

## **Appendix C**

### **Final Biological and Conference Opinion for Bureau of Reclamation, Bureau of Indian Affairs, and Non-Federal Water Management and Maintenance Activities on the Middle Rio Grande, New Mexico**

Consultation Number 02ENNM00-2013-F-0033

#### **Matrix of River System Impacts (MRSI) and A System of Assessing Effects to Species and Critical Habitats (ASAETS)**

	B	C	D	E
1		Matrix of River System Impacts: Does the action as described in rows have measurable impacts to seven categories of river system impacts over 15 years?		
2		If there is evidence the action/condition has impacts (no impact or subsidies) or benefits, and if so, describe them in the BiOp.		
3		Note: Impacts considered must affect resources in Action Area = in MRG from CO/NM border to Elephant Butte Dam (minus EB Reservoir)		
4	Agency(ies)	Type of Action	Class of Action	Theme of Activity
5	Agency(ies)	Type of Action	Class of Action	Theme of Activity
6	Agency(ies)	Type of Action	Class of Action	Theme of Activity
7	ABCWUA	Past, future, or ongoing action	Conservation Measure	Administration, coordination, planning, designing, reseach, meeting, etc.
8	ABCWUA	Past, future, or ongoing action	Conservation Measure	Discharge of water into the MRG
9	ABCWUA	Past, future, or ongoing action	Conservation Measure	Administration, coordination, planning, designing, reseach, meeting, etc.
10	ABCWUA	Environmental Baseline	Conservation Measure	Habitat Restoration Projects - Completed or consulted upon
11	ABCWUA	Environmental Baseline	Water Operation	Water Operations Infrastructure
12	ABCWUA/Reclamation	Environmental Baseline	Water Operation	Diversion/consumption/removal/depletion of water from the MRG
13	ABCWUA/State of NM/USEPA	Environmental Baseline	Water Operation	Discharge of water into the MRG
14	all	Environmental Baseline	Cumulative Effect	Habitat Disturbance
15	all	Environmental Baseline	Cumulative Effect	Habitat Disturbance
16	all	Environmental Baseline	Cumulative Effect	Habitat Disturbance
17	all	Environmental Baseline	Cumulative Effect	Habitat Disturbance
18	all	Environmental Baseline	Cumulative Effect	Habitat Disturbance
19	all	Environmental Baseline	Cumulative Effect	Habitat Disturbance
20	all	Environmental Baseline	Cumulative Effect	Habitat Disturbance
21	all	Environmental Baseline	Cumulative Effect	Habitat Disturbance
22	all	Environmental Baseline	Cumulative Effect	Habitat Disturbance
23	all	Environmental Baseline	Cumulative Effect	Habitat Disturbance
24	all	Environmental Baseline	Cumulative Effect	Habitat Disturbance
25	all	Environmental Baseline	Cumulative Effect	River System Impact
26	all	Environmental Baseline	Cumulative Effect	River System Impact
27	all	Environmental Baseline	Cumulative Effect	River System Impact
28	all	Environmental Baseline	Cumulative Effect	River System Impact
29	all	Environmental Baseline	Cumulative Effect	River System Impact
30	all	Environmental Baseline	Cumulative Effect	River System Impact
31	all	Environmental Baseline	Cumulative Effect	River System Impact
32	all	Environmental Baseline	Environmental Baseline	Water Rights and Water Operations - Surface Water and Groundwater Withdrawals
33	BDANWR	Past, future, or ongoing action	Administration	Administration, coordination, planning, designing, reseach, meeting, etc.
34	BDANWR	Past, future, or ongoing action	Conservation Measure	River System Impact
35	BDANWR	Past, future, or ongoing action	Conservation Measure	Administration, coordination, planning, designing, reseach, meeting, etc.
36	BDANWR	Past, future, or ongoing action	Conservation Measure	River System Impact
37	BDANWR	Past, future, or ongoing action	Conservation Measure	Administration, coordination, planning, designing, reseach, meeting, etc.

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5	Agency(ies)	Type of Action	Class of Action	Theme of Activity
38	BDANWR	Past, future, or ongoing action	Conservation Measure	River System Impact
39	BDANWR	Past, future, or ongoing action	Conservation Measure	Monitoring/Measuring
40	BDANWR	Past, future, or ongoing action	Maintenance	Habitat Restoration Projects - Lower Reach Plan - BdANWR Realignment Portion
41	BDANWR	Past, future, or ongoing action	Water Operation	Diversion/consumption/removal/depletion of water from the MRG
42	BDANWR	Past, future, or ongoing action	Water Operation	Discharge of water into LFCC and then into MRG
43	BDANWR/SEVILLETA/VdORO	Environmental Baseline	Environmental Baseline	Habitat Restoration Projects - Completed or consulted upon
44	BIA/Reclamation/Tribes/DOI	Environmental Baseline	Environmental Baseline	Habitat Restoration Projects - Completed or consulted upon
45	BIA/Reclamation/Tribes/DOI	Proposed Action	Water Operation	Discharge of water into the MRG as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights
46	BIA/Reclamation/Tribes/DOI	Proposed Action	Water Operation	Discharge of water into the MRG as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights
47	BIA/Reclamation/Tribes/DOI	Proposed Action	Water Operation	Diversion/consumption/removal/depletion of water from the MRG as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights
48	Corps	Future federal action consultation	BA - withdrawn	Administration, coordination, planning, designing, reseach, meeting, etc.
49	Corps	Future federal action consultation	BA - withdrawn	Administration, coordination, planning, designing, reseach, meeting, etc.
50	Corps	Future federal action consultation	BA - withdrawn	Administration, coordination, planning, designing, reseach, meeting, etc.
51	Corps	Future federal action consultation	BA - withdrawn	Monitoring/Measuring
52	Corps	Future federal action consultation	BA - withdrawn	Maintenance
53	Corps	Future federal action consultation	BA - withdrawn	Habitat Restoration Projects - New - BA withdrawn
54	Corps	Environmental Baseline	Environmental Baseline	Habitat Restoration Projects - Completed or consulted upon
55	Corps	Environmental Baseline	Environmental Baseline	Water Operations Infrastructure
56	Corps	Environmental Baseline	Environmental Baseline	Water Operations Infrastructure
57	Corps	Future federal action consultation	Maintenance	Maintenance
58	Corps	Future federal action consultation	Maintenance	Administration, coordination, planning, designing, reseach, meeting, etc.
59	Corps	Future federal action consultation	Maintenance	Maintenance
60	Corps	Future federal action consultation	Reservoir Operations	Reservoir Operations - Rio Chama flood management
61	Corps	Future federal action consultation	Reservoir Operations	Reservoir Operations - MRG flood management
62	Corps	Future federal action consultation	Reservoir Operations	Reservoir Operations - Jemez River flood management
63	Corps	Future federal action consultation	Reservoir Operations	Discharge of water into the MRG
64	Corps	Future federal action consultation	Reservoir Operations	Discharge of water into the MRG
65	Corps	Future federal action consultation	Reservoir Operations	Reservoir Operations - other flood management
66	Corps	Future federal action consultation	Reservoir Operations	Reservoir Operations - Cochiti Lake management
67	Corps	Future federal action consultation	Reservoir Operations	Reservoir Operations - MRG flood management
68	Corps/ USEPA /State of NM/ Tribes	Past, future, or ongoing action	Environmental Baseline	Clean Water Act activity
69	Corps/NMOSE/others	Past, future, or ongoing action	Environmental Baseline	Discharge of water into the MRG
70	MRGCD	Proposed Action	Administration	Administration, coordination, planning, designing, reseach, meeting, etc.
71	MRGCD	Proposed Action	Conservation Measure	Administration, coordination, planning, designing, reseach, meeting, etc.
72	MRGCD	Proposed Action	Conservation Measure	Administration, coordination, planning, designing, reseach, meeting, etc.
73	MRGCD	Proposed Action	Conservation Measure 11, 14, & 19	Habitat Restoration Projects - Completed and New - Outfall Refugia

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5	Agency(ies)	Type of Action	Class of Action	Theme of Activity
74	MRGCD	Proposed Action	Conservation Measure 13	Discharge of water into the MRG
75	MRGCD	Proposed Action	Conservation Measure 15	Habitat Restoration Projects - Lower Reach Plan - general and infrastructure
76	MRGCD	Proposed Action	Conservation Measure 16	BMPs for avoidance of minimization of species or habitat impacts
77	MRGCD	Proposed Action	Conservation Measure 18 & 48	Habitat Restoration Projects - San Acacia Fish Passage Pilot Project
78	MRGCD	Proposed Action	Conservation Measure 5, 8, 12, 20, 21, 40 & 45	Water Operations - manage the rate of river recession
79	MRGCD	Proposed Action	Conservation Measure 50	Water Operations - Irrigation system efficiency
80	MRGCD	Proposed Action	Conservation Measure 7, 10, 28, 30, 36, 40, 41, 43, & 44	Water Operations - Irrigation system efficiency
81	MRGCD	Environmental Baseline	Environmental Baseline	Habitat Restoration Projects - Completed or consulted upon
82	MRGCD	Proposed Action	Maintenance	Maintenance
83	MRGCD	Proposed Action	Maintenance	Maintenance
84	MRGCD/BIA	Proposed Action	Reservoir Operations	Water Operations at El Vado Reservoir - Diversion of MRG native water into storage
85	MRGCD	Proposed Action	Reservoir Operations	Water Operations at El Vado Reservoir - SJC interbasin transfer water
86	MRGCD	Proposed Action	Water Operation	Diversion/consumption/removal/depletion of water from the MRG
87	MRGCD/NMOSE	Proposed Action	Water Operation	Discharge of water into the MRG
88	MRGCD/NMOSE	Proposed Action	Water Operation	Discharge of water into the MRG
89	MRGCD/NMOSE	Proposed Action	Water Operation	Discharge of water into the MRG
90	MRGCD/Reclamation/BIA	Proposed Action	Conservation Measure 4	Water Operations at El Vado Reservoir - Modified timing of storage
91	NMED/USEPA	Past, future, or ongoing action	Environmental Baseline	Clean Water Act activity
92	NMED/USEPA	Past, future, or ongoing action	Environmental Baseline	Clean Water Act activity
93	NMED/USEPA	Past, future, or ongoing action	Environmental Baseline	Clean Water Act activity
94	NMED/USEPA	Past, future, or ongoing action	Environmental Baseline	Clean Water Act activity
95	NMED/USEPA	Past, future, or ongoing action	Environmental Baseline	Clean Water Act activity
96	NMISC	Proposed Action	Administration	Water Operations - Compact Relinquishment Credit/Debit Management
97	NMISC	Proposed Action	Administration	Administration, coordination, planning, designing, reseach, meeting, etc.
98	NMISC	Proposed Action	Conservation Measure	Administration, coordination, planning, designing, reseach, meeting, etc.
99	NMISC	Proposed Action	Conservation Measure 22 & 25	Discharge of water into the MRG

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5	Agency(ies)	Type of Action	Class of Action	Theme of Activity
100	NMISC	Proposed Action	Conservation Measure	Habitat Restoration Projects - Completed or consulted upon
101	NMISC	Proposed Action	Conservation Measure	Section 10 Activity - Captive Propagation
102	NMISC	Proposed Action	Conservation Measure 27	Water Operations - Authorization for release of existing Credit Water
103	NMISC	Environmental Baseline	Environmental Baseline	Habitat Restoration Projects - Completed or consulted upon
104	NMISC	Proposed Action	Conservation Measure 29	Maintenance
105	NMOSE	Proposed Action	Administration	Water Rights and Water Operations - Administer Surface Water and Groundwater Permits
106	NMOSE	Proposed Action	Administration	Water Rights and Water Operations - Administer Surface Water and Groundwater Permits
107	NMOSE	Proposed Action	Administration	Water Rights and Water Operations - Administer Surface Water and Groundwater Permits
108	NMOSE	Proposed Action	Administration	Administration, coordination, planning, designing, reseach, meeting, etc.
109	NMOSE	Environmental Baseline	Environmental Baseline	Water Rights and Water Operations - Administer Surface Water and Groundwater Permits
110	NMOSE	Environmental Baseline	Environmental Baseline	Water Rights and Water Operations - Administer Surface Water and Groundwater Permits
111	NMOSE/Reclamation	Proposed Action	Conservation Measure 6 & 9	Water Rights and Water Operations - Administer Surface Water and Groundwater Permits
112	Reclamation	Proposed Action	Administration	Administration, coordination, planning, designing, reseach, meeting, etc.
113	Reclamation	Proposed Action	Conservation Measure 36, 24, 38, 41	Discharge of water into the MRG
114	Reclamation	Proposed Action	Conservation Measure	Monitoring/Measuring
115	Reclamation	Proposed Action	Conservation Measure 26	Administration, coordination, planning, designing, reseach, meeting, etc.
116	Reclamation	Proposed Action	Conservation Measure 1	Discharge of water into the MRG
117	Reclamation	Proposed Action	Conservation Measure 42	Discharge of water into the MRG
118	Reclamation	Environmental Baseline	Environmental Baseline	Habitat Restoration Projects - Completed or consulted upon
119	Reclamation	Proposed Action	Maintenance	Maintenance
120	Reclamation	Proposed Action	Maintenance	Maintenance
121	Reclamation	Proposed Action	Maintenance	Maintenance
122	Reclamation/BIA/MRGCD	Proposed Action	Reservoir Operations	Diversion/consumption/removal/depletion of water at El Vado Reservoir (see row below for subsequent return of stored water)
123	Reclamation	Proposed Action	Reservoir Operations	Discharge of water into the MRG
124	Reclamation	Proposed Action	Reservoir Operations	Diversion/consumption/removal/depletion of water at Rio Chama with a return component
125	Reclamation	Proposed Action	Reservoir Operations	Water Operations at Heron and El Vado Reservoirs - San Juan Chama Project
126	Reclamation/BIA/MRGCD/NMISC	Proposed Action	Conservation Measure 17, 48 & 49	Habitat Restoration Projects - Angostura Fish Passage Project
127	Reclamation/BIA/MRGCD/NMISC	Proposed Action	Conservation Measure 17, 48 & 49	Habitat Restoration Projects - Isleta Fish Passage Project
128	Reclamation/MRGCD	Environmental Baseline	Environmental Baseline	Water Operations Infrastructure
129	Reclamation/MRGCD	Environmental Baseline	Environmental Baseline	Water Operations Infrastructure
130	Reclamation/MRGCD	Environmental Baseline	Environmental Baseline	Water Operations Infrastructure
131	Reclamation/MRGCD	Environmental Baseline	Environmental Baseline	Water Operations Infrastructure

