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**BEFORE THE ARIZONA NAVIGABLE STREAM ADJUDICATION COMMISSION**

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| In re Determination of Navigability of the Verde River | No. 04-009-NAV<br><br>**SALT RIVER PROJECT'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW** |

Pursuant to the Chairman's Order,[1] the Salt River Project Agricultural Improvement and Power District and Salt River Valley Water Users' Association (collectively, "SRP") hereby submit their proposed findings of fact and conclusions of law in this matter regarding the Verde River ("Verde"). References herein to the reporter's transcript of the evidentiary hearings held in 2006 and 2014-15 are set forth as "Tr. at [date:page] (witness)." Exhibits from the hearings before 2014 are referred as "EI __." Supplemental exhibits from the 2014-15 hearings are referred to as "X __." A table of contents appears on page 2. SRP's proposed

[1] First Amended Order Consolidating Cases, Setting Deadlines for Evidence Submissions, Setting Dates and Guideline for Future Hearings and Meetings (May 20, 2015); Order Amending Memorandum Submission Deadlines, Setting Page Limits, and Permitting Service of Documents by E-Mail (September 15, 2015).

findings of fact begin on page 6. SRP's proposed conclusions of law begin on page 107. A list of evidence cited, including subsequent short cites used herein, is attached as Appendix 1.

(Table of Contents appears on the following page.)

## TABLE OF CONTENTS

**TABLE OF CONTENTS (cont.)**

## TABLE OF CONTENTS (cont.)

## FINDINGS OF FACT

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

**SUMMARY OF EVIDENCE RECEIVED**

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

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

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

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

5. The Commission held hearings regarding the navigability of the Verde on March 29, 2005 (in Prescott); November 16 and 17, 2005 (in Phoenix); and January 18, 2006 (in Phoenix); on May 1, 2014 (in Prescott); on December 15-19, 2014 (in Phoenix); on February 18-20 and 23-25, 2015 (in Phoenix); and on March 31-April 3, 2015 (Phoenix). The hearings held in 2014 and 2015 are referred to herein as the "2014/15 Hearings."

6. All parties were advised that anyone who desired to appear and give testimony at any of the public hearings could do so and that, in making its findings and determination as to the Verde, the Commission would consider all matters presented to it at the hearings, as

well as other information that had been submitted to the Commission at any time prior to the hearing.

**WITNESSES DURING THE 2014/15 HEARINGS**

7. Jon Fuller, a consultant for the Arizona State Land Department ("ASLD"), testified during the 2014/15 Hearings on behalf of ASLD. *See* Tr. at 12/15/14:8-9 (Fuller).

8. Mr. Fuller submitted a Power Point presentation dated September 2014, entitled "Presentation to ANSAC: Verde River Navigability" [X035-ASLD 167] ("Fuller Power Point").

9. Don Farmer, a recreational Verde boater, testified during the 2014/15 Hearings on behalf of ASLD. *See* Tr. at 12/16/14:379-80 (Farmer).

10. Brad Dimmock, a historical boat builder and river runner, testified during the 2014/15 Hearings on behalf of ASLD. *See* Tr. at 3/31/15:2812 (Dimmock).

11. Richard Lynch, owner and operator of Verde Adventures in Clarkdale, Arizona, testified during the 2014/15 Hearings on behalf of ASLD. *See* Tr. at 12/16/14:283 (Lynch).

12. Win Hjalmarson, a retired employee of the United States Geological Survey, testified during the 2014/15 Hearings on behalf of Maricopa County. *See* Tr. at 12/18/14:945 (Hjalmarson).

13. Mr. Hjalmarson produced a report, dated October 4, 2014 entitled "Navigability Along the Natural Channel of the Verde River, AZ, Detailed Analysis from Sullivan Lake to the USGS Gage Near Clarkdale and General Analysis from Clarkdale Gage to Mouth" [X015] ("Hjalmarson 2014").

14. Mr. Hjalmarson produced an addendum to his report, dated November 14, 2014 [X036] ("Hjalmarson 2014a").

15. Mr. Hjalmarson produced a second addendum to his report, dated February 5, 2015 [X059] ("Hjalmarson 2015").

16. Vincent E. Randall, the cultural director for the Yavapai-Apache Nation for the Apache side, who previously served the tribe as Chairman, Vice-Chairman, and Council

member, testified during the 2014/15 Hearings on behalf of the Yavapai-Apache Nation. *See* Tr. at 2/20/15:1742-46 (Randall).

17. Mr. Randall submitted an affidavit to the Commission. *See* Affidavit of Vincent E. Randall (February 11, 2015) [X055] ("Randall 2015").

18. Dr. Douglas R. Littlefield, Ph.D., an expert on the history of the American West, testified during the 2014/15 Hearings on behalf of SRP. *See* Tr. at 2/18/15:1443 (Littlefield).

19. Dr. Littlefield submitted a report dated April 3, 2014 entitled "Revised and Updated Report: Assessment of the Navigability of the Verde River Prior to and on the Date of Arizona's Statehood, February 14, 1912" [X002] ("Littlefield 2014").

20. Dr. Littlefield also presented a Power Point presentation entitled "Assessment of the Verde River's Navigability on or before the Date of Arizona's Statehood, February 14, 1912" (October 2014) [X018] ("Littlefield Power Point").

21. Dr. Robert A. Mussetter, Ph.D. P.E., testified during the 2014/15 Hearings on behalf of SRP. *See* Tr. at 2/20/15:1855 (Mussetter).

22. Dr. Mussetter submitted a declaration to the Commission dated October 10, 2014, entitled "Declaration Navigability of the Verde River." *See* Mussetter, "Declaration: Navigability of the Verde River" (October 10, 2014) [X016] ("Mussetter 2014").

23. Dr. Mussetter is a registered Professional Engineer in ten states, including Arizona, with over thirty years of experience in analyzing the behavior of natural and manmade stream channels. He has a Ph.D. in Hydraulic Engineering from Colorado State University with an emphasis in river mechanics, and he is currently a Program Manager and Discipline Lead for Hydraulic Engineering in the Surface Water Group of Tetra Tech, Inc. *See* Mussetter 2014, at 1.

24. Dr. Mussetter also submitted a Power Point presentation entitled "Verde River Navigability" dated February 2015 [X060] ("Mussetter Power Point").

25. Dr. Jack August, a historian of the American West, specializing in Arizona history, testified during the 2014/15 Hearings on behalf of the City of Phoenix. *See* Tr. at 2/24/15:2302-05 (August).

26. Dr. August submitted a declaration regarding the historical background of the Verde River up until the time of statehood. *See* August, "Declaration of Jack L. August, Jr., Ph.D. on the Non-Navigability of the Verde River at and Prior to Arizona Statehood, February 14, 1912" (February 17, 2015) [X067] ("August 2015").

27. Rich Burtell, a registered engineer, testified during the 2014/15 Hearings on behalf of Freeport Minerals Corporation. *See* Tr. at 3/30/15:2578-79 (Burtell).

28. Mr. Burtell submitted a declaration to this commission entitled "Declaration of Rich Burtell on the Non-Navigability of the Verde River at and Prior to Statehood," dated September 2014 [X009] ("Burtell 2014").

**SEGMENTATION**

**Methodology**

29. Although Mr. Fuller originally divided the river into five segments, prior to the hearings in December 2014 he added "Segment 0" for a total of six segments. *See* Tr. at 12/15/14:45 (Fuller).

30. Mr. Fuller segmented the Verde "because the Verde River varies as it moves over its course through Arizona. There are changes in geology, bedrock canyons to alluvial valleys. There are changes in the channel characteristics, in the widths and depths, some degrees of pattern; changes in the character of the rapids, or lack thereof; and, of course, the flow rates increase as we move further downstream." *See* Tr. at 12/15/14:47-48 (Fuller).

31. Dr. Mussetter wrote: "The segmentation proposed by the Arizona State Lands Department (ASLD) provides a convenient structure for describing the characteristics of the Verde River; however, it is my opinion that segmentation of the reach is not necessary because no significant portion of ASLD Segments 3, 4 and 5 was navigable in its ordinary and natural condition at the time of Arizona's statehood." *See* Mussetter 2014, at 3 [X016].

32. Mr. Burtell testified: "So I looked at what had already been filed, and I believe it was, yeah, 2012, the State Land Department at that time segmented the river into five different segments. And in reviewing those segments, they seemed reasonable to me, and so I adopted those, if you will. I didn't find any reason to change those for the purposes of these proceedings." *See* Tr. at 3/30/15:2590 (Burtell).

33. Mr. Burtell further testified: "[I]f you look at nothing other than the slope of the river, the State Land Department's original segmentation certainly captures, I think, some distinct differences in the geomorphology of the river. Certainly Segment 1 is steeper, with rapids; and it's similar to Segments 3 and 4, also steeper, with rapids; versus their Segments 2 and 5 tend to be less steep, broader areas, with less rapids." *See* Tr. at 3/30/15:2592 (Burtell).

**Segment 0**

34. Mr. Fuller's Segment 0 runs "from Sullivan Lake down to Forest Road 638." *See* Tr. at 12/15/14:48 (Fuller).

35. Mr. Fuller used Bob Williams' boating guide to determine his segmentation. *See* Tr. at 12/15/14:48-49 (Fuller).

36. With regard to Segment 0, Mr. Fuller testified that "the channel characteristics in the upper part above Granite Creek, it's more of a pool-drop in the pattern, and below that it becomes a classic pool and riffle pattern that we see for most of the rest of the river down to the Salt. And it is a bit in a relatively narrow bedrock canyon." *See* Tr. at 12/15/14:49 (Fuller).

37. With regard to Segment 0, Mr. Fuller testified that besides some groundwater pumping "there's relatively minimal human impacts." *See* Tr. at 12/15/14:49 (Fuller).

38. With regard to Segment 0, Mr. Fuller testified that "it's not a reach that's often boated." *See* Tr. at 12/15/14:49 (Fuller).

39. Mr. Fuller subdivided Segment 0 into two segments: Segment 0-A (Sullivan Lake down to Granite Creek) and Segment 0-B (Granite Creek to Forest Road 638). *See* Tr. at 12/15/14:50 (Fuller); Fuller Power Point, Slide 42 [X035].

40. Mr. Fuller testified that Segment 0-A is "ephemeral or intermittent part of the stream, very bouldery and steep. If there were water, I guess you would call it rapids. There's infrequently water in that segment, with the exception of a long pool that's about one and a half to two-thirds of a mile long upstream of the Granite Reef confluence, which, of course, the pool is flat." *See* Tr. at 12/15/14:50 (Fuller).

41. With regard to Segment 0-A, Mr. Fuller testified that "[i]f you read the Williams Guide, he decided after the '93 flood to give it a shot down there and ended up climbing out the steep canyon walls. Too steep, too rocky, not enough water, too dangerous, and decided not to boat that. I don't know of anybody else who has boated that." *See* Tr. at 12/15/14:50 (Fuller).

42. With regard to Segment 0-B, Mr. Fuller testified that "[d]ownstream Granite Creek is where the river becomes perennial. It's full of riffles, relatively shallow." *See* Tr. at 12/15/14:51 (Fuller).

43. With regard to Segment 0-B, Mr. Fuller testified that "[t]here's a lot of beaver activity once you get downstream of Granite Creek." *See* Tr. at 12/15/14:51 (Fuller).

44. Mr. Fuller determined that Segment 0 is non-navigable. *See* Tr. at 12/15/14:57-58 (Fuller).

45. Part of the reason Mr. Fuller found Segment 0-B non-navigable was that "the boating guides state that the real boating conditions don't begin until Forest Road 638." *See* Tr. at 12/16/14:276 (Fuller).

46. One of the reasons Mr. Fuller found Segment 0 non-navigable was that "[s]ome of the boating guides that are out there describe the boating reaches beginning at Forest Road 638 and describes the reach upstream as more of a drag, pole and paddle." *See* Tr. at 12/15/14:59 (Fuller).

47. One of the reasons Mr. Fuller found Segment 0 non-navigable was that he "didn't have any historical descriptions of boating" on it. *See* Tr. at 12/15/14:59 (Fuller).

48. One of the reasons Mr. Fuller found Segment 0 non-navigable was that the Verde on that segment "is a very small river, and small enough so that when trees fall over, they block the entire channel." *See* Tr. at 12/15/14:59 (Fuller).

49. One of the reasons Mr. Fuller found Segment 0 non-navigable was that, when he tried to boat it, he was "pulling my boat over four beaver dams that crossed the river in that reach." *See* Tr. at 12/15/14:59 (Fuller).

50. With regard to Segment 0, Mr. Fuller testified: "When I look at the totality of the evidence, I say there are too many obstructions in this reach, there's too many -- the river is too small, small enough so that we have trees that fall over the river and create obstructions, not enough watershed area to create the kinds of flows needed to sweep those trees away, so they're more or less going to be there permanently and not cleaned out periodically." *See* Tr. at 12/15/14:211-12 (Fuller).

51. With regard to Segment 0, Mr. Fuller testified that "there is was an extensive amount of beaver activity in that area. And I would say that the majority of trees had chew marks on them from beavers, the ones by the river." *See* Tr. at 12/15/14:60 (Fuller).

52. Part of the reason Mr. Fuller found Segment 0-B non-navigable was that he did not have "any historical descriptions of boating in that segment." *See* Tr. at 12/16/14:277 (Fuller).

53. Mr. Farmer has never boated Segment 0. *See* Tr. at 12/16/14:398 (Farmer).

**Segment 1**

54. Mr. Fuller defines Segment 1 as beginning at "Forest Road 638 and goes down to Sycamore Canyon." *See* Tr. at 12/15/14:60 (Fuller); Fuller Power Point, Slide 47 [X035].

55. With regard to Segment 1, Mr. Fuller testified that "[i]t has a pool and riffle pattern, and it's inside a shallow to moderately deep bedrock canyon, has very defined bedrock walls and relatively narrow canyon bottom." *See* Tr. at 12/15/14:61-62 (Fuller).

56. With regard to Segment 1, Mr. Fuller testified that there has "[b]een some diminishment in the flow prior to and – before and prior to at 1912, primarily due to

withdrawals at the upper watershed; to a lesser degree a small diversion at Perkinsville. Other than that, there's not a lot of direct human impact to the channel itself . . . ." *See* Tr. at 12/15/14:62 (Fuller).

57. With regard to Segment 1, Mr. Fuller testified "[t]here you see a little double-channel stretch we just went past. It's a couple hundred meters long. Then we're in the shallow canyon. The river meanders back and forth, dominantly a single channel. There's a little riffle area. Sometimes the flow spreads out, but generally there's a clear, open channel is the place to go." *See* Tr. at 12/15/14:69 (Fuller).

58. Mr. Fuller testified that "Segment 1 in places narrows down to about two boat widths thick in one or two places, filled in with reeds." *See* Tr. at 12/15/14:74 (Fuller).

59. Mr. Fuller did not encounter any other boaters on the day he boated Segment 1. *See* Tr. at 12/15/14:78-79 (Fuller).

60. With regard to Segment 1, Mr. Fuller testified: "In terms of its ordinary and natural condition, based on the geomorphology of the reach, I would say it's very similar to its existing condition, particularly in recent years with some of the cattle enclosures." *See* Tr. at 12/15/14:220 (Fuller).

61. With regard to Segment 1, Mr. Farmer testified: "Again, it would depend on water flow. That area is generally low water. If it hits -- hits flood so rarely, it's not even worth speaking about. Really, I don't see any of them that should even be on there and be called a rapid." *See* Tr. at 12/16/14:420 (Farmer).

62. Mr. Farmer has never boated the Verde above Verde Ranch, which is six miles downstream of Forest Road 638. *See* Tr. at 12/16/14:398 (Farmer).

63. Mr. Farmer has paddled from Verde Ranch only once, and usually starts at Perkinsville. *See* Tr. at 12/16/14:398 (Farmer).

64. Mr. Farmer testified that, at Sycamore Creek, the Verde "becomes more of a river-type boat instead of a creek boating experience." *See* Tr. at 12/16/14:403 (Farmer).

65. Mr. Farmer has periodically had to get out of his boat while attempting to boat Segment 1 at low flow. *See* Tr. at 12/16/14:473 (Farmer).

**Segment 2**

66. Mr. Fuller's Segment 2 extends from Sycamore Canyon down to Beasley Flat. *See* Tr. at 12/15/14:80 (Fuller); Fuller Power Point, Slide 54 [X035].

67. With regard to Segment 2, Mr. Fuller testified that "[i]t has a pool and riffle pattern, saying it's an alluvial valley, and it has experienced diminished base flow since and prior to 1912." *See* Tr. at 12/15/14:79 (Fuller).

**Segment 3**

68. Mr. Fuller defines Segment 3 from Beasley Flat to Childs. *See* Tr. at 12/15/14:92 (Fuller); Fuller Power Point, Slide 60 [X035].

69. With regard to Segment 3, Mr. Fuller testified: "And the changes since statehood, this is a fairly pristine reach. In terms of the morphology of the stream, it hasn't changed much since its ordinary and natural conditions. I would say physically it's very much in its ordinary and natural condition, with the exception of some reduction in the normal flows." *See* Tr. at 12/15/14:223 (Fuller).

**Segment 4**

70. Mr. Fuller defines Segment 4 as Childs down to Needle Rock. *See* Tr. at 12/15/14:100 (Fuller); Fuller Power Point, Slide 66 [X035].

71. Mr. Fuller testified that Segment 4 is "perennial," "pool and riffle" with "some bedrock canyon." *See* Tr. at 12/15/14:100 (Fuller).

72. With regard to Segment 4, Mr. Fuller testified: "And the changes since statehood, again, this is primarily an undisturbed reach, has that wild and scenic designation. That's one of the criteria to get that designation. But the base flow is reduced, and then once we get below the dams today, the flow rights are substantially altered by the operations of those dams." *See* Tr. at 12/15/14:224 (Fuller).

**Segment 5**

73. Mr. Fuller defines Segment 5 as Needle Rock down to the Salt River confluence. *See* Tr. at 12/15/14:111 (Fuller).

74. Mr. Fuller testified that Segment 5 is a "perennial stream, pool and riffle, and now we're out of the canyons into an alluvial valley. The flow has been altered since the mid century, mid last century, with the major upstream dams. Of course, they were not there in statehood." *See* Tr. at 12/15/14:111 (Fuller).

75. Mr. Fuller testified that Segment 5 has some compound channels. *See* Tr. at 12/15/14:113-15 (Fuller).

**HISTORY OF THE VERDE**

**Historic and Prehistoric Indian Use**

76. Prehistoric evidence in the Verde River Valley reveals that the river provided an accessible route to water, but the river was used primarily for canal irrigation. *See* Fuller, et al., "Arizona Stream Navigability Study for the Verde River: Salt River Confluence to the Sullivan Lake" 2-14 (June 2003) [EI 31] ("Fuller 2003").

77. Despite the proximity to the river, there was no documented evidence of any prehistoric boating. *See* Fuller 2003, at 2-14 [EI 31].

78. As Mr. Fuller concluded at the January 18, 2006 hearing: "We found no evidence in the archaeological record of any use of boats on the Verde River." *See* Tr. at 1/18/06:10 (Fuller).

79. The evidence shows that native inhabitants did not use the Verde for navigation during recorded history. *See* Fuller 2003, at 3-1 [EI 31].

80. Although tribes (such as the Northeastern and Southeastern Yavapai, Pima, and Apache) occupied the Verde River Valley, water was used for simple ditch irrigation. *See* Fuller 2003, at 3-1 [EI 31].

81. No evidence submitted to the Commission by the ASLD's consultants or any other witness or exhibit indicated any use of boats on the Verde (commercial or otherwise) or any flotation of logs (regular or irregular) by these early inhabitants.

82. During the 2014/15 Hearings, Mr. Fuller testified that "[w]hen it comes to archaeology, there's not a lot to be said in terms of navigability." *See* Tr. at 12/15/14:118 (Fuller).

83. Mr. Fuller testified that "we have no accounts of boats or boating from the archaeological period. We have no preserved records that say the Native Americans were using boats. So I'll say it again. Native Americans, we have no evidence that they were using boats." *See* Tr. at 12/15/14:119 (Fuller).

84. "After the Hohokam culture flourished along the Salt and the Gila rivers, developing an extensive irrigation and canal system, in approximately 700 AD they entered the lower Verde Valley." *See* August 2015, at 3 [X067].

85. "A major archeological study in the 1990s, the Lower Verde Archeological Project, undertaken by the United States Bureau of Reclamation, examined two major Hohokam periods in the Lower Verde, the pre-classic period (500-1150) and the classic period (1150-1450). At least twenty-six separate settlements were identified in the areas of Bartlett and Horseshoe lakes. Water was the cornerstone for survival and as the population grew so too did the irrigation technology and their dependence upon it. A few sites, like Scorpion Point, were much larger than researchers anticipated. These sites included aqueducts, ball courts, canals, and multilevel compounds. These groups hunted beaver, whose dams were sophisticated, even employing arched construction. At their height, the Hohokam along the Lower Verde cultivated crops that included corn, tobacco, cotton, agave, and squash. They also gathered mesquite beans and cactus fruit. They traded with other peoples in Mexico and northern Arizona. These early inhabitants traveled by foot and there was no archeological evidence of boats or water-based transportation." *See* August 2015, at 3-4 [X067].

86. "Around 1300, while the Hohokam civilization was at its peak, another group migrated east from the Colorado River into the lower Verde Valley. Unlike the Hohokam, they were a hunter and gathering culture and led a nomadic existence. Indeed the Yavapai came to dominate the Lower Verde as well as the Middle and Upper Verde regions. They were divided among five groups of which four exist today. Like their predecessors, the Hohokam, there is a lack of evidence that the semi-nomadic group used the Lower Verde for commerce or travel." *See* August 2015, at 4-5 [X067] (citation omitted).

87. Mr. Burtell found "[n]o evidence of prehistoric boating by Native Americans." *See* Burtell 2014, at 4 [X009].

88. "From the pre-European contact, I have not seen [evidence of boating on the Verde], and neither in the anthropological literature . . . nor the historical material from historians of the region in the American West." *See* Tr. at 2/24/15:2318-19 (August).

89. Although the Hohokam conducted trade throughout the American Southwest and Mexico, there is no archeological evidence that they used boats. *See* Tr. at 2/24/15:2325-26 (August).

90. There is no evidence that the Yavapai people used boats on the Verde. *See* Tr. at 2/24/15:2328 (August).

91 Mr. Randall has never heard of any native peoples using boats on the Verde. *See* Tr. at 2/20/15:1785-87. (Randall).

92. In his affidavit for the 2014/15 Hearings, Mr. Randall wrote: "From my many decades of research regarding Yavapai and Apache history and culture, including my review of thousands of federal, state and private archival sources, my interviews with Tribal elders, and my interactions and discussions with historians, ethnographers and archaeologists, I have not come across any accounts of the use of the Verde River being used for trade or travel by our Yavapai and Apache People at all." *See* Randall 2015, at 7 [X055-YAN 1].

93. The "Yavapai and Apache People have never used canoes or rafts to travel on the Verde River and [the] Yavapai and Apache People have no traditional cultural knowledge of how to construct a canoe, boat or raft." *See* Randall 2015, at 7 [X055-YAN 1].

94. "No other tribes ever traded with [the] Yavapai and Apache People using canoes, boats or rafts and all of our trade with other tribes was by land routes." *See* Randall 2015, at 7 [X055-YAN 1].

95. The Yavapai and Apache "People have no oral history of ever seeing a canoe, boat or raft on the Verde River, including when our People returned to the Verde Valley around Camp Verde and Clarkdale in the late 1890's and early 1900's." *See* Randall 2015, at 7 [X055-YAN 1].

96. Mr. Fuller had no evidence that boats were used along the Verde on Indian reservations. *See* Tr. at 12/17/14:657 (Fuller).

97. The Commission finds, as a matter of fact, that the prehistoric inhabitants in the area did not use the Verde as a highway for commerce. *See* Findings of Fact 76-96.

**Spanish Explorers**

98. In the 1500s, Spanish explorers are known to have traveled in central Arizona in search of mines. *See* Fuller 2003, at 3-8 [EI 31].

99. No evidence was presented to show that these explorers ever used boats on the Verde. *See* Fuller 2003, at 3-8 [EI 31].

100. Dr. Littlefield examined a wide array of published and unpublished documents and photographs including federal surveys and reports, land settlement records created by the United States and Arizona governments, explorer's journals, diaries, early pioneer reminiscences, historical newspaper articles, old photographs, and many other records. *See* Littlefield 2014, at 1 [X002].

101. Dr. Littlefield concluded: "Taken as a whole, these records overwhelmingly illustrate that prior to and at the time of Arizona's statehood the Verde River was considered not navigable by virtually every contemporaneous observer. The historical record amply

demonstrates that the Verde River was highly erratic, subject to flooding and major channel changes, and blocked by obstacles." *See* Littlefield 2014, at 1-2 [X002].

102. The Spanish explorers that encountered the Verde "came through on foot and on horseback." *See* Tr. at 12/15/14:120 (Fuller).

103. Multiple Spanish explorers traveled through the area of the Verde, and none of them navigated the Verde River. *See* Tr. at 2/24/15:2336-37 (August).

104. The Spanish were very experienced boaters. *See* Tr. at 2/24/15:2337-38 (August).

105. Juan De Onate traveled through the Verde area and would have been very interested in any navigable rivers, but he did not note that the Verde was navigable. *See* Tr. at 2/24/15:2339-40 (August).

106. As a cartographer, Father Kino would have mapped the Verde if he thought it was navigable, but he did not. *See* Tr. at 2/25/15:2355 (August).

107. Dr. August testified that, if the Verde had been navigable, he would have expected more colonization by the Spanish. *See* Tr. at 3/30/15:2565 (August).

108. "Two Spanish explorers, Antonio Espejo and Marcos Farfan, were the first Europeans to visit the river (1583 and 1599, respectively) after being led there in search of gold by Hopi guides. There they encountered the Yavapai. Espejo called the Verde, 'El Rio de lost Reyes' (River of Kings). Farfan called it 'EI Rio Sacramento.' According to their diaries and reports, neither discerned where the river originated nor where it went. They traveled overland, using horses and mules for transportation. In 1604, Juan de Onate made a visit to the Yavapai in his search for an overland route to the sea." *See* August 2015, at 5 [X067].

