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BEFORE THE ARIZONA NAVIGABLE STREAM ADJUDICATION COMMISSION

In re Determination of Navigability of the Gila River	No. 03-007-NAV **PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW JOINTLY SUBMITTED BY THE SALT RIVER PROJECT, FREEPORT MINERALS CORPORATION, THE GILA RIVER INDIAN COMMUNITY, AND THE SAN CARLOS APACHE TRIBE**

Pursuant to the Second Amended Order Clarifying Deadlines and Hearing Dates dated December 23, 2014, the Salt River Project Agricultural Improvement and Power District and Salt River Valley Water Users' Association (collectively, "SRP"), Freeport Minerals Corporation ("Freeport"), the Gila River Indian Community (the "Community"), and the San Carlos Apache Tribe (the "Tribe") hereby submit their joint proposed findings of fact and

conclusions of law in this matter regarding the Gila River ("Gila"). References herein to the reporter's transcript of the evidentiary hearings held in 2003, 2004, 2005, and 2014 are set forth as "Tr. at [date:page] (witness)." Where specific transcript line references are noted, those references are shown as "ln.__." Exhibits from the hearings before 2014 are referred as "EI __." Supplemental exhibits from the 2014 hearings are referred to as "X __." A table of contents appears on page 3. The proposed findings of fact begin on page 4. The proposed conclusions of law begin on page 72. A list of evidence cited, including subsequent short cites used herein, is attached at the end of this document as Appendix 1.

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FINDINGS OF FACT

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

Summary of Evidence Submitted

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 Gila 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 Gila.

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 Gila.

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. 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 Gila, 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.

6. ANSAC has conducted two sets of hearings, in six different counties over the course of eleven years regarding the question of whether the Gila was navigable in its ordinary and natural condition on February 14, 1912.

7. The first set of hearings took place between 2003 and 2005, at which time various individuals submitted documents or oral testimony concerning the question of navigability as it applies to the Gila River. The Commission conducted the 2003-05 hearings and received and compiled evidence in accordance with A.R.S. § 37-1123 (B) and A.R.S. § 37-1126. The following hearings were held in the county seat in each county through which the Gila River flows:

a. October 14, 2003 in Graham County;

b. October 15, 2003 in Greenlee County;

c. March 9, 2004 in Pinal County;

d. November 15, 2004 in Gila County;

e. January 24, 2005 in Yuma County; and

f. November 16-17, 2005 in Maricopa County;

8. Following the 2003-05 hearings, the Commission reviewed the evidentiary record and issued a report entitled, *Report, Findings and Determination Regarding the Navigability of the Gila River from the New Mexico Border to the Confluence with the Colorado River*, dated January 27, 2009 ("ANSAC 2009 Report").

9. "Seventeen witnesses appeared at the hearings in Phoenix on November 16-17, 2005 and gave testimony. At least 11 of these witnesses were identified as experts in the fields of hydrology, hydraulics, geomorphology and history. Others were well-informed individuals in the areas of environmental law, land use, development and surveying." ANSAC 2009 Report, at 23.

10. The Commission's record included the "transcripts of testimony and what was said at the hearings." ANSAC 2009 Report, at 23 & Exhibit "C" thereto.

11. The ANSAC 2009 Report included an "Exhibit E: Evidence Log" listing the twenty-eight separate documentary filings, including studies, written documents, newspapers, and other historical accounts, pictures and recordings.

12. The ANSAC 2009 Report cited specific testimony and documentary evidence upon which the Commission relied in making its determination. *See* ANSAC 2009 Report, at 21-23.

13. Prior to the 2003-05 hearings, the Arizona State Land Department ("SLD") hired a technical consultant to perform extensive study and analysis of the Lower Gila River, which was submitted to the Commission in 1997 entitled, *The Navigability of the Gila River from the Town of Safford to its Confluence with the Colorado River; Preliminary and Final Report and Study* [EI 2]. That study was updated and revised in June 2003 by J.E. Fuller/Hydrology and Geomorphology, Inc. ("SLD/Lower") [EI 2].

14. The same SLD consultant also performed an extensive study and analysis of the Upper Gila River, which was submitted in 1997 entitled, *The Upper Gila River from the New Mexico Border to the Town of Safford; Preliminary and Final Report and Study*. That study was revised in 2003 by J.E. Fuller/Hydrology and Geomorphology, Inc. ("SLD/Upper") [EI 4].

15. Jon E. Fuller testified on behalf of the SLD regarding the SLD's Gila River navigability studies at the November 2005 hearing. Mr. Fuller's Power Point presentation for that testimony is in the record as EI 20.

16. Dr. Gary Huckleberry testified on behalf of the SLD at the November 2005 hearing regarding the geomorphology of the Gila River and presented his Report *Historical Geomorphology of the Gila River* [EI 14]. Dr. Huckleberry's report was entered into the record as part of the SLD/Upper at Chapter VII [EI 4].

17. Dr. Stanley Schumm testified at the November 2005 hearing and presented a written report on the *Geomorphic Character of the Lower Gila River* dated June 2004. His report appears in the record as EI 6.

18. Dr. Douglas Littlefield testified on behalf of SRP at the November 2005 hearing. His report from that testimony appears in the record as EI 12.

19. T. Allen Gookin testified on behalf of the Community at the March 2004 and November 2005 hearings. His presentations appear in the record as EI 5 and EI 15.

20. Dr. Jack August submitted an expert witness report in connection with the November 2005 hearing. That report, entitled *The Lower Gila River: A Non-Navigable Stream on February 14, 1912*, appears in the record as EI 17.

21. The Commission has retained "all existing evidence and all existing Commission reports as part of the record . . . ." *See* Commission's October 2012 Order.

22. The Commission has considered all existing evidence and reports as part of the record in this proceeding.

23. The Commission conducted a second set of hearings in 2014, at which time the Commission heard testimony and received evidence "for the purpose of determining the navigability or nonnavigability of the Gila River in its ordinary and natural condition at the State of Arizona's admission to the United States on February 14, 1912. . . ." Tr. at 06/16/14:7 (Chairman Noble). The second set of hearings were conducted on the following dates:

a. June 16-20, 2014 in Maricopa County;

b. August 18-20, 2014 in Maricopa County; and

c. August 28, 2014 in Pinal County;

24. A court reporter was present and transcribed the 2014 proceedings.

25. A *Report on the Navigability of the Gila River, prepared for the Gila River Indian Community* by T. Allen J. Gookin, dated May 19, 2014, was submitted into evidence on May 20, 2014 as X009 ("Gookin 2014").

26. Mr. Gookin again testified before the Commission on behalf of the Community in June 2014 regarding the navigability of the Gila River. *See* Tr. at 06/18/14:720 to 06/20/2004:1020 (Gookin).

27. A revised and updated report by Dr. Douglas R. Littlefield on behalf of SRP, entitled *Assessment of the Navigability of the Gila River Between the Mouth of the Salt River*

and the Confluence with the Colorado River Prior to and on the Date of Arizona's Statehood, February 14, 1912, dated November 2013, submitted on January 28, 2014. That report appears in the record as X002 ("Littlefield Report").

28. Dr. Douglas R. Littlefield testified in August 2014 and presented slides entitled *Assessment of the Gila River's Navigability on February 14th, 1912. See* Tr. at 08/19/14:1537-1635 (Littlefield). His presentation appears in the record as part of X018 ("Littlefield Presentation").

29. SRP submitted into evidence the *Declaration Navigability of the Gila River between the Arizona-New Mexico Stateline and the Confluence with the Colorado River*, by Robert A. Mussetter, dated January 8, 2014. That presentation appears in the record as part of X003 ("Mussetter Declaration").

30. Mr. Mussetter testified before the Commission in August 2014 and presented a revised power point slides on the *Gila River Navigability. See* Tr. at 08/19/14:1648 to 08/20/14:1892 (Mussetter). His presentation appears in the record as X026 ("Mussetter Presentation").

31. Freeport submitted into evidence the *Declaration of Richard Burtell on Non-Navigability of the Upper Gila River at and Prior to Statehood, In re Determination of Navigability of the Gila River (Case No. 03-007-NAV)*, by Richard Burtell, dated May 2014 ("Burtell") [X008].

32. Mr. Burtell is a Registered Geologist with a Master's of Science in Hydrology. Mr. Burtell has over twenty-five years of experience as an environmental scientist dealing with a host of water and environmental matters, and his experience and expertise extend to matters involving geology, hydrology, and hydrogeology. Mr. Burtell worked at the Arizona Department of Water Resources ("ADWR") for twelve years. For the majority of his tenure, Mr. Burtell served as the Manager of the Adjudications Section at ADWR. As Manager of the Adjudications Section, Mr. Burtell was extensively involved in evaluating the nature and

occurrence of surface water in Arizona streams, including the Gila River. *See, e.g.,* Mr. Burtell's *Curriculum Vitae,* Attachment A to his Declaration [X001].

33. Freeport submitted into evidence the affidavit of Dr. Richard E. Lingenfelter ("Lingenfelter") dated May 16, 2014 [X008].

34. Mr. Burtell testified before the Commission on June 20, 2014. *See* Tr. at 06/20/14:1040-1284 (Burtell). Mr. Burtell testified in support of the opinions set forth in his Declaration as well as in regard to his conversations with Dr. Lingenfelter and Dr. Lingenfelter's opinions concerning navigability set forth in Dr. Lingenfelter's Affidavit. *See* Tr. at 06/20/14:1040-1284 (Burtell).

35. Freeport submitted a variety of additional evidence, much of it in support of the testimony of Mr. Burtell or Dr. Lingenfelter's affidavit.

36. Mr. Fuller testified on behalf of the SLD on June 16 and 17, 2014, and presented slides titled, *Boating in Arizona* [X020] ("Fuller/Boating"); *see also* Tr. at 06/16/14:18-97 (Fuller).

37. Mr. Fuller also testified and presented slides entitled, *Gila River Navigability* ("Fuller/Gila") [X020]; *see also* Tr. at 06/16/14:97-266 (Fuller).

38. Donald D. Farmer testified on behalf of the SLD on June 18, 2014. *See* Tr. at 06/16/14:542-642 (Farmer).

39. *The Personal Narrative of James O. Pattie of Kentucky*, was submitted by the Maricopa County Flood Control District on January 28, 2014 [X006] ("Proponents' Narrative").

40. The SLD submitted *Additional Requested Citations from Jon Fuller regarding June 11, 2014 Power Point* ("Fuller Citations"). [X033:127].

41. The Maricopa County Flood Control District submitted a document entitled, *Various Citations to Boating, Channel Conditions, Channel Segmentation and Assessment of Navigability*, by Win Hjalmarson on January 28, 2014 [X006] ("Hjalmarson 2014").

42. On June 16, 2014, the Tribe submitted into evidence sixteen *Annual Report[s] of the Governor[s] of the Arizona Territory Made to the Secretary of Interior*, for the years 1878, 1849, 1881, 1883, 1884, 1885, 1886, 1890, 1894, 1895, 1896, 1899, 1900, 1901, 1902, and 1907 (collectively, "Governor's Reports") (cited as "GR [year] at [page]").[1] [X021:93-108].

43. On May 20, 2014, the Tribe submitted into evidence a report prepared in cooperation with the Arizona Department of Transportation, United Sates Department of Transportation and the Federal Highway Administration entitled, *Arizona Transportation History* ("ADOT Report") [X010:2].

44. On August 14, 2014, the Tribe submitted into evidence Chapters 1& 2 of the *Arizona State Rail Plan* prepared by the Arizona Department of Transportation, dated 2011 ("ADOT Plan") [X031:114].

45. On September 9, 2014, the Tribe submitted into evidence a copy of the Appendices from the First Edition of the James O. Pattie Narrative, printed in 1831 ("Pattie Appendices") [X036:120].

46. The Tribe submitted into evidence a copy of the "Editor's Preface" and "Introduction" by Timothy Flint, from the 1st Edition of the James O. Pattie Narrative published in 1831 ("Flint") [X036:121].

47. The Tribe submitted into evidence a copy of the "Preface" to the 3rd Edition of the James O. Pattie Narrative, by Reuben Gold Thwaites (1905) ("Thwaites") [X036:122].

48. The Tribe submitted into evidence a copy of the "Publisher's Preface" and "Historical Introduction" to the 4th Edition, of the James O. Pattie Narrative, edited by Milo Milton Quaife, Secretary and Editor of the Burton Historical Collection ("Quaife") [X036:123].

[1] References to evidence submitted by the Tribe will be cited as EX[Supplemental Evidence Number]:Tribes Identification #] at [page].

49. The Tribe submitted into evidence a copy of the "Editor's Preface" to the 6th Edition of the James O. Pattie Narrative, by William M. Goetzmann (1962) ("Goetzmann") [X036:124].

50. The Tribe submitted into evidence a copy of the "Introduction" to the 7th Edition of the James O. Pattie Narrative by James Batman (1988) ("Batman") [X036:125].

51. The Tribe submitted into evidence a copy of the Table of Contents, and Chapter III, *Echeadnia and Herrera – Finance – The Solis Revolt 1826-1830*; and Chapter VI *Overland – Smith and Pattie – Foreigners 1826-1830* from Volume 3 of Hubert Howe Bancroft's 7 volume series, *History of California* (1886) ("Bancroft") [X036:127].

52. The Tribe submitted into evidence a copy of Chapter X, *First Decade of Mexican Rule*, from the book, *History of the State of California, a Biographical Record of The Sierras. An Historical Report of the States Marvelous Growth from Its Earliest Settlement to the Present Time*, by Prof. J.M Guinn. Chapman Publishing Co. Chicago (1906) ("Guinn") [X036:128].

53. The Tribe submitted into evidence a copy of *Appendix E: James Ohio Pattie's Vaccination Story* from the Series *Francisco or Mission Dolores*, by Zephyrin Engelhardt. Francis Herald Press, Chicago (1924) ("Zephyrin") [X036:126].

54. The Tribe submitted into evidence a series of ninety-two historical newspaper articles highlighting events dealing with the Gila River, including but not limited to, descriptions of the River during various times of year and under a multitude of conditions, boating attempts, floods, irrigation, migration, land values, commerce, railroads, etc. [X014:1-92]

55. The Tribe submitted into evidence *The Handbook of Arizona: Its Resources, History, Towns, Mines, Ruins and Scenery*, by Richard Hinton (1877) ("Hinton") [X021:113].

56. The Tribe submitted into evidence *History of Safford A Few Facts About the Establishment of the City of Safford*, from the official government website for the City of Safford. ("History of Safford") [X039:129].

57. The Tribe submitted into evidence a copy of the *Supplementary Volume, Arizona*, by F.M. Irish (1907) ("Irish") [X010:1].

History of the Gila River

58. "[I]t is known that the Gila River played a major role in the human settlement patterns and occupational successes of prehistoric development within the study area." SLD/Upper, at 2-3; *see also* SLD/Lower, at III-20.[2]

59. "[M]ost of the prehistoric habitations in the study area were close to the river." SLD/Upper, at 3; *see also id.* at 2-18, 2-19.

60. Despite the concentration of prehistoric population along all segments of the River, "[a]rchaeological research has not documented any use of the river for commercial trade and travel or any regular flotation of logs" on the river. SLD/Upper, at 3, 2-23, 8-2.

61. Mr. Fuller testified in the 2014 hearing regarding the historic boating attempts on the Gila as well as modern recreational boating on the Gila. Mr. Fuller was the only expert witness during the 2014 hearings that testified that the Gila was navigable.

62. Mr. Fuller filed no formal report with the Commission for the 2014 hearings, but rather relied upon two Power Point presentations. *See* Fuller, *Presentation to ANSAC: Gila River Navigability* (June 16, 2014) [X013] ("Fuller/Gila"); Fuller, *Boating in Arizona ca. 1912* (June 16 2014) [X020] ("Fuller/Boating").

63. Despite the human presence however, "[a]rchaeological research has not documented any use of the river for commercial trade or travel" by any of these early civilizations. SLD/Upper, at § 2-23, § 8-2.

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[2] To distinguish between the two reports submitted by the State Land Department ("SLD") for the Gila River, these Findings of Fact and Conclusions of Law refer to the report on the Upper Gila as "SLD/Upper" and to the report on the Lower Gila as "SLD/Lower." *See* Fuller, et al., *Arizona Stream Navigability Study for the Upper Gila River, Safford to the State Boundary, and San Francisco River, Gila River Confluence to the State Boundary* (June 2003) [EI 2] ("SLD/Upper"); Fuller, et al., *Arizona Stream Navigability Study for the Gila River: Colorado River Confluence to the Town of Safford* (June 2003) [EI 4] ("SLD/Lower").

Historic and Prehistoric Indian Use of the Gila

64. "Native tribes from South America all the way up to Alaska all had some kind of boating if they lived anywhere near a river." Tr. at 11/16/05:103 ln.10-12 (Tellman); *see also* Tr. at 06/17/14:303 ln.3 to 304 ln.3 (Fuller). We know this because there are records, oral traditions, and archaeological findings demonstrating that boating occurred. *See* Tr. at 06/17/14:303 ln.3 to 304 ln.9 (Fuller).

65. As one example of such records, the Pima Indians who lived along the Gila River kept "calendar sticks" in which the Pimas recorded important aspects of their culture and society. *See* Tr. at 11/16/05:228 ln.22 to 229 ln.11 (Gookin).

66. Following the 2003-05 hearings, the Commission reviewed the evidentiary record and issued its 2009 report entitled. *See* ANSAC 2009 Report.

67. At that time, the Commission found that "[t]here is no evidence in [the] archeological Record that would indicate that any of the prehistoric cultures located in the study areas along the Gila River used the Gila River a means of transportation by boat or other watercraft and there has been no documented use of the river for commercial trade and travel or for result floatation of logs. All travel along the Gila River during this period was by foot." *Id* at 29.

68. In his 2014 testimony, Mr. Fuller stated that there is "limited information" in the archaeological records about Native American use of boats. *See* Tr. at 06/16/14:166 (Fuller).

69. When asked to specify what limited information there was, Mr. Fuller admitted that he could not recall any evidence of the use of the Gila by indigenous peoples for trade or commerce. *See* Tr. at 06/17/14:304-05 (Fuller).

70. In his 2003 report concerning the Upper Gila, Mr. Fuller stated that "[a]rchaeological research has not documented any use of the [Upper Gila] for commercial trade and travel or any regular floatation of logs." SLD/Upper, at 8-2.

71. The same is true of the Gila River in its entirety–Mr. Fuller could not identify any evidence of archaeological use of any segment of the Gila River for trade or commerce. *See* Tr. at 06/17/14:304 ln.17 to 307 ln.20 (Fuller).

72. Although Native American inhabitants of the region made use of water from the Gila for irrigation, they did not use the river for navigation during recorded history. *See* Gookin, *Presentation to Arizona Stream and Navigability Commission*, at 3 (November 16, 2005) [EI 15] ("Gookin 2005"); Tr. at 11/16/05:227 (Gookin).

73. The Pima Indians lived along both sides of much the Gila River and "could have benefited from water travel for trading purposes because they traded upstream and downstream from the Gila River . . . [b]ut there is no evidence of any boats used in trade." *See* Gookin, *Report on the Navigability of the Gila River Prepared for the Gila River Indian Community* at 6-7 (May 19, 2014) [X009] ("Gookin 2014").

74. The Pimas' mode of transportation was to run on foot beside the river. *See* Gookin 2005, at 3.

75. Hohokam travelled along the Gila River and down the Colorado River as far south as the Gulf of Baja to trade for clam shells. *Id.* at 2-3.

76. "If the Gila River had been navigable, you would have expected the Hohokam would have traveled down the Gila River to the Colorado River, then followed the Colorado, which we know to have been navigable, to the Gulf of California region." Gookin 2014, at IV:3-4.

