, and the coatings you
22 put on canvas is different, was different in 1912 than the coating that you would put on
23 today.” *Id.* at 1505.

24 685. “Royalex is an exceptionally abrasion- and impact-resistant material that
25 springs back from hard collisions. Images of canoes sailing off factory roofs or falling from
26 airplanes and surviving contributed to the growth of Royalex’s reputation for being
27

1 indestructible.” *See* Tr. 11/19/15:1506 (Gookin) (quoting promotional materials). “A
2 Royalex canoe can be folded in half by a bridge abutment or boulder, and then return to its
3 normal shape, with minimum hull distortion.” *Id.* “These Royalex canoes can be bent, folded
4 and generally abused with only minimal hull damage. . . . [T]hey’re nearly indestructible.”
5 *Id.* “A swamped Royalex canoe will often come through the toughest rapids unscathed and
6 pop back into near-perfect shape even after being folded around a midstream boulder. . . .
7 Royalex is the choice for remote rivers and mean rapids, simply because no other material
8 takes abuse so well.” *Id.* at 1506-07.

9 686. Mr. Gookin testified: “I looked at the durability of the canoes, and this was
10 primarily with modern recreation versus the early historic canoes; and found that if you’re
11 looking at canoes today, even most wood canoes, unless it’s been explicitly built to re-create a
12 past event, they’re much stronger than any canoe that existed back then” *See* Tr.
13 2/26/16:3442-43 (Gookin).

14 687. Dr. Newell wrote:

15 Modern day recreational craft have little bearing on the ability of the historic
16 Salt River community to use the river for the transportation of raw and finished
17 goods and passengers. Plastic kayaks and canoes are more durable than their
18 historic counterparts, are able to float in less water and have no role in
19 commercial trade and transportation as it was understood in the past. The same
20 case can be made for rubber rafts. The rubber raft is a completely new type of
21 craft in historic terms. When used for recreational transportation over white
22 water areas of a river they are certainly engaged in modern commercial activity.
23 However, this fails to indicate that the same stretch of river could have been
24 used to transport cargoes of finished goods, raw materials or passengers in the
25 past.

26 *See* Newell, at 21-22 [C044-SRP5].

27 688. Based on the foregoing evidence, the Commission finds that modern
recreational craft are not meaningfully similar to craft used for customary modes of trade and
travel at the time of Arizona’s statehood.

1 **The Edith**

2 689. On August 31, 2015, Mr. Dimock took his historical replica of the *Edith* out on
3 the Lower Salt from below Stewart Mountain Dam to Granite Reef at a flow rate of
4 approximately 650 cfs. *See* Tr. 10/22/15:532-33 (Dimock). He loaded the *Edith* replica with
5 850 lbs of sandbags and jugs of water. *See* Tr. 10/22/15:533 (Dimock).

6 690. Mr. Dimock described the *Edith* replica: “It’s, well, pointy at the bow, which is
7 behind the boatman. And then it broadens to about 4 feet and then narrows to about 3 feet out
8 at the stern. Has a bit of rocker from end to end, so the bottom goes up about 6 inches, and
9 it’s about 16 feet long.” *See* Tr. 10/22/15:534 (Dimock).

10 691. Regarding his trip down Segment 5 and the extreme upstream part of Segment
11 6, Mr. Dimock testified: “It was a lot prettier than I thought it would be, and lots of little
12 riffles. There’s one rapid called Bridge Rapid, I believe, and I did run aground there twice.
13 Had to get out and give the boat a yank. . . . I got out of the boat, which takes almost 200
14 pounds out of it, and pulled it off the rocks that I had launched on and walked it down a little
15 bit and got back in.” *See* Tr. 10/22/15:535-36 (Dimock).

16 692. Mr. Dimock testified that the estimated “500 lbs” of water that leaked into his
17 boat caused his boat to sink 4 more inches. *See* Tr. 10/22/15:554 (Dimock); Tr. 10/22/15:536
18 (Dimock).

19 693. Mr. Dimock testified that he would not want to use a wooden boat on the Upper
20 Salt. *See* Tr. 10/22/15:543 (Dimock). Mr. Dimock has boated the Upper Salt in rafts and
21 kayaks. *Id.*

22 694. Mr. Dimock did not discuss putting his *Edith* replica in any other section of the
23 Salt besides Segment 5 and the extreme upstream portion of Segment 6. *See* Tr. 10/22/15:551
24 (Dimock).

25 695. Mr. Dimock explained that he ran aground twice during his August 2015: “It
26 was two parts of the same rapid. The river braids into a few channels in the lower velocity
27

1 channel. That's where we went." *See* Tr. 10/22/15:551 (Dimock). Mr. Dimock ran aground,
2 got out and pushed his boat, got back in, and it ran aground again. *Id.*

3 696. Mr. Dimock testified that if he did the trip at 400 cfs, he "probably would have
4 had to drag it in a spot or two." *See* Tr. 10/22/15:553 (Dimock). At 200 cfs, he testified that
5 "that would be pretty low." *Id.*

6 697. Mr. Dimock testified that his *Edith* replica had a draft of about 7 inches with a
7 load of 1300 lbs. *See* Tr. 10/22/15:554 (Dimock).

8 698. Mr. Dimock testified that, he could "probably" put up to a ton of cargo in the
9 *Edith*, but he didn't think it would be any fun to row. *See* Tr. 10/22/15:555-56 (Dimock).

10 699. The Kolb brothers had to repair the originally *Edith* several times during their
11 trip down the Colorado. Tr. 10/22/15:556 (Dimock). There are even pictures of the Kolb
12 brothers looking through holes in the *Edith*. *Id.*

13 700. The day Mr. Dimock took his *Edith* replica on the Salt, the flow was 653 cfs,
14 which is "substantially higher than the median flow." *See* Tr. 11/19/15:1549 (Gookin). He
15 also stated that, although Mr. Fuller claimed that Mr. Dimock's trip down the Salt on the
16 *Edith* was on lower than median flow, "[i]n reality, it was a bit less than double median flow."
17 *See* Tr. 11/19/15:1458 (Gookin).

18 701. Regarding the *Edith*, Mr. Gookin testified: "[T]he *Edith*, as I understand, was
19 built as an exploration craft originally and would probably not be the same as a commercial
20 craft." *See* Tr. 2/26/16:3448 (Gookin).

21 702. Dr. Newell studied the Kolb brothers' boat. *See* Tr. 3/30/16:4259-60 (Newell).
22 Dr. Newell testified: "The Kolb brothers used a version of a Galloway boat, which was first
23 created by Nathaniel Galloway in the mid 19th century. That was essentially a dory, but it
24 was reinforced with a bow and a stern and built specifically for the purpose of exploring or
25 negotiating rapids and cataracts. It was not a boat that was designed for regular trade and
26 transportation up and down a river." *Id.* Regarding the load, Dr. Newell testified:
27

1 “According to Dimock, it could carry about a ton of cargo, and I think that’s very optimistic.
2 I would say maybe half a ton; and even at that, I wouldn’t want to go down a cataract in a
3 Galloway or a Kolb boat with a ton of cargo or a half a ton of cargo. It’s built primarily to
4 survive cataracts and to carry supplies for exploration and subsistence.” *Id.* “A Galloway
5 boat is a boat specifically designed for negotiating cataracts. It’s a boat used for exploration.
6 It’s not a boat that appears anywhere else in the general record as a typical boat used for the
7 transportation of people or trade and commerce. So as a specialized boat, I discounted that as
8 a vessel that would be typically used for trade and transportation.” *See* Tr. 3/31/16:4466-67
9 (Newell).

10 703. Mr. Fuller testified: “So a small boat with a full load, like if I take the Edith
11 loaded with a thousand pounds, 1,500 pounds, is not going to -- is going to have some trouble
12 at the lowest part of the year. During the seasonal high flow, no problem. Loading it less, a
13 boat a little more maneuverable or perhaps a little more durable than the Edith, would get
14 down the river year-round.” *See* Tr. 5/19/16:5086 (Fuller).

15 704. Mr. Gookin testified that canoes and boats like the *Edith* could not carry loads
16 that would justify their expense in 1912. *See* Tr. 11/19/15:1654 (Gookin).

17 705. Mr. Dimock testified that he could not portage the *Edith* by himself, but he
18 could “probably” figure out a way to line it. *See* Verde Tr. at 3/31/15:2883-84 (Dimock)
19 [C018–ALS 146].

20 706. Based on the foregoing evidence, the Commission finds that Mr. Dimock’s
21 staged trip in his historical replica does not support a finding that the Salt was navigable in its
22 ordinary and natural condition.

23 **Boat Types**

24 707. Mr. Fuller testified that “they tend to put ferries where roads come and go.” *See*
25 Tr. 10/23/15:927 (Fuller).

26 708. Dr. Newell wrote:
27

1 The small dugout [canoe] was primarily used for subsistence activity, hunting
2 and fishing, and for local travel. The earlier versions could hardly be described
3 as useful for the conveyance of cargoes of any kind. Even those dugouts
4 produced in southern states in the early twentieth century were acknowledged as
5 precariously balanced craft fit only for personal use. There is no evidence that
6 dugouts were used on the Salt River during the pre-historic period.

7 *See* Newell, at 7 [C044-SRP5].

8 709. Dr. Newell wrote:

9 The canoe, in addition to the dugout, was in wide use among Native American
10 Indians well prior to the arrival of Europeans. These were lightly framed craft
11 with an exterior skin or hull of birch or pine bark [] sewn with sinews or root
12 fiber. The native population used the craft for subsistence activities and local
13 transportation. The craft was quickly adopted by Europeans and used for the
14 same purposes. Trappers were among the first to also use canoes for the
15 transportation of small amounts of trade and finished goods. The lightweight
16 and small cargo made the craft suitable for frequent portages around falls and
17 rapids on rivers that were not navigable, such as the Salt.

18 *See* Newell, at 8 [C044-SRP5].

19 710. Dr. Newell wrote:

20 Both canoes and dugouts continued to be used throughout the states as they
21 expanded westward. Skillfully carved cypress dugouts were still being carved
22 in southern rural communities from Louisiana to Georgia well into the middle
23 of the twentieth century. The form faded from use with the advent of cheaply
24 produced plastic canoes and kayaks, the modern version of the historic canoe
25 now in wide use for recreational purposes. *There is no historical or
26 archaeological evidence to date that canoes were regularly used for trade and
27 transportation on the Salt River.*

See Newell, at 8 [C044-SRP5] (emphasis added).

711. Dr. Newell wrote: “The pirogue was doubtless used on other southwestern
rivers, especially those connected to the Red and Colorado River systems. There is no
indication that pirogues were ever in use on the Salt River.” *See* Newell, at 9 [C044-SRP5].

712. Dr. Newell wrote: “The skiff and its variations are most commonly used for
recreational, subsistence and local transportation. They are not a useful craft for carrying

1 heavy loads or many passengers. The design is not suitable for fast running currents as the
2 shallow draft resulted in a high center of gravity and a lack of stability. A skiff does appear to
3 have been used as a small utility craft in the Salt River on a calm stretch of water in the Salt
4 River Canyon.” *See* Newell, at 10 [C044-SRP5].

5 713. Dr. Newell wrote:

6 Traditionally built small craft such as rowboats would also have been widely
7 available in the southwest, either as a result of importation or construction by
8 skilled boat builders where there was sufficient demand for the work. These
9 vessels were typically of curved hull, carvel or clinker planked hull construction
10 with sophisticated internal framing using floor timbers and futtocks. Like
11 skiffs, rowboats and craft of similar design were used primarily for local
12 transportation, recreational and subsistence activities.

13 *See* Newell, at 11 [C044-SRP5].

14 714. Dr. Newell wrote:

15 The flat bottom was usually built without a keel, unless large “king and queen”
16 planks were used along the center of the hull. Steering and propulsion was by
17 means of a large stern sweep and oars, poles and wind power. As with the
18 Petersburg type boats . . . , the bateau was designed to carry heavy loads in fast
19 running upland rivers. As such they needed considerable operating depths
20 beneath the keel. There is no evidence that bateaus were ever used on the Salt
21 River.

22 *See* Newell, at 11 [C044-SRP5].

23 715. Dr. Newell wrote:

24 The keelboat [], largely introduced in the late eighteenth, early nineteenth
25 century overcame the limitations of the lighter, narrower bateau. They quickly
26 developed into the “freight truck” of the period and differed from the bateau in
27 several major features. The keelboat used a heavy central keel on a flat bottom,
a much wider beam, and the bow and stern were reinforced to withstand the
hazards of shallow river navigation. They were designed to carry large and
bulky loads of both raw and finished goods up and down navigable rivers.
Massive amounts of commercial cargo were transported over American rivers
by these craft, half a million tons in one twenty year period in the Ohio River
valley system for example []. Use of the craft spread westwards with the
opening up of the interior and they were being used on the upper reaches of the

1 Missouri River by the mid-nineteenth century. There is no archaeological or
2 historical evidence that keelboats were able to ply the Salt River.

3 *See Newell, at 11-12 [C044-SRP5] (citations omitted).*

4 716. Dr. Newell wrote:

5 Many of the rivers of the States originate in mountainous areas where
6 navigation encounters fast running and shallow rivers and streams, usually with
7 considerable changes in elevation over short distances. As with other vessel
8 environments, this problem already existed in European rivers and the same
9 design solution was used. The “mountain boat” appeared on eastern state rivers
10 as products such as short staple cotton and tobacco began to be produced on the
11 piedmont or upstate regions of the east coast after 1800 []. . . . Mountain boats
12 [] were unique in that they were often used on rivers that were not normally
regarded as navigable. The narrow beam and extreme length of the craft
enabled their use in shallow and narrow channels that, in their normal state, did
not carry sufficient water to float a commercial craft of any kind. . . . There is
no evidence of such activity or that these boats were ever used on the Salt River.

13 *See Newell, at 13-14 [C044-SRP5].*

14 717. Dr. Newell wrote:

15 A . . . craft called a “mackinaw” operated on the upper Missouri River. It, along
16 with keelboats, carried raw goods downriver from Fort Benton. According to
17 B. B. Barbour the mackinaws would often make “100 miles in a day” a figure
18 that implies fast currents indeed The mackinaws differed from the eastern
19 mountain boat only in that they also used sail power. Not surprisingly, the
20 mackinaws most often made one-way journeys and were broken up for lumber
at their destination. Again, there is no evidence that these one-way vessels were
used on the Salt River.

21 *See Newell, at 14-15 [C044-SRP5].*

22 718. Dr. Newell wrote:

23 Barge forms were in use well into the twentieth century and the present day on
24 large construction projects and for moving heavy loads where harbors and river
25 depths permit their use. In a significant change in traditional design, these
26 larger barges were built with a vertical stern that was strengthened to withstand
27 pushing forces from a tugboat. Smaller versions also were built to this same
design. We see no frequent evidence of their use on the Salt River or associated
irrigation canals.

1 *See* Newell, at 16 [C044-SRP5].

2 719. Dr. Newell wrote: “While canoes and dugouts have been documented as in use
3 by Native American Indians in other regions, there is no evidence that the Hohokam, or later
4 cultures such as those of the Pima, Maricopa and Apache tribes used them. Even if such craft
5 were in use, they were not a suitable craft for anything more than local travel and subsistence
6 activity.” *See* Newell, at 18 [C044-SRP5].