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5	Agency(ies)	Type of Action	Class of Action	Theme of Activity
132	Reclamation/MRGCD	Environmental Baseline	Environmental Baseline	Water Operations Infrastructure
133	Reclamation/MRGCD/Corps	Environmental Baseline	Environmental Baseline	Water Operations Infrastructure
134	Reclamation/MRGCD/Corps	Environmental Baseline	Environmental Baseline	Water Operations Infrastructure
135	Reclamation/MRGCD/NMISC	Proposed Action	Conservation Measure 2, 31, 32, 33, 34, 37, 38, & 39	Administration, coordination, planning, designing, reseach, meeting, etc.
136	Reclamation/MRGCD/NMISC	Proposed Action	Conservation Measure 70	Habitat Restoration Projects - Lower Reach Plan - BdANWR Realignment Portion
137	Reclamation/MRGCD/NMISC	Proposed Action	Conservation Measure 82	Monitoring/Measuring
138	Reclamation/NMISC	Proposed Action	Conservation Measure 52	Maintenance
139	Reclamation/NMISC	Proposed Action	Conservation Measure 71	Habitat Restoration Projects - Lower Reach Plan - Fort Craig to RM60 Portion
140	Reclamation/NMISC	Environmental Baseline	Environmental Baseline	Water Operations Infrastructure
141	Reclamation/NMISC/MRGCD	Proposed Action	Conservation Measure 3	Water Operations at El Vado Reservoir - Modified release of storage
142	Reclamation/NMISC/MRGCD	Proposed Action	Conservation Measure 51	BMPs for avoidance of minimization of species or habitat impacts
143	Reclamation/NMISC/MRGCD	Proposed Action	Conservation Measure 57	Section 10 Activity - monitoring for adaptive management (RIO)
144	Reclamation/NMISC/MRGCD	Proposed Action	Conservation Measure 68 & 72	Habitat Restoration Projects - Lower Reach Plan - general and infrastructure
145	Reclamation/TX	Environmental Baseline	Environmental Baseline	Water Operations Infrastructure
146	Reclamation/TX/NM	Past, future, or ongoing action	Environmental Baseline	Diversion/consumption/removal/depletion of water from the RG
147	USFS/City of SantaFe	Environmental Baseline	Environmental Baseline	Diversion/consumption/removal/depletion of water from the MRG
148	USFS/SantaFe	Environmental Baseline	Environmental Baseline	Diversion/consumption/removal/depleton of water from the MRG

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1	<b>Consolidated Simplified Matrix of River Sytem Impacts - Middle Rio Grande Valley from NM/CO to Elephant Butte Dam (minus reservoir)</b>			
2	draft 11.14.2013LRJDL; 11.18.13 TEAM; 20160603 VR; 20160612 JDL; 20160727 VMR & JDL; 20161104 JDL; 20161130 reflecting comment (Note that NOT ADVERSE* = MAY AFFECT, NOT LIKELY TO ADVERSELY AFFECT, but incl			
3	Scoring System changed Nov2016: high impacts to habitat = Likely Adverse; low impacts/marginal subsidies =Not Adverse*; No effect = None; Improves listed species habitats = Beneficial			
4	<b>Description of the Action, Activity, or Technique</b>	<b>Impacts to Geomorphology/Sediment Dynamics CHANNEL INCISION</b>	<b>Impacts to Geomorphology/Sediment Dynamics FLOOD PLAIN AGGRADATION</b>	<b>Impacts to Natural Flow Regime (Hydrology) SPRING RUNOFF</b>
5	<b>Description of the Action, Activity, or Technique</b>	<b>Geomorphic changes that affect the river channel. E.g., Channel Incision, simplification with loss of floodplain connection.</b>	<b>Geomorphic changes that affect the flood plain compared to the river channel. E.g. high banks, channel perching, and flood plain aggradation</b>	<b>Hydrograph changes: Spring snowmelt runoff</b>
6	<b>Description of the Action, Activity, or Technique</b>	Would the activity be expected to decrease sediment supply, incise the channel, destabilize the banks or river bed, lower reservoir base level, or decrease floodplain connectivity? (Activity contributes to large spatial or temporal geomorphic degradation (lowers channel bed elevation wrt flood plain) decreases inundation area = LIKELY ADVERSE; geomorphic impacts and/or subsidy expected but unmeasurable= NOT ADVERSE*; no effect = NONE; action improves elevational relationship by a geomorphic subsidy that increases inundation area = BENEFICIAL)	Would the activity be expected to increase flood plain aggradation (raises flood plain elevation wrt to channel bed), to allow lateral constraints restricting channel location and flood plain, increase islands or plugs, increase river bed or bank stability, or increase reservoir base level? (Activity contributes to large spatial or temporal flood plain aggradation that decreases inundation area=LIKELY ADVERSE; geomorphic flood plain impacts or subsidies expected small, offset, or unmeasurable=NOT ADVERSE*; no effect=NONE; elevational relationship is improved that increases inundation area = BENEFICIAL)	Would the activity be expected to alter timing (away or toward May and June), magnitude, or duration of Spring runoff at the ABQ Gage? (Activity alters timing, or reduces magnitude and duration=LIKELY ADVERSE; alters magnitude <5kAFY, or duration-hours, or timing-hours=NOT ADVERSE*; No effect=NONE; Increases magnitude by >5kAFY, increases duration by hours, shifts runoff towards MayorJune=BENEFICIAL)
7	Additional Storage of Native Water, Conservation Storage Agreements	LIKELY ADVERSE	NONE	NOT ADVERSE
8	Lease SJC/Supplemental Water to BOR. Continue water conservation	NOT ADVERSE	NONE	NOT ADVERSE
9	Water Operations Coordination	NONE	NONE	NOT ADVERSE
10	Habitat Restoration Projects (Montano, PdN, I-40, outfalls, etc.)	NONE	NONE	NONE
11	Historical construction and maintenance of ABCWUA drinking water ROR diversion dam	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE
12	diversion and delivery of surface water (including native carriage) away from MRG	LIKELY ADVERSE	NONE	LIKELY ADVERSE
13	discharge of wastewater into MRG in the Angostura Reach	LIKELY ADVERSE	NONE	NOT ADVERSE
14	non native reptile invasion	NONE	NONE	NONE
15	non native fish invasion	NONE	NONE	NONE
16	non native invertebrate invasion (leaf beetle, asian clam, quagga, certain snails, etc.)	NONE	NONE	NONE
17	non native mammal invasion	NONE	NONE	NONE
18	non native amphibian invasion	NONE	NONE	NONE
19	non native avian invasion	NONE	NONE	NONE
20	naive microbial invasion (amoeba, bacteria, fungi, virus, etc.)	NONE	NONE	NONE
21	human disturbance/pets/recreation	NONE	NONE	NONE
22	non native riparian plant invasion	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
23	Climate change - increasing temperatures	NONE	NONE	LIKELY ADVERSE
24	Land use changes	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
25	Climate change - decrease in spring runoff	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
26	*population with increased water demand	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE
27	Climate change - decrease in low flows	LIKELY ADVERSE	NONE	NOT ADVERSE
28	discharge of natural storm runoff	BENEFICIAL	LIKELY ADVERSE	BENEFICIAL
29	Climate change - increased wild fire intensity	BENEFICIAL	LIKELY ADVERSE	NOT ADVERSE
30	discharge of other pollution/solid waste/pesticides/etc	NONE	NOT ADVERSE	NONE
31	Riparian vegetation and transpiration	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
32	unauthorized ground water pumping	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE
33	Water Operations Coordination	NONE	NONE	NONE
34	Maintain boundary fences to control trespass cattle; allow for native ungulates to pass. Manage all ungulates, feral pigs,deer, elk, oryx, barbary sheep. Maintain Goodding's willow pole nursery and consider other native plant spp nurseries. Allow others to harvest 8,000 poles in support of HR.	NONE	NOT ADVERSE	NONE
35	Update Active Floodplain Plan within 3 yrs, Work with others to get high flow release, Work with others to design and support Riparian forest HR, Implement recommendations for restoration and maintenance on and off refuge	NONE	NONE	NONE
36	Conduct managed drawdowns on refuge in May and June. Purchase or lease upstream water rights. Modify water control infrastructure (langeman gates and ditches) . Implement measures identified in Appendix G. Hydrologist report. Work with water mgmt community to assist within Refuge needs to provide for silvery minnow.	NONE	NONE	NOT ADVERSE
37	Work with others to implement recovery actions on the refuge. Support Reclamation's research and monitoring efforts for flycatcher and cuckoo on the active floodplain. Support and monitor other entities research and monitoring of flycatcher and cuckoo on the historic floodplain	NONE	NONE	NONE