109. "More than one hundred years after de Onate visited the Yavapai, Father Eusebio Francisco Kino drafted the first map of the river which was shown flowing south from the Hopi villages to the Gila River. Today, these villages are located approximately one hundred-twenty miles northeast of Flagstaff. In 1691, Father Kino, a Jesuit and remarkably

skilled mapmaker, began establishing missions in what is now northern Mexico and southern Arizona. In 1702, after traveling through much of the province the Spanish called Pimeria Alta (Upper land of the Pima), including a visit to the confluence of the Salt and Verde in 1699, he produced the region's first remotely accurate map." *See* August 2015, at 5-6 [X067].

110. "On his 1702 map, Kino depicts a river entering the Gila from the north. He calls it Rio Azul or Blau Fluss (the Spanish and German translations for Blue River). The Verde would be called Rio Azul on maps for years to come, a name thought to have been connected to the legend of a mountain of gold, located somewhere in the vicinity of the Hopi villages, known as Sierra Azul." *See* August 2015, at 6 [X067].

111. "At one point Kino climbed a pass to the top of the Estrella mountains and from there his guides pointed out what Kino named the Rio Verde and the Rio Salado, which united and flowed west and joined the Gila. Manje added, 'This Salado River runs from east to west and to the south of . . . the Verde River . . . and they merge, as I have said. To the very end and to the most easterly point of this Pimeria there are also two rivers called, more properly, arroyos (small streams). They do not have any particular names. Kino's brief encounter with the Lower Verde River offers no indication that he navigated the river for transportation or commerce, nor do his diaries suggest that he viewed the Lower Verde as susceptible for transportation or commerce." *See* August 2015, at 7 [X067] (citations omitted).

112. "Another Jesuit priest, Father Juan Bautista Nentvig, published the first map that actually uses the name Verde, in 1764. Nentvig incorporated knowledge gathered from other Jesuit priests who, like Kino, had traveled overland extensively throughout Pimeria Alta. Nentvig, who traveled on horseback, also included information gleaned from the travels of Jesuit priests Father Jocobo Sedelmayr and Father Juan Keller, both of whom had visited the Verde at its confluence with the Salt River, twenty years earlier. These missionary/explorers traveled on horseback as well. Nentvig's book, Rudo Ensayo, was solid

in its geographical assertions. 'The Gila is joined by the Rio Asuncion which, according to Father Jacobo Sedelmayr, S.J., is formed by the confluence of the Verde, so-called because of the verdant groves of poplars along its banks, and the Salado, so salty that for some distance after the Asuncion joins the Gila the water remains undrinkable,' Nentvig wrote. Sedelmayr's notion of calling the portion of Salt River between its confluence with the Verde and its confluence with the Gila (Rio Asuncion) demonstrates the misunderstanding as to which river was the main stream. . . . In spite of the Spaniards traversing what is now central Arizona, they largely ignored the Verde." *See* August 2015, at 7-8 [X067] (citations omitted).

113. The Commission finds, as a matter of fact, that the Spanish explorers did not use the Verde as a highway for commerce. *See* Findings of Fact 98-112.

**American Trappers and Mountain Men**

114. Beginning in 1826, American trappers, such as James Ohio Pattie and Ewing Young, trapped in the vicinity of the Verde. *See* Fuller, 2003, at 3-8 [EI 31]; Tr. at 1/18/06:11 (Fuller).

115. Ewing Young trapped along the Verde, from its confluence with the Salt River to its headwaters, but there is no evidence in the record that Young's party ever traveled by water on the Verde itself. *See* Fuller 2003, at 3-2 [EI 31] (noting that, in 1829, Young's trapping party "traveled along the Verde River").

116. "The first Anglo frontiersmen who traversed the Verde Valley were a ragtag collection of adventurers, romanticized by later generations as 'mountain men.' From their headquarters in Taos, New Mexico they entered Arizona for one purpose: to trap beaver from every water course between the Upper Gila to the Colorado River delta. The first mountain men to set foot in Arizona were Sylvester Pattie and his son, James. They spent the winter of 1825-1826 trapping along the San Francisco (Verde), Gila, and San Pedro Rivers, travelling by horseback and on foot." *See* August 2015, at 9 [X067] (citation omitted).

117. There are no mentions of boats on the Verde by the early trappers. *See* Tr. at 12/15/14:120-21 (Fuller); Fuller Power Point, Slide 80 [X035].

118. Dr. August testified that the account of James Ohio Pattie's travels through Arizona are "pretty exaggerated, very colorful adjectives and animals that may or may not have existed. But it was entertainment and it was a great story, so he spun a tale." *See* Tr. at 2/25/15:2355 (August).

119. The early trappers in Arizona were aware of and capable of building and piloting customary boats used for trapping in the Southwest Region, but there is no evidence they used such boats on the Verde. *See* Tr. at 2/25/15:2375-77 (August).

120. One reason early maps did not accurately map the Verde was because settlers at the time did not see it as a highway of commerce. *See* Tr. at 2/25/15:2380 (August).

121. "In October 1831, Young led another trapping expedition to the Salt River. He followed his previous route via the Zuni Pueblo, continuing to the Salt, thence followed that stream overland, setting traps as they progressed. The group also trapped for twelve days on the Lower Verde River. Significantly, the party did not use the Lower Verde for transportation, but only extracted beaver pelts from it." *See* August 2015, at 10 [X067] (citation omitted).

122. "The fur trade in the Southwest declined precipitously after 1833. In its wake the mountain men left streams depleted of beaver. Although they decimated beaver populations along the Lower Verde, those populations recovered by the mid-1840s when the next surge of Anglo Americans settled the area. The mountain men did not stay in Arizona long enough to transform its economy or ecology. Nor did they use the Lower Verde as a form of transportation, trade, or commerce. Though trapping continued well into the 1840s this vanguard of American expansionism did not use boats for travel along the Lower Verde or other streams in Arizona, and instead traveled by horses, mules, wagon, or foot along the sides of the rivers." *See* August 2015, at 10-11 [X067] (citation omitted).

123. The Commission finds, as a matter of fact, that the American trappers and mountain men did not use the Verde as a highway for commerce. *See* Findings of Fact 114-122.

**Military Expeditions**

124. Later in the nineteenth century, military expeditions conducted surveys of railroad routes in the area of the Verde. *See* Fuller 2003, at 3-9 [EI 31].

125. There is no recorded history of boat travel by these military parties. *See* Fuller 2003, at 3-9 [EI 31].

126. "By the mid to late 1860s, four military camps were established on or near the Verde River, farming settlements had begun in the Verde Valley, and Prescott had been named the capital of the territory. With this level of early development, it is difficult to explain how military personnel, farmers, and townspeople all failed to use the Verde River as a highway for commerce if it were susceptible to commercial navigation." *See* Burtell 2014, at 9 [X009] (citation omitted).

127. With regard to Camp Verde, Dr. August testified that efficiency and ease of transportation was a "constant[]" concern for the military, but they did not use the Verde. They instead used "cumbersome" wagons, horses, and pack animals. *See* Tr. at 2/25/15:2389-90 (August).

128. The military even cut Stoneman's Road, which "was not easy," instead of using the Verde. *See* Tr. at 2/25/15:2391-92 (August).

129. Dr. August testified that the military had access to boats, but he has seen no evidence that they used boats on the Verde for trade and travel, despite the photograph of two soldiers in a boat on the Verde (X035-167). *See* Tr. at 2/25/15:2395-97 (August).

130. Dr. August testified: "I think if the Verde were navigable, I think you would have seen more commerce, military, material, and its use as . . . a highway of commerce." *See* Tr. at 3/30/15:2565 (August).

131. "By 1870, the Stoneman Road connected Ft. Whipple and Ft. McDowell, suggesting that transportation or the movement of troops on the Verde River was not considered by military leaders. Transportation, commerce, and military activity took place overland. Had the Verde been navigable, it would have been a much easier and efficient

journey to get from Fort Whipple to Fort McDowell. The Stoneman Military Road provided a conduit for the movement of troops, supplies, military materiel, and couriers between Ft. Whipple, near Prescott, and Fort McDowell. The road was constructed on orders from Brevet Major General George Stoneman, the military commander of all troops in Arizona. It followed a network of established trails used by Yavapai and Apache bands for hunting, gathering, and raiding. The original road ran northwest from Camp McDowell, between twin buttes at Brown's Ranch, toward Cave Creek and eventually north through the Black Canyon. When completed, the road reduced the trip between Whipple and McDowell from 175 miles to 98. It was an important transportation artery for troops and supplies during the US Army's winter campaign of 1872-1873 which broke organized Yavapai resistance to American settlement in central Arizona." *See* August 2015, at 16-17 [X067].

132. The Stoneman Road was "difficult to build" and "expensive." *See* Tr. at 2/25/15:2409-10 (August).

133. With regard to the Stoneman Road, Mr. Burtell testified: "[T]he route of Stoneman's Trail and then some later changes to it is essentially I-17 now, and we zoom on up there in a couple hours and don't think anything of it, but keep in mind this shortcut shaved off a week of time, a week. So it's not trivial getting from Point A to Point B back then. And it's really hard for me to think that if the Verde River was navigable, that they would have ignored it, when they're spending this much time and effort in building roads." *See* Tr. at 3/30/15:2630 (Burtell).

134. With regard to the Stoneman Road, Mr. Burtell testified: "I can't believe that if the Verde River was navigable, everybody would have ignored it because a road was so much easier. They were expensive to build. They were expensive to maintain." *See* Tr. at 3/30/15:2633 (Burtell).

135. The Commission finds, as a matter of fact, that the early military expeditions in the area did not use the Verde as a highway for commerce. *See* Findings of Fact 124-135.

**Settlers**

136. Following the discovery of gold in Arizona, permanent settlement was established in central Arizona. *See* Fuller 2003, at 3-9 [EI 31].

137. Early settlers commented on the Verde, revealing its variable nature and indicating that it was impeded by beaver dams and had extensive marshes in the floodplains. *See* Fuller 2003, at 3-13 to 3-14 [EI 31].

138. These early residents along the Verde used water from the river for farming, mining, and hydroelectric power. *See* Fuller 2003, at 3-15 to -17 [EI 31]. Farmers in the middle Verde River Valley constructed irrigation ditches. *Id.* at 3-15. Ranchers and farmers raised products and crops that were transported overland to the military forts. *Id.* Yet, despite substantial usage of the waters of the Verde, there is no evidence that the river itself was used for the transportation of any goods or people. *Id.*

139. The ASLD's consultants reported that early transportation in the Verde River Valley was primarily limited to horseback, mule trains, wagons, and railroad. *See* Fuller 2003, at 3-19 [EI 31].

140. "Mining and farming began back in the 1860s, and particularly with the farming began the diversions." *See* Tr. at 12/15/14:121 (Fuller).

141. Mr. Fuller had no evidence that miners and farmers along the Verde in the 1860s used boats on the Verde. *See* Tr. at 12/17/14:657 (Fuller).

142. Modern diversions of the Verde began in 1866 with the digging of Government Ditch to Fort McDowell. *See* Tr. at 2/24/15:2315 (August).

143. "The first Anglos to occupy the Verde River watershed were military and settlers in the Verde Valley and near Prescott. Although both required a ready means of transporting people and goods through the area, neither the military nor the settlers utilized the Verde River for that purpose, further indicating that the river was not navigable." *See* Burtell 2014, at 9 [X009].

144. "The need for practical and reliable transportation near the Verde River was not limited to the military. According to Hanchett (1998, pp.63 and 133-134), a stage line that carried passengers and mail between Prescott and Maricopa Wells had begun in August 1868. . . . [H]ad the Verde, Salt, and Gila rivers been navigable, these streams would have offered as direct a route between the two towns as passing overland by stage through Wickenburg." *See* Burtell 2014, at 11 [X009].

145. The Commission finds, as a matter of fact, that the early settlers in the area did not use the Verde as a highway for commerce. *See* Findings of Fact 136-144.

**USGS Land Surveys**

146. Another group of individuals who were present along the Verde at a relatively early date were the federal land surveyors who were responsible for conducting the rectangular survey in the new territory. Dr. Littlefield testified at the January 2006 hearing regarding surveys on the Verde from its uppermost reaches near Paulden, Arizona, downstream to the confluence with the Salt River. Each of these surveyors was under specific instructions to distinguish between navigable and non-navigable streams. *See* Littlefield, "Assessment of the Verde River's Navigability Prior to and on the Date of Arizona's Statehood, February 14, 1912," at 11-13, 37-45 (July 7, 2005) [EI 32] ("Littlefield 2005"); Tr. at 1/18/06:68-69 (Littlefield).

147. None of these Government representatives ever indicated that the Verde was navigable. *See* Littlefield 2005, at 73 [EI 32] ("[W]hile those surveys were done at varying times of the year, in different years, and by at least eight individuals, all of the descriptions and plats from this work consistently portrayed the Verde River as being a non-navigable stream.").

148. Dr. Littlefield testified again in the 2014/15 Hearings and presented a written report to the Commission. *See* Littlefield 2014 [X002].

149. "Since surveyors were required to 'meander' all navigable bodies of water (follow the sinuosities of the banks) and to keep detailed notes of those meanders, survey

documents are vital to understanding what the Verde was like at the time of survey." *See* Littlefield 2014, at 7 [X002].

150. "Federal government surveyors were specifically charged with the task of identifying navigable streams as part of their surveying duties, and the manuals and instructions under which they carried out their work were very precise about how navigable bodies of water were to be distinguished from non-navigable streams. As part of the U.S. Government's surveying efforts, the areas along parts of the Verde River were surveyed and resurveyed many times in the years before 1912. Significantly, while those surveys were done at varying times of year, in different years, and by at least eight individuals, all of the descriptions and plats that resulted from this work consistently portrayed the Verde River as a non-navigable stream." *See* Littlefield 2014, at 49-50 [X002].

151. "The U.S. Congress passed a variety of homestead laws in the mid-to-late nineteenth century designed to facilitate the settlement of lands in the West that had been acquired from Mexico at the end of the Mexican War in 1848. The statutes resulted in thousands of federal patents being issued to settlers determined to establish homes and farms in the West's unfamiliar climate." *See* Littlefield 2014, at 51 [X002].

152. "Once the application had been filed, the settler was required to live on the land for a number of years and make various improvements. When the necessary time had elapsed, he or she could return to the land office with witnesses to file affidavits stating that homesteading requirements had been met. The settler also would complete any remaining paperwork. The affidavits and paperwork created a patent file that contained a great deal of information about the settler and the land he or she wanted to acquire." *See* Littlefield 2014, at 60 [X002].

153. Dr. Littlefield examined all of the survey notes and plats "for the entire Verde River from its headwaters near Paulden, Arizona to the Verde's confluence with the Salt River, except for those surveys that were done long after statehood." *See* Tr. at 2/18/15:1460 (Littlefield).

154. "Most federal surveyors along the Verde River did not meander the stream, thus indicating a lack of navigability in their viewpoints. In those few instances where the surveyors did meander the Verde, all of those instances are attributable to instructions in different surveying manuals for meanders of nonnavigable bodies of water under certain special circumstances. Thus there were eight different federal surveyors, who were specifically charged with recording navigable bodies of water, and who undertook surveys along the Verde in different years, that indicated the Verde River, in their view, was not navigable." *See* Tr. at 2/18/15:1474 (Littlefield); *see also* Littlefield Power Point, at 16 [X024].

155. "[N]ot one of the surveyors recorded information about the Verde River that would be consistent with a determination of navigability." *See* Littlefield 2014, at 26 [X002].

156. The Commission finds, as a matter of fact, that the federal survey evidence supports the conclusion that the Verde was not, in its ordinary and natural condition at the time of statehood, susceptible to being used as a highway for commerce. *See* Findings of Fact 146-155.

**Federal Patents**

157. The federal and state land patents issued along the Verde are persuasive evidence of non-navigability. The Federal Government granted over one hundred separate patents that touched or overlay the Verde to private individuals. *See* Littlefield 2005, at 110 [EI 32]; Tr. at 1/18/06:71 (Littlefield).

158. In not one case did any of those patents (or the supporting patent files) indicate that acreage was being withheld because the Verde was navigable. *See* Littlefield 2005, at 110 [EI 32]; Tr. at 1/18/06:71 (Littlefield).

159. With regard to the land patent files he reviewed, Dr. Littlefield testified during the 2014/15 Hearings: "We obtained all of the patent files that relate, that either overlay or touch the Verde River, to review all of those patent files, and there are over 100 of them that

in some way came – that the Verde River came in contact with." *See* Tr. at 2/19/15:1476 (Littlefield).

160. "There were nearly 100 patents that were issued by the United States that touched or overlay the Verde River; and of these, approximately 50 of them were Desert Land Act patents that expressly had to be taking water from a nonnavigable body of water. In not one instance did the U.S. government, in granting any type of patent along the Verde River, indicate a belief that the stream was navigable by withholding acreage for the bed of the river. And, in fact, if you go through the homestead patent files, which I have, many of the patent applicants and their witnesses specifically noted that their patent claims included the bed of the river. And these are discussed in greater detail in my report. And then with regard to state patents, as I just mentioned, there were three parcels that the State patented that also included the bed and the banks of the Verde River. So, cumulatively, there were at least 153 U.S. and state patents that were issued by federal or state authorities indicating that many state and federal officials did not consider the Verde River to be navigable, nor did, for that matter, the various patentees of those lands." *See* Tr. at 2/19/15:1517-18 (Littlefield).

161. "[N]one of the federal patents that overlay the Verde River (regardless of their respective dates) contain any provisions for reserving the bed of the river to Arizona." *See* Littlefield 2014, at 62 [X002].

162. "In addition to patented lands already discussed, other parcels along the Verde River were claimed under the terms of the *Desert Land Act*. Passed by Congress on March 3, 1877, this law was intended to allow arid lands to be claimed in larger blocks than under other homestead acts since desert lands were less productive (from an agricultural perspective) than non-arid lands. The *Desert Land Act* allowed a settler to file an application for up to 640 acres. The relevance of the *Desert Land Act* to the question of the Verde River's navigability lies in the requirement that the desert land being claimed had to be irrigated before a final patent would be awarded. Importantly, the water used in that irrigation had to be taken from a non-navigable stream." *See* Littlefield 2014, at 71 [X002].

163. "There were over fifty applications for land under the Desert Land Act in lands adjacent to the Verde River, many of which cited that stream as their source of water. All of the applications were initially accepted by the U.S. General Land Office in Phoenix. The logical conclusion from these applications is that the Verde River (as the source for reclamation of these lands) must have been considered non-navigable by the applicants as well as by the administrators of the U.S. General Land Office." *See* Littlefield 2014, at 73 [X002].

164. "The history of Desert Land Act entries along the Verde Rive supports the evidence from homestead and cash entry patents that the Verde River was not considered navigable by contemporaneous observers. No mention was made in the Desert Land Act applications of reserving the bed and the banks of the Verde River for Arizona due to the sovereign rights of the state for those parcels overlying the river. Moreover, the fact that over fifty desert land entries cited the stream as a source of water indicates that many individuals thought the stream not to be navigable. In fact, the evidence indicates that all contemporaneous observers considered the Verde to be non-navigable." *See* Littlefield 2014, at 75 [X002].

165. "[T]he federal government granted over one hundred separate patents that touched or overlay the Verde River to private individuals. In not one case did any of these patents or the supporting patent files indicate that acreage was being withheld due to possible ownership of the bed of the Verde River by Arizona. In each case, several parties expressed implicit opinions on the navigability of the Verde through the request for, and award of, lands through which the river flowed. These included the patentee, his witnesses, and officials of the U.S. General Land Office. It is significant that cumulatively literally hundreds of people made judgments concerning the Verde River's navigability in this manner – opinions spread chronologically in many years, throughout different seasons, and over a large geographic area." *See* Littlefield 2014, at 76-77 [X002].

166. The Commission finds, as a matter of fact, that the federal patent evidence supports the conclusion that the Verde was not, in its ordinary and natural condition at the time of statehood, susceptible to being used as a highway for commerce. *See* Findings of Fact 157-165.

**State Patents**

167. Dr. Littlefield, summarizing his conclusions based upon hundreds of hours of historical research from a wide variety of sources (including survey records, land patents, other government documents, and newspapers), stated: "From this wealth of information, covering a huge array of documentary sources only one conclusion can be reached: The Verde River was not navigable or susceptible of navigation on or before February 14, 1912." Littlefield 2005, at 176 [EI 32].

168. "The patents issued by the state to private parties for land through which the Verde River ran provided another perspective. If the state's officials had believed the state owned the bed and banks of the river, they would have considered the stream's navigability in disposing of those lands." *See* Littlefield 2014, at 78 [X002].

169. The Commission finds, as a matter of fact, that the state patent evidence supports the conclusion that the Verde was not, in its ordinary and natural condition at the time of statehood, susceptible to being used as a highway for commerce. *See* Findings of Fact 167-168.

**Boating Attempts**

170. Additional evidence in support of a finding of non-navigability comes from the accounts of the Verde in the decades prior to statehood, including the early accounts of attempts by an ambitious few to actually float boats on the river. The evidence shows a sparse record of a few individuals who actually did attempt to navigate the Verde between 1873 and 1903. The SLD's 2003 report discusses at least eight accounts of attempts to boat the river before statehood. Those attempts are addressed in detail in below.

171. With regard to the account of an 1854 trip on the Verde by a trapper named Leroux, Mr. Burtell testified: "And one of the accounts that is one of the earliest that I think anyone is able to put on the table is a trapper named Leroux way back in 1854, and he talks about going up the Verde River, and I talk about that in my report. Two things that he characterizes that I think are of value. One is the rapids, although I don't think that it should be any surprise to people that the rapids haven't gone away. . . . But the other thing he talks about is lagoons that he came across. Now, he doesn't tell us where those lagoons are, but there are lagoons. And I think we should take his account of lagoons and marry that up with Vincent Randall's accounts of marshes and lagoons in the Camp Verde area. . . . That would suggest to me another line of evidence that there was shallow water spread out in that area that was conducive to breeding mosquitos with malaria." *See* Tr. at 3/30/15:2606 (Burtell).

172. Mr. Fuller testified that, in 1868, troops at Fort McDowell attempted to build a raft to ferry the river at high flow, but the raft capsized. *See* Tr. at 12/15/14:153 (Fuller); Fuller Power Point, Slide 127 [X035].

173. In June 1873, Charles Hayden attempted to float logs down the Salt River and to establish a lumber mill in Tempe, but could not get the logs through the canyons upstream. (*Weekly Arizona Miner*, June 14, 21, 28, 1873). Later, Hayden came to the Verde, but his effort to float logs there also failed. *See* Fuller 2003, at 3-20 [EI 31].

174. Mr. Fuller testified that, in 1878, troops at Fort McDowell used a boat to ferry the river "primarily during high flow." *See* Tr. at 12/15/14:153 (Fuller); Fuller Power Point, Slide 127 [X035].

175. Mr. Fuller testified that, in 1883, N. Willcox and Dr. Andrews took a canvas skiff from Fort McDowell to Barnum's Pier on the Salt River Canal. *See* Tr. at 12/15/14:154-55 (Fuller); Fuller Power Point, Slide 128 [X035].

176. Mr. Fuller testified that, in 1887, the U.S. Army used a collapsible boat to take couriers across the river during high flows in Segment 2. *See* Tr. at 12/15/14:155 (Fuller); Fuller Power Point, Slide 129 [X035].

177. Mr. Fuller used a photo of soldiers in a boat that he estimates to be approximately ten miles from Camp Verde to conclude that the soldiers navigated the boat there from Camp Verde. *See* Tr. at 12/15/14:155-56 (Fuller); Fuller Power Point, Slide 129 [X035].

178. Mr. Fuller had no evidence that the soldiers at Fort Verde used boats to go up or down the Verde other than a photo of soldiers in a boat, which he estimated to be at Beasley Flats. *See* Tr. at 12/17/14:656-57 (Fuller).

179. Mr. Fuller admitted that the he did not know whether the two soldiers pictured in a boat on Slide 129 of his Power Point presentation actually travelled downstream in that boat. *See* Tr. at 12/18/14:896 (Fuller).

180. With regard to the soldiers in a boat at Beasley Flats, Mr. Fuller had no knowledge as to how that boat got to the location of the photo. *See* Tr. at 12/17/14:674 (Fuller).

181. Mr. Fuller testified that, in December 1888, Major Spaulding traveled from Fort McDowell to Mesa Dam in a canoe, but one of the soldiers died from an accidental gunshot discharge during a portage. *See* Tr. at 12/15/14:156 (Fuller); Fuller Power Point, Slide 130 [X035].

182. According to Scott Soliday, research historian at the Tempe Historical Museum, an article in the *Mesa Free Press* of 1890 or 1891 describes how, after Fort McDowell was abandoned, A.J. Chandler had logs or sawn timber from the fort floated down the Verde and then used in the head gates of the Consolidated Canal. *See* Fuller 2003, at 3-21 [EI 31].

183. Mr. Fuller testified that, in 1891, T. Carrigan attempted to boat Segment 1 in a raft built of railroad ties, but the raft fell apart trying to cross the river. *See* Tr. at 12/15/14:157 (Fuller); Fuller Power Point, Slide 131 [X035].

184. Based on a single newspaper article from 1892, Mr. Fuller testified that JK & George Day traveled from Camp Verde to Yuma trapping five separate times. *See* Tr. at 12/15/14:158 (Fuller); Fuller Power Point, Slide 132 [X035].

185. Mr. Fuller could not offer any other example of trappers using boats on the Verde other than the Day brothers account. *See* Tr. at 12/17/14:655-56 (Fuller).

186. Mr. Fuller admitted that the Day brothers' trip was the only account of trapping on the Verde on or before statehood. *See* Tr. at 12/17/14:699 (Fuller).