7 720. Dr. Newell wrote:

8 Early European settlers were certainly engaged in the fur trade in the Salt River
9 area, but there is no evidence that bark or skin canoes were used to transport
10 bulk beaver pelts and other furs on a continual basis. The canoe form was
11 small, narrow and light draft. They could carry, depending upon length,
12 anywhere from five hundred to a thousand pounds. While they were highly
maneuverable, they were also fragile and not suitable for white water conditions
in fast moving, shallow and rocky channels.

13 *See* Newell, at 19-20 [C044-SRP5].

14 721. Dr. Newell wrote:

15 Later Europeans would have readily adopted the skiff for local travel and
16 subsistence activities. It would have been a particularly dangerous craft for
17 regular use on a river like the Salt. The skiff is a heavier craft than the canoe,
18 but it is flat-bottomed and highly unstable in anything but calm conditions.
19 They were not a craft customarily used for trade and transportation along the
20 length of a river. The image above [] shows three men (or possibly a woman in
the bow) on what appears to be a pleasure trip on the placid waters of the Salt
River Canyon (John Fuller places this scene on the Roosevelt Reservoir rather
than the Salt River Canyon). This is most likely the only use to which these
craft were put.

21
22 *See* Newell, at 20 [C044-SRP5].

23 722. Dr. Newell wrote:

24 It might be expected that industrial versions of the barge form would have been
25 used for construction projects in localized reaches such as the Roosevelt Dam.
26 These are heavily built craft with drafts of twelve to fourteen inches and more
27 depending upon size. When used to transport bulk cargos, these craft need long
reaches of stable water. They are most successfully used in coastal riverine

1 environments and canals. Flats and barges are solidly built craft and can
2 withstand rough treatment and pressure on the sides and ends from tug boats.

3 *See* Newell, at 20 [C044-SRP5].

4 723. Dr. Newell wrote: “Small steam craft have been used on inland and upland
5 rivers. The craft are usually small enough to be broken up and shipped into areas by rail and
6 then reassembled for local use. Again, these craft need from eight to fourteen inches of draft
7 and relatively calm waters. Typical examples of use were for recreational purposes and local
8 travel. There is no evidence of any such commercial steamboat traffic on the Salt prior to
9 Statehood.” *See* Newell, at 20-21 [C044-SRP5].

10 724. Dr. Newell wrote:

11 Ferry craft are not components of trade and transportation on a river (up and
12 downstream use). Instead, they are part of the local road system. There is
13 evidence that ferries operated on the Salt River and that there was at least one
14 “boat builder”, wagon maker and stable owner George Luhrs, in Phoenix who
15 made a large “skiff” for a local stagecoach company to enable passengers and
16 mail to cross the Salt, (Phoenix Herald, August 3rd, 1891). As mentioned
17 above, the ferry craft is a often a tethered flat with a draft of twelve to fourteen
18 inches, sometimes more depending upon total length. The depth of water to
operate in was needed only in the cross-river area in which the ferry operated.
Evidence suggests that many ferries of the Salt were useable only on a seasonal
basis. Seasonal changes in water depth – from flood stage to drought –
evidently impacted the value of ferry crossings.

19 *See* Newell, at 21 [C044-SRP5].

20 725. “Kayaks, although common in the arctic regions for thousands of years, were
21 apparently not used in Arizona until after World War II.” *See* Stantech 1998, at 32 [Upper
22 Salt EI11]; *See* Tr. 11/19/15:1500 (Gookin).

23 726. Canoes at the time of statehood were made of wood and were usable on “[I]akes
24 and calm rivers for fishing, recreation, travel.” *Id.* at 3; Tr. 11/19/15:1502 (Gookin).

25 727. Dr. Newell testified that a dugout canoe is “essentially a hollowed-out log.” *See*
26 Tr. 3/30/16:4192-95 (Newell). It is created using a “burn and scrape method” to “burn out the
27

1 top of a log, scrape it down to create a hollow form, which could then be floated on water.”
2 *Id.* “In prehistoric times they would have been used for subsistence travel, primarily, which is
3 fishing activities or crossing local rivers. . . . They’re . . . not particularly useful for carrying
4 heavy loads. They’re notoriously unstable. But I would say not really for any kind of
5 commercial purpose.” *Id.* Dr. Newell testified: “Actually, I’m kind of shocked at the
6 complete absence of information of dugouts being used, especially in the prehistoric times,
7 which, to me, is a very significant factor.” *Id.* “In South Carolina there are literally
8 thousands of dugouts that date from a few hundred years to a few thousand years old.” *Id.*
9 “In Arizona, the Salt River, there is absolutely no archaeological evidence whatsoever of a
10 dugout being found anywhere on the Salt River; and that, to me, is extremely significant.” *Id.*
11 “[T]ypically, we’re going to find unstable vessels, and a great many of them can be found on
12 river bottoms, mud banks, especially in floodplain areas, such as South Carolina, where you
13 have a lot of mud.” *Id.*

14 728. A birch bark canoe, is “a very light kind of vessel. It was also built by
15 aboriginal populations, usually on a very light wood frame with bark stretched over it and
16 fastened by sinew or root material. It was very quickly adopted by the early pioneers because
17 it was suitable for travel on rivers.” *See* Tr. 3/30/16:4196 (Newell).

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

20 730. Dr. Newell testified that a “pirogue is essentially an adaptation of a dugout
21 form.” *See* Tr. 3/30/16:4197-98 (Newell). He also testified:

22 A pirogue is essentially an adaptation of a dugout form. And there was an effort
23 early on in colonial period to make dugouts that were larger, capable of carrying
24 bigger cargos. So what they would begin to do is cut planks and put those
25 planks on the edges of the canoe, the gunnel, in order to expand the capacity of
26 the dugout. As that practice evolved over time, the dugout became a V-shaped
27 hull in the bottom of a vessel that was largely built up with planks on the sides,
and those vessels were called pirogues. They were, some of them, quite large,

1 had a fairly deep draft, could carry a very substantial cargo, especially on
2 relatively calm rivers.

3 *Id.* at 4197-99. Dr. Newell has “seen no documentation whatsoever of a pirogue appearing
4 on” the Salt. *Id.* Yet, Pirogues were used in the Southwest in Texas on the Red River. *Id.*

5 731. Dr. Newell testified:

6 A skiff is a very simple craft and was easy to build once planked lumber was
7 available from lumber mills. It is essentially flat planks that are nailed together
8 with -- and supported by a wooden frame inside the vessel, planked-up sides.
9 Again, they’re very small vessels. They tend to be, typically, unstable. They’re
10 good on placid water. Very rarely do you see them ever used in any kind of
11 rough water environment; and if they are, they have to be built up and
reinforced. But it’s typically a vessel used for subsistence activity such as we
see here, fishing or recreation, but not a craft you associate with commercial
transportation and trade.

12 *See* Tr. 3/30/16:4299-01 (Newell). Dr. Newell has seen no evidence of their use for
13 commercial trade or transportation on the Salt, whatsoever. *Id.*

14 732. Dr. Newell testified:

15 A rowboat is considered to be more of a traditional design, clinker or carvel
16 built, which is the manner in which the planks are fastened together; usually has
17 a transom, which is a flat end on the stern, and a pointed bow. They’re
18 considered a traditional vessel. They are typically small, used for local
19 transportation; not the kind of vessel that could carry a substantial cargo of any
kind and not the kind of vessel you would use for commercial trade and
transportation.

20 *See* Tr. 3/30/16:4201-02 (Newell). Although there are “accounts of them being stolen or
21 drifting downriver” on the Salt, there is no evidence they were used for commercial trade or
22 transportation on the Salt. *Id.*

23 733. Dr. Newell testified:

24 A bateau is an evolution of a lightly built craft. . . . It’s not exactly a canoe. It’s
25 bigger, longer than a canoe; but, again, has a very narrow beam, a very light
26 frame, light construction, and if handled properly, can do fairly well in fast
27 waters with a fairly heavy load. And we see this same design coming across
and being used on rivers like the Hudson and other rivers down the East Coast

1 and then further west. It's still a lightly built vessel, not capable of carrying a
2 huge cargo; but at the time, . . . early 19th century, could carry a commercially
viable load.

3 *See* Tr. 3/30/16:4202-03 (Newell). Dr. Newell testified that he has not seen “any evidence at
4 all of a bateau being used on the Salt River area.” *Id.*

5 734. A keelboat “essentially is the next evolution of the bateau, where there was a
6 demand for a more strongly built craft, capable of negotiating rivers and carrying heavy loads.
7 . . . [I]t had a flat bottom, but usually a keel and fairly solid bottom planks, reinforced bow
8 and stern, and a covered area in the center of the boat.” *See* Tr. 3/30/16:4203-04 (Newell).
9 Dr. Newell testified that the keelboat was the “freight truck of the late 18th, early 19th century
10 . . . as far west as California.” *Id.* It was the “vessel of choice” for commercial trade and
11 travel. *Id.* Dr. Newell is aware of no evidence of the use of keelboats on the Salt
12 “whatsoever.” *Id.* The keelboat “as it comes later into the 19th century, is also a response to
13 demand for larger, heavier cargos.” *Id.* Bulk cargoes “carried anywhere from 7 to 10 to 15
14 tons or more by the mid 19th century.” *Id.*

15 735. A “Durham boat,” a type of “mountain boat,” was used to “negotiate shallow
16 areas” along the Hudson River in New York and “carr[ied] various cargos from iron ore to
17 tobacco and cotton.” *See* Tr. 3/30/16:4205-06 (Newell).

18 736. A “Petersburg boat” is another variation of the mountain boat. *See* Tr.
19 3/30/16:4206-07 (Newell). “This type of boat was built to be able to carry 15 to 20 tons of
20 cotton down a very narrow channel at flood stage.” *Id.* Some of these boats were “up to 70
21 feet long.” *Id.*

22 737. “[A] keelboat is much, much broader, 15, 16, 17 feet, compared to a bateau or a
23 mountain boat, which is rarely going to be more than 7 to 8 feet wide.” *See* Tr. 3/30/16:4207
24 (Newell). The Petersburg boat had “a very heavily reinforced bow and stern.” *Id.*

25 738. Petersburg boats were used to haul “[i]ron ore, tobacco, tobacco barrels, which
26 are extremely heavy and large, and of course, cotton bales.” *See* Tr. 3/30/16:4209 (Newell).

1 739. “There’s absolutely no evidence of [mountain boats] ever being used on the
2 Salt.” *See* Tr. 3/30/16:4209 (Newell).

3 740. Dr. Newell next discussed “flats, boats, barges and scows.” *See* Tr.
4 3/30/16:4214-24 (Newell). Flat boats were used, in South Carolina, on canals and on
5 “relatively calm” rivers. *Id.* They were made out of longleaf pine and were used for
6 “[h]auling goods around a plantation.” *Id.* They were used for commercial trade and
7 transportation. *Id.* With regard to the use of flat boats on the Salt, Dr. Newell testified:

8 There’s only one account I could find, and that was clearly an experiment, to try
9 and operate these vessels on the Salt, and that was the flat boat that traveled for
10 a couple of miles or less from Hayden’s Ferry to a mill with 5 tons of wheat,
11 which would be a very light cargo. Typically a flat would -- in this particular
12 case, I think the one report said it was a ferry flat, which means it could have
13 carried anywhere from 10 to 15 tons of cargo. So obviously this is an
14 experiment, and it operated in one direction, one way, for a very short distance.
15 So clearly it was a failure.

16 *Id.*

17 741. Regarding steamboats, Dr. Newell testified: “It’s probably a medium-sized
18 steamboat. This is typical of the way in which the temporal factors counter into what is a
19 commercial load and what isn’t. In 1700 it might have been 200 pounds of beaver pelts. By
20 this time, you know, if you weren’t hauling 10, 20, 30, 40, 50 tons or 100 tons of cotton, you
21 weren’t making money. This is a great example of how they had to build boats that would be
22 capable of carrying those kinds of loads.” *See* Tr. 3/30/16:4221 (Newell). “Steamboats are
23 purposely built with a very wide beam, very shallow draft, so that they can navigate in
24 relatively stable, but shallow waters. For every hundred tons of merchandise on one of these
25 vessels, it’s going to sink in the water an inch, and typical draft loaded was 30, 31 inches.
26 And boats of that -- with that draft and those loads did operate on the Colorado River from
27 fairly early on, mid 19th century, up until the ‘20s and ‘30s.” *See* Tr. 3/30/16:4222 (Newell).
There is no evidence that steamboats ever operated on the Salt. *Id.* at 4222.

1 742. The boats listed in Dr. Newell's report are "clearly the types of boats and types
2 of uses typical in the Southwest where rivers allowed their use." *See* Tr. 3/30/16:4223
3 (Newell).

4 743. By the late 1800s in the Southwest, keelboats, steamboats, and mountain boats
5 would have been typical for commercial trade and travel. *See* Tr. 3/30/16:4223-24 (Newell).

6 744. Dr. Newell testified:

7 This is an early ferry called a rope ferry. It is tethered. It has one function, to
8 cross the river. And before engine power, the operator of the ferry would stand
9 on the edge of the ferry with what's called a ferry bat, which is essentially
10 something like a baseball bat with a notch in it. He would attach it to the rope
11 and twist it to get a purchase on the rope. Then he would walk the ferry beneath
his feet and then reattach and walk again until he got the ferry across the river.
It would come back the same way.

12 *See* Tr. 3/30/16:4225-26 (Newell). Ferries typically do not have "docks," but instead "an
13 angled dirt ramp." *Id.* at 4227.

14 745. Regarding the use of ferries to travel downstream, Dr. Newell testified:

15 Because of its extremely heavy construction, it would be extremely difficult to
16 navigate the vessel or, in this context, to operate the vessel. It would not
17 respond well to steering. It obviously couldn't carry a great deal of cargo. If
18 the Vandermark Kilgore vessel was, in fact, a ferry, that would explain why
19 they could only get 5 tons of wheat on it, because they simply didn't have the
capacity to put more on. It's not a vessel you would want to travel down a river
in for trade and transportation.

20 *See* Tr. 3/30/16:4228 (Newell).

21 746. Dr. Newell also testified:

22 They're not part of a riverine transportation -- trade and transportation system.
23 They're part of a road system. In fact, if you have a lot of ferries, that's a good
24 indication that the river they cross is surrounded by a network of roads. That in
25 itself indicates the river's probably not being used for trade and transportation.
26 But the ferry is something that crosses a river. It doesn't travel on a river. It is
27 part of a road transportation system, and, you know, in my view then is nothing
to do with trade and transportation on a river.

1 *Id.* at 4229. “[I]f a stagecoach company needed to get passengers across a river, a ferry at
2 sometimes was the only way to do it.” *Id.* at 4230. Dr. Newell testified: “If there’s a great
3 number of ferries crossing the river, it generally tends to indicate that the road network around
4 that river is more widely used than the river itself.” *Id.* at 4325.

5 747. Dr. Newell did not include Galloway style boats in his report because “it is a
6 specific purpose built boat for navigating cataracts, and it’s specially reinforced, it’s small,
7 might carry half a ton of cargo at best, if you call supplies cargo. It’s not a vessel that would
8 be generally used widely for the purposes of commercial trade and transportation.” *See* Tr.
9 3/31/16:4354-55 (Newell).

10 748. Dr. Newell testified that he is an expert in the types of watercraft that were used
11 or available for use in Arizona at or before statehood. *See* Tr. 3/31/16:4353 (Newell).