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	Description of the Action, Activity, or Technique	Geomorphic changes that affect the river channel. E.g., Channel Incision, simplification with loss of floodplain connection.	Geomorphic changes that affect the flood plain compared to the river channel. E.g, high banks, channel perching, and flood plain aggradation	Hydrograph changes: Spring snowmelt runoff
5	Implement projects to provide and manage willows and herbaceous vegetation for flycatcher, cuckoo and mouse breeding habitat (off floodway, on refuge) (NOTE: subsidy is addressed in narrative of the Biological Opinion as it is outside of floodway)	NOT ADVERSE	NOT ADVERSE	NONE
38	Conduct required T&E surveys before implementing projects. Conform to seasonal and geographic buffer zones around flycatcher, cuckoo, and mouse territories, and conduct habitat improvements	NONE	NONE	NONE
39	Restore Active Floodplain (avulsion channel, high side channels, shoreline destablize, plow, disc sandbars, non native species removal)	NOT ADVERSE	BENEFICIAL	BENEFICIAL
40	Maintain water rights, deliver, and manage water to Refuge - Consume ~ 8kaf using 45kaf inflow and 37kaf outflow	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
41	Collect and return water to LFCC	NONE	NONE	NOT ADVERSE
42	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	BENEFICIAL	BENEFICIAL
43	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	BENEFICIAL	BENEFICIAL
44	discharge of water into MRG in Cochiti and Angostura Reaches as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights	LIKELY ADVERSE	NONE	NOT ADVERSE
45	discharge of water into MRG in Isleta Reach as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights	LIKELY ADVERSE	NONE	NOT ADVERSE
46	Diversion/consumption/removal/depletion of water from the MRG as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
47	Water Operations Coordination	NONE	NONE	NONE
48	The Corps will continue to document and investigate geomorphic conditions and trends, and implement the MRG ES Collaborative Program, and Adaptive Management peer review.	NONE	NONE	NOT ADVERSE
49	The Corps will operate reservoirs to allow floods during spring runoff period within the limits of the stated safe channel capacity	NONE	NONE	NOT ADVERSE
50	Corps will monitor floods and verify the current safe channel capacity determinations	NONE	NONE	NOT ADVERSE
51	Corps will protect, modify, or replace instream structures (such as bridges and dam infrastructures) and conduct levee and dam maintenance with support of local sponsors	NONE	NONE	NOT ADVERSE
52	Corps will implement habitat restoration projects with the support of local cost-sharing sponsors.	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
53	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	BENEFICIAL	BENEFICIAL
54	Historical construction of flood control and storage dams - Cochiti/Jemez	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
55	Historical construction of flood control and storage dams - Abiquiu	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
56	Cochiti Dam Fish Screen cleaning and Bulkhead Placement onto Cochiti and Sile Irrigation headings - flows reduced 4hr to interrelated irrigation facility actions	NONE	NONE	NOT ADVERSE
57	Abiquiu Dam Tunnel Inspection interrelated to SJC project	NONE	NONE	NONE
58	Flushing Jemez Canyon Dam Stilling Basin	BENEFICIAL	NOT ADVERSE	NOT ADVERSE
59	Water Operations - water and sediment storage at Abiquiu	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
60	Water Operations - water and sediment storage at Cochiti	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
61	Water Operations - water and sediment storage and release at Jemez	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
62	Water Operations - Discharge of water at Abiquiu	LIKELY ADVERSE	NOT ADVERSE	NOT ADVERSE
63	Water Operations - Discharge of water at Cochiti	LIKELY ADVERSE	NOT ADVERSE	NOT ADVERSE
64	Water Operations - water and sediment storage and release (on short term basis per safe channel capacity) during summer storms (e.g, Gallisteo, other stormwater mgmt)	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
65	Water Operations - Manage imported SJC water in Abiquiu and to maintain Cochiti Lake	LIKELY ADVERSE	NOT ADVERSE	NOT ADVERSE
66	Water Operations - Detain floods after July 1 (if Otowi less than 1,500 cfs) then release carryover flood water between Nov 1 and Mar 31 at a rate of 40-725 cfs	LIKELY ADVERSE	NOT ADVERSE	NONE
67	Corps implements CWA Section 404 Dredge and Fill permits	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
68	Discharge of water and sediment (Urban stormwater) into the MRG	BENEFICIAL	NOT ADVERSE	NOT ADVERSE
69	Water Operations Coordination	NONE	NONE	NOT ADVERSE
70	Seek to increase MRGCD storage up to 50,000 ac-ft at Abiquiu/El Vado	LIKELY ADVERSE	NONE	LIKELY ADVERSE
71	Continue to fund science related activity, PVA modeling, and data analysis	NONE	NONE	NONE
72	Maintain or create RGSM refugia in MRGCD Outfalls - Deepen and widen MRGCD drain outfalls as potential RGSM habitat areas. Outfalls managed in a manner consistent with the overall purposes of the MRGCD. Wasteways and outfalls will also now discharge water more consistently (MRGCD) versus historical variable rate.	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
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5	Description of the Action, Activity, or Technique	Geomorphic changes that affect the river channel. E.g., Channel Incision, simplification with loss of floodplain connection.	Geomorphic changes that affect the flood plain compared to the river channel. E.g. high banks, channel perching, and flood plain aggradation	Hydrograph changes: Spring snowmelt runoff
74	LOWER REACH PLAN - INFRASTRUCTURE - SOUTH BOUNDARY OUTFALL Construction of a surface return flow collection system at MRGCD south boundary at River Mile 84 to aid in managing river recession and deliver return flows to the river. (MRGCD) Redirect excess water from San Antonio Acequia, Socorro Main S. Canal, Socorro Riverside Drain & Elmendorf Drain to central collection/dist point. Route this water to the LFCC. This project will be included with Reclamation/BDANWR Infrastructure and River Realignment projects. It will result in more water being returned to MRG in SAR.	NOT ADVERSE	NOT ADVERSE	NONE
75	MRGCD Funding-Provide a minimum of \$150,000 in annual ESA and science related funding, a portion of which may support San Acacia reach or other habitat projects	NOT ADVERSE	BENEFICIAL	BENEFICIAL
76	MRGCD voluntary adjustment of diversions to reduce RGSM egg/larvae entrainment	NONE	NONE	NOT ADVERSE
77	San Acacia Fish Passage Pilot Project - an initial pilot study will test small-scale modifications to determine if fish passage is possible with a pilot project involving in-channel grade control structures, modification of gates and apron. Then the dam will remain unchecked (gates raised) for much of the year. For gates raised, MRGCD would need the Bernardp Siphon Drain constructed to bring San Juan Drain water under river to the Drain Unit 7 to supply the Socorro Division irrigation demands. Planning will be in 2016-2017, and construction in 2017-2018 (MRGCD).	BENEFICIAL	NOT ADVERSE	NONE
78	MRGCD facility use to deliver water for riverine refugia or to manage recession rates.	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
79	MRGCD Lower Reach Plan infrastructure modifications - MRGCD will pursue construction of the "Bernardo siphon" and other actions as described, which will create a more reliable water supply in the Socorro Division and assist San Acacia Fish Passage Project with the management of river connectivity	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
80	MRGCD fund system improvements to be more efficient, closely match diversion to actual agricultural demand, reduce carriage water, and increase storage usage. MRGCD will use a Decision Support System, and irrigation scheduling to manage irrigation diversion rates. MRGCD will construct gaging stations to monitor diversion rates and deliveries to irrigation laterals, and expanded installation and use of automatic controls at MRGCD diversion structures, canals and wasteways. (MRGCD will fund 500,000 annually to be leveraged with Federal and State water conservation programs to accelerate improvements.	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
81	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	BENEFICIAL	BENEFICIAL
82	River facilities, dams, and Levee maintenance	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
83	MRGCD Facility Ditches, Drains, Canals, and Wasteway maintenance	NONE	NOT ADVERSE	LIKELY ADVERSE
84	Request for storage of native water in El Vado - impacts dependent on timing	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
85	Request to store and release of non native SJC water in El Vado	LIKELY ADVERSE	NONE	NOT ADVERSE
86	Divert/consume water at Cochiti/Site headings, Angostura, Isleta, San Acacia Diversion Dams, from drains or wasteways, from LFCC at 1200 check, Neil Cupp, and Lemitar	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
87	Discharge of water into MRG in Angostura Reach	LIKELY ADVERSE	NONE	NOT ADVERSE
88	Discharge of water into MRG in Isleta Reach	LIKELY ADVERSE	NONE	NOT ADVERSE
89	Discharge of water into MRG in San Acacia Reach	NOT ADVERSE	NONE	NOT ADVERSE
90	MRGCD/Reclamation/BIA - Adjust timing of storage from May through June to February through April as runoff becomes available and within current authorizations. (MRGCD , Reclamation, BIA/Pueblos)	NOT ADVERSE	NOT ADVERSE	BENEFICIAL
91	Manage and monitor municipal stormwater permits under the CWA	LIKELY ADVERSE	NOT ADVERSE	NOT ADVERSE
92	Manage and monitor confined animal feeding operation/nutrient permits under the CWA	NONE	NONE	NONE
93	Manage and monitor industrial wastewater permits under the CWA	NONE	NONE	NONE
94	Manage and monitor small municipal wastewater permits under the CWA	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
95	Adoption of Water Quality Standards	NONE	NONE	NONE
96	future storage during peak/spring runoff using Relinquishment Credits	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
97	Water Operations Coordination	NONE	NONE	NOT ADVERSE
98	Work with Rio Grande Compact Commission to gain approval for temporary reservoir operation deviations at El Vado or Cochiti Reservoir	NONE	NONE	BENEFICIAL
99	Relinquishment Credit Water for habitat depletions-The State will provide up to 250 ac-ft per event (not to exceed a total of 4,500 ac-ft in any 15-year period) and provide up to 150 ac-ft per event (not to exceed a total of 1,500 ac-ft during the fifteen year period) of Compact relinquishment credit (or total 202 cfs for 1 day; not to exceed 302 cfs for 10 days in 15 years) for storage and later release at low flow rates when MRGCD is not otherwise releasing stored water. Provide up to 60 acre-feet per deviation for depletions. Provide depletion offsets for the State, Corps, and Reclamations existing HR projects.	NONE	NONE	NOT ADVERSE

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	Description of the Action, Activity, or Technique	Geomorphic changes that affect the river channel. E.g., Channel Incision, simplification with loss of floodplain connection.	Geomorphic changes that affect the flood plain compared to the river channel. E.g, high banks, channel perching, and flood plain aggradation	Hydrograph changes: Spring snowmelt runoff
5	Maintain state-constructed overbank habitats for 10 years. The State will work with its Program partners to maintaining existing overbank habitat constructed by the State since 2006 in the Angostura and Isleta reaches for a period of at least 15 years	NOT ADVERSE	BENEFICIAL	NOT ADVERSE
100	Continue to fund/operate Los Lunas Silvery Minnow Refugium	NONE	NONE	NONE
101	State of NM will use an existing 100,000 ac-ft of Compact Relinquishment Credit water for MRGCD (~70%) and RGSM (~30%) during Article VII years. (Estimated 30K could be used for 5 years at ~200cfs for 15 days each of 5 years). This is potentially significant beneficial CM, depending on implementation (if storage during runoff) and apportionment.	NOT ADVERSE	NONE	BENEFICIAL
102	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	BENEFICIAL	BENEFICIAL
103	River Maintenance - State of NM to contribute up to \$1M funding for Delta Channel maintenance for water delivery efficiency to meet Compact deliveries	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
104	Evaluate and issue permits for Upper Rio Grande	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
105	Evaluate permits for MRG / contingency depletion in Angostura Reach	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
106	Evaluate permits/Transfer 20,000 ac-ft senior water rights over next 30 years	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
107	Alternative Administration (eg. Rio Chama, Taos Valley)	NONE	NONE	NONE
108	authorized ground water pumping - domestic	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE
109	authorized ground water pumping - municipal	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE
110	Letter Water Program - Exchange the supplemental, SJC or other water for Rio Grande water, allowing use of supplemental or other water for environment purposes, while remaining in compliance with the Compact and SJC Project regulations. Some water exchanges are done in winter. Information on impacts of exchanges were not quantified.	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
111	Water Operations Coordination	NONE	NONE	NOT ADVERSE
112	Pursue, acquire pre-1907 native water rights. Acquire right to store supplemental water. Acquire water through lease or purchase from willing sellers, including 546 ac-ft associated with Price's Dairy. Release such water to meet highest need. Release EDWA water.	NOT ADVERSE	NONE	NOT ADVERSE
113	Monitoring rates of recession and water operations (river eyes)	NONE	NONE	NONE
114	Implement formal adaptive management program called the "RIO." Water managers will annually utilize the RIO to evaluate and determine the best use of available water for conservation. Water managers will test the Service's Hydrobiological Objectives water management hypotheses within an Adaptive Management framework the strategic use of river operations is expected to improve species status through the various strategies.	NOT ADVERSE	NONE	NOT ADVERSE
115	Release of leased SJC/Supplemental water program water for spring runoff or low flow management as guided through Adaptive Management/RIO	NOT ADVERSE	NOT ADVERSE	BENEFICIAL
116	Pump water from the LFCC into the MRG to manage recession and support riverine refugia. Reclamation will evaluate these activities as part of the Lower Reach Plan.	NOT ADVERSE	NONE	NOT ADVERSE
117	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	BENEFICIAL	BENEFICIAL
118	Up to 8 river maintenance/habitat restoration projects per year	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
119	Maintenance of the LFCC and Delta Channel	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
120	Maintenance of the spoil bank levee	NOT ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
121	Stores native water in El Vado Reservoir at the request of the MRGCD as allowed under the Rio Grande Compact or by BIA notification for Tribal needs - depends on timing	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
122	Releases native water from storage in El Vado for Middle Rio Grande irrigation uses, at the request of BIA, MRGCD, or the NMISC.	LIKELY ADVERSE	NOT ADVERSE	BENEFICIAL
123	Bypasses native flows up to 100 cfs to meet demands of Rio Chama water rights holders.	NOT ADVERSE	NONE	NOT ADVERSE
124	Manage (store, release, administer) non-native SJC water from San Juan tributaries in Heron Reservoir	LIKELY ADVERSE	NOT ADVERSE	NOT ADVERSE
125	Reclamation will implement a program to facilitate fish passage at San Acacia, Isleta and Angostura Diversion Dams, with assistance from BIA, MRGCD and the State, within the first 10 years of the new BiOp (Reclamation 2016b). Side channel construction options will be explored at Angostura and Isleta Diversion Dams	NONE	BENEFICIAL	BENEFICIAL
126	Reclamation will implement a program to facilitate fish passage at San Acacia, Isleta and Angostura Diversion Dams, with assistance from BIA, MRGCD and the State, within the first 5 years of the new BiOp (Reclamation 2016b). Side channel construction options will be explored at Angostura and Isleta Diversion Dams	NONE	BENEFICIAL	BENEFICIAL
127	Historical construction of Angostura Diversion Dam	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
128	Historical construction of Isleta Diversion Dam	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
129	Historical construction of San Acacia Diversion Dam	BENEFICIAL	LIKELY ADVERSE	NOT ADVERSE
130	Historical installation of jetty jacks	LIKELY ADVERSE	LIKELY ADVERSE	NOT ADVERSE
131				

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5	<b>Description of the Action, Activity, or Technique</b>	<b>Geomorphic changes that affect the river channel. E.g., Channel Incision, simplification with loss of floodplain connection.</b>	<b>Geomorphic changes that affect the flood plain compared to the river channel. E.g, high banks, channel perching, and flood plain aggradation</b>	<b>Hydrograph changes: Spring snowmelt runoff</b>
132	Construction of MRGCD infrastructure and riverside drains	LIKELY ADVERSE	NOT ADVERSE	NOT ADVERSE
133	Historical spoilbank levee construction	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
134	Historical rectification of MRG channel	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
135	Develop Conservation Storage Tools. Coordinate to develop Conservation Pool (30-60,000 ac-ft) in upstream reservoirs. (Include working with ABCWUA). Pursue modified reservoir operations including those at Heron, El Vado, Abiquiu and Cochiti beyond current authorizations. MRGCD will work others to coordinate 60,000 ac-ft storage legislation w/in 4 yrs	LIKELY ADVERSE	NONE	LIKELY ADVERSE
136	BDANWR River Realignment Project will commence by 2018 by Reclamation with MRGCD, and State. This is a long-term project with multiple components, e.g., river realignment, LFCC pumping.	BENEFICIAL	BENEFICIAL	BENEFICIAL
137	MONITORING - Fund portions of hydrology, species, and habitat monitoring. Riparian habitat monitoring will be funded (Reclamation, MRGCD, and State). State of NM authorizes up to \$75,000 for monitoring.	NONE	NONE	NONE
138	A "net benefit" approach to river maintenance. Habitat restoration techniques used within river maintenance project footprint, such as bioengineering, revegetation, bank lowering, etc., such that there is a net benefit to elevations of species habitats. (Reclamation, State)	BENEFICIAL	BENEFICIAL	BENEFICIAL
139	Fort Craig to RM 60 Restoration includes improving the LFCC for water delivery and construction at the RM 60 site of a structure to allow return flows to the MRG (Reclamation, State)	BENEFICIAL	BENEFICIAL	BENEFICIAL
140	Historical construction of Low Flow Conveyance Channel	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
141	Annually evaluate the need for modified reservoir operations within current authorities at El Vado Dam to better meet the needs of the species - see Reclamation 2016a; RGCC 2016. (Reclamation, State, MRGCD)	LIKELY ADVERSE	NOT ADVERSE	BENEFICIAL
142	All species or habitat - specific avoidance and minimization BMPs	NONE	NONE	NONE
143	SECTION 10 - Design of monitoring data collection minimizes effects to species.	NONE	NONE	NONE
144	Lower Reach (San Acacia) Plan - include multiple planned river maintenance and habitat restoration projects that will be coordinated in the Lower Reach. Efforts will include agency and public interactions to establish strategies to engage private landowners. (Reclamation, State, MRGCD) Fund and Construct Lower Reach (San Acacia) Habitat Restoration at approximately \$1 to 5 million per year as part of River Maintenance and Restoration. (Reclamation)	BENEFICIAL	BENEFICIAL	BENEFICIAL
145	Historical construction and maintenance of Elephant Butte Dam and Reservoir	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
146	Rio Grande Project	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
147	Diversion/removal/depletion of water away from the MRG	NOT ADVERSE	NONE	NOT ADVERSE
148	Historical construction and ongoing maintenance of drinking water dams - Buckman	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE

