

# Appendix H.6 – Aquatic Resources Environmental Consequences – Tables and Figures (Compared to Existing Conditions)

## Direct Effects

### Upper Arkansas River, Upstream of Pueblo Reservoir

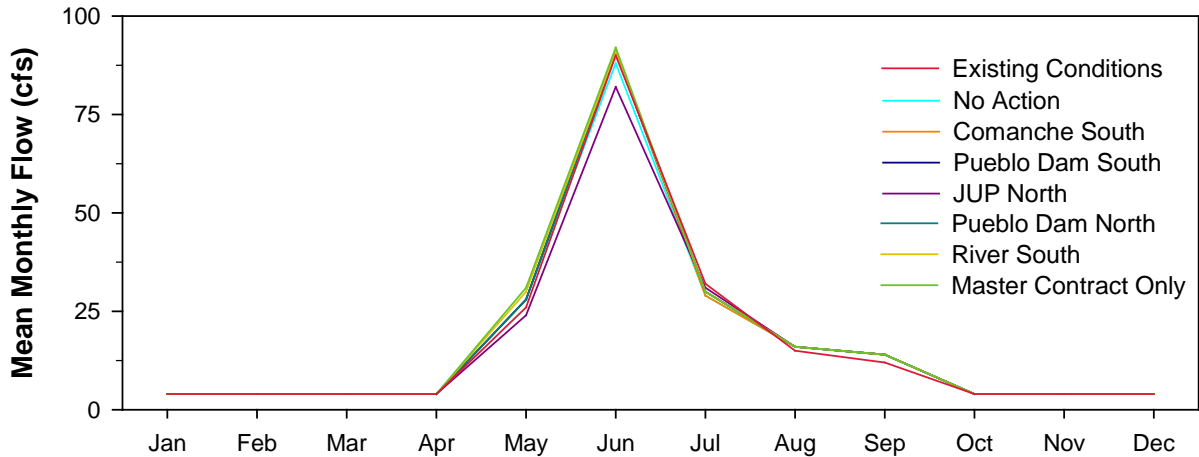


Figure 1. Direct Effects Mean Monthly Streamflow for All Alternatives and Existing Conditions in Lake Fork Creek

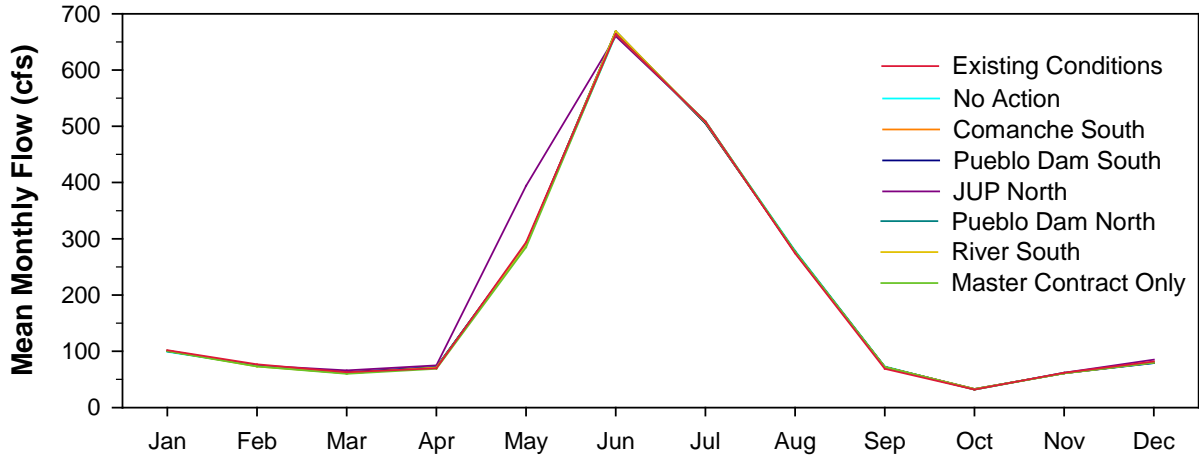
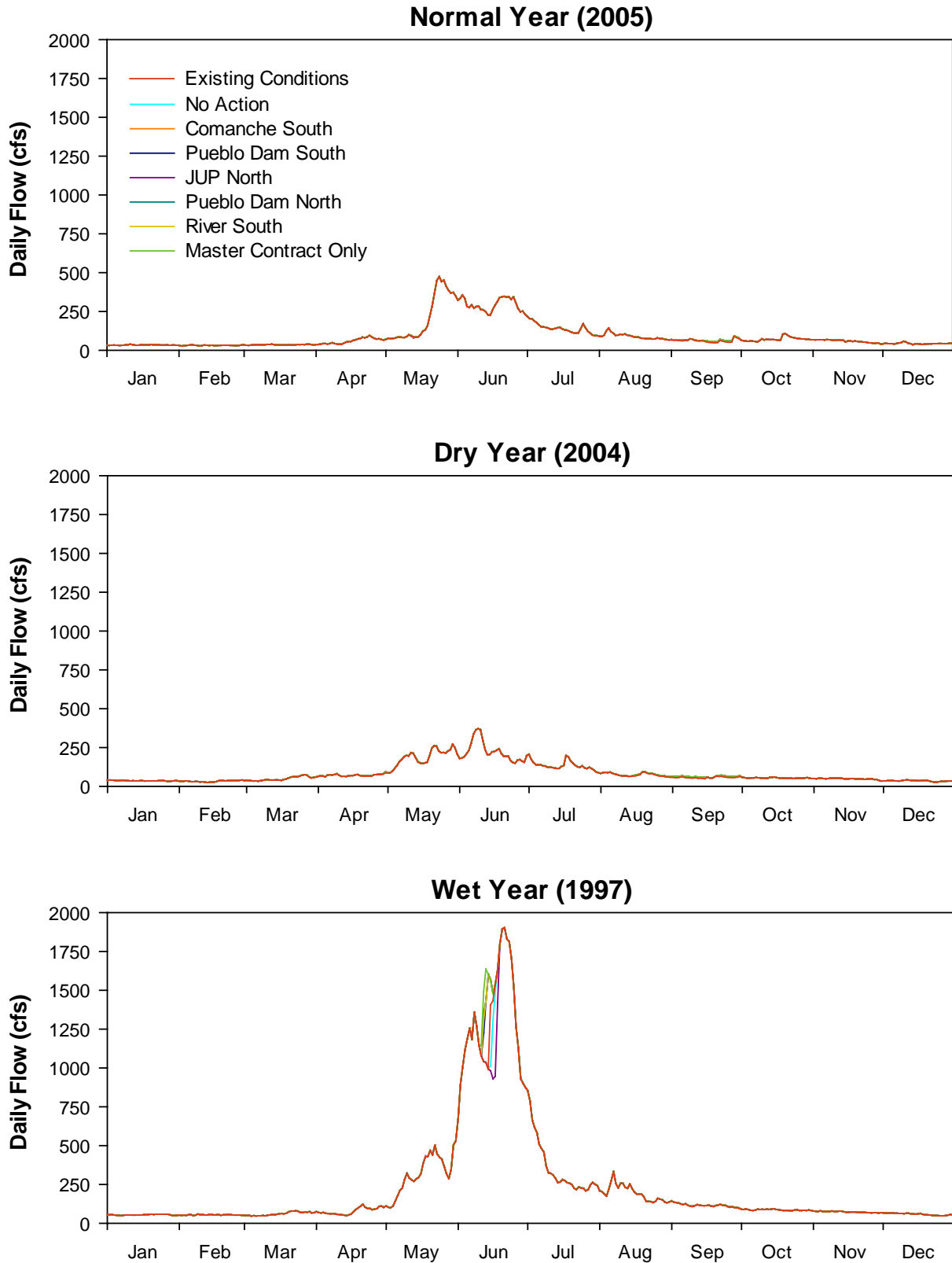


Figure 2. Direct Effects Mean Monthly Streamflow for All Alternatives and Existing Conditions in Lake Creek

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**Figure 3. Direct Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 1 of the Upper Arkansas River at the Malta Gage.**

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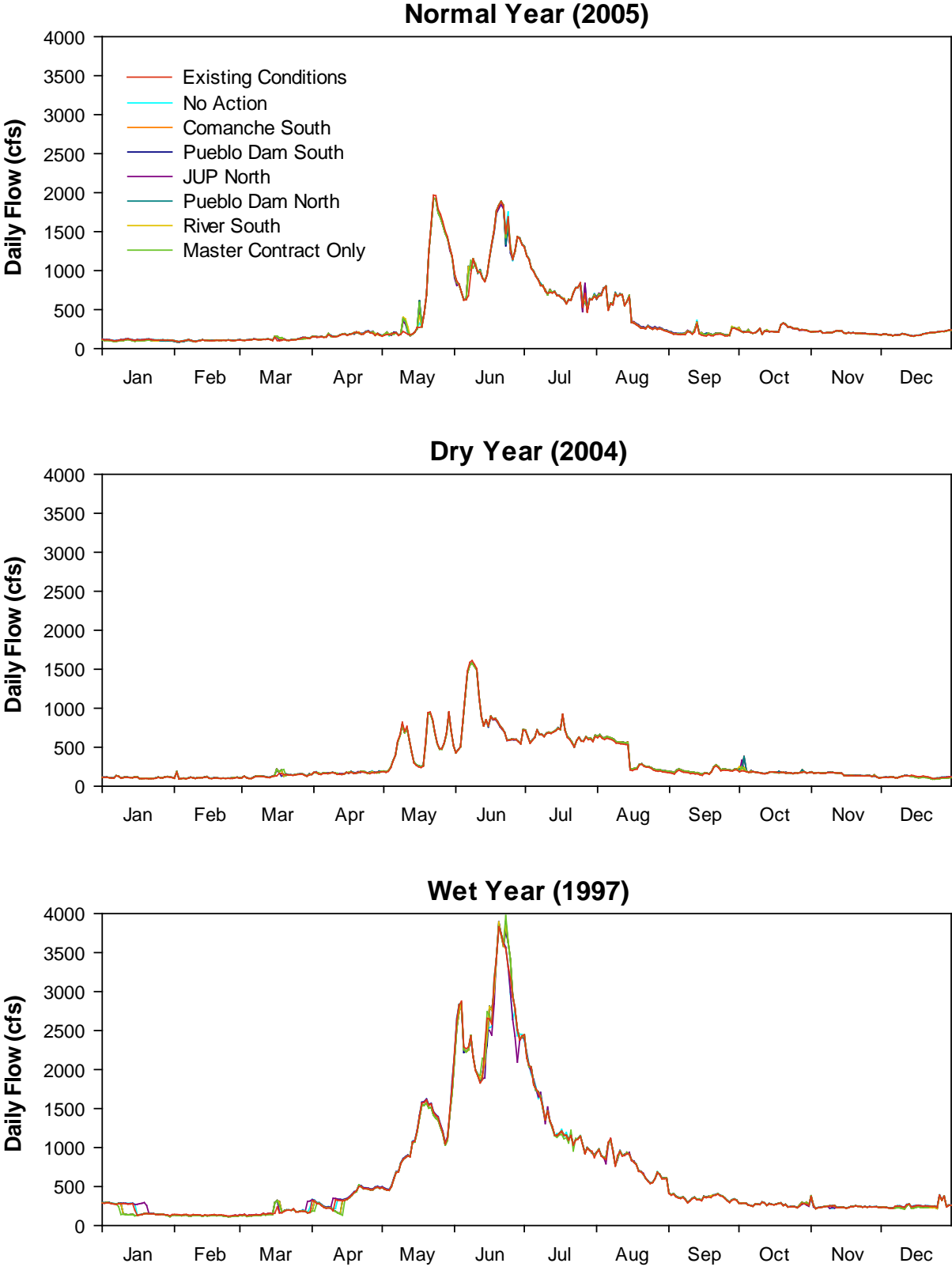
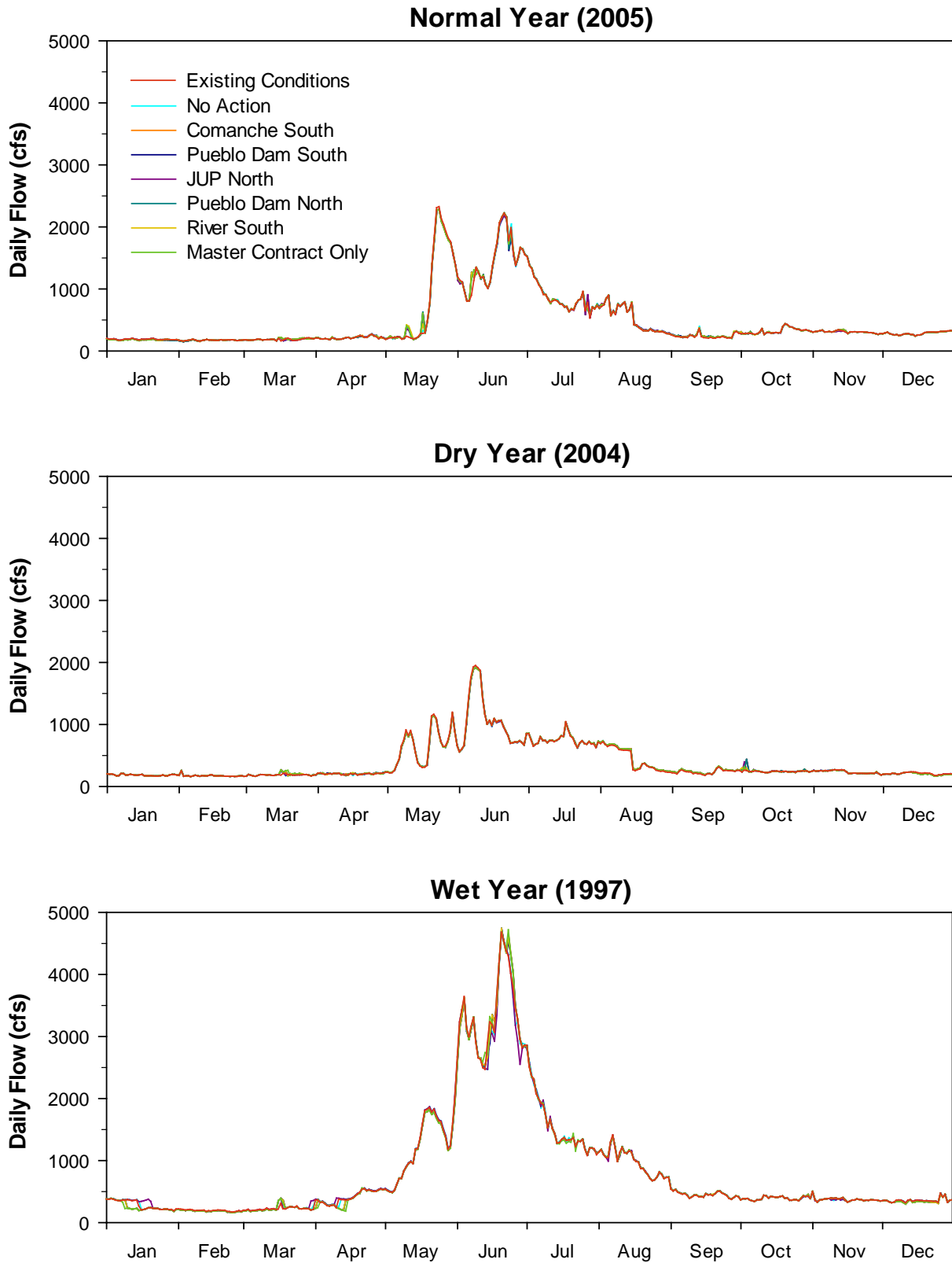