12 **Boating Season**

13 749. Mr. Fuller admits that *PPL Montana* states that the boatable season of the year
14 must not be “so brief that is not a commercial reality.” Fuller PowerPoint, slide 42. “So if
15 you were to try to pick a boatable time of the year, you would be thinking about wintertime
16 and early – late winter, early spring.” *See* Tr. 10/20/15:44 (Fuller); Fuller PowerPoint, slide
17 39.

18 750. Regarding the 93-mile, canyon-bound reach between the White and Black River
19 confluence and the head of Roosevelt Lake, “[t]he period of the year when there is sufficient
20 water to permit even whitewater boating is very limited, generally extending only from March
21 1 through May 15 in normal years, and even shorter periods in dry years.” *See* Mussetter
22 Declaration, at 19 [C024].

23 751. Regarding the 93-mile, canyon-bound reach between the White and Black River
24 confluence and the head of Roosevelt Lake, Dr. Mussetter wrote:

25 The General Information section at the beginning of the modern boating guide
26 by Whitis and Vinson (2014) contains the following statement: “Just a short
27 two and one-half hour drive from central Phoenix is a special river that

1 relatively few boaters get to enjoy, mainly due to its short unpredictable
2 season.” The third paragraph of the above-referenced section also contains the
3 following statement: “The boating season for the Salt typically begins in early
4 March and runs through April with anything from dangerously high water to
5 rock-scraping low water possible.

6 *See Mussetter Declaration, at 19 [C024].*

7 752. Regarding the 93-mile, canyon-bound reach between the White and Black River
8 confluence and the head of Roosevelt Lake, Dr. Mussetter wrote:

9 [T]he March 9, 2014, edition of the Arizona Daily Star reported that
10 commercial rafting companies cancelled their 2014 seasons on the Upper Salt
11 and Verde Rivers due to the lack of water. This report contained the following
12 quote from the owner of the Wilderness Aware Rafting Company: ‘We need an
13 absolute minimum of 400 cfs to get the boats out without having to drag it over
14 the rocks.’ Based on the data from the Salt River near Roosevelt and Salt River
15 near Chrysotile gages (USGS Gage Nos. 9498500 and 9497500, respectively)
16 that are located near the Highway 288 and Highway 60 Bridges, respectively,
17 the discharge in this part of the reach is less than 400 cfs about 60 percent of the
18 time, on average, over the entire year and about 20 percent of the time during
19 the typical rafting season.

20 *See Mussetter Declaration, at 19-20 [C024].*

21 753. The Southwest Paddler’s boating guide for the Upper Salt River “from US
22 Highway 60 to SH 288” describes the Salt as “a *seasonal* stream that is usually *navigable*
23 *from March through May*, depending upon snowpack in the mountains and rainfall within the
24 drainage basin.” *See Southwest Paddler’s Guide; Upper Salt River, at 1 [C018–ASLD28]*
25 (emphasis added).

26 754. “The flow pattern of the Salt and Gila Rivers was seasonal. During most of the
27 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.” *See Richmond 1987, at 32 [EI12, Part 2, Tab 2].*

755. The U.S. Forest Service wrote:

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

13 *See* USFS 1998, at 3 [Upper Salt EI08].

14 756. “It is difficult to develop hard and fast rules for boatability of streams in the
15 Arizona context. Water supply varies dramatically throughout the year, but even with
16 adequate water, a stream may not be boatable. Boatability depends on a number of factors –
17 water supply, slope of the stream, obstacles such as boulders or sand bars, and width and
18 depth of the channel.” *See* Stantech 1998, at 34 [Upper Salt EI11].

19 757. “Water supply varies greatly by season, usually being highest in the spring
20 when snow melts in the mountains. Some rivers are only boatable for a few weeks a year
21 while others may be boatable for several months. Amounts also vary from year to year.
22 Estimates vary on the amount of water needed for boating. The usual measure of water
23 supply is in cubic feet per second (cfs). The amount of water needed depends primarily on
24 the width and depth of the channel and danger from obstacles such as rocks. For example,
25 BLM estimates that the Virgin River is runnable by rafts in some segments with 1,000 cfs, but
26 in another segment, 2,000 – 3,000 cfs is required. In one segment BLM considers 400 cfs
27 minimal for kayaks, while 500 cfs is needed in the rest of the river. Having enough water,
however is not the entire picture. Too much water can cause problems. Generally above
certain flow levels, rivers can become hazardous, although that too is not the entire picture.
At low water, a rock may be clearly seen and avoided; at somewhat higher levels it may

1 create a reversal (hole) that must be avoided; and at maximum levels, the rock may again
2 become an insignificant as a barrier.” *See* Stantech 1998, at 34 [Upper Salt EI11].

3 758. Rivers that are “Boatable Seasonally” include: “Mid to low elevation stream,
4 more than 8’ wide in most places, occasional Class 1-3 rapids, sandy or gravelly bottom, only
5 occasional obstacles, at least 5” of water most places for at least one month of the year.” *See*
6 Stantech 1998, at 35 [Upper Salt EI11].

7 759. “There is a bit of revolution in river running going on in the state that makes it
8 hard to give definitive information. Boaters who aren’t content to resign themselves to *a few*
9 *days of fun per year on most of the state’s rivers* have started using *durable plastic canoes*
10 *and single person inflatables to run them at levels well below what was in the past has been*
11 *considered boatable*. These seemingly stubborn individuals may end up *dragging their boats*
12 *over a riffle too shallow to float once in a while* but to pay that small inconvenience for the
13 reward of a day in the river is well worth it in their eyes.” *See* Stantech 1998, at 36 [Upper
14 Salt EI11] (emphasis added).

15 760. In March 2014, rafting companies had to cancel the boating season due to a
16 “dry Arizona winter.” *See* Tr. 1/27/16:2270 (Mussetter) (quoting *Arizona Daily Star*, March
17 9, 2014); Mussetter Presentation, slide 27. The owner of Canyon Rio Rafting was quoted as
18 saying: “We need an absolute minimum of 400 cfs to get the boats out without having to drag
19 it out over the rocks.” *Id.*

20 761. Dr. Mussetter provided flow duration curves using data from the gages at
21 Roosevelt and Chrysotile. *See* Tr. 1/27/16:2272 (Mussetter); Mussetter Presentation, slide
22 28. Chrysotile is farther upstream and is “very similar” to natural conditions. *Id.* The median
23 flow at Roosevelt is 316 cfs. *Id.* The median flow at Chrysotile is 260 cfs. *Id.* at 2272-73.
24 Dr. Mussetter provided annual hydrographs for those same graphs to show the seasonal
25 variation: “This shows the seasonal variation. So you see that, basically, the rafting season, if
26
27

1 you will, when the flows tend to be higher; and then you also see the effects of the monsoon
2 season in the late summer and early fall.” *Id.* at 2277; Mussetter Presentation, slide 29.

3 762. Based on the foregoing evidence, the Commission finds that to the extent the
4 Salt could ever be used to support navigation, the season is too brief to sustain a commercial
5 reality.

6 **Boating Guides**

7 **Mr. Williams’ Boating Guide**

8 763. Mr. Williams authored the book *Paddling Arizona*, “a guide to lakes, rivers, and
9 creeks, so paddling destinations both flatwater paddling and flat streams and whitewater
10 rivers.” *See* Tr. 10/21/15:275 (Williams).

11 764. Mr. Williams’ guide for the Lower Salt River (between Saguaro Lake and
12 Granite Reef) states that the “minimum flow” is 300 cfs, that the ideal flow is 500-1,500 cfs,
13 and has a difficulty level of “advanced.” *See Paddling Arizona*, at 28 [C018–ASLD 200].

14 765. Mr. Williams’ testified that his minimum flow numbers in his guide are for
15 providing a boater with “normal expectations,” which he defines as “that you’re not getting
16 stuck to the point that you have to get out of your boat multiple times.” *See* Tr. 10/21/15:302
17 (Williams).

18 766. Mr. Williams’ guide for daily run of the Salt River for the seven miles below
19 the U.S. 60 bridge states that rapids encountered run up to class IV under certain
20 circumstances and has a gradient of 35 feet per mile. *See Paddling Arizona*, at 208 [C018–
21 ASLD 200]. The “likely season” for this run is listed as February to early May, but “[h]eavy
22 monsoon years provide flows in August and September.” *Id.* It also states that the minimum
23 flow is 500 cfs for rafts, 300 cfs for kayaks, 200 cfs for inflatable kayaks, with an ideal flow
24 rate of 1,000 to 3,000 cfs. *Id.*

25 767. Mr. Williams testified that boating below the minimums in his guidebook
26 results in: “You just hit more rocks. You might have to jump out of your boat a time or two.
27

1 You know, I'm writing this book for someone who's come in here to run the river and enjoy -
2 - enjoy their time. So it's all about expectations. I know people have run the river lower than
3 200 cfs in inflatable kayaks. And if they're fine with getting out of their boat a time or two,
4 that's great." See Tr. 10/21/15:305 (Williams).

5 768. Regarding the daily stretch of the Upper Salt, Mr. Williams writes:

6 The standard put-in is located at a large eddy a few hundred yards down the
7 road from the highway. Some elect to launch closer to the highway bridge,
8 however, and run a gravel bar rapid above the main put-in. . . . There is another
9 short steep gravel bar leading into a wall immediately below the main put-in
10 eddy, then a long straight-away leads to Tailings Rapid, where the river bends
11 right. Next is Bump & Grind-an aptly named shallow gravel bar. The narrow
12 rapid just below here that sluices against the right wall is called Maytag. This
13 one tends to spin rafts around, hence the name. It is fast and powerful, but
14 straightforward with no big holes. Next is Grumman, where some sizeable
15 holes do lurk. The river makes a sharp right along a cliff wall above Mother
16 Rock. At higher flows, look for a great surf hole above Mother Rock on the
17 right. Next is Eagles Nest, sometimes called Overboard. This is a left turn with
18 some big potentially hazardous rocks along the right bank. At most levels, a
19 good play hole exists toward the bottom of the rapid. This same hole can of
20 course flip small rafts or unsuspecting paddlers. Some class II water below
21 Eagles Nest is the end of the Mule Hoof Bend section of rapids. If there were a
22 trail, one could hike up to the road from here, and then walk a short quarter mile
23 back to the put-in. For now, this shortcut route is a difficult desert bushwhack
24 that is rarely attempted. The next few miles of river are splashy class I and II.
25 Just past 2nd Campground where raft guides and other paddlers often camp, the
26 river bends right into Exhibition Rapid. This one holds the biggest waves on
27 the run. A few easy ledge rapids lead down to Cibecue Rapid and Cibecue
Creek, a popular take-out. For those who continue downstream, a steep gravel
bar called 3-way keeps the action going, then the river turns right into Salt River
Draw Rapid. Next is Mescal, a simple yet forceful drop with a fast and shallow
hole. Just below Mescal is the last good place to take out, because the road
climbs away from the river after this. Also, the Salt Banks are just downstream
on river right. This is a sacred Apache site, and strictly off-limits.

24 *See Paddling Arizona*, at 208-210 [C018-ASLD 200].

25 769. Regarding Bump and Grind rapid, Mr. Williams testified: "[I]t's a gravel bar
26 and it changes with each flood. So some years there's a good channel through it, and some
27

1 years there's not a great channel through it. And so, you know, usually you'll – you'll hit a
2 rock at some point and you'll slide over a rock at some point." *See* Tr. 10/21/15:309
3 (Williams). Mr. Williams defines a shallow gravel bar as "less than 6 inches." *Id.* at 309.

4 770. Mr. Williams testified that he has seen boaters flip at Eagles Nest rapid. *See* Tr.
5 10/21/15:313 (Williams).

6 771. Mr. Williams' guide for the wilderness section of the Salt River (the 52 miles
7 below the U.S. 60 bridge), states that it contains class IV rapids and requires a minimum flow
8 of 400 cfs (although it has been run at lower flow rates), with an ideal flow rate of 1,000 cfs to
9 3,000 cfs. *See Paddling Arizona*, at 208-10 [C018–ASLD 200]. The "likely season" is
10 March through May. *Id.*

11 772. Mr. Williams' guide for the wilderness section of the Salt River (the 52 miles
12 below the U.S. 60 bridge), states:

13 Within a couple miles below Gleason Flat, you'll encounter Eye of the Needle
14 Rapid, and Black Rock-a class IV drop. Class II and III action continues for
15 several miles as the river winds through desert hills. The whitewater picks up
16 and the canyon pinches down below Lower Corral Canyon. First is The Maze,
17 and then Pinball. Both of these bouldery rapids require ferry moves in swift
18 current. The scenery gets more dramatic below here as the river enters Jump
19 Off Canyon. Steep fins of Quartzite knife into the river, one of which forms
20 Quartzite Falls. Quartzite Falls was once a formidable drop containing a very
21 sticky hole, and most trips portaged. In 1993, a misguided engineer who also
22 happened to be a weekend raft guide hiked in and blew up the hydraulic
23 forming ledge. The once magnificent and powerful rapid is now emasculated to
24 a shadow of its former self. On the brighter side, it is still a solid class IV drop,
25 and the jackass who blew it up with his friends did indeed do some time in the
26 big house. Just below Quartzite, Corkscrew Rapid is the final major obstacle in
27 Jump Off Canyon. The river remains swift with occasional class III down to
Cherry Creek, then you are officially on the paddle out.

24 *See Paddling Arizona*, at 214 [C018–ASLD 200].

25 773. When asked about the length of the season for this portion of the Salt, Mr.
26 Williams testified: "Because it's such a highly variable environment down here in the
27

1 Southwest. You know, some years, it's not gonna ever get to a thousand 22 cfs, and some
2 years, it will be, you know, 2-, 3-, 4,000 cfs throughout that entire period." *See* Tr.
3 10/21/15:317 (Williams).

4 774. Regarding the Black Rock rapid, Mr. Williams testified: "It's a short ledge with
5 a couple different chutes going through. The current piles into a cliff wall below on the left.
6 It's powerful currents. I believe there's a flood channel on far river left there that you can --
7 If you're to portage the rapid, I think that's the portage route." *See* Tr. 10/21/15:319
8 (Williams).

9 775. Regarding the Maze rapid, Mr. Williams testified: "The Maze . . . has several
10 boulders sprinkled throughout the rapid. So it's just a little bit more complex in . . . the way
11 the currents react." *See* Tr. 10/21/15:319 (Williams).

12 776. Regarding Corkscrew rapid, Mr. Williams testified: "It's another one of those
13 Class IVs that requires scouting for most paddlers. And . . . it's tricky to negotiate it
14 successfully. . . . It's easy . . . portage on the left, or you could line a boat there. It's not a
15 long rapid, but it is a little bit delicate to negotiate it successfully." *See* Tr. 10/21/15:320-21
16 (Williams).

17 777. Mr. Williams has boated up to seventy streams and rivers in Arizona in his
18 kayak. *See* Tr. 10/21/15:337 (Williams).

19 778. Mr. Williams testified that he would be surprised to find out that courts had
20 found the San Juan River and the Rio Grande river not navigable. *See* Tr. 10/21/15:358
21 (Williams).

22 779. Mr. Williams' guidebook is for recreational boaters and not businessmen
23 interested in using a building for commerce. *See* Tr. 10/21/15:368-69 (Williams).

24 780. Mr. Williams' guide for the Lower Salt River (between Saguaro Lake and
25 Grantie Reef) states that the "minimum flow" is 300 cfs, that the ideal flow is 500-1,500 cfs,
26 and has a difficulty level of "advanced." *See Paddling Arizona*, at 28 [C018-ASLD 200].
27

1 781. Based on the foregoing evidence, the Commission finds that Mr. Williams’
2 guidebook supports a finding of nonnavigability on the Salt River.