77. Hohokam recorded their methods of trade onto their pottery, and no evidence in the record suggests any of these methods ever included the use of a boat or other floatation device. *Id.* at 3.

78. "The concept that the traders were recorded on the pottery but boats were not is an additional indication of the Hohokam reliance on trade by walking." *Id.* at 3.

79. "If the Hohokam could have navigated they would have, but they did not, the Hohokam chose to walk." *Id.* at 4.

80. Mr. Farmer, the SLD's only witness other than Mr. Fuller, testified that he was unaware of any Hohokam use of boats on the Gila. *See* Tr. at 06/18/14:618 (Farmer).

81. Mr. Gookin testified that, although the focus of his work was on Segment 6, his opinions were not limited to Segment 6. *See* Tr. at 06/18/14:999-1000 (Gookin).

82. "If the Gila River had been navigable, it would have been navigated for about 2,000 years. No evidence of commercial navigation exists." Gookin 2014, Executive Summary at 1.

83. Mr. Fuller suggested that Native Americans might not have boated down the Gila because they found "alternative modes more suitable." *See* Tr. at 06/16/14:59 (Fuller).

84. Mr. Fuller opined that, for the Native Arizona tribes prior to statehood, "[t]he business of the river was to take it out and farm it and drink it," as opposed to using it for transportation. *See* Tr. at 06/16/14:51 (Fuller).

85. Mr. Fuller testified that he was unaware of any cultural beliefs about rivers that would preclude the Apache, the Akimel O'otham, or the Pee-Posh from boating the Gila River, had it been navigable. *See* Tr. at 06/17/14:463 (Fuller).

Early Exploration, Settlement, and Conditions before the 1800s

86. The record contains numerous historical narratives, observations, reports, and journals from those who claimed to have travelled along and near the Gila River. *See* SLD/Upper, at § 8-2; SLD/Lower, IV-64, III-24.

87. There is no evidence in the record of a reliable, first-person account or verified account, showing that the Gila River was used for travel or commerce. *Id.*

88. The record shows that some early travelers came through the territory carrying canoes, rafts, and other watercraft. *See* Tr. at 06/17/14:324-25 (Fuller); *see also* SLD/Upper, at 4.[3]

[3] *See also* SLD/Upper, at §3-1 ("Although these trappers constructed canoes and rafts to use on the Colorado River, they apparently did not float the upper Gila and San Francisco Rivers.")

89. Travelers carrying watercraft through the territory did not attempt to navigate the Gila River, but instead travelled overland along the Gila, until reaching the Colorado River where they could float their boats in the water. *See* SLD/Upper, at § 3-1.

90. The Commission reviewed both the SLD/Upper and SLD/Lower reports and did not find sufficient evidence of navigation on the Gila River. *See generally* ANSAC 2009 Report.

91. Mr. Fuller told the Commission that he had read a student's master's thesis that contained one instance of trappers using canoes on the Gila River, traveling from Safford to Yuma on several occasions. *See* Tr. at 06/16/14:177, 190, 264 (Fuller).

92. Mr. Fuller later admitted that the same master's thesis indicated that the canoes were never used on the Gila River, but instead were used to navigate the Colorado. *Id.* at 327-28 (Fuller).

93. In Mr. Fuller's report, *Criteria for Assessing Characteristics of Navigability for Small Watercourses in Arizona*, at 21 (September 1998) [X016-FMI_X008] ("Small Watercourses"), he concluded that early Spanish explorers navigated the Colorado, but that "[t]he Spaniards are not known to have used boats on other Arizona rivers as their exploration inland was on horseback and on foot." *See* Tr. at 06/17/14:339 (Fuller).

Settlement and Conditions after the 1880s

94. Rather than the rivers that traversed early settlements, "the railroad, by providing what the Gila River never did, sustainable commercial transport, 'laid the groundwork for the development of Arizona's modern economy.'" Gookin 2014, at IV:16.

95. Railroads were built across Arizona by 1871, and a more robust railroad network existed at the time of statehood. *See* Tr. at 06/16/14:54 (Fuller); Fuller/Boating, slides 65-66.

96. "Beginning in 1846, military operations commenced in the region due to the Mexican War. . . . Instead of the water route, the military chose to march directly from the

Gila-Salt confluence across the desert to the approximate location of Painted Rock Dam that exists today." Gookin 2014, at IV:13.

97. No documents were found from this period of the use [of] boats on the Gila River to transport supplies to Fort Goodwin. . . . This is significant because the need for reliable and inexpensive transportation to the fort clearly existed and it was time when the region was largely unsettled, with little water diverted for agriculture." *See* Burtell, at 8.

Historical Surveys

98. Another group of individuals who were present along the Gila at a relatively early date were the federal land surveyors who were responsible for conducting the rectangular survey in the new territory.

99. Dr. Douglas Littlefield, a historian of the American West retained by SRP, testified regarding surveys on the lower portion of the river (downstream from the Salt River confluence) at both the November 2005 and 2014 Hearings. *See generally* Tr.

100. Dr. Littlefield also submitted to the Commission his *Assessment of the Navigability of the Gila River Between the Mouth of the Salt River and the Confluence with the Colorado River Prior to and on the Date of Arizona's Statehood, February 14, 1912* 10-20 (November 3, 2005) [EI 12] ("Littlefield 2005"). Dr. Littlefield testified again in 2014. *See generally* Tr.

101. Dr. Littlefield concluded that each of these surveyors was under specific instructions to distinguish between navigable and non-navigable streams. *See* Tr. at 11/16/05:128 (Littlefield); *see also* Littlefield 2005.

102. The U.S. General Land Office ("USGLO") surveys are evidence of non-navigability because they are the "perspective historical party who was specifically told to look for navigability at the time that he carried out his work and these were professionals . . . ." Tr. at 08/18/14:1317 (Littlefield).

103. The surveys are particularly relevant to determining navigability in the Gila's "ordinary and natural" condition because most of them were performed at a relatively early date. *See id.* at 1315; *see also* Gookin 2014, at V:7.

a. Dr. Littlefield testified that, with regard to waterways, U.S. General Land Office Surveyors were told specifically that they were to meander, "which means to measure by degree bearings the sinuosities of all navigable bodies of water." Tr. at 08/18/14:1315 (Littlefield).

b. Dr. Littlefield examined all of the plats and field notes covering the Gila from its confluence with the Salt to the confluence of the Colorado and concluded that "none of them indicated that the river was navigable by having meanders done on both banks." Tr. at 08/18/14:1335-36 (Littlefield); *see also* Tr. at 08/18/14:1318 (Littlefield); Burtell, at 11.

c. "[W]hile those surveys were done at varying times of the year, in different years, and by several individuals, all of the descriptions and plats from this work consistently portrayed the Gila River as being a non-navigable stream." *See* Littlefield 2005, at 55.

d. "The interiors of townships through which the Gila River flows between the confluence of the Salt and the juncture with the Colorado River were surveyed initially over a wide range of years most of which were prior to statehood . . . 1868, 1871, 1874, 1877, '78, '82, '83, 1890, 1910, and 1911." Tr. at 08/18/14:1315 (Littlefield).

104. Another pre-statehood account of the Gila River came from John R. Bartlett of the United States Army Corps of Topographical Engineers in 1854. *See* SLD/Upper, at 3-14. Mr. Bartlett worked on surveying the boundary between the United States and Mexico from 1850 to 1853. *See id.*

105. In one report by Bartlett, he stated: "It is doubtful whether [the Gila] can ever be navigated, except at its floods, and these are by no means regular. At such times [i.e., during irregular floods,] flat-bottomed boats might pass to the mouth of the Salinas [Salt River], near the Pima villages." *See* SLD/Upper, at 3-14; *see also id.* at 5, 8-4; Burtell, at 10.

106. "Early descriptions of the upper Gila and San Francisco Rivers do not differ significantly from contemporary descriptions of the river . . . Bartlett . . . believed that the Gila River was not navigable except during irregular floods." Tr. at 06/17/14:341 (Fuller); SLD/Upper, at 8-4.

107. Mr. Burtell's report states that the government assessments he reviewed were made prior to "substantial settlement by Americans and prior to the flooding of the early 1900s," but none found that the Upper Gila was susceptible to navigation. *See* Burtell, at 11.

Federal Patents

108. "[T]here are approximately 150 federal and state patents issued by different federal and state authorities to multitudes of people and entities where all of these parties made judgments that in their opinion the Gila River was not navigable." Tr. at 08/18/14:1361 (Littlefield).

109. State, federal, and homestead patents "shed considerable light on the navigability or nonnavigability." Tr. at 08/18/14:1337 (Littlefield).

110. Dr. Littlefield examined "every single federal and state patent that in any way touched the Gila River." Tr. at 08/18/14:1337-38 (Littlefield).

a. The Federal Government granted over ninety-five separate patents that touched or overlay the lower portion of the Gila (below the Salt River confluence) to private individuals. *See* Littlefield 2005, at 88; Tr. at 11/16/05:135 (Littlefield).

b. "Federal patents . . . indicate the total amount of land awarded by the United States. The acreage is significant because if the Gila River had been considered navigable, federal officials presumably would not have granted title to any land through which the river flowed." *See* Littlefield, *Revised and Updated Report: Assessment of the Navigability of the Gila River Between the Mouth of the Salt River and the Confluence with the Colorado River Prior to and On the Date of Arizona's Statehood*, at 69 (November 12, 2013) [X002] ("Littlefield 2013").

c. Dr. Littlefield examined over one hundred federal patents, and in not one instance did he find a patent suggesting that the Gila was navigable. *See* Tr. at 08/18/14:1360 (Littlefield); Littlefield, *Assessment of the Gila River's Navigability on February 14, 1912* (June 16, 2014), slide 28 [X018] ("Littlefield Presentation"). In not one case did any of those patents (or the supporting patent files) indicate that acreage was being withheld because the river was navigable. *See* Littlefield 2005, at 88; Tr. at 11/16/05:135 (Littlefield); Littlefield 2013, at 70; Tr. at 08/18/14:1360 (Littlefield); Littlefield Presentation, slide 28.

Desert Land Act

111. "The relevance of the Desert Land Act to the question of the Gila River's navigability lies in the law's requirement that the land be irrigated before the final patent was awarded. Importantly, the water to be used had to be taken from a non-navigable stream." Littlefield 2013, at 78.

112. "There were over twenty patents adjacent to the Gila River awarded under the Desert Land Act, many of which cited that stream as their source of water." Littlefield 2013, at 79.

State Patents

113. "The patents issued by Arizona to private parties for land through which the river ran provide another perspective. If the state had believed it owned the bed and banks of the river, it presumably would have considered the stream's navigability in disposing of those lands. Yet there are over sixty instances in which the state chose to sell lands which lay in the river bed." Littlefield 2013, at 91.

114. The Arizona state land patents represent approximately sixty separate instances where State officials as well as the parties purchasing the land found the Gila not to be navigable. *See* Tr. at 08/18/14:1360 (Littlefield).

115. 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, "[f]rom this wealth of information,

covering a huge array of documentary sources only one conclusion can be reached: The Gila River was not navigable or susceptible of navigation on or before February 14, 1912." Littlefield 2005, at 136.

116. "Cumulatively, . . . there are approximately 150 federal and state patents issued by different federal and state authorities to multitudes of people and entities where all of these parties made judgments that in their opinion the Gila River was not navigable." Tr. at 08/18/14:1361 (Littlefield); Littlefield Presentation, slide 28.

Boating Attempts on the Gila River

117. Prior to issuing the ANSAC 2009 Report, the Commission received evidence concerning sporadic historic attempts to float the Gila, and found that the "incidents of boating or attempted boating were for recreational purposes and none of them, except the very earliest, during the Mexican-American War and the passage of the Forty-Niners had any commercial intent at all." ANSAC 2009 Report, at 58.

118. The Commission went on to find that

> [t]he only evidence submitted regarding boating on the Gila River is one of recreational use, whether personal or commercial, in order to view the scenery and wildlife, enjoy the excitement of white water rapid running and perhaps do some recreational fishing, in late winter and spring. These facts do not satisfy the federal test for navigability or susceptibility of navigability.

Id.

119. Having provided the parties an opportunity to submit additional evidence leading up to and during the hearings held in 2014, the Commission finds that the record that existed leading up to ANSAC 2009 Report contained the great majority of the sporadic historic attempts to float the Gila.

120. Historic attempts to float the Gila were indeed sporadic. For instance, there are only four historic accounts of boating the Upper Gila. None provides evidence of susceptibility to navigation. The 1869 account involved the use of a raft to cross the river, not to navigate up or down the river. The 1886 account involved the use of a dugout canoe that

ultimately capsized. Similarly, the 1891 account involved a capsizing event in February floodwaters, and the final account, from 1895, resulted in a capsized flat-bottomed craft downstream of San Carlos. Burtell Declaration, at Table 15.

121. Another attempt to boat the Upper Gila was described by Mr. Burtell during his testimony. Several 49ers were traveling along the Upper Gila in July, and a member of the party, David C. Buchanan, was accidentally shot in the leg. According to the account, "[s]everal plans were suggested to carry Buchanan on," and, eventually, "[t]hey *built a raft* for Buchanan, *but it was not practicable. The river was too low and too many rapids.* About dark, a party went up the river to meet the raft. They found the raft three miles up the river. They came in camp at 10:00 at night. They brought Buchanan on the litter, nine miles to where timber could be had. *He was carried by men.*" Tr. at 06/20/14:1138 ln.21 to 1143 ln.17 (Burtell) (quoting Chapter 9 of Gila Trails, Item No. X016, Freeport 7).

122. The Commission has received documents and taken testimony regarding the Narrative of James Ohio Pattie, a young boy trapper from Cincinnati who claimed to have traveled throughout the western United States from 1824-1830. Upon his return home, Pattie recalled his six years of adventure and published the first edition of his Narrative in 1831. ("Pattie Narrative" or "Narrative").[4]

123. The Commission's record contains a document submitted by the Maricopa County Flood Control District, titled *The Personal Narrative of James O. Pattie* into the Record on January 28, 2014 [X006]. ("Proponents' Narrative").

124. The Proponents' Narrative is misleading in its title and description because it is not a complete copy of the Pattie Narrative. *See* Appendices from the 1st Edition of the James O. Pattie Narrative (1831) [X036:120]; *see also* the "Editors Preface" and

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[4] *The personal narrative of James O. Pattie, of Kentucky : during an expedition from St. Louis, through the vast regions between that place and the Pacific Ocean, and thence back through the city of Mexico to Vera Cruz, during journeyings of six years, in which he and his father, who accompanied him, suffered unheard of hardships and dangers, had various conflicts with Indians, and were made captives, in which captivity his father died; together with a description of the country, and the various nations through which they pass*, James Ohio Pattie (1831).

"Introduction" by Timothy Flint, from the 1st Edition of the James O. Pattie Narrative published in 1831 [X036:121] ("Flint").

125. The Pattie Narrative was edited by Timothy Flint, who also wrote the book's "Preface" and attached three anonymous notes to the back of the Narrative. *Id.*

126. Flint's influence on the Pattie Narrative is vital for the purposes of ANSAC, as all of the topographical illustrations, including the descriptions of the Gila River, were written by Flint, not James Pattie. *See* Flint, at iii-iv.

127. Flint had never been to Arizona and based his descriptions on his "acquaintance with the accounts of travelers in New Mexico, and published views of the country . . . ." *Id.*

128. The Commission cannot rely on the Pattie Narrative as evidence of what the Gila River looked like in the 1800's because those descriptions were written by a man who had never been to the Arizona or the southwest. *See* discussion, *supra.*

129. In addition to inserting his own descriptions of the scenery, Flint intentionally suppressed and softened parts of left parts of Pattie's story out of the Narrative entirely. *See* Flint, at iii-iv.

130. In addition to inserting his own descriptions of the scenery, Flint chose to "suppress" or "soften" parts of Pattie's claims and entirely omit incidents and circumstances which he believed "too revolting to be recorded." *Id.*

131. There have been seven editions of the Pattie Narrative since its original publication in 1831. Five of these editions include historical prologues, introductions, historical prologues, editor's preface's and notes, warning readers that the Pattie Narrative is not a reliable historical document, and may not even be the writings of James O. Pattie. *See* discussion, *infra.*

132. Milo Milton Quaife, Secretary and Editor of the Burton Historical Collection wrote the "Publishers Preface" and "Historical Introduction" to the 4th Edition of the Pattie Narrative (1930) [X036:123] ("Quaife").

133. Quaife warns the reader that the Pattie Narrative they are about to read lacks any "historical sense of accuracy" and would never stand the test of "subsequent historical criticism." Quaife, at v-vi.

134. The Pattie Narrative was the result of an uneducated frontiersman who "upon his return from his six years' absence, without journals or notes, tells his story with the pride and ador of a youth who has had a great adventure and wants the acclaim that comes in telling it." Quaife, at xiv.

135. In his Narrative James Pattie describes his heroic adventures in great detail and yet fails to name all but two of the dozens of men who accompanied him throughout his perilous 6-year journey. *See generally* the Pattie Narrative.

136. Pattie "could not possibly have remembered the experiences described and at the same time have forgotten the names of his companions in peril." Quaife, at xx.

137. Multiple historians have concluded that "Pattie could not supply the names of his companions, or even identify the expeditions he had accompanied, since to do so would render him liable to prompt exposure..." Quaife, at xxii.

138. In the series *Francisco or Mission Dolores*, scholar Zephyrin Engelhardt states that the few names Pattie relays during his time in California have all turned out to be incorrect or a "complete fabrication, with no evidence to support his claims." Zephyrin, at 407-11.

139. "Pattie claimed to have found 3,904 Indians at the Mission of San Luis Rey, and that he had vaccinated 2,850 [for small pox]. The Truth is 2,744 neophytes then lived under the Missions jurisdiction, but about one-third dwelt at Pala whither Pattie did not go." Zephyrin, at 407-11; Pattie Narrative, at 212-13.

140. Pattie claimed to have vaccinated a total of 22,000 people for small pox during his time out west. *See* Pattie Narrative, at 217.

141. "[T]he fifteen Missions at which he vaccinated, as he claims, contained only 11,551 Indians, and the whites did not exceed 2,000 souls." Zephyrin, at 408.

142. "There is no record in the archives respecting the ravages of small-pox or Patties professional tour. . . ." Bancroft, at 168-69.

143. The complete Narrative is "absurdly inaccurate in many respects . . . built on a substratum of truth." Bancroft, at 82-83 n.43.

144. Parts of the Pattie Narrative are in fact "deliberate falsehoods." Bancroft, at 170-71.

145. Jon Fuller presented evidence to the Commission that he claims shows historical boating on the Gila River. *See* SLD/Upper, at 3-8, 3-9, 3-10, 3-11, 3-23, 3-31, and 3-32; *see also* SLD/Lower, at IV-1.

146. Mr. Fuller testified on behalf of Proponents and cited the Pattie Narrative as evidence of historical navigability on the Gila River. *See* Tr. at 06/18/14:649 (Fuller); Fuller/Boating, at 101.

147. When asked about the historical inaccuracies of the Pattie Narrative, Mr. Fuller admitted he had never read the Pattie Narrative or Proponents' Narrative when he made his historical boating determination. *See* Tr. at 06/18/14:698 (Fuller).

148. Mr. Fuller explained that he had used a "daisy chain" method of research to support his testimony, by which he was "citing information that was previously in the Land Departments Report." Tr. at 06/18/14:698 (Fuller).

149. Mr. Fuller explained that his testimony on the history of boating on the Gila River was taken directly from "a draft document that the Arizona Attorney Generals had provided with their statement of facts . . . [a]nd what they were doing was citing to the record." Tr. at 06/17/14:330, 378 (Fuller).