Figure 4. Direct Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 2 of the Upper Arkansas River at the Buena Vista Gage

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**Figure 5. Direct Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 3 of the Upper Arkansas River at the Nathrop Gage**

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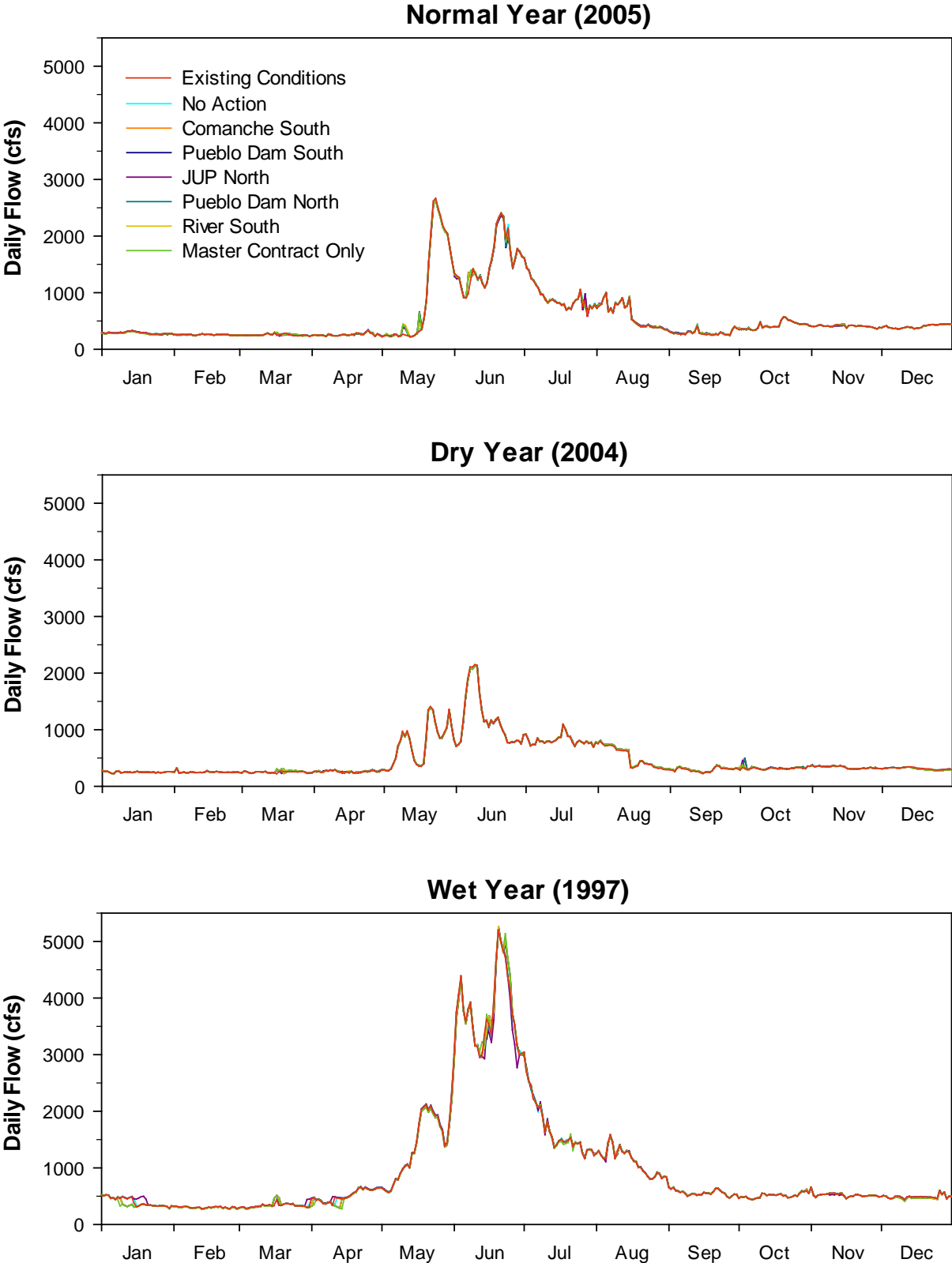
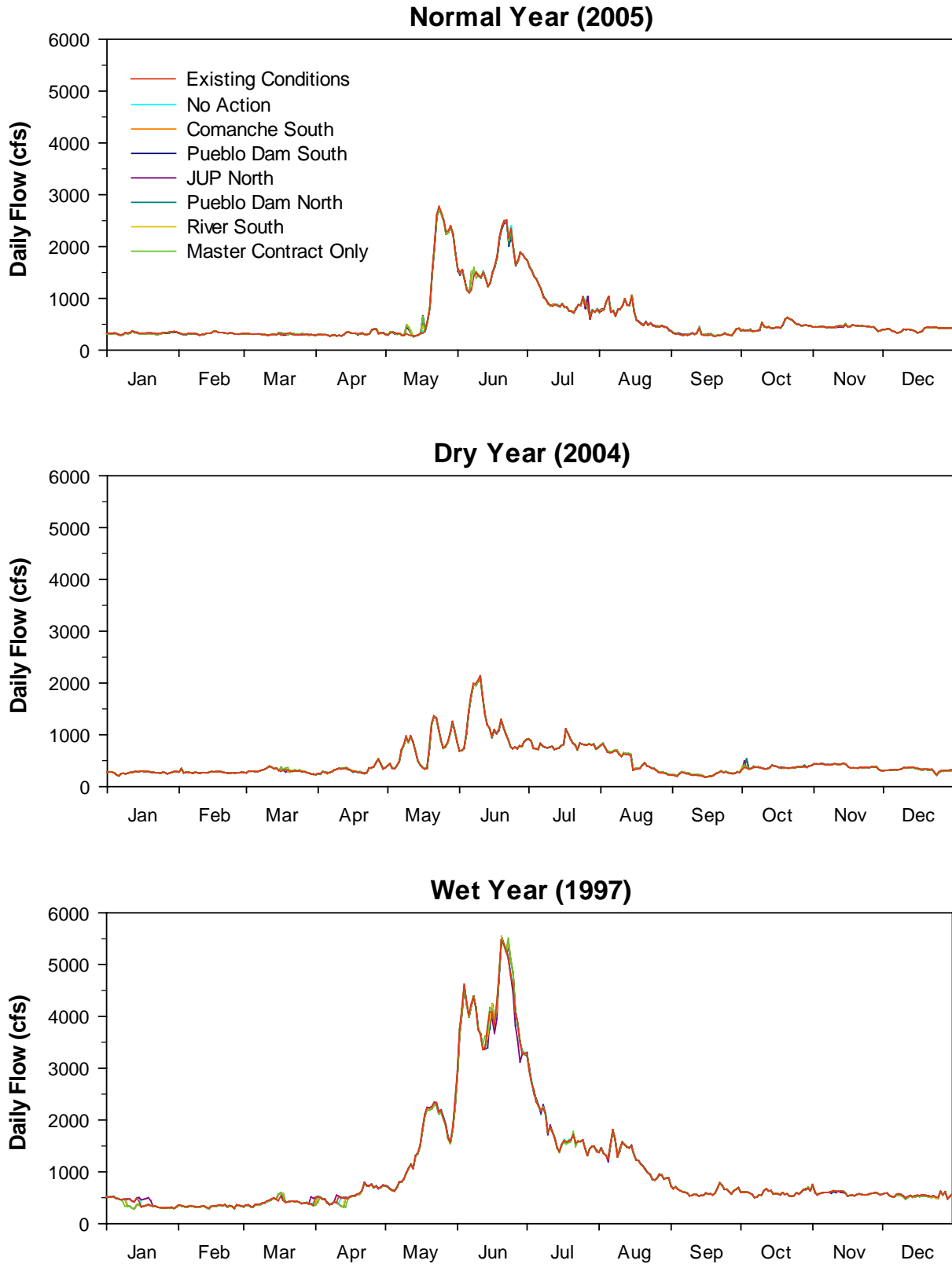


Figure 6. Direct Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 4 and Segment 5 of the Upper Arkansas River at the Wellsville Gage

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**Figure 7. Direct Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 6 of the Upper Arkansas River at the Parkdale Gage**

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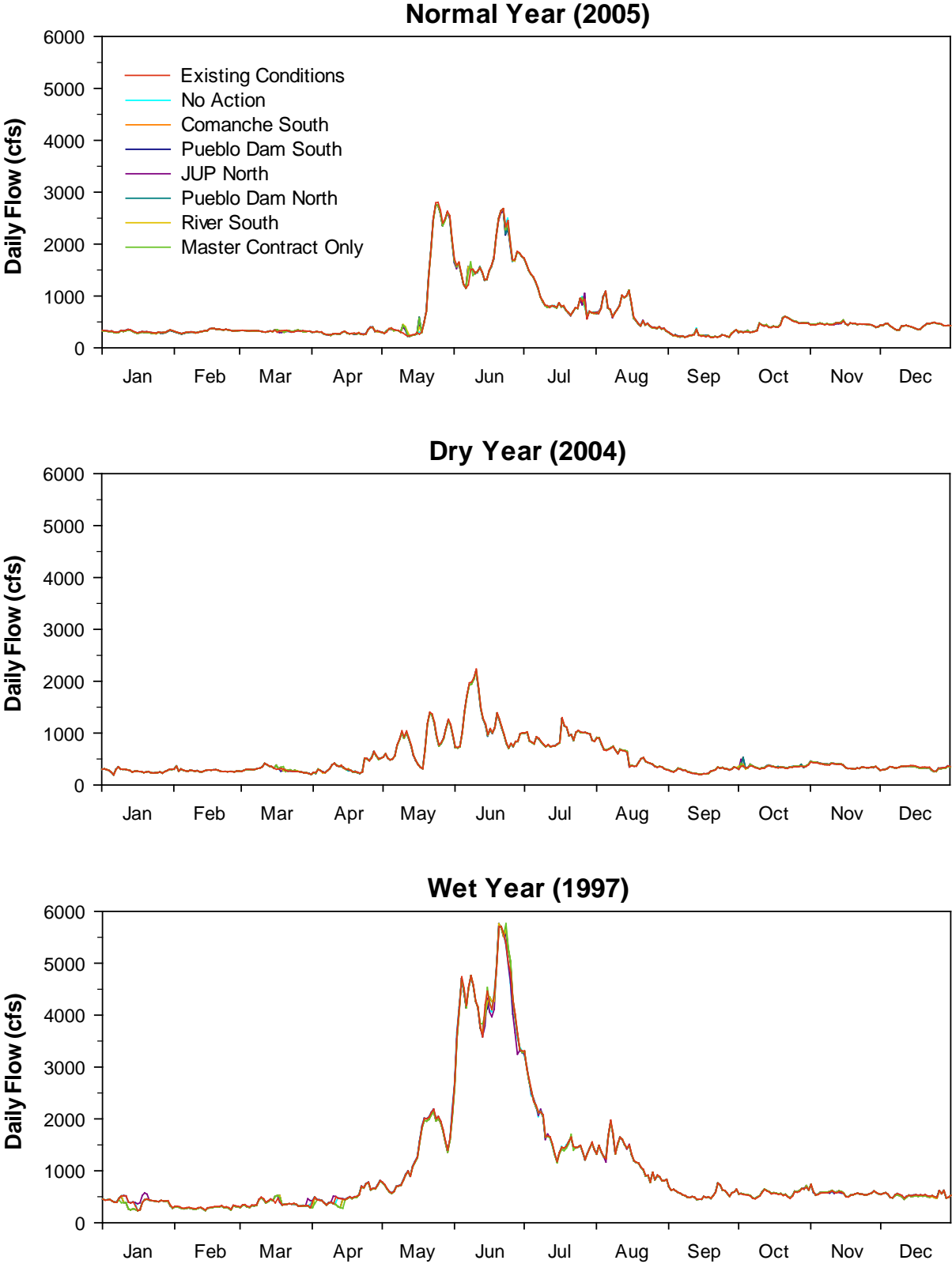
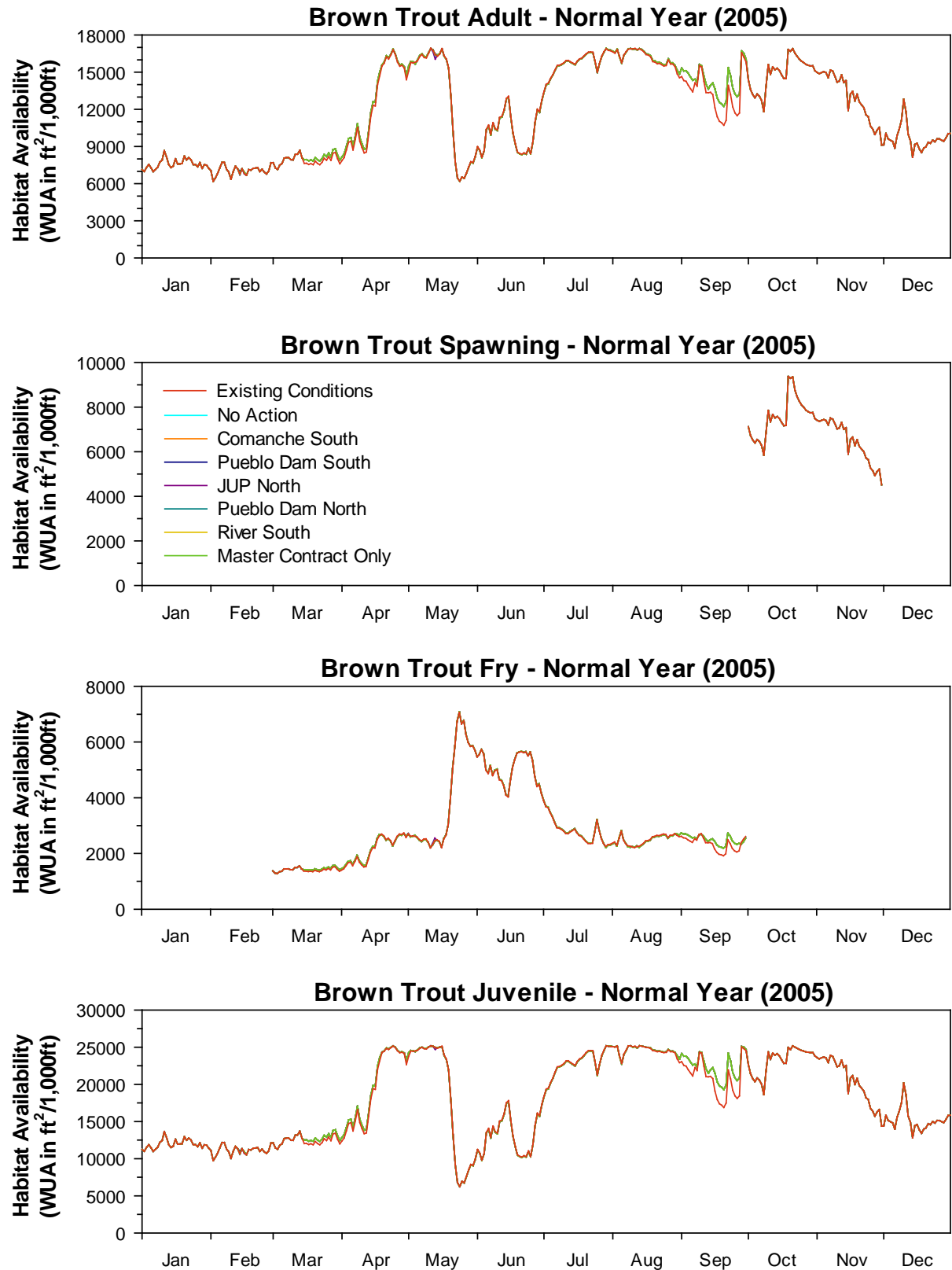