3 **United States Forest Service Guide**

4 782. A 1995 United States Forest Service Guide for the Upper Salt (Highway 60
5 bridge to Roosevelt Reservoir) includes a series of “Safe Boating Considerations:”

6 a. “It is difficult to generalize about this river since much depends on the
7 time of year, water level, boat involved, and certainly the skills of the river runner. It very
8 definitely is **not** a river meant of beginners or novices!” *See USFS Recreational Opportunity*
9 *Guide for the Upper Salt River*, at 1 [Upper Salt EI08] (“USFS Guide”) (emphasis in
10 original).

11 b. “‘There are several rapids which can go to a solid Class IV at certain
12 water levels. This river is unusually run in small rafts and in kayaks. It is **not** suitable for
13 ‘rubber duckies’, open canoes, etc. It is also generally unsuitable for large rafts (over 15 feet).
14 Motors of any type are prohibited.” *Id.* (emphasis in original).

15 c. “All safety precautions should be taken on the entire river. Your
16 personal flotation device (often incorrectly referred to as a ‘life vest’) should be high quality,
17 and provide flotation equal to at least 10 percent of your body weight. It should be worn *at*
18 *all times* when on the river. Full or partial wet suits are important safety items early in the
19 season. Kayakers should have rescue lines installed on their boats; rafters should have a good
20 throw rope, and know how to use it.” *Id.* at 2 (emphasis in original).

21 d. “The information contained in this guide is for general informational
22 purposes only, and is not meant to be taken as an invitation, nor as a statement of conditions
23 at any one time. All persons intending to run this river are responsible for personally
24 assessing these conditions as well as their own ability to cope with them. You should be
25 aware that all recreational river use of this type involves a degree of risk, and persons
26 engaging in this activity assume the risk associated therewith. There are a number of books
27

1 on the market that can assist you in developing your back-country skills. Do not ‘bite off
2 more than you can chew’, since compassion is not one of this river’s attributes.” *Id.* at 3.

3 e. “Some (but not all) rapids are named and described, but they are not
4 rated. This is due to inherent problems with rating systems, and because the rapids change
5 radically with changes in water level. When in doubt, scout!” *Id.* at 5.

6 783. The *USFS Guide* also includes descriptions of a number of rapids, including:

7 a. “Mile 59.8 Highway 60 Bridge R.A.P.: It is possible to launch on either
8 the north or the south side of the river, however both require running Island Rapid which is
9 best avoided by rafters at moderate and low water levels. *See* *USFS Guide*, at 7 [EI08].

10 b. “**Baptism Rapid**: Usually too rocky at low water. Some nasty holes at
11 higher water. . . . (Named for what happens if you underestimate this one.)” *Id.* at 9.

12 c. “**Island Rapid**: Nasty rocks to hang up on in both channels; best to start
13 below this rapid except at higher water. There is also the ‘African Queen Sneak Route’ going
14 far left at Mile 49.6. Drowning here in 1973.” *Id.*

15 d. “**Bump and Grind Rapid**: The upper easy part of this rapid conceals a
16 rocky ledge across the entire low end. Rafts may be lined at low water. (Named for a famous
17 dance river-runners once knew, and for what happens at lower water.)” *Id.*

18 e. “**Maytag Chute**: Main part of river goes straight—to left of small
19 island, but preferred route is *far* right to the right of the island (which can be used for
20 scouting). Tricky Currents!” *Id.*

21 f. “**Reforma Rapid**: (Scouting recommended.) Some deep and sneaky
22 holes (rocks) in this one. At higher water, they can be mean! Drowning here in 1986.
23 (Named for a ski run at Taos, and for what can occur here.)” *Id.*

24 g. “**Mother Rock**: Major rock in center of river. No problem if you stay
25 right. There is a diabase sill cliff capped with Mescal limestone to the left. Below Mother
26
27

1 Rock is a long rock garden. Work your way to its *far* right side to enter Overboard Rapid.”

2 *Id.*

3 h. “**Overboard Rapid**: Difficult to scout. Enter far right, but then pull
4 away from the right side; there is a very large rock (or hole) at lower end on right. (Named
5 for what commonly happens here.)” *Id.* (emphasis in original).

6 i. “**Exhibition Rapid**: Broad at the top, narrows at bottom. Some good
7 haystacks with occasional hidden holes. (Named for a ski run in Sun Valley, and for what you
8 can put on here.)” *Id.* at 11.

9 j. “**Three-Way Rapid**: One run is straight ahead, but the middle chute
10 (take a hard right) can provide a good ride.” *Id.*

11 k. “**Salt River Draw Rapid**: (Scouting recommended from left bank.)
12 Hairy at all levels. Stay away from the left side.” *Id.*

13 l. “**Ledges Rapid**: A series of drops created by the resistant Dripping
14 Spring Quartzite. Big rocks (or holes) can be hidden in the waves on the left side.” *Id.*

15 m. “**Little Boat Eater**: A *keeper* is located at the very bottom of the
16 rapid which is immediately above the quiet water at Walnut Falls. It is very close to the left
17 bank, and gets more troublesome at lower water.” *Id.*

18 n. “**The Rat Trap**: At lower water, a sharp drop with buried rocks and
19 turbulence. At higher water, a sneak route to the right is available.” *Id.*

20 o. “**White Rock Rapid**: This long rapid beings just around a sharp right-
21 hand turn. Usually a good ride, but it can be intense at high water. The river is entering a
22 gorge of gleaming white Precambrian Ruin Granite that is over 1,400,000,000 years old.” *Id.*

23 p. “**Granite Rapid**: A rock splits the river. Both sides can be tough, and
24 there’s no place to stop.” *Id.* at 13.

25 q. “**Eye of the Needle**: (Scouting recommended.) This one sneaks up on
26 you. At lower water, a very narrow passage (with a sizeable drop) between rocks — run left.

27

1 At high water, a reversal can be created across most of the river, and far right is preferred —
2 look over carefully. (Named for its biblical reference).” *Id.*

3 r. “**Black Rock Rapid:** (Scouting recommended.) This is a significant
4 rapid at the end of a right-hand turn; it requires *close* attention. There is an impressive drop,
5 and tricky currents. At higher water, it can be run (or lined) through the left channel. At low
6 water, a difficult waterfall is formed. (named for the movie — don’t let it be a bad day here
7 for you — and for the color of the rock here.” *Id.* (emphasis in original).

8 s. “**Pendejo Curve:** Stay off the left wall. Tougher at low water.” *Id.* at
9 15.

10 t. “**Upper Corral Rapid:** Current goes into rocks, lower right side.” *Id.*

11 u. “**Lower Corral Rapid:** This is a good place to regroup for what’s
12 ahead. This long rapid begins just around a sharp left-hand turn; you are now jumping off
13 down into Jump Off Canyon. There are some sneaky *pinball* possibilities to be avoided for
14 the next mile.” *Id.*

15 v. “**The Maze:** (Scouting recommended.) Starts just around sharp right-
16 hand turn. Several large rocks block the river; they become knarly [sic] holes at higher water.
17 Current will take you left, but one route is extreme *far* right against the wall.” *Id.* (emphasis
18 in original).

19 w. “**Quartzite Rapid (Falls):** This was once an awesome rapid, with many
20 a tale told by those who encountered it. A drowning occurred here in 1969 and two occurred
21 in 1993. In the fall of 1993, the lower drop was destroyed by high explosives. After an
22 intensive investigation by the Forest Service and BATF, it was determined that a group of
23 eight persons had carried out this shameful destruction; the ringleaders were William Kenneth
24 Stoner (a former river-guide) and Richard Merrick Scott (both of Phoenix, AZ). Please pause
25 for a moment to mourn the loss of this irreplaceable natural feature. The upper drop remains
26 a challenge, and scouting is recommended.” *Id.*

27

1 x. **Corkscrew Chute:** (Scouting recommended.) Below Quartzite, there
2 is a pool and sometimes an island. *Corkscrew* begins at the pool’s lower end. At some water
3 levels, this one behaves like a Grand Canyon rapid.” *Id.*

4 y. **The Sleeper:** There is a sneaky hole near the beginning of a nice long
5 ride. Stay left away from the hole.” *Id.* (emphasis in original).

6 z. **Cliff Hanger Rapid:** The main current runs directly into a bluff with a
7 large eddy pool to the left. Rafters should run this with care. (Named because it is sometimes
8 a mystery if a raft will ever come out of the eddy pool and for what you can do if you flip.)”
9 *Id.* at 17.

10 784. Based on the foregoing evidence, the Commission finds that the USFS Guide
11 supports a finding of nonnavigability on the Salt River.

12 **Commercial Component**

13 785. With regard to commerce, Mr. Fuller testified: “Could be exchange of goods. I
14 don’t know that there necessarily needs to be profit. Could be losing money, I suppose.
15 Although the objective of business is not to lose money.” *See* Tr. 10/22/15:643 (Fuller).

16 786. Mr. Gookin testified: “[R]ecreational criteria I don’t think are relevant because
17 it doesn’t consider the lows associated with commerce or, if you’re taking people, the lows
18 associated with the camping and so forth for long trips. The shallowest portion of a river is
19 the most difficult to boat.” *See* Tr. 11/19/15:1531 (Gookin). Mr. Gookin testified that the
20 historical boating accounts lead him to conclude that there is no evidence that Segments 1
21 through 6 could support commercial activities. *Id.* at 1477.

22 787. Dr. August defines the term “highway of commerce” means “that the river was
23 able to serve settlers as a highway of commerce up and down the river.” *See* Tr. 1/26/16:1875
24 (August). “Highway of commerce” is a term of art in historical purposes and historians use it
25 “quite often.” *Id.* He testified that it is a “pattern of use” for a “particular purpose.” *Id.* Dr.
26 August defined a highway of commerce is “a highway or thoroughfare in which commerce
27

1 and travel takes place on a regular, predictable basis, some significant amount of traffic up
2 and down. *Id.* at 2014.

3 788. Dr. Mussetter testified: “It needs to be boatable often enough to support the
4 commercial portion of the definition of navigability, and that would vary depending on the
5 type of commercial activities that were being done.” *See* Tr. 1/29/16:2668 (Mussetter).

6 789. Mr. Gookin determined that using canoes one way down the Salt would be
7 “economically way out of the question.” *See* Tr. 2/26/16:3439 (Gookin). Regarding using a
8 train to bring the canoe back upstream, Mr. Gookin testified: “I did look at the fact that
9 shipping the canoes out to Arizona cost four times first class postage, and that told me that --
10 well, that plus the Powell experience, where they ordered canoes shipped and one of them
11 arrived nonusable. It had broken up during shipment. That kind of told me that you really
12 have to pack it right to ship it back on the railroad.” *Id.* at 3440.

13 790. Mr. Gookin believes that downstream travel can be sufficient to make a river
14 navigable only if it is “commercially feasible.” *See* Tr. 2/26/16:3451 (Gookin).

15 791. Mr. Gookin testified that the commercial component of navigability requires a
16 “reasonable expectation of profit,” but it does not need to actually make a profit. *See* Tr.
17 2/26/16:3457 (Gookin).

18 792. Dr. Newell testified that he would not have liked to use a cargo boat on the Salt
19 in its natural condition because it would not be safe and “evidence suggests that it couldn’t be
20 done successfully.” *See* Tr. 3/30/16:4279 (Newell).

21 793. Dr. Newell testified:

22 Time is as important as the load and the vessel. And as I think I’ve explained,
23 for example, a canoe that could carry 200 pounds of something in 1700, if that
24 were beaver pelts, that would be an economically viable load, a commercial
25 load. You could sell that for enough money to both live on and to trade on. By
26 1900, less so, simply because of the nature of the cargo. To be economically
27 viable by the turn of the century, you’re probably going to need to be using a
boat that’s capable of carrying a much greater and much heavier cargo, such as
cotton bales, lumber, ores, things of that nature.

1 *See* Tr. 3/31/16:4401 (Newell).

2 794. With regard to his standard for commercial navigation, Dr. Newell testified: “I
3 mean this is a typical standard in my profession. I mean, you’re looking at 300 years of the
4 development of trade and transportation on rivers, and we all know that the profit factor is one
5 of the main driving factors behind that development of trade and transportation in any region
6 of the country.” *See* Tr. 3/31/16:4434-35 (Newell).

7 795. Mr. Fuller agreed that, if a person hired a commercial transportation on a river,
8 a boat flipping over would not be part of the experience the person paid for. *See* Tr.
9 5/19/16:5050 (Fuller). Mr. Fuller testified: “I don’t think, if you were being transported, you
10 would be specifically looking to get flipped out.” *Id.*

11 796. Mr. Fuller agreed that, if cargo that might have gotten ruined by getting wet
12 would fall into the “cargo didn’t arrive category” and would not constitute a success. *See* Tr.
13 5/19/16:5050 (Fuller).

14 797. Mr. Fuller testified that, if a passenger had to get out and push the boat because
15 of shallow stretches: “I think they would prefer not to push.” *See* Tr. 5/19/16:5050 (Fuller).

16 798. Mr. Fuller testified that the factors of time, difficulty, and damage to a boat are
17 considerations for a commercial enterprise. *See* Tr. 10/23/15:784 (Fuller).

18 **COMPARISONS TO OTHER RIVERS**

19 799. Dr. Newell wrote:

20 American rivers, especially those used since colonial times for trade and
21 transportation, have distinct signatures in the historical and cultural record.
22 Maps of the river route will be found to contain name references to trade and
23 transportation activities on the river. These will include names given to
24 landings, fueling stations, railheads. Towns along the route will show dedicated
25 commercial riverfront facilities from warehouses to brokerage houses, shipping
26 firm offices, factors offices etc.

27 *See* Newell, at 23 [C044-SRP5].

800. Mr. Fuller testified that a portion of the San Juan River that was determined to
be non-navigable is regularly used for recreation. *See* Tr. 10/23/15:815 (Fuller). Mr. Fuller

1 testified that the average flow is likely higher on the San Juan River compared to the Salt.
2 *See* Tr. 10/23/15:815 (Fuller).

3 801. Mr. Gookin testified: “[W]hen Phoenix began, Yuma already existed. It was an
4 ocean port, and by that I don’t mean it was located on the ocean, but boats that had sailed the
5 ocean could sail upstream the Colorado and dock at the port in Yuma. So it was a primary
6 source of supply for territorial Arizona.” *See* Tr. 11/19/15:1519 (Gookin).

7 802. Mr. Gookin testified: “We know for a fact that the Quartermaster’s Station at
8 Yuma used a navigable river to supply the Forts up the Colorado. We know for a fact that
9 they didn’t use the river to supply the Forts up the Gila and Salt. We know that they wrote
10 that they wish they could have, but they had to do it by wagon, which was much more
11 expensive and so forth.” *See* Tr. 11/20/15:1735 (Gookin).

12 803. Dr. August testified: “[Navigable rivers] are certainly the foundation of some
13 of our major cities in the country and helped the growth progress, and the advance of western
14 civilization as we know it, particularly the term Manifest Destiny in the 19th century that
15 helped us populate the American West after the war with Mexico. So that certainly was a
16 consideration, the navigable streams.” *See* Tr. 1/26/16:1988-89 (August).