187. With regard to the Day brothers account, Dr. August testified: "[I]t obviously could be factual, but it's also very entertaining to read. I could imagine those who were working their hard lives away would read something like that and that would seem adventuresome and exciting, so . . . [the fur trade in 1892] certainly wasn't as vigorous and important and central to the economy of the region as it was, say, in the 1820s and '30s, and there was a little more economic diversification in Arizona by 1892. There was some other activities going on. So in many ways, it's kind of like an outlier." *See* Tr. at 2/25/15:2420-21 (August).

188. Dr. August testified that the 800 mile distance allegedly traveled in the Day brothers account is "inaccurate." *See* Tr. at 2/25/15:2420-21 (August).

189. Dr. August agreed that, if the Day brothers account was accurate in length of time, the Day brothers traveled at 1.7 miles a day down the Verde. *See* Tr. at 2/25/15:2426-27 (August).

190. With regard to the Day brothers' trip, Mr. Burtell testified: "[T]he 800 miles that's referenced in that article at least doesn't jive with where they started and where they ended up, if you were just along the river taking a straight course. . . . The takeaway . . . is a trip that took 209 days, covered 260 river miles . . . that works out to less than 2 miles a day." *See* Tr. at 3/30/15:2595 (Burtell).

191. With regard to the Day brothers' trip, Mr. Burtell testified: "What's provocative about that article is that the State Land Department, based on what was written by the reporter, said that this was one of the Day brothers' fifth time going down the river. So they've counted all five – they've counted the latest trip and the four other trips and says that's evidence of five trips." *See* Tr. at 3/30/15:2597 (Burtell).

192. With regard to the Day brothers' trip, Mr. Burtell testified: "It's all speculation. All of us are at a loss because we don't know. All we have is one newspaper article from a Yuma paper indicating what they did out there. So we simply don't know, and I guess I would just encourage the Commission to keep that in mind when the State Land Department is counting that as five separate trips and proof of navigability." *See* Tr. at 3/30/15:2599 (Burtell).

193. Mr. Burtell testified that the actual distance of the Day brothers' trip is less than half of what was reported in the *Sentinel*. *See* Tr. at 3/30/15:2600 (Burtell).

194. With regard to the account of a trip on the Verde by Joseph Pratt Allyn, Mr. Burtell testified: "He passed through the Santa Fe area and saw the Rio Grande River in the wintertime, when by the time that Allyn got to the Verde River, it was February and early March, when the higher flow was occurring. And he compared the Verde River to the Rio Grande River and says . . . 'The general characteristics of the valley are similar to those of the Rio Grande and there is nearly as much water in the river as there was in that stream when I first struck it coming from Santa Fe.'" *See* Tr. at 3/30/15:2614 (Burtell). Mr. Burtell also noted that the Rio Grande River has been deemed non-navigable throughout its entire length in New Mexico. *Id.*

195. Mr. Fuller testified that, in May 1894, 300 cords of lumber were possibly placed in the Verde, but that the scheme was abandoned because of a threat to the Arizona Dam. *See* Tr. at 12/15/14:161 (Fuller); Fuller Power Point, Slide 133 [X035].

196. Mr. Fuller testified that, in June 1899, a man named Willard used a boat to construct a rock dam at Perkinsville. *See* Tr. at 12/15/14:162 (Fuller); Fuller Power Point, Slide 134 [X035].

197. Mr. Fuller testified that, in winter 1903 in Segment 2, Ralph Palmer used a steel boat to hunt ducks and used a horse that was trained to return home when he got in his boat. *See* Tr. at 12/15/14:162 (Fuller); Fuller Power Point, Slide 135 [X035].

198. With regard to the historical accounts left by Carson, Young and Dye, Dr. August testified: "[T]here's some truth or factual information that generated a good story and a fanciful retelling of events." *See* Tr. at 2/25/15:2475 (August).

199. Mr. Fuller testified that, in April 1905, Hooker, Cox, Smith, and Miller attempted to use iron boats to travel from Jerome to Phoenix, but they gave up and took a wagon back. *See* Tr. at 12/15/14:164-65 (Fuller); Fuller Power Point, Slide 136 [X035].

200. Mr. Fuller described the Hooker, Cox, Smith, and Miller trip as a "failed boating account." *See* Tr. at 12/15/14:164-65 (Fuller).

201. Mr. Fuller testified that it must have been "quite a thing" to order boats in order for the Hooker, Cox, Smith and Miller trip to make the news. *See* Tr. at 12/15/14:166 (Fuller); Fuller Power Point, Slide 136 [X035].

202. Mr. Fuller testified that, in August 1910, four men attempted to travel from "Verde country" to Mesa until their boat wrecked and they lost their gear and had to walk to Mesa. *See* Tr. at 12/15/14:166-67 (Fuller); Fuller Power Point, Slide 137 [X035].

203. Mr. Fuller testified that the August 1910 trip was a failure. *See* Tr. at 12/15/14:168 (Fuller); Fuller Power Point, Slide 137 [X035].

204. Mr. Fuller testified that, in the spring of 1917, Stevens and Webber attempted to boat the Verde, but decided that they could not navigate the Verde Falls. *See* Tr. at 12/15/14:169-70 (Fuller); Fuller Power Point, Slide 138 [X035].

205. Mr. Fuller testified that, in February 1931, Fogel & Gireaux traveled from Clarkdale to Ft. McDowell on a five-week trapping trip in a flat bottomed boat. *See* Tr. at 12/15/14:170-71 (Fuller); Fuller Power Point, Slide 139 [X035].

206. The ASLD's consultants concluded that: "Historical accounts of boating on the Verde River do exist, though the vast majority of transportation in the region [was] by horses, mule trains, wagons, and railroad." *See* Fuller 2003, at 3-22 [EI 31].

207. Mr. Fuller testified that the historians quoted in the 2003 ASLD Report (Jim Byrkit, Bob Munson, and Betty Tome) all offered their opinion that the Verde was not navigable. *See* Tr. at 12/15/14:172 (Fuller); Fuller Presentation, Slide 140.

208. The Commission finds, as a matter of fact, that the evidence relating to boating attempts supports the conclusion that the Verde (a) was not actually used as a highway for commerce prior to statehood and (b) was not, in its ordinary and natural condition at the time of statehood, susceptible to being used as a highway for commerce. *See* Findings of Fact 170-207.

**Other Historical Descriptions**

209. Dr. Littlefield testified: "I examined multitudes of historical documents describing the Verde River at many points in time, both before and near Arizona statehood in 1912. I looked at a wide spectrum of published and unpublished sources, most of which were primary in nature, including U.S. government and state and territorial materials, historical newspaper accounts, and other archival records and photographs. And it seems to me that from this wealth of information, there's only one conclusion that could be made, which was a conclusion reached by literally hundreds of contemporaneous observers, either who stated it directly or implicitly reached the same conclusion; that the Verde River was not navigable or susceptible of navigation on or before February 14th, 1912." *See* Tr. at 2/19/15:1555 (Littlefield).

210. "As early as 1865, the Arizona Territorial Legislature meeting in its Second Session, reached the conclusion that the Verde River was not navigable." *See* Tr. at 2/19/15:1535 (Littlefield).

211. On December 28, 1865, the legislators passed a 'Memorial Asking Congress for an Appropriation to Improve the Navigation of the Colorado River.' Seeking $150,000 to remove obstacles such as sand bars, snags, boulders, and other obstructions in the Colorado's bed, the memorial declared that '*the Colorado River is the only navigable water in this Territory[.]*' (Emphasis added.)" *See* Littlefield 2014, at 95 [X002].

212. "Prior to development and under ordinary conditions, travelers along the river observed a relatively shallow stream characterized by both rapids and wide lagoons." *See* Burtell 2014, at 2 [X009].

213. Mr. Fuller testified Wallace W. Elliot & Co.'s description of the Verde as "eighty feet in width" is an "accurate description of the lower parts of the river and less accurate for the upper parts of the river." *See* Tr. at 12/15/14:129-30 (Fuller); Fuller Power Point, Slide 89 [X035].

214. On February 25, 1871, "*The Miner* newspaper published a lengthy description of Arizona Territory. Providing considerable detail about the region in an article published on February 25, 1871, the paper listed the territory's principal rivers, and like the Arizona Territorial Legislature in 1865, *The Miner* indicated that the Colorado River was navigable within the territory, but the paper made no similar observation about other Arizona rivers. 'The principal rivers,' *The Miner* stated, 'are the Colorado, which is navigable for hundreds of miles, the Gila, Salt, Verde, Bonita, Prieta, San Pedro, White, Sipicue, and Little Colorado.'" *See* Littlefield 2014, at 96 [X002].

215. "In 1872 the U.S. Government sent George M. Wheeler to obtain topographical information about Arizona and Nevada and to assess the region's resources, climate, and other qualities which might affect homesteaders." *See* Littlefield 2014, at 80 [X002].

216. "Following his exploration of the region, Wheeler submitted a report to Congress which contained a daily record of the journey as well as descriptions of various subjects. In the report, Wheeler mentioned several streams in Arizona, including the Verde, Gila, and the Salt." *See* Littlefield 2014, at 80 [X002].

217. "Wheeler did not describe any of these rivers as being navigable, although navigability was a characteristic Wheeler would have commented on given his discussion of the Colorado River." *See* Littlefield 2014, at 80 [X002].

218. "The U.S. Geological Survey and its predecessor agencies had started recording commentary concerning the West's water resources as early as the 1870s. These documents

carry considerable detail about the Verde River prior to and at the time of Arizona's statehood in 1912." *See* Littlefield 2014, at 80 [X002].

219. "The erratic nature of the Verde River and its lack of navigability were emphasized in January 1874, when Prescott's Weekly Arizona Miner newspaper carried a brief note about the stream's flooding:

> Mr. Wm. Head is up here from the Verde, but will shortly return. He was in our office this morning and stated that the Verde River was very high – at the time of the latest departure. It was running all over the low valleys. Mr. Peter Arnold lost a wagon in the flood."

*See* Littlefield 2014, at 96 [X002].

220. On September 24, 1875, "the *Weekly Journal-Miner* ran a news story aimed at answering many questions that had been sent to the paper about Yavapai County. Among the information about farming and life there, the newspaper also described water sources and observed that while there was ample water available, none of the region's streams were navigable:

> Our mountains contain fine, clear gravel-bottomed streams and lakes, valleys of great beauty and varying in length and width spread out in every direction among the mountains. The San Francisco or Verde River and the Colorado Chiquito (Little Colorado or Flax River) together with the Great Colorado with its wonderful Cañon, are the most important rivers of Yavapai, *but there is no navigable water in the county; all freight is moved by large trains of pack mules or heavy wagons drawn by from four to twenty mules to the wagon.*

[Emphasis added.]" *See* Littlefield 2014, at 98 [X002].

221. "In 1888, the Geological Survey's director, John Wesley Powell, began what became known as the "Powell Irrigation Survey." Essentially a study of which arid lands in the West might be reclaimed by storing and diverting water from the region's streams, Powell's work led to increasingly frequent commentary in the Geological Survey's records regarding water resources throughout the western part of the United States." *See* Littlefield 2014, at 81 [X002].

222. "[O]n March 4, 1891, the *Weekly Journal-Miner* carried an article about a boat being used to try to repair railroad facilities where those crossed the Verde River:

> Roadmaster Thomas Carrigan has had several immersions in attempting to repair the telegraph line and railroad track. In attempting to cross the Verde River the other day, on a raft constructed of [railroad] ties, his frail craft went to pieces, and but for the precaution of carrying a rope with him, he stood a good chance of being drowned.

*See* Littlefield 2014, at 99 [X002].

223. "An article published in 1892 noted that '[t]he Rio Verde, like all Western streams, is quite copious during the spring months from the periodical rains and melted snow, but during the summer and autumn it is only a creek of 500 inches.'" *See* Littlefield 2014, at 99 [X002].

224. "As the Weekly Journal-Miner reported on February 19, 1896, following spring flooding:

> some dark morning you hear a roar like a mighty wind tearing through a forest, and here it comes – a solid head of water – swift by reason of its great incline, and dark with the soil of the ranchers' valuable land. Then, when it falls, the work of destruction still goes on. The high banks, having become saturated, crumble from beneath, and day and night one can hear the sound of large portions of land falling into the water. I tell you this quiet little Verde River is a brilliant deception. Every flood we have it changes its current. One year it ripples up against this side, and the next it purrs and murmurs its deceptive little song clear across on the other side, and so back and forth, back and forth, always demanding a toll, and taking it too, with a lavish and liberal hand. The great question now when one wants to buy a ranch is, will the river take it? This too is the question in locating[irrigation] ditches, everything must be put as far out of the way of the river as possible."

Littlefield 2014, at 99-100 [X002].

225. "The dramatic fluctuation that typified the entire Gila Basin was more specifically noted in the *Eighteenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1896-97*. This volume contained a table showing the Verde River's monthly discharge at its mouth. According to the table, in January 1895 the

maximum discharge had been 33,000 cubic feet per second, while the minimum had been only 527 cubic feet per second." *See* Littlefield 2014, at 82 [X002].

226. "The *Nineteenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1897-98* further confirmed the agency's determination that the Verde River was highly erratic in flows." *See* Littlefield 2014, at 82 [X002].

227. The author of the report wrote that the bed of the Verde at McDowell station, approximately a half mile above the stream's mouth:

> is similar to the one of Gila River – sandy and liable to change during a slight rise. . . . The bed of the river evidently changed during the last freshet, scouring out [the channel]. . . . The river fluctuated in this channel until August 23."

*See* Littlefield 2014, at 82-83 [X002].

228. "The dramatic fluctuation that typified the entire Gila Basin was more specifically noted in the *Eighteenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1896-97*. This volume contained a table showing the Verde River's monthly discharge at its mouth. According to the table, in January 1895 the maximum discharge had been 33,000 cubic feet per second, while the minimum had been only 527 cubic feet per second." *See* Littlefield 2014, at 82 [X002].

229. "[T]he U.S. Geological Survey also published a series of research treatises known as 'Water Supply Papers.' While these studies dealt with specific topics and geographic areas, some examined subjects which shed light on the nature of the Verde River prior to or at the time of Arizona's statehood. The Water Supply Papers further confirm the undependable and unpredictable nature of the stream. A number of these studies detailed the widely fluctuating flow of the Verde through tables. These indicated that at some times of year the stream had less than 100 cubic feet per second in it, while at other times flows could exceed 100,000 cubic feet per second." *See* Littlefield 2014, at 83 [X002].

230. "In addition to detailing the unpredictable flows of the Verde in tables, the U.S. Geological Survey's Water Supply Papers also offered textual descriptions of the stream's

characteristics. For instance, Frederick H. Newell, reporting in 1902 in Water Supply Paper No. 85, observed that the 'channel [of the Verde River] is similar to that of Salt River – sandy and liable to change during a slight rise.' The following year, in Water Supply Paper No. 73, Arthur Powell Davis offered a more detailed picture of the Verde River:

> Verde River drains the central portion of Arizona, and Upper Salt River the east central portion. Both streams are more or less torrential in character, the combined flow dwindling at times to about 100 cubic feet per second, and at other times reaching a volume more than one hundred times as great. . . . [T]he greater portion of the basin, however, is of a mountainous character, being cut with profound canyons and dotted by rugged mountains. . . ."

*See* Littlefield 2014, at 83-84 [X002].

231. "Water Supply Paper No. 329 reported that in the year of Arizona's statehood, records measuring the Verde's flow had been made at three gaging stations, one near Camp Verde (at Camp Childs), one actually at Camp Verde, one downstream at Camp McDowell. At the first two stations, the channel was recorded as being mostly of sand and clay, and of a shifting nature. The station near Camp Verde, however, recorded that the channel 'appears fairly permanent.' Nevertheless, indicating the river's shallow nature, even at the Camp Childs measuring station some of the measurements had to be taken by wading the stream (as they also had been done at the other stations at times)." *See* Littlefield 2014, at 85 [X002].

232. "The unpublished records of George M. Wheeler that led to his published report to Congress in 1872 (see earlier in this chapter) provide yet more information about the nature of the Verde River prior to Arizona's statehood in 1912. Wheeler's draft 'Progress Report Upon Geographical and Geological Explorations and Surveys West of the 100th Meridian in 1872' observed that:

> [t]here are three streams whose navigability gives them more or less importance as commercial lines, namely: the Columbia, the Sacramento, and the Colorado rivers. [Wheeler had reduced the number of navigable streams to two in his final report to Congress – see earlier in this chapter.] The limit of navigation of these streams for freight carrying vessels, has already been determined and from it, is deduced the conclusive fact that except for their advantages as an

> assistance to local interior traffic, and as the possible adjunct to trans-continental routes, that the standard for their usefulness has been fixed: which usefulness is governed by the rates of increase of commerce from the ports at their mouths to and from the head of navigation in each case."

*See* Littlefield 2014, at 85-86 [X002].

233. "[O]ther unpublished U.S. Geological Survey records also illustrate the nature of the Verde River. One particularly revealing unpublished report was undertaken by E.C. Murphy to determine potential hydroelectric power sites within Arizona. Although written shortly after Arizona became a state, Murphy's report was based on data accumulated for many years prior to statehood, and it had been done to conform to provisions of the 1910 enabling act allowing Arizona to join the Union. That law, however, also prevented the future new state from selecting parcels valuable as hydroelectric power sites as part of acreage granted to Arizona by Congress. Murphy's report was the result of an investigation to locate those hydroelectric power sites so the United States could retain them." *See* Littlefield 2014, at 86 [X002].

234. "Regarding the Verde River, Murphy wrote that there was a long set of runoff data at Camp McDowell covering 1889-1914. The data, Murphy noted, indicated that there was an extreme variation in the Verde's flow on a monthly basis, with the highest rate of flow taking place in March (with a twenty-six-year average of 121,600 acre-feet) to a low in June (with an average of 8,700 acre-feet). Murphy observed that the 'great variation in the annual run-off of streams in the Southwest is well illustrated' by these figures." *See* Littlefield 2014, at 86-87 [X002].

235. "Like the annual reports of the U.S. Reclamation Service, the agency's unpublished documents further depicted the Verde River as highly unpredictable and not useful for commercial navigation." *See* Littlefield 2014, at 88 [X002].

236. On April 11, 1914, "Reclamation Service official F.W. Hanna responded to a letter he had received from G.F. Hart, president of the Paradise-Verde Water Users' Association. Hart had written on behalf of his constituents, who had requested that the

federal government build a reservoir on the Verde River to irrigate their lands. Hanna, in his response, informed Hart that the proposed Horseshoe Reservoir, if built, was designed to help regulate Verde River natural flow water already being used by farmers in the Salt River Valley – not the Paradise Valley." *See* Littlefield 2014, at 90-91 [X002].

237. "Hanna claimed that Horseshoe Reservoir would be used to supplement storage at Roosevelt Dam. Nevertheless, flows of the Verde River were so irregular, according to Hanna, that Horseshoe Reservoir itself could not be relied upon alone, and therefore it was unsuitable as storage for the Paradise Valley. Hanna enclosed a table which showed that:

> there are several years in which there would be absolutely no water available for storage. Moreover in the series of years from 1896 to 1904, inclusive, there are four years, three of which are consecutive, in which there would be no water supply for storage in the Horseshoe Reservoir, and there would be very little available water for the whole period of nine years. It appears, therefore, that the water supply even though the Horseshoe Reservoir is not constructed for the Salt River Project would be very unreliable for additional lands which would have to depend upon this source of supply alone."

*See* Littlefield 2014, at 91 [X002].

238. "Early Phoenix resident and member of Congress Carl Hayden also indicated that the Verde was not navigable. In his speech in front of the U.S. House of Representatives on February 3, 1916, Hayden spoke about flood control on non-navigable streams. House Resolution 122 had been introduced by the speaker of the House, and Hayden interpreted the speaker's intention to be the creation of 'a committee having jurisdiction over all bills relating to flood control whether the floods occur on navigable or non-navigable streams.' Hayden explained his support of this resolution: 'I come from a State where we have dry rivers and no harbors, and I want to see a committee established that will give consideration to the flood problems on non-navigable streams.'" *See* Littlefield 2014, at 100-01 [X002].

239. "[R]eporting to the secretary of the interior on irrigation at the Camp McDowell reservation in 1905, Indian Service Inspector W.H. Code commented on the impact of flooding on the channel of the Verde River:

> The narrow valley of the Verde River embraced within the boundaries of this reservation has a steep gradient toward the river, and the Jones Canal [which served the reservation] winding its way around the base of foot hills for a distance of nearly six miles, interceps [*sic*] many drainage lines, which, in times of heavy stormes [*sic*], run vast quantities of water which sweep out canal banks and fill sections of the ditch with a heavy sand deposit. To further increase the difficulties, the banks of the Verde River at the head of ditch have suffered great erosion . . . and the river channel seems to have scoured down to a considerable depth, leaving the present canal grade elevated a distance of several feet above the grade of river."

*See* Littlefield 2014, at 92 [X002].

240. Mary Boyer's recollection of the Verde at Segment 2 in 1874 stated that it was "about the size of the Woods ditch." *See* Tr. at 12/15/14:131 (Fuller); Fuller Power Point, Slide 92 [X035].

241. Charles Willard's description of Segment 2 in 1879, stated:

> When I first saw the Verde Valley it was a hunter's and stockman's paradise. Wild game was everywhere and the grass was knee high and plentiful. The land was like a sponge and when it rained the water was absorbed into the ground immediately, so very little ran into the river channel and the small amount that did run into the river bed, stood in pools which became stagnant and polluted with malaria germs . . . . Most everybody that came to the Verde Valley brought cattle, horses or sheep with them and the stock soon trampled the spongy land down to solid ground, thus causing the rain water to run into the river channel, which was then only about 100 feet wide and the flood waters often rose to six or seven feet high, causing the river to cut into banks, change the course of the main river channel and the river bed spread to half a mile wide in places.

*See* Tr. at 12/15/14:133 (Fuller); Fuller Power Point, Slide 94 [X035].

242. Dan Huntington's description of Segment 5 in 1880, stated that the Verde was "full of beaver dams." *See* Tr. at 12/15/14:136 (Fuller); Fuller Power Point, Slide 96 [X035].

243. Nick Perkin's description of Segment 1 in the 1890s, stated:

> The floodplain of the river was quite stable in the 1890s, and Yavapai Indians were using canals to irrigate their crops along the banks of the stream. The river flowed slowly, impeded by many beaver dams, and extensive marshes occupied

> the floodplains. River was deep enough to discourage livestock from swimming it.

*See* Tr. at 12/15/14:135 (Fuller); Fuller Power Point, Slide 97 [X035].

244. Ralph Palmer's description of Segment 2 in 1902 stated that the Verde was "50 feet wide and no more than waist deep." *See* Tr. at 12/15/14:136 (Fuller); Fuller Power Point, Slide 98 [X035].

245. One resident recalled that, in February of 1875, the Verde abruptly changed from a calm stream to a dangerous flooding watercourse:

> This was the flood time of year. I had seen the Verde suddenly come raging down, tearing away everything before it—great trees and even rocks tossed about like so much straw. On one trip, while crossing a peaceful little stream, a wall of water and debris came out of nowhere and swept away most of our packtrain in the twinkling of an eye, and then in a few minutes subsided to a trickling stream.

*See* Fuller 2003, at 3-13 [EI 31] (quoting Corbusier 1968:269).

246. Another resident, who moved to the Verde River Valley in 1879, wrote, "[t]he land was like a sponge and when it rained the water was absorbed into the ground immediately, so very little ran into the river channel and the small amount that did run into the river bed, stood in pools which became stagnant and polluted with malaria germs . . . ." *See* Fuller 2003, at 3-13 to -14 [EI 31] (quoting Verde Valley Pioneers Association 1954: 150).

247. "In describing the river on the Fort McDowell Indian Reservation in 1909, the superintendent of irrigation for the United States Indian Service explained, "The Verde River flows through a flat of sand and gravel bars, from one-half to three-quarters of a mile in width, bordered by cut banks from five to twenty feet in height. It swings from one side of the flat to the other, and where it impinges against a cut bank, is continuously eroding away the land." *See* Littlefield (2014), at 93 [X002].

248. The Commission finds, as a matter of fact, that the historical descriptions of the river support the conclusion that the Verde was not, in its ordinary and natural condition at the

time of statehood, susceptible to being used as a highway for commerce. *See* Findings of Fact 209-247.

**HYDROLOGY OF THE VERDE**

**General Information**

249. The Commission also received and reviewed a substantial amount of evidence regarding the hydrology of the Verde.

250. The Verde watershed "is smaller in watershed area than the Gila." *See* Tr. at 12/15/14:130 (Fuller); Fuller Power Point, Slide 89 [X035].

251. The Verde is "a perennial stream. It's spring-fed. It's a gaining stream, or it was in its ordinary and natural condition, through Segment 4. And in Segment 5 it's somewhat of a losing stream." *See* Tr. at 12/15/14:190 (Fuller).

**Variability**

252. When asked if the Verde is dynamic, Mr. Farmer replied a "hundred percent." *See* Tr. at 12/16/14:418 (Farmer).

253. Mr. Farmer testified: "Some years there is a lack of water and it is virtually unrunnable by rafts, by large rafts . . . ." *See* Tr. at 12/16/14:448 (Farmer).

254. The Verde "is a dynamic river. It changes constantly." *See* Tr. at 12/17/14:561(Farmer).

255. With regard to why flows on the Verde are lower during the summer, Mr. Fuller testified that "primarily it's the lack of precipitation. We don't see a lot of rain in the summer. It's pretty dry in those months, and whatever snowpack occurred that was giving us those boosts in the wintertime has come and gone; but there is also a vegetative effect, clearly that moisture is being sucked out of the river by the riparian vegetation." *See* Tr. at 12/15/14:36 (Fuller).

256. Mr. Fuller testified that "[i]n Arizona we might have a little stronger seasonal fluctuation than some places, more humid climates specifically, but nothing particularly unusual about Arizona's seasonal fluctuations." *See* Tr. at 12/15/14:38 (Fuller).

257. Mr. Fuller defines the "ordinary" range of the river as between the "10 percent and the 90 percent flow durations." *See* Tr. at 12/15/14:43 (Fuller).