Figure 8. Direct Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 7 of the Upper Arkansas River at the Portland Gage

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**Figure 9. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ $\text{ft}^2/1,000\text{ft}$ ]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 1 of the Upper Arkansas River**



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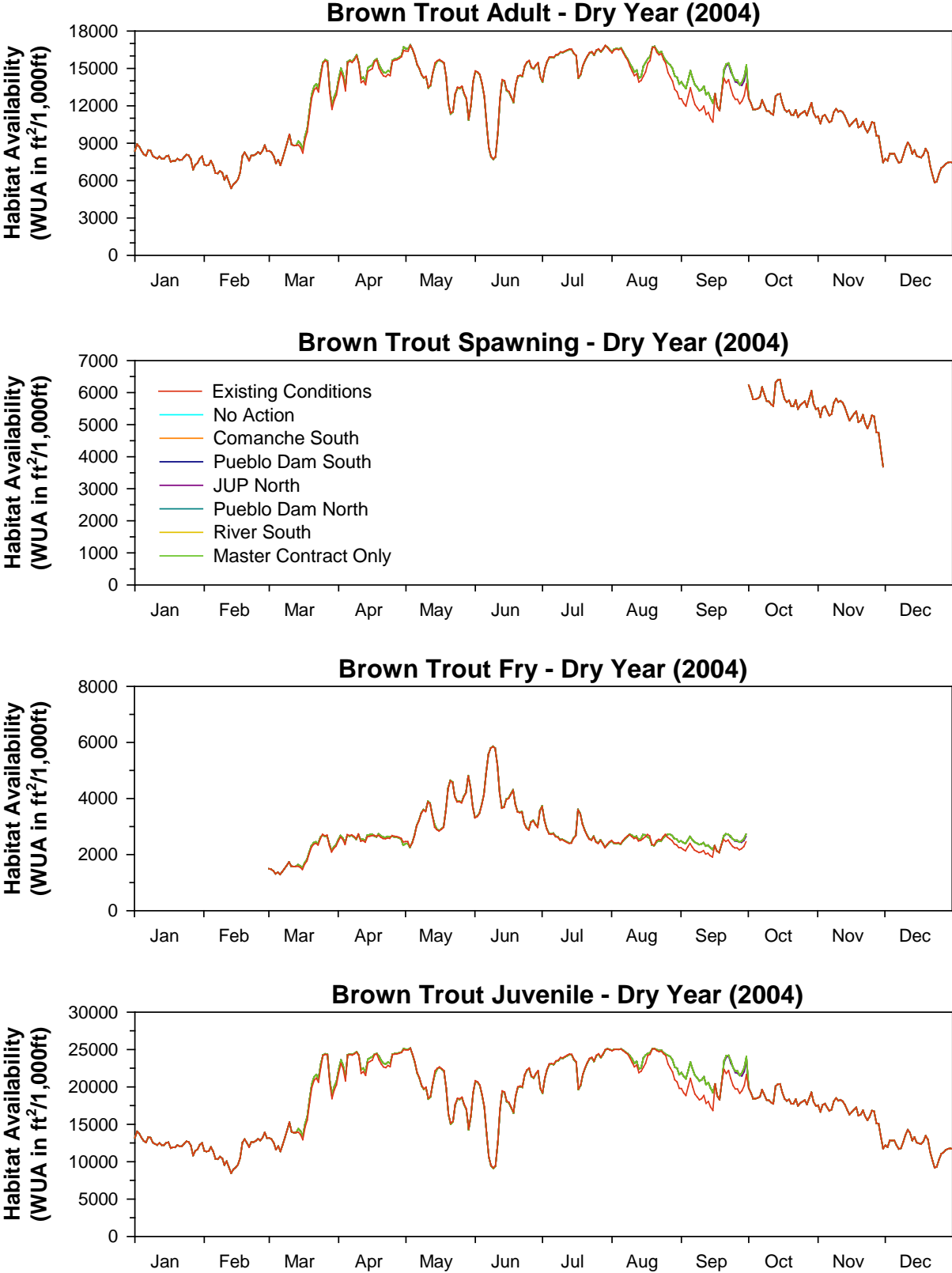
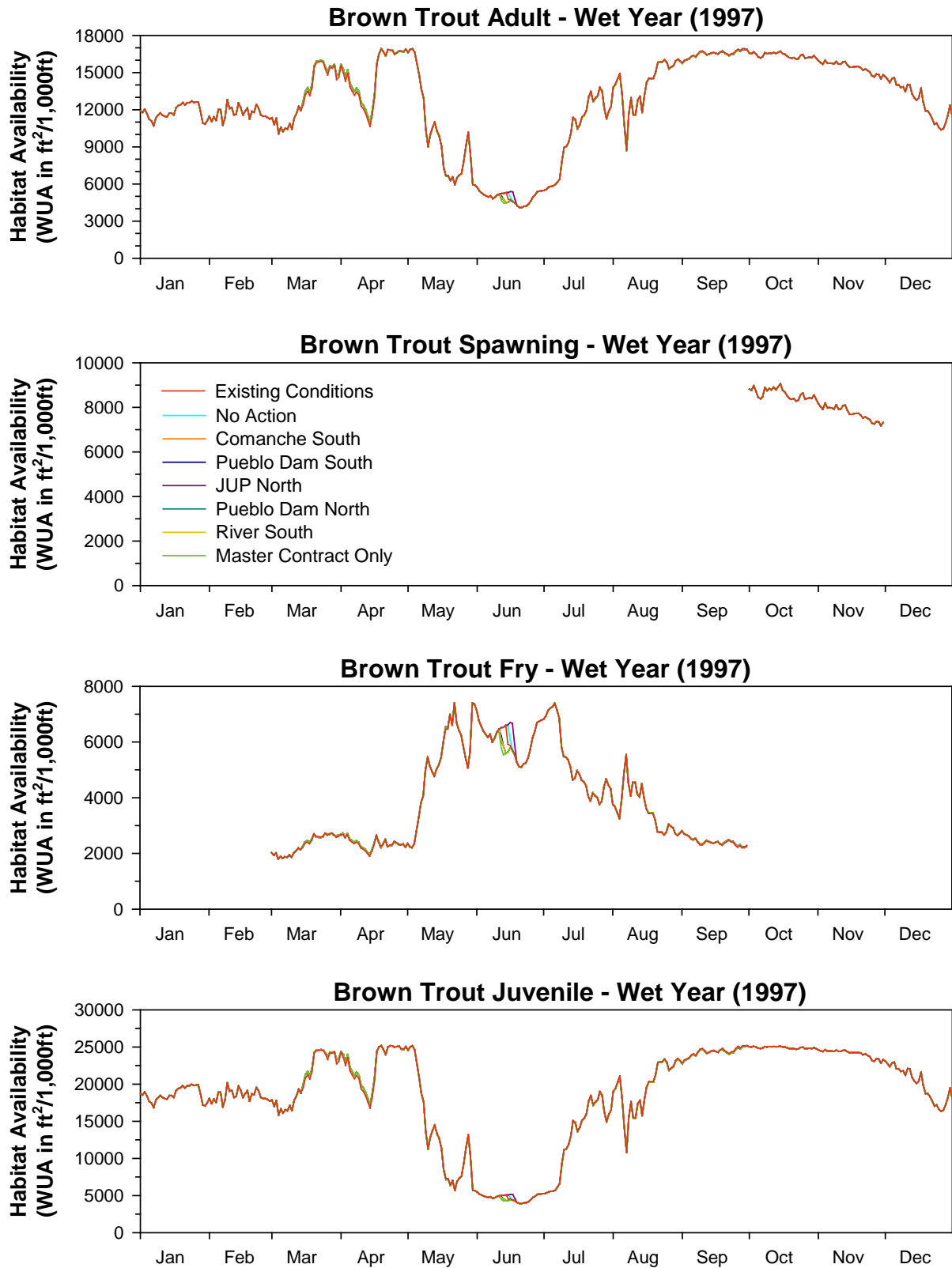


Figure 10. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 1 of the Upper Arkansas River

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**Figure 11. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 1 of the Upper Arkansas River**

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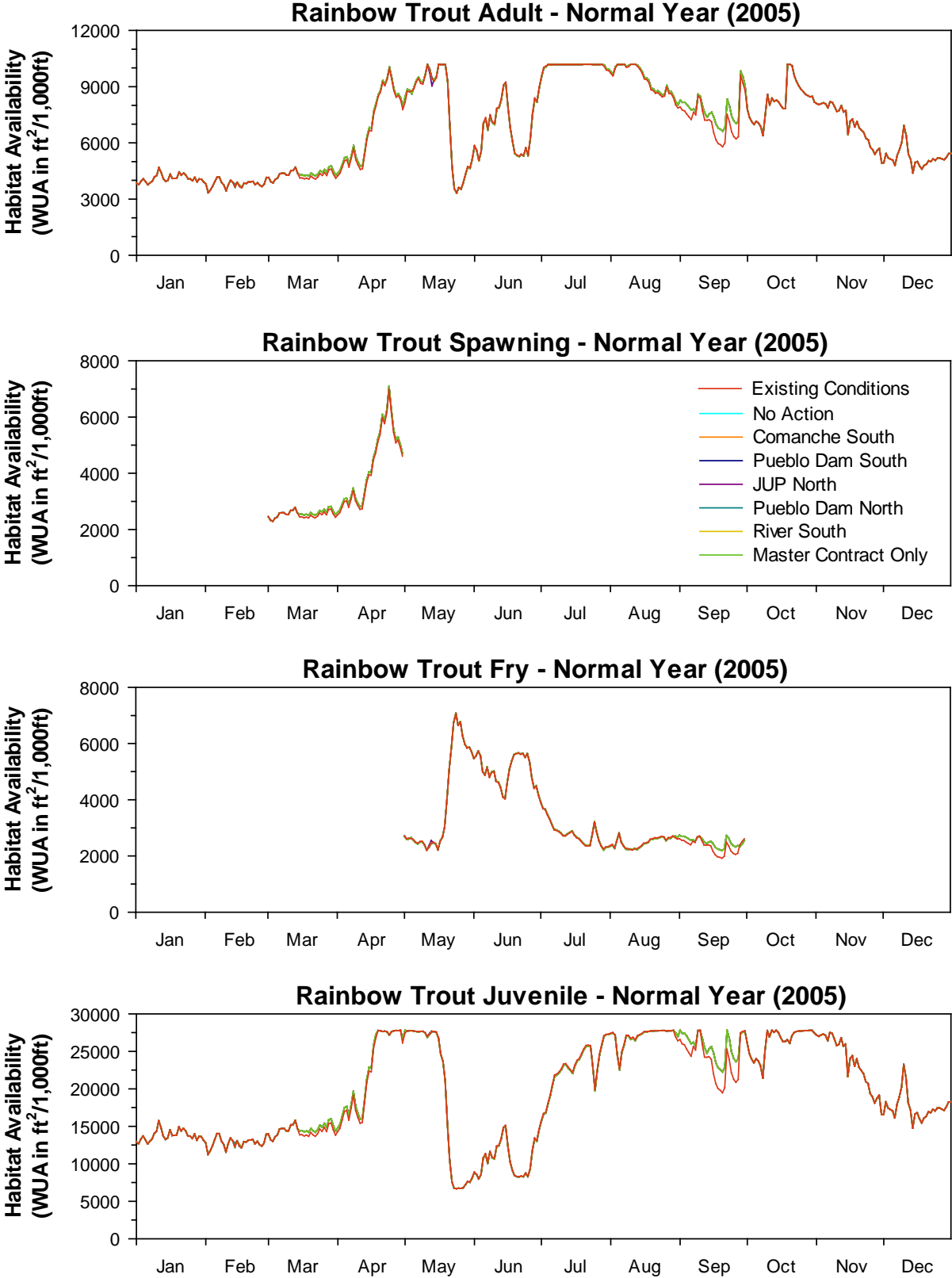
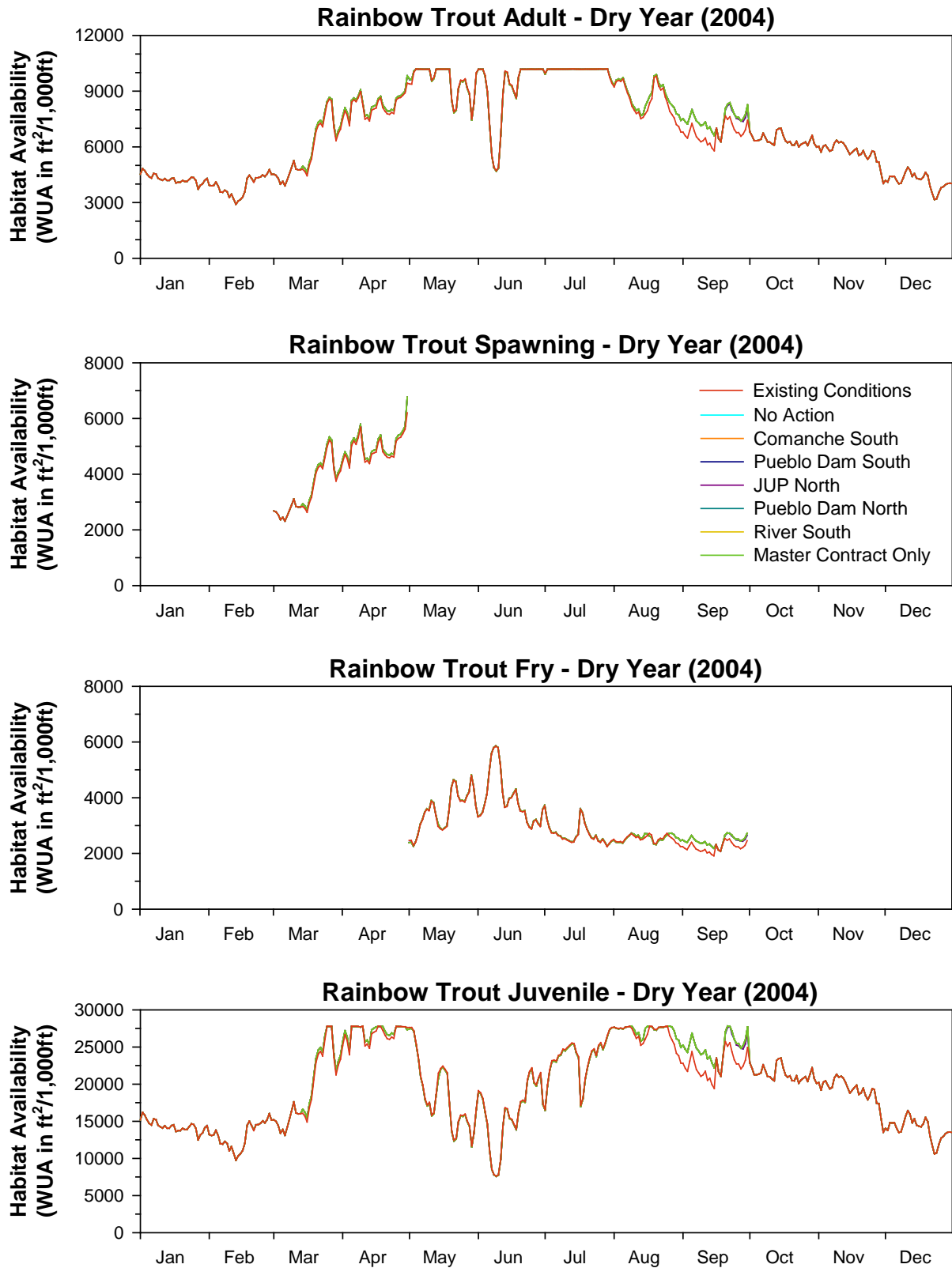