17 804. The Colorado was used as a transportation route prior to the advent of the
18 railroads in Arizona. *See* Tr. 1/26/16:1995-96 (August). It was used to move people and
19 goods up and down the river. *Id.* Dr. August considers the Colorado a navigable river. *Id.*

20 805. Dr. Littlefield wrote:

21 [T]he Arizona Legislature in 1865 declared that the Colorado River was the
22 only navigable body of water in the Territory. Regularly navigated from its
23 mouth at the Gulf of California past Yuma to approximately present-day
24 Bullhead City, the Colorado River was the subject of many stories in a
25 multitude of newspapers, promotional publications, as well as in published
26 government documents. The significance of such boating on the Colorado
27 River – which carries substantially more water than the Salt River – was not lost
on prospective businessmen, possible settlers, and military officials, all of
whom hoped for easier access to the interior parts of the southwestern United

1 States on the Colorado. Such access, however, was not available on other
2 southwestern rivers.

3 *See* Littlefield Declaration, ¶ 54.

4 806. Dr. Littlefield wrote:

5 From accounts of expeditions on the Colorado River, therefore, some details
6 about boat navigability and southwestern rivers around the time of Arizona
7 statehood can be discerned – observations made by parties ‘on the scene’ and
8 not reconstructions of history by taking the present and projecting it backward.
9 This is not to say that river travel was not attempted on southwestern streams
10 other than the Colorado in the nineteenth century – indeed, it was because water
11 travel was by far the most economical method of internal communication.
12 Nevertheless, river navigation on those other southwestern streams such as the
13 Salt River proved to be too risky and hazardous due to channel changes, floods,
14 or insufficient water.

15 *See* Littlefield Declaration, ¶ 55.

16 807. Dr. Littlefield wrote: “[T]he utility of the Colorado River as a navigable
17 waterway was recognized by the middle of the nineteenth century when the [] United States
18 sent Lieutenant J.C. Ives up the Colorado on an expedition to investigate and report on the
19 stream’s navigability. Ives later concluded that the Colorado was indeed navigable, but
20 sometimes only by overcoming many obstacles and sandbars.” *See* Littlefield Declaration, ¶
21 56.

22 808. Dr. Littlefield wrote: “Further exploratory trips along the Colorado River to
23 assess its utility as a navigable waterway were subsequently conducted by John Wesley
24 Powell in 1869 and 1871-1872 . . . and by George M. Wheeler in 1871, . . . These
25 expeditions clarified that the Colorado River was useful for regular boating on its lower
26 reaches but not through the Grand Canyon.” *See* Littlefield Declaration, ¶ 57.

27 809. Dr. Littlefield wrote:

[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

1 support boats used for transporting commerce such as those used by Ives,
2 Powell, and Wheeler. A dependable and reliable draft of two feet could not be
3 had in a river that was sometimes only a few inches deep, although at flood
4 stage, the Salt could contain very deep water. Then, however, the raging
5 torrents were too dangerous to be navigated. Based on historical accounts, even
6 the dories used by John Wesley Powell to go down the Colorado River in 1869
7 and 1871-1872 or the rowboats used in the Wheeler expedition in 1871 likely
8 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.

9 *See* Littlefield Declaration, ¶ 58.

10 810. “Throughout the world, rivers have been historically been corridors of travel,
11 the conduits through which people and goods have been transported to distant destinations.
12 But with the exception of the Colorado River, the desert streams of Arizona could never serve
13 this purpose. These rivers were vitally important to early travelers for other reasons: they
14 were the primary source of life-giving water in the harsh desert environment, and they also
15 served as directional markers, with their vibrant green band of vegetation set against the dull
16 gray-brown landscape, pointing the way to the next settlement. Most often, however, the
17 desert rivers were more of an impediment than an aid to travelers. Their erratic fluctuating
18 flows frequently created new channels across a broad floodplain, and shifting pockets of
19 quicksand made crossing by foot, horseback, or wagon difficult or even dangerous. The
20 hazards of rivers were most evident in the spring when melting snow in the mountains
21 converged into raging torrents tearing through the valleys. All who journeyed through
22 Arizona were familiar with these unpredictable hydrological obstacles; consequently , early
23 transportation routes tended to follow not the rivers, but the river crossings.” *See*
24 *Archaeological Consulting Services*, at 61 [C018–ASLD 15].

25 811. Dr. Newell testified that there was Native American boat use on the Colorado
26 River. *See* Tr. 3/31/16:4471 (Newell).

1 812. With regard to the historical boating accounts on the Salt, Dr. Newell asks:
2 “Was it a commercial load, was it trade and transportation in a commercial sense, was it ever
3 repeated, was it repetitive business, was it up and downstream. No single account ever met
4 those criteria.” *See* Tr. 3/31/16:4319-20 (Newell). “The evidence doesn’t show that any of
5 these attempts represented commercial trade and transportation on a repetitive basis.” *Id.*

6 **ORDINARY AND NATURAL CONDITION**

7 813. Mr. Fuller testified: “[F]loods do a lot of geomorphic work, so they shape the
8 floodplain. They do erosion. They remove vegetation from the floodplain. Sometimes the
9 low flow channel removes – it moves across the floodplain in some cases. So the low flow
10 channel or the flood that could be a low flow channel, it could be the floodplain itself, could
11 be widened during a very large flood.” *See* Tr. 10/20/15:37 (Fuller).

12 814. Mr. Fuller testified that the Salt existed in its “natural condition” between the
13 1800s to the 1860s. Tr. 10/20/15:46 (Fuller); Fuller PowerPoint, slide 40.

14 815. Mr. Fuller testified that “there’s minimal change upstream of [Roosevelt]” on
15 the Salt from its natural condition. Tr. 10/20/15:47 (Fuller); Fuller PowerPoint, slide 43.

16 816. With regard to the Lower Salt River, Dr. Mussetter wrote:

17 The 1980s-era gravel and cobbles were exposed by downcutting of the river
18 through a much finer-grained, sand-and-gravel surface layer that was present
19 prior to 1965, and presumably under natural conditions, as well. This finer
20 material would have been mobilized on a more frequent basis than the exposed
21 gravel and cobbles, which would have made the low-flow channel much less
22 stable, laterally, than under modern conditions.

23 *See* Mussetter Declaration, at 5 [C024].

24 817. With regard to the Lower Salt River, Dr. Mussetter wrote:

25 Under natural conditions, the riparian corridor along the river was very sparse.
26 Upstream flow regulation has changed the flow regime by increasing the
27 baseflows, and this has resulted in a more robust riparian corridor that also
28 makes the low-flow channel more stable (and less dynamic) under modern
29 conditions than under natural conditions.

1 See Mussetter Declaration, at 5 [C024].

2 818. Regarding the 93-mile, canyon-bound reach between the White and Black River
3 confluence and the head of Roosevelt Lake, Dr. Mussetter wrote:

4 The geologic conditions along the approximately 93-mile canyon-bound
5 upstream reach of the Upper Salt River strongly indicate that the
6 geomorphology has changed very little since the date of Arizona's statehood.
7 This reach flows through a narrow, bedrock canyon that controls the planform
8 alignment, longitudinal profile and width of the active river channel. In this
9 setting, significant changes in geomorphology due to the direct action of the
10 river occur over very long (geologic) time-frames that are orders of magnitude
11 longer than the approximate century since Arizona's statehood. Because of the
12 remoteness of the area, human activities that directly affect the geomorphic
13 character of the river, including both direct physical modifications and changes
14 in the flow regime, have been very limited. As a result, both the physical
15 configuration of the river and the flows that occur under current conditions in
16 this part of the reach are very similar to conditions at the time of statehood.

13 See Mussetter Declaration, at 12 [C024].

14 819. Regarding the portion of the Upper Salt between Granite Reef and Stewart
15 Mountain dams, Dr. Mussetter wrote:

16 [T]he geomorphic and vegetation characteristics of the river reflect the
17 significant effects of the upstream flow regulation. Based on the data from the
18 USGS *near Roosevelt* gage that is located upstream from Roosevelt Lake and
19 the *below Stewart Mountain Dam* gage that reflects the effects of the regulation,
20 the upstream facilities significantly reduce the annual peak discharges that
21 create the disturbance regime that removes vegetation and drives the braiding
22 process, but have a less significant effect on the total amount of flow passing
23 through the reach []. For the common period of record from Water Year (WY)
24 1935 through WY2013, the annual peak discharge at the near Roosevelt gage
25 exceeded 13,300 cfs in half the years (i.e., the median discharge) and exceeded
26 60,000 cfs in 13 of the 79 years (~16 percent, or about 1 in 6 years); whereas,
27 the median annual peak discharge at the *below Stewart Mountain Dam* gage was
only 2,340 and 60,000 cfs was exceeded only once (WY1980; peak discharge of
64,000 cfs). In comparison, the average annual runoff volume past the *near
Roosevelt* gage during this period was about 581,000 ac-ft, and about 667,000
ac-ft at the *below Stewart Mountain Dam* gage[]. Prior to construction of the
dams, large peak flows would have occurred in the downstream portion of the
reach on a regular basis, just as they do under existing conditions in the canyon-

1 bound, upstream portion of the reach, but with typically larger peak discharge
2 due to the larger drainage area.

3 *See Mussetter Declaration, at 22 [C024].*

4 820. Dr. Mussetter wrote:

5 As is true for most dryland rivers, there is strong correlation between the annual
6 flood peak and the annual runoff in the Salt River []. The annual runoff
7 volumes at the historic Salt River at Roosevelt gage that was located at the
8 approximate site of the existing Roosevelt Dam show runoff volumes exceeding
9 1 million ac-ft during 6 of the 22 years for which data are available between
10 WY1889 and WY1913 []; indicating that large floods occurred during these
11 years. The largest annual flows (and presumably, largest annual peaks)
12 occurred in WY1891 and WY1905-WY1907, when there were no significant
13 upstream diversions and prior to completion of the water storage projects that
14 include Roosevelt Dam. Based on this information, the portion of the Upper
15 Salt River below present-day Stewart Mountain Dam was most likely strongly
16 braided, with little in-channel vegetation at the date of Arizona's statehood as a
17 result of these floods.

18 *See Mussetter Declaration, at 26 [C024].*

19 821. Dr. Mussetter wrote:

20 Although the effects of significant upstream flow regulation, that began with
21 completion of Roosevelt Dam in 1911, on total flow volume are less than on the
22 flood disturbance regime, it does significantly affect the duration and timing of
23 the flows by reducing the duration of high and low discharges and increasing
24 the duration of flows in the intermediate range []. This has a compounding
25 effect on the characteristics of the river that affect navigability because it
26 severely limits the disturbance regime that occurred prior to the dams that
27 created the wide, braided, and unvegetated channel, provides higher flow during
certain periods to sustain the vegetation that grows on the braid bars and
provides longer periods of intermediate magnitude flows for which depths
might be suitable for navigation. The effects of flow regulation on increasing
riparian vegetation and channel narrowing are well-documented in the literature
[]. As a result of these effects, the alluvial reach of the Upper Salt River
between Stewart Mountain and Granite Reef Dams in its current condition
would be much more likely to sustain navigation, as defined under the Arizona
Revised Statutes, than it would have under natural conditions.

See Mussetter Declaration, at 28 [C024] (citations omitted).

1 822. Dr. Mussetter wrote:

2 The Arizona Division 1 Court of Appeals found that *ordinary* condition of the
3 river means the absence of *major flooding or drought* and *natural* condition
4 means the absence of *man-made dams, canals and other diversions* []. While it
5 is reasonable to exclude the limited periods when the river is actually
6 experiencing major flooding or drought when considering navigability, the
7 effects of these periods on the long-term character of the river cannot be
8 discounted. The wide, braided planform that is created by major flooding
9 persists for a significant period and influences the form of the river throughout
10 the ensuing low- to moderate flow periods. Extended droughts can also have a
11 long-term impact on the character of the river, especially when followed by a
12 major flood, because they tend to diminish the amount of riparian vegetation,
13 making the river even more susceptible to widening and braiding during
14 flooding.

15 *See* Mussetter Declaration, at 28 [C024] (emphasis in original).

16 823. Dr. Mussetter wrote:

17 Construction of Roosevelt Dam was completed in 1911; thus, the dam, itself,
18 would have been an impediment to navigation at the date of statehood. The
19 specific characteristics of approximately 53-mile reach through the existing
20 reservoirs at and prior to the date of Arizona's statehood are less certain than the
21 upstream canyon-bound reach and the downstream braided reach because
22 historical information is limited and inundation by the reservoir prevents direct
23 assessment of the characteristics of the valley floor. In spite of those
24 limitations, the available information strongly suggests that this reach would
25 also have been non-navigable at and prior to the date of statehood. A
26 significant part of the inundated reach between the dams is canyonbound; thus,
27 would have very likely had geomorphic characteristics similar to the upstream
reach, including rapids created by bedrock outcrops, tributary debris fans and
colluvium []. According to Gregory (1979) [], an alluvial floodplain was
present in the area occupied by Roosevelt Lake and this was the first place
where water from the upper Salt River would have been available for canal
irrigation. This portion of the Upper Salt River that is now inundated by
Roosevelt Lake may have been similar to the downstream, alluvial reach and
the upstream Gleason Flats reach that had a wide, braided character that would
have also made navigation impractical using the watercraft in use at and prior to
the date of Arizona's statehood.

28 *See* Mussetter Declaration, at 28 [C024] (citations omitted).

1 824. Dr. Mussetter wrote:

2 The modern-day character of the approximately 40-mile reach of the Lower Salt
3 River from Granite Reef Dam to the confluence with the Gila River is
4 significantly different from the historical character in a variety of ways that are
5 important to the question of whether it was navigable under ordinary and natural
6 conditions at the date of Arizona's statehood. Under natural conditions, the
7 channel had a sand-bed, braided configuration, and human-induced hydrologic
8 changes have converted it to a compound channel, with a slightly meandering
9 low-flow channel nested inside a wider braided channel []. Much of the sand
10 that previously made up the bed has been stripped off, leaving behind a coarser
11 bed that is dominated by gravel and cobbles. The riparian corridor along the
low-flow channel is more robust than under natural conditions. These changes
result from a combination of upstream water and sediment storage that have
changed the annual flow patterns and reduced the amount of sediment delivered
to the reach and direct human activities including extensive sand and gravel
mining, multiple highway crossings and other urbanization effects.

12 *See* Mussetter Declaration, at 31-32 [C024].

13 825. Dr. Mussetter wrote:

14 Under natural conditions, flows were typically elevated above baseflow during
15 March, April and early-May due to snowmelt from the higher elevation portions
16 of the basin. Monsoonal thunderstorms periodically increased the discharge for
17 short periods during late-summer and early-fall. Winter, cyclonic storms that
18 typically have a longer duration and wider geographic coverage than the
monsoonal storms also caused large, but still relatively short-duration
(compared to the snowmelt hydrograph) floods. This general pattern can be
19 clearly seen in the median mean daily flow hydrograph from the long-term
20 records at the near Roosevelt gage where flows are not significantly impacted
21 by upstream water management []. Although the drainage area at the near
22 Roosevelt gage is considerably smaller than the total drainage area of the
23 portion of the Lower Salt River upstream from the below Stewart Mountain
24 Dam gage (4,306 mi² versus 6,232 mi²), the seasonal runoff patterns prior to
25 upstream flow regulation were similar. Under modern (i.e., post-statehood)
26 conditions, the snowmelt hydrograph is essentially captured by the upstream
27 reservoirs, and these flows are released at a lower rate (but higher than natural
baseflows) and for a longer period of time beginning in early-March and ending
in late-November [].

26 *See* Mussetter Declaration, at 32 [C024].