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1	<b>Consolidated Simplified Matrix of River Sytem Impacts - Middle Rio Grande Valley fr</b>				
2	draft 11.14.2013LRJDL; 11.18.13 TEAM; 20160603 VR; 20160612 JDL; 20160727 VMR & idual species impacts may vary - contact the Service for specific questions or refinement; No Effect means that the action does not affect the category at all)				
3	Scoring System changed Nov2016: high impacts to habitat = Likely Adverse; low impacts/ma				
4	<b>Description of the Action, Activity, or Technique</b>	<b>Impacts to Natural Flow Regime (Hydrology) SUMMER LOW FLOW</b>	<b>Impacts to Natural Flow Regime (Hydrology) GROUNDWATER INTERACTIONS</b>	<b>Impacts to Water Properties WATER QUALITY</b>	<b>Impacts to Riparian Vegetation RIPARIAN CONDITION</b>
5	<b>Description of the Action, Activity, or Technique</b>	<b>Hydrograph changes: Low-Flow Period and Desiccation</b>	<b>Hydologic changes: surface-water/groundwater interaction.</b>	<b>Temporary or long term changes to water quality in river.</b>	<b>Riparian vegetation alteration</b>
6	<b>Description of the Action, Activity, or Technique</b>	Would the activity be expected to contribute to or increase low flows, river intermittency or desiccation? (Contributes to river drying or extends low flows=LIKELY ADVERSE; Does not contribute to low flows or adds small volumes water=NOT ADVERSE*; No effect=NONE; Area of wetted channel depth or length is increased=BENEFICIAL)	Would the activity be expected to alter alluvial groundwater levels such that areas of groundwater are reduced or surface water is lost from river? Substantial loss of ground or surface water=LIKELY ADVERSE; temporary loss or mounding of ground water with no impacts to riparian vegetation=NOT ADVERSE*; No effect=NONE; Groundwater levels stabilized in habitat or rise=BENEFICIAL)	Would the activity be expected to alter the daily or seasonal oxygen, temperature, nutrients, or turbidity outside of normal or optimal range for fish? (Activity expected to injure fish or prey or instantly harass fish away=ADVERSE; Short term change and short term (hours) response and maintains optimal habitat range=NOT ADVERSE*; No effect=NONE; Activity restores and maintains natural water quality variability or seasonal characteristics compared to control= BENEFICIAL)	Would the activity be expected to alter the potential for a dense riparian shrub community (DRS)? (Activity permanently reduces area of DRS, potential, or species habitat microclimate=LIKELY ADVERSE; temporary impacts with restoration to functional within 2 years=NOT ADVERSE*; No effects whatsoever=NONE; Increases or establishes contiguous DRS>5 acres of DRS or dynamics of DRS community=BENEFICIAL)
7	Additional Storage of Native Water, Conservation Storage Agreements	NOT ADVERSE	NONE	NONE	NOT ADVERSE
8	Lease SJC/Supplemental Water to BOR. Continue water conservation	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
9	Water Operations Coordination	NOT ADVERSE	NONE	NOT ADVERSE	NONE
10	Habitat Restoration Projects (Montano, PdN, I-40, outfalls, etc.)	NONE	NONE	NOT ADVERSE	NONE
11	Historical construction and maintenance of ABCWUA drinking water ROR diversion dam	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
12	diversion and delivery of surface water (including native carriage) away from MRG	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE
13	discharge of wastewater into MRG in the Angostura Reach	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE	BENEFICIAL
14	non native reptile invasion	NONE	NONE	NONE	NONE
15	non native fish invasion	NONE	NONE	NOT ADVERSE	NONE
16	non native invertebrate invasion (leaf beetle, asian clam, quagga, certain snails, etc.)	NONE	NONE	NOT ADVERSE	LIKELY ADVERSE
17	non native mammal invasion	NONE	NONE	NONE	NOT ADVERSE
18	non native amphibian invasion	NONE	NONE	NONE	NONE
19	non native avian invasion	NONE	NONE	NONE	NOT ADVERSE
20	naive microbial invasion (amoeba, bacteria, fungi, virus, etc.)	NONE	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
21	human disturbance/pets/recreation	NONE	NONE	LIKELY ADVERSE	LIKELY ADVERSE
22	non native riparian plant invasion	LIKELY ADVERSE	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
23	Climate change - increasing temperatures	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
24	Land use changes	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
25	Climate change - decrease in spring runoff	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
26	^population with increased water demand	LIKELY ADVERSE	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
27	Climate change - decrease in low flows	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
28	discharge of natural storm runoff	BENEFICIAL	BENEFICIAL	BENEFICIAL	BENEFICIAL
29	Climate change - increased wild fire intensity	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
30	discharge of other pollution/solid waste/pesticides/etc	NONE	NONE	LIKELY ADVERSE	NOT ADVERSE
31	Riparian vegetation and transpiration	LIKELY ADVERSE	LIKELY ADVERSE	BENEFICIAL	BENEFICIAL
32	unauthorized ground water pumping	LIKELY ADVERSE	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
33	Water Operations Coordination	NOT ADVERSE	NONE	NOT ADVERSE	NONE
34	Maintain boundary fences to control trespass cattle; allow for native ungulates to pass. Manage all ungulates, feral pigs,deer, elk, oryx, barbary sheep. Maintain Goodding's willow pole nursery and consider other native plant spp nurseries. Allow others to harvest 8,000 poles in support of HR.	NONE	NONE	NOT ADVERSE	NOT ADVERSE
35	Update Active Floodplain Plan within 3 yrs, Work with others to get high flow release, Work with others to design and support Riparian forest HR, Implement recommendations for restoration and maintenance on and off refuge	NOT ADVERSE	NONE	NONE	BENEFICIAL
36	Conduct managed drawdowns on refuge in May and June. Purchase or lease upstream water rights. Modify water control infrastructure (langeman gates and ditches) . Implement measures identified in Appendix G. Hydrologist report. Work with water mgmt community to assist within Refuge needs to provide for silvery minnow.	NOT ADVERSE	NONE	NONE	NOT ADVERSE
37	Work with others to implement recovery actions on the refuge. Support Reclamation's research and monitoring efforts for flycatcher and cuckoo on the active floodplain. Support and monitor other entities research and monitoring of flycatcher and cuckoo on the historic floodplain	NONE	NONE	NONE	NONE

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	Description of the Action, Activity, or Technique	Hydrograph changes: Low-Flow Period and Desiccation	Hydrologic changes: surface-water/groundwater interaction.	Temporary or long term changes to water quality in river.	Riparian vegetation alteration
5	Implement projects to provide and manage willows and herbaceous vegetation for flycatcher, cuckoo and mouse breeding habitat (off floodway, on refuge) (NOTE: subsidy is addressed in narrative of the Biological Opinion as it is outside of floodway)	LIKELY ADVERSE	NONE	NONE	NOT ADVERSE
38	Conduct required T&E surveys before implementing projects. Conform to seasonal and geographic buffer zones around flycatcher, cuckoo, and mouse territories, and conduct habitat improvements	NONE	NONE	NONE	NONE
39	Restore Active Floodplain (avulsion channel, high side channels, shoreline destablize, plow, disc sandbars, non native species removal)	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	BENEFICIAL
40	Maintain water rights, deliver, and manage water to Refuge - Consume ~ 8kaf using 45kaf inflow and 37kaf outflow	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
41	Collect and return water to LFCC	LIKELY ADVERSE	LIKELY ADVERSE	NOT ADVERSE	BENEFICIAL
42	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	BENEFICIAL
43	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	BENEFICIAL
44	discharge of water into MRG in Cochiti and Angostura Reaches as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE	BENEFICIAL
45	discharge of water into MRG in Isleta Reach as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE	BENEFICIAL
46	Diversion/consumption/removal/depletion of water from the MRG as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
47	Water Operations Coordination	NOT ADVERSE	NONE	NOT ADVERSE	NONE
48	The Corps will continue to document and investigate geomorphic conditions and trends, and implement the MRG ES Collaborative Program, and Adaptive Management peer review.	NONE	NONE	NONE	NONE
49	The Corps will operate reservoirs to allow floods during spring runoff period within the limits of the stated safe channel capacity	NONE	NONE	NONE	NONE
50	Corps will monitor floods and verify the current safe channel capacity determinations	NONE	NONE	NONE	NONE
51	Corps will protect, modify, or replace instream structures (such as bridges and dam infrastructures) and conduct levee and dam maintenance with support of local sponsors	NONE	NONE	NONE	NONE
52	Corps will implement habitat restoration projects with the support of local cost-sharing sponsors.	NONE	NONE	BENEFICIAL	BENEFICIAL
53	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	NOT ADVERSE	BENEFICIAL	BENEFICIAL
54	Historical construction of flood control and storage dams - Cochiti/Jemez	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
55	Historical construction of flood control and storage dams - Abiquiu	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
56	Cochiti Dam Fish Screen cleaning and Bulkhead Placement onto Cochiti and Sile Irrigation headings - flows reduced 4hr to interrelated irrigation facility actions	NOT ADVERSE	NONE	NONE	NONE
57	Abiquiu Dam Tunnel Inspection interrelated to SJC project	NONE	NONE	NONE	NONE
58	Flushing Jemez Canyon Dam Stilling Basin	NOT ADVERSE	NOT ADVERSE	BENEFICIAL	NONE
59	Water Operations - water and sediment storage at Abiquiu	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE
60	Water Operations - water and sediment storage at Cochiti	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
61	Water Operations - water and sediment storage and release at Jemez	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
62	Water Operations - Discharge of water at Abiquiu	BENEFICIAL	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
63	Water Operations - Discharge of water at Cochiti	BENEFICIAL	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
64	Water Operations - water and sediment storage and release (on short term basis per safe channel capacity) during summer storms (e.g. Gallisteo, other stormwater mgmt)	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
65	Water Operations - Manage imported SJC water in Abiquiu and to maintain Cochiti Lake	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE	NOT ADVERSE
66	Water Operations - Detain floods after July 1 (if Otowi less than 1,500 cfs) then release carryover flood water between Nov 1 and Mar 31 at a rate of 40-725 cfs	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
67	Corps implements CWA Section 404 Dredge and Fill permits	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
68	Discharge of water and sediment (Urban stormwater) into the MRG	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE	BENEFICIAL
69	Water Operations Coordination	NOT ADVERSE	NONE	NOT ADVERSE	NONE
70	Seek to increase MRGCD storage up to 50,000 ac-ft at Abiquiu/El Vado	NOT ADVERSE	NONE	NONE	NOT ADVERSE
71	Continue to fund science related activity, PVA modeling, and data analysis	NONE	NONE	NONE	NONE
72	Maintain or create RGSM refugia in MRGCD Outfalls - Deepen and widen MRGCD drain outfalls as potential RGSM habitat areas. Outfalls managed in a manner consistent with the overall purposes of the MRGCD. Wasteways and outfalls will also now discharge water more consistently (MRGCD) versus historical variable rate.	BENEFICIAL	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
73					