150. Mr. Fuller could neither provide a reference to where in the Narrative James O. Pattie claimed to have navigated the Gila River, nor could he provide the Commission with the citations used by the SLD. *See* Tr. at 06/17/14:279 and 330-31 (Fuller); *id.* at 06/18/14: 697 (Fuller).

151. Mr. Fuller testified that James Pattie and his party carved eight dugout canoes and navigated the Gila River from Safford to Yuma several times. *See* Tr. at. 06/16/14:177-78, 190 (Fuller); *id.* at 06/17/14:297, 336, 413-14 (Fuller); Fuller/Boating, at 101.

152. The Commission finds that the SLD's assertions regarding numerous Pattie canoe trips on the Gila are unsupported by the evidence. Pattie's memoirs are clear that when his party constructed eight canoes, they had already reached the Colorado River. *See, e.g.,* Tr. at 06/20/14:1132 ln.23 to 1138 ln.2 (Burtell); *id.* at 06/17/14:335/8 to 338/23 (Fuller).

153. Moreover, Safford did not exist at the time that Pattie purports to have traveled along the Gila. *See* discussion, *infra.*

154. Pattie purports to have trapped in the Upper Gila prior to 1830.

155. The Town of Safford was established by a small party of prisoners in the winter of 1873, forty-three years after Mr. Fuller testified Pattie navigated the Gila River. *See* History of Safford, at 1.

156. Pattie could not have traveled between Safford and the Colorado River during the period from 1824 to 1930. *See* discussion, *supra.*

157. Pattie's Narrative and the story of James O. Pattie traveling near the Gila River are referenced by Proponents multiple times throughout the record as evidence of river's description. *See* Fuller Citations at 2(a)-(b); Fuller/Boating, at 80; Tr. at 06/16/14:177, 183 (Fuller); Tr. at 06/17/14:330 (Fuller); *see also* Hjalmarson 2014 at 2; Proponents' Narrative; Fuller Citations, at 2(c); Fuller/Boating, at 101; Tr. at 06/16/14:190-92 (Fuller); Tr. at 06/17/14:285, 290, 324-9l, 336 (Fuller); SLD/Lower, at IV-1; SLD/Upper, 3-1 to 11.

158. Based upon the discussion above, the Commission finds that the Pattie Narrative is not credible evidence of boating on the Gila River.

159. Mr. Fuller also cited to G.P. Davis' master's thesis when testifying about historical boating accounts. *See* Tr. at 06/16/14:177, 190 (Fuller); Tr. at 06/17/14:297 (Fuller); Fuller/Boating, at 101.

160. Mr. Fuller later admitted that he never read G.P. Davis' master's thesis. *See* Tr. at 0 6/17/14:336 (Fuller).

161. "These early trappers traveled primarily on horseback or on foot in the [upper Gila River] area, although there records indicate that they built and used canoes and rafts when they reached the Colorado River . . . ." SLD/Upper, at 8-2.

162. The SLD's reports include a handful of other accounts mentioning attempts to boat the Gila River prior to statehood. *See* SLD/Lower, at IV-2 to IV-14; SLD/Upper, at 3-27 to 3-29.

163. These accounts consisted of "low draft" boats used for "downstream travel." *See* Tr. at 06/16/14:60 (Fuller).

Mormon Battalion and Captain Philip St. George Cooke

164. In December 1846 or January 1847, Captain Philip St. George Cooke and the Mormon Battalion constructed a raft from two wagon beds to float supplies on the Gila from Gila Bend to Yuma. *See* SLD/Lower, at IV-2.

165. The attempt was a failure, and the raft went aground numerous times, while Lieutenant George Stoneman "was forced to jettison a portion of the cargo." SLD/Lower, at IV-2; *see* Tr. at 11/16/05:38, 70 (Gilpin).

166. In a book regarding the 1847 expedition by the Mormon Battalion along the lower Gila, Edwin Corle stated:

> With all this happiness of environment, Colonel Cooke made his first mistake of the trip. He took a look at the Gila River, which was at this point, and would be today if there were any water in it, about four or five feet deep and 150 yards wide. He decided to construct a boat, to be made of two wagon beds lashed together, and ballasted by two long cottonwood logs.
>
> Lieutenant George Stoneman, whose self-shot thumbs had now healed, was put in command of this first ship to attempt to run the Gila. The clumsy craft was overloaded. Colonel Cook's thought was to lighten the burden of the wagon train, and to utilize water power by letting the Gila pull his boat downstream as if it were a raft. That plan would have worked on eastern rivers, but not on the unpredictable Gila.

> Lieutenant Stoneman became the first skipper on the Gila River—and he regretted it. The improvised boat carried mostly meat and flour. At times the craft caught on sand bars and spun crazily. Once it was half submerged and Stoneman and his crew of three had to hustle the cargo ashore. Then the boat was freed of the sand bar and they had to moor it and reload. Irksome was the word for it. For in less than a mile it snagged on another sandbar and the same tedious process had to be repeated. As this kind of thing became the routine of the day, Stoneman decided he'd never get to the mouth of the Gila. So he lightened his ship by making a cache of half the cargo and eventually guided, pushed, and poled her to the lower end of the Gila, and beached her just in time to prevent her from being sucked into the more mighty Colorado. Here he met his commanding officer. Boating on the Gila, he reported to Colonel Cooke, was definitely not to be recommended to Washington. Cooke, being a man of adaptability, dropped the subject. And, without making an issue of it, he sent four men and four mules back upstream to salvage the cached meat and flour.
>
> . . .
>
> The importance of the Mormon Battalion in southwestern history is institutional rather than active. It brought the Mormon culture through the Gila Valley to California, it proved that wheels could move west; and it instilled the idea in some men's minds that where wagon wheels could go so might, some future day, a railroad. It demonstrated that the Gila River was not practical for navigation, and it added considerably to the knowledge of remote Arizona. Because of the success of the expedition other wagons prepared to move west. Americans were on the march.

Corle, *The Gila: River of the Southwest*, at 153-54 (1951) [EI 1].

167. Col. Phillip St. George Cooke described his failed attempt to travel down the Gila by wagons converted into boats during that expedition: "The experiment signally failed, owing to the shallowness of the water on the bars; the river was very low. In consequence of the difficulty of approaching the river, orders mistaken &c., the flour only was saved from the loading, and the pontoons were floated empty to the crossing of the Rio Colorado, where they were used as a ferry boat." *See* Littlefield 2013, at 94-95.

Howard Party

168. In 1849, the Edward Howard party reportedly constructed a boat to float down the Gila from Gila Bend to Yuma. There is no information in the record indicating what time

of year this trip took place or whether it may have occurred during a flood. *See* SLD/Lower, at IV-2; *see* Tr. at 11/16/05:70 (Gilpin).

169. Testimony during the 2014 hearing also addressed the "Howard" trip in 1849. In 1885, a newspaper included a story of the use of a ferry to float a family down the Gila in 1849. *See* Littlefield 2013, at 131-32. The article stated that military officials at Fort Yuma were alarmed when they heard of the trip because of the dangerous nature of the river. *Id.* With regard to this trip, Mr. Fuller acknowledged that the newspaper described the family as "reckless voyagers." *See* Tr. at 06/16/14:195 (Fuller); Fuller/Gila, at 103.

170. Mr. Fuller agreed that Charles Edward Pancoast's account includes statements by the crew of the Howard family trip as related by Pancoast: "The Crew told us afterwards that they found the River shallow and full of Bars, and the Current very rapid; they frequently found themselves aground and had much difficulty in getting off." Tr. at 06/17/14:424 (Fuller); Hannum, *A Quaker Forty-Niner: The Adventures of Charles Edward Pancoast on the American Frontier*, at 248 (1930) [X004_ASLD 47].

171. In regard to this account, Mr. Fuller testified that he was not surprised the crew encountered sandbars. *See* Tr. at 06/17/14:424 (Fuller). Mr. Fuller testified that the description of "shallow" is relative and dependent on the type of boat used. *See* Tr. at 06/17/14:424 (Fuller). Mr. Fuller testified that the crew's description of the current as "very rapid" was "kind of high" but admitted that there was "some current, certainly." Tr. at 06/17/14:425 (Fuller).

Forty-Niners

172. In 1850, an unsigned letter to the *New York Daily Tribune* from a traveler at Camp Salvation reported that the "expedient of lightening down teams by building small boats on the Gila" had been tried and succeeded. There was no other contemporaneous report indicating that it was common practice for travelers during the Gold Rush in this region to travel on the Gila by boat to the Colorado River. The letter also does not indicate what time of year this trip took place. *See* SLD/Lower, at IV-3; Tr. at 11/16/05:71 (Gilpin).

173. In its 2009 report, the Commission observed that "[t]here are reports that some . . . Forty-Niners attempted to float boats or rafts down the Gila to Yuma, but generally they were unsuccessful." 2009 ANSAC Report, at 33.

Morgan's Ferry

174. Henry Morgan operated Morgan's Ferry near Maricopa Wells for twenty-five years beginning in 1867. The ferry was used only to cross the river. There is no information indicating how many trips this ferry took or whether it was operated only on a seasonal basis. SLD/Lower, at IV-5; *see also* Tr. at 11/16/05:71-72 (Gilpin).

Cotton and Bingham

175. In February 1881, two men, Cotton and Bingham, were reported to be planning a trip to Yuma via the Salt and Gila Rivers in an 18-foot skiff, flat-bottom boat. It is unclear whether this trip actually occurred because the newspaper article (the only record of this supposed trip) was written the day before the trip. *See* SLD/Lower, at IV-7; *see also* Tr. at 11/16/05:74 (Gilpin).

"Yuma or Bust"

176. In November 1881, three men, including William "Buckey" O'Neill, reportedly departed Phoenix for Yuma in a 20-foot long, 5-foot wide boat called "Yuma or Bust." During the trip, it is reported that the men were "wading in water up to their knees." *See* SLD/Lower, at IV-7; *see also* Tr. at 11/16/05:73 (Gilpin).

177. The *Arizona Gazette* reported about an exploration of the Salt and Gila, stating: "'Yuma or Bust' party which left Phoenix recently for the purpose of exploring the Salt and Gila rivers were seen yesterday, only twelve miles from here, all waiding [sic] in mud and water up to their knees, pulling the boat, and apparently as happy (?) as mudturtles." Littlefield 2013, at 128. Four days later, the Gazette contained another story, stating that "the boat reached Gila Bend and 'busted.' . . . [The crew] endured great hardships, being compelled to wade in the water the greater portion of the time and push the craft ahead of them." *Id.*

178. With regard to the "Yuma or Bust" expedition, Mr. Fuller acknowledged that they had "[a] good deal of trouble getting through some sandbars" and were seen "pushing their boat." *See* Tr. at 06/16/14:196-97 (Fuller); Fuller/Gila, at 107.

Straus, Dallman & Co.

179. In March 1891, Straus, Dallman & Co. operated a ferry crossing the Gila. The ferry was used only to cross the river. There is no information indicating how many trips this ferry took or whether it was operated only on a seasonal basis. *See* SLD/Lower, at IV-8; *see also* Tr. at 11/16/05:71-72 (Gilpin).

Evans and Adams

180. In January 1895, G.W. Evans and Amos Adams reportedly boated down the San Francisco River from Clifton, then down the Gila to Riverside. This trip was reported in two newspaper articles—one was a letter to the editor in the *Arizona Sentinel*, and the other was a publication of a letter from Evans and Adams documenting the trip in the *Graham County Bulletin*. The two articles detail the difficulties the pair experienced. In the Upper Gila, the pair experienced problems due to "a continuous series of rough rapids and falls for 81 miles." SLD/Upper, at 3-28. At one point, Evans fell in the water and swam or was carried by the current downstream. Evans called it "a torturous route." The boat itself was damaged due to the rapids, with "one end being entirely submerged" and Adams had to "bail[] out the water from the stern." SLD/Lower, at IV-8; *see also* Tr. at 11/16/05:74-75 (Gilpin).

181. Upon reaching Sacaton in February 1895, Evans and Adams reportedly hauled their boat overland via train and then boated down the Salt and Gila Rivers to Yuma. The pair did not boat the entire length of the Gila. Upon reaching Yuma, Evans concluded that he "would not engage to make the trip down (the Gila's) hazardous waters again." SLD/Upper, at 3-28; SLD/Lower, at IV-8 to IV-9; *see also* Tr. at 11/16/05:75 (Gilpin).

182. Evans and Adams reported "81 mile[s] of rough rapids and falls" and that they had difficulty in one segment because of a blind corner, which resulted in them damaging their boat while attempting to line it. *See* Tr. at 06/16/14:200 (Fuller).

Shibely

183. In April 1905, Jack Shibely reportedly attempted to boat the Gila downstream from Phoenix. *See* SLD/Lower, at IV-13.

184. The boat capsized once and lost much of its cargo. *See* SLD/Lower, at IV-13; *see also* Tr. at 11/16/05:40 (Gilpin).

185. Pre-statehood stream flow gauge records indicate large discharges in March 1905, indicating that the river may have been in flood stage when Shibely took his trip. *See* SLD/Lower, at VI-4.

Sykes

186. In 1909, there is one report that Stanley Sykes canoed the entire length of the Gila. Doubt is cast on whether this trip occurred because the account does not appear in Sykes' biographical sketch, nor is there any other contemporaneous record of this incident. *See* SLD/Upper, at 3-29; *see also* Tr. at 11/16/05:76-77 (Gilpin).

187. If the trip did in fact occur, the record demonstrates that Sykes did not float the Upper Gila. *See, e.g.,* Tr. at 06/20/14:1132 ln.23 to 1138 ln.2 (Burtell); Tr. at 06/17/14:335 ln.8 to 338 ln.23 (Fuller).

188. As a basis for his opinion that the Gila was navigable in its "ordinary and natural condition," Mr. Fuller also relied upon the reported trip by Stanley Sykes and Charlie McLean from Phoenix to Yuma in the 1890s. *See* Tr. at 06/16/14:197 (Fuller); Fuller/Gila, at 108.

189. On cross-examination, however, Mr. Fuller admitted that, during the 2005 hearing, Ms. Tellman (another witness for the SLD) testified that the Sykes trip was "quite unsuccessful": "Only one person could be in the boat at the time because the other one would weigh it down too much. So one person would walk along and pull the boat while the other one sat in it, or sometimes they both would pull the boat." Tr. at 06/17/14:336-37 (Fuller); Tr. at 11/15/05:106 (Tellman); Fuller/Gila, at 115.

190. Mr. Fuller opined that, although only one person could be in the boat at a time while the other person was walking along the river, the trip was still "successful for one person." *See* Tr. at 06/17/14:498-99; Fuller/Boating, at 108.

Emory and Kearny

191. After his travels in Arizona in the 1840s, William H. Emory described the shifting channel of the Gila west of the Salt confluence. *See* Littlefield 2013, at 96-97. Emory stated in 1853 that the Gila "is not navigable, but is a never failing stream, discharging a large volume of water." *Id.* In an 1857 report, Emory further described the Gila's shifting channel: "The Gila does not always run in the same bed; whenever it changes the boundary must change, and no survey nor anything else can keep it from changing." *See* Littlefield 2013, at 97 (citing Emory, *Report on the United States and Mexican Boundary Survey Made under the Direction of the Secretary of the Interior* (1857)). Even Mr. Fuller conceded that Lt. Emory described the Gila as "non-navigable." *See* Tr. at 06/16/14:178 (Fuller); Fuller/Gila, at 81.

192. Authoring a chapter in Emory's *Report on the United States and Mexican Boundary Survey Made under the Direction of the Secretary of the Interior*, Lieutenant Nathaniel Michler concluded that the Gila was not navigable while indicating that the Colorado River was the only navigable river in the area:

> . . . The Gila becomes so low that a sand-bar forms at its mouth during the summer, and at no time does it supply much water. The Colorado on the contrary, is navigable for small steamers, drawing two and two and a half feet water, as high up as Fort Yuma. . . . This [navigation] is a great saving, as the cost of transportation of stores by trains across the desert is enormous. . . .

Littlefield 2013, at 97-98.

193. Mr. Fuller admitted that his report of the Upper Gila detailed Stephen Watts Kearny and William Emory's exploration of the Upper Gila River and San Francisco River in 1846, but contains no record of them using the Gila for transportation or shipping. *See* Tr. at 06/17/14:339 (Fuller); SLD/Upper, at 8-2.

194. During his travels in Arizona in 1846-1847, Emory, while traveling west of the confluence of the Gila and Salt rivers, described the shifting channel of the Gila:

> encamped on an island where the valley is contracted by sand buttes in what had been very recently the bed of the river. It was overgrown with willow, cane, Gila grass, flag grass, &c. The pools in the old bed of the river were full of ducks, and all night the swan, brant and geese, were passing. . . .

Although Emory originally thought the Gila was boatable, he later abandoned that idea after the Gadsen Purchase in 1853, stating that the Gila "is not navigable, but is a never failing stream, discharging a large volume of water." Littlefield 2013, at 96-97.

Log Floats

195. With respect to the lower stretch of the Gila below Dome (the SLD's Segment 8), Mr. Fuller testified that, in 1897, people had been bringing wood down the Gila on a raft. *See* Tr. at 06/16/14:201 (Fuller); Fuller/Gila, at 113.

196. On cross-examination, Mr. Fuller admitted that he did not know how far the logs were floated, and he acknowledged that it could have been as short as half a mile. *See* Tr. at 06/17/14:427 (Fuller).

197. Mr. Fuller stated the 1897 article was the only documented instance of floating logs on the Gila. *Id.*

Hamilton, Jordan, and Halesworth

198. Mr. Fuller testified Hamilton, Jordan, and Halesworth completed a trip down the Gila in 1897 and found the river was "perfectly practicable for navigation." Tr. at 06/16/14:195 (Fuller); Fuller/Gila, slide 105.

Burke and Davis

199. On April 5, 1980, the *Tombstone Epitaph Prospector* reported:

> Deputy Sheriff Frank Burke and George Davis of the Harqua Hala mines, who had $15,000 in gold bullion in charge, were dumped into the Gila River last week by their boat capsizing. As the boat turned over, Davis held onto the bullion and struck the bottom of the river with some force; through the assistance of Mr. Burke, Davis and his bullion were soon on 'terra firm,'

otherwise known as Sentinel station on the railroad [downstream on the Gila from Gila Bend].

Littlefield 2013, at 132. Mr. Fuller testified that the boaters damaged or lost their boat at the Needle's Eye Wilderness Area and were forced to build another boat. *See* Tr. at 06/16/14:198 (Fuller); Fuller/Gila, slide 109.

Day Brothers

200. With regard to the J.K. and George Day trip from Camp Verde to Yuma in 1891-92, Mr. Fuller testified that the trip was "very profitable" with no problems and that the Day brothers intended to boat the Gila again the next day. *See* Tr. at 06/16/14:199 (Fuller); Fuller/Gila, slide 110.

Gully and Richardson

201. With regard to the Lt. Gully & Richardson trip from Pima Villages to Yuma in 1896, Mr. Fuller testified that there were no incidents. *See* Tr. at 06/16/14:200-01 (Fuller); Fuller/Gila, slide 112.

Powell

202. With regard to the HMT Powell trip in 1896, Mr. Fuller testified that the boat had difficulty with sandbars. *See* Tr. at 06/16/14:203 (Fuller); Fuller/Gila, slide 117.

Father Kino

203. Mr. Fuller testified that he could not recall whether Father Kino and his companions navigated the Colorado River, but admitted that his previous report (Small Watercourses [X016-FMI_X008]) stated that early Spanish explorers navigated the Colorado River, but that "[t]he Spaniards are not known to have used boats on other Arizona rivers as their exploration inland was on horseback and on foot" despite exploring the Gila, Santa Cruz, and San Pedro Rivers. Tr. at 06/17/14:339 (Fuller). Mr. Fuller testified that he was not aware of any evidence that the early Spanish explorers navigated any other Arizona river besides the Colorado River. *See* Tr. at 06/17/14:340 (Fuller).

