
CONTENTS

EXECUTIVE SUMMARY.....	VI
1.0 INTRODUCTION	1
1.1 ORGANIZATION.....	1
1.2 PURPOSE OF AND NEED FOR ACTION	3
1.3 PROPOSED ACTION	3
1.3.1 OPERATION OF GLEN CANYON DAM.....	4
1.4 BACKGROUND	5
1.5 STRUCTURED DECISION MAKING PROJECT.....	10
1.6 SELECTED LEGAL AUTHORITIES	11
1.7 RELATED ACTIONS, PROJECTS, PLANS AND DOCUMENTS.....	15
1.7.1 1995 GLEN CANYON DAM ENVIRONMENTAL IMPACT STATEMENT AND RECORD OF DECISION	15
1.7.2 HIGH FLOW EXPERIMENT PROTOCOL ENVIRONMENTAL ASSESSMENT	15
1.7.3 OTHER AGENCY ACTIONS, PROJECTS, PLANS, AND DOCUMENTS	16
1.8.1 DEPARTMENT OF THE INTERIOR.....	18
1.8.1.1 BUREAU OF INDIAN AFFAIRS.....	18
1.8.1.2 BUREAU OF RECLAMATION	18
1.8.1.3 NATIONAL PARK SERVICE.....	19
1.8.1.4 U.S. FISH AND WILDLIFE SERVICE	19
1.8.1.5 U.S. GEOLOGICAL SURVEY	19
1.8.2 DEPARTMENT OF ENERGY.....	20
1.8.2.1 WESTERN AREA POWER ADMINISTRATION.....	20
1.9 PREVIOUS NON-NATIVE FISH CONTROL EFFORTS.....	20
1.10 ROLE OF ADAPTIVE MANAGEMENT IN NON-NATIVE FISH CONTROL	21
1.11 PUBLIC INVOLVEMENT.....	25
1.12 CONSULTATION WITH AMERICAN INDIAN TRIBES.....	26
1.13 RELEVANT RESOURCES AND ISSUES	29
1.14 AUTHORIZING ACTIONS, PERMITS OR LICENSES	30
1.15 DECISION FRAMEWORK	31
1.16 RELATIONSHIP BETWEEN EAS FOR NON-NATIVE FISH CONTROL AND HIGH-FLOW PROTOCOL.....	31
1.17 RELATIONSHIP BETWEEN THIS EA AND THE LONG-TERM EXPERIMENTAL AND MANAGEMENT PLAN.....	34
1.18 ISSUES FOR ANALYSIS.....	35
2.0 DESCRIPTION OF ALTERNATIVES	45
2.1 NO ACTION ALTERNATIVE	45
2.2 PROPOSED ACTION	46
2.2.1 OTHER FLOW AND NON-FLOW ACTIONS	49
2.3 MITIGATION AND MONITORING.....	50
2.4 ALTERNATIVES CONSIDERED AND ELIMINATED FROM DETAILED STUDY	51
3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES	55
3.1 GENERAL SETTING	55
3.2 NATURAL RESOURCES	55
3.2.1 FISH	56
3.2.1.1 HUMPBACK CHUB	57
3.2.1.2 RAZORBACK SUCKER.....	58

3.2.1.3	NON-LISTED NATIVE FISHES.....	59
3.2.1.4	TROUT.....	59
3.2.1.5	OTHER NON-NATIVE FISHES.....	61
3.2.1.6	EFFECTS OF HIGH FLOW EXPERIMENTS ON FISHES	61
3.2.2	FISH AND FISH HABITAT UNDER NO ACTION	63
3.2.3	FISH AND FISH HABITAT UNDER THE PROPOSED ACTION.....	69
3.3	CULTURAL RESOURCES	73
3.3.1	SACRED SITES UNDER NO ACTION	74
3.3.2	SACRED SITES UNDER THE PROPOSED ACTION	74
3.3.3	HISTORIC PROPERTIES UNDER NO ACTION	74
3.3.4	HISTORIC PROPERTIES UNDER THE PROPOSED ACTION.....	75
3.4	SOCIOECONOMIC RESOURCES.....	75
3.4.1	RECREATION UNDER NO ACTION.....	75
3.4.1.1	FISHING UNDER NO ACTION.....	75
3.4.1.2	RECREATIONAL BOATING UNDER NO ACTION	77
3.4.1.3	NET ECONOMIC USE VALUE OF RECREATION UNDER NO ACTION	78
3.4.1.4	NONUSE ECONOMIC VALUE UNDER NO ACTION	81
3.4.2	RECREATION UNDER PROPOSED ACTION	82
3.4.2.1	FISHING UNDER PROPOSED ACTION	82
3.4.2.2	RECREATIONAL BOATING UNDER PROPOSED ACTION.....	83
3.4.2.3	NET ECONOMIC USE VALUE OF RECREATION UNDER PROPOSED ACTION.....	84
3.4.2.4	NONUSE ECONOMIC VALUE UNDER PROPOSED ACTION	86
3.5	INDIAN TRUST ASSETS.....	86
3.5.1	INDIAN TRUST ASSETS UNDER NO ACTION	86
3.5.2	INDIAN TRUST ASSETS UNDER THE PROPOSED ACTION	87
3.6	WILD AND SCENIC RIVERS	87
3.7	WILDERNESS	87
3.8	ENVIRONMENTAL JUSTICE IMPLICATIONS UNDER NO ACTION	88
3.9	ENVIRONMENTAL JUSTICE IMPLICATIONS UNDER THE PROPOSED ACTION	88
4.0	CONSULTATION AND COORDINATION.....	89
4.1	CONSULTATION	89
4.2	PUBLIC SCOPING ACTIVITIES.....	89
4.3	AGENCY COOPERATION.....	89
5.0	REFERENCES CITED	91
6.0	APPENDICES	103
APPENDIX A:	NON-NATIVE FISH MANAGEMENT BELOW THE GLEN CANYON DAM REPORT FROM A STRUCTURED DECISION MAKING PROJECT	103
APPENDIX B:	SCIENCE PLAN.....	104
APPENDIX C:	BIOLOGICAL ASSESSMENT.....	105
APPENDIX D:	SUPPLEMENT TO BIOLOGICAL ASSESSMENT	106
APPENDIX E:	BIOLOGICAL OPINION.....	107
APPENDIX F:	LETTER TO STATE HISTORIC PRESERVATION OFFICE WITH CONCURRENCE STAMP.....	108

Figures

	Page
1. Geographic scope of the proposed action, showing places referenced in the text.....	2
2. Distribution of juvenile humpback chub (<i>Gila cypha</i>)	6
3. Annual population estimates of adult humpback chub (age 4+).....	40
4. Estimated adult humpback chub abundance (age 4+) from ASMR	58
5. Average annual electrofishing catch rates of rainbow trout in the Lees Ferry 1991–2010..	60
6. Expected predation of young humpback chub by trout in the absence of non-native fish removal.	65
7. Expected losses of adult humpback chub (age 4+) due to predation by trout in the absence of non-native fish removal.	66
8. Fishing user days by month in the Lees Ferry reach	76
9. Whitewater boating in the Grand Canyon, annual use by month	78
10. Numbers of anglers served by one fishing guide business.	86

Tables

	Page
1. List of resources and issues evaluated.	30
2. Non-native fish species presently found in the Actoin Area.	58
3. Mohave and Coconino Counties, Arizona – Baseline Socioeconomic Data.	79
4. Navajo Roadside Vending and Employment.	80
5. Estimates of Nonuse Value.	81
6. List of persons, agencies, and organizations consulted for purposes of this Environmental Assessment.....	90