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	Description of the Action, Activity, or Technique	Hydrograph changes: Low-Flow Period and Desiccation	Hydrologic changes: surface-water/groundwater interaction.	Temporary or long term changes to water quality in river.	Riparian vegetation alteration
5					
74	LOWER REACH PLAN - INFRASTRUCTURE - SOUTH BOUNDARY OUTFALL Construction of a surface return flow collection system at MRGCD south boundary at River Mile 84 to aid in managing river recession and deliver return flows to the river. (MRGCD) Redirect excess water from San Antonio Acequia, Socorro Main S. Canal, Socorro Riverside Drain & Elmendorf Drain to central collection/dist point. Route this water to the LFCC. This project will be included with Reclamation/BDANWR Infrastructure and River Realignment projects. It will result in more water being returned to MRG in SAR.	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
75	MRGCD Funding-Provide a minimum of \$150,000 in annual ESA and science related funding, a portion of which may support San Acacia reach or other habitat projects	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
76	MRGCD voluntary adjustment of diversions to reduce RGSM egg/larvae entrainment	NONE	NONE	NOT ADVERSE	NONE
77	San Acacia Fish Passage Pilot Project - an initial pilot study will test small-scale modifications to determine if fish passage is possible with a pilot project involving in-channel grade control structures, modification of gates and apron. Then the dam will remain unchecked (gates raised) for much of the year. For gates raised, MRGCD would need the Bernardp Siphon constructed to bring San Juan Drain water under river to the Drain Unit 7 to supply the Socorro Division irrigation demands. Planning will be in 2016-2017, and construction in 2017-2018 (MRGCD).	BENEFICIAL	NONE	NOT ADVERSE	NOT ADVERSE
78	MRGCD facility use to deliver water for riverine refugia or to manage recession rates.	BENEFICIAL	BENEFICIAL	BENEFICIAL	BENEFICIAL
79	MRGCD Lower Reach Plan infrastructure modifications - MRGCD will pursue construction of the "Bernardo siphon" and other actions as described, which will create a more reliable water supply in the Socorro Division and assist San Acacia Fish Passage Project with the management of river connectivity	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
80	MRGCD fund system improvements to be more efficient, closely match diversion to actual agricultural demand, reduce carriage water, and increase storage usage. MRGCD will use a Decision Support System, and irrigation scheduling to manage irrigation diversion rates. MRGCD will construct gaging stations to monitor diversion rates and deliveries to irrigation laterals, and expanded installation and use of automatic controls at MRGCD diversion structures, canals and wasteways. (MRGCD will fund 500,000 annually to be leveraged with Federal and State water conservation programs to accelerate improvements.	BENEFICIAL	NOT ADVERSE	NOT ADVERSE	BENEFICIAL
81	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	BENEFICIAL
82	River facilities, dams, and Levee maintenance	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
83	MRGCD Facility Ditches, Drains, Canals, and Wasteway maintenance	LIKELY ADVERSE	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
84	Request for storage of native water in El Vado - impacts dependent on timing	BENEFICIAL	BENEFICIAL	NOT ADVERSE	NOT ADVERSE
85	Request to store and release of non native SJC water in El Vado	BENEFICIAL	BENEFICIAL	BENEFICIAL	NOT ADVERSE
86	Divert/consume water at Cochiti/Site headings, Angostura, Isleta, San Acacia Diversion Dams, from drains or wasteways, from LFCC at 1200 check, Neil Cupp, and Lemitar	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
87	Discharge of water into MRG in Angostura Reach	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE	BENEFICIAL
88	Discharge of water into MRG in Isleta Reach	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE	BENEFICIAL
89	Discharge of water into MRG in San Acacia Reach	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE	BENEFICIAL
90	MRGCD/Reclamation/BIA - Adjust timing of storage from May through June to February through April as runoff becomes available and within current authorizations. (MRGCD , Reclamation, BIA/Pueblos)	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	BENEFICIAL
91	Manage and monitor municipal stormwater permits under the CWA	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE	NONE
92	Manage and monitor confined animal feeding operation/nutrient permits under the CWA	NONE	NONE	LIKELY ADVERSE	NOT ADVERSE
93	Manage and monitor industrial wastewater permits under the CWA	NONE	NONE	NOT ADVERSE	NOT ADVERSE
94	Manage and monitor small municipal wastewater permits under the CWA	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
95	Adoption of Water Quality Standards	NONE	NONE	BENEFICIAL	NONE
96	future storage during peak/spring runoff using Relinquishment Credits	LIKELY ADVERSE	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
97	Water Operations Coordination	NOT ADVERSE	NONE	NOT ADVERSE	NONE
98	Work with Rio Grande Compact Commission to gain approval for temporary reservoir operation deviations at El Vado or Cochiti Reservoir	NOT ADVERSE	NONE	NONE	NOT ADVERSE
99	Relinquishment Credit Water for habitat depletions-The State will provide up to 250 ac-ft per event (not to exceed a total of 4,500 ac-ft in any 15-year period) and provide up to 150 ac-ft per event (not to exceed a total of 1,500 ac-ft during the fifteen year period) of Compact relinquishment credit (or total 202 cfs for 1 day; not to exceed 302 cfs for 10 days in 15 years) for storage and later release at low flow rates when MRGCD is not otherwise releasing stored water. Provide up to 60 acre-feet per deviation for depletions. Provide depletion offsets for the State, Corps, and Reclamations existing HR projects.	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	BENEFICIAL

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5	Description of the Action, Activity, or Technique	Hydrograph changes: Low-Flow Period and Desiccation	Hydrologic changes: surface-water/groundwater interaction.	Temporary or long term changes to water quality in river.	Riparian vegetation alteration
100	Maintain state-constructed overbank habitats for 10 years. The State will work with its Program partners to maintaining existing overbank habitat constructed by the State since 2006 in the Angostura and Isleta reaches for a period of at least 15 years	NONE	NONE	NOT ADVERSE	BENEFICIAL
101	Continue to fund/operate Los Lunas Silvery Minnow Refugium	NONE	NONE	NONE	NONE
102	State of NM will use an existing 100,000 ac-ft of Compact Relinquishment Credit water for MRGCD (~70%) and RGSM (~30%) during Article VII years. (Estimated 30K could be used for 5 years at ~200cfs for 15 days each of 5 years). This is potentially significant beneficial CM, depending on implementation (if storage during runoff) and apportionment.	BENEFICIAL	NOT ADVERSE	BENEFICIAL	BENEFICIAL
103	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	BENEFICIAL
104	River Maintenance - State of NM to contribute up to \$1M funding for Delta Channel maintenance for water delivery efficiency to meet Compact deliveries	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
105	Evaluate and issue permits for Upper Rio Grande	LIKELY ADVERSE	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
106	Evaluate permits for MRG / contingency depletion in Angostura Reach	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
107	Administer permits/Transfer 20,000 ac-ft senior water rights over next 30 years	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
108	Alternative Administration (eg. Rio Chama, Taos Valley)	NONE	NONE	NONE	NONE
109	authorized ground water pumping - domestic	LIKELY ADVERSE	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
110	authorized ground water pumping - municipal	LIKELY ADVERSE	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
111	Letter Water Program - Exchange the supplemental, SJC or other water for Rio Grande water, allowing use of supplemental or other water for environment purposes, while remaining in compliance with the Compact and SJC Project regulations. Some water exchanges are done in winter. Information on impacts of exchanges were not quantified.	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
112	Water Operations Coordination	NOT ADVERSE	NONE	NOT ADVERSE	NONE
113	Pursue, acquire pre-1907 native water rights. Acquire right to store supplemental water. Acquire water through lease or purchase from willing sellers, including 546 ac-ft associated with Price's Dairy. Release such water to meet highest need. Release EDWA water.	BENEFICIAL	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
114	Monitoring rates of recession and water operations (river eyes)	NOT ADVERSE	NONE	NONE	NONE
115	Implement formal adaptive management program called the "RIO." Water managers will annually utilize the RIO to evaluate and determine the best use of available water for conservation. Water managers will test the Service's Hydrobiological Objectives water management hypotheses within an Adaptive Management framework the strategic use of river operations is expected to improve species status through the various strategies.	NOT ADVERSE	NOT ADVERSE	NONE	NONE
116	Release of leased SJC/Supplemental water program water for spring runoff or low flow management as guided through Adaptive Management/RIO	BENEFICIAL	BENEFICIAL	BENEFICIAL	NOT ADVERSE
117	Pump water from the LFCC into the MRG to manage recession and support riverine refugia. Reclamation will evaluate these activities as part of the Lower Reach Plan.	BENEFICIAL	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE
118	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	BENEFICIAL
119	Up to 8 river maintenance/habitat restoration projects per year	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
120	Maintenance of the LFCC and Delta Channel	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE
121	Maintenance of the spoil bank levee	LIKELY ADVERSE	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
122	Stores native water in El Vado Reservoir at the request of the MRGCD as allowed under the Rio Grande Compact or by BIA notification for Tribal needs - depends on timing	LIKELY ADVERSE	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
123	Releases native water from storage in El Vado for Middle Rio Grande irrigation uses, at the request of BIA, MRGCD, or the NMISC.	BENEFICIAL	BENEFICIAL	BENEFICIAL	BENEFICIAL
124	Bypasses native flows up to 100 cfs to meet demands of Rio Chama water rights holders.	NONE	NONE	NONE	NONE
125	Manage (store, release, administer) non-native SJC water from San Juan tributaries in Heron Reservoir	BENEFICIAL	BENEFICIAL	BENEFICIAL	BENEFICIAL
126	Reclamation will implement a program to facilitate fish passage at San Acacia, Isleta and Angostura Diversion Dams, with assistance from BIA, MRGCD and the State, within the first 10 years of the new BiOp (Reclamation 2016b). Side channel construction options will be explored at Angostura and Isleta Diversion Dams	BENEFICIAL	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
127	Reclamation will implement a program to facilitate fish passage at San Acacia, Isleta and Angostura Diversion Dams, with assistance from BIA, MRGCD and the State, within the first 5 years of the new BiOp (Reclamation 2016b). Side channel construction options will be explored at Angostura and Isleta Diversion Dams	BENEFICIAL	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
128	Historical construction of Angostura Diversion Dam	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
129	Historical construction of Isleta Diversion Dam	BENEFICIAL	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
130	Historical construction of San Acacia Diversion Dam	BENEFICIAL	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
131	Historical installation of jetty jacks	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE

	F	J	K	L	M
5	Description of the Action, Activity, or Technique	Hydrograph changes: Low-Flow Period and Desiccation	Hydrologic changes: surface-water/groundwater interaction.	Temporary or long term changes to water quality in river.	Riparian vegetation alteration
132	Construction of MRGCD infrastructure and riverside drains	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
133	Historical spoilbank levee construction	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
134	Historical rectification of MRG channel	NOT ADVERSE	LIKELY ADVERSE	NOT ADVERSE	LIKELY ADVERSE
135	Develop Conservation Storage Tools. Coordinate to develop Conservation Pool (30-60,000 ac-ft) in upstream reservoirs. (Include working with ABCWUA). Pursue modified reservoir operations including those at Heron, El Vado, Abiquiu and Cochiti beyond current authorizations. MRGCD will work others to coordinate 60,000 ac-ft storage legislation w/in 4 yrs	NOT ADVERSE	NONE	NONE	NOT ADVERSE
136	BDANWR River Realignment Project will commence by 2018 by Reclamation with MRGCD, and State. This is a long-term project with multiple components, e.g., river realignment, LFCC pumping.	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE	BENEFICIAL
137	MONITORING - Fund portions of hydrology, species, and habitat monitoring. Riparian habitat monitoring will be funded (Reclamation, MRGCD, and State). State of NM authorizes up to \$75,000 for monitoring.	NONE	NONE	NONE	NONE
138	A "net benefit" approach to river maintenance. Habitat restoration techniques used within river maintenance project footprint, such as bioengineering, revegetation, bank lowering, etc., such that there is a net benefit to elevations of species habitats. (Reclamation, State)	BENEFICIAL	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
139	Fort Craig to RM 60 Restoration includes improving the LFCC for water delivery and construction at the RM 60 site of a structure to allow return flows to the MRG (Reclamation, State)	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE	LIKELY ADVERSE
140	Historical construction of Low Flow Conveyance Channel	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
141	Annually evaluate the need for modified reservoir operations within current authorities at El Vado Dam to better meet the needs of the species - see Reclamation 2016a; RGCC 2016. (Reclamation, State, MRGCD)	BENEFICIAL	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE
142	All species or habitat - specific avoidance and minimization BMPs	NOT ADVERSE	NONE	BENEFICIAL	BENEFICIAL
143	SECTION 10 - Design of monitoring data collection minimizes effects to species.	NONE	NONE	NONE	NONE
144	Lower Reach (San Acacia) Plan - include multiple planned river maintenance and habitat restoration projects that will be coordinated in the Lower Reach. Efforts will include agency and public interactions to establish strategies to engage private landowners. (Reclamation, State, MRGCD) Fund and Construct Lower Reach (San Acacia) Habitat Restoration at approximately \$1 to 5 million per year as part of River Maintenance and Restoration. (Reclamation)	BENEFICIAL	BENEFICIAL	LIKELY ADVERSE	BENEFICIAL
145	Historical construction and maintenance of Elephant Butte Dam and Reservoir	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE	LIKELY ADVERSE
146	Rio Grande Project	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE
147	Diversion/removal/depletion of water away from the MRG	LIKELY ADVERSE	NOT ADVERSE	NOT ADVERSE	LIKELY ADVERSE
148	Historical construction and ongoing maintenance of drinking water dams - Buckman	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE	NOT ADVERSE