258. Mr. Fuller testified: "And I would suggest that the ordinary condition of the river is when it's between its 90 and 10 percent flow duration." *See* Tr. at 12/15/14:193 (Fuller).

259. Mr. Lynch testified: "Spring runoff, again, spring runoff, if we get a big winter, boom, you know, that first part of March can be pretty tricky. So we'll always have a couple of days here and there where we might have to call trips or we have to go into bigger boats; we have to go into rafts and do these things. Just depends on the conditions, what skill level everybody's got at that time. And then during the monsoon season, we'll average probably two to three days during the monsoon season where you just have to call it because of flash flooding conditions." *See* Tr. at 12/16/14:291 (Lynch).

260. Mr. Lynch testified that flash floods can make boating the Verde "very dangerous." *See* Tr. at 12/16/14:296 (Lynch).

261. Mr. Lynch testified that you see rafts on the Verde during spring runoff or during the monsoon season "when the water is higher." *See* Tr. at 12/16/14:297 (Lynch).

262. When asked how shallow the river can get, Mr. Lynch testified: "It gets pretty skinny. I mean in terms of cubic feet per second, the Camp Verde stretch has been down into the 17, 18 cubic feet per second, and which isn't a lot of water; but, again, it all stays in the channel. We're out there moving rocks. We're helping to keep the water in channels so that it is boatable in different sections." *See* Tr. at 12/16/14:311-12 (Lynch).

263. When asked how shallow the river can get, Mr. Lynch testified: "Oh, it was skinny. You're talking about areas of maybe just enough to get the boats through, you know, maybe 8 to 10 inches in some spots." *See* Tr. at 12/16/14:313 (Lynch).

264. When asked how shallow the Verde is at Clarkdale at 50 cubic-feet per second ("cfs"), Mr. Lynch testified: "You're going to be looking at, you know, maybe -- going through the chutes and the riffles, those are going to be the lowest spots. You know, you're

looking at, you know, a lot of like mid-calf. I don't know. Maybe a foot or a little bit more of water. Not quite as bony as the Camp Verde stretch." *See* Tr. at 12/16/14:313-14 (Lynch).

265. At lower depths, inflatable duckies will be bouncing off rocks even though they draw only 5 to 6 inches. *See* Tr. at 12/16/14:314 (Lynch).

266. If a commercial boater required a range from 250 cfs to 300 cfs on the Verde to carry on a specific form of commerce, that flow would not necessarily occur on the same day, week, or month from year to year. *See* Tr. at 12/17/14:621-23 (Fuller).

**Flow Rates**

267. The Verde is an erratic stream, prone to long periods of low water interspersed with extreme floods. Mr. Farmer testified that the Verde "is dynamic. The water comes up, it shifts the rocks and the sand and the gravel around. It can topple trees. It can move objects. It's got that much power." *See* Tr. at 12/16/14:451 (Farmer).

268. Mr. Farmer testified that the Verde "is dynamic. It changes. There's no written map or word that does not need updating from time to time." *See* Tr. at 12/16/14:452 (Farmer).

269. The United States Geological Survey ("USGS") has operated six gauges on the Verde, but only two were operational before statehood. *See* Fuller 2003, at 7-5 [EI 31].

270. According to the ASLD's consultants, the average monthly streamflow rate in February 1912 was 300 cfs at the McDowell gauge. *See* Fuller 2003, at 7-6 (Table 7-3) [EI 31]. Two days after statehood, the reading at that gauge was 269 cfs. *Id.*

271. The other pre-statehood gauge was established in February 1911, near Camp Verde. *See* Fuller 2003, at 7-6 [EI 31]. Although only limited measurements were taken, the ASLD's consultants estimate that the average streamflow in February 1912 was approximately 200 cfs. *Id.*

272. The ASLD's consultants stated in 2003 that flow discharge in February 1912 was below long-term average rates. *See* Fuller 2003, at 7-6 [EI 31]. Their 2003 report presents long-term average discharge rates for the two pre-statehood gauges. *Id.* The report

estimates that the average discharge rate was 781 cfs annually at the McDowell gauge and 470 cfs at the gauge near Camp Verde. *Id.* (Table 7-3). Their estimates of the average discharge rates for February were 2,121 cfs at the McDowell gauge and 1,100 cfs at the gauge near Camp Verde. *Id.*

273. Mr. Fuller testified that the median flow rate at the Paulden gauge at Segment 1 is 26 cfs, and the ten-percent flow rate is 22 cfs. *See* Tr. at 12/15/14:196 (Fuller); Fuller Power Point, Slide 159 [X035].

274. Mr. Fuller testified that the median flow rate at the Clarkdale gauge at Segment 2 is 86 cfs and the ten-percent flow rate is 70 cfs. *See* Tr. at 12/15/14:197 (Fuller); Fuller Power Point, Slide 159 [X035].

275. Mr. Fuller testified that the median flow rate at the Camp Verde gauge at Segment 3 is 188 cfs and the ten-percent flow rate is 82 cfs. *See* Tr. at 12/15/14:197 (Fuller); Fuller Power Point, Slide 159 [X035].

276. Mr. Fuller testified that the median flow rate at the Tangle Creek gauge at Segment 4 is 240 cfs and the ten-percent flow rate is 123 cfs. *See* Tr. at 12/15/14:198 (Fuller); Fuller Power Point, Slide 159 [X035].

277. Mr. Fuller testified that the average flow rate at the McDowell gauge at Segment 5 is 781 cfs, but the data is not available for the median or ten-percent flow rate. *See* Tr. at 12/15/14:198 (Fuller); Fuller Power Point, Slide 159 [X035].

278. "Modern data (1945 through 2013) for the Verde River below Tangle Creek gage (USGS Gage No. 09508500) that is located just upstream from Horseshoe Reservoir indicates that the discharge in the river was less than 240 cfs about half the time and less than 340 cfs about 75 percent of the time, on an annual basis." *See* Mussetter 2014, at 11 [X016].

279. "Flows at this location are specifically representative of the flows at the downstream end of ASLD Segment 4, and they are probably slightly higher than the flows in the remainder of ASLD Segments 3 and 4 since Tangle Creek and the East Verde River, that

have a combined drainage area of about 610 $mi^2$ (or about 11 percent of the total drainage area at the gage), enter within Segment 4." *See* Mussetter 2014, at 11 [X016].

280. "The primary human modification to the flows during the measurement period is due to upstream irrigation diversions. Burtell (2014) estimated that these diversions totaled 183 cfs, and 57 percent of the diverted flow was lost to consumptive uses (i.e., about 43 percent returned to the river; thus, should be accounted for in the measured flows). Considering the uncertainty in these estimates, it seems reasonable to conservatively round the typical diversion quantity to 185 cfs and the flow loss to 60 percent; thus, flows under natural conditions during the irrigation season (typically April 15 through September 15) would have been 90 cfs to 95 cfs larger than the measured flows. A flow-duration curve developed by adjusting the irrigation season flows upward by the larger value of 95 cfs indicates that the discharge in Segments 3 and 4 would have been less than 265 cfs about 50 percent of the time and less than 375 cfs about 75 percent of the time, on an annual basis." *See* Mussetter 2014, at 13 [X016].

281. Mr. Burtell estimated that, "for 75% of the time, undepleted streamflows along the Verde River remained (a) below 100 cfs in Segment 1 and the upper reach of Segment 2; (b) below 500 cfs in Segment 3 and the lower reach of Segment 2; and, (c) below 600 cfs in Segments 4 and 5. Because the quantities diverted upstream of the gages and added back to the river to reconstruct flows were not corrected for the effects from infiltration and evapotranspiration (ET), these values for undepleted streamflow should be considered an upper estimate. Actual undepleted flows along the Verde River would have been lower." *See* Burtell 2014, at 15 [X009].

282. Mr. Burtell's "analysis showed that, absent cultural depletions, flows in the Verde River remained less than 600 cfs along all five stream segments during 75% of the year. Reconstructed flows along Segment 1 and the upper reach of Segment 2 typically remained below 100 cfs." *See* Burtell 2014, at 19 [X009].

**Depths**

283. With regard to the historical photograph of cars crossing the Verde near Bridgeport in 1915, Mr. Fuller estimated the depth of the river to be "a foot and a half." *See* Tr. at 12/15/14:144 (Fuller); Fuller Power Point, Slide 106 [X035].

284. Mr. Fuller estimated the depth of the Verde in the 1902 historical photograph of sheep crossing the river is "2 feet or less." *See* Tr. at 12/15/14:149-50 (Fuller); Fuller Power Point, Slide 121 [X035].

285. Mr. Fuller testified that the median average depth at the Paulden gauge at Segment 1 is 0.9 ft. *See* Tr. at 12/15/14:205 (Fuller); Fuller Power Point, Slide 166 [X035].

286. Mr. Fuller testified that the median average depth at the Clarkdale gauge at Segment 2 is 1.5 ft. *See* Tr. at 12/15/14:206 (Fuller); Fuller Power Point, Slide 167 [X035].

287. Mr. Fuller testified that the median average depth at the Camp Verde gauge at Segment 3 is 1.5 ft. *See* Tr. at 12/15/14:207-08 (Fuller); Fuller Power Point, Slide 168 [X035].

288. Mr. Fuller testified that the median average depth at the Tangle Creek gauge at Segment 4 is 0.9 ft. *See* Tr. at 12/15/14:207-08 (Fuller); Fuller Power Point, Slide 169 [X035].

289. Mr. Fuller testified that the average depth for the McDowell gauge is 1.7 ft. *See* Tr. at 12/15/14:208 (Fuller); Fuller Power Point, Slide 169 [X035].

290. With regard to depths of the Verde at Clarkdale, Mr. Lynch testified: "Well, this time of year, of course, you know, the wintertime, we're running with a nice base flow because not many water users are out there, plants aren't growing, things of that nature. So up in the Clarkdale area we're looking at pools right now that are anywhere from, say, 3 to 5 feet deep. In our chutes and little drops, you know, they're about anywhere from, you know, mid-calf to knee to go through the little chutes that connect the deeper pools." *See* Tr. at 12/16/14:291 (Lynch).

291. Mr. Burtell "found that undepleted flows in the Verde River typically had a mean depth of less than 2.0 feet during 75% of the year." *See* Burtell 2014, at 20 [X009].

292. Mr. Burtell's stream depths "represent conditions at discrete points along the river where the USGS found the channel was relatively uniform and unaffected by rapids and, therefore, suitable for a gaging station. However, . . . rapids are common along four of the five Verde River segments and at these points flow depths would likely have been lower and more irregular." *See* Burtell 2014, at 20 [X009].

**Experts' Methodology**

293. Mr. Fuller used modern hydrologic data in his assessment. *See* Tr. at 12/15/14:45 (Fuller).

294. For his hydrological analysis, Mr. Fuller relied "primarily" on USGS data that dates from the late 1800s to the present. *See* Tr. at 12/15/14:191 (Fuller).

295. With regard to how much more flow would be in the Verde in its ordinary and natural condition, Mr. Fuller testified: "The exact amount of the more flow is almost irrelevant to me at this point, because I know that if I go out there in the conditions as they exist now, it's boatable." *See* Tr. at 12/15/14:192 (Fuller).

296. Mr. Fuller testified that "the data that we presented are reliable. They come from the USGS. They're an objective third party. They're the best available data for most of the river systems in America, throughout the state and certainly for the Verde." *See* Tr. at 12/15/14:195 (Fuller).

297. Mr. Hjalmarson testified that he did a "detailed analysis" of the upper Verde upstream of the Clarkdale gage, and a more general analysis for the rest of the river. *See* Tr. at 12/18/14:945 (Hjalmarson).

298. Mr. Hjalmarson testified that he "used standard engineering and hydrologic methods, or hydraulic methods" while writing his report. *See* Tr. at 12/18/14:956 (Hjalmarson).

299. With regard to his flow duration curves, Mr. Hjalmarson testified: "It's not a pure statistical method, but it's close enough for what we did." *See* Tr. at 12/18/14:1006 (Hjalmarson).

300. Mr. Hjalmarson testified that he used a second method to determine how much flow has been lost by human impact, relying on a 1952 Bureau of Reclamation Report that estimated the natural flow to be 751 cfs, and subtracted the average annual flow for the entire period of record (651 cfs) and attributed the entirety of the 100 cfs difference to evapotranspiration from cultivated land in the upper watershed. *See* Tr. at 12/18/14:997 (Hjalmarson).

301. Mr. Hjalmarson testified that he used a third method to determine how much flow has been lost by human impact by using conveyance slope estimates and hydraulic computations to come up with, what he describes as a "SWAG, a scientific wild-ass guess, using whatever little information I had." *See* Tr. at 12/18/14:997 (Hjalmarson).

302. With regard to his third method, Mr. Hjalmarson testified: "I came up with 60 cfs, but I assumed a cross-section shape that was probably wrong. So anyway, for what it's worth, I gave it a shot, and I'm not going to stand behind that. It's truly a scientific wild guess. But I was pleasantly surprised that it came in the ballpark. " *See* Tr. at 12/18/14:997 (Hjalmarson).

**Mr. Hjalmarson's Attempts to Recreate Predevelopment Flows**

303. Mr. Fuller testified that he did no specific work to quantify diversions from the Verde. *See* Tr. at 12/17/14:648 (Fuller).

304. Mr. Hjalmarson attempted to quantify the amount of diversions that were taking place in the upstream areas of the Verde and in tributary areas in the period before stream gages were installed on the Verde, in order to attempt to quantify the predevelopment flows on the Verde. *See* Tr. at 12/18/14:983 (Hjalmarson).

305. Mr. Hjalmarson used GLO cadastral surveys to determine the irrigated acreage in the Verde drainage area and multiplied the acreage by the consumptive use factor

determined by USGS and ADWR in order to calculate the anthropogenic reduction in base flow. *See* Tr. at 12/18/14:983 (Hjalmarson).

306. Mr. Hjalmarson's assumptions about the number of acres historically irrigated in the Verde headwaters areas changed throughout the hearing. Mr. Hjalmarson first testified that he determined that there was 8,095 cultivated acres in the upper Verde watershed. *See* Tr. at 12/18/14:1073 (Hjalmarson).

307. Mr. Hjalmarson's report includes a Census Report, a Bulletin of the Twelfth Census on the Agriculture of Arizona," which lists several counties and ditches, miles in length, construction, acres irrigated in 1899, and average acres irrigated per mile of canal. For Yavapai County, it lists 8,730 acres irrigated in 1899." Mr. Hjalmarson agreed that "if that figure is accurate, there's no way that 8,000 of those 8,700 acres were all above Paulden. When asked if "a lot of the acreage that you identified above Paulden does not fit within the acres being irrigated because they are dryland farming and are not, therefore, being irrigated . . . ?" Mr. Hjalmarson replied "I don't know." *See* Hjalmarson 2014, Appendix C, at 9 [X015]; Tr. at 12/19/14:1123-25 (Hjalmarson).

308. Mr. Hjalmarson later testified that, because of an error in his analysis of irrigated acreage in Walnut Creek, the irrigated acreage should be closer to 7,000 rather than the 8,000 figure in his report. *See* Tr. at 2/18/15:1268 (Hjalmarson).

309. Mr. Hjalmarson's total irrigated acreage figures were derived from surveys taken in multiple years. *See* Tr. at 2/18/15:1269-70 (Hjalmarson).

310. Mr. Hjalmarson acknowledged that his irrigated acreage figures may be inaccurate because of crop rotation and other factors that occurred through the years of the surveys. *See* Tr. at 2/18/15:1269-71 (Hjalmarson).

311. Mr. Hjalmarson testified that the 1,395 acres for Walnut Creek that appears on page 23 of his report should have been 325 acres. *See* Tr. at 2/18/15:1271 (Hjalmarson).

312. With regard to Mr. Hjalmarson's estimates of cultivated acreage at the time of statehood, Mr. Burtell testified: "[W]hen it comes to, again, the amount of impact to

streamflow per acre, Mr. Hjalmarson is four times greater than I am. Where we differ, and we differ substantially, is the headwaters area. Mr. Hjalmarson indicates that I think his original estimate was 8,000 irrigated acres only in -- specifically in the headwaters area above Sullivan Lake Dam, and then he's come down to 7,000. I find that number to be just simply unsupported. It's a very, very, very high number that seems inconsistent with several lines of evidence, and I'll let the Commission see what they think about the lines of evidence." *See* Tr. at 3/30/15:2728 (Burtell).

313. With regard to Mr. Hjalmarson's use of survey maps to estimate cultivated acreage, Mr. Burtell testified: "Now, the other thing that struck me about this map is what is missing. In an area that has over 2,000 acres of Mr. Hjalmarson saying irrigated agriculture, where are the irrigation ditches? I could not find any reference, when I went through the original field notes, any reference to irrigation ditches." *See* Tr. at 3/30/15:2734-35 (Burtell).

314. Mr. Hjalmarson's consumptive use factor of 3.15 af/year was taken from a USGS document that cited data from the Arizona Department of Water Resources ("ADWR"), and the USGS document states: "Withdrawals for agriculture in the Little Colorado River Plateau basin and sub-basins in the Salt River drainage were estimated based on groundwater irrigation data developed by USGS (Tadayon, 2005) and recent aerial and satellite photography for effluent irrigated areas. The datasets include only the locations of agricultural fields, but no information for crop type, applied irrigation, or period of irrigation. Consequently, the fields were assigned a weighted irrigation factor of 3.15 ac-ft/yr that was developed from agricultural irrigation data from the Verde Valley (Arizona Department of Water Resources, 2000). *See* D.R. Pool, et. al., United States Geological Survey, Regional Groundwater-Flow model of the Redwall-Muav, Coconino, and Alluvial Basin Aquifer Systems of Northern and Central Arizona, Scientific Investigations Report 2-10-5180, v. 1.1 (2011), at 37 [X037, Freeport 32] ("Pool 2011").

315. Mr. Hjalmarson agreed that, if his cultivated acreage number is overstated, the impacts he calculated to the effect on baseflow is overstated. *See* Tr. at 12/19/14:1114 (Hjalmarson).

316. Mr. Hjalmarson admitted that his 3.15 af/year consumptive use factor was used for an area that includes lands with different elevation and precipitation levels. *See* Tr. at 2/18/15:1281-82 (Hjalmarson).

317. Mr. Hjalmarson testified that he was aware of "deficit farming" where farmers would apply less water than normally would be applied due to shortage. *See* Tr. at 2/18/15:1275-76 (Hjalmarson).

318. Mr. Burtell testified: "I think Mr. McGinnis brought up a question to Mr. Hjalmarson that I was a little surprised that he couldn't answer; that he didn't have a concept of deficit irrigation. Deficit irrigation certainly occurs in a case where you might have a limited water source, but you're still growing a crop." *See* Tr. at 3/30/15:2736 (Burtell).

319. Mr. Hjalmarson admitted that the 3.15 af/year consumptive use factor he used was taken from a USGS document that covered a much broader area than the four sub-watersheds he analyzed. *See* Tr. at 2/18/15:1284-85 (Hjalmarson).

320. Mr. Hjalmarson admitted that he did not differentiate his consumptive use figure based on the type of crop that was grown. *See* Tr. at 2/18/15:1286-87 (Hjalmarson).

321. Mr. Hjalmarson admitted that he did not look at the ADWR document from which the USGS figure of 3.15 was taken. *See* Tr. at 2/18/15:1289-90 (Hjalmarson).

322. Mr. Hjalmarson admitted that many of the acres detailed in the GLO surveys he analyzed were corn crops and that the ADWR report includes a consumptive use factor of 1.86 for corn. *See* Tr. at 2/18/15:1289-90 (Hjalmarson); Pool 2011, at 37 [X037].

323. Mr. Hjalmarson admitted that the same ADWR report that his 3.15 af/year consumptive use factor came from also lists a consumptive use factor of 2.00 af/year for Big Chino Wash, Walnut Creek and Williamson Valley, and 3.30 for Granite Creek. *See* Tr. at 2/18/15:1293-97 (Hjalmarson); Arizona Department of Water Resources, "Verde River

Watershed Study," at 3-35, Table 3-15 (2000) [X057] ("ADWR 2000"); *id.* at 3-29, Tables 3-10 & 3-11 [X057].

324. Mr. Hjalmarson admitted that using the more specific numbers in the ADWR report results in 11 or 12 cfs less reduction in flow than the number cited in Mr. Hjalmarson's report. *See* Tr. at 2/18/15:1299-301(Hjalmarson); ADWR 2000, at 3-35, Table 3-15 [X057]; ADWR 2000, at 3-29, Tables 3-10 & 3-11 [X057].

325. With regard to the difference between Mr. Hjalmarson's application of the 3.15 af/year consumptive use factor and ADWR's more specific numbers, Mr. Hjalmarson testified: "Well, my basis is it's an average figure for crops in an area that the USGS studied where they use the same figure. So I simply used what they used, and I used it as an average because back in the 1870s and so forth I really didn't know what crops were out there. I do know there were some corn, there were some beans. There was also documentation on meadowland and so forth. . . . Those are for specific conditions that were out there at the time. So they knew – they had more information that led them to use methodology other than the average. They knew more specific information about what was going on there. Therefore, they were justified in using something that you might consider better than using the average 3.15." *See* Tr. at 2/18/15:1397 (Hjalmarson).

326. With regard to Mr. Hjalmarson's consumptive use factor of 3.15 acre-foot per acre, Mr. Burtell testified: "So for a given acre of ground, Mr. Hjalmarson assumes 3.15 acre-foot per acre is used to irrigate. Mr. McGinnis I think questioned, I think correctly, whether that 3.15 is even applicable in some parts of the Verde. But that 3.15 acre-foot per acre, when you compare that to how I did my correction of the river, that is four times less water he's putting back into the river than I am for irrigation." *See* Tr. at 3/30/15:2619 (Burtell).

327. Mr. Hjalmarson essentially ignored the presence of dryland farming (cultivation with no irrigation) in the areas. Mr. Hjalmarson testified that he made no attempt to determine what, if any, dryland farming was occurring in the Big Chino area based aerial

photographs, even though he admitted that dryland farming occurred there. *See* Tr. at 12/19/14:1199 (Hjalmarson).

328. Mr. Hjalmarson stated: "I clearly discuss [dryland farming] for Del Rio Springs, where I eliminated, I don't know, approximately half of it or a significant part of it." *See* Tr. at 12/19/14:1115 (Hjalmarson).

329. With regard to recognizing dryland farming in the Verde drainage area, Mr. Hjalmarson stated, "on the Big Chino, the Big Chino was a really dicey area, but, yeah, I did the same thing in Big Chino." *See* Tr. at 12/19/14:1115 (Hjalmarson).

330. Mr. Hjalmarson stated: "As I explained yesterday – and I know what you're leading up to here, and it entered my mind too, that I might be including some. It's possible I am including some dryland there. I was doing my best to avoid it, however, and using what information I had." *See* Tr. at 12/19/14:1118 (Hjalmarson).

331. Mr. Hjalmarson testified that it is "possible" that some of the 7,000 acres he assumed were irrigated were dryland farmed. *See* Tr. at 2/18/15:1274 (Hjalmarson).

332. Mr. Burtell testified: "I'm not in any way inferring that there wasn't crops being grown up here. But nobody talks about irrigation ditches. So I think that begs the question why. And I think the easy answer to it is there was enough moisture up there that it was dryland farmed." *See* Tr. at 3/30/15:2737 (Burtell).

333. Mr. Burtell testified: "Hinton wrote a handbook to Arizona dated 1878, and in what I believe is being passed out, he talks about Fort Whipple. And up at Fort Whipple, obviously the military was up there, and most of these early military bases at the time had cultivated lands associated with them. And on Page 317 of that document, Hinton recounts that 'At the post garden potatoes, cabbages, turnips, corn, beats, tomatoes, melons and cucumbers,' no beans, apparently, 'are successfully cultivated, without irrigation.'" *See* Tr. at 3/30/15:2740 (Burtell).

334. "But a large area is good tillable land, which the experience of the past two years has demonstrated will produce excellent crops of corn and other grain, without irrigation." *See Arizona Miner* (February 1, 1868) [X037-Freeport 8].

335. "The Williamson Valley is the freshest and greenest spot we have seen in Arizona. The large extent of meadow land has much to do in rendering it beautiful, and this is well backed and sustained by waving fields of excellent corn that grow without artificial irrigation, the soil being sufficiently moist near the wash or dry bed, which at high water seems to drain the Valley." *See Weekly Arizona Miner* (September 23, 1871) [X037-Freeport 8].

336. The evidence showed that dryland farming could and did occur in the area. "Among the most important of these valleys are Williamson, Chino, Peeple's, Agua Fria, Skull, Kirkland, and Walnut Grove. Their soil is generally a rich mold, formed by the detritus from the surrounding hills. There is no water for irrigation in most of them, and farmers depend entirely on rain for the raising of a corp." *See The Resources of Arizona, Its Mineral, Farming, and Grazing Lands, Towns and Mining Camps; Its Rivers, Mountains, Plains, and Mesas; with a Brief Summary of its Indian Tribes, Early History, Ancient Ruins, Climate, Etc., A Manual of Reliable Information Concerning the Territory*, at 85 (1881) [X037-Freeport 11]; Tr. at 12/19/14:1120 (Hjalmarson).

337. "Along the line of the Atlantic and Pacific railroad, which crosses the county from east to west, at an elevation from 5,000 to 7,000 feet, some crops, especially for forage, are raised without irrigation." *See* F. H. Newell, *Report on Agriculture by irrigation in the Western Part of the United States at the Eleventh Census: 1890*, at 81 (1894) [X037, Freeport 10]; Tr. at 12/19/14:1121 (Hjalmarson).

338. The Commission finds, as a matter of fact, that the hydrology evidence supports the conclusion that the Verde was not, in its ordinary and natural condition at the time of statehood, susceptible to being used as a highway for commerce. *See* Findings of Fact 249-337.

## GEOMORPHOLOGY AND IMPEDIMENTS TO NAVIGATION

### Evidence from 2006 Hearing

339. The Commission also received and reviewed a substantial amount of evidence regarding the geomorphology of the Verde and natural impediments to navigation.