Figure 12. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 1 of the Upper Arkansas River

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**Figure 13. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 1 of the Upper Arkansas River**

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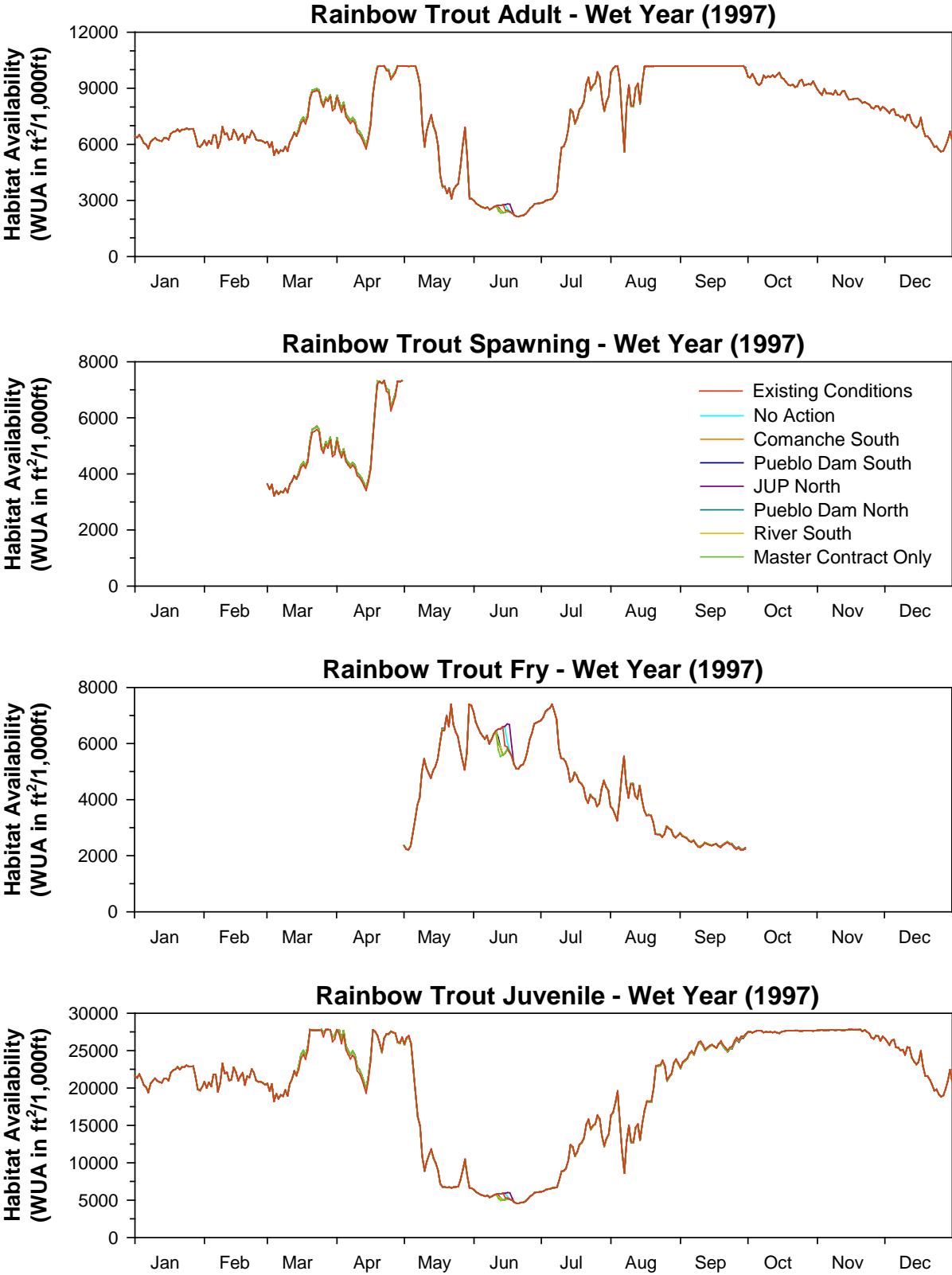
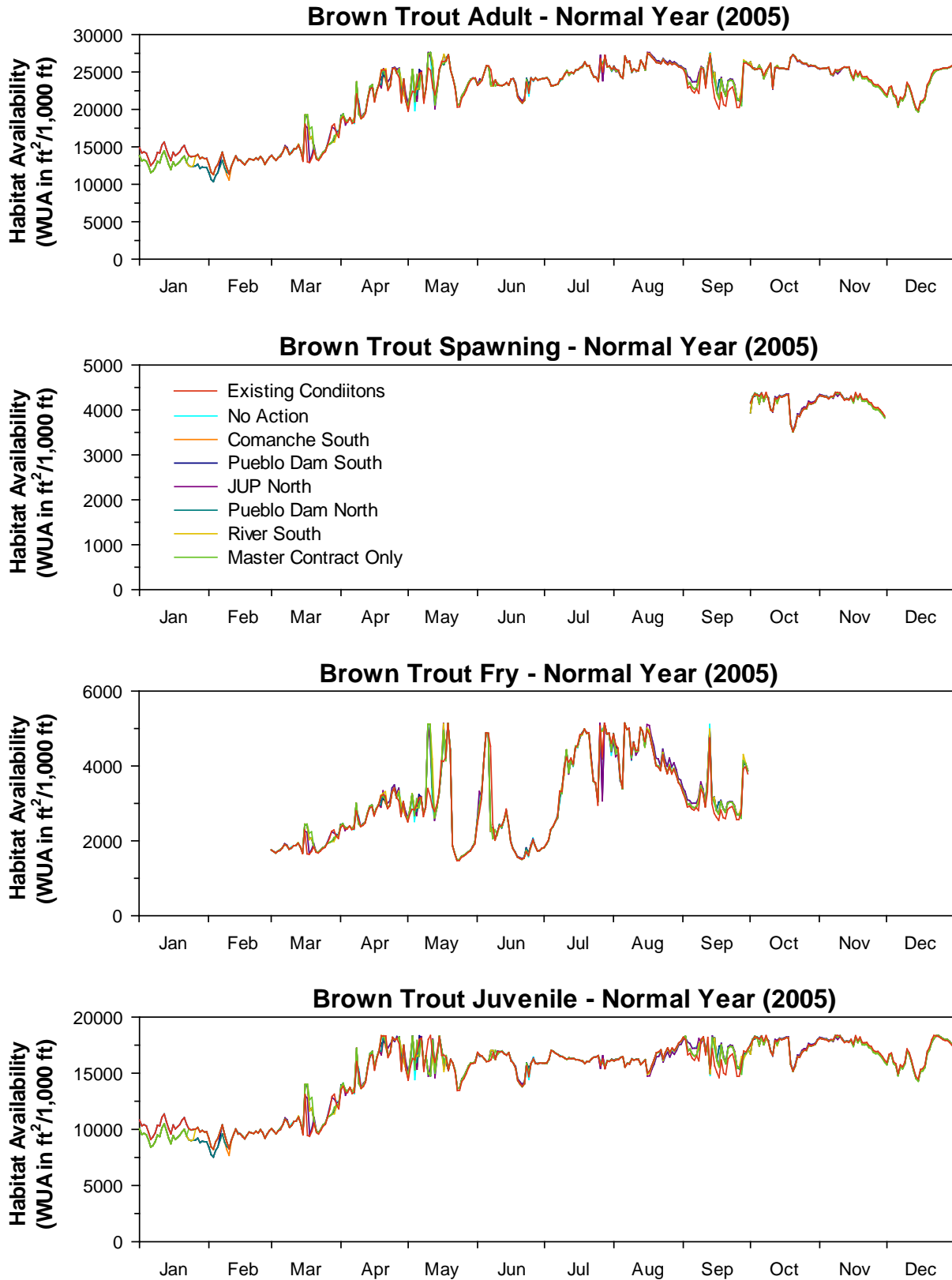


Figure 14. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 1 of the Upper Arkansas River

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**Figure 15. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 2 of the Upper Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

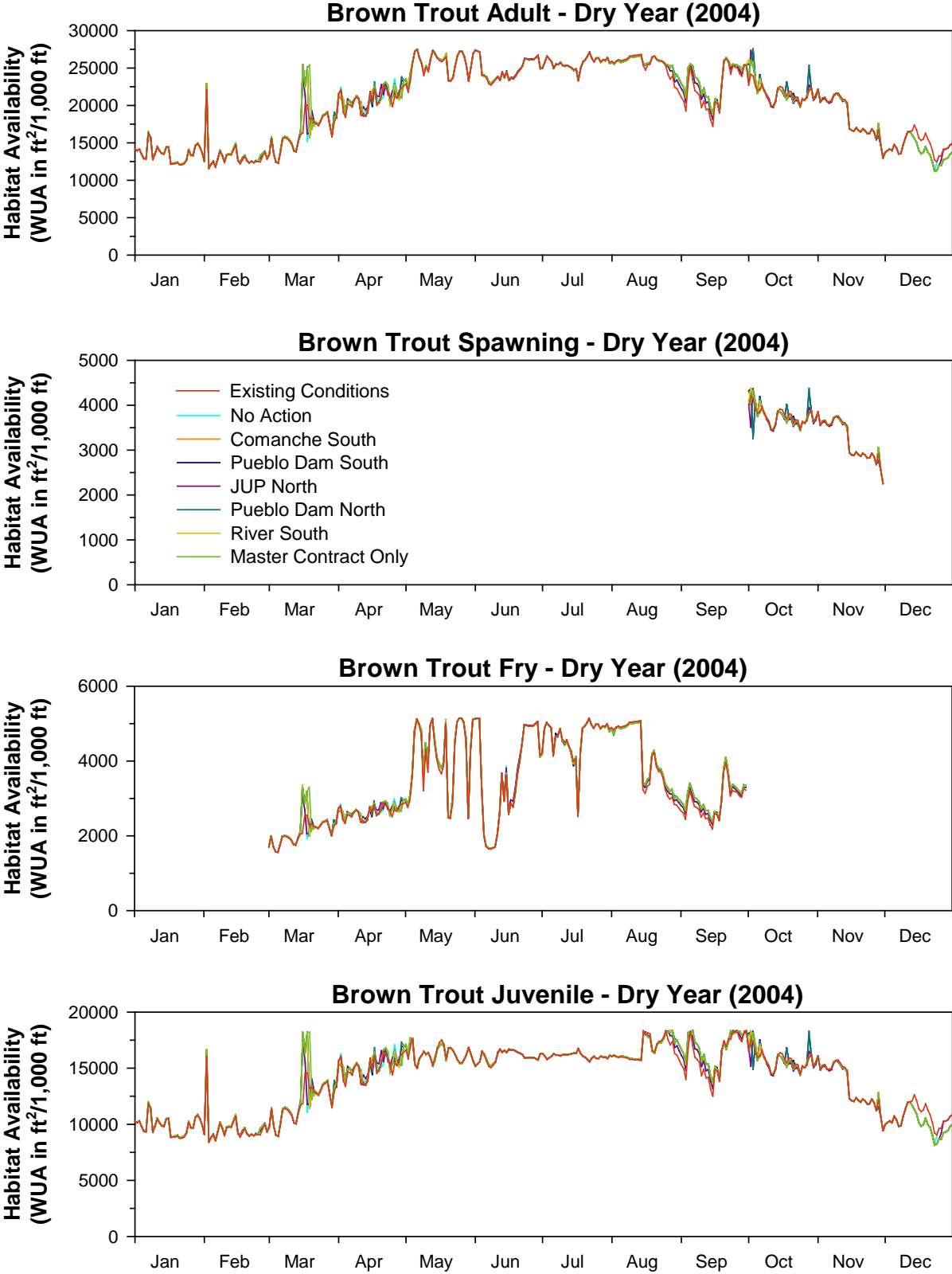
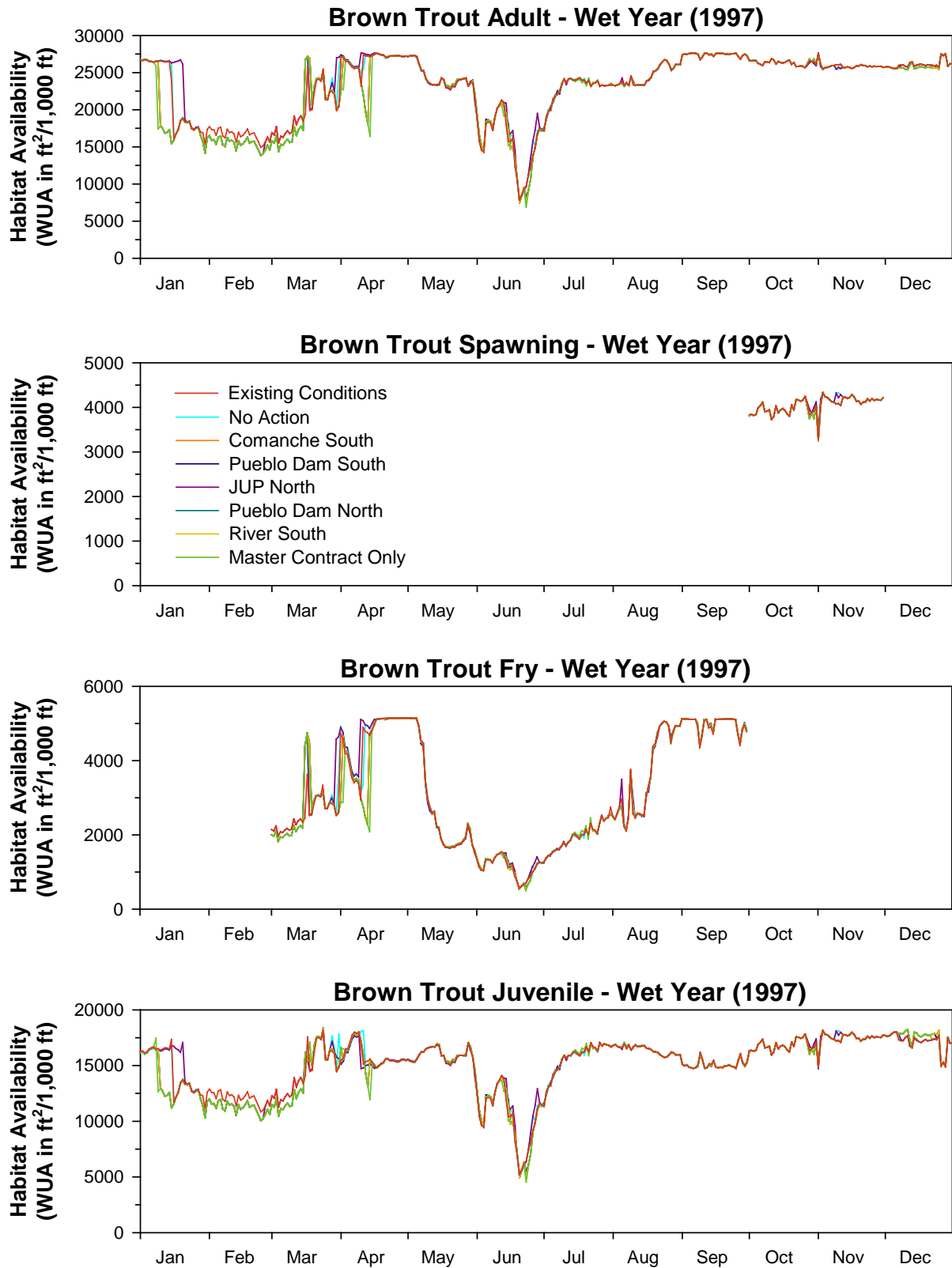