	F	N
1	<b>Consolidated Simplified Matrix of River Sytem Impacts - Middle Rio Grande Valley fro</b>	
2	draft 11.14.2013LRJDL; 11.18.13 TEAM; 20160603 VR; 20160612 JDL; 20160727 VMR &	
3	Scoring System changed Nov2016: high impacts to habitat = Likely Adverse; low impacts/ma	
4	<b>Description of the Action, Activity, or Technique</b>	Site Specific Impacts (noise, spills, invasives) SPECIES DISTURBANCES
5	<b>Description of the Action, Activity, or Technique</b>	<b>Construction or other mechanical or human impacts</b>
6	<b>Description of the Action, Activity, or Technique</b>	Would the activity be expected to contribute disturbance of water or substrate, excess noise, or substantially increase the risk of spills or invasive species introductions? (Impacts are large or recurring (>0.1 ac species habitat) = LIKELY ADVERSE; brief and temporary disturbances or subsidy with BMPs to <0.1 habitat acres) = NOT ADVERSE*; activity does not affect species = NONE; Avoidance or BMPs deployed to reduce impacts substantially to nearly not adverse*=BENEFICIAL)
7	Additional Storage of Native Water, Conservation Storage Agreements	NONE
8	Lease SJC/Supplemental Water to BOR. Continue water conservation	NONE
9	Water Operations Coordination	NONE
10	Habitat Restoration Projects (Montano, PdN, I-40, outfalls, etc.)	NONE
11	Historical construction and maintenance of ABCWUA drinking water ROR diversion dam	NOT ADVERSE
12	diversion and delivery of surface water (including native carriage) away from MRG	NONE
13	discharge of wastewater into MRG in the Angostura Reach	NOT ADVERSE
14	non native reptile invasion	LIKELY ADVERSE
15	non native fish invasion	LIKELY ADVERSE
16	non native invertebrate invasion (leaf beetle, asian clam, quagga, certain snails, etc.)	LIKELY ADVERSE
17	non native mammal invasion	LIKELY ADVERSE
18	non native amphibian invasion	LIKELY ADVERSE
19	non native avian invasion	LIKELY ADVERSE
20	naive microbial invasion (amoeba, bacteria, fungi, virus, etc.)	LIKELY ADVERSE
21	human disturbance/pets/recreation	LIKELY ADVERSE
22	non native riparian plant invasion	LIKELY ADVERSE
23	Climate change - increasing temperatures	NONE
24	Land use changes	LIKELY ADVERSE
25	Climate change - decrease in spring runoff	NONE
26	^population with increased water demand	NONE
27	Climate change - decrease in low flows	NONE
28	discharge of natural storm runoff	LIKELY ADVERSE
29	Climate change - increased wild fire intensity	LIKELY ADVERSE
30	discharge of other pollution/solid waste/pesticides/etc	LIKELY ADVERSE
31	Riparian vegetation and transpiration	NONE
32	unauthorized ground water pumping	NONE
33	Water Operations Coordination	NONE
34	Maintain boundary fences to control trespass cattle; allow for native ungulates to pass. Manage all ungulates, feral pigs,deer, elk, oryx, barbary sheep. Maintain Goodding's willow pole nursery and consider other native plant spp nurseries. Allow others to harvest 8,000 poles in support of HR.	NOT ADVERSE
35	Update Active Floodplain Plan within 3 yrs, Work with others to get high flow release, Work with others to design and support Riparian forest HR, Implement recommendations for restoration and maintenance on and off refuge	NONE
36	Conduct managed drawdowns on refuge in May and June. Purchase or lease upstream water rights. Modify water control infrastructure (langeman gates and ditches) . Implement measures identified in Appendix G. Hydrologist report. Work with water mgmt community to assist within Refuge needs to provide for silvery minnow.	NONE
37	Work with others to implement recovery actions on the refuge. Support Reclamation's research and monitoring efforts for flycatcher and cuckoo on the active floodplain. Support and monitor other entities research and monitoring of flycatcher and cuckoo on the historic floodplain	NONE

	F	N
5	<b>Description of the Action, Activity, or Technique</b>	<b>Construction or other mechanical or human impacts</b>
38	Implement projects to provide and manage willows and herbaceous vegetation for flycatcher, cuckoo and mouse breeding habitat (off floodway, on refuge) (NOTE: subsidy is addressed in narrative of the Biological Opinion as it is outside of floodway )	NONE
39	Conduct required T&E surveys before implementing projects. Conform to seasonal and geographic buffer zones around flycatcher, cuckoo, and mouse territories, and conduct habitat improvements	NONE
40	Restore Active Floodplain (avulsion channel, high side channels, shoreline destablize, plow, disc sandbars, non native species removal)	LIKELY ADVERSE
41	Maintain water rights, deliver, and manage water to Refuge - Consume ~ 8kaf using 45kaf inflow and 37kaf outflow	NONE
42	Collect and return water to LFCC	NONE
43	Riparian and Aquatic Habitat Restoration Projects Completed	NONE
44	Riparian and Aquatic Habitat Restoration Projects Completed	NONE
45	discharge of water into MRG in Cochiti and Angostura Reaches as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights	NOT ADVERSE
46	discharge of water into MRG in Isleta Reach as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights	NOT ADVERSE
47	Diversion/consumption/removal/depletion of water from the MRG as part of the exercise of the Pueblos' statutorily-recognized and aboriginal rights	NONE
48	Water Operations Coordination	NONE
49	The Corps will continue to document and investigate geomorphic conditions and trends, and implement the MRG ES Collaborative Program, and Adaptive Management peer review.	NONE
50	The Corps will operate reservoirs to allow floods during spring runoff period within the limits of the stated safe channel capacity	NONE
51	Corps will monitor floods and verify the current safe channel capacity determinations	NONE
52	Corps will protect, modify, or replace instream structures (such as bridges and dam infrastructures) and conduct levee and dam maintenance with support of local sponsors	NONE
53	Corps will implement habitat restoration projects with the support of local cost-sharing sponsors.	LIKELY ADVERSE
54	Riparian and Aquatic Habitat Restoration Projects Completed	NONE
55	Historical construction of flood control and storage dams - Cochiti/Jemez	NONE
56	Historical construction of flood control and storage dams - Abiquiu	NONE
57	Cochiti Dam Fish Screen cleaning and Bulkhead Placement onto Cochiti and Sile Irrigation headings - flows reduced 4hr to interrelated irrigation facility actions	NOT ADVERSE
58	Abiquiu Dam Tunnel Inspection interrelated to SJC project	NOT ADVERSE
59	Flushing Jemez Canyon Dam Stilling Basin	NONE
60	Water Operations - water and sediment storage at Abiquiu	NONE
61	Water Operations - water and sediment storage at Cochiti	NONE
62	Water Operations - water and sediment storage and release at Jemez	NONE
63	Water Operations - Discharge of water at Abiquiu	NONE
64	Water Operations - Discharge of water at Cochiti	NONE
65	Water Operations - water and sediment storage and release (on short term basis per safe channel capacity) during summer storms (e.g. Gallisteo, other stormwater mgmt)	NONE
66	Water Operations - Manage imported SJC water in Abiquiu and to maintain Cochiti Lake	NONE
67	Water Operations - Detain floods after July 1 (if Otowi less than 1,500 cfs) then release carryover flood water between Nov 1 and Mar 31 at a rate of 40-725 cfs	NONE
68	Corps implements CWA Section 404 Dredge and Fill permits	LIKELY ADVERSE
69	Discharge of water and sediment (Urban stormwater) into the MRG	LIKELY ADVERSE
70	Water Operations Coordination	NONE
71	Seek to increase MRGCD storage up to 50,000 ac-ft at Abiquiu/El Vado	NONE
72	Continue to fund science related activity, PVA modeling, and data analysis	NONE
73	Maintain or create RGSM refugia in MRGCD Outfalls - Deepen and widen MRGCD drain outfalls as potential RGSM habitat areas. Outfalls managed in a manner consistent with the overall purposes of the MRGCD. Wasteways and outfalls will also now discharge water more consistently (MRGCD) versus historical variable rate.	NOT ADVERSE

	F	N
5	Description of the Action, Activity, or Technique	Construction or other mechanical or human impacts
74	LOWER REACH PLAN - INFRASTRUCTURE - SOUTH BOUNDARY OUTFALL Construction of a surface return flow collection system at MRGCD south boundary at River Mile 84 to aid in managing river recession and deliver return flows to the river. (MRGCD) Redirect excess water from San Antonio Acequia, Socorro Main S. Canal, Socorro Riverside Drain & Elmendorf Drain to central collection/dist point. Route this water to the LFCC. This project will be included with Reclamation/BDANWR Infrastructure and River Realignment projects. It will result in more water being returned to MRG in SAR.	LIKELY ADVERSE
75	MRGCD Funding-Provide a minimum of \$150,000 in annual ESA and science related funding, a portion of which may support San Acacia reach or other habitat projects	NONE
76	MRGCD voluntary adjustment of diversions to reduce RGSM egg/larvae entrainment	NONE
77	San Acacia Fish Passage Pilot Project - an initial pilot study will test small-scale modifications to determine if fish passage is possible with a pilot project involving in-channel grade control structures, modification of gates and apron. Then the dam will remain unchecked (gates raised) for much of the year. For gates raised, MRGCD would need the Bernardp Siphon constructed to bring San Juan Drain water under river to the Drain Unit 7 to supply the Socorro Division irrigation demands. Planning will be in 2016-2017, and construction in 2017-2018 (MRGCD).	LIKELY ADVERSE
78	MRGCD facility use to deliver water for riverine refugia or to manage recession rates.	NONE
79	MRGCD Lower Reach Plan infrastructure modifications - MRGCD will pursue construction of the "Bernardo siphon" and other actions as described, which will create a more reliable water supply in the Socorro Division and assist San Acacia Fish Passage Project with the management of river connectivity	LIKELY ADVERSE
80	MRGCD fund system improvements to be more efficient, closely match diversion to actual agricultural demand, reduce carriage water, and increase storage usage. MRGCD will use a Decision Support System, and irrigation scheduling to manage irrigation diversion rates. MRGCD will construct gaging stations to monitor diversion rates and deliveries to irrigation laterals, and expanded installation and use of automatic controls at MRGCD diversion structures, canals and wasteways. (MRGCD will fund 500,000 annually to be leveraged with Federal and State water conservation programs to accelerate improvements.	NONE
81	Riparian and Aquatic Habitat Restoration Projects Completed	NONE
82	River facilities, dams, and Levee maintenance	LIKELY ADVERSE
83	MRGCD Facility Ditches, Drains, Canals, and Wasteway maintenance	NOT ADVERSE
84	Request for storage of native water in El Vado - impacts dependent on timing	NONE
85	Request to store and release of non native SJC water in El Vado	NONE
86	Divert/consume water at Cochiti/Sile headings, Angostura, Isleta, San Acacia Diversion Dams, from drains or wasteways, from LFCC at 1200 check, Neil Cupp, and Lemitar	NONE
87	Discharge of water into MRG in Angostura Reach	NOT ADVERSE
88	Discharge of water into MRG in Isleta Reach	NOT ADVERSE
89	Discharge of water into MRG in San Acacia Reach	NOT ADVERSE
90	MRGCD/Reclamation/BIA - Adjust timing of storage from May through June to February through April as runoff becomes available and within current authorizations. (MRGCD , Reclamation, BIA/Pueblos)	NONE
91	Manage and monitor municipal stormwater permits under the CWA	LIKELY ADVERSE
92	Manage and monitor confined animal feeding operation/nutrient permits under the CWA	LIKELY ADVERSE
93	Manage and monitor industrial wastewater permits under the CWA	LIKELY ADVERSE
94	Manage and monitor small municipal wastewater permits under the CWA	LIKELY ADVERSE
95	Adoption of Water Quality Standards	NONE
96	future storage during peak/spring runoff using Relinquishment Credits	NONE
97	Water Operations Coordination	NONE
98	Work with Rio Grande Compact Commission to gain approval for temporary reservoir operation deviations at El Vado or Cochiti Reservoir	NONE
99	Relinquishment Credit Water for habitat depletions-The State will provide up to 250 ac-ft per event (not to exceed a total of 4,500 ac-ft in any 15-year period) and provide up to 150 ac-ft per event (not to exceed a total of 1,500 ac-ft during the fifteen year period) of Compact relinquishment credit (or total 202 cfs for 1 day; not to exceed 302 cfs for 10 days in 15 years) for storage and later release at low flow rates when MRGCD is not otherwise releasing stored water. Provide up to 60 acre-feet per deviation for depletions. Provide depletion offsets for the State, Corps, and Reclamations existing HR projects.	NONE