340. Geomorphologist Dr. Stanley Schumm presented a written report in 2004 regarding the geomorphology of the Verde. *See* Schumm, "Geomorphic Character of the Verde River" (December 2004) [EI 30] ("Schumm 2004").

341. In his report, Dr. Schumm stated that substantial portions of the Verde have a braided channel along with bedrock controls and geologic structures. *See* Schumm 2004, at 2 [EI 30].

342. Dr. Schumm noted that the channel of the Verde changed historically, with channel erosion and channel widening largely as a result of floods in the early twentieth century. *See* Schumm 2004, at 8 [EI 30].

343. Dr. Schumm opined that the width of the channel and river gradient of the Verde is highly variable throughout its course due to bedrock and tributary influences. *See* Schumm 2004, at 2, 14 [EI 30].

344. Dr. Schumm concluded that "the numerous rapids and bedrock impact on the river prevent navigation, but even more important are the very steep gradients ranging from 12 to 25 ft/mile" that would make navigation "impossible." *See* Schumm 2004, at 2, 14 [EI 30].

345. Dr. Schumm's conclusions regarding the variable nature of the Verde is consistent with the geomorphic information presented by the SLD's consultants at the 2006 hearing. *See* Tr. at 01/18/06:18-19, 26-27 (Pearthree) ("I hammered home the point the Verde is a variable floodplain, valley morphology changes a lot up and down the river."); Fuller 2003, at 5-26 [EI 31] (noting that the width of the flood channels varies substantially).

346. Although the ASLD's consultants concluded that the Verde can be characterized primarily as having a pool-and-riffle sequence, this indicates that the river

carries coarse bedload sediment. *See* Fuller 2003, at 5-6 [EI 31]; Tr. at 01/18/06:20 (Pearthree) ("Typically rapids would be another term for that narrower, steeper, coarse bed load river.").

347. As noted in the ASLD's 2003 report: "The bed forms of the low-flow channels are characterized by a repeating sequences of pools (deeper water areas) and riffles or rapids (shallow water areas typically dominated by cobbles and small boulders)." *See* Fuller 2003, at 5-6 [EI 31].

348. This "pool-and-riffle" pattern also explains why a few accounts exist of persons using boats to cross the river, even though virtually no accounts exist of persons using boats to travel along the river. Especially in periods of high flows, the "pools" likely would contain sufficient water to allow a boat to cross the river. By the same token, the "riffles" and rapids would, except in periods of extremely high water, make travel along the length of the river impossible.

**Shifting Channels**

349. "Portions of the Verde River (e.g., much of the downstream approximately 18 miles of the reach) are bounded by modern alluvium; and thus, are not confined by bedrock or older, erosion resistant terraces as discussed above." *See* Mussetter 2014, at 6 [X016].

350. "The morphology of the channel at any point in time is inherited from the last significant, flood-driven alteration, and this controls the channel form during the subsequent recovery period." *See* Mussetter 2014, at 6 [X016].

351. "Following the channel-altering flood event, the river channel returns to its pre-disturbance condition (i.e., it recovers) relatively slowly compared to the rate of adjustment during the flood through sedimentation in low energy areas and re-establishment of riparian vegetation on the surfaces that were disturbed by the flood. As a result, it is not possible to define a dominant discharge, because the larger, more infrequent flows are more geomorphically effective than the frequently occurring flows." *See* Mussetter 2014, at 6 [X016].

352. "During floods, the flows are so powerful that they can rapidly 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." *See* Mussetter 2014, at 6 [X016].

353. "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." *See* Mussetter 2014, at 6 [X016].

354. "A series of high discharge years (1889, 1890, 1891) appears to have caused major channel erosion, and this was continued by the high discharge years of 1905, 1906, 1907, and 1909." *See* Mussetter 2014, at 24 [X016].

355. Mr. Fuller testified "[m]ost arid region streams, the Verde River included, it's called flood dominated. What does that mean? When you have a big flood like 1993, it comes through and to some extent it rewrites the system. It moves things around. It moves boulders and it moves sand and moves vegetation, and they leave that persistent mark on the floodplain. There can be some widening of the flood channel and some rearrangement of the flood channels. It moves a lot of vegetation. In some cases there's something called geomorphic threshold. You can substantively change the river." *See* Tr. at 12/15/14:30 (Fuller).

356. Mr. Lynch testified that "whenever we get the big flash flooding, of course, everything changes. You know, there's certain places that just get – the channel gets moved over here, where it used to run over there, particularly at confluences, where you have the Oak Creek coming in, you have West Clear Creek, Beaver Creek. Those things get – during the big water events those areas get really crazy because everything's going. The Verde River is going off, plus the side canyons are going off. And then when we have the big flood events it cleans the whole corridor out. There's no more trees. Because once we get into low water times, the entire river corridor becomes – is overgrown with trees and brushes and all kinds of

vegetation, and when we have our big flood events, bam, I mean it's just cleared out." *See* Tr. at 12/16/14:302-03 (Lynch).

357. Mr. Lynch testified: "Sometimes after the big floods it just rechannelizes everything. A lot of what we've done, the river just tends to flow with it and actually create a deeper channel than it was before." *See* Tr. at 12/16/14:332 (Lynch).

358. The 1993 flood "moved" the low flow channel. *See* Tr. at 12/15/14:33 (Fuller).

359. A 1904 map of Segment 5 demonstrates that the "low flow channel or the main channel did shift position from 1904 to [1930]." *See* Tr. at 12/15/14:140-41 (Fuller); Fuller Power Point, Slide 105 [X035].

360. After a flood, channels do not always return to the same place or contain the same number of rocks. *See* Tr. at 12/17/14:614-15 (Fuller).

361. Large floods can shift the channel over the "entire reach" of the Verde. *See* Tr. at 2/18/15:1333 (Hjalmarson).

362. "Low-flow channels have shifted position to a much greater degree than the larger flood channels." *See* Hjalmarson 2014, Appendix G, at 79 [X015].

363. "The 1891 flood probably caused a considerable amount of change in flood-channel position and possibly morphology. The survey of 1892 specifically recorded the new positions of 'meanders' of the Verde River in the camp Verde area, and several hundred acres of 'fine bottom land' were washed away in the flood and replaced by channel gravel." *See* Hjalmarson 2014, Appendix J, at 5-6 [X015] (quoting Pearthree 1996).

364. In his report, Mr. Hjalmarson quotes Leopold and Langbein (1960), including: "The channel is constantly shifting position especially in the basin fill areas." *See* Hjalmarson 2014, Appendix L, at 7 [X015].

365. "In comparing the original U.S. General Land Office survey plats and the early U.S. Geological Survey topographic maps, it is clear that in some locations the Verde River changed channel significantly." *See* Littlefield 2014, at 51-59 [X002].

366. "Further commentary on the vacillating nature of the Verde River's channel is contained in a May 20, 1905, letter from J.R. Meskimons, superintendent of irrigation for the U.S. Indian Service, to Indian Service Commissioner Francis E. Leupp. Meskimons was writing in regard to an irrigation survey that was in progress at the Camp McDowell Reservation. He wrote that:

> [t]he map shows the position of the river at the time the survey was made. It has, however, changed its course since, to the great detriment of the head and upper portions of the (Jones) canal. . . . When this survey was made the river had cut within about fifty feet of the canal in one place only, and that at an angle in the canal. I therefore cut a new canal about 700 feet long, thus straightening the old and removing the canal approximately 100 feet from the river. However the grade stakes were hardly set when the river again rose and cut away its bank until it approached to within ten feet of the canal in one place, and in no place for a distance of about 3000 feet is the river more than 50 feet from the canal. When the water again subsided the Indians cleaned the upper portion of the canal again and cutting to a very flat grade got water in the canal without the aid of a weir. . . . It can be readily seen that the canal is in a precarious condition, that one good heavy rain would destroy probably a mile of the upper end of same, besides washing out and filling up of the canal wherever the flood waters from the hills strike it."

*See* Littlefield 2014, at 92-93 [X002].

367. "Yet another Indian Service official commented in 1910 on the Verde River's erratic behavior and frequent channel changes at Camp McDowell:

> The water proposition here under existing conditions is a very unsafe one. There is a sufficient amount in the Verde River to supply all the needs of the Indians located here but the uncertainty as to where the main channel will be from time to time makes the question of irrigation an uncertain one. Here the river is nearly, if not quite, a half mile wide from bank to bank. Today the main channel may be on one side and tomorrow one of the many floods of water many sweep down and change the entire course of the channel to the opposite side of the river, and pile up a sandbar between it and the head of the ditch; or, on the other hand, the swift current is liable to cut into the bank and ruin the intake for the canal by cutting out a deep channel any feet below the head of the canal, leaving it high and dry. . . . [The] present canal is constructed for some distance through a sandbar and then for some distance follows near the bank of the river. Just at the present time, this canal is affording a good supply of water but the element of uncertainty as to its permanency, reduced the assurance of raising a crop

> almost to the minimum. The first floods coming down may render it absolutely useless."

*See* Littlefield 2014, at 94 [X002].

**Braiding**

368. Certain portions of the Verde have a braided channel, which is not conducive to navigation. "The Verde River valley becomes less confined in ASLD Segment 5, providing more potential for lateral adjustment, and widening and braiding under un-regulated flow conditions." *See* Mussetter 2014, at 24 [X016].

369. Mr. Fuller testified that the historical photo of Segment 2 in 1880 shows a braided portion of the river. *See* Tr. at 12/15/14:149 (Fuller); Fuller Power Point, Slide 118 [X035].

370. Mr. Fuller testified that "[t]here is some local braiding in some of the riffles." *See* Tr. at 12/15/14:188 (Fuller).

371. Mr. Fuller testified that "[t]here are plenty of riffles, something we've also talked about. Most of them are boulder, defined by boulders. There's one, Verde Falls, that's created by bedrock. The vast majority of those are Class I's and II's. There are a couple III's and a IV . . . ." *See* Tr. at 12/15/14:190 (Fuller).

372. Mr. Farmer testified that "[t]here's a bit of braiding" in Segment 5. *See* Tr. at 12/16/14:412 (Farmer).

373. With regard to Segment 5, Mr. Farmer testified "it was a little bit braided in some areas, and the brush was a little bit thicker." *See* Tr. at 12/16/14:414 (Farmer).

374. Mr. Farmer testified: "When you get out of the low flow channel and you get out into the braided channels that now are watered, yes, you have severe hazards of trees." *See* Tr. at 12/16/14:450 (Farmer).

375. Mr. Fuller testified: "If you're looking at the whole river corridor, there are portions that reasonable people could say the corridor is braided." *See* Tr. at 12/17/14:602 (Fuller).

376. Mr. Fuller testified that Segment 5 is the most braided segment of the Verde. *See* Tr. at 12/17/14:604 (Fuller).

377. Mr. Fuller testified that there is a substantial drop-off between Segment 5 and Segment 4 in terms of braiding (Segment 5 being substantially more braided), but that Segment 4 was the second most braided section of the Verde. *See* Tr. at 12/17/14:604-05 (Fuller).

378. Mr. Fuller testified that during a flood, certain portions of the Verde would have multiple channels. *See* Tr. at 12/17/14:607-08 (Fuller).

379. Mr. Fuller agreed that the level of braiding depends on the amount of flow. *See* Tr. at 12/17/14:608 (Fuller).

380. Mr. Fuller testified: "I would think that the true statement would be as the flow increases, you might see some increase in braiding." *See* Tr. at 12/17/14:609 (Fuller).

381. Mr. Hjalmarson admitted that a number of the photos he included in his report in his first addendum depict braiding. *See* Tr. at 2/18/15:1350-52 (Hjalmarson).

382. Mr. Hjalmarson testified: "There's little pockets there where I said – I said braided, but I really mean there's multiple channels down there where they appear to be braided, and then next year it might be a single channel." *See* Tr. at 2/18/15:1363 (Hjalmarson).

383. Dr. Mussetter testified that the last downstream twelve to eighteen miles of the Verde River are similar in geomorphic characteristics to the Gila River – "A wide valley bottom, tends to be – the flood channel at least is very braided; and when it gets hit with really large floods, the channels tend to shift around. You have multiple flow paths." *See* Tr. at 2/20/15:1883 (Mussetter).

384. With regard to Segment 5, Dr. Mussetter testified: "This part of the reach . . . has a much wider valley bottom. The island-braided character of the river under current conditions occurs – it's island-braided now because of the effect of regulation by the reservoirs. It was probably a highly braided reach, and we see that in these older

photographs, under natural conditions, very responsive to the large flows. So, you know, as Graf explained and as I explained in some detail in my earlier testimony, dryland rivers tend to go from periods of – they get hit by a big flood. They widen out. It rips the vegetation out. It shifts the sediment around. It becomes a very braided type system in areas like this. And then over time between the floods, it tends to settle down. The channels tend to consolidate. You get some vegetation. And then they get hit by another flood. So the sequencing of the flows is a really important aspect of these reaches. These 1934 photographs were taken not too long after a series of really big floods, and so you see the braided character of the river, fairly un – highly unstable multichannel character in the low flow part of the reach that would make navigation impractical." *See* Tr. at 2/23/15:1944-45 (Mussetter); Mussetter Power Point, at 53 [X060].

385. "The downstream approximately 18 miles of the reach flows through a wider valley where the river is bounded by modern, more erodible alluvium in most locations. Under present conditions, the reach has an island-braided character, with multiple channels in many locations that are stabilized by riparian vegetation that remains relatively stable due to the upstream flow regulation. Under natural conditions prior to significant upstream flow regulation, this reach responded to periodic high flow events such as those that occurred in the late-19th and early 20th centuries by developing a wide, braided pattern with multiple, unstable low-flow channels that would have precluded reliable navigation using the watercraft that were in customary use at and prior to Arizona's statehood." *See* Mussetter 2014, at 3 [X016].

386. With regard to Mr. Hjalmarson's criticism of Figure 5 of his Gila River report (Hjalmarson 2014, Appendix J, at 6 [X015]), Dr. Mussetter testified: "I used this graph to simply make the point that during the modern record, there's fairly strong correlation between the annual peak flow and the annual flow volume. In other words, during high flow years, years when you have a fairly high volume of water that comes through the river, those tend to be the same years that you have really high peak discharges that cause the braiding character

and that aspect of the river behavior." *See* Tr. at 2/23/15:1949-50 (Mussetter); Mussetter Power Point, at 55 [X060].

387. With regard to Mr. Hjalmarson's USGS graph distinguishing braided and meandering rivers based on channel slope and bankfull discharge, Dr. Mussetter testified: "And so Mr. Hjalmarson drew a green circle in the range of gradients for the lower Verde River, and he's suggesting that the bankfull discharge in the lower Verde River is somewhere between 180 and 650 cfs. He also said that it probably corresponds to something akin to the two-year flood. I'm not quite sure how he makes the connection between this level of discharge and the two-year flood. . . . His characterization of bankfull discharge in that plot would mean that the Verde River is flowing at bankfull conditions, essentially, for something between a month and a half and eight months out of the year, which is clearly absurd." *See* Tr. at 2/23/15:1959 (Mussetter); Mussetter Power Point, at 61-62 [X060].

388. With regard to the concept of bankfull discharge, Dr. Mussetter testified: "[B]ankfull discharge is the discharge where the channel is full of water and it's just beginning to spill out onto the floodplain. So it's a high flow. Most geomorphologists would say that it's a high frequently-occurring flow, something in the range of the mean annual flood or the flood that happens once every couple of years." *See* Tr. at 2/23/15:1959-60 (Mussetter); Mussetter Power Point, at 61-62 [X060].

389. With regard to the concept of bankfull discharge, Dr. Mussetter testified: "[B]ased on the flood frequency curve, the two to five-year event would be somewhere between 16 – it would be somewhere between 16 and 45,000 cubic feet per second. Most geomorphologists would say that the bankfull discharge is somewhere in that range. There's a common school of thought that it's in the one and a half to two-year range. It's a debatable concept. And, actually, in dryland rivers it's not all that relevant. It tends to be much higher in dryland rivers than it does in plains, self-adjusted, sort of equilibrium-type streams. . . . So if you plot those, the real discharges for the two to five-year event that most geomorphologists would say is the bankfull discharge, you're solidly in the braided category. So this strongly

supports the idea that certainly at high flows, the Verde River, you would expect the lower end of that to be in the braided range. . . . This is just for the lower portion of the river." *See* Tr. at 2/23/15:1961-63 (Mussetter); Mussetter Power Point, at 63-64 [X060].

390. With regard to Segment 2, Dr. Mussetter testified: "There were some portions of Segment 2 that undoubtedly had braided conditions, multichannel conditions." *See* Tr. at 2/24/15:2279 (Mussetter).

391. With regard Segment 5, Mr. Fuller testified "[a]s you saw from the photos that I showed you earlier, on occasion there are places where the splits are equal and they're separated, and there are some spots on this segment where you have that multiple channel and it extends for some distance." *See* Tr. at 12/15/14:115 (Fuller).

392. Mr. Fuller testified that a portion of Segment 5 is "highly braided." *See* Tr. at 12/15/14:115 (Fuller).

393. There are sandbars in Segment 5. *See* Tr. at 12/15/14:190 (Fuller); Fuller Power Point, Slide 154 [X035].

394. Mr. Fuller agreed that many of the historical photos he included in his presentation showed multiple channels, braiding, sandbars, riffles, vegetation, and rocks. *See* Tr. at 12/17/14:670-87 (Fuller).

**Steep Slope**

395. The steep slope of the Verde also causes difficulties for possible navigation. "The approximately 17-mile segment of the Verde River between Beasley Flat and Verde Hot Spring . . . is entrenched into a relatively narrow, deep canyon . . . . The overall gradient is relatively steep (-19 feet/mile), and bedrock is present in the bed and banks of the river in many locations, providing strong lateral and vertical control on the position and profile of the river. In one location (Verde Falls), bedrock outcrop creates an approximately 4-foot high waterfall with numerous other boulder obstructions [ ]." *See* Mussetter 2014, at 11 [X016] (citations omitted).

396. "The overall gradient is slightly flatter than Segment 3, but still relatively steep at about 17 feet/mile." *See* Mussetter 2014, at 16 [X016].

397. Mr. Fuller "didn't do any particular analyses, mathematical analyses, of slope" of the Verde. *See* Tr. at 12/17/14:636 (Fuller).

398. Mr. Fuller agreed that generally, as the slope of a river increases, it becomes less navigable. *See* Tr. at 12/17/14:636-37 (Fuller).

399. According to Mr. Burtell's Declaration, Segment 1 is 37 miles long with a slope of 21 feet per mile ("ft/mi"); Segment 2 has a length of 49 miles with a slope of 13 ft/mi; Segment 3 has a length of 16 miles with a slope of 20 ft/mi; Segment 4 has a length of 35 miles, with a slope of 18 ft/mi; and Segment 5 is 55 miles long with a slope of 13 ft/mi. *See* Burtell 2014, at 3 [X009].

**Marshes**

400. Other impediments to early navigation would have been the marshes that were present in the Camp Verde area. Mr. Fuller agreed that marshy conditions would most likely make a river less navigable. *See* Tr. at 12/17/14:657-58 (Fuller).

401. Mr. Fuller testified that, in his 2003 report, he wrote: "The extent of marshland in the central Verde River was drastically reduced during the period preceding and surrounding statehood." *See* Tr. at 12/17/14:660-61 (Fuller).

402. Mr. Hjalmarson testified that "some of what was going on in the marshy lands of the Verde, the Camp Verde area, basically our cienegas adjacent to the Verde River." *See* Tr. at 12/18/14:990 (Hjalmarson).

403. Mr. Fuller testified that a 1870 War Report by the Surgeon General stated that Segment 5 was a "source of malaria." *See* Tr. at 12/15/14:130 (Fuller); Fuller Power Point, Slide 90 [X035].

404. Mr. Fuller testified that a 1974 book by Fish states that, in the 1870s, Segment 2 "was so marshy that the Yavapais were able to farm only 20 of the 125 acres available on the floodplain." *See* Tr. at 12/15/14:131 (Fuller); Fuller Power Point, Slide 91 [X035].

405. Mr. Fuller testified that Leonora Lee's description of Segment 2 in 1875, stated:

> In those days malaria was common . . . . There were few, if any floods, and the Verde River spread out wide, and so shallow you could cross it on clumps of grass. Willow and undergrowth were so heavy all over the river bed that the water was forced into standing pools which bred mosquitoes. Some thought we may have had it when we came, but when the run-off got bigger and the river was cleaned out occasionally with flood, the malaria disappeared.

*See* Tr. at 12/15/14:132 (Fuller); Fuller Power Point, Slide 93 [X035].

**Boulders**

406. Mr. Hjalmarson's report states "[t]here is also evidence of large boulders that rolled in and along the river channel and floodplain from adjacent steep slopes." *See* Hjalmarson 2014, Appendix G, at 78 [X015].

407. When asked whether there are times when the flow is too low to run a guided tour, Mr. Lynch testified: "But the river – and we've done a lot of work to it. When the water gets low, we've gone out there, we have to move rock around. We have to -- where we see people are stacking up or where they're not following the current, the flow, we've actually gotten out there and we move the rock around so that people can boat through it. It does get skinny in May and June, but we've never had a season that we haven't been able to do it." *See* Tr. at 12/16/14:293 (Lynch).

408. When asked whether he could still boat the Verde if his company did not move rocks, Mr. Lynch testified: "You would be getting out of your boat a lot" on "all" sections of the river. *See* Tr. at 12/16/14:293 (Lynch).

409. Mr. Lynch testified that. if he did not remove brush and debris from the Verde, "you would have to have people getting in and out of the boat all of the time." *See* Tr. at 12/16/14:332 (Lynch).

410. Mr. Lynch testified that by removing trees and rocks from the Verde, it makes the channel faster and deeper. *See* Tr. at 12/16/14:354 (Lynch).

411. Mr. Lynch testified that by removing rocks and trees from the Verde, the Verde is no longer in its original and natural state. *See* Tr. at 12/16/14:354 (Lynch).

**Rapids**

412. Mr. Fuller agreed with Jim Slingluff's previous testimony that there are "probably 130 rapids or riffles on the river and that probably only 30 of them are large enough to have names." *See* Tr. at 12/17/14:722-23 (Fuller).

413. Mr. Hjalmarson testified that "physical features of the channel itself, the number of, say, riffles or a major waterfall" affect navigability. *See* Tr. at 2/18/15:1264-65 (Hjalmarson).

414. With regard to obstructions on the Verde, Mr. Hjalmarson testified that "I think under natural conditions there were some things in there that, well, a person with my skill wouldn't want to go over. I would carry my boat around." *See* Tr. at 2/18/15:1330-31 (Hjalmarson).

415. "Williams (1996, pp.iii through 119) identified over 100 rapids along the Verde River from its headwaters to Horseshoe Reservoir." *See* Burtell 2014, at 13 [X009].

416. "[S]ome of the very features that make [the Verde] attractive for recreational use (remoteness, rapids and shallow, rocky channels) would have made the Verde River unsuitable as a highway of commerce at and or before statehood." *See* Burtell 2014, at 5 [X009].

417. "[P]rior to significant development, the Verde River was a shallow stream easily crossed by horse or mule and characterized by both rapids and lagoons. The river was at times deeper and more difficult to cross, but usually only following storm events and/or during spring snowmelt." *See* Burtell 2014, at 6 [X009].

418. With regard to rapids on the Verde, Mr. Fuller testified that "there's a fair number of rapids on the Verde River. There's 60-some named rapids." *See* Tr. at 12/15/14:64 (Fuller).

419. "Where the rivers are confined by bedrock, the planform and profile of the river is controlled by the bedrock and local deposits of coarse-grained material from debris flows emanating from the side canyons and from material falling directly into the river from the canyon walls. These features create rapids, shallow riffles, and in some cases, waterfalls that can make navigation extremely challenging or impossible, even for modern-day whitewater boats." *See* Mussetter 2014, at 9 [X016].

420. "In some locations along the Verde River, the bedrock can cause sharp breaks in the longitudinal profile that create waterfalls and rapids that can make navigation very challenging and dangerous, and in some cases, impossible." *See* Mussetter 2014, at 5 [X016].

421. "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." *See* Mussetter 2014, at 5 [X016].

422. "Segment 3 runs from Beasley Flat down to Verde Hot Springs. It's about 17 miles. It's a moderately steep gradient through that part of the reach, about 19 feet per mile. There are 11 named rapids in this reach. One of them is a Class IV . . . . That's Verde Falls. And there are seven Class III rapids as well within this reach." *See* Tr. at 2/23/15:1895 (Mussetter); Mussetter Power Point, at 15 [X060].

423. The drop at Verde Falls is anywhere from 4 to 8 feet. *See* Tr. at 2/23/15:1897-98 (Mussetter); Mussetter Power Point, at 18 [X060].

424. With regard to the Rock Garden and Palisades Rapid, Dr. Mussetter testified: "It squeezes the river over, and you've got some really big rocks in the river and some fairly messy whitewater." *See* Tr. at 2/23/15:1899 (Mussetter); Mussetter Power Point, at 19 [X060].

425. "The portion of the Verde River between Beasley Flat and the head of Horseshoe Reservoir is confined within a relatively narrow canyon in which the planform, longitudinal profile and width of the river is controlled by bedrock outcrop and by older, erosion-resistant terraces. This portion of the reach has not been significantly altered by

human activity, and it contains numerous rapids that make navigation challenging and hazardous even using modern whitewater craft. In at least one location, the available river guides recommend portaging. This part of the reach would not have been navigable under ordinary and natural conditions using the watercraft in customary use at and before Arizona's statehood." *See* Mussetter 2014, at 3 [X016].

426. With regard to the Punk Rock or Turkey Gobbler Rapid, Dr. Mussetter testified: "This is Punk Rock Rapid or it's otherwise known as Turkey Gobbler Rapid. They rate it as a 3+. They note at the bottom it's a nasty rapid with some sharp pointy rocks. So you see that there's some big – there's bedrock control in this area. There's some big boulders in the reach, some kind of messy whitewater, and some rocks sticking up out that would be challenging for a normal boat that would be used for commerce in this kind of a reach." *See* Tr. at 2/23/15:1899 (Mussetter); Mussetter Power Point, at 20 [X060].