Hale

204. In August 1893, the *Arizona Sentinel* published an article entitled "A Narrow Escape," which stated:

> Capt. Hale, his son, A.C. Leffel, and Mr. Cox went bathing near the mouth of the Gila River Saturday evening. The undertow of the whirlpool caught Mr. Leffel, [and] when young Hale went to his assistance, he too was drawn under by the current. Capt. Hale went to the rescue of the two when he as drawn down. Mr. Cox, seeing that the three were about to drown, tore a board from the fence nearby and rushed to their rescue. He succeeded in getting near enough to the Capt. so that he seized the end of the board, and hung to it, while with the other hand he hung on to Leffel, who had young Hale still in his grasp. By the hardest of work, Mr. Cox was enabled to draw the three men from the current into shoal water, where they were safe. It was a very narrow escape. Half a minute's delay, and the three would have found a watery grave.

Littlefield 2013, at 135.

Other Boating Accounts

205. On June 16, 1866, the *Arizona Miner* (a Prescott-based publication) included a narrative a trip through Arizona including a description of the Gila, stating that it "is at some seasons dry twenty-five miles above its junction with the Colorado [River]." Littlefield 2013, at 120.

206. In 1905, two new ferryboats began operating on the Gila. A new ferry, "The Gila King," began operating a month later. *See* SLD/Lower, at IV-13; *see also* Tr. at 11/16/05:71-72 (Gilpin). The ferry was used only to cross the river. *Id.* There is no information indicating how many trips this ferry took or whether it was operated only on a seasonal basis. *Id.*

207. In March 1905, a new model boat that had "hand-driven, side-propellers" was unable to cross the Gila. *See* SLD/Lower, at IV-13; *see also* Tr. at 11/16/05:76 (Gilpin). It was reported that "nothing short of a ten horse power engine" would be needed to cross the river. *Id.*

208. In December 1905, another boating attempt was unsuccessful, in part because the parties could not launch the boat. *See* SLD/Lower, at IV-13; *see also* Tr. at 11/16/05:76 (Gilpin). When the Phoenix railway bridge was washed out, there was an attempt to use a boat to cross the Gila. *Id.* The launch of the boat failed, however, because reportedly "the current was too swift." *Id.*

209. Mr. Fuller testified that, in February and March 1886, a prospector used a dugout canoe to travel down the Gila from Clifton to Florence. *See* Tr. at 06/16/14:204 (Fuller); Fuller/Gila, slide 118. Mr. Fuller described this attempt as "a boating failure" because his boat got entangled in a strainer, which caused him to lose his gear and his boat to sink. *See* Tr. at 06/16/14:204 (Fuller); Fuller/Gila, slide 118. The prospector gave up and walked to Florence (an 80 mile walk). *See* Tr. at 06/16/14:204 (Fuller); Fuller/Gila, slide 118.

210. The accounts of attempted boating consist mostly of anecdotal evidence from local newspaper articles. The Commission finds that these articles do not provide a sufficient basis to support a finding of navigability. For example, one newspaper article was written the day before the supposed boating trip was to occur on the Salt and Gila Rivers, but there was no article or any other record corroborating that the trip actually occurred. *See* SLD/Lower, at IV-7.

211. The Commission also notes that such newspaper reports must be considered in the context of the nature of 19th century Western newspapers, which often acted not only as reporters of news but also as "boosters" for the local community in an effort to attract settlers to growing towns. *See* Littlefield 2005, at 110-12. These early newspapers had substantial incentive to exaggerate the benefits of their local communities. *Id.* at 112.

212. The Commission finds, as a matter of fact, that the accounts of attempted boating on the river tend to prove that the river was not used or susceptible to being used as a "highway for commerce." On at least two occasions, the parties could not launch the boats on the Gila. *See* SLD/Lower, at IV-13. During one account, the boat capsized, losing much of its cargo. *Id.* In two other instances, the boats went aground or were badly damaged. *Id.* at

IV-2, IV-8. A trip that occurred in November 1881 on a boat called "Yuma or Bust" appears to have "busted" as the participants were "wading in water up to their knees" and had to push their boat much of the time. *Id.* at IV-7. When 49ers traveling the Gila had a need to transport one of their wounded companions, they were unable to float the man down the river because the river was too shallow and had too many rapids. *See* Tr. at 06/20/14:1138 ln.21 to 1143 ln.17 (Burtell) (quoting Chapter 9 of Gila Trails, Item No. X016, Freeport 7). They instead were forced to carry him overland seeking medical attention. *Id.*

213. The Commission finds that the recorded opinions on navigability by the participants themselves also tend to show that the river was not suitable as a "highway for commerce." For example, in G.W. Evans and Amos Adams' trip from Clifton along the San Francisco River and then down the Gila to Riverside, Evans called the trip along the Gila "a torturous route" as he made his way through the rapids and falls of a canyon. *See* SLD/Lower, at IV-8. Evans concluded that "I would not engage to make the trip down (the Gila's) hazardous waters again." *Id.*

214. Several of the boating accounts relate to ferries that are known to have operated at some times on the Gila. SLD/Lower, at IV-5

215. The records of ferries provide evidence that ferries were used only to cross the river, as opposed to travel upstream and downstream. Beginning in 1867, Morgan's Ferry operated near Maricopa Wells. *Id.*

216. Later, in 1891, a ferry operated by the Straus, Dallman & Co. was used to cross the river. *Id.* at IV-8.

217. In 1905, there were three other ferry boats that were also operated on the river. *Id.* at IV-13.

218. All of the ferries were used to traverse the river, serving as the functional equivalent of a bridge.

219. Dr. Donald Jackson, a history professor from Lafayette College in Pennsylvania who was retained by Maricopa County, testified in the 2005 hearing regarding the historic

boating attempts on the Gila. Dr. Jackson filed no formal report with the Commission, but rather relied upon an eighteen-page Power Point presentation. *See* Jackson, *Lower Gila River Navigability* (November 16, 2005) [EI 21] ("Jackson"). Dr. Jackson did not testify during the 2014 hearing and did not provide a supplemental report. *See generally* Tr.

220. The Commission has reviewed Dr. Jackson's Power Point presentation and the transcript of his 2005 testimony and finds his testimony not persuasive on the issue of navigability. His testimony was based upon a cursory review of the historic evidence, which was less credible than that presented by the other witnesses and supported by the Commission's own review of the relevant documents. For example:

a. Dr. Jackson cited a statement by a member of the 1846 Kearney expedition that the river was "about 100 yards wide and flowing along a sandy bottom." *See* Jackson, at 8. Dr. Jackson failed to note, however, that the Kearney expedition itself traveled over land along the river and not by boat on the water. *See generally* Burtell, Attachment C.

b. Dr. Jackson referred to anecdotal evidence that members of the Mormon Battalion in 1847 attempted to float down the lower reaches of the river by making a boat out of two of their wagons. *See* Jackson, at 9. He largely ignored the documentary evidence, however, which clearly provides that the wagons "went aground on numerous occasions" and that the participants were "forced to jettison a portion of the cargo." SLD/Lower, at IV-2; *see* Tr. at 11/17/05:208 (Jackson).

c. Dr. Jackson discussed the trip down the river in 1849 by Mrs. Howard/Pancoast. *See* Jackson, at 10. Dr. Jackson himself acknowledged that the details of the trip as reported in the source documents "are not always consistent," however. *Id.*

d. Dr. Jackson cited a letter sent from "Camp Salvation" to the *New York Tribune* in February 1850, which indicated that some undisclosed number of westward travelers had made use of boats on the Gila. *See* Jackson, at 10. Dr. Jackson did not state (and the record does not otherwise indicate) the length of the trip or the location of "Camp Salvation." *See id.* Dr. Jackson's reliance upon this account also ignored other evidence in

the record showing that February is typically a month of high runoff from precipitation events and snow melt. *See* Burtell, Tables 2 & 3.

e. Dr. Jackson relied upon an 1881 newspaper article stating that two persons (Cotton and Bingham) were "scheduled to leave the next day" on a trip down the Gila. *See* Jackson, at 11. Dr. Jackson acknowledged, however, that no evidence exists that this trip actually occurred. *See id.*

f. Dr. Jackson cited the "Yuma or Bust" episode, whereby Buckey O'Neil and others unsuccessfully attempted to float a boat down the Gila to Yuma in 1881. *See* Jackson, *supra*. Although Dr. Jackson acknowledged that "at times the boat had to be pushed by men wading in water 'up to their knees,'" he insisted that this account was evidence that the river was navigable at statehood. *Id.* at 12. In fact, Dr. Jackson testified that he considered walking when pushing a boat to be a part of navigation on a watercourse. *See* Tr. at 11/17/05:215 (Jackson); *but see PPL Montana, LLC v. Montana*, 132 S. Ct. 1215, 1233 (2012) ("Mere use by initial explorers or trappers, who may have dragged their boats in or alongside the river despite its nonnavigability . . . is not enough.").

g. As the "linchpin" for his opinion, Dr. Jackson relied upon an 1895 account of an attempt by Amos Adams and J.W. Evans to float a boat the entire length of the river. *See* Tr. at 11/17/05:212-15 (Jackson). Dr. Jackson ignored the documented fact that the boat itself was badly damaged and that it was, in places, lowered by a 200-foot rope through rapids and between boulders. *See* SLD/Lower, at IV-8. Although Dr. Jackson acknowledged that the actual participants in the trip stated that they would not do it again, he disregarded their sentiments by concluding that their trip was evidence that the full length of the Gila was susceptible to navigation. *See* Tr. at 11/17/05:215 (Jackson).

h. Dr. Jackson referred to a 1905 newspaper article about the attempt by Jack Shibley to boat the river from Phoenix to Gila Bend. *See* Jackson, at 13. That particular boat, however, capsized at least once and lost its cargo. *See* SLD/Lower, at IV-13.

i. Dr. Jackson placed substantial reliance upon a statement by Gustavus Streitz that he used a "skiff" to cross the river while doing work as a county surveyor. *See* Jackson, at 14. Dr. Jackson opined that this limited act of using a boat to cross the river in 1893 proves that the river was "navigable" at statehood. *Id.* at 16; *see* Tr. at 11/17/05:200 (Jackson).

221. The Commission finds that Dr. Jackson's review of the historical evidence does not support a finding that the river was actually used as a "highway for commerce" at or before statehood.

222. The Commission finds that the accounts of attempted boating on the Gila are not sufficient to support a finding of navigability and, in fact, they prove just the opposite. People generally met with disastrous consequences, with some people losing their supplies, damaging their craft, or never even launching the boat. These ill-fated attempts show that the Gila is not and never has been "navigable." Furthermore, the use of ferries to cross the river does not demonstrate that navigation along the stream occurred or could have occurred.

Other Historical Descriptions of the Gila River

223. Dr. Richard E. Lingenfelter, a recognized expert on navigation in the West who has published more than twenty books and studied this issue since 1957, submitted an affidavit regarding navigation on the Gila. *See* Affidavit of Richard E. Lingenfelter and curriculum vitae attached thereto (May 16, 2014) [X008] ("Lingenfelter").

224. As Mr. Fuller recognized in one of his reports presented to the Commission, Dr. Lingenfelter is responsible for one of the two seminal works on historic boating in Arizona, *Steamboats on the Colorado River, 1852-1916. See* 1998 Final Report, Criteria for Assessing Characteristics of Navigability for Small Watercourses in Arizona [X016, Freeport 8] at B-1 p. 1.

225. Dr. Lingenfelter also recently completed a six-year study of the economic history of metal mining in the American West, which included historical research concerning major copper mines at Ajo and Clifton-Morenci in Arizona. *See* Lingenfelter ¶ 13.

226. Drawing upon his depth of experience as a researcher and historian in these areas, Freeport retained Dr. Lingenfelter "to provide an affidavit concerning the history of navigation in Arizona and regarding whether the Gila River was navigable or susceptible to navigation in its ordinary and natural condition at and prior to statehood." Lingenfelter ¶ 2.

227. Mr. Lingenfelter's affidavit states:

> In over fifty years of researching and writing on Western American history, I found no historical evidence of any commercial navigation on the Gila River more than a short distance above its junction with the Colorado, despite a continued demand from developing mines for cheaper transportation.

See Lingenfelter, at 10.

228. "Taken as a whole, these records illustrate that many years prior to and at the time of Arizona's statehood in 1912 the Gila River was considered *not* navigable by virtually every contemporaneous observer." *See* Littlefield 2013, 1-2.

229. Dr. Littlefield testified that he has never seen historical photographic evidence of boating on the Gila. *See* Tr. at 08/18/14:1395 (Littlefield).

230. The historical evidence also includes descriptions of the river by those who were present in the area at an early date. For instance, Richard C. McCormick, who served as Arizona Territory's delegate to Congress from 1869 to 1870, testified before Congress on April 1, 1870, regarding a possible railroad route through Arizona. *See* Littlefield 2013, at 121. Regarding the Gila, he stated: "For half or two-thirds of the year it is a larger river, and the other part a comparatively small one. It is not navigated." *Id.*

231. On July 12, 1884, the *Arizona Champion* published an article detailing the advantages of living in Arizona, described the Gila as a "large stream," but concluded: "The territory has but one navigable river, the Great Colorado." *See* Littlefield 2013, at 130.

232. In 1891, the *Twelfth Annual Report of the U.S. Geological Survey* ("USGS") included a description of the Gila stating that "[t]hese streams fluctuate greatly, being at times subject to sudden floods, especially during summer rains, when they often sweep out bridges,

dams, and canal head works, while at other times they may diminish until the water almost disappears." *See* Littlefield 2013, at 101.

233. Similarly, the USGS *Report of Progress of Stream Measurements for the Calendar Year 1905, Part XI. Colorado River Drainage Above Yuma* stated:

> [t]he river now (1905) flows in a channel fully 1 mile north of the original channel. . . . At every flood the channel shifts. The valley at its narrowest is half a mile wide and the waters may occupy any part or all of it. . . . [The river contains] an enormous amount of mud and sand. At times the waves of sand traveling along the bed of the stream are so large, the current is so swift, and the stream so shallow, that the water is broken into a uniform succession of waves 2 feet high and over.

Littlefield 2013, at 101-02. This document also included a table recording discharge at "Gila City." *Id.* On February 8, 1905, the discharge was 82,000 cubic feet per second ("cfs"), but just eight days later (February 16), no discharge was recorded at all. *See id.*

234. In 1906, U.S. Geological Survey Water Supply Paper No. 162 entitled *Destructive Floods in the United States in 1905, with a Discussion of Flood Discharge and Frequency and an Index of Flood Literature* described the Gila's spring floods: "[The Gila's bed] not only scours out during a flood and fills in after it, but [the] channel changes from one side of the bottom to the other. . . . This continual changing of the river bed has made it exceedingly difficult to secure reliable estimates of the rate of flow, and some of the estimates may be largely in error." Littlefield 2013, at 102-03.

235. In 1866, the *Arizona Miner* included a description of the Gila, stating that it "is at some seasons dry twenty-five miles above its junction with the Colorado." Littlefield 2013, at 120.

State and Federal Report: Arizona Transportation History

236. The San Carlos Apache Tribe submitted into evidence a report prepared in cooperation with the Arizona Department of Transportation, United Sates Department of Transportation and the Federal Highway Administration entitled, *Arizona Transportation History* ("ADOT Report") [X010:2].

237. The Tribe submitted into evidence Chapters 1&2 of the *Arizona State Rail Plan* prepared by the Arizona Department of Transportation, dated 2011 ("ADOT Plan") [X031:114].

238. The Arizona Department of Transportation ("ADOT"), the Federal Highway Administration and the United States Department of Transportation published reports that show the Gila River was never used for transportation or travel. *See generally* ADOT Report and ADOT Plan, *supra*.

239. ADOT, United States Department of Transportation and Federal Highway Administration collectively researched, prepared and published the ADOT Report in December of 2011. *See* ADOT Report and discussion, *infra*.

240. Part One of the ADOT Report is a Historical Narrative, covering Arizona Transportation from 1400's to 1863. *See* ADOT Report, at 7-14.

241. Part Two of the ADOT Report covers Arizona Transportation History from 1864 to 1911. *See Id.* at 15-23.

242. Prior to statehood, "Freight and passengers had been able to reach Arizona by boat since 1852, when steamboat service was established on the lower Colorado River. But travel inland from the river still required a difficult and time-consuming journey by horse or stagecoach, often made worse by the poor conditions of the few existing road." *Id.* at 14.

243. In the mid 1800's, railroads and steamboats were the "dominate means of commercial transportation" throughout the entire United States. *Id.* at 144.

244. In Arizona, the ferry took travelers across Colorado River at Yuma, but it was "stagecoaches that carried passengers from town to town across the Territory." *Id.* at 121.

245. Overland roads across the nation "generally consisted of a path worn in the dirt by constant use. Rough and dusty in dry weather, highways became muddy and often impassable under wet conditions." *Id.* at 109.

246. The roads were so bad that "whenever possible, travelers and freighters avoided highways altogether in favor of trains or boats." *Id.* at 109.

247. In Arizona, there were no navigable rivers and "everyone in the new territory agreed that Arizona's most pressing need was for wagon roads." *Id.* at 14.

State Report: Arizona State Rail Plan

248. ADOT published a "Railway Plan" in March of 2011, which included a summary of the transportation history in Arizona. *See* ADOT Plan, at 1-2.

249. Before and around the time of Arizona's statehood, the "dominate means of commercial transportation" was the railroad. *Id.* at 144.

250. The railroads in Arizona "have historically played a crucial role in the State's transportation system . . . ." *Id.* at 7.

251. There was navigation on the Lower Colorado River upstream to various points in Arizona by "light draft stern-wheel boats." *Id.* at 2.

252. Aside from the Lower Colorado River, there were no Rivers in Arizona prior to statehood that were capable of navigation. *See Id.* at 2.

253. For people's cargo and supplies to reach the interior of the Territory the only option was overland travel. *See Id.* at 121.

254. The "cornerstones of early Arizona Commerce (cattle, citrus, copper, climate and cotton) would not have been possible without the transportation provided by the railroad industry." *Id.* at 2.

Commerce in the Territory

255. The record shows that in the territorial period of Arizona that the development of reliable "[m]eans of transportation are necessary in order to reach markets for the exchange of commodities." Irish, at 23.

Territorial Governors Request for Railroads

256. The San Carlos Apache Tribe submitted into evidence sixteen *Annual Report[s] of the Governor[s] of the Arizona Territory made to the Secretary of Interior*, for the years 1878, 1849, 1881, 1883, 1884, 1885, 1886, 1890, 1894, 1895, 1896, 1899, 1900, 1901, 1902,

and 1907 (collectively "Governor's Reports") (cited as "GR [year] at [page]")[5] [X021:93-108].

257. The record includes sixteen Governor's Reports which were filed with the United States Secretary of Interior ("Secretary") for the purpose of reporting "on the progress and development of the Territory for the year . . . together with such suggestions as" that Governor "deems proper for the attention of Congress." GR 1883, at 3 [X021:96].

258. In 1878, Arizona needed a reliable, cost-effective means of transporting people and goods into and throughout the Territory or risk being "shut up and barred out from progress by its inaccessibility." GR 1878, at 1 [X021:93].

259. The Arizona Territory did not lack commercial and economic opportunity. Territorial Governor John C. Fremont described Arizona as a "gateway of commerce and travel between the States east of the Mississippi, and California and the Pacific Ocean. Fronting on Mexico it is in position to profit by any developments which may result from the awakening interest of merchants and manufacturers in the trade of this country . . . ." *Id.* at 7.

