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Dolores River Ecological Response Monitoring

April 7, 2017

Management Opportunities and Objectives—Lower Dolores River Implementation, Monitoring and Evaluation Plan for Native Fish (2014)

- **FLUSHING FLOW - 400-800 cfs** - scouring fine sediments from riffles for improved spawning potential for native fish
- **FLUSHING FLOW - 800-2000 cfs** - initiate mobilization of the median-size particle (D_{50}); maintain riffle productivity and vertical relief between pools and riffles
- **HABITAT MAINTENANCE FLOW (bankfull flows) - 2000 - 3400 cfs** - maintain pattern and profile of channel; pool scour; mobilize riffles; initiate floodplain interaction
- **HABITAT MAINTENANCE FLOW - Peak flows of >3400 cfs** - alluvial groundwater recharge; nutrient exchange; floodplain scour for germination sites; mobilization of larger riffle materials (D_{84}); increase habitat complexity

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Flow Hypotheses—Lower Dolores River Implementation, Monitoring and Evaluation Plan for Native Fish (2014)

Flow Hypothesis	Habitat Objective	Measurable Benchmark
Flushing Flow **400-800 cfs to scour fine sediment**	Maintain quality spawning habitat at times appropriate for spawning to occur	Quantify percentage of fines (<2mm) in spawning beds (cobbles) pre- and post-flow event; percentage of fines measured should be reduced, with specific attention paid to aligning flushing flows relative to the timing of native fish spawning.
Flushing Flow **800-2000 cfs to initiate mobilization of the median-size particle**	Maintenance of riffle and pool vertical relief	D_{50} should coarsen in riffles; annual accumulation of fine sediment should be scoured from pools. Pool-riffle profile should be maintained.
	Maintain benthic macro-invertebrate productivity	Taxa measurements for benthic macro-invertebrate species in riffles (quantitative/ qualitative measures?) should reflect productive instream environment.

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Flow Hypotheses—Lower Dolores River Implementation, Monitoring and Evaluation Plan for Native Fish (2014)

Flow Hypothesis	Habitat Objective	Measurable Benchmark
Habitat Maintenance Flow **2000 - 3400 cfs for 7+ days (bankfull flows)**	Maintain pattern and profile appropriate for the reach	Monitor changes in cross-section and profile dimensions; channel aggradation, degradation or entrenchment should be assessed; over a reach, over time, gradient and pool-riffle spacing should be consistent. Assess plan-view changes, such as stabilization of mid-channel bars or bar extension; vegetative encroachment on point bars; medial bar expansion.
	Scour pools	Maintenance of pool depth (see above re: pool depths).
	Mobilize majority of riffle materials	Monitor mobile fraction of channel bed in riffle; tracers or direct bedload transport measurements; hydraulic modeling.
	Initiation of significant interaction with floodplains in alluvial reaches.	Cottonwood recruitment (or at least some indication of seed-bed preparation and germination); maintenance of other riparian indicators (e.g., minimize encroachment of xeric/mesic species onto floodplains). Validate Q_{bkf} hypotheses by reach.

Flow Hypotheses—Lower Dolores River Implementation, Monitoring and Evaluation Plan for Native Fish (2014)

Flow Hypothesis	Habitat Objective	Measurable Benchmark
Habitat maintenance Flow **Peak flows of >3400 cfs at a frequency of ~7-10 years**	Mobilize and re-set riffle habitats; create and maintain instream habitat diversity (pool scour; backwaters; secondary channels)	Document movement of D_{84} in riffles; assess instream habitat complexity. Assess cross section and longitudinal changes.
	Maintain floodplain exchange and robust riparian vegetative community	Monitor riparian vegetation diversity and density; cottonwood germination and recruitment (NOTE - Riparian monitoring will be an important indicator of whether large flows are providing the exchange benefits to instream resources).
	Energy and nutrient exchange between channel and floodplains	Validate Q_{bkf} hypotheses by reach. Floodplain inundation depths; measure exchange of material between channel and floodplain (e.g., painted patches; floodplain transect monitoring).
	Maintenance of alluvial aquifer	Groundwater monitoring in floodplain.

Work Plan--2017

- Sediment Transport Monitoring
- Aerial Photography/Photo Points/Drone Work
- Groundwater Monitoring
- Riparian Vegetation/Floodplain Monitoring
- Fish Population Surveys

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Sediment Transport Monitoring

Deployment of monitoring to test flow hypotheses:

- Cross section surveys
- Pebble Counts
- Painted Rocks
- Sediment Traps
- Scour Stakes

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Sediment Transport Monitoring

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Deploying Ecological Response Monitoring in 5 Weeks

- **Coordinate staff time, vehicles, and equipment of Dolores River Native Fish Monitoring & Recommendation Team Members, esp.**
  - Colorado Parks & Wildlife
  - The Nature Conservancy
- **Working with public and private landowners**
- **Outreach to academic institutions and researchers familiar with the Dolores River and monitoring needs, esp.**
  - Fort Lewis College—Dr. Cynthia Dott, Dr. Gary Gianniny, Dr. Jonathan Harvey
  - Colorado Mesa University—Dr. Gigi Richard
  - Utah State University—Dr. Phaedra Budy
  - Colorado State University—Dr. Ryan Morrison
- **Consultants (hired by The Nature Conservancy)**
  - Restoration Services Consulting
- **Volunteers!**
  - Katie Birch, Wilson Water Group

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Additional Volunteer/Observer (Bedrock, CO)

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CONTACT INFORMATION

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