427. Mr. Fuller testified that the first time he boated Segment 3 he hit Punk Rock "broadside" and broke the seat in his canoe. *See* Tr. at 12/15/14:96 (Fuller).

428. With regard to the Black Hole Rapid, Dr. Mussetter testified: "This is Black Hole Rapid. You see the large cobble bar in the center of the river and then some very shallow riffle/rapid areas around either side [ ]. The channel splits around that island." *See* Tr. at 2/23/15:1900 (Mussetter); Mussetter Power Point, at 21 [X060].

429. With regard to Segment 4, Dr. Mussetter testified: "Segment 4 is about 36 miles long. It runs from Verde Hot Spring down to the head of Horseshoe Reservoir. The gradient through that reach is similar to Segment 3, slightly flatter. Segment 3 was 19 feet per mile. This is about 17 feet per mile. There are 13 named rapids in Segment 4. Five of those are rated as Class III and eight of them are rated as Class II rapids." *See* Tr. at 2/23/15:1908 (Mussetter); Mussetter Power Point, at 26 [X060].

430. With regard to the White Flash rapid on Segment 3, Mr. Farmer testified: "Say 20 years ago, White Flash used to be a significant drop, probably 20-foot gradient from the top of it to the bottom, and it had a right turn in the middle of it. So it was something that you

had to boat down. It was still a Class II, but you had to boat down it. A flood has rearranged that to where now the gradient on that rapid is probably only 10 feet, and there's hardly a riffle there at present; and it's been that way for about 10 years." *See* Tr. at 12/16/14:422 (Farmer).

431. With regard to Segments 3 and 4, Dr. Mussetter testified: "[T]hese reaches are relatively narrow, bedrock-confined, flows through a bedrock-confined canyon. There are numerous rapids in these reaches that would make navigation for commercial purposes very impractical. My opinion is these reaches certainly don't meet the standard for navigability using the types of boats that were in customary use for commerce at the date of Arizona statehood." *See* Tr. at 2/23/15:1944 (Mussetter); Mussetter Power Point, at 52 [X060].

432. Mr. Lynch testified that he would not operate a commercial boating operation below Beasley Flats. *See* Tr. at 12/16/14:334 (Lynch).

433. Mr. Lynch testified that he would not take his ducky on the Verde below Beasley Flats. *See* Tr. at 12/16/14:334 (Lynch).

434. With regard to a rapid on Segment 1, Mr. Fuller testified "[i]n this area here there was a landslide that came down right there, with a bunch of big rocks in the river, and that's one of the rapids along the segment that's a III. In low water it's a very narrow chute. At high water it would be more challenging whitewater." *See* Tr. at 12/15/14:69 (Fuller).

435. Mr. Fuller testified that there are two Class II rapids on Segment 2. *See* Tr. at 12/15/14:79 (Fuller).

436. Mr. Fuller testified that "[r]apids classifications change with flow rate. Different seasons of the year, different flow rates. It could be harder or tougher. Some of them get harder with more flow and then get easier, and some of them get easier with more flow. Kind of depends on the specific geometries." *See* Tr. at 12/15/14:87-88 (Fuller).

437. Mr. Fuller testified that "Segment 3 is the so-called whitewater reach of the Verde River. So it has its moniker, probably because some of the larger rapids, the larger rapid, are located in this reach." *See* Tr. at 12/15/14:92 (Fuller).

438. With regard to rapids on Segment 3, Mr. Fuller testified that "[t]he people that are looking for a little more excitement, it's still dominantly Class II and below. But there are a couple of Class III's and a Class IV in there, depending on the flow rate that you happen to catch when you're there." *See* Tr. at 12/15/14:92 (Fuller).

439. "ASLD Segment 3 contains 11 named rapids, including one Class IV and 7 Class III rapids. In all cases, the rapids and riffles represent significant impediments to navigation by the watercrafts that were in use at and prior to the time of Arizona's statehood." *See* Mussetter 2014, at 14 [X016].

440. With regard to the rapids on Segment 4, Mr. Fuller testified "Segment 4, the classifications that I've used, there are no Class III's and IV's. I understand that the Forest Service now publishes a guide where they've upgraded a few of the II's and III's. There's certainly no IV's in there. 4 percent of the length is Class II's. There's 29 of them." *See* Tr. at 12/15/14:101 (Fuller).

441. Mr. Farmer testified that he warns people to use extreme caution when approaching Verde Falls. *See* Tr. at 12/16/14:457 (Farmer).

442. Despite his extensive time spent canoeing the Verde, Mr. Farmer has never run Verde Falls in a canoe. *See* Tr. at 12/16/14:457 (Farmer).

443. Mr. Farmer has never seen a person run Verde Falls in a canoe fully loaded. *See* Tr. at 12/16/14:458 (Farmer).

444. Mr. Farmer testified that Verde Falls "respective of flow, it would be rated a Class III or Class IV." *See* Tr. at 12/16/14:390 (Farmer).

445. Mr. Farmer agreed that, under certain conditions, Verde Falls can be a Class V rapid. *See* Tr. at 12/17/14:561(Farmer).

446. Mr. Farmer testified that it would require four men to lift his largest canoe when fully loaded with 700 pounds of gear. *See* Tr. at 12/16/14:437 (Farmer).

447. Mr. Farmer testified that it took three men to portage Verde Falls with his 17-foot canoe with 300 pounds in it. *See* Tr. at 12/16/14:390 (Farmer).

448. Mr. Farmer testified that if he did not have four men with him to portage his largest canoe when fully loaded, he would need to unload it. *See* Tr. at 12/16/14:437-38 (Farmer).

449. Mr. Farmer testified that it would take him approximately two hours to portage his larger canoe when fully loaded if he was alone. *See* Tr. at 12/16/14:438 (Farmer).

450. Mr. Fuller testified that Verde Falls is a challenging place to boat under very different flow conditions. *See* Tr. at 12/17/14:632 (Fuller).

451. Mr. Farmer testified that there is a strong current at Turkey Gobbler Rapid or Punk Rock. *See* Tr. at 12/16/14:458 (Farmer).

452. With regard to Turkey Gobbler Rapid or Punk Rock, Mr. Farmer testified "[w]henever you have an obstruction in current and then high water will take the current over the top of the rock, it develops a hole on the downstream side off that rock." *See* Tr. at 12/16/14:458-59 (Farmer).

453. With regard to "holes," Mr. Farmer testified "[i]t's a hydraulic that you really don't care to go into." *See* Tr. at 12/16/14:459 (Farmer).

454. Mr. Farmer testified: "On Bushman Rapid, you enter it kind of coming in from the left. It runs into a cliff and it turns you immediately to the right. Then as you are progressing down it, there's two rock ledges that jut out into the current. And that's what he's talking about, tricky laterals as the water goes over those ledges." *See* Tr. at 12/16/14:459-60 (Farmer).

455. With regard to Bushman Rapid, Mr. Farmer testified: "The holes at the lower end are caused by boulders that have fallen off the cliff through the years. I've never seen them come into play." *See* Tr. at 12/16/14:460 (Farmer).

456. With regard to Bushman Rapid, Mr. Farmer testified: "The entry to Bushman, where the river shallows up to, say, somewhere between 10 and 14 inches, is rocks. The river shallows up. It's difficult to wind your boat through there, to get lined up. To get lined up for

it, you may hit a rock. You might stop. Then you might go again and remaneuver. It can be tricky to get to it at low flow, yes." *See* Tr. at 12/16/14:479-80 (Farmer).

457. With regard to Rocky Split or Black Hole Rapid, Mr. Farmer testified: "What he's talking about, the black rock, it's a piece of schist that sticks straight up, and the water used to go right over the top of it. In the last 10 years that drop has been dewatered, and we're now boating it on a channel completely over on the left. So Black Hole Rock Rapid only exists at high water now. . . . It's put more water in the left braid, and that's now the low flow boating channel on the left side." *See* Tr. at 12/16/14:460-61 (Farmer).

458. With regard to Nasty Little Dog-Leg Rapid, Mr. Farmer testified: "Well, the river at that point, at Nasty Little Dog-Leg, which lies just below the confluence of Fossil Creek in the Verde River, the river flows into a low cliff. When I say low, about 10 foot tall on the right side of it, and then you instantly have to turn your boat to the left and finish the run. And the dog-leg would be where you have to make the move." *See* Tr. at 12/16/14:460-61 (Farmer).

459. Rapids that pose an obstacle to use as a highway of commerce actually provide the characteristic that draws recreational boaters. *See* Tr. at 3/30/15:2669 (Burtell).

460. Mr. Fuller testified that recreational boaters "may choose to take the shallower channel because it's a, quote, more fun ride." *See* Tr. at 12/15/14:23 (Fuller).

461. An April 27, 1905, *Arizona Silver Belt* article describes four men preparing to boat the Verde, and states "[i]n places they will have to shoot rapids, and in others it will be necessary to carry their boat. *See* Hjalmarson 2014, Appendix A, at 57 [X015].

**Beaver Dams**

462. Portions of the Verde River Blue Trail Guide included in Mr. Hjalmarson's report states: "Numerous and prolific, beavers are the engineers of the Verde! In the stretches from the headwaters downstream to Perkinsville they have built dam after dam, creating habitat for plants, fish and mammals." *See* Hjalmarson 2014, Appendix I, at 13 [X015].

463. "[F]rom the 1860s through the 1880s, beaver dams were common along Segments 1, 2 and 5 of the river." *See* Burtell 2014, at 13 [X009].

464. With regard to Segment 1, Mr. Fuller testified "[t]he last time we paddled through this reach we had found one beaver dam . . . ." *See* Tr. at 12/15/14:68 (Fuller).

465. Mr. Fuller testified "[t]his is the one beaver dam that we found in Segment 1. Not much of a beaver dam, but that was the only one. There were better beaver dams in Segment 0, four of them to be exact, across the entire river. And there were some partial dams that we paddled right past." *See* Tr. at 12/15/14:74 (Fuller).

466. Beavers are "part of the ordinary and natural condition of the river, if beavers are there and they're making dams. So to artificially remove them I would say would be in the same camp as artificially damming the river and counting that as an ordinary and natural condition." *See* Tr. at 12/15/14:186 (Fuller).

467. Mr. Lynch testified that there are beavers on the upper Verde and between Clarkdale and Camp Verde. *See* Tr. at 12/16/14:295 (Lynch).

468. Mr. Farmer has seen beaver dams on the Verde between Verde Ranch and Perkinsville. *See* Tr. at 12/16/14:390 (Farmer).

469. Mr. Farmer has had to get out of his boat because of beaver dams on the Verde. *See* Tr. at 12/16/14:398 (Farmer).

470. When asked how long it takes to get over a beaver dam while boating on the Verde River, Mr. Lynch testified: "Because you've got to get out of your boat. It depends, if it's really cold and you don't want to do it. You know, this is anywhere, you know, five to ten minutes to get around the whole thing, because usually wherever they've built these things it's going to be very reedy. There's going to be lots of bushes and trees. There's lots of things to navigate around when you get to these things." *See* Tr. at 12/16/14:295 (Lynch).

471. With regard to beaver dams on the Verde River above Perkinsville, Mr. Hjalmarson testified: "Right now there's a couple there, yeah, right up to the upper rim and

right below Granite Creek there's a couple up there right now." *See* Tr. at 2/18/15:1332 (Hjalmarson).

472. With regard to beaver dams on the Verde, Mr. Burtell testified: "I don't think historically the folks that were using the river would have viewed beaver dams as something fun to cross or enjoyable. I think they would have viewed it as, oh, boy, here's another beaver dam we need to worry about. Maybe we can cross it; maybe we have to unload all of our gear and supplies and get back in, only to find another one a mile downstream." *See* Tr. at 3/30/15:2636 (Burtell).

473. Mr. Burtell testified: "Again, I'll just reiterate the common occurrence of these beaver dams, as indicated by these historic accounts, suggest that they were common, and they would be a common obstacle that a boater would have to deal with. Would it defeat navigability in its entirety by itself? Maybe yes, maybe no. But it's just one more thing that a boater at this time would have to grapple with." *See* Tr. at 3/30/15:2647 (Burtell).

474. With regard to the Coues account of beaver dams on the Verde, Mr. Burtell testified: "[H]is account, particularly . . . towards the end, 'and the San Francisco, the Verde, is it very abundant,' that is, beaver, 'and its dams occur, in some places, every few hundred yards." *See* Tr. at 3/30/15:2648 (Burtell).

**Strainers**

475. Portions of the Verde River Blue Trail Guide included in Mr. Hjalmarson's report warns boaters: "Be aware of wildlife and river hazards such as strainers (fallen trees or debris) that are partially submerged in the water. They allow water to rush through but can pin a boat or body underwater." *See* Hjalmarson 2014, Appendix I, at 2 [X015].

476. With regard to Segment 1, Mr. Fuller testified "[t]here's plenty of places where the overhanging vegetation is dense and trees cover the river, a few places where you're kind of in a green tunnel; not many. Most of the time you can see the sky." *See* Tr. at 12/15/14:71 (Fuller).

477. Mr. Fuller testified that downed trees in the river force a boater to get out of their boat and physically move their boat over the tree before getting back in. *See* Tr. at 12/15/14/72 (Fuller).

478. Mr. Fuller testified that Segment 4 "[t]ends to be a little strainery." *See* Tr. at 12/15/14:108 (Fuller).

479. Mr. Lynch testified: "The trees that fall in the river. You know, because the river is, you know, is a dynamic environment and trees are growing along the bank, you know, and when you have the big flash flooding events, you know, here goes the bank being cut away and so you'll have trees that are falling into the river constantly." *See* Tr. at 12/16/14:332 (Lynch).

480. When asked if he thought other portions of the Verde were navigable other than the portions where he operates his tours, Mr. Lynch replied:

> They're tougher because there's a lot – you know, since nobody's out there maintaining them on a regular basis, there's a lot more tree growth, strainers, trees that have fallen. What we do on the stretches that we commercially boat all the time, we're out there constantly cutting back the bushes, the trees. When things fall into the river, we go out there with our chainsaws, because we've got to get all that stuff out of the river or people -- it's just not safe. You can't get around it. So when you go into stretches of the river that we don't boat commercially, that can get relatively overgrown with all kinds of strange things.

*See* Tr. at 12/16/14:309 (Lynch).

481. Regarding Segment 2, Mr. Farmer testified: "I've been down it where there was a strainer across the river and you would have to get out of the boat and maneuver the boat around the strainer." *See* Tr. at 12/16/14:403 (Farmer).

482. Mr. Farmer testified: "You don't want to get washed into a strainer. It can cause all kinds of problem. They're pretty much probably the most dangerous part of the river if you would get swept into one. So you get out on top of the drop, slow the boat down and just ease the boat down through the strainer. When you get through it, jump back in the boat and go." *See* Tr. at 12/16/14:404 (Farmer).

483. When asked why strainers are dangerous, Mr. Farmer testified: "Well, imagine yourself going down this highway, and you have this set of trees coming up in front of you and you're about to hit them and you're going to wrap your boat around it. Now you're swimming or – you're swimming if you're lucky. You might get tangled up in the tree and drowned also." *See* Tr. at 12/16/14:450-51 (Farmer).

484. Mr. Farmer testified that he has gotten caught in a "root ball" on the Verde River. *See* Tr. at 12/16/14:451 (Farmer).

485. Mr. Farmer testified that there are a lot of strainers at high water on the Verde from Perkinsville to TAPCO. *See* Tr. at 12/16/14:473-74 (Farmer).

486. The Commission finds, as a matter of fact, that the geomorphology evidence supports the conclusion that the Verde was not, in its ordinary and natural condition at the time of statehood, susceptible to being used as a highway for commerce. *See* Findings of Fact 339-485.

**MODERN BOATING**

**Evidence from 2006 Hearing**

487. One of Arizona's premier white water boaters, Mr. Jim Slingluff, testified in 2006 regarding some of the boating trips he has taken on the Verde. *See* Tr. at 1/18/06:101-31 (Slingluff). His stories indicated that, at various points along its course, the river has natural impediments that would have prevented navigation at statehood and continue to do so. His slides depicted canoes and other modern craft hung up on boulders, trapped in rocky areas, and overturned after encountering falls or rapids. *Id.* at 1/18/06:106-13; *see* Slingluff, Power Point Presentation Slides 21, 27, and 35 (boulders), 8, 19, and 38 (rapids), 40 (canoe pinned in boulder) (January 18, 2006) [EI 34].

488. Mr. Slingluff indicated that there are at least 130 rapids along the river. *See* Tr. at 1/18/06:125 (Slingluff). Mr. Slingluff readily acknowledged that many stretches of the river are hazardous—even with modern equipment and his substantial expertise. *See* Tr. at

1/18/06:112-113 (Slingluff) ("There have been just very few injuries on the Verde where the person was injured in the water where they had to be choppered out . . . .").

489. Mr. Slingluff himself testified that, despite his significant experience in white-water rafting on many rivers across the country, there were two times where he "was at immediate risk of dying" while boating on the Verde due to high velocity falls. *See* Tr. at 1/18/06:112 (Slingluff).

490. As Mr. John Colby of the Cimarron River Company testified in 2006, his company's guided boating trips (which were no longer taking place by the time of the 2014/15 Hearings, *see* Tr. 12/16/15 (Lynch) (stating that there were no other commercial boating operations on the Verde); Tr. 12/17/14 (Farmer) (referring to Colby's operation in the past tense)) were conducted from Childs to the Horseshoe Reservoir and from the Bartlett Reservoir to the confluence with the Salt River. *See* Tr. at 1/18/06:55-56 (Colby). The multi-day trips are conducted only once or twice per year, and only in certain seasons. *Id.* at 1/18/06:57.

491. Two authors, Mr. Jim Byrkit and Mr. Bob Munson, who have written extensively on the history of the Verde, stated that the river is not navigable, even though they were aware of recreational boating on the river. *See* Fuller 2003, at 4-2 [EI 31]. Mr. Byrkit noted that such boating is normally possible only in February and March, and that in other months, "the Verde River cannot be run because it dries up or because it is dangerous, and that a lot of people have died in the Verde River because they enter the river during flooding." *Id.*

**Recreational Nature of Boating Accounts**

492. During his testimony at the 2014/15 Hearings, Mr. Fuller agreed that recreational boaters "may choose to take the shallower channel because it's a, quote, more fun ride." *See* Tr. at 12/15/14:23 (Fuller).

493. "The purpose of [the modern boating accounts detailed by the ASLD] was (and continues to be) recreational." *See* Burtell 2014, at 5 [X009].

**Size of Boats**

494. Mr. Fuller testified that "[s]o if there's a rapid, big rapid in the river, clearly you're not going to take barges over it like you see in the upper picture here; and nor in any way am I suggesting that you could take those kind of barges on the Verde." *See* Tr. at 12/15/14:39 (Fuller).

495. Mr. Lynch testified that you could not float a barge on the Verde. *See* Tr. at 12/16/14:355 (Lynch).

496. Mr. Hjalmarson testified: "I believe that maximum depths are more representative of navigability for a river like the Verde, because I knew enough about it to know that you're not going to float a 20-foot wide barge down that river. So I knew that, going in, that – and it could be a little biased, if you wanted to argue having a fully neutral approach to this. But I knew going in that were dealing with small watercraft, and so that was the initial basis for my analysis, and I knew that maximum depth would be more representative of some kind of average depth for small watercraft." *See* Tr. at 12/19/14:1084-85 (Hjalmarson).

497. With regard to the types of boats used on the Verde historically, Mr. Fuller testified that "the boats that were being used are small boats. So I'm not here to say that you could take a steamboat down the Verde River. I think the rapids that are there, albeit they're mostly Class II, are enough to prevent that kind of use; nor even haul ore. Hopefully we can just dispel that whole argument and not have to come back to that. The river depths, the kinds of boats that you can get down this river are not sufficient that you're going to be hauling vast quantities of ore, certainly not the economic operations of the mines at Jerome. You needed to take that heavy stuff different places." *See* Tr. at 12/15/14:180 (Fuller).

498. Mr. Lynch sees "smaller" rafts on the Verde, but not the 18-foot rafts like he sees on the Colorado and San Juan. *See* Tr. at 12/16/14:316-17 (Lynch).

499. Mr. Lynch sees rafts on the Verde only during spring runoff and monsoon season. *See* Tr. at 12/16/14:316-17 (Lynch).

500. Mr. Farmer testified that certain brands of boats are improper for the Verde. *See* Tr. at 12/16/14:438-39 (Farmer).

501. When asked if he would build a different kind of boat to run the Verde than he would for the Colorado River, Mr. Dimmock testified: "Yeah, if – but, of course, I know too much. You know, I've been a boat builder and I've run all these rivers; whereas those guys haven't. But I would build a smaller, lighter craft for a smaller river." *See* Tr. at 3/31/15:2846-47 (Dimmock).

502. Mr. Dimmock testified that the boat he would build for the Verde would probably not be able to hold the ton of cargo he stated his "Edith" replica could. *See* Tr. at 3/31/15:2915 (Dimmock).

503. When asked if he would build a different kind of boat to run the Verde than he would for the San Juan River, Mr. Dimmock testified: "Somewhere in between. You know, the San Juan's a bit more flow than the Verde. I would build a small, quick-turning boat for the Verde." *See* Tr. at 3/31/15:2847 (Dimmock).

504. Mr. Dimmock "[a]bsolutely" agreed that if the boat he would build for the Verde was full of cargo, it would defeat his efforts to make it maneuverable and quick-turning. *See* Tr. at 3/31/15:2915 (Dimmock).

**Boat Types**

505. In writing on boating in shallow creeks and rivers generally, Mr. Slingluff has noted that such watercourses "are boatable in many different canoes, but aluminum, canvas, and wood boats are easily damaged and difficult to repair." *See* Slingluff, "Shallow Streams: Liquid Paths Into Wilderness," *The Southwestern Sportsman National Magazine*, Winter 1990-1991, at 16 [EI 34] ("Slingluff/*Southwestern Sportsman*").

506. Mr. Slingluff wrote further that, "[p]lastic canoes are durable, slide easily over rocks, slip quietly through the water, and do not conduct heat or cold." *See* Slingluff/*Southwestern Sportsman*, at 16 [EI 34].

507. In another publication, Mr. Slingluff asked: "If the canoe is going to carry you and your gear most of the way, why mind dragging the canoe over short expanses of wet rock now and then? How shallow can you go? My canoe draws 3 inches of water when loaded with 260 pounds of paddler and gear. Add another 100 pounds and it takes 4 inches." *See* Slingluff, "Stream Canoeing In Arizona," *Arizona Hunter and Angler*, April 1991, at 22 [EI 35].

508. In an article written for *The Southwestern Sportsman National Magazine*, Mr. Slingluff wrote:

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

*See* Slingluff, *Shallow Streams: Liquid Paths Into Wilderness, The Southwestern Sportsman National Magazine*, at 16 (Winter 1990-91) [EI034-1].

509. Mr. Fuller testified that canoes are "more durable than they were before." *See* Tr. at 12/15/14:57-58 (Fuller).

510. Mr. Fuller testified that modern boats compared to historical boats have "improved durability, no doubt about that." *See* Tr. at 12/15/14:250 (Fuller).

511. Mr. Farmer testified that "a plastic boat will take a little more abuse than a wood boat would, certainly." *See* Tr. at 12/16/14:385 (Farmer).

512. Mr. Fuller testified: "And the primary difference between a plastic boat today and a wooden boat of 1912 is that the plastic boat can take a little more abuse, and maybe even a lot more abuse, depending on the design of the boat. You're able to do some things with plastic that are more difficult to do with wood -- not to say that you couldn't do -- or canvas. So there are some performance-related changes in boats. You can make faster boats out of modern materials than you could out of historic materials." *See* Tr. at 12/15/14:227 (Fuller).

513. "[M]odern boats are more durable than older boats." *See* Tr. at 12/17/14:588 (Fuller).

514. Durability "is one of the important characteristics" on a river that has rocks and rapids. *See* Tr. at 12/17/14:588 (Fuller).

515. Comparing historical wooden dories at the time of statehood to modern rubber rafts, Mr. Dimmock testified: "Durability, I will say modern rafts take a beating for a lot longer than a wood boat, but modern rafts are designed to be used over and over and over and over and over again; whereas the wood boats in those days were maybe going to do one trip, because there's nobody there in their car to drive them back to the put-in. They would probably build another boat. So in terms of durability, they would last a trip or two, no problem" *See* Tr. at 3/31/15:2841 (Dimmock).

516. Inflatable kayaks are "pretty indestructible and foolproof." *See* Tr. at 12/18/14:878-79 (Fuller).

517. Regarding when he started running rivers, Mr. Dimmock testified: "I started at Prescott College, which, to be nonnegligent, made us wear helmets and life jackets for all of our kayaking. And so it was available. Kayaking was just starting to pick up in the early '70s. They invented the plastic kayak, which was more durable than the fiberglass ones and the skin ones before that, and that's sort of when I got into the kayaking." *See* Tr. at 3/31/15:2822 (Dimmock).

518. When asked if boats in 1912 were meant to last only a trip or two, Mr. Dimmock testified: "They would last until you wreck them, but they would certainly last a trip or two, yes. Again, I mean, you can wreck anything. But a wood boat won't last as long as a rubber boat." *See* Tr. at 3/31/15:2910 (Dimmock).

519. Mr. Farmer testified: "Again, if I know that I'm in a wood boat or a fiberglass boat, I'm going to be extra, extra careful with it. If I'm in the plastic boat fully loaded, I might just punch that rock." *See* Tr. at 12/16/14:483 (Farmer).

520. When asked what boats he uses for his tours, Mr. Lynch testified : "We use the inflatable kayaks. They call them duckies. These are – they're real safe. They're stable. They're like miniature little rafts, but they're in the shape of a kayak, and you need absolutely no skill whatsoever to use them. That's why we – you know, most of our customers, they're just interested in a river experience. They're not out there to become expert boaters or do anything way too technical. So the inflatable kayaks, the duckies, are just perfect for what we do." *See* Tr. at 12/16/14:293-94 (Lynch).