260. The only means for traversing the territory was by wagon road and the lack of a fast, cheap, and reliable alternative kept Arizona "shut off from immigration and precluded development, which its great resources would have otherwise commanded." *Id.* at 1.

261. Stage lines carried mail regularly to all points in the territory and all freight for the Territory was hauled by mule teams, which connected southern and northern Arizona. *See* GR 1881, at 24 [X021:95].

262. The "physical formation of the country" made the existing transportation facilities, and the "interchange of home products" nearly impossible. GR 1895, at 34 [X021:99].

263. The Governor's Reports made it clear that the Territory needed a railway system that provided a reliable system of transportation. GR 1886, at 5.

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[5] References to evidence submitted by the Tribe will be cited as [X[Supplemental Evidence Number]:Tribe's Identification #] at [page].

264. The people in Arizona needed "cheap transportation for our imports, lumber, machinery and other building and mining supplies as well as enable us to export our surplus of grain, cattle, and rebellious ore to foreign markets." GR 1895, at 61.

265. The Federal Government had good incentive to invest money into Arizona's transportation system since "[a]ny aid that the Congress could be induced to give these railroad enterprises would be repaid manifold to the country in increased revenue from increased commercial activity and the opening of new branches of trade . . . and in great addition to the common wealth by bringing into use that which now remains locked up in the mines of this country." GR 1878, at 7.

266. When the railroad finally reached the Territory, it had a "marked impetus to all branches of industry. . . . The building of railroads has attracted capital to the grand opportunities which the country presents, and many heavy investments are being made." GR 1883, at 3-5.

267. The Governor argued that further development of the Colorado River would "open a permanent and direct communication between the Southern Pacific and the Atlantic and Pacific Railroad, thus uniting northern and southern Arizona by a transportation line which will at once bring about an exchange of products and create a large amount of traffic for these lines." GR 1895, at 61.

268. The Gila River was never suggested as a means of transportation, partially because it was "torrential in their character, rising at times with great rapidity and carrying an immense volume of water for a short time." GR 1903, at 220.

269. The Governors concluded that, aside from the Colorado River, none of the rivers in Arizona were navigable. *See* GR 1896, at 139 [X021:103].

270. There is no historical evidence in the record "that any profitable commercial enterprises were conducted using the Gila River for trade and travel as of the time of statehood." Schumm, at 12.

Mining, Commerce and Transportation

271. In 1907, Mr. F.M. Irish reported that the "rivers of Arizona are not suited to navigation. Light-draught steamers can usually ascend the Colorado from the Bay of California as far as Yuma, but little or no traffic is carried on by these means." Irish, at 23-24.

272. "Commerce in the Territory was carried out by the railroads . . . . These roads connect Arizona with the ports of the Gulf of Mexico and markets of the Mississippi Valley on one hand, and with Pacific Coast cities on the other." *Id.* at 23-24.

273. In Arizona, large freight bound for mining towns located further away from the railroads had to be hauled in on wagons. "These wagons are large and heavy, and are drawn by from six to twenty horses or mules. This method is slow and expensive. Without railroads, Arizona could have made very little progress toward her present prosperous condition." *Id.* at 23-24.

274. Smaller parcels and merchandise were delivered to the Upper Gila River using the overland mail routes, while merchandise from Clifton to Silver City travelled around 120 miles, via ox and mule transportation. *See* Hinton, at 84.

275. Mining operations throughout the nation and within the Territory "were constantly looking for cheaper transportation, either by river or rail." Lingenfelter, at 8.

276. "Transportation costs, particularly shipping out copper matte and high-grade ores, were very often the largest expenses of the mining operation, and frequently determined whether profitable operations were possible." Lingenfelter, at 8.

277. Having the Colorado River, a navigable river, close to a mine lead to cheaper transportation and "[s]ince the cost of mining the rich surface ore and shipping them by steamer from Yuma were only a small fraction of that return, the mine could be profitable. But the cost of hauling the ore by wagon, a roughly 300-mile round trip . . . was nearly half of the value of the ore, and made the working ores running less than about $150 a ton unprofitable." *Id.* at 9.

278. Mines would have benefitted tremendously if the Gila River had been susceptible to navigation, "they could cut shipping costs by two-thirds, and profitably work a much larger amount of lower grade ore, but they found that even rafting down the Gila, let alone running a steamer up it, was simply not possible most of the year," *Id.* at 9.

279. Dr. Lingenfelter ultimately concluded "mining entrepreneurs would have eagerly undertaken navigation of the Gila if it had been possible. The failure of anyone to do so was not for [a] lack of demand, but for lack of sufficient water. The Gila River was simply not susceptible to commercial navigation" *Id.* at 10.

280. The need for alternative methods of transportation was necessary for any commercial progress to be made by the mines in Arizona, "[t]he opening up of transportation facilities to miners of western Arizona and Southeastern Nevada and California would create a most profitable commerce and develop a vast amount of wealth which to-day cannot be utilized for want of transportation." GR 1895, at 34.

281. There is evidence in the late 1890's that mines located closer to the Gila River were making progress; however, it was not a result of using the Gila River. It was due to the early construction of the Atlantic and Pacific Railroads, which drew attention to the copper deposits in the northern parts of Arizona. *Id.* at 34.

282. Mining investors and operators were unwilling to invest capital into even the richest mines within the Arizona Territory and it was mostly due to the lack of transportation facilities. *See* GR 1896, at 31 [X021:103].

283. "The building of new railroads has enabled the owners of silver properties to make shipment of ore at a profit, and in some sections of the Territory the silver mining is active and profitable." GR 1901, at 98 [X021:106].

Hydrology and Geomorphology of the Gila River

284. The Commission also received and reviewed a substantial amount of evidence regarding the hydrology and geomorphology of the Gila.

Hydrology of the Gila River

285. Mr. Gookin's report states that "[t]he earliest recorded observation of the river being dry was in 1775," and that the Gila-River was also dry in mid-February, 1854. Gookin 2014, at II:18.

286. There were few stream gauge records available for this reach of the river at or before statehood. *See* SLD/Upper, at 5-19.

287. The first flow data on the upper portions of the river, for instance, was gathered in 1899. *See* SLD/Upper, at 5-16; SLD/Lower, at VI-4. This was a one-day reconnaissance trip, and no continuing data was recorded. *See* SLD/Upper, at 5-16.

288. The SLD's reports rely primarily upon average annual flow data collected after statehood. The reports themselves acknowledge that data regarding "average" conditions is of dubious value for purposes of determining whether a river is navigable, however:

> It is important to note that the flow characteristics presented in Table 23 represent the average condition at discrete points along the study reaches. There is no doubt that there will be reaches which have obstacles such as broad shallow areas, sand bars, rapids, and irrigation diversions which, at certain discharges, will have significantly different flow characteristics. These conditions may, in some cases, preclude or at least hinder the use by any boat, especially for travel in the upstream direction.

SLD/Upper, at 5-45.

289. For these reasons, knowing the average annual flow of an erratic stream like the Gila provides little information about whether that river is or ever was navigable. Likewise, knowing (or estimating) the "average depth" of a river is likewise of limited value to determining whether it was "navigable." *See* SLD/Upper, at 5-45.

290. The Commission also received and reviewed information submitted by the Salt River Project, entitled *Information Regarding Navigability of Selected U.S. Watercourses* (April 2003) [EI 28] ("Watercourse Information"). That document contained information on federal and state court decisions in which the "navigability" of a river was actually determined.

291. The SLD's consultants in 2003 estimated the average annual flow of the Upper Gila, without considering the presence of any dams or diversion structures, at 200 to 439 cubic-feet per second ("cfs"). *See* SLD/Upper, at 7, 5-32. The SLD report for the Lower Gila does not contain a similar estimated flow number for that reach, but it does report a pre-statehood average monthly flow of 1,277 cfs at the downstream gauging station at Dome. *See* SLD/Lower, at VI-4.

292. Mr. Hjalmar Hjalmarson, a hydraulic engineer and hydrologist retained by Maricopa County, assumed, based upon estimates of predevelopment upstream flows, that the flow of the river downstream from the Salt River confluence "typically was at least 1,750 cfs for 50% of each year." *See* Hjalmarson, *Navigability Along the Natural Channel of the Gila River* 15 (October 25, 2002) [EI 23] ("Hjalmarson 2002"). Mr. Hjalmarson did not testify or submit any written statement to the Commission during the 2014 hearings.

293. Four of the twenty-one watercourses listed in Exhibit EI 28 have been found "navigable," in whole or in part, by a state or federal court. Of those four "navigable" watercourses, the lowest annual average flow is 2,277 cfs—for the Great Miami River in Ohio, which was found navigable in part and non-navigable in part. *See* Watercourse Information. The other three "navigable" watercourses had average annual flow rates of 7,316 cfs (the Colorado River in Utah), 6,930 cfs (the Green River in Utah), and 4,066 cfs (the McKenzie River in Oregon). *Id.* Six rivers that courts have specifically determined to be non-navigable (the Arkansas River in Oklahoma, the Chattahoochee River in Georgia, the Little River in Arkansas, the Neosho River in Kansas, the Red River on the border between Oklahoma and Texas, and the Rio Grande) have average annual flow rates higher than those estimated for the Gila. *See* Watercourse Information.

294. The evidence shows that the Gila is "susceptible to wide seasonal and annual variations in discharge rates." SLD/Upper, at 8. The SLD's consultants estimated minimum monthly average flows for the Upper Gila, for example, to range from 15 to 100 cfs. *Id.* at 7, 5-32. This low flow contrasts with irregular floods that create up to 140,000 cfs in flow. *See*

SLD/Upper, at 5-46; *see also id.* at 3-22 to 3-23 (describing torrential floods in the Clifton area in the 1870s, 1880, 1891, 1903, 1905, 1906, and 1916); SLD/Lower, at IV-42 (describing 1891 flood).

295. Mr. Burtell reconstructed flows to reflect the Upper Gila's natural condition by adjusting USGS gage data to account for upstream diversions. Mr. Burtell made use of gage data from several gages in the Upper Gila River Watershed, taking care to select a time of ordinary precipitation and prior to impacts from groundwater pumping, and he reconstructed flows by accounting for the upstream diversions and adding that water back into the stream. *See generally* Tr. at 06/20/14:1097/14 to 1125/7 (Burtell).

296. Mr. Burtell's reconstructed flows and depths "are overestimates or at least are at the highest level of what could reasonably have occurred based on the data that I looked at." Accordingly, Mr. Burtell included "less than" symbols ("<") to denote that the actual depths were less than the conservative calculations. *See* Tr. at 06/20/14:1098 ln.20 to 1099 ln.8 (Burtell).

297. There was agreement during the hearing that Mr. Burtell's calculations were, indeed, conservative, and Mr. Fuller even incorporated Mr. Burtell's depth reconstructions into his PowerPoint presentation to the Commission. *See* Tr. at 08/19/14:1703 ln.24 to 1704 ln.15 and 1742 ln.1-15 (Mussetter); Tr. at 06/17/14:342 ln.1 to 343 ln.13 (Fuller).

298. In summarizing his results, Mr. Burtell determined

> that undepleted flows along the Upper Gila River typically had a mean depth of less than 2.0 feet and average velocities greater than 1.5 feet per second. Flows were generally deeper and/or velocities were greater during the spring snowmelt and summer monsoon, but even at those times, flow depths at most points typically remained less than 2 feet. Such stream depths would not have supported commercial boat travel in light of prior court decisions (e.g. *United States v. Utah* . . .) and certain navigability guidelines . . . .

Declaration ¶ 81.

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Geomorphology of the Gila River

299. During the 2005 hearings, the Commission received, reviewed, and considered extensive evidence regarding the geomorphology of the Gila.

300. The evidence showed that substantial portions of the river prior to statehood, especially in the lower portions of the river below the Salt River confluence, consisted of a braided channel. Such channels are associated with sand bars and other impediments to navigation. *See* Schumm, *Geomorphic Character of the Lower Gila River*, at 3 (June 2004) [EI 6] ("Schumm").

301. Geomorphologist Dr. Stanley Schumm presented a written report and testified at the November 2005 hearing regarding the geomorphology of the lower portion of the river. In his report, Dr. Schumm stated that "[t]he Gila River is characterized by inherent instability and frequent and destructive channel migration." Schumm, at 3.

302. Dr. Schumm concluded that, in part due to the large floods that occurred in 1905 and 1906, the "[g]eomorphic and hydrologic evidence demonstrates that on February 14, 1912 the lower Gila River was not navigable." Schumm, at 16; *see also* Tr. at 11/17/05:17 (Schumm).

303. Dr. Schumm's statements regarding the braided nature of the river channel are consistent with information included in the SLD's reports and the specific findings of Dr. Huckleberry, the SLD's geomorphologist. According to the SLD's report, environmental reconstructions for the Gila River Valley show that the river has been braided through most of its existence. Evidence of braiding exists back as early as 798-899 A.D. *See* SLD/Lower, at III-23. According to that evidence, the river varied between a bar-braided channel and an island-braided channel from 798 A.D. to 1500 A.D. *Id.*

304. Dr. Huckleberry reported that the river has experienced "alternating periods of channel stability and instability, and specifically, changes in channel form (e.g., braided vs. meandering)" during the past 10,000 years. SLD/Lower, at VII-2.

305. "Periods of increased large flood frequency are more likely to be associated with wide, braided channel conditions on the Gila River." SLD/Lower, at VII-2; *see also* Tr. at 11/16/05:56-57 (Huckleberry). Dr. Huckleberry concluded:

> The Gila River is a classic example of a dryland river that seldom seeks equilibrium form. Unlike rivers in humid regions that have more stable channels adjusted for more continuous streamflow with less variance in discharge, the dryland rivers are inherently more unstable and more prone to changes in channel configuration. . . . [A] basic premise of this study is that the Gila River responds to secular climatic variability by radical changes in channel configuration, and that periods of increased, large flood frequency correlate with unstable, braided channel conditions.

SLD/Lower, at VII-10.

306. These conclusions that at least large parts of the Gila consist of a braided channel also are supported by early anecdotal descriptions of the river. In 1899, for instance, the bed of the river was described as "sandy and shifting." *See* SLD/Lower, at IV-9. That same 1899 account stated that "[t]he channel of the (Gila) river at the buttes is composed of quicksand and likely to change daily with any considerable amount of water in the river." *Id.* at IV-10; *see also, e.g., id.* at IV-12 (1904: "The bed of the stream is composed of sand and gravel, free from vegetation, and shifting."); *id.* (1905: "At every flood the channel shifts."); *id.* at IV-13 (1908: "the constantly shifting channel"); *id.* at IV-14 (1910: "The bed of the stream is composed of shifting sand and silt."); *id.* (1910: "The bed of the stream is wide and composed of shifting sand").

307. Although Dr. Schumm did not specifically address the portions of the river above the Salt River confluence, the SLD's consultants did. Those consultants reported that the bedrock geology of these portions of the river "made access to the river difficult during the period around statehood, prevented development of extensive irrigation systems, and prevented the development of large population centers near the river." SLD/Upper, at 4-18; *see also* Tr. at 11/16/05:60 (Fuller).

308. Mr. Hjalmarson also testified regarding certain hydrology and geomorphology issues in 2005. *See* Hjalmarson 2005, *supra*; Hjalmarson, Power Point Presentation entitled "Navigability Along the Natural Channel of the Gila River, AZ" (November 16, 2005) [EI 23] ("Hjalmarson 2005 PP").

309. Mr. Hjalmarson's standard for navigability is based upon modern recreational boating standards known as the Hyra method (Hyra, R., 1978, Methods of assessing instream flows for recreation: Instream Flow Information Paper No. 6, U. S. Fish and Wildlife Service and others). *See* Tr. at 11/17/05:252 ln.4-15 (Hjalmarson).

310. In reliance upon the Hyra method, Mr. Hjalmarson assumes that a stream is navigable if it has one foot of depth. *See* Tr. at 11/17/05:252 ln.4-15 (Hjalmarson).

311. In his report filed with the Commission in October 2002, Mr. Hjalmarson concluded: "It is my opinion the Gila River, from the confluence with the Salt River to the mouth at the Colorado River, was susceptible to navigation at the time of statehood (February 14, 1912) in its ordinary and natural condition." Hjalmarson 2005, at 30. Subsequent to the completion of that report, however, Mr. Hjalmarson was deposed in litigation involving Gillespie Dam on the lower Gila. In that deposition, Mr. Hjalmarson testified that he did not know whether the Gila was predictable enough for someone who wanted to conduct commercial navigation on it in 1912 to be able to do so on a regular basis. Deposition of Hjalmar Hjalmarson, at 20, *A-Tumbling-T v. Paloma Investment* 44 (January 16, 2003) [EI 24] ("Hjalmarson Depo."); *see also* Hjalmarson, *Confidential Notes: The Ability to Navigate the Gila River Under Natural Conditions, Below the Confluence with the Salt River to the Mouth at Yuma, Arizona* 45 (July 2001) [EI 25] ("Hjalmarson 2001") ("My limited research on the history of navigability of the Gila River suggests that it was not used on a regular basis for any kind of water transportation of bulk commodities such as furs or covered wagons or people. . . . Clearly, no accounts that the river was developed for navigation were found.").

312. Mr. Hjalmarson's work submitted to this Commission recognizes that the data necessary to prove that the river ever was susceptible to navigation is severely lacking. *See, e.g.,* Hjalmarson 2002, at 9 ("There are few known direct observations of the flow and of the morphology of the river. There are no measurements of streamflow by the U.S. Geological Survey (USGS) until 1888. There are no aerial photographs or detailed topographic maps of the river channel. . . . There are only a few available recorded observations of the river hydraulics and morphology made by explorers.").

313. Mr. Hjalmarson obtained estimates of pre-development flows in the river at the Gila River and Salt River Indian Reservations. *See* Hjalmarson 2002, at 12-14. Those estimates were based upon a USGS numerical model "developed to simulate ground-water flow, stream-aquifer connection, and evapotranspiration for purposes of evaluating predevelopment hydrologic conditions on the reservation." *Id.* at 14. Mr. Hjalmarson then summed these two estimates together and ran that combined flow estimate through some equations to obtain a hypothetical width and depth of the river. *Id.*; *see* Hjalmarson 2001, at 34 ("The problem with estimating channel size and shape corresponding to the natural flow characteristics is there is little reliable evidence of channel width and depth before about 1860. A solution is the use of regional hydraulic geometry relations to estimate channel width using the estimate of mean annual discharge for natural watershed conditions.").

314. In order to do the task Mr. Hjalmarson was asked to perform, it was "necessary to estimate the size and shape of the river channel before about 1860 when the flow was natural." Hjalmarson 2001, at 10. In his 2003 deposition, Mr. Hjalmarson testified that his analysis focused solely upon hydrology and hydraulic geometry and "excluded a number of other things that others have testified that they utilized in trying to determine navigability, historical data and observations of pioneers and things like that." Hjalmarson Depo., at 123.

315. In the 2001 version of his report, Mr. Hjalmarson acknowledged the lack of important data for a determination of susceptibility to navigation:

> Obviously, a large number of historic measurements of channel characteristics, especially channel width and depth for dry-weather flows, would be important information for assessment of navigability. However, in the absence of historic measurements of channel geometry at several locations along the river, the hydraulic geometry is considered a reliable general estimate of channel width and depth.

Hjalmarson 2001, at 45; *see also* Hjalmarson Depo., at 20 (referring to his 2001 draft: "These are – what I did in the production of the report and because of the way I – because of my history of commonly producing reports from the work I do, the way I go about doing the job is I put things together as if it's going to be published."); *see also id.* at 21-22 (clarifying that report generated from 2001 Notes was the one filed with this Commission).

316. Mr. Hjalmarson made no effort to calibrate his results, feeling that it was unecessary. *See* Tr. at 11/17/05:293 ln.5 to 295 ln.24 (Hjalmarson).