Figure 16. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 2 of the Upper Arkansas River

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**Figure 17. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 2 of the Upper Arkansas River**



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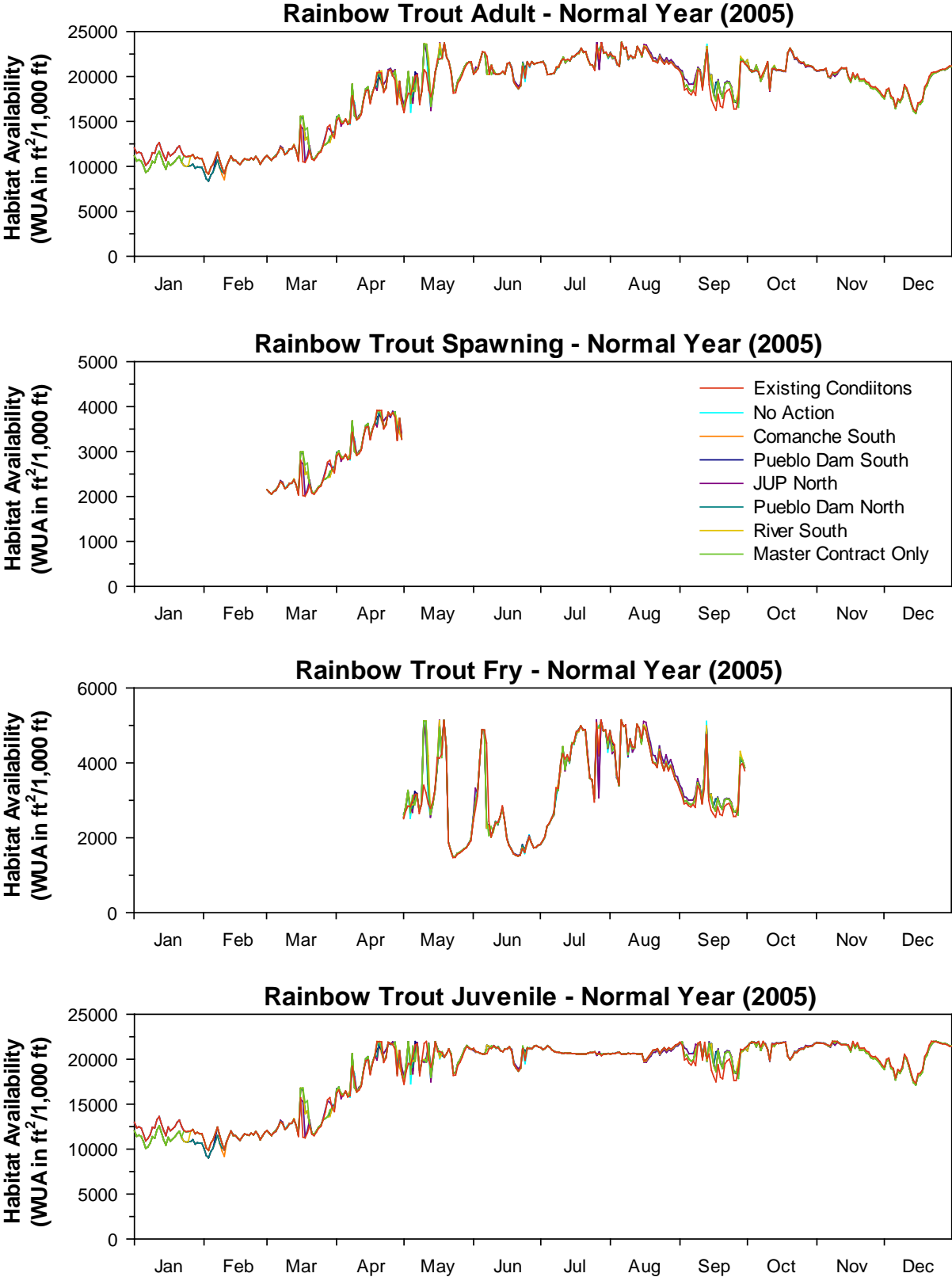


Figure 18. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 2 of the Upper Arkansas River

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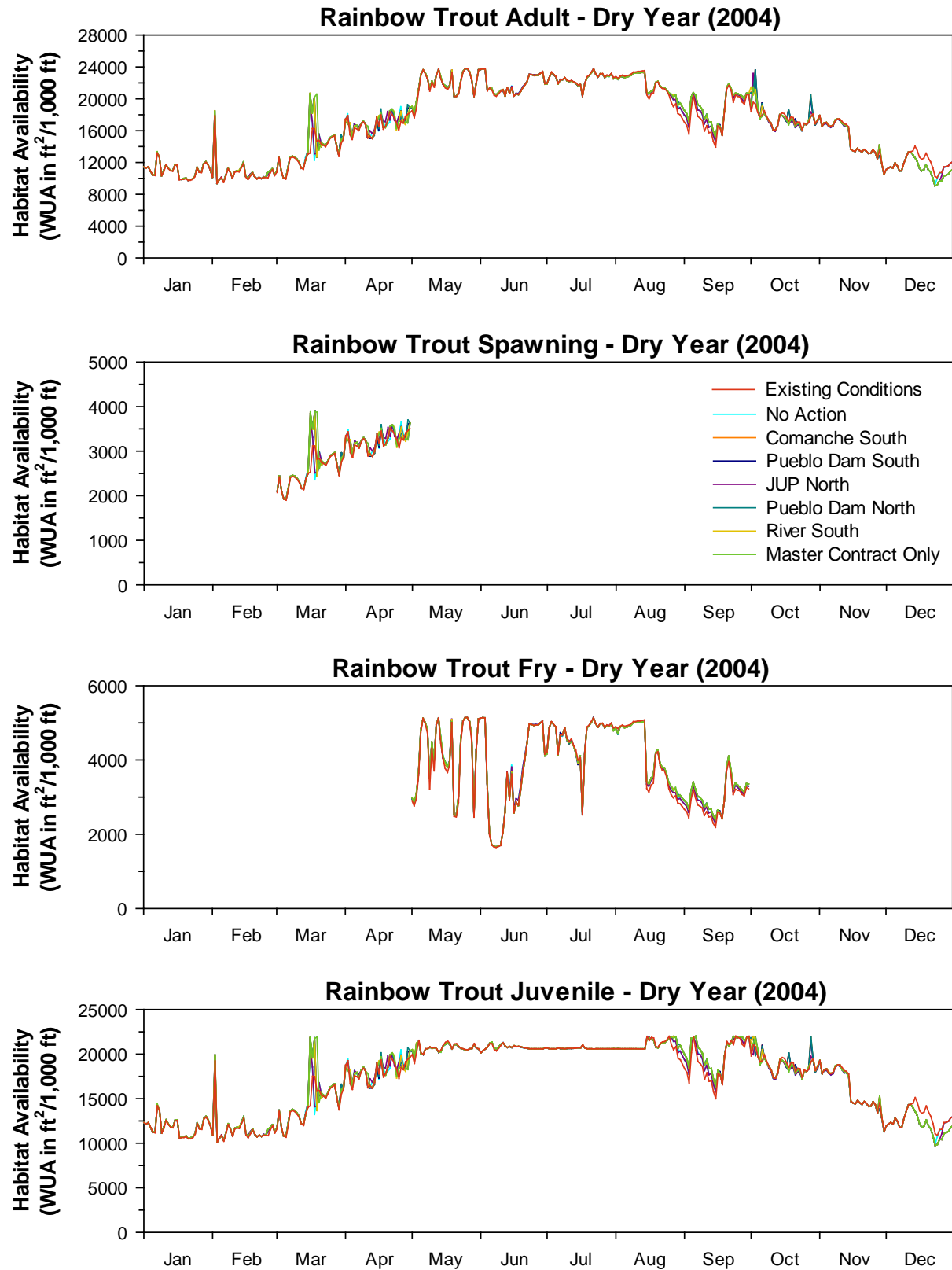


Figure 19. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 2 of the Upper Arkansas River

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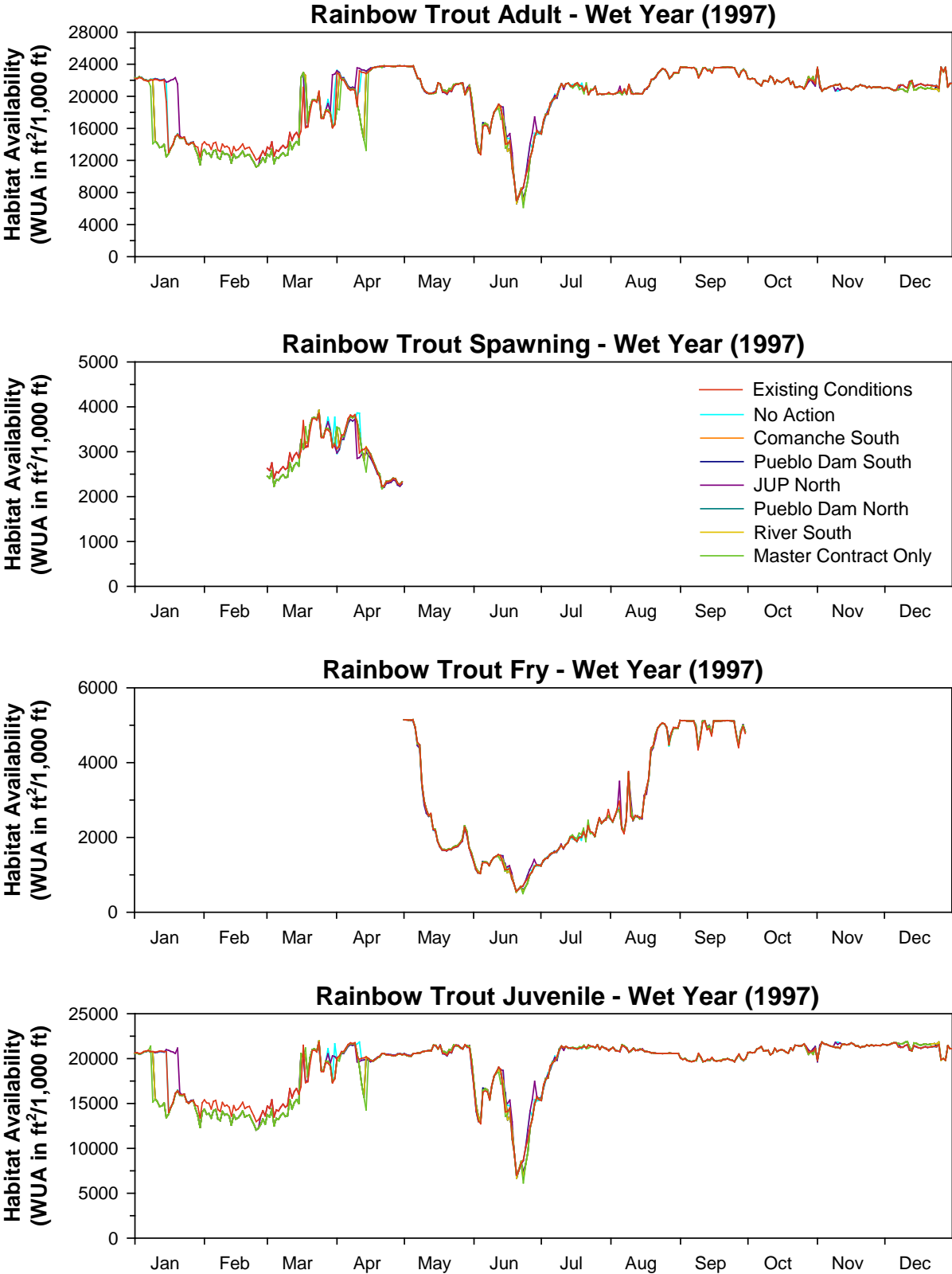
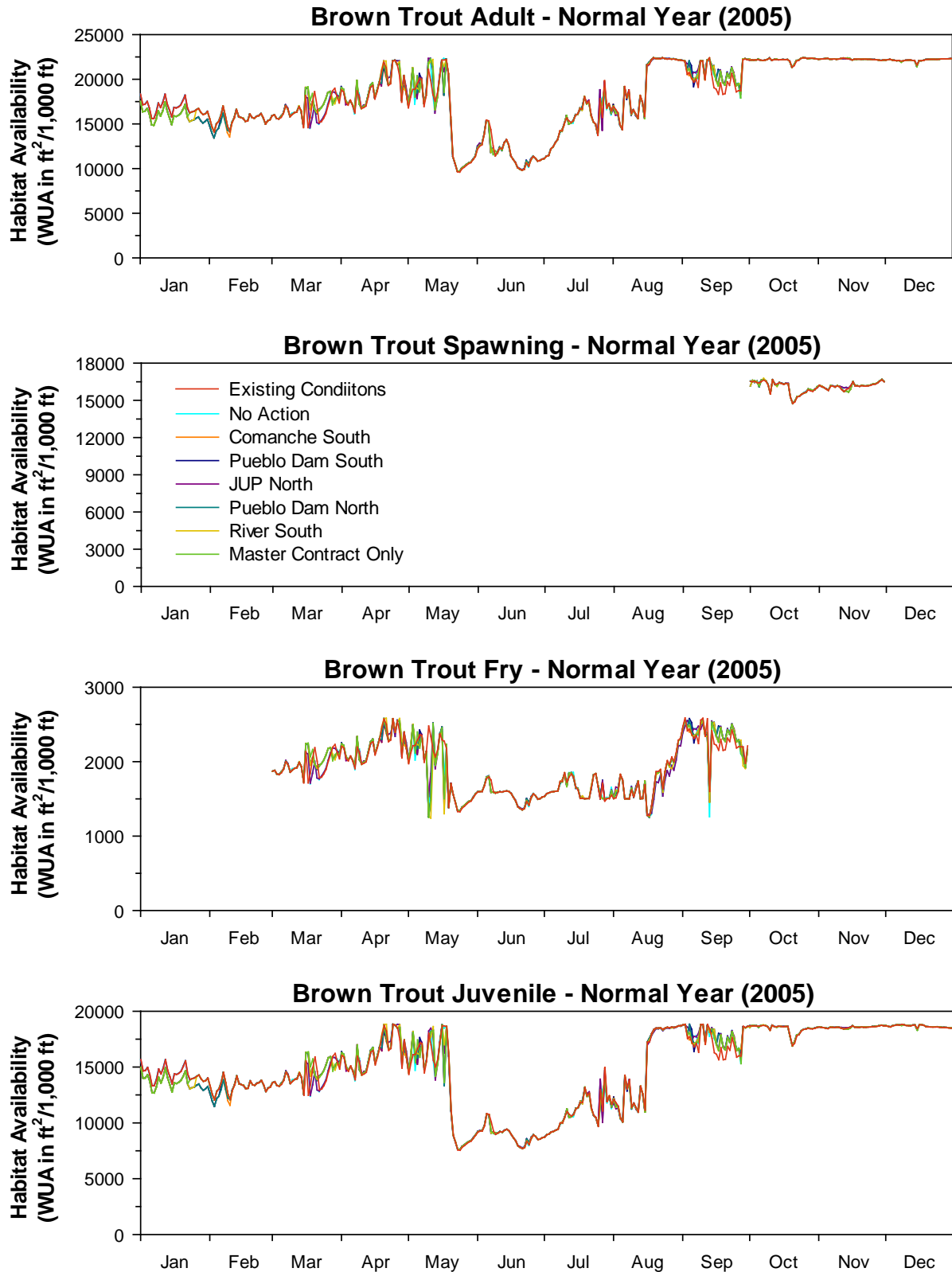