521. Mr. Lynch testified that the duckies he uses on his tours are "a lot more stable" than a canoe. *See* Tr. at 12/16/14:294 (Lynch).

522. With regard to the duckies he uses on his tours, Mr. Lynch testified: "The duckies are – you just don't need any skill. You can hit things, you can bounce off things, you can get stuck on things, and they do – they just – they're just a superior craft for any kind of boater. I mean I'm a pretty good boater, and that's what I use." *See* Tr. at 12/16/14:307 (Lynch).

523. Mr. Lynch testified that he uses inflatable duckies because they are good for bouncing on rocks. *See* Tr. at 12/16/14:314 (Lynch).

524. Mr. Lynch testified that inflatable kayaks are better for bouncing off rocks than wooden canoes. *See* Tr. at 12/16/14:314 (Lynch).

525. With regard to canoes on the Verde, Mr. Lynch testified: "I'm not a canoer. I'm a ducky guy. But I see these guys, you know, going. I can see and I can hear them when they're coming down. When they're coming down the river at lower flows, you can hear them, you know, going over the rocks. You can see them hitting things and talking about, oh, yeah, we had to get out and drag here, we had to get out here; where the duckies will, for the most part, glide right over everything." *See* Tr. at 12/16/14:314-15 (Lynch).

526. Mr. Farmer testified that all of his canoes are plastic. *See* Tr. at 12/16/14:383-84 (Farmer).

527. Mr. Farmer testified that canoe technology has advanced. *See* Tr. at 12/16/14:387-88 (Farmer).

528. Mr. Dimmock testified: "And the modern boats, you know, you can land in the rocks, you can park in the rocks, you can bounce off rocks and walls. And the wood boats you can't do those things. So, you know, people who aren't really into wood boats think it's really silly to run them anymore, and they would rather run an inflatable. It's easier." *See* Tr. at 3/31/15:2869 (Dimmock).

529. "They were cheaper and they were more durable. The fiberglass boats will shatter if you hit a rock hard enough; and the plastic ones, after a couple generations of plastic ones, they got them to where they were pretty much unbreakable. They're like Tupperware." *See* Tr. at 3/31/15:2888 (Dimmock).

530. Mr. Dimmock testified that neither fiberglass nor plastic boats were available in 1912. *See* Tr. at 3/31/15:2888 (Dimmock).

531. Mr. Dimmock testified that "almost any canoe would be [inappropriate for running Verde Falls]. An open canoe might very likely swamp; and the other boat we have is a decked canoe, but we were really amateurs at the time, so the portage is quick and easy and we did that." *See* Tr. at 3/31/15:2882 (Dimmock).

532. When asked what other crafts would be inappropriate for running Verde Falls, Mr. Dimmock testified: "I think most anything. Well, kayaks are fine because you have such quick recovery. It just depends on who's running the boat. If it's something you're likely to get out of control and bash into this one big rock below there, you might want to think about not running it." *See* Tr. at 3/31/15:2882 (Dimmock).

533. Mr. Dimmock testified that his replica boats would be inappropriate for running Verde Falls. *See* Tr. at 3/31/15:2882 (Dimmock).

534. Mr. Dimmock testified that a portage around Verde Falls would be more difficult in his replica boats than it would in a canoe. *See* Tr. at 3/31/15:2883 (Dimmock).

535. Mr. Dimmock testified that he could not portage Verde Falls by himself in his replica boats, but he could "probably" figure out a way to line it. *See* Tr. at 3/31/15:2883-84 (Dimmock).

536. Mr. Lynch uses USGS gage data and weather radar when operating his tours. *See* Tr. at 12/16/14:339 (Lynch).

537. "Pretty much everybody" checks the internet for conditions before boating the Verde. *See* Tr. at 12/16/14:366 (Lynch).

538. When asked if the Kolb brothers had dry bags, Mr. Dimmock testified: "Oh, not so good. There was natural rubber that was used in making some bags that you could roll them tight and they would be watertight, but they usually would crack and leak. They dried stuff out a lot in those days. They had tin cans with screw-on lids. Some people were carrying stuff in those. But no plastic bags, no Jack's Plastic Welding river bags at all. Even when that started in 1971, the waterproof bags were not waterproof. It was pretty primitive even then." *See* Tr. at 3/31/15:2841 (Dimmock).

539. Mr. Dimmock testified: "And so what are some of the skills that have developed over the last hundred years that are so critical to what – you know, you said we can run anything now. We've got the knowledge. We've got the background. We've learned from our predecessors and built upon that." *See* Tr. at 3/31/15:2940-41 (Dimmock).

**Successful vs. Unsuccessful Boating**

540. Mr. Fuller defines success as "the boat and the passengers and the cargo arrived." *See* Tr. at 12/15/14:173 (Fuller); Fuller Power Point, Slide 141 [X035].

541. Mr. Fuller defines failure as: (1) death or serious injury, (2) cargo is lost and unrecovered, (3) the boat is destroyed and is not reparable, or (4) the trip is not completed. *See* Tr. at 12/15/14:173 (Fuller); Fuller Power Point, Slide 141 [X035].

542. The Commission finds Mr. Fuller's "success" standard not helpful for purposes of determining navigability for title.

**Boat Wrecks on the Verde**

543. Mr. Farmer has had "near misses" on the Verde, which he defines as "[g]et off your line and slap a rock and almost flip your boat." *See* Tr. at 12/16/14:409-10 (Farmer).

544. Mr. Farmer testified: "There's some places where you might be caught out in an inappropriate craft or in an inappropriate spot, and you're going to have to bivouac until the water goes down a little bit." *See* Tr. at 12/16/14:441 (Farmer).

545. Mr. Farmer has "wrecked" his canoe "completely" on the Verde. *See* Tr. at 12/16/14:446 (Farmer).

546. Mr. Farmer testified: "I do hit my boat at those low levels. There's no denying that." *See* Tr. at 12/16/14:449 (Farmer).

547. Mr. Farmer testified: "I've been stuck on plenty of rocks that I didn't see." *See* Tr. at 12/16/14:455 (Farmer).

548. Mr. Farmer swamped his canoe "many times" on the Verde. *See* Tr. at 12/16/14:467-68 (Farmer).

549. Mr. Farmer has seen wrecked canoes and boats in Segment 3. *See* Tr. at 12/16/14:505 (Farmer).

550. With regard to Segment 3, Mr. Farmer "I've heard of people having to walk out after they lost their [inflatable kayak] in a strainer or something like that." *See* Tr. at 12/16/14:505 (Farmer).

551. Mr. Farmer sees damaged canoe hulls on the Verde "from time to time." *See* Tr. at 12/17/14:568 (Farmer).

552. Mr. Fuller has "heard stories of damaged canoes" on the Verde. *See* Tr. at 12/17/14:589 (Fuller).

**Low-Water Boating and "ELFers"**

553. Mr. Fuller testified: "You know, my own personal experience has been that, you know, you see the low month being July there. You know, there's some stuff that's written in the guides that say, hey, you don't want to go out there in low water season because

it's, you know, too rocky and difficult. And I kind of like those conditions. I like being on the river when it's hot. And so lately I've gone down rivers at low flows and I've found them to be extremely boatable, in contrast to what's written in the guide. So my own personal experience is they're a lot more boatable and are very enjoyable at low water." *See* Tr. at 12/15/14:249 (Fuller).

554. There are a subset of boaters called "ELFers" (ELF standing for "extreme low flow") that enjoy boating in low flow conditions. *See* Tr. at 12/16/14:497-98 (Farmer).

555. Mr. Farmer has "never heard of an ELFer on the Colorado. That's just a different type of river. . . . with a lot more annual flow in it." *See* Tr. at 12/16/14:533 (Farmer).

556. Mr. Farmer's personal threshold for navigability is something between 2 and 6 inches, "[d]epending on the boat." *See* Tr. at 12/16/14:536 (Farmer).

**Boating Guides**

557. In analyzing the rapids on the Verde, Mr. Fuller's sources were Bob William's guide and Jim Slingluff's guide. *See* Tr. at 12/15/14:66 (Fuller).

558. One of the boating guides submitted to the Commission as evidence is the United States Forest Service's Recreation Opportunity Guide for the Verde River, dated 1997. *See* USFS's Recreation Opportunity Guide for the Verde River, 1997 [EI 12] ("Forest Service Guide").

559. The Forest Service Guide does not characterize the Verde as a navigable stream suitable to be a highway for commerce:

a. Speaking about the Verde River generally, the guide cautions: "It is difficult to generalize about this river since much depends on the time of year, water level, boat involved, and certainly the skills of the river-runner." *See* Forest Service Guide, 2 [EI 12].

b. "It **very definitely** is not a river meant for beginners or novices." *See id.* (emphasis in original).

c. "This river is usually run in rafts and kayaks. It is possible to run it in a white-water canoe, however the number of wrecked canoes that have been left along it clearly show that this can be a high-risk type of trip." *See id.*

d. "The river-running season is basically March and April, and depends very much on the spring run-off. The amount of water in the river is critical: some years the river is virtually unrunnable by rafts due to lack of run-off." *See id.*

e. "Below 400 CFS (into Horseshoe R.), you will begin having trouble with rocks and other obstacles. It is run at lower levels but can be very hard on equipment if certain rapids are not walked." *See id.*

f. "Above 3,000 CFS, trees, brush, etc., along the side and in the channels become even more of a hazard, and river-running becomes significantly more dangerous." *See id.*

g. "All safety precautions should be taken when preparing for a trip on this river. Although it does not have the big white-water of some rivers, it does have special hazards such as trees and vegetation blocking channels, etc. Since these change from flood, it is not possible to accurately show the locations of these hazards on this map." *See id.*

h. "It should also be recognized that because of the isolated nature of much of this river, little problems can very quickly become big problems!" *See id.*

i. "Because the water in March is snowmelt and very cold, full or partial wet suits are important." *See id.* at 3.

j. With regard to "Pre-fall Rapid," the guide states: "(Scout) Some nasty drops here. Don't let pre-fall become free-fall! Line boats from left." *See id.* at 8.

k. With regard to Verde Falls, the guide states: "Boats can be lined far left over falls. Use extreme caution do not accidentally run these falls!" *See id.*

l. With regard to Turkey Gobbler Rapid, the guide states: "(scout) (If you are one don't let it! Strong current into high rock on right. Nasty hole at higher water." *See id.* (emphasis in original).

m With regard to Bushman Rapid, the guide states: "(Scout) Some tricky laterals and holes at lower end. Use care if boats are lined." *See id.*

n. These cautions continue throughout the rest of the guide warning of various strainers, rock gardens, rapids, trees blocking the river, and boulders, among other dangers. *See id.*

560. Another boating guide submitted to the Commission as is Jim Slingluff's Verde River Recreation Guide, First Edition, dated 1990. *See* Jim Slingluff, Verde River Recreation Guide, First Edition, 1990 [X035_ASLD 162] ("Slingluff Guide").

561. Mr. Fuller described Jim Slingluff's book "Verde River Recreation Guide" as "the preeminent river guide for the Verde River for a long time." *See* Tr. at 12/15/14:230-31 (Fuller).

562. Mr. Fuller testified that Jim Slingluff's book was written with canoeists in mind. *See* Tr. at 12/15/14:244 (Fuller).

563. Mr. Lynch described Mr. Slingluff's boating guide as the "Bible." *See* Tr. at 12/16/14:337 (Lynch).

564. When asked if talking with someone is more helpful than reading river guides, Mr. Farmer testified: "Guidebooks are about the same as talking to a person. In regards to the Slingluff Guide, which has been mentioned here, he writes in the first person right at you. It's about like a conversation with an expert on the river." *See* Tr. at 12/16/14:418-19 (Farmer).

565. Similar to the Forest Service Guide, the Slingluff Guide does not characterize the Verde River as a navigable stream suitable to be a highway for commerce:

a. Mr. Slingluff writes: "Like most boaters, I like my streams made interesting with rocks, current, and various obstructions." *See* Slingluff Guide, at 5 [X035_ASLD 162].

b. "Be very careful near all strainers. They are involved in a large percentage of the very few paddling deaths that occur every year." *See id.* at 11.

c. "When trying to decide whether or not to run a rapid, be influenced by the following: 1. If you don't run it successfully, you will be required to swim it from whatever point your failure occurs." *See id.*

d. "It is always faster to walk a rapid and line the boat through than it is to clean up after an upset or attempt to deal with a pin." *See id.*

e. "If you swamp your boat, stay upstream of it." *See id.*

f. "If you are going to face substantial whitewater, put additional flotation in your canoe. Tying inner tubes into the thwarts does nicely." *See id.*

g. "If you find yourself swimming in a rapid, get on your back, get your butt and feet high, and keep your fingers in a fist. You are trying to minimize the portions of your fragile body that could strike or get stuck between the rocks." *See id.* at 12.

h. "If you are pushed into an obstruction, the water will attempt to seize your upstream edge as soon as your speed is slower than that of the current and flip you over. You can counter this by leaning in such a way as to show the bottom of your craft to the current." *See id.*

i. "Do not paddle into a drop that has a vertical drop where the water at the bottom flows back up to the drop (up river). Such drops are called drowning machines, or reversals." *See id.*

j. "Boaters slang for a helmet is a 'brain bucket.' I like the term. It clearly states the reason why helmets should be worn. Kayakers and other decked boaters should always wear their 'brain buckets.' Open boaters, canoeists, and inflatable paddlers should wear them whenever they paddle Class 3 or higher water, or whenever dropping over waterfalls." *See id.*

k. "I really recommend you put on below the Verde Ranch. Just below the Ranch, the river splits its meager flow around an island. Neither channel has enough water to paddle (normally, so boaters are faced with dragging their boats over a considerable distance.

If there would be enough water to paddle, you would be swept by the fast current into all sorts of trees and shrubs." *See id.* at 21.

l. "Two miles below Hell Point, 19.5 miles into the Verde's descent, is an area known as Bear Siding or US Mines. . . . In high water this whole section becomes challenging. Increased water volume brings increased water velocity. The creek is narrow with lots of high water strainers and limited spaces to get out and scout." *See id.* at 23.

m. In a section describing the stretch of the Verde between Perkinsville and TAPCO, boxed and partially bolded, it states: "In high water this whole section becomes challenging. Increased water volume brings increased water velocity. The creek is narrow with lots of high water strainers and limited spaces to get out and scout." *See id.* at 29.

n. In the section describing the stretch of the Verde between Beasley Flats and Childs, Mr. Slingluff writes: "I've boated this section at 47 cfs (Camp Verde) and it took two days. I was out of my boat a good bit, dragging over rock bars." *See id.* at 85.

o. "At 500 cfs, the river has a lot of push but has not yet buried many of the rocks. This is the level when the very first larger rowing rafts may appear. It is my favorite level. I love the technical demands of dodging all those rocks. Since the river doesn't flow at this level regularly, no clear channel is created. It is a fast run through irregular obstacles." *See id.* at 86.

p. "Rock bars are typically created by the outflow of some drainage, in this case, the Chasm Creek and Sycamore Creek drain gauges. These rocks are deposited by floods and rearranged by floods. It stands to reason, then, that channels will be ill-defined and changeable from flood to flood." *See id.* at 89.

q. "At low levels (below 90 cfs at Camp Verde), there is an acknowledgeable risk of a midstream pin upstream of Punk Rock. If you find yourself too far to the right, there is also a risk of being pinned into one of the small channels to the right of Punk Rock. At all levels, the current will want to carry you right smack dab into (or over)

Punk Rock. If the current is not flowing over the Rock, it will pillow up against it, giving you a last minute advantage to get around." *See id.* at 91.

r. "About one-mile below Punk Rock the river pools up against a river right cliff and a very large rock bar that blocks the entire main channel. You have arrived at Bushman Rapid. Bushman was named for a tree that was inconveniently placed in the only boatable channel. Eventually, some river runner went into Bushman at very low levels and sawed the offender off. The drop still has plenty of challenge and fun. The stump has new growth and may soon again eat boaters. The channel is to the extreme river left. It takes off to the left, traveling only a very short distance before it hits a very steep bank and is forced to turn to the right. The top of the drop can be too shallow to boat at levels much below 150 cfs." *See id.*

s. "Below Fossil Creek a large island shows on the topo maps. This island exists only at higher flows. At normal flows, all the water descends the river right channel. The trip around this 'island' is shallow and rocky, with one very deceptive little rapid party way into your descent. Be on the lookout for a good-sized boulder out in the current. At levels below 200 cfs (Camp Verde) the left channel is totally obstructed, but from above the right channel appears boatable. It IS boatable, if you manage to avoid the two hidden rocks immediately over the lip of the drop. If you don't avoid them, you have pinned your boat in very fast current at the beginning of a trip through Wilderness. If I am heavily-loaded, I drag around over the left channel." *See id.* at 102-03.

t. In a section describing the stretch of the Verde between Horseshoe Dam and Bartlett Dam, in a box, it states: "The first mile or so is braided and, depending on which braids have water, could contain some very nasty strainers. If paddling, you may want to skip it and put on a mile or so downstream near KA Ranch." *See id.* at 117.

u. "I believe plastic canoes are the best single craft to have. They do not conduct heat or cold very well, they are durable, and they slide easily off rocks. Touching a metal boat in the dead of winter or in the heat of summer is not fun. Metal, wood and

fiberglass all lack the durability necessary to boat shallow creeks. None of the latter materials will slide off rocks as well as does plastic." *See id.* at 149.

566. Also submitted to the Commission was an excerpt from the Second Edition of Mr. Slingluff's Guide. *See* Jim Slingluff, Verde River Recreation Guide, Second Edition, 1990 [X038].

567. In the second edition, Mr. Slingluff cautions boaters: "Boaters, paddler clubs, and paddler magazines SHOULD NOT say or infer that a stream is unboatable if what they mean is the stream is too low, or high, or rough, or flat or tree-lined for their particular paddling tastes. Such comments could find their way into the commission or court as evidence that a stream has minimal public value or was not navigable at statehood. Also, go paddle small streams and keep careful records of dates and conditions. Finally, don't forget to write the state land commissioner and let him know you possess information relating to the issue of stream navigability and/or public values. None of us can let our individual and group responsibilities drop on this. It is the boaters, (past, present, and future) who hold the responsibility to secure the beachhead for the coming fight. All share in the fight to see that all public interests are known and protected." *See id.* at 148.

568. Another boating guide submitted to the Commission is Bob Williams's A Floater's Guide to the Verde River, dated 1996. *See* Bob Williams, A Floater's Guide to the Verde River, 1996 [X035_ASLD 155] ("Williams Guide").

569. Mr. Fuller used Bob Williams' boating guide to determine his segmentation. *See* Tr. at 12/15/14:48-49 (Fuller).

570. With regard to Mr. Williams' boating guide, Mr. Fuller testified "Mr. Williams . . . has no reason to fabricate the conditions that he observed and reported on . . . ." *See* Tr. at 12/16/14:277 (Fuller).

571. Similar to the Forest Service and Slingluff guides, the Williams Guide does not characterize the Verde River as a navigable stream suitable to be a highway for commerce:

a. Discussing his first boating trip on the Verde, Mr. Williams writes: "As I recall, the trip went fairly well until I met 'Off-the-Wall' rapid eleven miles downriver. I hit the Wall, rolled the boat in classic greenhorn style, took a long turbulent swim, destroyed the keel tubing on the Coleman, about drowned my dog, and soaked every open pore of my gear. After regrouping, I limped the *Minnow* down to the Falls, took one look at the drops and said, 'I'm outta here!' carried my boat and gear up to the Falls Road, walked and hitched into town, and called my brother." *See* Williams Guide, at iv [X035_ASLD 155].

b. "In time, I went down the Childs run with a buddy and renewed my confidence. We lost it in two drops between Beasley and Gap Creek, but not at the Wall." *See id.*

c. "A very temperamental, mercurial and unpredictable river above the dams. Low water boating enthusiasts usually have no trouble planning a trip on some section at any time of the year." *See id.* at v.

d. Describing the section of the Verde from Granite Creek to Forest Road, Mr. Williams writes: "This five miles is shallow and narrow most of the year. You'll use your paddle more as a pole as you plod down this tiny and fragile creek of a river. Expect wear and tear during the countless drag-throughs. You'll be sorely disappointed if you came down here expecting a leisurely paddle dipping cruise." *See id.* at 8 (underlining in original).

e. Describing the section of the Verde from Pipeline to Perkinsville, Mr. Williams writes: "Expect slow going and long miles during this stretch of the Verde during normal flow. If you paddle a heavily loaded tandem canoe, it may be a laborious task to cover only five miles in a day. Going solo, you may find some easier times; but even if you ride as high as a water strider and work as a hard as a beaver, you'll be lucky to cover ten. There are enough lovely small pools to enjoy some actual paddling moments, but on the whole you'll find yourself zagging and zigging among the countless low spots that are just waiting to bump you around or bring you to a grinding halt." *See id.* at 14.

f. "Government Canyon and 'The Guv Drop.' With Arizona's notoriety in the Guv category, who could resist the moniker for this rocky and noteworthy spot! Almost the entire vertical change of this river mile is accounted at this place. 'Guv Drop' descends at least ten feet in twenty yards, so floaters should reapply their cautions and be readily prepared for boulder hopping." *See id.* at 25.

g. "During my first run through here from Morgan Ranch I made the mistake of leaving too many miles to paddle and pole on my final day. I had to get from mile 33 to TAPCO (mile 46) by mid-afternoon in order to meet my shuttle schedule. It was a torturous and exhausting day that allowed me little time to appreciate the surroundings. Since then, I have never tried to paddle more than ten miles a day, and I have usually arranged trips that are more in the seven or eight miles per day range. There is just too much to do and see down here to allow rocky drops and drag-throughs to get you down during a hurried day." *See id.* at 30.

h. "Elevation 3,670 – Rafael Draw enters from the left soon after Mile 32.0. Low flow floaters will embark on a seemingly endless and tiring pinball through 'Rafael's Gauntlet.' The Gauntlet begins with a small typical riffle at M. 32.1, and then you encounter more knocking in the vicinity of an old ford and a once-inhabited cave on the left at M. 32.2. A respite can be found at the beautiful "Big Springs" on the left at M. 32.3. I've seen these springs spill into the Verde at all times of the year, making it an ideal little break spot. Soon after the springs, you'll hit more and more slow going, bumps and grinds, and likely walk-throughs during the remainder of Rafael's Gauntlet." *See id.* at 35.

i. Describing the Verde from Beasley Flats to the Childs Campground, Mr. Williams writes: "On the other paddle, this is not a stretch for novices. Please choose a Verde Valley run to cut your teeth on moving water. I have seen many wrecked boats, witnessed inflating concerns and fear and heard many stories of hardship and emergency. Down here, one must be prepared and in the company of other knowledgeable boaters." *See id.* at 70.

j. Describing the same section, Mr. Williams writes: "What floaters will encounter down here depends entirely on the flow of the Wild and Scenic Verde. It can come up and go down in a matter of hours, or less! So the common question of 'what is the c.f.s.?' may be met with close approximations at best even from river rats and SRP gauge guardians. The following are only roughed-out descriptions based on personal experience and excessive calls to Flowline." *See id.* at 73.

k. Describing the stretch when the flow is below 100 cfs, Mr. Williams writes: "Rocks surface everywhere but in the pools. Drag-overs are common and getting hung up midway through drops such as Off-The Wall, Punk Rock and Bushman is highly probable. Just plan to line over Prefalls and the Falls. Running with this flow can be frustrating and tiring, but also fascinating as the river exposes its bed and bowels for viewing pleasure of the off-season floater." *See id.*

l. Describing the stretch when the flow is between 100 and 200 cfs, Mr. Williams writes: "Still too many rocks to avoid even for shallow draft crafts. However, there are fewer drag-overs. Tandem or heavily loaded canoes can run this flow, but expect slow going. Prefalls can be run with a scrape or two, but come back later to hit the Falls unless you like gouges and possibly pointless problems." *See id.*

m. Describing the stretch when the flow is between 200 and 400 cfs, Mr. Williams writes: writes "Here is a nifty range for your first run down here. More rocks are buried, but the river has yet to gain the push that could cause pause with greenhorns. Prefalls can be run with a lightened boats and better odds of clean going. Prefalls and the Falls should be done only by experienced paddlers and with companions at the ready from this cfs and higher. All of the named rapids still have their share of rocks that could blow set-ups or kick you over, so scout them well if you are new to this stretch." *See id.*

n. Describing the stretch when the flow is between 400 and 600 cfs, Mr. Williams writes: "Now we're getting close to the volume where rafts can share the flow. Those little troublesome rocks get washed and some river force and hydraulics appear.