317. Even using Mr. Hjalmarson's estimates and assumptions, the river would not be particularly susceptible to navigation. *See* Hjalmarson 2001, at 44 ("Several assumptions and simplifications must be made before Manning's equation can be used to estimate" the depth relative to the amount of discharge (C) and the slope of the discharge-depth relation (*f*).").

Mr. Hjalmarson testified that "about 70% of the time the flow is less than the mean annual flow. In terms of using a vessel on the Gila River, the lower flows such as the base runoff, may limit navigability for at least part of a typical year." Hjalmarson 2002, at 16. Mr. Hjalmarson also conceded that, although he opined that the river would be "very easy" to navigate, it would be subject to difficulties associated with "obstacles" such as sand bars and riffles. *Id.* at 24-25.

318. One of the tests Mr. Hjalmarson used to determine susceptibility to navigation was the Langbein method, which estimates the river's tractive force. According to the report, "[m]ajor navigation appears to be associated with river tractive forces of less than 0.001." Hjalmarson 2002, at 27. "Within the range from 0.002 to 0.001, navigation is usually limited to ferry or short-run operations." *Id.* "[R]iver tractive forces of 0.001 and 0.002 are near the

maximum feasible for commercial navigation." *Id.* The tractive force Mr. Hjalmarson reports for the Gila is 0.001. *Id.* Even under Mr. Hjalmarson's own analysis, the tractive force for the river is (1) above (i.e., worse for navigation than) that associated with "major navigation," (2) above (i.e., worse for navigation than) the "maximum feasible for commercial navigation," and (3) in the range "usually limited to ferry or short-run operations." *Id.*

319. Mr. Hjalmarson's analysis in his final report assumed that the "natural" Gila was a single meandering, smooth, parabolic channel. *See* Hjalmarson 2005 PP, at 33; *see also id.* at 27; Tr. at 11/17/05:265-66 (Hjalmarson).

320. This assumption directly conflicts with the opinions by Drs. Schumm and Huckleberry (the geomorphologists), who opined that the river was unstable and had a braided channel. *See* Findings of Fact Nos. 299-307. The assumption also is contrary to the historical evidence that the river had a sandy, shifting bottom. *See id.*

321. In the 2009 ANSAC Report (p. 73), the Commission determined that Mr. Hjalmarson's decision that a parabolic channel should be assumed "is a singularly unusual conclusion in view of the testimony of so many parties as to the braided condition of the river and the sand islands, sand bars and other obstacles reported by others."

322. Based upon all of the evidence submitted, the Commission again finds that Mr. Hjalmarson's assumption of a single, meandering, smooth, parabolic channel is not appropriate or justified in this instance.

323. Mr. Hjalmarson's assumption of a single meandering, smooth, parabolic channel is also contrary to his own opinions presented in the 2001 version of his report. *See* Hjalmarson 2001. In that document, Mr. Hjalmarson referred to the multiple channels and braiding of the river, both in its predevelopment and current condition:

a. "Two of the sites where [sic] selected because they were braided channels that represented the worst-case condition for navigability. It is unknown if the braided conditions were representative of natural conditions." Hjalmarson 2001, at 35.

b. "Following very large floods[,] the channel may have become destabilized and reaches may have developed multiple channels of braids. Braided channels divide and combine." Hjalmarson 2001, at 35.

c. "There may have been channel braiding in places along the Gila River as suggested by the oldest available USGS topographic maps. There was also at least one historic account of multiple channels." Hjalmarson 2001, at 35.

d. "Following a very large flood, the channel may more than double in width (at the expense of flood-plain areas), straighten, and modify to a braided pattern. Most silt and fine sand may be washed from the bed material, and coarse-sand to gravel sizes would be added by destruction and reworking of flood-plain deposits. This braided channel condition would be unstable." Hjalmarson 2001, at 41.

e. "Navigability of the Gila River below Gillespie Damsite was limited by areas with multiple (braided) channels because flow was divided among two or more channels." Hjalmarson 2001 Notes, at 66; *see also* Hjalmarson Depo., at 79-80 ("Q. Is it your opinion that under the hypothetical situation, with your estimated mean annual flow, it was not braided? . . . A. I would – in most places, I would expect it not to be braided. But because of the nature of the channels like the Gila, I would expect to have localized areas of braided like conditions following large floods. You'd get increases in gradient and so forth from some deposition, and braided – and braiding-like conditions might – might – might occur.").

f. "Navigation during low flows was limited where the low-water channels may have been braided. Flow appears to divide into two or more channels in these areas and there may not have been much depth for rafts and small boats during long-dry periods when base runoff was low. Where low water was in a single channel all of the low water was confined to the channel and flow depths, the major limiting parameter for navigation on the Gila River, were greatest where low water was in three channels the low water was distributed and more total flow was needed to produce the needed depths." Hjalmarson 2001, at 50.

324. Although much of nine additional days of hearing in 2014 focused on the geomorphology of the river in its "ordinary and natural condition," none of that evidence changes the conclusion that the Commission reached in 2009. Mr. Fuller, for instance, testified that the "character of the river valley is rewritten" during large flood events, and he stated that these flood events can move the low flow channel from the left side of the river to the right. *See* Tr. at 06/16/14:117 (Fuller). He also testified that, in certain circumstances, "floods have more of an impact on the channel than [] diversions." Tr. at 06/17/14:351 (Fuller).

325. Dr. Schumm passed away in the interim between the 2005 and 2014 hearings, and his colleague, Dr. Robert Mussetter, continued his work on the Gila. *See* Mussetter, *Declaration Regarding Navigability of the Gila River Between the Arizona-New Mexico State Line and the Confluence with the Gila River* (January 8, 2014) [X003] ("Mussetter"); Tr. at 08/19/14:1658-60 (Mussetter).

326. Dr. Mussetter testified that the geomorphology of the river (i.e., the "channel pattern") "has a lot to do with whether a river is navigable." *See* Tr. at 08/19/14:1649, 1675-76 (Mussetter). He stated that, "historically, the characteristics of the Gila River are very strongly impacted by floods that occur in the river." *Id.* at 1678-79. "This river has undoubtedly always been very dynamic. It has experienced large floods." *Id.* at 1679. Regarding the Gila and similar rivers, Dr. Mussetter testified:

> They basically work by a big flood comes along, it blows the river out, you get a wide, braided condition, you tear up the banks, you shift the sandbars around and so on. And then over the next period of time the flood recedes and the river kind of settles down, and it's been described as sort of recovering back towards a more stable and less dynamic system. And then another flood comes along and you start the process all over again.

Id. at 1879-80. Dr. Mussetter acknowledged that portions of the Gila might have had a single channel in the mid-1800s and perhaps at other times over the prior hundreds of years, but he said that those periods were naturally followed by large floods that would turn the river back into a wide, braided channel. *Id.* at 1693, 1965, 1697-1700.

327. At certain points in history, certain portions of the river might have had a single, relatively stable channel. At other times, however, especially for extended periods following floods and during other wet cycles, the Gila appeared as much of it appears today—a wide, unstable, braided watercourse with multiple and shifting channels. *See, e.g.,* Tr. at 06/16/14:135 (Fuller); Fuller/Gila, at 37.

328. The dynamic and shifting nature of the Gila is an "ordinary and natural condition." For instance, Mr. Farmer testified that the Gila is a "dynamic river." *See* Tr. at 06/18/14:639 (Farmer). Mr. Gookin stated that "[t]he reason that no single condition can be used is simply that a river is variable." Gookin 2014, at III:2. Dr. Littlefield testified: "The historical record illustrates that the Gila River was erratic, subject to unpredictable flooding, prone to channel changes and blocked by natural obstacles such as rock outcroppings and sandbars." Tr. at 08/18/14:1450 (Farmer).

329. In Mr. Gookin's 2014 report, he concludes that three groups of major floods (1890-91, 1905-06, and 1915-1916) "were the floods that turned the Gila River from being a primarily single channel river into a primarily braided stream." Gookin 2014, at 13.

330. Mr. Burtell's 2014 report states: "In response to several large flood events that began in the early 1900s, portions of the river widened substantially and became braided." *See* Burtell, at 4.

331. The Gila River does not uniformly maintain a single low flow channel when the stream is in a braided condition. For instance, field measurement records from the USGS demonstrate that the Upper Gila frequently had multiple flowing channels through the Duncan Valley and the Safford Valley. This remained true even decades after the flooding and braiding took place, during a time when the river was in the process of transitioning back to a single meandering channel. *See* Tr. at 06/20/14:1053 ln.19 to 1054 ln.16 (Burtell). Aerial photographs from 1935 and 1937 also show that the river remained divided among multiple flowing channels through the Duncan Valley and, in particular, the Safford Valley. Soil

Conservation Photos Index Map and Aerial Photographs of the Gila River [X027, Freeport 12].

332. Mr. Burtell testified that braiding is a natural condition of the Gila River. Going back hundreds or even thousands of years, the Gila has a long history of alternating between cycles of channel braiding followed by cycles of single channel conditions. *See* Tr. at 06/20/14:1057/2 to 1058/19 (Burtell).

333. When significant portions of the Gila River developed braided channels in the early 1900s, it was not the result of man, but of significant flooding that is an intrinsic component of the river's natural condition. *See* Tr. at 06/20/14:1057 ln.2 to 1058 ln.19 (Burtell).

334. As Dr. Huckleberry testified on behalf of the ASLD in 2005, "in terms of the overall geometry of the floodplain, and particularly the flood channels, it's the floods that have the greatest impact." Tr. at 11/16/05:94 ln.22 to 95 ln.11 (Huckleberry).

335. Contemporaneous historical accounts of these floods support the conclusion that these floods "blew out" the Gila.

a. In 1891, *Part II of the Eleventh Annual Report of the U.S. Geological Survey*, stated:

> These floods are of the most destructive and violent character; the rate at which the water rises and increases in amount is astonishingly rapid, although the volume is not always very great. . . . From this it will be recognized that the onset of such a flood is terrific. Coming without warning, it catches up logs and bowlders [sic] in the bed, undermines the banks, and, tearing out trees and cutting sand-bars, is loaded with this mass of sand, gravel, and driftwood – most formidable weapons for destruction.

Littlefield 2014, at 100-01.

b. In 1906, U.S. Geological Survey Water Supply Paper No. 162 entitled *Destructive Floods in the United States in 1905, with a Discussion of Flood Discharge and Frequency and an Index of Flood Literature* described the Gila's spring floods:

> [T]he total run-off for the five months is 2,957,400 acre-feet. To appreciate the magnitude of the run-off on this stream during this period it is necessary to remember that this stream is usually dry at this place about ten months of the year. . . . [The Gila's bed] not only scours out during a flood and fills in after it, but [the] channel changes from one side of the bottom to the other. . . . This continual changing of the river bed has made it exceedingly difficult to secure reliable estimates of the rate of flow, and some of the estimates may be largely in error.

Littlefield 2014, at 102-03.

c. On October 2, 1897, the *Mohave County Miner* declared: "The Gila River has been on the warpath and farms and stock along its course suffered considerably 10 days ago." Littlefield 2014, at 136.

d. On August 17, 1901, the *Arizona Republican* reported on the severe flooding of the Gila that damaged a railroad bridge near Phoenix:

> The Gila River is still high enough to endanger the M. & P. [Maricopa & Phoenix Railroad] bridge. The river seems to have a particular spite at the bridge and is systematically working to destroy it. The current strikes the bridge at the north bank and then turns and runs south along the bridge until it strikes the south bank. Some timbers were taken down last night to be used to make the operation of transferring passengers, baggage, and mail easier. No repairing can be done until the river falls. About seventy feet of track was torn up yesterday and carried off to prevent its being lost if the bridge gives way.

Littlefield 2014, at 136-37.

e. On September 19, 1901, the *Phoenix Weekly Republican* reported:

> The Gila River is certainly a remarkable stream and its nerve commands respect. When the [railroad] bridge was built, the stream ran straight east and west, and a long trestle was put up for its accommodation. Gradually, it left the south bank and ate into the north bank above the bridge.

Littlefield 2014, at 137.

f. On February 25, 1905, the *Tucson Daily Citizen*, while calling the Gila "notoriously treacherous and unconventional," reported:

> Bicknell, of the Maricopa and Phoenix railroad, said yesterday that it would be at least a week before the company could transfer passengers at the Gila river bridge and ten days at least before trains could be run across the bridge. He said the river was 4,500 feet wide Sunday afternoon at that point, and there was no impediment in his speech when the remark was made. . . . The familiar island in the center of the stream was submerged and there was nothing to distinguish the river from a large-sized ocean, except that there was more driftwood and debris afloat making the river less navigable than a tropical sea during a simoom [sic].

Littlefield 2014, at 137-38.

g. On January 19, 1906, the *Arizona Republican* reported:

> The Gila bridge is going some this time for sure. There was no halting in the order of its going but when the time came, twelve bents of it just rose up and shook their skirts and floated off gracefully toward the ocean. As mentioned in yesterday's paper, it was just crouching for the spring when the train came over on Thursday afternoon about 4 o'clock. The river was then coming down like a tidal wave and in the early evening the bridge wobbled away with a mocking gurgle and was seen no more. The river was very high all day yesterday and it was expected that the rest of the bridge would follow along piecemeal until there wouldn't be enough left to patch again, but strange to say, no more of it was loosened during the day. Superintendent Bicknell is hoping that it will stand through the flood and thinks it really ought to. A joke is a joke all right, but even the Gila River can carry things too far sometimes.

Littlefield 2014, at 138-39.

h. On December 5, 1906, the *Tucson Daily Citizen* reported:

> The troublesome Gila is raging. This treacherous stream, after lying peaceful for several months, has suddenly risen and its waters are rushing across Arizona toward the Colorado [River] at terrific speed, carrying much ahead of it and doing considerable damage. . . . Two bents were carried away on the Gila bridge of the Maricopa & Phoenix road. It was reported that the remainder of the bridge, however, withstood the rush of the waters.

Littlefield 2014, at 139.

336. Dr. Mussetter's report states, "[l]arge floods that occurred during the period between 1895 and 1906 scoured away much of this vegetation, caused extensive bank erosion

and channel widening, and converted the Gila River to a wide, braided planform that persists to the present time." *See* Mussetter, at 2.

337. Dr. Mussetter testified that examining GLO survey maps prior to, and after, statehood, shows that the river moved and changed dramatically in a matter of decades:

a. Regarding GLO survey maps of the Gila River, Dr. Mussetter testified:

> [I]n that sort of dry period in the mid 1800s, when we have descriptions of the river being a single-thread channel, and then we come forward to a period after the larger floods around the turn of the century, and we see a wide, braided channel at that time, showing the influence of the flows.

Tr. at 08/19/14:1693 (Mussetter); *see also* Mussetter, *Gila River Navigability* (August 19, 2014), slide 18 [X026] ("Mussetter Presentation").

b. Regarding GLO survey maps of the Gila west of Phoenix (GLO Plats T1N, R1W 1867 & 1915), Dr. Mussetter testified:

> We have a narrower – it may be somewhat wider than the previous photographs, but still single-thread-ish type channel in the mid 1800s, and then we have a somewhat wider channel around 1950, subsequent to the floods that occurred, you know, around the date and right before the date of statehood.

Tr. at 08/19/14:1693-94 (Mussetter); *see also* Mussetter Presentation, slide 20.

c. Regarding GLO survey maps of the Gila west of Phoenix (GLO Plats T1N, R2W 1883 & 1907), Dr. Mussetter testified:

> [T]he difference between those two, the character of the river at those two times, is related to the large floods. And while human activity may have had some influence on those floods, those floods would have certainly have been very large and would have had a similar effect."

Tr. at 08/19/14:1695 (Mussetter); *see also* Mussetter Presentation, slide 22.

338. "It takes several decades in the arid regions for a river to undo the damage created by a flood, and restore it to a single channel, well-defined river. . . . Due to the extensive braiding, the Middle and Lower Gila segments along the Safford segment were not navigable as of Statehood." Gookin 2014, at V:19. "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." *See* Mussetter, at 4 (citations omitted).

339. "From at least the date of Arizona's Statehood to the late-1980s, the Gila River has been characterized by inherent instability and frequent and destructive channel migration. For example, the channel shifted 0.5 miles near Buckeye during a flood in 1941." *See* Mussetter, at 6 (citations omitted).

340. Mr. Fuller admitted that portions of the upper Gila consisted of wide, braided flood channels at the time of statehood. *See* Tr. at 06/17/14:350 (Fuller).

341. "The Gila River was extensively braided in the Safford, the Middle Gila, and the Lower Gila reaches by 1912. The Gila River was also braided in smaller reaches in the mid 1800s." Gookin 2014, at III:3.

342. Dr. Mussetter's report states, "[t]he braided planform and generally low to non-existent flows would have made it highly impractical (or impossible in many places) to navigate the river with watercraft during the general timeframe of Arizona's statehood." *See* Mussetter, at 2.

343. "The braided plan from that existed certainly at that time and the really low flows would have made commercial navigation very impractical." Tr. at 08/19/14:1700 (Mussetter); *see also* Mussetter Presentation, slide 27; Tr. at 08/19/14:1666-67 (Mussetter); *see also* Mussetter Presentation, slide 4. "While it is possible to navigate a braided river, it takes far more river flow than any of the experts or records suggest for the Gila River." Gookin 2014, at III:2.

344. Dr. Littlefield presented several exhibits showing the Gila in different locations on various historical maps, which illustrated that the Gila's channel changed over time. Tr. at 08/18/14:1351-52 (Littlefield); Littlefield Presentation, slides 20-22.

345. Based upon all of the evidence, the Commission finds that the Gila is not, was not in 1912, and was not for any other significant period of time a single, meandering, smooth, parabolic channel. *See* Findings of Fact Nos. 209-344.

346. The Commission, based upon all of the evidence submitted, reiterates its 2009 finding that Mr. Hjalmarson's analysis is not credible or persuasive because his assumption regarding a single, parabolic channel is incorrect and unjustified. Because there is not and was not a single, smooth channel, Mr. Hjalmarson's estimates regarding the width and depth of the river have no basis. The only way to get from an estimated flow rate to a width and depth is to assume that such flow goes through a single, smooth channel (like a man-made canal). Otherwise, the flow is dispersed into the multiple braided channels, and it is impossible to reliably estimate the width or depth of the channel(s).

Obstacles to Navigation

347. The Commission received extensive evidence of obstacles that existed on the Gila at and before statehood and remain obstacles to navigation today.

348. Dr. Littlefield testified: "The historical record illustrates that the Gila River was erratic, subject to unpredictable flooding, prone to channel changes and blocked by natural obstacles such as rock outcroppings and sandbars." Tr. at 08/18/14:1450 (Littlefield).

349. With regard to General Kearny's military reconnaissance down the Gila in October 1846, Mr. Burtell's report states, "Kearny reached the confluence with the San Pedro River in November 1846." *See* Burtell, at 6. Johnston reported that the Gila had "about 18 inches [of] water on the shoals . . . and canoes might pass down it very readily and good sized boats, if it was not for the round rocks in its bed." *Id.*

350. Mr. Fuller testified that the rapids on the Gila tend to be "small drops." Tr. at 06/16/14:71 (Fuller). According to Mr. Fuller, after the confluence with the San Francisco River, "it starts to become a little more cobbly downstream of that so the riffles are a little rockier." Tr. at 06/16/14:132 (Fuller); Fuller/Gila, slide 36. Mr. Fuller testified that Segment 4 is a perennial reach with a compound channel pattern, and a pool and ruffle pattern, which is "[m]ore cobble, more rocky, in a bedrock Canyon." He also testified that there are a number of rapids in Segment 4 including class IIs, and a class III. *See* Tr. at 06/16/14:141

(Fuller); Fuller/Gila, slide 42. In his experience on SLD Segments 2, 4 and 5, Mr. Farmer stated that he has encountered rapids. *See* Tr. at 06/18/14:564 (Farmer).