Figure 20. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 2 of the Upper Arkansas River

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**Figure 21. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of the Upper Arkansas River**

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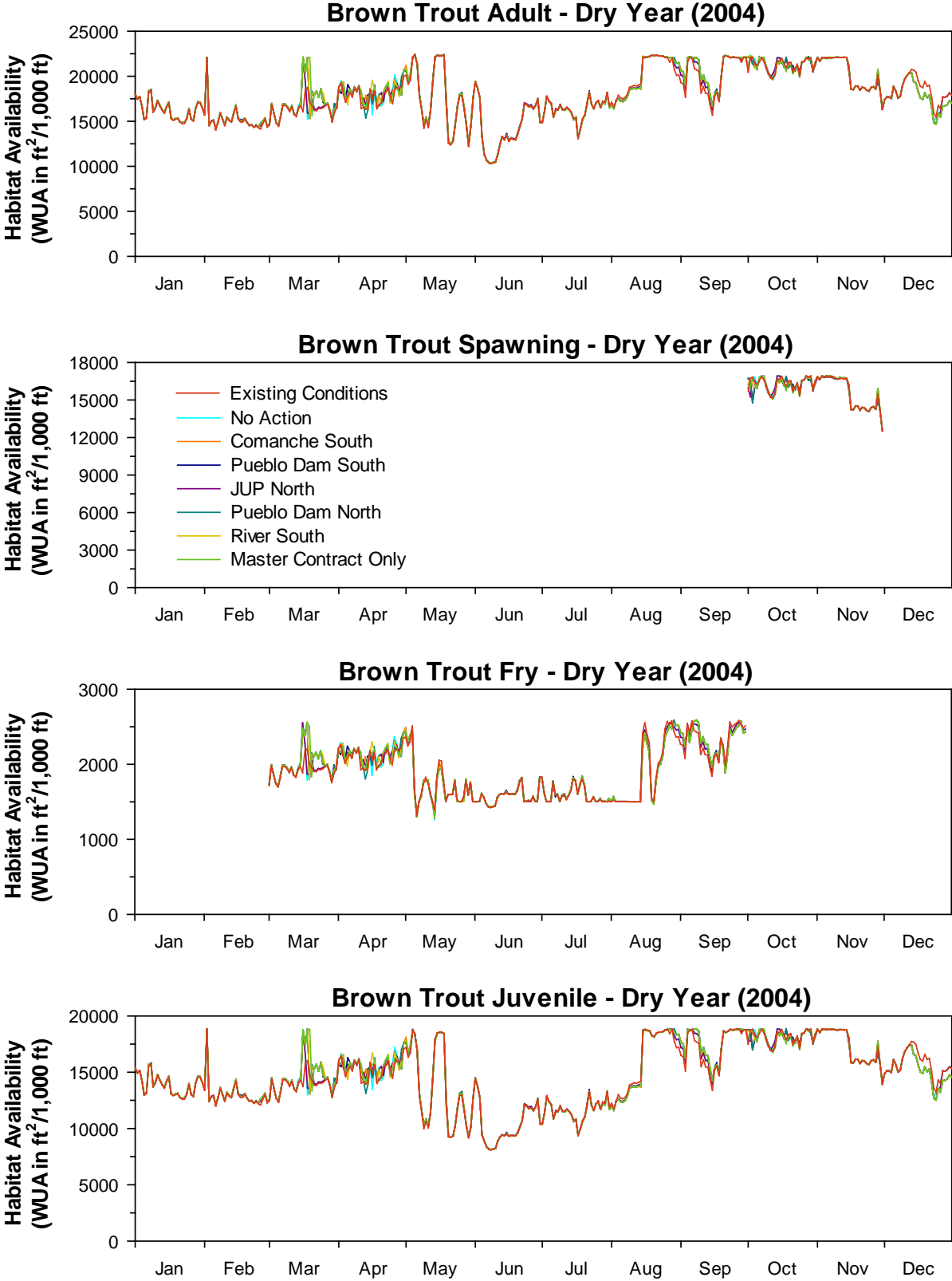
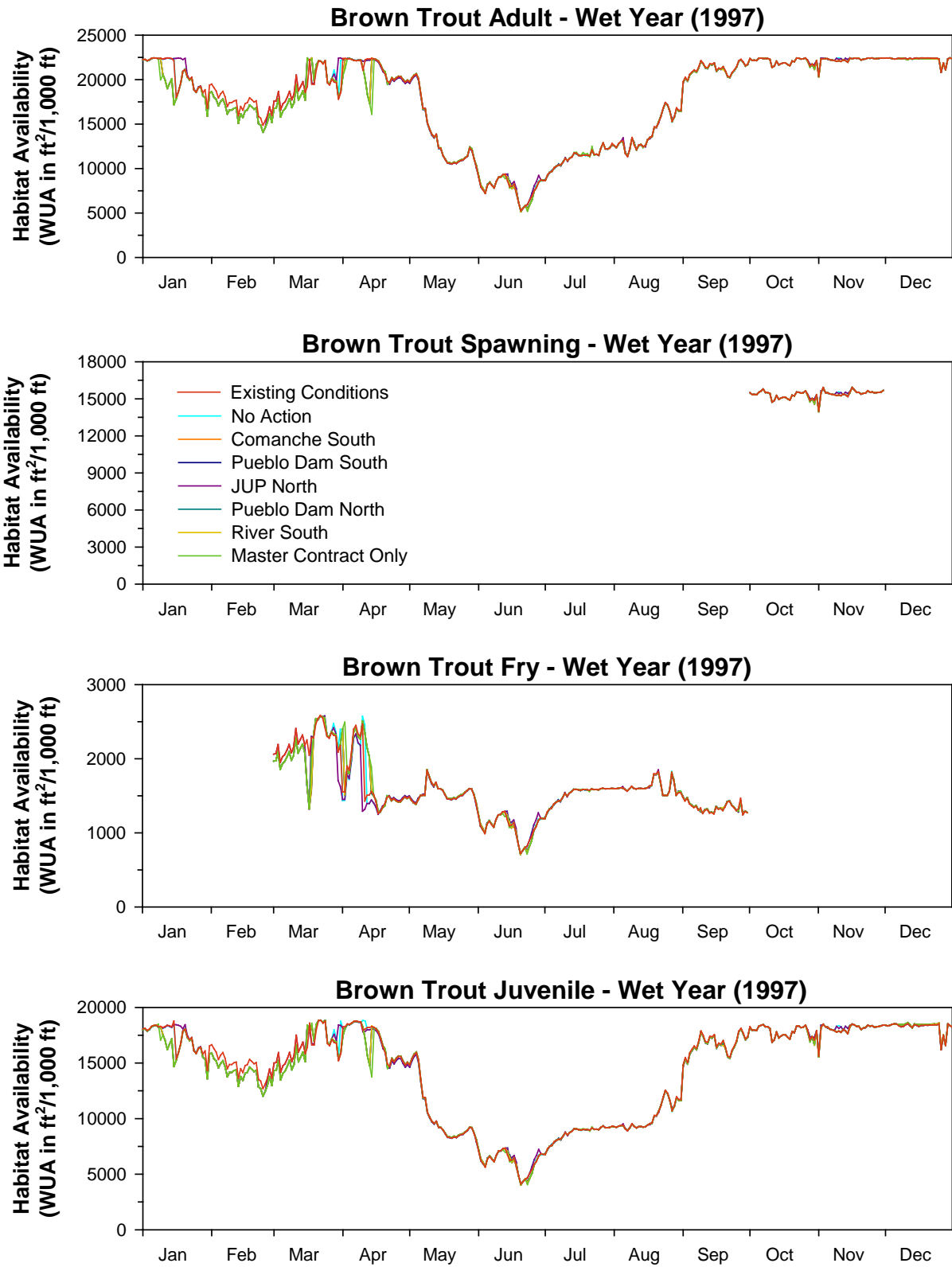


Figure 22. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of the Upper Arkansas River

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**Figure 23. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of the Upper Arkansas River**

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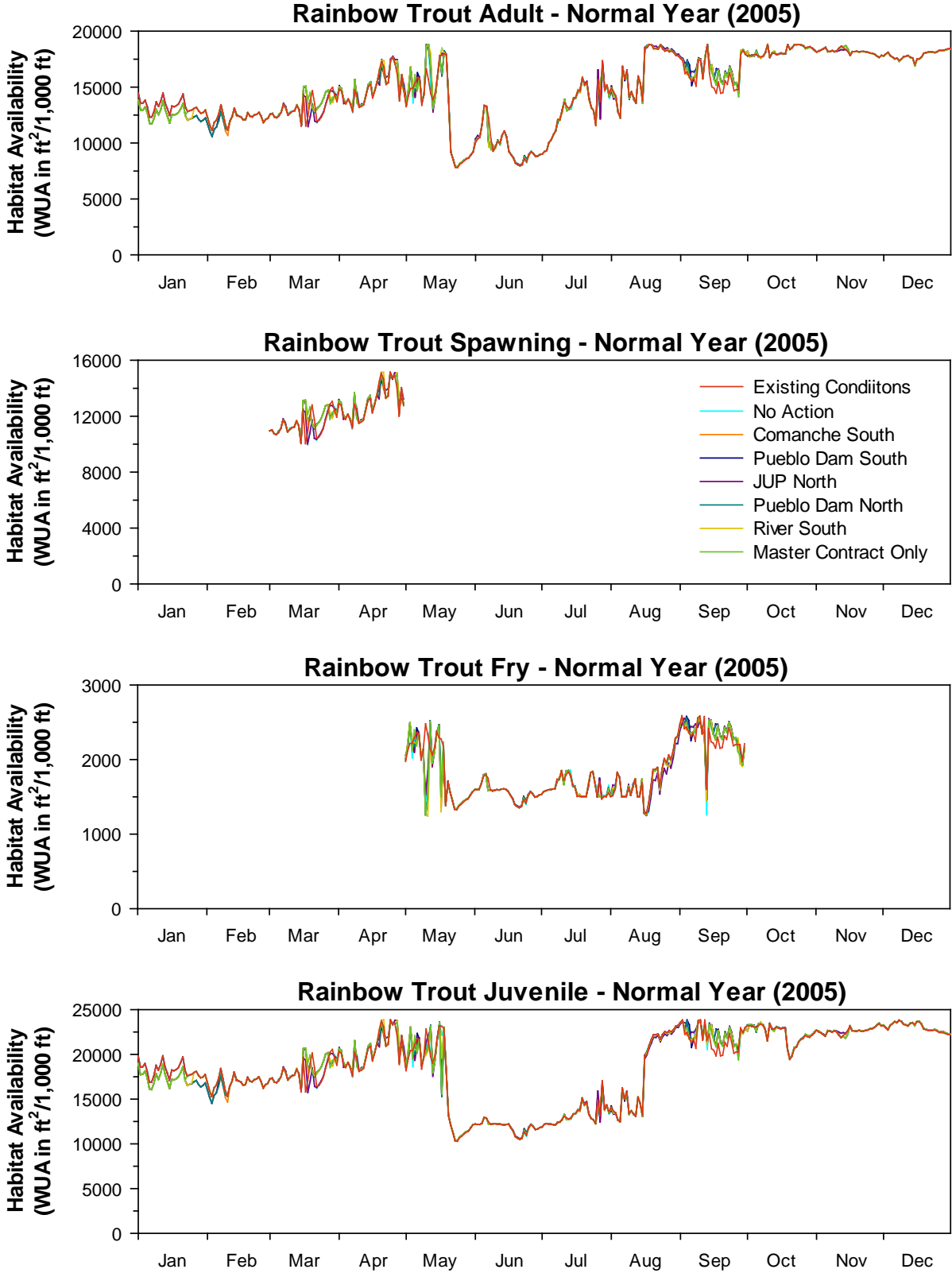
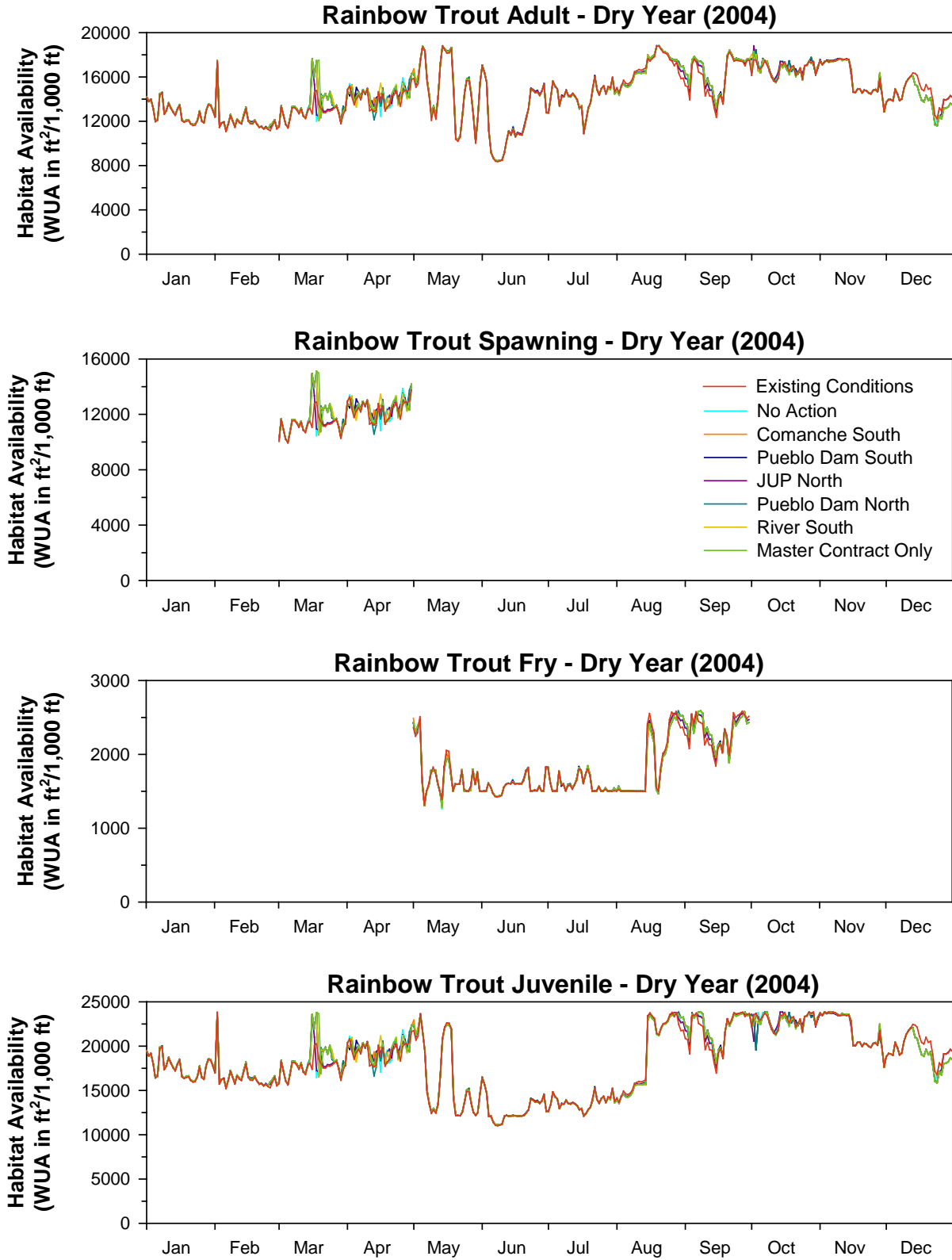