Decent paddling skill becomes a necessity. Learning by doing is a great philosophy, but it shouldn't be applied by learners down here from this cfs on up the gauge." *See id.*

o. Describing the stretch when the flow is between 600 and 1000 cfs, Mr. Williams writes: "Larger rafts can now consider the Verde fun and runnable. Canoes should expect a swift and wet ride. Powerful hydraulics, sizeable waves, and required maneuvers in current make this a nifty level for seasoned paddlers. If you choose to run Prefalls, have companions below to help prevent a wrong-side-up entrance into The Falls. The right channel of Prefalls is clear and fun in and of itself. The Falls can be run flush. All named drops should be scouted. Mid river wraps present more serious prospects at these higher flows." *See id.*

p. Describing the stretch when the flow is between 1000 and 3000 cfs, Mr. Williams writes: "The Verde is now bank wide on the flats and very pushy in the drops and chutes. All but heavier rafts will have smooth going. Open boaters can expect to get very wet. The width of the Verde in this high water stage gives boaters more options for 'cheating' some rapids. Most small boat floaters should consider skipping The Falls and Punk Rock and opting for the right channels of Prefalls and Bushman. Be careful at S-Curve and Rocky Split because of the strainers and pushy currents. Wide rocky drops like Sycamore and Childs provide pure dancing enjoyment. Please remember when planning a trip that these increased flows do quicken your pace, but more time is required for scouts and bails and ports or lines." *See id.*

q. "Mile 90.5 – Paddle over near the right shore as the Verde starts to make a wide right turn. When you hear the rush of rapid, pull over and scout. Here is the Verde's first significant drop in quite a while. If you don't like what you see, consider paddling back to Beasley because Off-The-Wall is an easy Class II compared to many rapids below. The common approach is river right. The flow over the rock bar on the left may force you upon the right wall, so you should plan a left draw stroke or two just below the entrance. In low water, there are a couple of exposed rocks to watch for midway down. Be steady and try to

keep in line with the current. In high water, Off-the-Wall lateral waves and holes will try to fill you up. Below the main part of this rapid, in high water, you may find a nasty lateral recirculating hole created by the current clashing with the wall and a submerged ledge. Work left to avoid it or brace well. During a run at 2,000, I inadvertently surfed most of it before it overpowered my downstream lean and dumped me. If you wish to skip the whole shebang, dragging over the far left part of the rock bar is a safe option." *See id.*

r. With regard to "Safety Valve Rapid," Mr. Williams writes: "This channel is the easier way to go, but don't be misled! Challenge awaits in 'Safety Valve' as well. You'll have to do some fancy paddle work to avoid rocks and strainers. Don't fill up in here because recovery before the Main Falls may be impossible. Where the channels merge, the current can be severely pushy. You should have discussed a strategy for this spot during your initial scout above. Either ferry to the left shore, or lacking the wherewithal to accomplish that, pull over to the right. In lower flows, you will have to drag over parts of 'Safety Valve.'" *See id.* at 77.

s. "Prefalls present real problems for heavily loaded boats. I always lighten up before running both of the Falls. It is worth the effort to run loftier and safer." *See id.* at 78.

t. "Once the prefalls is run, skirted, ported or lined, the Falls and its pitfalls should be thoroughly pondered. You are at the Verde's most notorious spot and serious accidents have happened right here." *See id.*

u. "One of my most memorable river scares happened while camping below Chasm Creek around M. 93.2. Just before dusk, I noticed an overturned and obviously heavily loaded inflatable kayak adrift in mid-channel. A buddy and I launched our canoe and ferried furiously to the inflatable before it and we would be swept into Sycamore Rock Gardens. Relief swept over us when we reached the far shore and found nothing except parcels of soaked and ruined gear. While we prepared to ferry the boat back to camp, our other friends had begun their scramble upstream to find the owner. Thanks be to the river

Gods that the kayaker arrived in camp physically intact and in only an initial stage of hypothermia. He and his companion, also in an inflatable, had both tipped at the Falls, lost their boats and swam the entire distance to Mile 92.0. We caught one boat and a strainer caught the other, or this entire lucky scenario could have been otherwise." *See id.*

v. Describing "Rock 'n Middle Rapid," Mr. Williams writes: "This tricky Class II rapid has claimed more than its share of victims because of the narrow and rocky top portion and the big rock itself. This rapid is one of those that is more technical in moderate to low flows (500 cfs or less). It takes some slick paddle work to avoid the rocks at the beginning, some of which could easily veer you broadside at a bad time. If you have the faintest doubts about getting safely down the upper lip, you should consider lining down the right side. If all goes well in the top, you'll immediately start to draw hard right to safely skirt Rock 'n Middle itself. Before I saw that beautiful canoe wrapped and thoroughly destroyed here in 1991, I hadn't given Rock n' Middle more than the usual concern and caution! From then on my respect has grown for what could happen here. Please be careful." *See id.* at 99.

572. The Commission finds, as a matter of fact, that the evidence relating to modern boating supports the conclusion that the Verde was not, in its ordinary and natural condition at the time of statehood, susceptible to being used as a highway for commerce. *See* Findings of Fact 487-571.

**ORDINARY AND NATURAL CONDITION**

573. The flow of the Verde is dynamic and variable. *See* Findings of Fact 252-266.

574. The Verde always has been subject to unpredictable flooding and seasonal periods of high flows. *See, e.g.,* Findings of Fact 137, 174, 219, 223-230, 234-235, 237, 239, 241, 245, 252, 259-261, 267, 354.

575. The Commission finds, as a matter of fact, that the Verde is in its "ordinary" condition when it is not in a state of flood or drought.

576. Floods on the Verde can alter the channel morphology in a manner that persists long after the flood flows have receded. *See* Findings of Fact 349-367.

577. The Commission finds, as a matter of fact, that the channel changes that persist after flood flows recede are part of the "ordinary" condition of the Verde. *See* Findings of Fact 339-367.

578. The Commission finds, as a matter of fact, that any particular segment of the Verde was in its "natural" condition prior to the commencement of upstream diversions and groundwater pumping and prior to the construction of upstream dams.

579. Non-Native diversions began on the Verde in ASLD Segments 2, 4, and 5 in the 1860s. *See* Findings of Fact 140, 142.

580. Evidence in the record regarding the commencement of diversions in the watershed upstream from ASLD Segment 2 is less specific, but the available evidence suggests that such diversions began in the late 1800s. *See* Findings of Fact 303-338.

581. Widespread groundwater pumping did not begin in Arizona until well after statehood. *See* Tr. at 04/02/15:3437-38 (Burtell).

582. The first large dams on the Verde were not constructed until well after statehood. *See* Fuller 2003, at 3-1.

583. The Commission finds, as a matter of fact, that the Verde was in its "natural" condition in and prior to the 1860s for ASLD Segments 2, 3, 4, and 5 and in and prior to the late 1800s for ASLD Segments 0 and 1. *See* Findings of Fact 578-582.

. . .

## CONCLUSIONS OF LAW

Based upon the evidence in the record and application of applicable federal and state law, the Commission makes the following conclusions on questions of law and mixed questions of law and fact:

**THE COMMISSION'S ROLE**

1. A watercourse can meet the test for "navigability" under the Arizona statute and the case law if it satisfies either of two elements: (1) If it was actually used as a "highway for commerce," or (2) if it was "susceptible to being used" as a "highway for commerce." *See* A.R.S.§ 37-1101(5). In making such determinations, "all evidence should be examined during navigability determinations and no relevant facts should be excluded." *Defenders of Wildlife v. Hull*, 199 Ariz. 411, 425, 18 P.2d 722, 736 (App. 2001). "[A] river is navigable in law when it is navigable in fact." *Muckleshoot Indian Tribe v. FERC*, 993 F.2d 1428, 1431 (9th Cir. 1993). Thus, the Commission must consider all of the evidence in the record before it. When the Commission reviews the evidence, it should determine that the Verde never has been used or susceptible to being used as a "highway for commerce."

**BURDEN OF PROOF**

2. The Arizona courts have long held that the proponents of navigability bear the burden of proving that a river is navigable. *See Land Dep't v. O'Toole*, 154 Ariz. 43, 46 n.2, 739 P.2d 1360, 1363 n.2 (App. 1987); *Arizona Ctr. for Law in the Public Interest v. Hassell*, 172 Ariz. 356, 363 n.10, 837 P.2d 158, 165 n.10 (App. 1991); *Defenders of Wildlife v. Hull*, 199 Ariz. 411, 420, 18 P.2d 722, 731 (App. 2001); *State ex rel. Winkleman v. Arizona Navigable Stream Adjudication Comm'n*, 224 Ariz. 230, 238, 229 P.3d 242, 250 (App. 2010) ("*State v. ANSAC*").

3. The Arizona statutes further support this allocation of the burden. In order for the Commission to determine that a particular watercourse or segment thereof is "navigable," the proponents of navigability must establish that fact by a "preponderance of the evidence." *See* A.R.S. § 37-1128(A). If sufficient evidence is not presented to show navigability for a

particular watercourse or segment, the Commission must find that watercourse or segment non-navigable. *Id.*

**ORDINARY AND NATURAL CONDITION**

4. The U.S. Supreme Court in *PPL Montana* rejected the "liberal" interpretation of the federal test of navigability that had been adopted by the Montana Supreme Court, an interpretation that has been advocated by the proponents of navigability in this and other Arizona cases. The Montana Supreme Court had stated: "Broadly speaking, the District Court perceived the navigability for title test as somewhat 'fluid.' . . . Our independent review of the caselaw in this area establishes unequivocally that the District Court's understanding of the navigability for title test was correct. The concept of navigability for title purposes is very liberally construed by the United States Supreme Court. . . ." *PPL Montana, LLC v. State*, 355 Mont. 402, 229 P.3d 421, 446 (2010), *rev'd,* 132 S. Ct. 1215 (2012). The Montana Supreme Court had applied that "very liberal" interpretation of the navigability test and also had adopted a similarly broad definition of "commerce": "Additionally, the term 'commerce' in the navigability for title context is very broadly construed. . . . Because navigability is based upon a broad definition of commerce combined with an 'actual' or 'susceptible of use' standard, present-day usage of a river may be probative of its status as a navigable river at the time of statehood. . . ." *Id.* at 446-47 (citations omitted).

5. The U.S. Supreme Court reversed the Montana Supreme Court's decision and soundly rejected its reasoning. 132 S. Ct. at 1215. In reaching its decision, the Court took the opportunity to clarify and restate the law of navigability from its prior decisions and to rein in the more "liberal" and expansive constructions of that law proffered by some state courts and lower federal courts in recent years, including:

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

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

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

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

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

6. The proponents of navigability discount the natural obstructions and other impediments to navigation on the Verde, contending that, under the liberal interpretation of the federal test, the river was navigable in its "ordinary and natural condition." The *PPL*

*Montana* opinion makes clear, however, that natural obstructions to navigation that would require portages can and often do make the river nonnavigable:

> . . . Even if portage were to take travelers only one day, its significance is the same; it demonstrates the need to bypass the river segment, all because that part of the river is nonnavigable. Thus, the Montana Supreme Court was wrong to state, with respect to the Great Falls reach and other stretches of the rivers in question, that portages "are not sufficient to defeat a finding of navigability." 355 Mont., at 438, 229 P.3d at 446. In most cases, they are, because they require transportation over land rather than over the water. . . .

132 S. Ct. at 1231.

7. The Commission concludes, as a matter of law, that the Verde is in its "ordinary" condition when it is not in a state of flood or drought. *See State v. ANSAC*, 224 Ariz. at 241-42, 229 P.3d at 253-54.

8. The Commission concludes, a matter of law, that the channel changes that persist after flood flows recede are part of the "ordinary" condition of the Verde. *See* Findings of Fact 576-577; *see also State v. ANSAC*, 224 Ariz. at 241-42, 229 P.3d at 253-54

9. The Commission concludes, as a matter of law, that any particular segment of the Verde was in its "natural" condition prior to the commencement of upstream diversions and groundwater pumping and prior to the construction of upstream dams. *See State v. ANSAC*, 224 Ariz. at 241-42, 229 P.3d at 253-54.

10. The Commission concludes, as a matter of law, that the Verde was in its "natural" condition in and prior to the 1860s for ASLD Segments 2, 3, 4, and 5 and in and prior to the late 1800s for Segments 0 and 1. *See* Findings of Fact 578-583.

**SEGMENTATION**

11. The Commission has examined the evidence and made its assessment of navigability based upon the segmentation proposed by ASLD. Because the Commission finds and concludes, as a matter of fact and law, that the entirety of the Verde River is non-navigable, *see* Conclusions of Law 22-32, *infra*, the Commission has determined that further

discussion of segmentation is unnecessary for purposes of its decision. *See* Findings of Fact 29-33.

**ACTUAL NAVIGATION ON THE VERDE**

12. No evidence exists of any prehistoric boating or flotation of logs on the Verde. *See* Findings of Fact 76-97, *supra*. Likewise, no credible evidence exists that the early explorers, soldiers, or settlers ever used the river—for "commerce" or otherwise. *See* Findings of Fact 98-145; *see also Lykes Bros., Inc. v. Corps of Eng'rs*, 821 F. Supp. 1457, 1459 (M.D. Fla. 1993), *aff'd*, 64 F.3d 630 (11th Cir. 1995) (had river been navigable, it would seem obvious that military and settlers would have used the river to transport men and supplies rather than carrying them overland). The evidence of the isolated accounts of attempted boating does not establish that the river was used for any type of trade or travel. *Id.* Insufficient evidence exists to show that the Verde ever was actually navigated.

13. The Commission concludes, as a matter of law, that the Verde was not actually used as a "highway for commerce." *See* Findings of Fact 76-208.

**SUSCEPTIBILITY TO NAVIGATION**

14. Because the Verde was never actually used as a "highway for commerce," the only way it can be considered navigable is if it was "susceptible" to such use. Insufficient evidence exists in the record to show that the river, in any condition at any time, was capable of acting as "a corridor or conduit within which the exchange of goods, commodities or property or the transportation of persons may be conducted." A.R.S § 37-1101(3) (defining "highway for commerce"); *see also* Findings of Fact 76-208,

15. Although a flood does not fall within the natural and ordinary condition of the River, the effects of a flood on the geomorphology of a river cannot be ignored. *See* Findings of Fact 339-486, *supra*.

16. The vast majority of the proponents of navigability's case relies entirely on evidence of modern recreational boating, contrary to the guidance of *PPL Montana*, 132 S. Ct. at 1233, 1233-34 ("If modern watercraft permit navigability where the historical

watercraft would not, . . . then the evidence of present-day use has limited or no bearing on navigability at statehood.").

17. The proponents' own boating witnesses readily admit that modern recreational boats are exceedingly more light, durable, and nimble, for instance, Mr. Slingluff wrote: "Plastic canoes are durable, slide easily over rocks, slip quietly through the water, and do not conduct heat or cold. Plastic canoes can open areas to sportsmen that are otherwise only a wish." *See* Findings of Fact 505-539, *supra*. In contrast, historic statehood era craft were likely to last only a trip or two. *See* Finding of Fact 515, *supra*.

18. The proponents of navigability also readily admit that, in their optimistic estimations, the Verde River can support only small draft boats like canoes and kayaks, which severely limits the modes of commercial trade and travel the Verde might support. *See* Findings of Fact 492-504, *supra*.

19. The Commission also finds Mr. Fuller's definition of "successful" boating exceedingly broad and without any relation to a commercial reality. *See* Findings of Fact 540-542, *supra*. The fact that a skilled kayaker in a modern plastic or inflatable craft can float, bump, and scrape down a shallow stream does not make it navigable. If that were the case, modern recreational boating enthusiasts have demonstrated that nearly every stream in the United States is navigable for title purposes. A commercial boater or traveler at the time of statehood would have a far greater concern for crashing, wrecking, or swamping their boats and damaging or losing their valuable cargo or customers. This explains the dearth of boating in the Verde's history until the later twentieth century when plastic boats were introduced.

20. The Commission concludes, as a matter of law, that the Verde was not, in its ordinary and natural condition at the time of statehood, susceptible to being used as a "highway for commerce." *See* Findings of Fact 146-585; Conclusions of Law 15-20.

**DETERMINATION OF NON-NAVIGABILITY**

21. In its 2001 decision in *Defenders of Wildlife v. Hull*, the Arizona Court of Appeals stated that "all evidence should be examined during navigability determinations and

no relevant facts should be excluded." 199 Ariz. 411, 425, 18 P.3d 722, 736 (App. 2001). "[A] river is navigable in law when it is navigable in fact." *Muckleshoot Indian Tribe v. FERC*, 993 F.2d 1428, 1431 (9th Cir. 1993).

22. In reaching its determination that the Verde is and was non-navigable, the Commission considered all of the evidence in the record before it. *See* Findings of Fact, *supra*.

23. A watercourse can meet the test for "navigability" under the Arizona statute and the case law if it satisfies either of two elements: (1) If it was actually used as a "highway for commerce," or (2) if it was "susceptible to being used" as a "highway for commerce." *See* A.R.S. § 37-1101(5); *see also generally Elder v. Delcour*, 263 S.W.2d 221, 226 (Mo. App. 1953).

24. The Commission finds and concludes, as a matter of fact and law, that the Verde has never been actually used as a "highway for commerce." *See* Findings of Fact 76-208; Conclusions of Law 13-14. No evidence exists of any prehistoric boating or flotation of logs on the river. *See* Findings of Fact 76-97, *supra*. Insufficient evidence exists to support a finding that the early explorers, soldiers, or settlers in the area near the river, who traveled through the area on several occasions, used the river—for "commerce" or otherwise. *See* Findings of Fact 98-145*; see also Lykes Bros., Inc. v. Corps of Eng'rs*, 821 F. Supp. 1457, 1459 (M.D. Fla. 1993), *aff'd*, 64 F.3d 630 (11th Cir. 1995) (court found that had river been navigable, it would seem obvious that military and settlers would have used the river to transport men and supplies rather than carrying them overland). The evidence of the isolated accounts of attempted boating on the river, discussed in detail in Findings of Fact 170-208, did not establish that the river was used for any type of regular (or even periodic) trade or transportation during the period immediately before and at statehood. *See id.*

25. Because the river was never actually used as a "highway for commerce," the only way it can be considered navigable is if it was "susceptible" to such use. *See* A.R.S. § 37-1101(5).

26. Sufficient evidence was not presented to the Commission to show that the river, in any condition at any time, was capable of acting as "a corridor or conduit within which the exchange of goods, commodities or property or the transportation of persons may be conducted." A.R.S § 37-1101(3) (defining "highway for commerce").

27. Although the river existed in close proximity to much of the exploration and settlement in early Arizona, it was never used for any type of regular trade or transportation. In order for the Commission to determine that the river was "susceptible to being used . . . as a highway for commerce," it must find that the prehistoric inhabitants, the early explorers, the trappers, settlers, military, and thousands of citizens who resided along the river and in the general area prior to statehood simply failed to comprehend the potential usefulness of the river as an avenue for navigation. No evidence exists to support such a finding. *See also, e.g., Webb v. Board of Comm'rs of Neosho County*, 257 P. 966 (Kan. 1927).

28. It might be theoretically possible that, on one or more occasions in particular years, it would have been feasible for a person to float a boat down some portion of the river. Occasional use in exceptional times does not, however, support a finding of navigability. *Miami Valley Conservancy Dist. v. Alexander*, 692 F.2d 447, 451 (6th Cir. 1982) ("limited," "sporadic," "minimal," and "uniformly unsuccessful" evidence of boat use on creek does not establish navigability, without specific evidence of successful commercial navigation); *see also United States v. Oregon*, 295 U.S. 1, 23 (1935) (evidence of sporadic and ineffective use of boats was not enough to find water course navigable); *North Dakota v. United States*, 770 F. Supp. at 509-10 (unique, isolated tie drive in time of high water was not enough to establish river navigability); *see also United States v. Harrell*, 926 F.2d 1036, 1040 (11th Cir. 1991); *Harrison v. Fite*, 148 F. 781, 784 (8th Cir. 1906) ("A theoretical or potential navigability, or one that is temporary, precarious, and unprofitable, is not sufficient. While the navigable quality of a water course need not be continuous, yet it should continue long enough to be useful and valuable in transportation. . . . Mere depth of water, without profitable utility, will not render a water course navigable in the legal sense . . . nor will the

fact that it is sufficient for pleasure boating or to enable hunters or fishermen to float their skiffs or canoes."); *In re River Queen*, 275 F. Supp. 403, 407 (W.D. Ark. 1967) (when determining navigability, court "inquiry should be made as to the number of persons the stream would accommodate and the nature and extent of the kinds of vessels it would carry. The mere fact that the stream might at times carry single logs or canoes or the average row boat used by fishermen is not sufficient to establish the navigability of the stream. It must serve a useful purpose in opening a commercial route for the people living along its banks") (citing 56 *Am. Jur.*, Waters §§ 180-181).

29. "The mere fact that a river will occasionally float logs, poles, and rafts downstream in times of high water does not make the river navigable." *United States v. Crow, Pope & Land Ents., Inc.*, 340 F. Supp. 25, 32 (N.D. Ga. 1972) (citing *United States v. Rio Grande Dam & Irr. Co.*, 174 U.S. 690 (1989)). "The waterway must be susceptible for use as a channel of useful commerce and not merely capable of exceptional transportation during periods of high water." *Id.* (citing *Brewer-Elliott Oil & Gas Co. v. United States*, 260 U.S. 77 (1922)); *see also United States v. Harrell*, 926 F.2d at 1036 ("susceptibility of use as a highway for commerce should not be confined to 'exceptional conditions or short periods of temporary high water'") (quoting *United States v. Utah*, 283 U.S. 64, 87 (1931)); *Lykes Bros.*, 821 F. Supp. at 1463 ("Evidence of navigation during periods of flooding or abnormally high water is not sufficient to support a finding of navigability.") (citations omitted).

30. No government agency, including federal land surveyors, ever indicated that the Verde was navigable. *See* Findings of Fact Nos. 146-169, 209-248; *see also United States v. Oregon*, 295 U.S. at 23 (courts should consider government's treatment of watercourse as non-navigable in their analysis of navigability); *see also Washington Water Power Co. v. Federal Energy Regulatory Comm'n*, 775 F.2d 305, 332 (D.C. Cir. 1985) (government's, including Army Corps of Engineers,' description and treatment of river is relevant to determination of river navigability). Likewise, no federal or state land patent indicated that the Verde was navigable. *See* Findings of Fact Nos. 157-169; *see also Lykes Bros.*, 821 F.

Supp. at 1460 (court found actions by State show that, for many years, it considered river non-navigable, e.g., land bordering river had been deeded to private ownership and owners paid taxes); *Koch v. Department of Interior*, 47 F.3d 1015, 1019 (10th Cir. 1995) (because Federal Government did not express intent to retain island in non-navigable river, title to island passed to patent holder).

31. Based upon all of the historical and scientific data and information, documents, and other evidence produced and considered by the Commission, the Commission finds that the Verde, in its ordinary and natural condition, was not used or susceptible to being used as a highway for commerce as of February 14, 1912 and therefore was not navigable as defined in A.R.S. § 37-1101(5).

DATED this 9th day of November, 2015.

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## APPENDIX 1
**Evidence Cited**

| NO. | DATE | DESCRIPTION | SHORT CITE |
|---|---|---|---|
| N/A | Various | Reporter's Transcript of Proceedings | Tr. |
| EI 12 | 1997 | United States Forest Service, "Recreation Opportunity Guide for the Verde River" | Forest Service Guide |
| EI 30 | 12/2004 | Schumm, "Geomorphic Character of the Verde River" | Schumm 2004 |
| EI 31 | 06/2003 | Fuller, et al., "Arizona Stream Navigability Study for the Verde River, Salt River Confluence to the Sullivan Lake" | Fuller 2003 |
| EI 32 | 07/07/2005 | Littlefield, "Assessment of the Verde River's Navigability Prior to and on the Date of Arizona's Statehood, February 14, 1912" | Littlefield 2005 |
| EI 34-2 | 01/18/2006 | Slingluff, Power Point Presentation | |
| EI 34-1 | 1990/91 | Slingluff, "Shallow Streams: Liquid Paths Into Wilderness," *The Southwestern Sportsman National Magazine* | Slingluff, *Southwestern Sportsman* |
| EI 35 | 04/1991 | Slingluff, "Stream Canoeing In Arizona," *Arizona Hunter and Angler* | |
| X002 | 04/03/2014 | Littlefield, "Revised and Updated Report: Assessment of the Navigability of the Verde River Prior to and on the Date of Arizona's Statehood, February 14, 1912" | Littlefield 2014 |
| X009 | 09/2014 | Burtell, "Declaration of Rich Burtell on the Non-Navigability of the Verde River at and Prior to Statehood" | Burtell 2014 |
| X015 | 10/04/2014 | Hjalmarson, "Navigability Along the Natural Channel of the Verde River, AZ, Detailed Analysis from Sullivan Lake to the USGS Gage Near Clarkdale and General Analysis from Clarkdale Gage to Mouth" | Hjalmarson 2014 |
| X016 | 10/10/2014 | Mussetter, "Declaration Navigability of the Verde River." | Mussetter 2014 |
| X035 | 10/2014 | Fuller, "Presentation to ANSAC: Verde River Navigability" | Fuller Power Point |

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| X036 | 02/05/2015 | Hjalmarson Second Addendum | Hjalmarson 2015 |
| X037 | 2011 | D.R. Pool, et. al., "United States Geological Survey, Regional Groundwater-Flow model of the Redwall-Muav, Coconino, and Alluvial Basin Aquifer Systems of Northern and Central Arizona, Scientific Investigations Report 2-10-5180" | Pool 2011 |
| X037 (F-8) | 02/01/1868 | *Arizona Miner* (February 1, 1868) | |
| X037 (F-8) | 09/23/1871 | *Weekly Arizona Miner* (September 23, 1871) | |
| X037 (F-10) | 1894 | F. H. Newell, *Report on Agriculture by irrigation in the Western Part of the United States at the Eleventh Census: 1890* | |
| X037 (F-11) | 1881 | *The Resources of Arizona, Its Mineral, Farming, and Grazing Lands, Towns and Mining Camps; Its Rivers, Mountains, Plains, and Mesas; with a Brief Summary of its Indian Tribes, Early History, Ancient Ruins, Climate, Etc., A Manual of Reliable Information Concerning the Territory* | |
| X055 | 02/11/2015 | Affidavit of Vincent E. Randall | Randall 2015 |
| X057 | 2000 | Arizona Department of Water Resources, "Verde Watershed Study" | ADWR 2000 |
| X060 | 02/2015 | Mussetter, "Verde River Navigability" | Mussetter Power Point |
| X067 | 02/17/2015 | August, "Declaration of Jack L. August, Jr., Ph.D. on the Non-Navigability of the Verde River at and Prior to Arizona Statehood, February 14, 1912" | August 2015 |
| X024 | 10/2014 | Littlefield, "Assessment of the Verde River's Navigability on or before the Date of Arizona's Statehood, February 14, 1912" | Littlefield Power Point |
| X036 | 11/14/2014 | Hjalmarson First Addendum | Hjalmarson 2014a |
| X035_ ASLD 162 | 1990 | Jim Slingluff, Verde River Recreation Guide, First Edition | Slingluff Guide |
| X038 | 1990 | Jim Slingluff, Verde River Recreation Guide, Second Edition | |

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| X035_ ASLD 155 | 1996 | Bob Williams, A Floater's Guide to the Verde River | Williams Guide |