351. Mr. Farmer testified that boaters will encounter contact with rocks "[m]ost of the time" because of lack of visibility. *See* Tr. at 06/18/14:573.

352. Mr. Fuller testified that, in order to get past obstacles without portaging, a boater must find a deeper channel, get out of the boat and tow it with a rope, use body weight to propel the boat over the obstacle, or get out of your boat and drag it. *See* Tr. at 06/16/14:79-80 (Fuller); Fuller/Boating, at 104.

353. Mr. Farmer stated that he has encountered rapids on the SLD Segments 2, 4, and 5. *See* Tr. at 06/18/14:564 (Farmer). He testified that the rapids on the Gila "could pose some danger" to a beginner boater. *Id.* at 565. He noted that there are places on the Gila where a novice boater "should get out and scout the rapid and plan his descent through it." *Id.* at 565.

354. Mr. Gookin also addressed other obstacles to navigation that existed under natural conditions but are no longer present. He discussed marshes that occurred on the Gila, referred to as "sh-shon" by the Pimas. *See* Gookin 2014, at V:17. Mr. Gookin stated: "The U.S.G.S. in its modeling of the predevelopment condition of the Gila River Indian Reservation found that in 1870 the western 1/3 of the Reservation had 'large marshy areas' due to groundwater coming to the surface. As late as 1915, the area still contained swamps." *Id.* at V:18.

355. Mr. Fuller testified that sandbars exist on the Gila. *See* Tr. at 06/16/14:77 (Fuller); Fuller/Boating, slides 100-01.

356. Dr. Littlefield testified sandbars can make rivers "difficult to navigate." Tr. at 08/19/14:1605 (Littlefield). Dr. Mussetter testified that language in *United States v. Utah*, 283 U.S. 64, 85 (1931) ("The principal impediment to navigation is found is [sic] shifting sandbars . . . .") "acknowledged that one of the principal impediments to navigation that they

were looking at in that case was the presence of shifting sandbars." Tr. at 08/19/14:1677-78 (Mussetter); *see also* Mussetter Presentation, slide 11.

357. Mr. Fuller testified that that obstructions called "strainers" or trees that grow into the river exist on the Gila. *See* Tr. at 06/16/14:79 (Fuller); Fuller/Boating, slide 103. Mr. Fuller testified that strainers can cause particular difficulty to inexperienced boaters. Tr. at 06/16/14:79 (Fuller); Fuller/Boating, slide 103.

358. Several witnesses addressed the presence of beaver dams on certain portions of the Gila. *See, e.g.,* Tr. at 06/16/14:75-76 (Fuller); Fuller/Boating, at 96. The witnesses discussed whether the beaver dams would have been an impediment to navigation. Mr. Gookin opined that "beaver dams would have forced considerable amounts of portage in the natural state." Gookin 2014, at III:9; *see also id.* at IV:11. With regard to going over a beaver dam in a canoe, Mr. Farmer testified: "The bottom of the boat is going to scrape over the top of the beaver dam. The front of the boat is probably going to hit the bottom on the reentry. The back of the boat is probably going to drag the beaver dam all the way down." Tr. at 06/18/14:626 (Farmer). On examination by the SLD's counsel, Dr. Mussetter described his experience when he encountered beaver dams on rivers while he was boating: "Well, I got out of the canoe and carried it around and got back in the canoe." *See* Tr. at 08/19/14:1761 (Mussetter). In other words, he portaged. *See* Tr. at 06/16/14:79 (Fuller) (definition of "portaging"). Upon further examination by counsel for Maricopa County, Dr. Mussetter testified that, if he had five days' worth of camping gear or 500 pounds of beaver pelts with him, he would have had to unload that cargo from the canoe prior to carrying it around the beaver dam. *See* Tr. at 08/20/14:1853-54 (Mussetter).

359. Mr. Fuller's presentation suggested that some of the reasons as to why people did not navigate Arizona rivers were flow depth, cost, speed of travel, skills, and location. *See* Fuller Boating, slide 68.

360. Mr. Fuller testified that boulders could be a factor in determining susceptibility to navigation depending on the "number of boulders." Tr. at 06/17/14:377 (Fuller).

361. Mr. Farmer testified that boaters will encounter contact with rocks "[m]ost of the time" because of lack of visibility. Tr. at 06/18/14:573 (Farmer).

Boats Available at the Time of Statehood

Ferries

362. Much of the testimony presented to the Commission involved ferries. Mr. Fuller testified that ferries are "primarily used for crossing rivers." Tr. at 06/16/14:22 (Fuller). Almost all of Mr. Fuller's testimony regarding ferries (used to cross rivers rather than to conduct commercial transport up or down rivers) described ferries on rivers other than the Gila. *See* Tr. at 06/16/14:31-35 (Fuller); Fuller/Boating, slides 19-26. According to Mr. Fuller, the evidence of the use of ferries demonstrates a susceptibility to boating "at least at that location." Tr. at 06/16/14:35 (Fuller); Fuller/Boating, slide 28.

Steamboats

363. Mr. Fuller presented significant testimony regarding the use of steamboats in Arizona. Mr. Fuller's testimony regarding the use of steamboats in Arizona involved steamboats on the Colorado River. *See* Tr. at 06/16/14:29 (Fuller).

364. When the Colorado River has high flows, some of the water backs up into the Gila, which gives the lowest portion of the Gila capacity to float boats:

> The Gila River is navigable a long distance up from Yuma at present, due to the backing of the waters of the Colorado. In the Colorado, the flow is very large, due to the meltage [*sic*] of the snows in Colorado and Utah. Steamboat excursions up the Gila from Yuma are the rage of late.

Littlefield 2013, at 135. Mr. Fuller admitted that steamboats could not have been used on the Upper Gila in its ordinary and natural condition. *See* Tr. at 06/17/14:289 (Fuller); Tr. at 06/18/14:717 (Fuller).

365. Dr. Littlefield testified that he has never seen a primary source stating that a steamboat traveled up the Gila to Gila City or Dome. *See* Tr. at 08/18/14:1394 (Littlefield).

366. Mr. Fuller's Power Point presentation implied that steamboats traveled up to Gila City, on the Lower Gila. *See* Fuller/Gila, at 99. At the hearing, however, he could not

testify as to where Gila City was located or how many miles up the river it was. *See* Tr. at 06/17/14:410 (Fuller).

367. Mr. Lingenfelter found that miners "found that even rafting down the Gila, let alone running a steamer up it, was simply not possible most of the year." *See* Lingenfelter, at 9.

Inflatable Boats

368. Mr. Fuller testified to the use of inflatable boats around the time of statehood to cross the Colorado River. He provided no examples, however, of statehood-era inflatable boats used to travel down Arizona rivers, and on no rivers besides the Colorado River. *See* Tr. at 06/16/14:47 (Fuller); Fuller/Boating, slide 54.

369. The first example provided by Mr. Fuller of an inflatable boat used in Arizona to travel downstream was in 1937. *See* Fuller/Boating, slide 55.

370. When asked if inflatable boats were commonly used in Arizona prior to 1940, Mr. Fuller testified that he did not have any evidence that they were commonly used, but noted that 1937 was the first trip in the Grand Canyon and that Whipple used them in the mid-1800s. *See* Tr. at 06/17/14:301-02 (Fuller).

371. "Use of inflatables . . . did not become common until the development of artificial rubber in the 1940s." Small Watercourses, at 22; Tr. at 06/17/14:302 (Fuller); *See* Tr. at 06/17/14:443 (Fuller).

372. "Inflatable boats were available as early as the 1850s, but these boats were awkward, difficult to maneuver, and not very durable and it was not until artificial rubber was developed during World War II that inflatables became feasible." Small Watercourses, at 22; Tr. at 06/17/14:302 (Fuller).

Other Boats

373. Although Mr. Fuller testified that flatboats were available at statehood, he opined that flatboats are unwieldy and difficult to control without boating experience. *See* Tr. at 06/16/14:36 (Fuller); Fuller/Boating, slide 31.

374. Mr. Fuller's testimony regarding dories involved their use on the Colorado River and rivers besides the Gila. *See* Tr. at 06/16/14:37-40 (Fuller); Fuller/Boating, slide 35.

375. Mr. Fuller testified that, at the time of statehood, canvas boats were advertised as "having the capability of reaching thousands of streams that could not be reached until the folding canvas boat" demonstrating that materials are crucial for determining the depth of a stream a boat could handle. *See* Tr. at 06/16/14:45 (Fuller); Fuller/Boating, slide 52. As Mr. Fuller testified, "[folding canvas boats] were built specifically for low water conditions . . . ." *Id.* Mr. Fuller testified, however, that a person using a canvas boat might be more likely to portage in order to avoid a sharp rock that could tear the boat. *See* Tr. at 06/16/14:81 (Fuller); Fuller/Boating, slide 105.

376. Mr. Fuller testified that portions of the Gila are not navigable to keelboats. *See* Tr. at 06/18/14:716 (Fuller).

377. Mr. Fuller testified that certain segments of the Gila were not conducive to large deep draft boats. *See* Tr. at 06/17/14:465 (Fuller).

378. Mr. Fuller testified that you could not reliably navigate a boat large enough to transport ore on the Gila in its natural and ordinary condition. *See* Tr. at 06/18/14:727 (Fuller).

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 Gila 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 v. ANSAC*, 224 Ariz. at 238, 229 P.3d at 250.

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. Much of the testimony during the 2014 hearing related to whether the periodic large floods that occur on the Gila and change the nature and shape of the channel were "ordinary and natural." The evidence showed that such flood and channel changes had occurred throughout history, even before modern development, and thus were part of the river's "ordinary and natural condition."

5. For example, Francisco Garces explored Arizona between 1775 and 1776 and stated that the Gila ran over the land with such "lack of restraint" that it appeared "to shift

their channels, forming wash-outs, and dividing into branches, according as the force of the current bears more or less to this side or to that." Littlefield 2013, at 93.

6. Mr. Fuller testified that the braiding of the channel in the Upper Gila was the result of floods and that the braided flood channel "is a natural condition of the river." Tr. at 06/17/14:350-51 (Fuller); *see also id.* at 476-77. He also stated that, by comparing the maps between 1912 and 1948, the location of the channel shifted by approximately a half mile. *Id.* at 06/16/14:154-55. He opined that, in certain circumstances, "floods have more of an impact on the channel than [] diversions." *Id.* at 06/17/14:351.

7. That changes in the channel as a result of floods are part of the Gila's "ordinary and natural condition" was supported by testimony from the experts. For example, in Mr. Gookin's report, he concluded that three groups of major floods (1890-91, 1905-06, and 1915-1916) "were the floods that turned the Gila River from being a primarily single channel river into a primarily braided stream." Gookin 2014, at II:13.

8. Mr. Gookin opined that "a major flood often creates major changes in the channel configuration." Gookin 2014, at V:11. "[S]ome reaches of the Gila River were braided in the early 1870s. After the major floods of the 1890-91 and 1905-06, many portions of the Gila River were braided." *Id.* at V:18.

9. Dr. Mussetter specifically opined regarding whether the impact of floods was part of the "ordinary and natural condition" of the river: "The specific time when the high water is there during a flood probably fits outside the definition of ordinary; but the impact of that, that persist[s] sometimes for many years or even decades after the flood, is an ordinary condition of the river." Tr. at 08/19/14:1701 (Mussetter); *see also id.* at 1824.

10. Dr. Mussetter testified that the floods on the Gila were the primary driver of the braiding and that such floods occurred throughout history. *See* Tr. at 08/19/14:1679, 1852 (Mussetter). The wide, braided planform that is created by major flooding persists for a significant period and influences the form of the river throughout the ensuing low- to moderate flow periods. *See* Mussetter, at 7-8.

11. Dr. Mussetter's 2014 testimony regarding the geomorphology of the Gila was consistent with the testimony by all the experts during the 2005 hearings including Mr. Fuller's prior testimony and that of Mr. Huckleberry. *See* Tr. at 08/20/14:1868-81 (Mussetter).

12. 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).

13. 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.*

14. The proponents of navigability discount the natural obstructions and other impediments to navigation on the Gila, contending that, under the liberal interpretation of the

federal test, the river was navigable in its "ordinary and natural condition." In his 2014 testimony, Mr. Fuller attempted to distinguish between "obstacles" and "obstructions," arguing that features such as beaver dams, sand bars, and rapids were "obstacles" that make the river more "fun" and not "obstructions" that impede commercial travel. *See* Fuller/Gila, at 21 ("Obstruction ≠ Obstacle, Challenge"). 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.

Segmentation

15. Dr. Mussetter testified that segmentation of the Gila is not necessary because the Gila, in its "entirety" does not meet the federal standard for navigability. *See* Tr. at 08/19/14:1736 (Mussetter).

16. Dr. Mussetter testified that he did not segment the Gila because he thinks the entire Gila does not meet the federal test for navigability, but he did consider the variability of the river throughout its course in Arizona. *See* Tr. at 08/20/14:1783-85, 1815-16 (Mussetter).

17. Mr. Burtell believes that no portion of the Upper Gila is navigable, but that it was useful to divide this portion of the Gila into three segments: (1) Segment A – Duncan Valley, from the New Mexico Border to just below Guthrie (31 miles); (2) Segment B – Gila Box (27 miles); and (3) Segment C – Safford Valley, from just below Bonita Creek to Coolidge Dam (89 miles). *See* Burtell, at 3.

. . .

. . .

Actual Navigation on the Gila River

18. No evidence exists of any prehistoric boating or flotation of logs on the Gila. *See* Findings of Fact 58-85, *supra*. Likewise, no credible evidence exists that the early explorers or soldiers ever used the river—for "commerce" or otherwise. *Id. 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 Gila ever was actually navigated.

19. Dr. Lingenfelter stated, among other things, that there is "no historical record of any commercial navigation on the Gila River," and "the Colorado River was Arizona's only navigable stream." Lingenfelter, ¶ 12, at 3. This lack of navigation occurred "despite a continuing demand from developing mines for cheaper transportation." *Id.* ¶ 30, at 10.

20. Mr. Fuller testified that the historical accounts of boats on Arizona rivers consisted of "low draft" boats used for "downstream travel." Tr. at 06/16/14:60 (Fuller); Fuller/Boating, slide 73.

21. "There seems to be little disagreement that there is no history of commercial navigation on the Gila River." Gookin 2014, at IV 1 (citing Hjalmarson 2001).

22. On November 4, 1870, the *Arizona Champion* reported that Richard C. McCormick, who served as Arizona Territory's delegate to Congress from 1869 to 1870, testified before Congress on April 1, 1870 regarding a possible railroad route through Arizona. Regarding the Gila, he stated: "For half or two-thirds of the year it is a larger river, and the other part a comparatively small one. It is not navigated." *See* Littlefield 2014, at 121.

23. Mr. Burtell's report states that he found no evidence of sustained commercial use on the Gila. *See* Burtell, at 2.

24. With regard to historical photographs of the Upper Gila, Mr. Burtell's report concludes that "[t]he photograph and historic accounts . . . indicate that, in its natural and ordinary condition, the Upper Gila River typically had relatively shallow flow (about 2 feet or less) that would not have supported commercial navigation prior to statehood. *See* Burtell, at 7.

25. Mr. Burtell's report states that "[t]he fact that the Upper Gila River was not used for commercial navigation before substantial diversions occurred . . . suggests that the few historic attempts to float the river were novelty by adventurers and not a reflection of the practical utility of the river for trade and travel." *See* Burtell, at 21.

26. Mr. Burtell's report states that:

> The three other historic accounts of boating the Upper Gila River occurred during the winter or early spring of 1886, 1891 and 1895. The purposes of these trips were prospecting, hunting/trapping and recreation, respectively. Each boating party consisted of a one- or two-man crew and the only known cargo was their supplies. One boat was referred to as a "dugout" and a second as "flat-bottomed," 18 feet long by 3.5 feet wide. Both are considered small, low-draft boats. The type and length of the third boat is unknown. All three trips began at or above Clifton and proceeded downstream with each boat reportedly capsizing, at least two in the canyons below Coolidge Dam.

See Burtell, at 21.

Susceptibility to Navigation

27. 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. 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").

28. Mr. Fuller was the only expert witness who testified during the 2014 hearings that the Gila was navigable.

29. The Commission finds Mr. Fuller's testimony unpersuasive relative to the weight of the evidence presented to the Commission because Mr. Fuller's determination that the Gila is navigable is based on an standard for navigability inconsistent with *PPL Montana,* 132 S. Ct. at 1215 (2012).

30. Mr. Fuller's standard for navigability is based upon his personal recreational experience as well as the Hyra method, the same modern recreational boating standards replied upon by Mr. Hjalmarson. *See, e.g.,* Tr. at 06/16/14:42 ln.5-17 and 61 ln.14-15 (Fuller).

31. Mr. Fuller testified that "I'm using for the purposes of my testimony 6 inches as a minimum flow." Mr. Fuller chose that as his cut off because "at less than 6 inches, it becomes a little less fun to paddle." Tr. at 06/16/14:42 ln.5-17 (Fuller). The Commission finds that Mr. Fuller's framework for determining navigability is recreational boating, not use of the river as a highway of commerce.

32. Mr. Fuller used the terms "navigable" and "boatable" synonymously. *See* Tr. at 06/17/14:370-71. For example:

a. Mr. Fuller testified that *The Daniel Ball* Test is satisfied if "you can float a canoe down a stream." Tr. at 06/17/14:280 (Fuller).

b. According to Mr. Fuller, "susceptibility" to navigation requires "sufficient depth of flow to float a boat." Tr. at 06/16/14:20 (Fuller).

c. Mr. Fuller testified that he defines "highway of commerce" as "a corridor over which some sort of activity could occur." Tr. at 06/17/14:455 (Fuller).

d. Mr. Fuller opined that a boating trip was successful[6] if a boat could travel down a particular segment, and no one was injured and no one died. *See* Tr. at 06/17/14:371, 418-19, 505 (Fuller).

[6] Mr. Fuller acknowledged that his standard for a "successful" boating trip was not based on a legal standard. *See* Tr. at 06/17/14:502-03 (Fuller); *see also id.* at 359.

e. Mr. Fuller defined a successful boating trip as one where "the boat, the passengers, and the cargo arrive[s]," Tr. at 06/16/14:209, and defined a failed boating trip as a trip where "there was a death or serious injury, the cargo was completely lost and not recovered, the boat was destroyed and not repairable, and the trip was not completed." *Id.*

f. According to Mr. Fuller, a boating trip is not a failure when there is "a difficulty or problem that was resolved during the trip," such as flipping a small boat, a necessary line or portage, an obstacle, or the boat required adjustments to navigate the stream. *See* Tr. at 06/16/14:209-10 (Fuller); *see also id.* at 06/17/14:390-92 (Fuller).

g. "[T]he occasional flipping [of] a boat, the occasional bumping into a rock, [and] the occasional hitting a sandbar is not that unusual." *Id.* at 06/16/14:207 (Fuller). A newspaper describing a trip as "daring or adventurous or any other adjective that sounds scary" does not make it a failure. *See* Tr. at 06/16/14:210 (Fuller).

h. While admitting that Col. Cooke described the Mormon Battalion trip as a "complete failure," Mr. Fuller considered it a success because the boat arrived and: "Nobody died. Nobody was injured. That seems like successful boating." *See* Tr. at 06/17/14:410-11, 418-19 (Fuller).

i. Mr. Fuller's standard for navigability is contrary to the "commercial reality" test applied by the U.S. Supreme Court in *PPL Montana* and virtually every other portion of that opinion. *See* Conclusions of Law Nos. 12-14, *supra*.

j. Mr. Fuller's standard is also inconsistent with the specific findings of prior federal and state court decisions regarding the navigability of particular streams. For instance, Mr. Fuller has navigated the San Juan River in a canoe successfully. *See* Fuller Photos, at 21-23 [X037]. The Special Master appointed by the U.S. Supreme Court found the San Juan non-navigable, however. *See* Report of the Special Master, at 185 (October 15, 1930) [X016-FMI_X009]; *United States v. Utah*, 283 U.S. 64, 74, 89 (1931) (affirming Special Master's findings). Likewise, based upon the flow rates, many other watercourses deemed non-navigable by federal and state courts likely would be navigable under Mr.