	F	N
5	<b>Description of the Action, Activity, or Technique</b>	<b>Construction or other mechanical or human impacts</b>
100	Maintain state-constructed overbank habitats for 10 years. The State will work with its Program partners to maintaining existing overbank habitat constructed by the State since 2006 in the Angostura and Isleta reaches for a period of at least 15 years	LIKELY ADVERSE
101	Continue to fund/operate Los Lunas Silvery Minnow Refugium	BENEFICIAL
102	State of NM will use an existing 100,000 ac-ft of Compact Relinquishment Credit water for MRGCD (~70%) and RGSM (~30%) during Article VII years. (Estimated 30K could be used for 5 years at ~200cfs for 15 days each of 5 years). This is potentially significant beneficial CM, depending on implementation (if storage during runoff) and apportionment.	NONE
103	Riparian and Aquatic Habitat Restoration Projects Completed	NONE
104	River Maintenance - State of NM to contribute up to \$1M funding for Delta Channel maintenance for water delivery efficiency to meet Compact deliveries	LIKELY ADVERSE
105	Evaluate and issue permits for Upper Rio Grande	NONE
106	Evaluate permits for MRG / contingency depletion in Angostura Reach	NONE
107	Administer permits/Transfer 20,000 ac-ft senior water rights over next 30 years	NONE
108	Alternative Administration (eg. Rio Chama, Taos Valley)	NONE
109	authorized ground water pumping - domestic	NONE
110	authorized ground water pumping - municipal	NONE
111	Letter Water Program - Exchange the supplemental, SJC or other water for Rio Grande water, allowing use of supplemental or other water for environment purposes, while remaining in compliance with the Compact and SJC Project regulations. Some water exchanges are done in winter. Information on impacts of exchanges were not quantified.	NONE
112	Water Operations Coordination	NONE
113	Pursue, acquire pre-1907 native water rights. Acquire right to store supplemental water. Acquire water through lease or purchase from willing sellers, including 546 ac-ft associated with Price's Dairy. Release such water to meet highest need. Release EDWA water.	NONE
114	Monitoring rates of recession and water operations (river eyes)	NONE
115	Implement formal adaptive management program called the "RIO." Water managers will annually utilize the RIO to evaluate and determine the best use of available water for conservation. Water managers will test the Service's Hydrobiological Objectives water management hypotheses within an Adaptive Management framework the strategic use of river operations is expected to improve species status through the various strategies.	NONE
116	Release of leased SJC/Supplemental water program water for spring runoff or low flow management as guided through Adaptive Management/RIO	NONE
117	Pump water from the LFCC into the MRG to manage recession and support riverine refugia. Reclamation will evaluate these activities as part of the Lower Reach Plan.	LIKELY ADVERSE
118	Riparian and Aquatic Habitat Restoration Projects Completed	NOT ADVERSE
119	Up to 8 river maintenance/habitat restoration projects per year	LIKELY ADVERSE
120	Maintenance of the LFCC and Delta Channel	LIKELY ADVERSE
121	Maintenance of the spoil bank levee	LIKELY ADVERSE
122	Stores native water in El Vado Reservoir at the request of the MRGCD as allowed under the Rio Grande Compact or by BIA notification for Tribal needs - depends on timing	NONE
123	Releases native water from storage in El Vado for Middle Rio Grande irrigation uses, at the request of BIA, MRGCD, or the NMISC.	NONE
124	Bypasses native flows up to 100 cfs to meet demands of Rio Chama water rights holders.	NONE
125	Manage (store, release, administer) non-native SJC water from San Juan tributaries in Heron Reservoir	NONE
126	Reclamation will implement a program to facilitate fish passage at San Acacia, Isleta and Angostura Diversion Dams, with assistance from BIA, MRGCD and the State, within the first 10 years of the new BiOp (Reclamation 2016b). Side channel construction options will be explored at Angostura and Isleta Diversion Dams	LIKELY ADVERSE
127	Reclamation will implement a program to facilitate fish passage at San Acacia, Isleta and Angostura Diversion Dams, with assistance from BIA, MRGCD and the State, within the first 5 years of the new BiOp (Reclamation 2016b). Side channel construction options will be explored at Angostura and Isleta Diversion Dams	LIKELY ADVERSE
128	Historical construction of Angostura Diversion Dam	NONE
129	Historical construction of Isleta Diversion Dam	NONE
130	Historical construction of San Acacia Diversion Dam	NONE
131	Historical installation of jetty jacks	NONE

	F	N
5	<b>Description of the Action, Activity, or Technique</b>	<b>Construction or other mechanical or human impacts</b>
132	Construction of MRGCD infrastructure and riverside drains	NONE
133	Historical spoilbank levee construction	NONE
134	Historical rectification of MRG channel	NONE
135	Develop Conservation Storage Tools. Coordinate to develop Conservation Pool (30-60,000 ac-ft) in upstream reservoirs. (Include working with ABCWUA). Pursue modified reservoir operations including those at Heron, El Vado, Abiquiu and Cochiti beyond current authorizations. MRGCD will work others to coordinate 60,000 ac-ft storage legislation w/in 4 yrs	NONE
136	BDANWR River Realignment Project will commence by 2018 by Reclamation with MRGCD, and State. This is a long-term project with multiple components, e.g., river realignment, LFCC pumping.	LIKELY ADVERSE
137	MONITORING - Fund portions of hydrology, species, and habitat monitoring. Riparian habitat monitoring will be funded (Reclamation, MRGCD, and State). State of NM authorizes up to \$75,000 for monitoring.	LIKELY ADVERSE
138	A "net benefit" approach to river maintenance. Habitat restoration techniques used within river maintenance project footprint, such as bioengineering, revegetation, bank lowering, etc., such that there is a net benefit to elevations of species habitats. (Reclamation, State)	NOT ADVERSE
139	Fort Craig to RM 60 Restoration includes improving the LFCC for water delivery and construction at the RM 60 site of a structure to allow return flows to the MRG (Reclamation, State)	LIKELY ADVERSE
140	Historical construction of Low Flow Conveyance Channel	NONE
141	Annually evaluate the need for modified reservoir operations within current authorities at El Vado Dam to better meet the needs of the species - see Reclamation 2016a; RGCC 2016. (Reclamation, State, MRGCD)	NONE
142	All species or habitat - specific avoidance and minimization BMPs	BENEFICIAL
143	SECTION 10 - Design of monitoring data collection minimizes effects to species.	LIKELY ADVERSE
144	Lower Reach (San Acacia) Plan - include multiple planned river maintenance and habitat restoration projects that will be coordinated in the Lower Reach. Efforts will include agency and public interactions to establish strategies to engage private landowners. (Reclamation, State, MRGCD) Fund and Construct Lower Reach (San Acacia) Habitat Restoration at approximately \$1 to 5 million per year as part of River Maintenance and Restoration. (Reclamation)	LIKELY ADVERSE
145	Historical construction and maintenance of Elephant Butte Dam and Reservoir	NONE
146	Rio Grande Project	NONE
147	Diversion/removal/depletion of water away from the MRG	NONE
148	Historical construction and ongoing maintenance of drinking water dams - Buckman	NOT ADVERSE

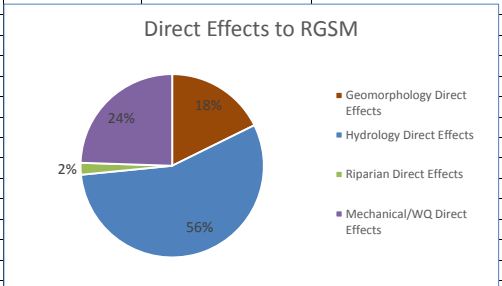
	B	C	D	E	F	G
1			<b>Direct and Indirect Effects to Individuals</b>	<b>Direct and Indirect Effects to Individuals</b>	<b>Direct and Indirect Effects to Individuals</b>	<b>Direct and Indirect Effects to Individuals</b>
2	Category of Impact to River System		<b>Mortality</b>	<b>Reproductive Behavior_Success</b>	<b>Growth Rates_Energy Requirements_Stress &amp; Autoimmune response</b>	
3			Would the system impact be expected to cause mortality of minnows of any life stage? Yes at least 1 individual mortality = 1; numerous mortalities=10; no mortality=0	Would the system impact be expected to result in decreased or impaired reproduction? Yes, adults produce few or little recruits to juveniles=10; successful spawning but recruits to juveniles lessened=1; or no effect on recruitments=0	Would the system impact be expected to result in reduced growth or increased energy requirements, stress/autoimmune response? Yes, effects result in significant alteration of these=10; effects are altered temporarily or to small degree=1; or no effect on these factors=0	Would the system impact be expected to result in chronic physiological stress? Yes, effects result in significant stress, stress response in many animals=10; small portion of population stressed=1; or no effect on stress response=0
4	Impacts to Geomorphology/Sediment Dynamics - channel incision	Geomorphic changes that affect the river channel. E.g., Channel Incision, simplification and loss of floodplain connection.	0	10	10	10
5	Impacts to Geomorphology/Sediment Dynamics - floodplain aggradation	Geomorphic changes that affect the river channel. E.g. geomorphic changes that reduce channel mobility and stabilize it (lateral constraints restricting channel location and floodplain, increase islands or plugs, or increase river bed or bank stability)	1	1	0	0
6	Impacts to Natural Flow Regime (Hydrology) - spring runoff	Hydrograph changes: Spring snowmelt runoff	0	10	1	1
7	Impacts to Natural Flow Regime (Hydrology) - low flow	Hydrograph changes: Low-Flow Period and Desiccation	10	10	10	10
8	Impacts to Natural Flow Regime (Hydrology) - groundwater interaction	Hydrologic changes: surface-water/groundwater interaction resulting in loss of water	10	1	10	1
9	Impacts to Water Properties	Temporary or long term changes to water quality in river.	1	1	1	10
10	Impacts to Riparian Vegetation	Riparian vegetation alteration	0	1	1	1
11	Site Specific Short Term Impacts (noise, disturbance, spills, invasives)	Construction or other mechanical or human impacts	1	1	1	10
12						
13			● 23	● 35	● 34	● 43

	B	H	I	J	K	L	M	N	O	P	Q
1		<b>Direct and Indirect Effects to Individuals</b>	<b>Direct and Indirect Effects to Individuals</b>	<b>Critical Habitat/Hydrologic Regime PCE</b>	<b>Critical Habitat /Depth, Velocity, and Length PCE</b>	<b>Critical Habitat/Substrate PCE</b>	<b>Critical Habitat/Water Quality PCE</b>	<b>Biotic Interactions</b>	<b>Biotic Interactions</b>	<b>Biotic Interactions</b>	<b>Biotic Interactions</b>
2	Category of Impact to River System	<b>Genetic Viability</b>	<b>Movement (natural behavior)</b>	<b>Flowing water, low/mod currents, diversity of habitats for all life stages &amp; seasons</b>	<b>Low-velocity habitat, eddies, refuge, of sufficient river miles</b>	<b>Sand/Silt</b>	<b>Temp, DO, pH</b>	<b>Food Quantity, Timing, Quantity</b>	<b>Predators</b>	<b>Competitors</b>	<b>Disease Risk and Parasites</b>
3		Would the system impact be expected to affect genetic viability? Expect large impairment of genetic resiliency=10; expect some impairment=1; no effect on genetics expected=0	Would the activity be expected to alter the normal swimming movements/feeding behavior/sheltering behavior? Animals flee the area =10; animals flee the area briefly=1; no effect=0;	Would the impact alter the season norms of type of flow water macrohabitat types (e.g., runs, pools, glides, backwaters, flooded overbank areas, etc.) Yes, impacts alter large areas of habitat increasing uniformity of macrohabitat types (>1mile or >10 acres); small areas of macro habitat alteration (<1 mile & <1 acre)=1; no effect 0	Would the impact alter the amount of areas of low flow velocities or reduce flow length? Yes, impacts alter large areas of habitat increasing velocities or shortening length of aquatic habitat (>1mile or >10 acres); small areas of macro habitat alteration (<1 mile & <1 acre)=1; no effect 0	Would the activity be expected to contribute to or increase the grain size of substrate materials? Yes, impact results in more cobble and sand and less silt=10; Yes impact reduces silt and fine sand=1; no effect=0	Would the impact be expected to alter the normal water quality regime or exceed physiological tolerances? Yes, substantial modification of habitat WQ=10; minor or temporary exceed (>LC5) WQ tolerances=1; no effect on habitat WQ=0	Would the impact be expected to reduce food items, change its diversity or qualities? Yes, density, diversity, or quality of food items reduced substantially =10; some alteration in food items=1; no effect=0	Would the impact be expected to increase predators? Yes, density, diversity, or effectiveness of predators is increased substantially =10; some alteration in predators=1; no effect=0	Would the impact be expected to increase space of food competitors? Yes, density, diversity, or effectiveness of competitors is increased substantially =10; some alteration in competitors=1; no effect=0	Would the impact be expected to increase disease or parasite incidence or effects on species? Yes, density, diversity, or effectiveness of disease or parasites is increased substantially =10; some alteration in disease risks=1; no effect=0
4	Impacts to Geomorphology/Sediment Dynamics - channel incision	1	1	10	1	10	1	10	10	10	1
5	Impacts to Geomorphology/Sediment Dynamics - floodplain aggradation	0	0	10	10	1	0	1	10	10	1
6	Impacts to Natural Flow Regime (Hydrology) - spring runoff	10	1	10	10	1	0	10	1	10	1
7	Impacts to Natural Flow Regime (Hydrology) - low flow	10	10	10	10	0	10	10	10	1	10
8	Impacts to Natural Flow Regime (Hydrology) - groundwater interaction	1	1	10	10	0	10	1	10	1	10
9	Impacts to Water Properties	1	10	0	0	0	10	1	1	10	10
10	Impacts to Riparian Vegetation	0	1	0	0	0	1	1	1	0	1
11	Site Specific Short Term Impacts (noise, disturbance, spills, invasives)	0	10	10	1	5	1	1	1	1	0
12											
13		23	34	60	42	17	33	35	44	43	34

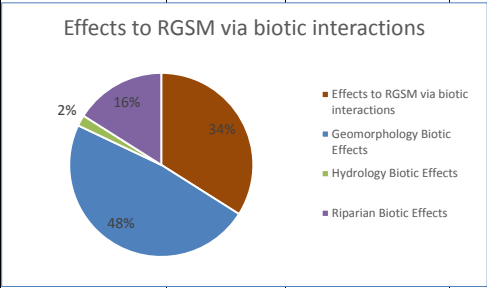
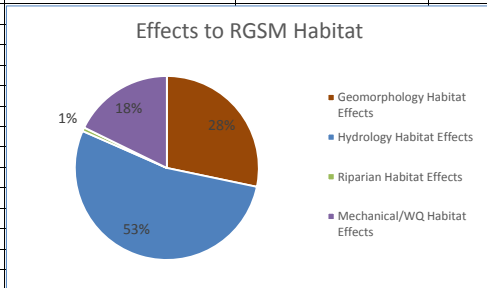
	B	R	S	T	U	V
1						
2	Category of Impact to River System	Scoring System	percent of total score	Sum of Category	Category Percent of Total	
3						
4	Impacts to Geomorphology/Sediment Dynamics - channel incision	● 85	17%			
5	Impacts to Geomorphology/Sediment Dynamics - floodplain aggradation	● 45	9%	130	26%	
6	Impacts to Natural Flow Regime (Hydrology) - spring runoff	● 66	13%			
7	Impacts to Natural Flow Regime (Hydrology) - low flow	● 121	24%			
8	Impacts to Natural Flow Regime (Hydrology) - groundwater interaction	● 76	15%	263	53%	
9	Impacts to Water Properties	● 56	11%	56	11%	
10	Impacts to Riparian Vegetation	● 8	2%	8	2%	
11	Site Specific Short Term Impacts (noise, disturbance, spills, invasives)	● 43	9%	43	9%	
12			100%			
13						