Figure 24. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of the Upper Arkansas River

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**Figure 25. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of the Upper Arkansas River**



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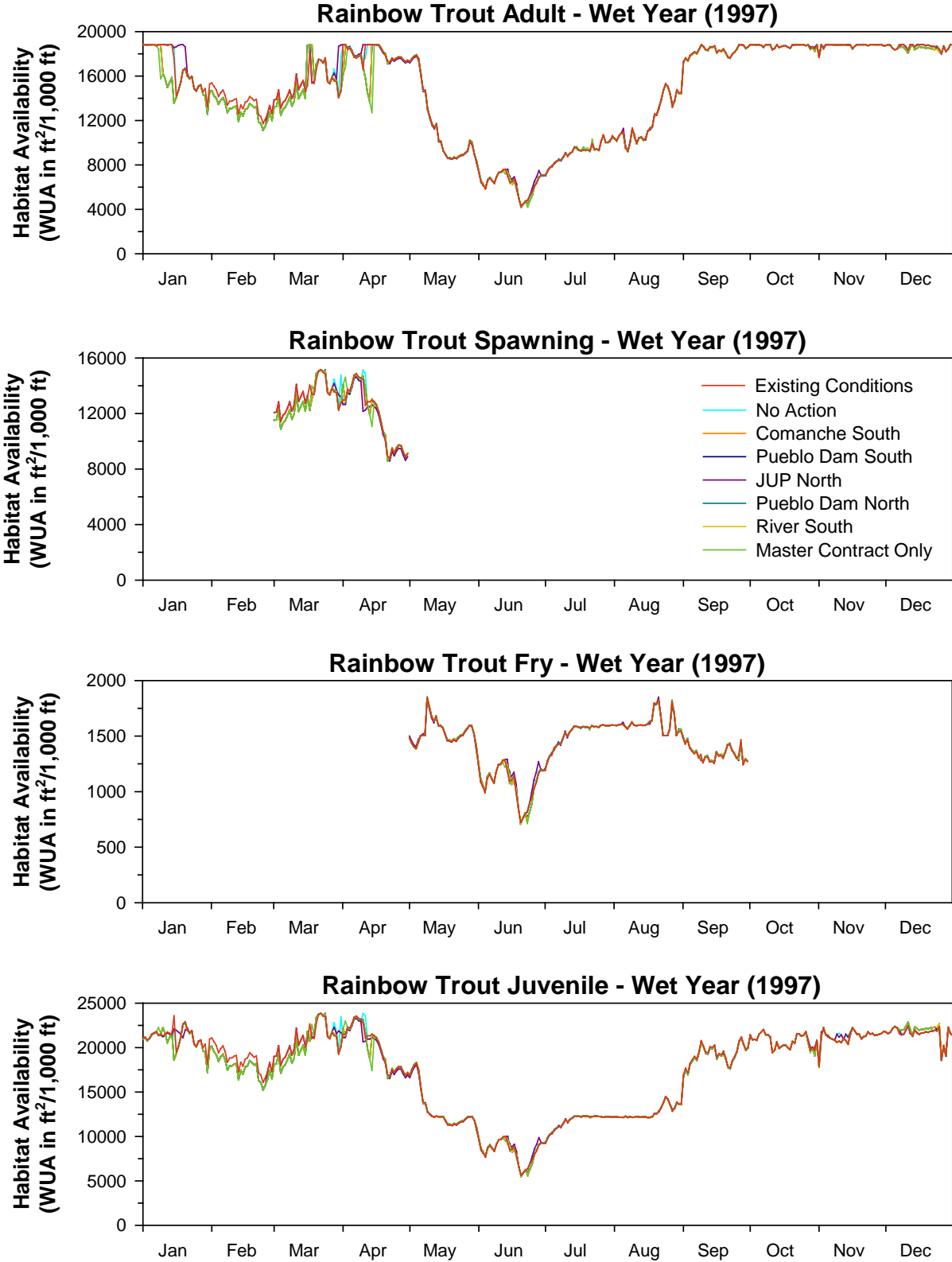
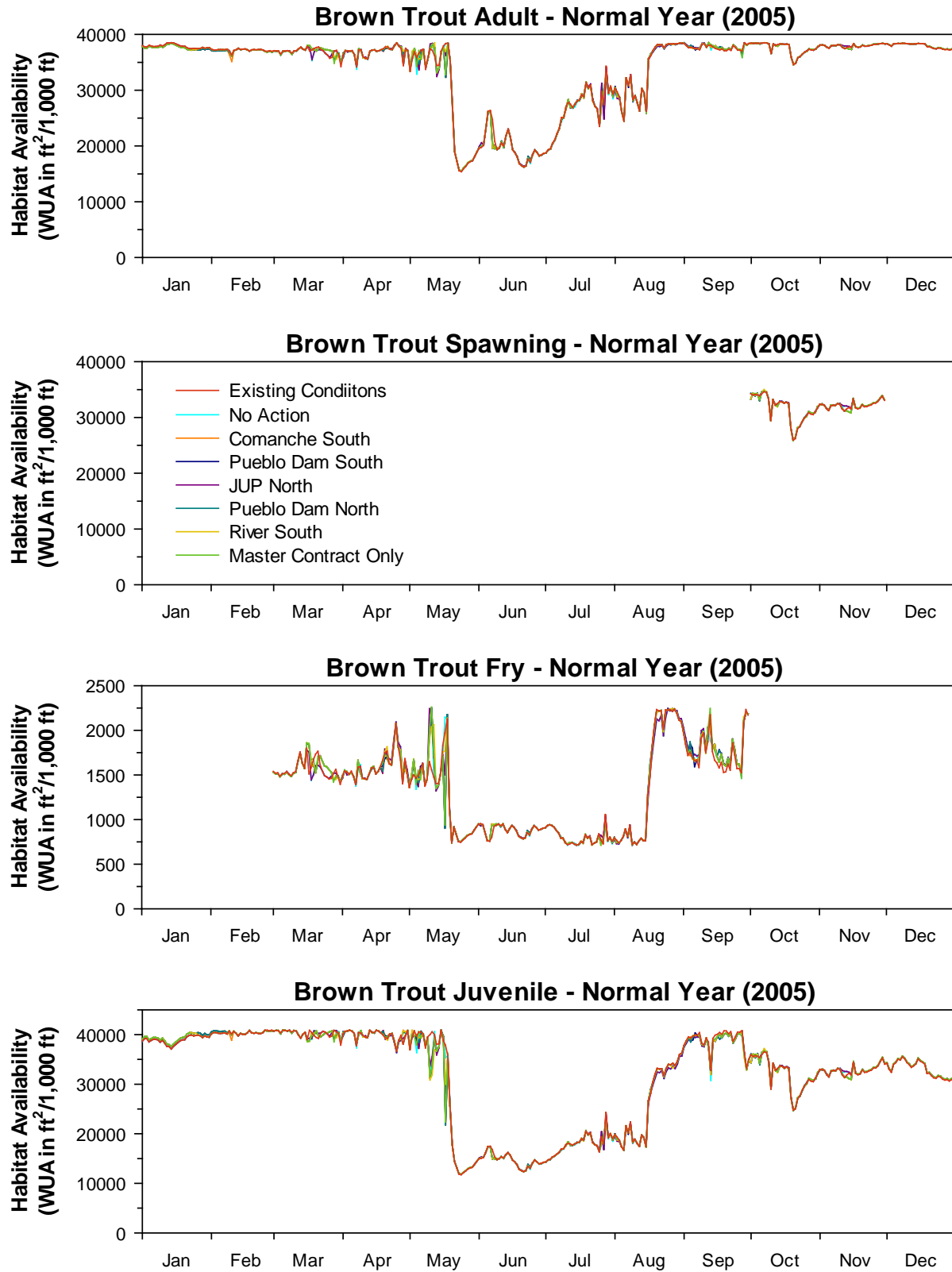


Figure 26. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of the Upper Arkansas River

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**Figure 27. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 4 of the Upper Arkansas River**

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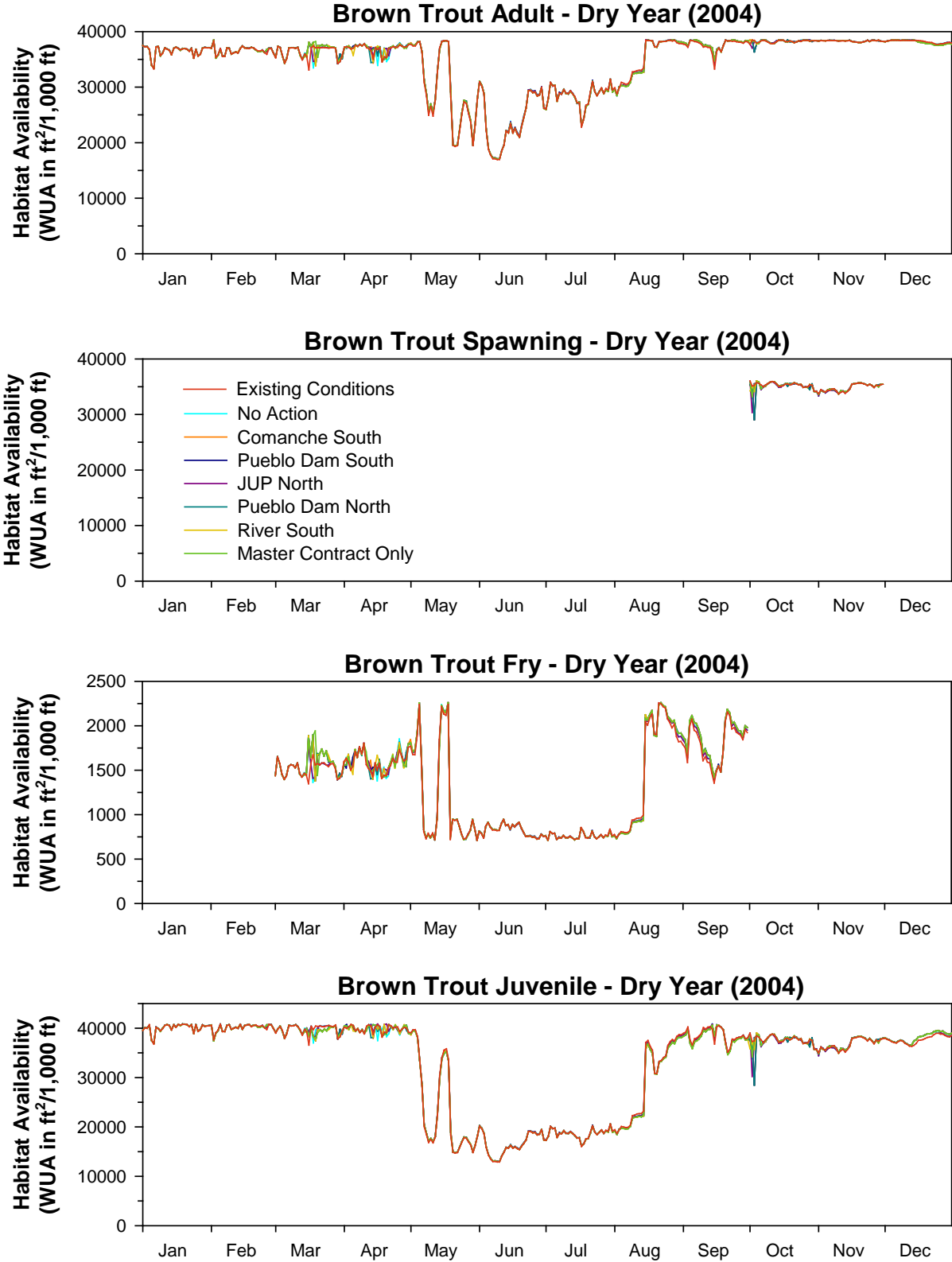
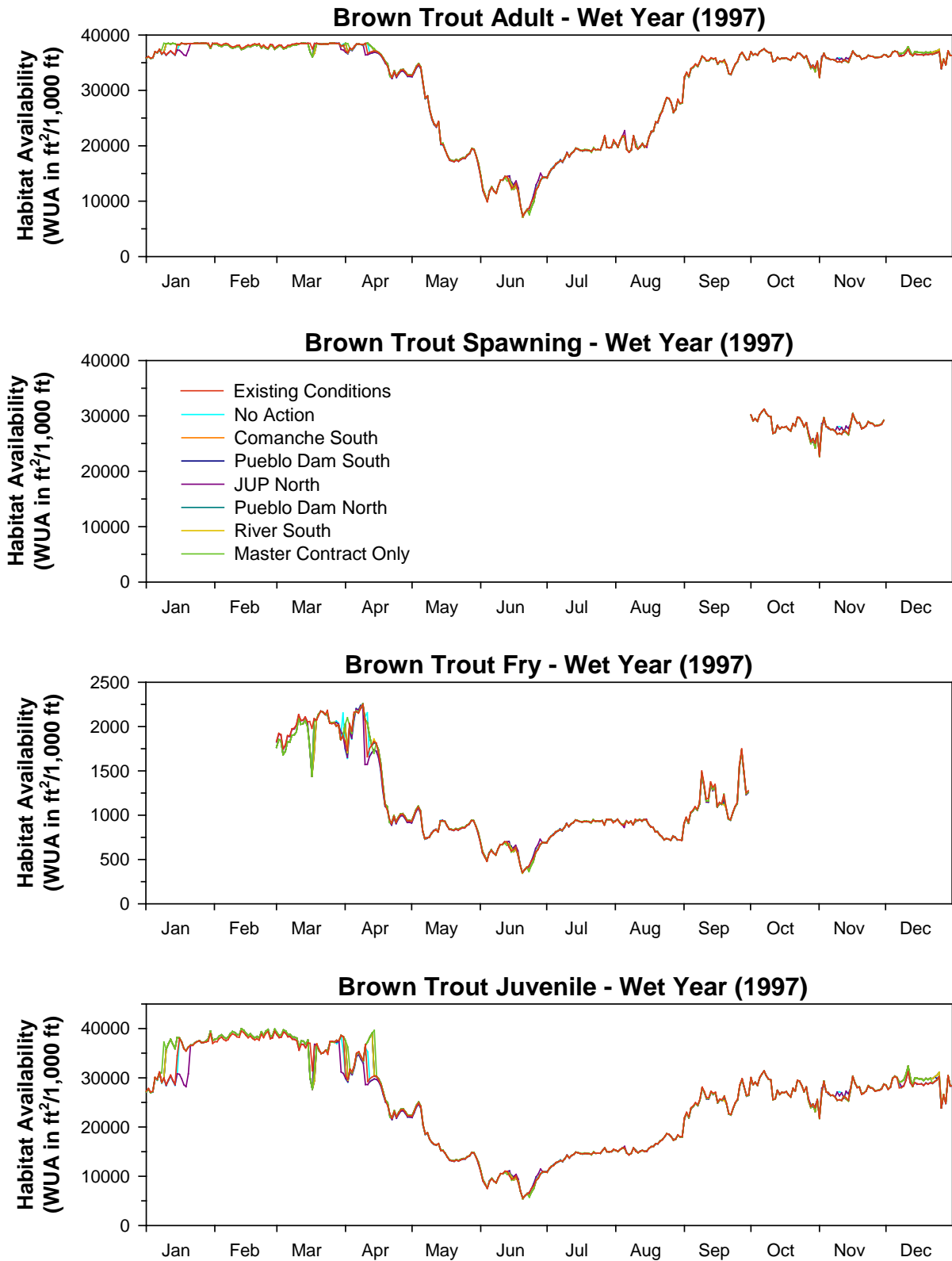