1 826. Dr. Mussetter wrote:

2 The long-duration intermediate flow releases during the spring, summer and
3 early-fall under post statehood conditions have reduced the effects of periodic
4 floods that created the disturbance regime responsible for the natural, braided
5 character, and it also irrigates the riparian vegetation, resulting in a more robust
6 riparian corridor that further limits braiding potential. Eyewitness accounts and
7 historical photographs reported by Graf, et al. (1994) indicate that much of the
8 channel had little or no vegetation, with bands of cottonwood and willow along
9 the edges, prior to modern development. The lowest terrace, which in many
cases may have acted as a flood plain, was often covered by mesquite bosques.
As a result, the banks of both the low-flow and flood channels would have been
more erodible, and therefore, more active and unstable, under natural conditions
than under post-statehood conditions.

10 *See* Mussetter Declaration, at 33 [C024] (citations omitted).

11 827. Photographer Robert Webb wrote that Segment 5 has become more cobbly in
12 modern terms because the dam deprives the reach of sediment. *See* Tr. 10/20/15:185 (Fuller);
13 Fuller PowerPoint, slide 137.

14 828. Regarding historical photographs of Segment 2 near Chrysotile, Robert Webb
15 wrote: “The water level is only slightly higher in 2000 than it was in 1964. In the
16 intervening thirty-six years, two floods have exceeded 70,000 ft³/s and four have exceeded
17 50,000 ft³/s. Despite these floods, riparian vegetation along the banks has increased, in
18 particular nonnative tamarisk. The palms have grown considerably.” *See* Fuller PowerPoint,
19 slide 139.

20 829. Regarding historical photographs of Segment 3 near Roosevelt, Robert Webb
21 wrote: “The 1993 flood, which had a peak discharge of 143,000 ft³/s, at the gaging station on
22 the bridge visible in the distance, did little to slow the advance of riparian vegetation—in
23 particular tamarisk—at this site. Native species notably Carrizo grass, have also increased
24 although they are difficult to distinguish from the tamarisk in this view.” *See* Tr.
25 10/20/15:188-89 (Fuller); Fuller PowerPoint, slide 141.

1 830. Mr. Fuller testified: “Through the bulk of the year, the river gets shut off. And
2 then somewhere around May, they flip it on again. And somewhere around the end of
3 September, they most years flip it off. So they kind of jam in what used to occur throughout
4 the year into the irrigation season, basically.” See Tr. 10/23/15:973 (Fuller).

5 831. Mr. Fuller testified that there is more vegetation in “some places” in Segment 5.
6 See Tr. 10/23/15:975 (Fuller). Vegetation stabilizes river channels. See Tr. 10/23/15:975
7 (Fuller). Mr. Fuller agreed that the fact that there are fewer and smaller floods results in more
8 riparian vegetation. See Tr. 10/23/15:976 (Fuller).

9 832. Historical photographs of the Salt at Roosevelt show a wide sandy alluvial
10 valley. See Tr. 11/17/15:1105 (Fuller). “The channel is wide and mostly barren of riparian
11 vegetation.” See Robert H. Webb et. al, *The Ribbon of Green – Change in Riparian*
12 *Vegetation in the Southwestern United States*, at 322 (2007) [C032B].

13 833. Regarding Segment 5, Mr. Fuller testified: “Well, the limit downstream of a
14 dam is going to be the function of the amount of sediment that’s delivered, the amount it’s
15 able to derive from the bed and banks, the resistance of the material that’s there naturally. So
16 there’s going to be some impact. The degree downstream that that impact is felt is a
17 variable.” See Tr. 11/18/15:1332 (Fuller).

18 834. Regarding Segment 5, Mr. Fuller testified: “There would be less silt and mud,
19 but a lot of the silt and mud -- there was still a fair degree of silt and mud being delivered, but
20 there’s a substantial difference in the amount of sands and gravels and larger.” See Tr.
21 11/18/15:1333 (Fuller).

22 835. Mr. Gookin testified:

23 [W]hen a dam is built, a well-known phenomena is that the riverbed
24 downstream will do what is called armor. The water, as it comes into the dam,
25 it slows down and it drops the silt, the sand, the clay, or anything bigger that it’s
26 got. And the water that comes out through the penstock has very little in the
27 way of suspended sediments into it, and that makes the water what is called
hungry, and, basically, the river starts eating the riverbed and taking the silt and
the sand and whatever particles it can lift to get it back to its more natural state

1 of having a good suspended load. This means that as it does that, the big rocks,
2 which the river can't pick up, stay and everything else moves downstream. And
3 as this continues, the big rocks keep dropping further and further down and
4 meet with other big rocks, and, finally, you end up with a bed that's pretty much
5 just cobbles or bigger rocks. This is important on -- in addition to the no sudden
6 floods, it's important because this means that the Manning's n, the roughness
7 coefficient, would probably increase, which means the river would flow deeper
8 than it did in the natural condition.

9 *See* Tr. 11/19/15:1475-76 (Gookin).

10 836. "Once the reservoirs were in place, the lakes became popular boating areas.
11 Photos of boats on reservoirs are available from the 1880s and later. After construction of
12 Roosevelt Dam, boating was a popular pastime." *See* Stantech 1998, at 27 [Upper Salt EI11].

13 837. Regarding Segment 5, Mr. Gookin testified: "[S]ince 1912 the Tamarisk or salt
14 cedar tree has invaded the area, and that makes a big difference in how the riparian habitat
15 around the channel behaves. I believe . . . that the river bottom has been scoured by the dams'
16 releases, with the hungry water and grabbing the other stuff." *See* Tr. 11/19/15:1549-50
17 (Gookin).

18 838. Mr. Gookin showed that several places where the Salt was more braided in
19 Segment 5 around the time of statehood. *See* Tr. 11/19/15:1554 (Gookin).

20 839. Mr. Gookin testified:

21 Basically, a river bottom usually has a whole bunch of different soils in it; some
22 cobble, some smaller rocks, gravel, sand. It varies in proportions, and it will
23 vary spot to spot. As the hungry water -- when the water comes into a dam, the
24 suspended sediment drops and starts filling up the reservoir behind the dam.
25 When they release it, it comes out and it's called it's hungry, because it doesn't
26 have the suspended sediments that it would normally have, and so it's very easy
27 for it to erode the downstream reaches. As it starts picking up the finer grained
materials, because it's easier to pick up a small grain of sand than it is a cobble,
the bigger pieces of soil, like cobbles, remain, and so it slowly declines in
elevation as the fines and the mediums are washed out, and you're left with a
layer that usually is just cobbles or with very little other stuff around it. And
that's called armoring because it kind of armors the riverbed against further
erosion.

1 *See* Tr. 11/19/15:1572 (Gookin).

2 840. Dr. Mussetter testified:

3 At this point we're approaching 200,000 acre-feet of sediment that's stored in
4 [Roosevelt] reservoir, and the bulk of that would have gone downstream and
5 passed through Segment 4 and into Segments 5 and 6 under natural conditions;
6 and now it's being trapped in the reservoir. So we have a sediment deficit in the
reach below the reservoir. . . . Most of it's in Roosevelt, I think, because it's
farthest up in the system and captures the bulk of the supply.

7 *See* Tr. 1/28/16:2426 (Mussetter); Mussetter Presentation, slide 97.

8 841. The large quantity of sediment stored behind the dam has "a substantial impact
9 on the morphology of the channel down in [Segment 5]." *See* Tr. 1/28/16:2427 (Mussetter);
10 Mussetter Presentation, slide 97. The sediment trapped behind Roosevelt is "probably mostly
11 sand; a fair amount of gravel and cobbles as well, but mostly sand and silt." *See* Tr.
12 1/28/16:2428 (Mussetter); Mussetter Presentation, slide 97.

13 842. Dr. Mussetter testified: "I expect under natural conditions [Segment 5]
14 probably was still a gravel-cobble bed primarily, but there would have been a lot more sand,
15 more sand bars and that sort of thing, in this portion of the reach. It's been washed away
16 because the upstream sediment supply has been cut off and now we've run flows for some
17 hundred years through this part of the reach with very little sediment supply." *See* Tr.
18 1/28/16:2431 (Mussetter); Mussetter Presentation, slide 100.

19 843. Dr. Mussetter testified:

20 [T]he below Stewart Mountain volumes, those are very similar to the volumes
21 that occur from the other gages, even though from the previous slide you saw
22 that most of the peaks are cut off. And so I think we all recognize that it's just
23 flow-regulating effect. Essentially, the same amount of water goes through the
reach below Stewart Mountain Dam, Segment 6, as did historically, but it
comes off in a much different pattern.

24 *See* Tr. 1/28/16:2418 (Mussetter); Mussetter Presentation, slide 91.

25 844. Dr. Mussetter testified:

26 [W]e hear a lot about the recreational use of that part of the river and under
27 modern conditions. And I think it's important to recognize that the flow regime

1 is very, very different from what it would have been; much higher flows now
2 during that part of the year that the recreation is going on than there would have
3 been under historic conditions in a typical year. There are also some
4 implications, and we'll talk about it as we go forward, in terms of the effect of
5 those flows on the behavior of the channel as well.

6 *See* Tr. 1/28/16:2425 (Mussetter); Mussetter Presentation, slide 96.

7 845. Regarding Segment 5, Dr. Mussetter testified: "I expect that that corridor was
8 much more dynamic under natural conditions, because it's subject to more frequent flooding
9 that would rip the vegetation out." *See* Tr. 1/28/16:2431 (Mussetter); Mussetter Presentation,
10 slide 101. The "steady flow regime during the late spring, summer months, when flows being
11 released from Stewart Mountain, would elevate the flow and tend irrigate that, which would
12 also tend to encourage more vegetation growth." *Id.* at 2432. This creates "much more of a
13 tendency for a single thread, less dynamic, laterally dynamic channel." *Id.*

14 846. The combination of less dynamic flows along with sediment deprivation
15 encourages the formation of a single channel. *See* Tr. 1/28/16:2433 (Mussetter); Mussetter
16 Presentation, slide 101.

17 847. Regarding the geomorphology of Segment 5, Dr. Mussetter testified:

18 It most definitely is different because of the sediment trapping. There is less
19 sediment supplied to the reach. We have had essentially the same volume of
20 water go through that reach, albeit at different, sort of more sustained flow rates,
21 less flashy than it did historically. So that's moved a lot of the sediment that
22 would have formerly been there out. I wouldn't be surprised if there had been a
23 fair amount of downcutting of the riverbed. It's lower now than it was before.
24 By how much, we really can't say. At this point it's pretty much armored. And
25 then, again, the sustained flow regime from the dam releases during the
26 summer, spring and summer months, would also tend to elevate the water levels
27 above what they would have been historically during those times of the year and
would encourage stability of the riparian corridor. So you would have a
tendency for a more stable single-thread channel than you would have seen
under natural conditions. . . . [I]f there's more sediment supply and the river is
wider, the depths would obviously be shallower. It would move it more in the
direction . . . of the meandering-type channel. So you would expect to see more
multiple threads, more than one, not necessarily a single-thread channel, and
shallower depths.

1 See Tr. 1/28/16:2439-40 (Mussetter); Mussetter Presentation, slide 113.

2 448. Dr. Mussetter testified that the *Edith* trip on Segment 5 was not under natural
3 and ordinary conditions. See Tr. 1/28/16:2541 (Mussetter).

4 849. Dr. Mussetter testified:

5 I think there's good reason to believe that it's more navigable now than it was at
6 that time. . . . [B]y cutting off the sediment supply, we've flushed out the sands.
7 We've probably had some downcutting of the river. The flow regulation has
8 tended to force it into a more single-thread, narrower channel than would have
9 been before the main part of the channel that you referred to earlier. And all of
those changes, to me, push it in the direction of having, typically, deeper flow
depths.

10 See Tr. 1/28/16:2555 (Mussetter).

11 850. Dr. Mussetter testified that the Salt in Segment 5 and Segment 6 have downcut
12 and coarsened up. See Tr. 1/28/16:2556 (Mussetter).

13 851. Dr. Mussetter testified: “[O]ne simple explanation is that the flows during the
14 time when the recreational boaters use the river are substantially higher than they would have
15 been during that part of the year under natural conditions. So there's just simply more water
16 in the river at those times.” See Tr. 1/28/16:2556 (Mussetter).

17 852. Mr. Gookin testified that Segment 5 is more navigable today than in its ordinary
18 and natural condition. See Tr. 2/26/16:3470-71 (Gookin). Mr. Gookin stated:

19 You have a dam that controls the releases. It allows a steady higher flow for
20 extended durations. You don't have the risk of floods coming down. It
21 encourages the growth of vegetation along the sides of the bank, which, together
22 with the other destabilizing factor tamarisk, makes the channel narrower and
23 deeper. Oh, dams intercept the sediment, which affects the rocks or the -- both
24 the slope of the channel and the lining of the channel. And as I put in my
report, garbage affects the lining of the channel, but I've never found a
Manning's n for garbage. I looked.

25 *Id.*

1 853. “By the time the river reaches the I-10 highway crossing, it has returned to the
2 low locational probability configuration. . . . Other stable zones are co-located with
3 engineering works, such as the stabilized location associated with the Central Avenue bridge .
4 . . .” *See* Graf 1983, at 129 [C042]. Dr. Mussetter testified that Graf means is saying that the
5 Salt is “laterally unstable.” *See* Tr. 5/17/16:4494 (Mussetter). “[A] lot of stability and the
6 configuration that you see in the modern channel is related to the non-natural configuration of
7 the channel if you will.” *Id.*

8 854. “The downcutting of the main-flow channel has proceeded through three
9 distinct layers of sediment. The pre-1965 bed was in layers of course sand. . . . In 1949 (and
10 extending back to the earliest photographs in the 1880’s) the bed was predominately sandy,
11 with some cobbles probably transported into the study reach from mountainous areas
12 upstream [].” *See* Graf 1983, at 132 [C042].

13 855. Historical photographs of the Salt at Roosevelt show a wide sandy alluvial
14 valley. *See* Tr. 11/17/15:1105 (Fuller). “The channel is wide and mostly barren of riparian
15 vegetation.” *See* Robert H. Webb et. al, *The Ribbon of Green – Change in Riparian*
16 *Vegetation in the Southwestern United States*, at 322 (2007) [C032B].

17 856. Mr. Fuller agreed that, over time, some of the signs of post-dam degradation
18 may become less visible. *See* Tr. 5/19/16:5093-94 (Fuller); Fuller Rebuttal PowerPoint, slide
19 124.

20 857. Mr. Fuller agreed that some of the historical photographs show a less sandy and
21 more vegetated river. *See* Tr. 5/19/16:5095-96 (Fuller); Fuller Rebuttal PowerPoint, slide
22 126.

23 858. On direct, Mr. Fuller testified:

24 So median I talked about. The seasonal variation, the flow recurs -- occurs
25 within a predictable ordinary range, so we also provided this flow duration data.
26 So 10 percent of the time the flow is exceeded, and 90 percent of the time the
27 flow is not exceeded. We gave this data so you have this range. I would
 suggest that the 10 to 90 percent range is a pretty reasonable estimate of

1 ordinary. You could probably go a little higher or lower, but 10 to 90 percent is
2 a readily available statistic, available from the USGS data. USGS doesn't have
a dog in this fight and is pretty impartial, so it seemed like a reliable source.

3 *See* Tr. 10/21/15:496 (Fuller); Fuller PowerPoint, slide 225.