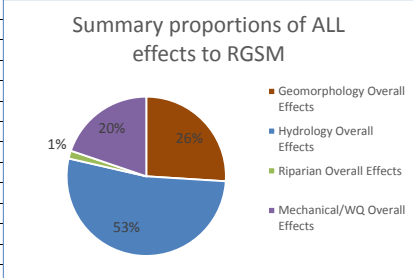
	B	C	D	E	F	G
2	Category of Impact to River System		Mortality	Reproductive Behavior_Success	Growth Rates_Energy Requirements_Stress & Autoimmune response	
14						
15		% out of possible maximum impact score (80)	29%	44%	43%	54%
16	500	% of total impact score per species (487)	5%	7%	7%	9%
17		Relative Impact type score (sum values for category/total maximum value per species)				
18		Relative Impact Percent by Category				
19						
20						
21						
22			Direct Effects to RGSM			
23			Geomorphology Direct	34	18%	
24			Hydrology Direct Effect	107	56%	
25			Riparian Direct Effects	4	2%	
26			Mechanical/WQ Direct	47	24%	
27				192	100%	
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						



	B	H	I	J	K	L	M	N	O	P	Q		
	Category of Impact to River System	Genetic Viability	Movement (natural behavior)	Flowing water, low/mod currents, diversity of habitats for all life stages & seasons	Low-velocity habitat, eddies, refuge, of sufficient river miles	Sand/Silt	Temp, DO, pH	Food Quantity, Timing, Quantity	Predators	Competitors	Disease Risk and Parasites		
2													
14													
15		29%	43%	75%	53%	21%	41%	44%	55%	54%	43%		
16	500	5%	7%	12%	8%	3%	7%	7%	9%	9%	7%		
17		Direct/Indirect	192			critical habitat	152				156		
18		Direct/Indirect	38%			critical habitat	30%				31%		
19						Hydrology PCE	39%						
20						Velocity PCE	28%						
21						Substrate PCE	11%						
22						WQ PCE	22%						
23						Effects to RGSM Habitat					Effects to RGSM via biotic interactions		
24						Geomorphology Habitat Effects	43	28%			Geomorphology Biotic Effects	53	34%
25						Hydrology Habitat Effects	81	53%			Hydrology Biotic Effects	75	48%
26						Riparian Habitat Effects	1	1%			Riparian Biotic Effects	3	2%
27						Mechanical/WQ Habitat Effects	27	18%			Mechanical/WQ Biotic Effects	25	16%
28							152	100%				156	100%
29													
30													
31													
32													
33													
34													
35													
36													
37													
38													
39													
40													
41													
42													
43													
44													








	B	R	S	T	U	V
	Category of Impact to River System	Scoring System	percent of total score	Sum of Category	Category Percent of Total	
2						
14						
15						
16	500					
17						
18						
19						
20						
21						
22			Summary proportions of ALL effects to RGSM			
23			Geomorpholo	130	26%	
24			Hydrology Ov	263	53%	
25			Riparian Over	8	2%	
26			Mechanical/W	99	20%	
27				500	100%	
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						



	B	C	D
1			Direct and Indirect Effects
2		<b>Future Project Conservation Measures</b>	<b>Mortality</b>
3	Impacts to Geomorphology/Sediment Dynamics - channel incision	<b>Geomorphic changes that affect the river channel. E.g., Channel Incision, simplification and loss of floodplain connection.</b>	0
4	Impacts to Geomorphology/Sediment Dynamics - floodplain aggradation	<b>Geomorphic changes that affect the river channel. E.g. geomorphic changes that reduce channel mobility and stabilize it (lateral constraints restricting channel location and floodplain, increase islands or plugs, or increase river bed or bank stability)</b>	0
5	Impacts to Natural Flow Regime (Hydrology) - spring runoff	<b>Hydrograph changes: Decrease in spring snowmelt runoff</b>	0
6	Impacts to Natural Flow Regime (Hydrology) - low flow	<b>Hydrograph changes: Low-Flow Period and Desiccation</b>	10
7	Impacts to Natural Flow Regime (Hydrology) - groundwater interaction	<b>Hydrologic changes: surface-water/groundwater interaction resulting in loss of water</b>	10
8	Impacts to Water Properties	<b>Temporary or long term changes to water quality in river.</b>	0
9	Impacts to Riparian Vegetation	<b>Riparian vegetation alteration</b>	10
10	Site Specific Short Term Impacts (noise, disturbance, spills, invasives)	<b>Construction/Maintenance or other mechanical or human impacts</b>	5
11			
12			<b>35</b>
13		% out of possible maximum score (80)	44%
14	1001	% of total effect score per species (1369)	3%
15		Relative Effect type score (sum values for category/total maximum value per species)	
16		Relative Effect Percent by Category	
17			
18			
19			
20			
21			

	E	F	G	H	I	J
1	Direct and Indirect Effects	Direct and Indirect Effects	Direct and Indirect Effects	Direct and Indirect Effects	Direct and Indirect Effects	Direct and Indirect Effects
2	<b>Reproductive Behavior/ Nest success/ Fledging</b>			<b>Growth Rates and Energy Requirements</b>	<b>Physiological stress and Immune response</b>	<b>Movement (natural behavior)</b>
3	10	10	10	10	10	5
4	10	10	10	10	5	5
5	10	10	10	10	10	10
6	10	10	10	10	10	10
7	10	10	10	10	10	10
8	0	0	0	0	0	0
9	10	10	5	10	10	5
10	10	10	10	10	10	10
11						
12	<b>70</b>	<b>70</b>	<b>65</b>	<b>70</b>	<b>65</b>	<b>55</b>
13	88%	88%	81%	88%	81%	69%
14	7%	7%	6%	7%	6%	5%
15				direct/indirect	430	
16				direct/indirect	43%	
17						
18						
19						
20						
21						

	K	L	M	N	O
1	Riparian Vegetation PCE	Riparian Vegetation PCE	Habitat Effects	Habitat Effects	Habitat Effects
2	<i>Successional riparian habitat (trees, shrubs, water)/ Dynamic River System</i>	<i>Dense riparian vegetation 2-30m height</i>	<b>Migratory and Transitional Habitat</b>	<b>Exposure to Weather Floods, fire, leaf beetles</b>	<b>Ability to colonize new breeding sites</b>
3	10	10	10	10	10
4	10	10	10	5	10
5	10	10	10	0	10
6	10	10	10	10	10
7	10	10	10	10	10
8	0	0	0	0	0
9	10	10	10	10	10
10	5	5	5	1	10
11					
12	 <b>65</b>	 <b>65</b>	 <b>65</b>	 <b>46</b>	 <b>70</b>
13	81%	81%	81%	58%	88%
14	6%	6%	6%	5%	7%
15				all habitat	311
16				all habitat	31%
17					
18					
19	Riparian vegetation PCE		130		
20	Riparian vegetation PCE		68%		
21					

	P	Q	R	S	T	U	V	W	X
1	<b>Insect Prey PCE</b>	Biotic Interactions	Biotic Interactions	Biotic Interactions	Biotic Interactions				
2	<i>Variety of insect prey populations/Food Quantity, timing</i>			<b>Predators</b>	<b>Cowbird Parasitism</b>		<b>percent of total score</b>	<b>Sum of Category</b>	<b>Category Percent of Total</b>
3	10	10	0	10	10	● 145	14.5%		
4	5	10	0	5	5	● 120	12.0%	265	26%
5	10	10	10	5	5	● 140	14.0%		
6	10	1	10	10	10	● 161	16.1%		
7	10	10	10	10	10	● 170	17.0%	471	47%
8	1	1	0	0	0	● 2	0.2%	2	0%
9	10	10	5	10	5	● 150	15.0%	150	15%
10	5	1	5	10	1	● 113	11.3%	113	11%
11									
12	● 61	● 53	● 40	● 60	● 46				
13	76%	66%	50%	75%	58%				
14	6%	5%	4%	6%	5%				
15	6%			allbiotics	260				
16				all biotics	26%				
17									
18									
19	Insect Prey PCE	61							
20	Insect Prey PCE	32%							
21									

	B	C	D
1			Direct and Indirect Effects
2		<b>Future Project Conservation Measures</b>	<b>Mortality</b>
3	Impacts to Geomorphology/Sediment Dynamics - channel incision	<b>Geomorphic changes that affect the river channel. E.g., Channel Incision, simplification and loss of floodplain connection.</b>	0
4	Impacts to Geomorphology/Sediment Dynamics - floodplain aggradation	<b>Geomorphic changes that affect the river channel. E.g. geomorphic changes that reduce channel mobility and stabilize it (lateral constraints restricting channel location and floodplain, increase islands or plugs, or increase river bed or bank stability)</b>	0
5	Impacts to Natural Flow Regime (Hydrology) - spring runoff	<b>Hydrograph changes: Decrease in spring snowmelt runoff</b>	0
6	Impacts to Natural Flow Regime (Hydrology) - low flow	<b>Hydrograph changes: Low-Flow Period and Desiccation</b>	5
7	Impacts to Natural Flow Regime (Hydrology) - groundwater interaction	<b>Hydrologic changes: surface-water/groundwater interaction resulting in loss of water</b>	5
8	Impacts to Water Properties	<b>Temporary or long term changes to water quality in river.</b>	0
9	Impacts to Riparian Vegetation	<b>Riparian vegetation alteration</b>	10
10	Site Specific Short Term Impacts (noise, disturbance, spills, invasives)	<b>Construction/Maintenance or other mechanical or human impacts</b>	5
11			
12			<b>25</b>
13		% out of possible maximum score (80)	31%
14	815	% of total effect score per species (1369)	3%
15		Relative Effect type score (sum values for category/total maximum value per species)	
16		Relative Effect Percent by Category	
17			
18			
19			
20			
21			
22			



	E	F	G	H
1	Direct and Indirect Effects	Direct and Indirect Effects	Direct and Indirect Effects	Direct and Indirect Effects
2	<b>Reproductive Behavior/ Nest success/ Fledging</b>	<b>Growth Rates and Energy Requirements</b>	<b>Physiological stress and Immune response</b>	<b>Movement (natural behavior)</b>
3	5	10	10	10
4	5	10	5	10
5	10	10	10	10
6	10	10	10	10
7	10	10	10	10
8	0	0	0	0
9	10	10	10	5
10	10	10	10	10
11				
12	<b>60</b>	<b>70</b>	<b>65</b>	<b>65</b>
13	75%	88%	81%	81%
14	7%	9%	8%	8%
15		direct/indirect	285	
16		direct/indirect	35%	
17				
18				
19				
20				
21				
22				

	I	J	K	L	M
1	<b>Riparian Vegetation PCE</b>	<b>Riparian Vegetation PCE</b>	<b>Habitat Effects</b>	<b>Habitat Effects</b>	<b>Habitat Effects</b>
2	Successional riparian habitat (trees, shrubs, water)/ Dynamic River System	Riparian vegetation patches at least 325 ft wide and 200 acres in extent with at least 1 nesting grove of dense mature trees	Migratory, Foraging, and Transitional Habitat	Exposure to Weather Floods, fire, leaf beetles	Ability to colonize new breeding sites
3	10	10	10	10	10
4	10	10	10	10	10
5	10	10	10	0	10
6	10	10	10	10	10
7	10	10	10	10	10
8	0	0	0	0	0
9	10	10	10	10	10
10	5	5	5	1	10
11					
12	<b>65</b>	<b>65</b>	<b>65</b>	<b>51</b>	<b>70</b>
13	81%	81%	81%	64%	88%
14	8%	8%	8%	6%	9%
15				all habitat	316
16				all habitat	39%
17					
18					
19					
20	Riparain vegetation PCE	130			
21	Riparain vegetation PCE	68%			
22					

	N	O	P	Q	R	S	T	U
1	<b>Insect Prey PCE</b>	<b>Insect Prey PCE</b>	<b>Insect Prey PCE</b>	Biotic Interactions				
2	<i>Variety of insect prey populations, food quantity, timing</i>			<b>Predators</b>		<b>percent of total score</b>	<b>Sum of Category</b>	<b>Category Percent of Total</b>
3	10	10	0	5	● <b>110</b>	13.5%		
4	10	10	0	5	● <b>105</b>	12.9%	215	26.4%
5	10	10	10	5	● <b>115</b>	14.1%		
6	10	1	10	10	● <b>126</b>	15.5%		
7	10	10	10	10	● <b>135</b>	16.6%	376	46.1%
8	1	1	0	0	● <b>2</b>	0.2%	2	0.2%
9	10	10	5	10	● <b>130</b>	16.0%	130	16.0%
10	5	1	5	10	● <b>92</b>	11.3%	92	11.3%
11								
12	● <b>66</b>	● <b>53</b>	● <b>40</b>	● <b>55</b>				
13	83%	66%	50%	69%				
14	8%	7%	5%	7%				
15	8%		allbiotics	214				
16			all biotics	26%				
17								
18								
19								
20	Insect Prey PCE	66						
21	Insect Prey PCE	34%						
22								