Fuller's standard. *See generally, e.g.,* Watercourse Information [EI 28]. Mr. Fuller himself testified that he personally concluded that the San Pedro was not navigable and that he consulted with the SLD when it made the decision to not take a position on navigability of the San Pedro. *See* Tr. at 06/17/14:282 (Fuller). Mr. Fuller testified that it was his recommendation to the SLD that it not "pursue a finding of navigability" for the San Pedro or Santa Cruz Rivers. *Id.* at 365-66. Mr. Farmer testified that he has not boated the San Pedro River because "there's not been enough flow in it." Tr. at 06/18/14:579-80 (Farmer).

33. The Commission also finds Mr. Fuller's focus on depth in his determination that the Gila is navigable, to the exclusion of other considerations, unpersuasive. For example:

a. Mr. Fuller opined that "susceptibility" to navigation is "is "really all about depth; and that "[w]idth is generally not a parameter." Tr. at 06/16/14:61 (Fuller); *see also* Tr. at 06/17/14:284 (Fuller) ("[i]t is all about depth"); Tr. at 06/17/14:466 (Fuller) ("If the river is not deep enough that you can put a boat in it in its ordinary and natural condition for the entire year . . . it's not navigable."). Mr. Fuller testified that the historical accounts of boats on Arizona rivers consisted of "low draft" boats used for "downstream travel." Tr. at 06/16/14:60 (Fuller); Fuller/Boating, slide 73.

b. Mr. Fuller testified that he used the U.S. Fish and Wildlife Service's depth standards in making his determination that the Gila is navigable. Tr. at 06/16/14:62-63 (Fuller); Fuller/Boating, slide 62-63. Mr. Fuller admitted that he assumed that the minimum depths he cited for various watercraft from U.S. Fish and Wildlife assume modern recreational watercraft. *See* Tr. at 06/17/14:470 (Fuller); Fuller/Boating, slide 76. *PPL Montana* clarified, however, that "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." 132 S. Ct. at 1233, 1233-34. Mr. Fuller testified that the historical accounts of boats on Arizona rivers consisted of "low draft" boats used for "downstream travel." Tr. at 06/16/14:60 (Fuller); Fuller/Boating, slide 73.

c. Based on these standards, Mr. Fuller testified that canoes require a six-inch depth to navigate a river. Tr. at 06/16/14:37 (Fuller); Boating, slide 46; *see also* Tr. at 06/17/14:311 (Fuller). He also testified that, for the purposes of determining navigability for title, "a half foot of depth is sufficient to float canoes" as long as that depth was regularly occurring "more than a couple days a year." *See* Tr. at 06/17/14:284 (Fuller). Based on the *Utah* Special Master Warren's determination that three feet was necessary for commercial navigation in 1896, Mr. Gookin's report concludes, however, that "[n]avigability requires at least a three foot depth in 1912." Gookin 2014, Executive Summary at 2.

d. Like Mr. Fuller, Mr. Farmer's standard for navigability is also based upon his view of what is boatable in a modern recreational canoe, *see* Tr. at 06/18/14:594 ln.7 to 595 ln.6 (Farmer), and the Commission finds this standard to be inconsistent with *The Daniel Ball* test and *PPL Montana*.

34. Further, the Commission also finds Mr. Fuller's testimony unpersuasive because of its reliance on the experience of the boater. For example:

a. Mr. Fuller testified that the skill of a boater is a factor in determining whether a river is navigable. *See* Tr. at 06/17/14:361-62 (Fuller); *see also id.* at 06/16/14:52 (It "takes special skills to get down a river right-side up."); *id.* at 06/16/14:70 ("[Y]ou can't underscore the importance of experience.).

b. Mr. Fuller also testified, however, that boating a particular river is an "evolutionary process that takes some time" to develop the boats and experience required to navigate a river. *See* Tr. at 06/16/14:24 (Fuller); Fuller/Boating, slide 8. This would make the determination of whether a river is navigable dependent upon the skill and boating experience of the local population at the time of statehood. Mr. Fuller testified that it can take up to 50 years for people to develop the right kind of boat to navigate a river. *See* Tr. at 06/17/14:318 (Fuller) (referencing Fuller/Boating, slide 8). On cross-examination, Mr. Fuller admitted that despite his contention that "[b]oats were adapted to fit specific rivers & uses," *see* Fuller/Boating, slide 7, he did not provide any examples of settlers in Arizona that

determined a specific adaptation that was necessary for navigating the Upper Gila. *See* Tr. at 06/17/14:289 (Fuller). Mr. Fuller testified that "if there were a river in which it couldn't be boated by any type of boat that was available prior to statehood, and that sometime after statehood there was a boat that was invented or evolved that allowed that boating, I don't think that would meet the Daniel Ball Test." *See* Tr. at 06/17/14:435-36, 37-38 (Fuller).

c. Mr. Fuller testified that strainers can cause particular difficulty to inexperienced boaters. *See* Tr. at 06/16/14:79 (Fuller); Fuller/Boating, slide 103.

d. Mr. Fuller testified "experienced boatmen" were prepared to repair wooden boats at the time of statehood. *See* Tr. at 06/16/14:88 (Fuller); Fuller/Boating, slide 109.

e. Mr. Fuller testified that given his experience, there are rivers that he could navigate that less experienced boaters could not. *See* Tr. at 06/17/14:360-61 (Fuller).

f. With regard to Class II rapids, Mr. Farmer testified that there are "a couple places" where a novice boater "should get out and scout the rapid and plan his descent through it." *See* Tr. at 06/18/14:565 (Farmer). Mr. Fuller testified that the difference between an obstruction and an obstacle depends on the type of boat, the skill of the boater, and the stream's flow for the purposes of navigability for title. *See* Tr. at 06/16/14:66-67 (Fuller); Boating, slide 78. Mr. Fuller testified, however, that river rapids rated I through V are navigable "by definition." *See* Tr. at 06/16/14:68 (Fuller); Fuller/Boating, slide 82.

35. The Commission also found Mr. Fuller's reliance on modern recreational boating unpersuasive under 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."). For example:

a. During his testimony, Mr. Fuller stated that his "personal experience sitting in a boat" helps him determine what part of a river is boatable and what is not. Tr. at

06/17/14:360 (Fuller). Mr. Fuller also testified that because he could boat the Gila, he believed "that the river is navigable." *Id.*

b. Mr. Fuller testified that part of the reason in modern times people boated parts of the Gila recreationally when people did not pre-statehood was because they have "a lot more time" and was based on his observation of modern recreational boating. Tr. at 06/17/14:372 (Fuller).

c. SLD's other witness, Mr. Farmer, with regard to the historic boating record of the Gila, testified that he has not focused on it, but that he has "come across anecdotal information on that through the years." Tr. at 06/18/14:547 (Farmer).

d. Modern recreational watercraft are far more capable than watercraft at the time of statehood. For example:

i. Mr. Lingenfelter's affidavit states that he is "very familiar with the types of crafts that were 'in customary use for trade and travel at the time of statehood'" and that they "did not include craft that are similar to modern day recreational craft such as modern lightweight canoes and kayaks." Lingenfelter, at 9. He concluded, "[t]he craft customarily used for trade and travel at the time of statehood included large steamboats and gasoline powered paddle wheelers." *Id.*; *see also* Gookin 2014, at V 14.

ii. Mr. Fuller testified that there is no difference in the draft between prehistoric canoes, canoes at the time of statehood, and Kevlar or plastic canoes. He also testified that "the design and shape of the boat" are the sole factors in how much water a canoe draws. *See* Tr. at 06/16/14:43-44 (Fuller); *see also* Tr. at 06/16/14:43-44 (Fuller); Tr. at 06/16/14:79 (Fuller); Fuller/Boating, slide 109. Mr. Farmer testified the same. *See* Tr. at 06/18/14:549 (Farmer); Tr. at 06/18/14:597 (Farmer). As Dr. Mussetter testified, however, this ignores Archimedes' principle, a fundamental principle of physics that holds "that an object that's put in the water will displace an equivalent weight of the water. So if you have a light boat it will displace a fairly small amount of water, and therefore, the draft will be fairly

small. And if you have a heavy boat, it will displace more water." *See* Tr. at 08/19/14:1705 (Mussetter).

iii. Mr. Farmer testified that, canoes "are by far the most complex craft to navigate, but they are the epitome of being at one with the river, and canoes have a dynamic that you can get a canoe into places that you can't get other types of craft at certain water flows." Tr. at 06/18/14:548 (Farmer).

iv. Mr. Fuller testified that canvas boats were advertised as "having the capability of reaching thousands of streams that could not be reached until the folding canvas boat" demonstrating that materials are crucial for determining the depth of a stream a boat could handle. As Mr. Fuller testified, "[folding canvas boats] were built specifically for low water conditions . . . ." Tr. at 06/16/14:45 (Fuller); Fuller/Boating, slide 52.

v. Mr. Fuller testified that although boats have not changed significantly in the last 102 years, "durability has improved significantly," which means that it requires less skill to safely pilot a boat down the river. *See* Tr. at 06/16/14:86-87 (Fuller); Fuller/Boating, slide 114; *see also* Tr. at 06/17/14:365-69 (Fuller). Mr. Farmer testified that the material his boats are made of was not available at the time of statehood and undergoes "different manufacturing techniques completely." *See* Tr. at 06/18/14:620-21 (Farmer).

vi. The improvement in durability is indeed significant. As Mr. Gookin described in his report, the strength of modern fiberglass is 30,000 pounds per square inch (psi), more than 30 times the strength of the cedar used for the canoes in the Sears catalog. This means that, in addition to requiring less water to float, a modern recreational craft can withstand impacts with rocks and boulders much better than the canoes that were used at the time of statehood. *See, e.g., PPL Montana*, 132 S. Ct. at 1234 ("Modern recreational fishing boats, including inflatable rafts and lightweight canoes or kayaks, may be able to navigate water much more shallow or with rockier beds than the boats customarily used for trade and travel at statehood.").

vii. The Commission finds that modern canoes and kayaks made of Kevlar, Hypalon, fiberglass, and other modern materials are not equivalent to the boats customarily used for trade and travel at statehood, and that the evidence presented concerning modern recreational boating therefore may not be relied upon to support a finding of navigability. *PPL Montana*, 132 S. Ct. at 1234 (holding that "present day recreational use of the river did not bear on navigability," and that "reliance upon the State's evidence of present-day, recreational use, at least without further inquiry, was wrong as a matter of law.").

e. Modern recreational boaters also have access to technology that the population of Arizona did not have access to at the time of statehood. For example:

i. Mr. Farmer testified that before floating the Gila Box, he checks the flows online. *See* Tr. at 06/18/14:629 (Farmer).

ii. Mr. Farmer testified that he uses either a truck or a truck and a trailer to get to the river when he boats. *See* Tr. at 06/18/14:630 (Farmer).

iii. Mr. Farmer testified that he usually brings his cell phone on boating trips, but he keeps it in a waterproof container. *See* Tr. at 06/18/14:631 (Farmer).

iv. Mr. Farmer testified that boating his attire ranges from "full dry suits and fleece down to sandals and shorts" and drysuits are made out of Gor-Tex and neoprene. Tr. at 06/18/14:632 (Farmer).

f. Regarding Mr. Fuller's boating of the Upper Gila River, Mr. Burtell's report states "[t]he purpose of these trips was (and continues to be) recreational. Most trips occur in the winter and spring and utilize canoes, kayaks and inflatable rafts. Inner tubes are also used, particularly during low flows in the summer." *See* Burtell, at 21.

g. The Commission finds that modern recreational boating is not equivalent to any commercial activity that occurred at the time of statehood. *See PPL Montana*, 132 S. Ct. at 1234. Recreational boating in Arizona is a modern phenomenon that proliferated in recent times in response to the development of lighter, more durale materials than those available at statehood.

> The development of durable small boats – plastic, fiberglass and other modern types of canoes and kayaks, inflatable boats for single paddlers and for groups – all contributed to the rising popularity of river running in Arizona especially on rivers not previously considered boatable, or boatable only very rarely because of low water.

1998 Final Report, *Criteria for Assessing Characteristics of Navigability for Small Watercourses in Arizona* [X016, Freeport 8, p. 32].

Determination of Non-Navigability

36. 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).

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

38. 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).

39. The Commission finds, as a matter of fact and law, that the Gila has never been actually used as a "highway for commerce." No evidence exists of any prehistoric boating or flotation of logs on the river. *See* Findings of Fact Nos. 58-85, *supra*. Insufficient evidence exists to support a finding that the early explorers or soldiers in the area near the river, who traveled through the area on several occasions, used the river—for "commerce" or otherwise. *See id.; 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 between 1846 and 1909, discussed in detail in Findings of Fact Nos. 117-222, 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.*

40. 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).

41. 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").

42. 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 Pima-Maricopas and Chiricahua Apaches, 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).

43. It might be theoretically possible that, on one or more occasions in particular years, it would have been feasible for a person to boat or float logs 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).

44. "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).

45. No government agency, including federal land surveyors, ever indicated that the Gila was navigable. *See* Findings of Fact Nos. 98-107; *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 Gila was navigable. *See* Findings of Fact Nos. 108-116; *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).

46. 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 Gila, 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 23rd day of January, 2015.

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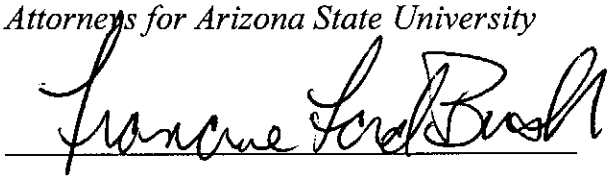

APPENDIX 1
Evidence Cited

NO.	DATE	DESCRIPTION	SHORT CITE
EI 1	1951	Corle, *The Gila: River of the Southwest*	None
EI 2	June 2003	Fuller, et al., *Arizona Stream Navigability Study for the Upper Gila River, Safford to the State Boundary, and San Francisco River, Gila River Confluence to the State Boundary*	SLD/Upper
EI 4	June 2003	Fuller, et al., *Arizona Stream Navigability Study for the Gila River: Colorado River Confluence to the Town of Safford*	SLD/Lower
EI 6	June 2004	Schumm, *Geomorphic Character of the Lower Gila River*	Schumm
EI 12	November 3, 2005	Littlefield, *Assessment of the Navigability of the Gila River Between the Mouth of the Salt River and the Confluence with the Colorado River Prior to and on the Date of Arizona's Statehood, February 14, 1912*	Littlefield 2005
EI 15	November 16, 2005	Gookin, *Presentation to Arizona Stream and Navigability Commission*	Gookin 2005
EI 16	November 6, 1995	Tellman, Tellman evidence	Tellman evidence
EI 17	November 16, 2005	August, *The Lower Gila River: A Non-Navigable Stream on February 14, 1912*	None
EI 20	November 16, 2005	Fuller, Power Point Presentation entitled "Gila River Navigability Studies"	None
EI 21	November 16, 2005	Jackson, *Lower Gila River Navigability*	Jackson
EI 23	October 25, 2002	Hjalmarson, *Navigability Along the Natural Channel of the Gila River*	Hjalmarson 2002
EI 23	November 16, 2005	Hjalmarson, Power Point Presentation entitled "Navigability Along the Natural Channel of the Gila River, AZ"	Hjalmarson 2005 PP
EI 24	January 16, 2003	Deposition of Hjalmar Hjalmarson, *A-Tumbling-T v. Paloma Investment*	Hjalmarson Depo.

EI 25	July 2001	Hjalmarson, *Confidential Notes: The Ability to Navigate the Gila River Under Natural Conditions, Below the Confluence with the Salt River to the Mouth at Yuma, Arizona*	Hjalmarson 2001
EI 28	April 2003	*Information Regarding Navigability of Selected U.S. Watercourses*	Watercourse Information
X001	January 14, 2014	Burtell, *Curriculum Vitae*	None
X002	November 12, 2013	Littlefield, *Revised and Updated Report: Assessment of the Navigability of the Gila River Between the Mouth of the Salt River and the Confluence with the Colorado River Prior to and On the Date of Arizona's Statehood*	Littlefield 2013
X003	January 8, 2014	Mussetter, *Declaration Regarding Navigability of the Gila River Between the Arizona-New Mexico State Line and the Confluence with the Gila River*	Mussetter
X004	1930	Hannum, *A Quaker Forty-Niner: The Adventures of Charles Edward Pancoast on the American Frontier*	None
X006	1831	Flint, *The Personal Narrative of James O. Pattie, of Kentucky*	Proponents' Narrative
X008	May 2014	Burtell, *Declaration of Rich Burtell on the Non-Navigability of the Upper Gila River at and Prior to Statehood*	Burtell
X008	May 16, 2014	Affidavit of Richard E. Lingenfelter and curriculum vitae attached thereto	Lingenfelter
X009	May 19, 2014	Gookin, *Report on the Navigability of the Gila River Prepared for the Gila River Indian Community*	Gookin 2014
X010	December 2011	Arizona Department of Transportation Research Center, *Arizona Transportation History*	ADOT Report
X010	1907	F.M. Irish, *Arizona*	Irish
X013	June 16, 2014	Fuller, *Presentation to ANSAC: Gila River Navigability*	Fuller/Gila

X016	September 1998	Fuller, et al., *Criteria for Assessing Characteristics of Navigability for Small Watercourses in Arizona*	Small Watercourses
X018	June 16, 2014	Littlefield, *Assessment of the Gila River's Navigability on February 14, 1912* (Powerpoint presentation)	Littlefield Presentation
X020	June 16, 2014	Fuller, *Boating in Arizona ca. 1912*	Fuller/Boating
X021	1878-1907	Various, *Annual Reports of the Governors of the Arizona Territory Made to the Secretary of the Interior*	Governor's Reports
X021	1877	*The Handbook of Arizona: Its Resources, History, Towns, Mines, Ruins and Scenery*	Hinton
X026	August 19, 2014	Mussetter, *Gila River Navigability* (Powerpoint presentation)	Mussetter Presentation
X033	Undated	Fuller, *Additional Requested Citations for Fuller Powerpoint*	None
X036	2011	Arizona Department of Transportation, *Arizona State Rail Plan*	ADOT Plan
X036	1831	Appendices from First Edition of James O. Pattie Narrative	Pattie Appendices
X036	1831	Flint, Editor's Preface and Introduction, *Personal Narrative of James O. Pattie* (1st Ed.)	Flint
X036	1930	Quaife, Publisher's Preface and Historical Introduction, *Personal Narrative of James O. Pattie* (4th Ed.)	Quaife
X036	1962	Goetzmann, Editor's Preface, *Personal Narrative of James O. Pattie* (6th Ed.)	Goetzmann
X036	1988	Batman, Introduction, *Personal Narrative of James O. Pattie* (7th Ed.)	Batman
X036	1886	Bancroft, *History of California*	Bancroft
X036	1906	Guinn, *History of the State of California*	Guinn
X036	1924	Zephyrin Engelhardt, *Francisco or Mission Dolores*	Zephyrin
X033	Undated	Fuller, *Additional Requested Citations for Fuller Powerpoint*	None
X037	Various	Fuller Photos	None

X039	Undated	City of Safford, *History of Safford: A Few Facts About the Establishment of the City of Safford* (Webpage)	History of Safford