4 859. Mr. Fuller originally defined "ordinary" flows between the 10 and 90 percent
5 range. *See* Tr. 10/23/15:980-81 (Fuller). On rebuttal, Mr. Fuller testified that, over the course
6 of these hearings, he shifted his "ordinary" range of flows from 10 percent to 90 percent to 10
7 percent to a 2-year flood event. *See* Tr. 5/19/16:5114 (Fuller).

8 860. Annual discharge is highly variable from year to year. *See* Tr. 1/28/16:2421
9 (Mussetter); Mussetter Presentation, slide 94.

10 861. Dr. Mussetter testified:

11 So you see the typical pattern that we've seen already with the high flows
12 during the springtime, low flows in the summer, and then generally some
13 elevated flows during the late summer, early fall monsoon season. So that's
14 characteristic of what the flows would have been like under natural conditions
15 in Segments 5 and 6. Under regulated conditions the orange line basically
16 represents what that looks like now. . . . [T]he total volume of flow on an
17 annual basis is roughly the same; but the pattern is completely different. And so
now you see it's essentially dry November, December, January, early February;
and then we start releasing, and through much of the spring and summer, we're
fairly steady at up over 1,000 to 1,500 cubic feet per second.

18 *See* Tr. 1/28/16:2423-24 (Mussetter); Mussetter Presentation, slide 96.

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

24 863. Based on the foregoing evidence, the Commission finds that Segments 3
25 through 5 are generally more navigable today than they were in their ordinary and natural
26 condition.

1 CONCLUSIONS OF LAW

2 Based upon evidence in the record and application of applicable federal and state law,
3 the Commission makes the following conclusions on questions of law and mixed questions of
4 law and fact:

5 THE COMMISSION'S ROLE

6 1. A watercourse can meet the test for "navigability" under the Arizona statute and
7 the case law if it satisfies either of two elements: (1) If it was actually used as a "highway for
8 commerce," or (2) if it was "susceptible to being used" as a "highway for commerce." *See*
9 A.R.S. § 37-1101(5). In making such determinations, "all evidence should be examined
10 during navigability determinations and no relevant facts should be excluded." *Defenders of*
11 *Wildlife v. Hull*, 199 Ariz. 411, 425, 18 P.2d 722, 736 (App. 2001). "[A] river is navigable in
12 law when it is navigable in fact." *Muckleshoot Indian Tribe v. FERC*, 993 F.2d 1428, 1431
13 (9th Cir. 1993). Thus, the Commission must consider all of the evidence in the record before
14 it. Upon the Commission's review of the evidence, it has determined that the Salt never has
15 been used or susceptible to being used as a "highway for commerce."

16 BURDEN OF PROOF

17 2. The Arizona courts have long held that the proponents of navigability bear the
18 burden of proving that a river is navigable. *See Land Dep't v. O'Toole*, 154 Ariz. 43, 46 n.2,
19 739 P.2d 1360, 1363 n.2 (App. 1987); *Arizona Ctr. for Law in the Public Interest v. Hassell*,
20 172 Ariz. 356, 363 n.10, 837 P.2d 158, 165 n.10 (App. 1991); *Defenders of Wildlife v. Hull*,
21 199 Ariz. 411, 420, 18 P.2d 722, 731 (App. 2001); *State ex rel. Winkleman v. Arizona*
22 *Navigable Stream Adjudication Comm'n*, 224 Ariz. 230, 238, 229 P.3d 242, 250 (App. 2010)
23 ("*Winkleman*").

24 3. The Arizona statutes further support this allocation of the burden. In order for
25 the Commission to determine that a particular watercourse or segment thereof is "navigable,"
26 the proponents of navigability must establish that fact by a "preponderance of the evidence."
27

1 See A.R.S. § 37-1128(A). If sufficient evidence is not presented to show navigability for a
2 particular watercourse or segment, the Commission must find that watercourse or segment
3 non-navigable. *Id.*

4 **ORDINARY AND NATURAL CONDITION**

5 4. The U.S. Supreme Court in *PPL Montana* rejected the “liberal” interpretation of
6 the federal test of navigability that had been adopted by the Montana Supreme Court, an
7 interpretation that has been advocated by the proponents of navigability in this and other
8 Arizona cases. The Montana Supreme Court had stated: “Broadly speaking, the District
9 Court perceived the navigability for title test as somewhat ‘fluid.’ . . . Our independent
10 review of the caselaw in this area establishes unequivocally that the District Court’s
11 understanding of the navigability for title test was correct. The concept of navigability for
12 title purposes is very liberally construed by the United States Supreme Court. . . .” *PPL*
13 *Montana, LLC v. State*, 355 Mont. 402, 229 P.3d 421, 446 (2010), *rev’d*, 132 S. Ct. 1215
14 (2012). The Montana Supreme Court had applied that “very liberal” interpretation of the
15 navigability test and also had adopted a similarly broad definition of “commerce”:
16 “Additionally, the term ‘commerce’ in the navigability for title context is very broadly
17 construed. . . . Because navigability is based upon a broad definition of commerce combined
18 with an ‘actual’ or ‘susceptible of use’ standard, present-day usage of a river may be
19 probative of its status as a navigable river at the time of statehood. . . .” *Id.* at 446-47
20 (citations omitted).

21 5. The U.S. Supreme Court reversed the Montana Supreme Court’s decision and
22 soundly rejected its reasoning. 132 S. Ct. at 1215. In reaching its decision, the Court took the
23 opportunity to clarify and restate the law of navigability from its prior decisions and to rein in
24 the more “liberal” and expansive constructions of that law proffered by some state courts and
25 lower federal courts in recent years, including:
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1 a. Reaffirming that the navigability for title test is applied as of the date of
2 statehood. 132 S. Ct. at 1227-28. “Upon statehood, the State gains title within its borders to
3 the beds of watercourses then navigable. . . .” *Id.*

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

9 c. Confirming its prior pronouncements that the test relates to use or
10 susceptibility to use for commerce as of the date of statehood. 132 S. Ct. at 1233.
11 “Navigability must be assessed as of the time of statehood, and it concerns the river’s
12 usefulness for ‘trade and travel,’ rather than for other purposes.” *Id.* “Mere use by initial
13 explorers or trappers who may have dragged their boats in or alongside the river despite its
14 nonnavigability in order to avoid getting lost, or to provide water for their horses or
15 themselves, is not enough.” *Id.*

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

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

3 6. The proponents of navigability discount the natural obstructions and other
4 impediments to navigation on the Salt, contending that, under the liberal interpretation of the
5 federal test, the river was navigable in its “ordinary and natural condition.” The *PPL*
6 *Montana* opinion makes clear, however, that natural obstructions to navigation that would
7 require portages can and often do make the river nonnavigable:

8 . . . Even if portage were to take travelers only one day, its significance is the
9 same; it demonstrates the need to bypass the river segment, all because that part
10 of the river is nonnavigable. Thus, the Montana Supreme Court was wrong to
11 state, with respect to the Great Falls reach and other stretches of the rivers in
12 question, that portages “are not sufficient to defeat a finding of navigability.”
13 355 Mont., at 438, 229 P.3d at 446. In most cases, they are, because they
14 require transportation over land rather than over the water. . . .

13 132 S. Ct. at 1231.

14 7. Many of the opponents of navigability have argued that *PPL Montana* decision
15 modified the Arizona Court of Appeals decision in *Winkleman*. The Commission does not
16 need to reach that question because the Commission concludes that Salt is not navigable
17 under *Winkleman*’s more liberal test.

18 8. The Commission concludes, as a matter of law, that the Salt is in its “ordinary”
19 condition when it is not in a state of flood or drought. *See Winkleman*, 224 Ariz. at 241-42,
20 229 P.3d at 253-54.

21 9. The Commission concludes, a matter of law, that the channel changes that
22 persist after flood flows recede are part of the “ordinary” condition of the Salt. *See Findings*
23 *of Fact* Nos. 521-557, 567-573, 813-863; *see also Winkleman*, 224 Ariz. at 241-42, 229 P.3d
24 at 253-54

25 10. The Commission concludes, as a matter of law, that any particular segment of
26 the Salt was in its “natural” condition prior to the commencement of upstream diversions and
27

1 groundwater pumping and prior to the construction of upstream dams. *See Winkleman*, 224
2 Ariz. at 241-42, 229 P.3d at 253-54.

3 11. The Commission concludes, as a matter of law, that the Salt was in its “natural”
4 condition in and prior to the 1860s for ASLD Segments 2, 3, 4, 5, and 6 and in and prior to
5 the late 1800s for Segment 1. *See Findings of Fact Nos. 82-199, 813-863.*

6 **SEGMENTATION**

7 12. On or about September 15, 2005, SRP filed a motion requesting that the
8 Commission find that it lacks statutory subject matter jurisdiction to determine the
9 navigability of Roosevelt Lake (“Roosevelt”) and any portion of the Upper Salt River, Tonto
10 Creek, or any other affected watercourse lying beneath Roosevelt. *See Salt River Project’s*
11 *Motion for Finding of Lack of Statutory Subject Matter Jurisdiction to Determine*
12 *Navigability of Roosevelt Lake (September 15, 2005).*

13 13. In its December 2007 decision regarding the Upper Salt, the Commission
14 agreed with SRP and found: “[T]he Commission holds that it does not have jurisdiction to
15 consider the navigability of Roosevelt Lake or of the streams formerly existing under
16 Roosevelt Lake, including Tonto Creek land inundated by the lake because the dam and lake
17 were built before statehood and the streams did not exist on February 14, 1912 having been
18 merged into the lake.” *See Report, Findings and Determination Regarding the Navigability of*
19 *the Upper Salt River from the Confluence of the White and Black Rivers to Granite Reef*
20 *Dam, at 51 (December 7, 2007).*

21 14. On May 18, 2015, SRP asked the Commission to reconfirm its 2007 finding.
22 *See Salt River Project’s Renewed Motion for Finding of Lack of Jurisdiction to Determine*
23 *Navigability of Roosevelt Lake and Former Salt River Beneath It (May 18, 2015).*

24 15. The Commission reconfirms its December 2007 determination that the
25 Commission lacks jurisdiction to consider the navigability of Roosevelt Lake or of the
26 streams formerly existing under Roosevelt Lake, including Tonto Creek and land inundated
27

1 by the lake because the dam and lake were built before statehood and the streams did not exist
2 on February 14, 1912, having been merged into the lake. *See* A.R.S. § 37-1123(A); *see also*
3 *id.* § 37-1128(A). The Commission has no authority, duty, or jurisdiction to make
4 navigability determinations for bodies of water that do not meet the definition of a
5 “watercourse” under the statute.

6 16. The Commission has examined the evidence and made its assessment of
7 navigability based upon the segmentation proposed by ASLD, except as provided in
8 Conclusions of Law Nos. 12-15. Because the Commission finds and concludes, as a matter of
9 fact and law, that the entirety of the Salt River is non-navigable, *see* Conclusions of Law Nos.
10 27-38, *infra*, the Commission has determined that further discussion of segmentation is
11 unnecessary for purposes of its decision. *See* Findings of Fact Nos. 17-81.

12 **ACTUAL NAVIGATION ON THE SALT**

13 17. No evidence exists of any prehistoric boating or flotation of logs on the Salt.
14 *See* Findings of Fact Nos. 82-104, *supra*. Likewise, no credible evidence exists that the early
15 explorers, soldiers, or settlers ever used the river—for “commerce” or otherwise. *See*
16 Findings of Fact Nos. 105-469; *see also Lykes Bros., Inc. v. Corps of Eng’rs*, 821 F. Supp.
17 1457, 1459 (M.D. Fla. 1993), *aff’d*, 64 F.3d 630 (11th Cir. 1995) (had river been navigable, it
18 would seem obvious that military and settlers would have used the river to transport men and
19 supplies rather than carrying them overland). The evidence of the isolated accounts of
20 attempted boating does not establish that the river was used for any type of trade or travel. *Id.*
21 Insufficient evidence exists to show that the Salt ever was actually navigated.

22 18. The Commission concludes, as a matter of law, that the Salt was not actually
23 used as a “highway for commerce.” *See* Findings of Fact Nos. 82-469.

24 **SUSCEPTIBILITY TO NAVIGATION**

25 19. Because the Salt was never actually used as a “highway for commerce,” the
26 only way it can be considered navigable is if it was “susceptible” to such use. Insufficient
27

1 evidence exists in the record to show that the river, in any condition at any time, was capable
2 of acting as “a corridor or conduit within which the exchange of goods, commodities or
3 property or the transportation of persons may be conducted.” A.R.S § 37-1101(3) (defining
4 “highway for commerce”); *see also* Findings of Fact Nos. 470-463.

5 20. Although a flood does not fall within the natural and ordinary condition of the
6 River, the effects of a flood on the geomorphology of a river cannot be ignored. *See* Findings
7 of Fact Nos. 521-557, 567-573, 813-863, *supra*.

8 21. The vast majority of the proponents of navigability’s case relies entirely on
9 evidence of modern recreational boating, contrary to the guidance of *PPL Montana*, 132 S.
10 Ct. at 1233, 1233-34 (“If modern watercraft permit navigability where the historical
11 watercraft would not, . . . then the evidence of present-day use has limited or no bearing on
12 navigability at statehood.”).

13 22. The proponents’ own boating witnesses readily admit that modern recreational
14 boats are exceedingly lighter, more durable, and nimble, for instance, Mr. Slingluff wrote:
15 “Plastic canoes are durable, slide easily over rocks, slip quietly through the water, and do not
16 conduct heat or cold. Plastic canoes can open areas to sportsmen that are otherwise only a
17 wish.” *See* Jim Slingluff, “Shallow Streams: Liquid Paths into Wilderness,” *The*
18 *Southwestern Sportsman* (Feb. 15, 1991) [C055-C]; *see also* Findings of Fact Nos. 593-798,
19 *supra*. In contrast, historic statehood era craft were likely to last only a trip or two. *See*
20 Findings of Fact Nos. 678-680, *supra*.

21 23. The proponents of navigability also readily admit that, in their optimistic
22 estimations, the Salt can support only small draft boats like canoes and kayaks, which
23 severely limits the modes of commercial trade and travel the Salt might support. *See* Findings
24 of Fact Nos. 593-798, *supra*.

25 24. The Commission also finds Mr. Fuller’s definition of “successful” boating
26 exceedingly broad and without any relation to a commercial reality. *See* Findings of Fact
27

1 Nos. 268-282, 785-798, *supra*. The fact that a skilled kayaker in a modern plastic or
2 inflatable craft can float, bump, and scrape down a shallow stream does not make it navigable.
3 If that were the case, modern recreational boating enthusiasts have demonstrated that nearly
4 every stream in the United States is navigable for title purposes. A commercial boater or
5 traveler at the time of statehood would have a far greater concern for crashing, wrecking, or
6 swamping their boats and damaging or losing their valuable cargo or customers. This
7 explains the dearth of boating in the Salt’s history until the later twentieth century when
8 plastic boats were introduced.

9 25. Mr. Dimock’s staged 2015 trip with the *Edith* on Segment 5 and part of
10 Segment 6 shows neither actual navigation nor susceptibility to navigation. *See* Findings of
11 Fact Nos. 689-706. The Salt was not in its “ordinary and natural condition” in 2015, *see*
12 Findings of Fact Nos. 813-863, and the *Edith* was not a type of vessel customarily used in
13 commerce in 1912. *See* Findings of Fact Nos. 785-798.

14 26. The Commission concludes, as a matter of law, that the Salt was not, in its
15 ordinary and natural condition at the time of statehood, susceptible to being used as a
16 “highway for commerce.” *See* Findings of Fact Nos. 470-863; Conclusions of Law Nos. 19-
17 25.

18 **DETERMINATION OF NON-NAVIGABILITY**

19 27. In its 2001 decision in *Defenders of Wildlife v. Hull*, the Arizona Court of
20 Appeals stated that “all evidence should be examined during navigability determinations and
21 no relevant facts should be excluded.” 199 Ariz. 411, 425, 18 P.3d 722, 736 (App. 2001).
22 “[A] river is navigable in law when it is navigable in fact.” *Muckleshoot Indian Tribe v.*
23 *FERC*, 993 F.2d 1428, 1431 (9th Cir. 1993).

24 28. In reaching its determination that the Salt is and was non-navigable, the
25 Commission considered all of the evidence in the record before it. *See* Findings of Fact, Nos.
26 1-863, *supra*.

27

1 29. A watercourse can meet the test for “navigability” under the Arizona statute and
2 the case law if it satisfies either of two elements: (1) If it was actually used as a “highway for
3 commerce,” or (2) if it was “susceptible to being used” as a “highway for commerce.” *See*
4 A.R.S. § 37-1101(5); *see also generally Elder v. Delcour*, 263 S.W.2d 221, 226 (Mo. App.
5 1953).

6 30. The Commission finds and concludes, as a matter of fact and law, that the Salt
7 has never been actually used as a “highway for commerce.” *See* Findings of Fact Nos. 82-
8 469; Conclusions of Law 17-18. No evidence exists of any prehistoric boating or flotation of
9 logs on the river. *See* Findings of Fact Nos. 82-104, *supra*. Insufficient evidence exists to
10 support a finding that the early explorers, soldiers, or settlers in the area near the river, who
11 traveled through the area on several occasions, used the river—for “commerce” or otherwise.
12 *See* Findings of Fact 98-145; *see also Lykes Bros., Inc. v. Corps of Eng’rs*, 821 F. Supp. 1457,
13 1459 (M.D. Fla. 1993), *aff’d*, 64 F.3d 630 (11th Cir. 1995) (court found that had river been
14 navigable, it would seem obvious that military and settlers would have used the river to
15 transport men and supplies rather than carrying them overland). The evidence of the isolated
16 accounts of attempted boating on the river, discussed in detail in Findings of Fact Nos. 268-
17 445, did not establish that the river was used for any type of regular (or even periodic) trade
18 or transportation during the period immediately before and at statehood. *See id.*

19 31. Because the river was never actually used as a “highway for commerce,” the
20 only way it can be considered navigable is if it was “susceptible” to such use. *See* A.R.S. §
21 37-1101(5).

22 32. Sufficient evidence was not presented to the Commission to show that the river,
23 in any condition at any time, was capable of acting as “a corridor or conduit within which the
24 exchange of goods, commodities or property or the transportation of persons may be
25 conducted.” A.R.S § 37-1101(3) (defining “highway for commerce”).
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1 33. The Commission finds Mr. Fuller’s testimony regarding hydrology and
2 geomorphology of the Salt not credible. *See* Findings of Fact Nos. 478-520. Furthermore,
3 the Commission finds that Mr. Fuller’s conclusions of these topics have been fully rebutted
4 and outweighed by the other evidence. *See id.*

5 34. Although the river existed in close proximity to much of the exploration and
6 settlement in early Arizona, it was never used for any type of regular trade or transportation.
7 In order for the Commission to determine that the river was “susceptible to being used . . . as
8 a highway for commerce,” it must find that the prehistoric inhabitants, the early explorers, the
9 trappers, settlers, military, and thousands of citizens who resided along the river and in the
10 general area prior to statehood simply failed to comprehend the potential usefulness of the
11 river as an avenue for navigation. No evidence exists to support such a finding. *See also,*
12 *e.g., Webb v. Board of Comm’rs of Neosho County*, 257 P. 966 (Kan. 1927).

13 35. It might be theoretically possible that, on one or more occasions in particular
14 years, it would have been feasible for a person to float a boat down some portion of the river.
15 Occasional use in exceptional times does not, however, support a finding of navigability.
16 *Miami Valley Conservancy Dist. v. Alexander*, 692 F.2d 447, 451 (6th Cir. 1982) (“limited,”
17 “sporadic,” “minimal,” and “uniformly unsuccessful” evidence of boat use on creek does not
18 establish navigability, without specific evidence of successful commercial navigation); *see*
19 *also United States v. Oregon*, 295 U.S. 1, 23 (1935) (evidence of sporadic and ineffective use
20 of boats was not enough to find water course navigable); *North Dakota v. United States*, 770
21 F. Supp. at 509-10 (unique, isolated tie drive in time of high water was not enough to
22 establish river navigability); *see also United States v. Harrell*, 926 F.2d 1036, 1040 (11th Cir.
23 1991); *Harrison v. Fite*, 148 F. 781, 784 (8th Cir. 1906) (“A theoretical or potential
24 navigability, or one that is temporary, precarious, and unprofitable, is not sufficient. While
25 the navigable quality of a water course need not be continuous, yet it should continue long
26 enough to be useful and valuable in transportation. . . . Mere depth of water, without
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1 profitable utility, will not render a water course navigable in the legal sense . . . nor will the
2 fact that it is sufficient for pleasure boating or to enable hunters or fishermen to float their
3 skiffs or canoes.”); *In re River Queen*, 275 F. Supp. 403, 407 (W.D. Ark. 1967) (when
4 determining navigability, court “inquiry should be made as to the number of persons the
5 stream would accommodate and the nature and extent of the kinds of vessels it would carry.
6 The mere fact that the stream might at times carry single logs or canoes or the average row
7 boat used by fishermen is not sufficient to establish the navigability of the stream. It must
8 serve a useful purpose in opening a commercial route for the people living along its banks”)
9 (citing 56 *Am. Jur.*, Waters §§ 180-181).

10 36. “The mere fact that a river will occasionally float logs, poles, and rafts
11 downstream in times of high water does not make the river navigable.” *United States v.*
12 *Crow, Pope & Land Ents., Inc.*, 340 F. Supp. 25, 32 (N.D. Ga. 1972) (citing *United States v.*
13 *Rio Grande Dam & Irr. Co.*, 174 U.S. 690 (1989)). “The waterway must be susceptible for
14 use as a channel of useful commerce and not merely capable of exceptional transportation
15 during periods of high water.” *Id.* (citing *Brewer-Elliott Oil & Gas Co. v. United States*, 260
16 U.S. 77 (1922)); *see also United States v. Harrell*, 926 F.2d at 1036 (“susceptibility of use as
17 a highway for commerce should not be confined to ‘exceptional conditions or short periods of
18 temporary high water’”) (quoting *United States v. Utah*, 283 U.S. 64, 87 (1931)); *Lykes Bros.*,
19 821 F. Supp. at 1463 (“Evidence of navigation during periods of flooding or abnormally high
20 water is not sufficient to support a finding of navigability.”) (citations omitted).

21 37. No government agency, including federal land surveyors, ever indicated that the
22 Salt was navigable. *See Findings of Fact Nos. 143-160, 200-267, 446-469; see also United*
23 *States v. Oregon*, 295 U.S. at 23 (courts should consider government’s treatment of
24 watercourse as non-navigable in their analysis of navigability); *see also Washington Water*
25 *Power Co. v. Federal Energy Regulatory Comm’n*, 775 F.2d 305, 332 (D.C. Cir. 1985)
26 (government’s, including Army Corps of Engineers,’ description and treatment of river is
27

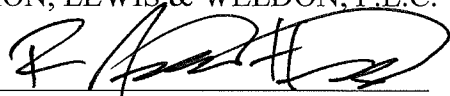
1 relevant to determination of river navigability). Likewise, no federal or state land patent
2 indicated that the Salt was navigable. *See* Findings of Fact Nos. 238-267; *see also Lykes*
3 *Bros.*, 821 F. Supp. at 1460 (court found actions by State show that, for many years, it
4 considered river non-navigable, e.g., land bordering river had been deeded to private
5 ownership and owners paid taxes); *Koch v. Department of Interior*, 47 F.3d 1015, 1019 (10th
6 Cir. 1995) (because Federal Government did not express intent to retain island in non-
7 navigable river, title to island passed to patent holder).

8 38. Based upon all of the historical and scientific data and information, documents,
9 and other evidence produced and considered by the Commission, the Commission finds that
10 the Salt, in its ordinary and natural condition, was not used or susceptible to being used as a
11 highway for commerce as of February 14, 1912 and therefore was not navigable as defined in
12 A.R.S. § 37-1101(5).

13 DATED this 17th day of August, 2016.

14 SALMON, LEWIS & WELDON, P.L.C.

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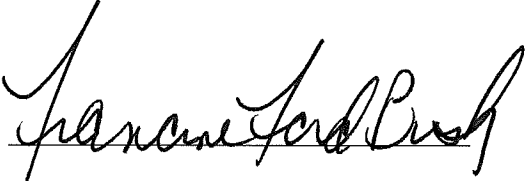
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APPENDIX 1
Evidence Cited

NO.	DATE	DESCRIPTION	SHORT CITE
N/A	Various	Reporter's Transcript of Proceedings	Tr.
Upper Salt EI08	January 1998	U.S. Forest Service, <i>Evaluation of Navigability at the Time of Statehood Salt River (Roosevelt Dam upstream to the Eastern Boundary of Tonto National Forest)</i>	USFS 1998
Upper Salt EI11	1998	Stantech Consulting Inc. In Association with JE Fuller/Hydrology & Geomorphology, Inc., <i>Criteria for Assessing Characteristics of Navigability for Small Watercourses in Arizona</i>	Stantech 1998
Upper Salt EI08	January 1998	U.S. Forest Service, <i>USFS Recreational Opportunity Guide for the Upper Salt River</i> (attached)	USFS Guide
Upper Salt EI 27	June 2003	Fuller, et al., <i>Arizona Stream Navigability Study for the Salt River: Granite Reef Dam to the Confluence of the White and Black Rivers</i>	Fuller Upper Salt 2003
Lower Salt EI06	March 31, 1892	<i>Wormser v. Salt River Valley Canal Co.</i> , 2nd Jud. Dist. of Territory of Ariz., No. 708	Kibbey Decree
Lower Salt EI06	March 10, 1910	<i>Hurley v. Abbott</i> , 3rd Jud. Dist. of Territory of Ariz., No. 4564	Kent Decree
Lower Salt EI 12, Part 2, Tab 1	May 15, 1964	<i>Memorandum from Director, U.S. Dept. of Interior, Bureau of Land Management</i>	N/A
Lower Salt EI12, Part 2, Tab 2	February 1987	Larry J. Richmond, Ph.d., <i>A Historical Analysis of Portions of the Salt and Gila Rivers, Arizona</i>	Richmond 1987
Lower Salt EI 23	1971	Paul F. Ruff, <i>A History of the Salt River Channel in the Vicinity of Tempe, Arizona 1858-1869</i>	Ruff 1971

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3	Lower Salt EI 29	April 2003	Douglas E. Kupel, Ph.D., <i>Historical and Scientific Evidence Concerning Navigability of the Lower Salt River</i>	N/A
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5	Lower Salt EI 30	April 2003	Fuller, et al., <i>Arizona Stream Navigability Study for the Salt River: Granite Reef Dam to the Gila River Confluence</i>	Fuller Lower Salt 2003
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7	C001	June 8, 2014	Littlefield, <i>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</i>	Littlefield Lower Salt
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10	C002-ASLD 42	Dec. 22, 1985	Earl Zarbin, "Pioneers tried to float logs down Salt River for sawmill in Valley," <i>Arizona Republic</i>	Zarbin
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12	C002-ASLD 44	Nov. 1991	Thomsen & Porcello, <i>Predevelopment Hydrology of the Salt River Indian Reservation, East Salt River Valley, Arizona</i>	Thomsen & Porcello
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14	C004	Feb. 7, 2014	Littlefield, <i>Revised and Updated Report: Assessment of the Navigability of the Upper Salt River Above Granite Reef Dam Prior to and on the Date of Arizona's Statehood, February 14, 1912</i>	Littlefield Upper Salt
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18	C018-ASLD 14	Unknown	City of Tempe, <i>Hayden Flour Mill and Silos</i>	N/A
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20	C018-ASLD 15	Unknown	Archaeological Consulting Services, Ltd., <i>Hayden Flour Mill: Landscape, Economy, and Community Diversity in Tempe, Arizona, VOLUME 1: Introduction, Historical Research and Historic Architecture</i>	Archaeological Consulting Services
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23	C018-ASLD2 8	Unknown	<i>Southwest Paddler's Guide; Upper Salt River</i>	N/A
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25	C018-ALS 146	Various	Verde Transcript	Verde Tr.
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1	C018– ASLD 200	2006	Tyler Williams, <i>Paddling Arizona</i>	Paddling Arizona
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3	C018– ASLD 246	Various	USGS Historical Maps	N/A
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5	C018 – ASLD 252	Feb. 19, 1908	<i>Arizona Republican</i> , Growing Structure of Roosevelt Dam	N/A
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7	C020	July 11, 2015	Littlefield, <i>Declaration of the Non-Navigability of the Salt River at and Prior to Arizona's Statehood on February 14, 1912</i>	Littlefield Declaration
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9	C021– Freeport 1	July 2015	Rich Burtell, <i>Declaration of Rich Burtell on the Non-Navigability of the Upper Salt River at and Prior to Statehood</i>	N/A
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11	C022	July 27, 2015	Gookin, <i>Navigability of the Salt River</i>	Gookin Report
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14	C024	Aug. 20, 2015	Mussetter, <i>Declaration Navigability of the Upper and Lower Salt River</i>	Mussetter Declaration
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16	C026 – E	Oct. 24 1996	Troy L. Pewe, <i>Morphology of the Salt River: Stewart Mountain Dam to Phoenix, Arizona</i>	Pewe 1996
17	C027	2001	Kristin Atwell, <i>Quartzite's Fall: A Wilderness Tale Film</i>	N/A
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19	C030- ASLD3 64	Oct. 15, 2015	Fuller, <i>Presentation to ANSAC: Salt River Navigability</i>	Fuller PowerPoint
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21	C031– SRP 2	2015	Mild 2 Wild website	N/A
22	C032B	2007	Robert H. Webb et. al, <i>The Ribbon of Green – Change in Riparian Vegetation in the Southwestern United States</i>	N/A
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C042	1983	William L. Graf, <i>Flood-Related Channel Change in an Arid-Region River</i>	Graf 1983
C044-SRP5	2016	Newell, <i>Synopsis of Historic Watercraft Operating In Southwestern States and the Salt River, Arizona</i>	Newell
C044-SRP3	1969	Bert M. Fireman, <i>Charles Trumbull Hayden, The Smoke Signal</i>	N/A
C048	2015	Compilation of Boating Accounts	Compilation
C053-ASLD 383	Feb. 11, 1894	<i>Arizona Republican</i>	N/A
C053-ASLD 384	July 12, 1906	<i>Arizona Silver Belt</i>	N/A
C053-ASLD 385	May 2016	Fuller, <i>Presentation to ANSAC: Salt River Navigability—Rebuttal</i>	Fuller Rebuttal
C053-ASLD 392	1972	Carl T. Hayden, <i>Charles Trumbull Hayden Pioneer</i>	N/A
C053-ASLD 397	2016	Fuller, <i>Salt River Rebuttal: Rating Curves</i>	Fuller Rating Curves