Figure 28. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 4 of the Upper Arkansas River

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**Figure 29. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 4 of the Upper Arkansas River**

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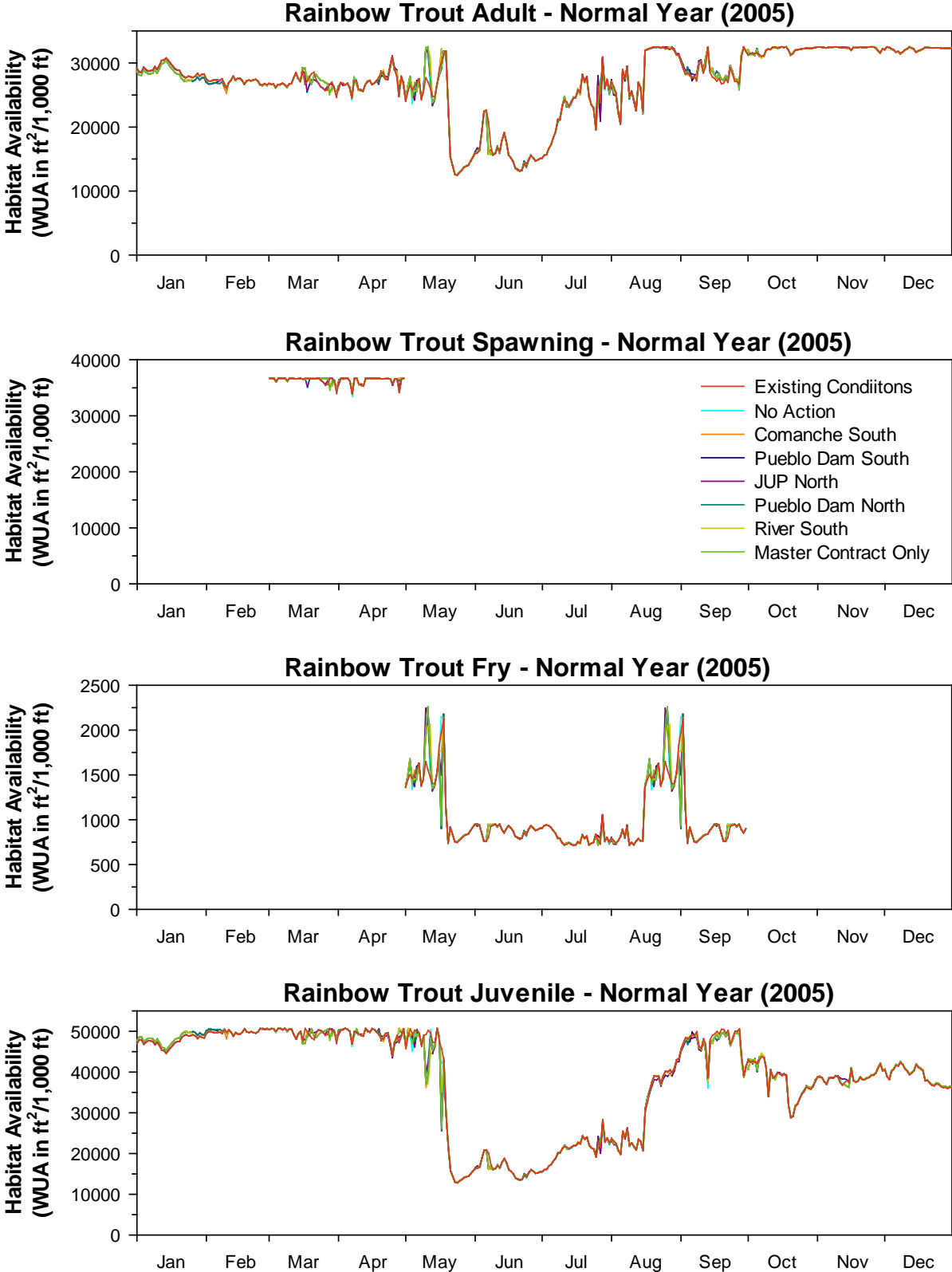


Figure 30. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 4 of the Upper Arkansas River

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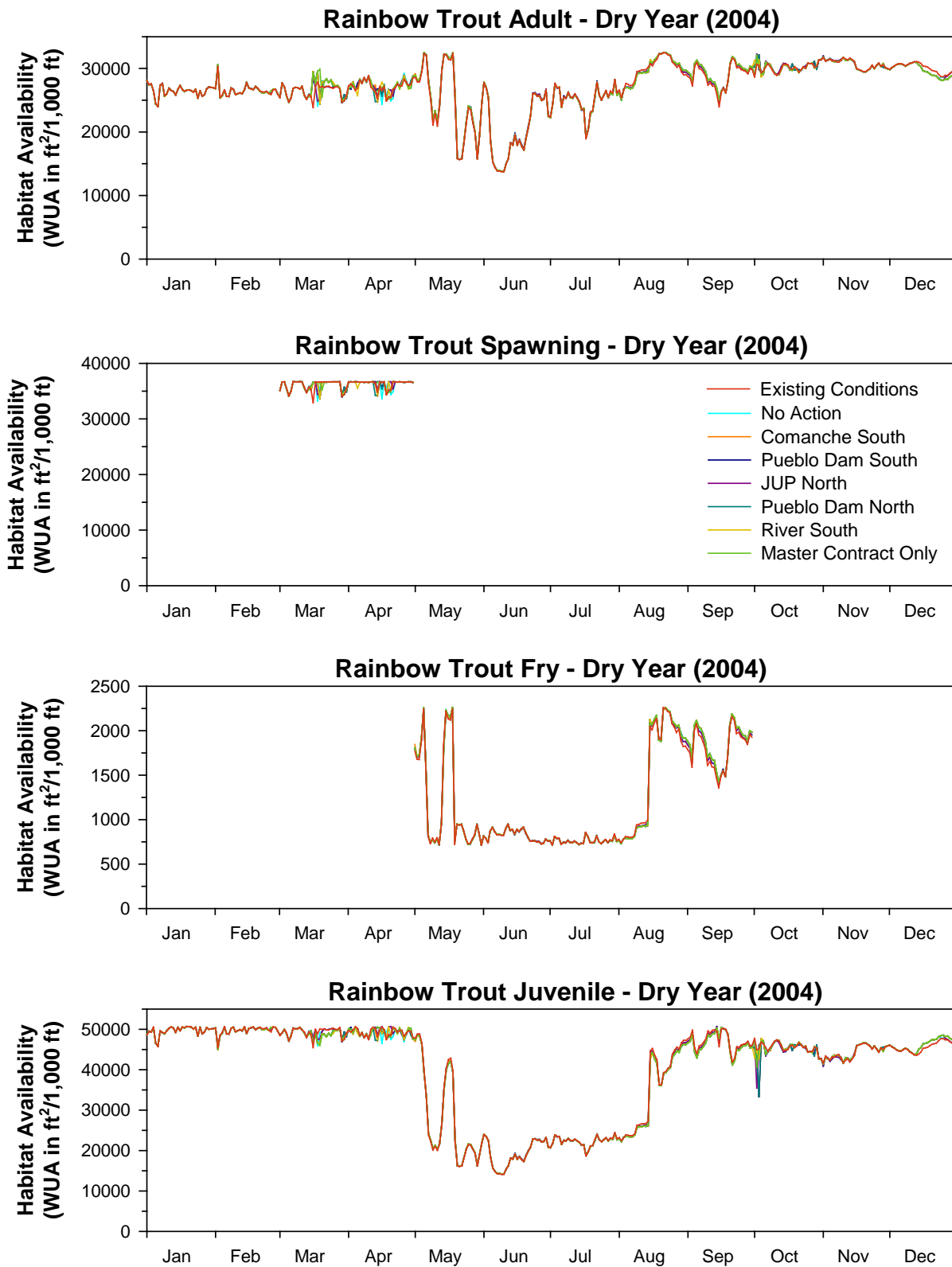


Figure 31. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 4 of the Upper Arkansas River

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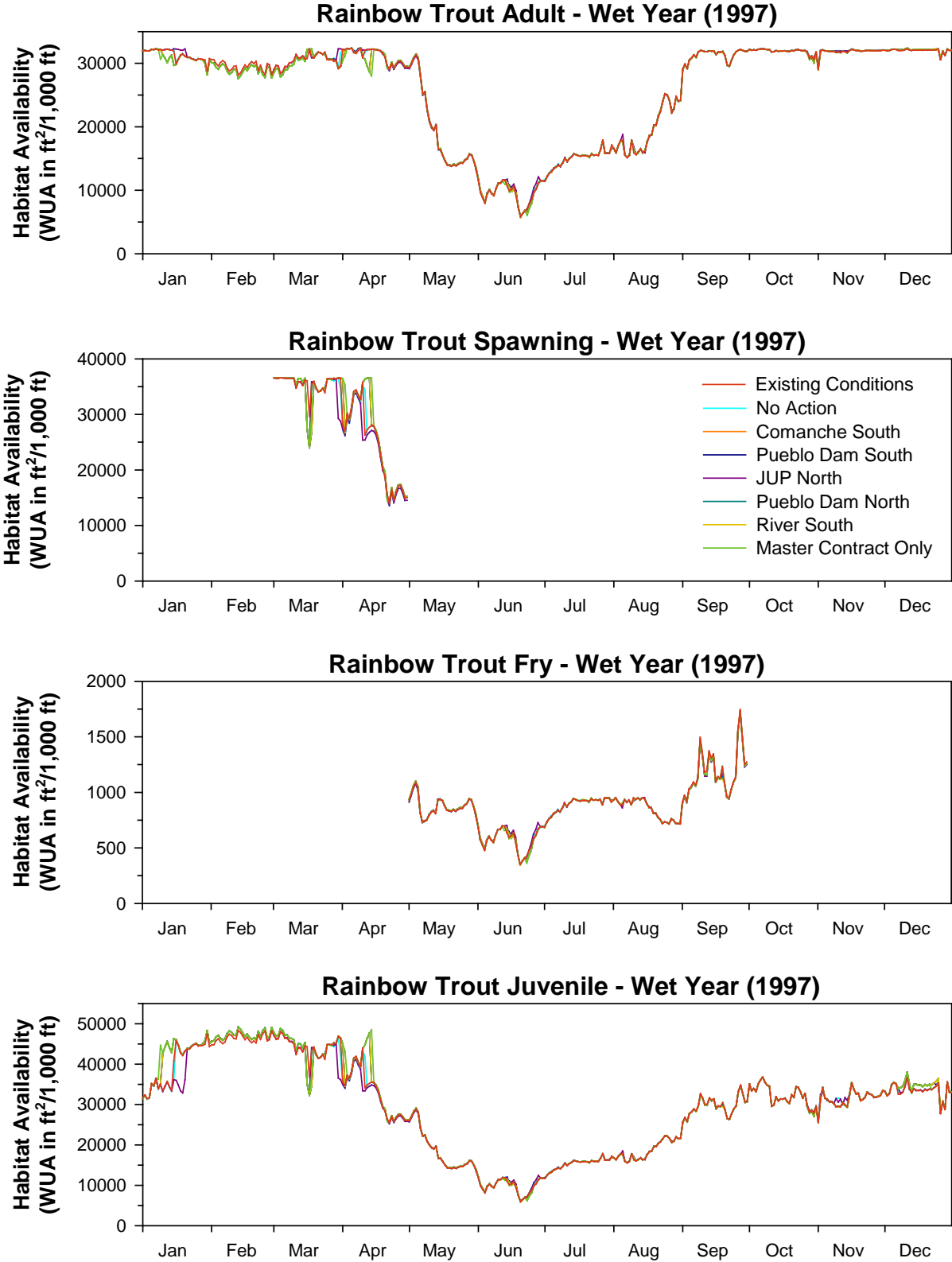
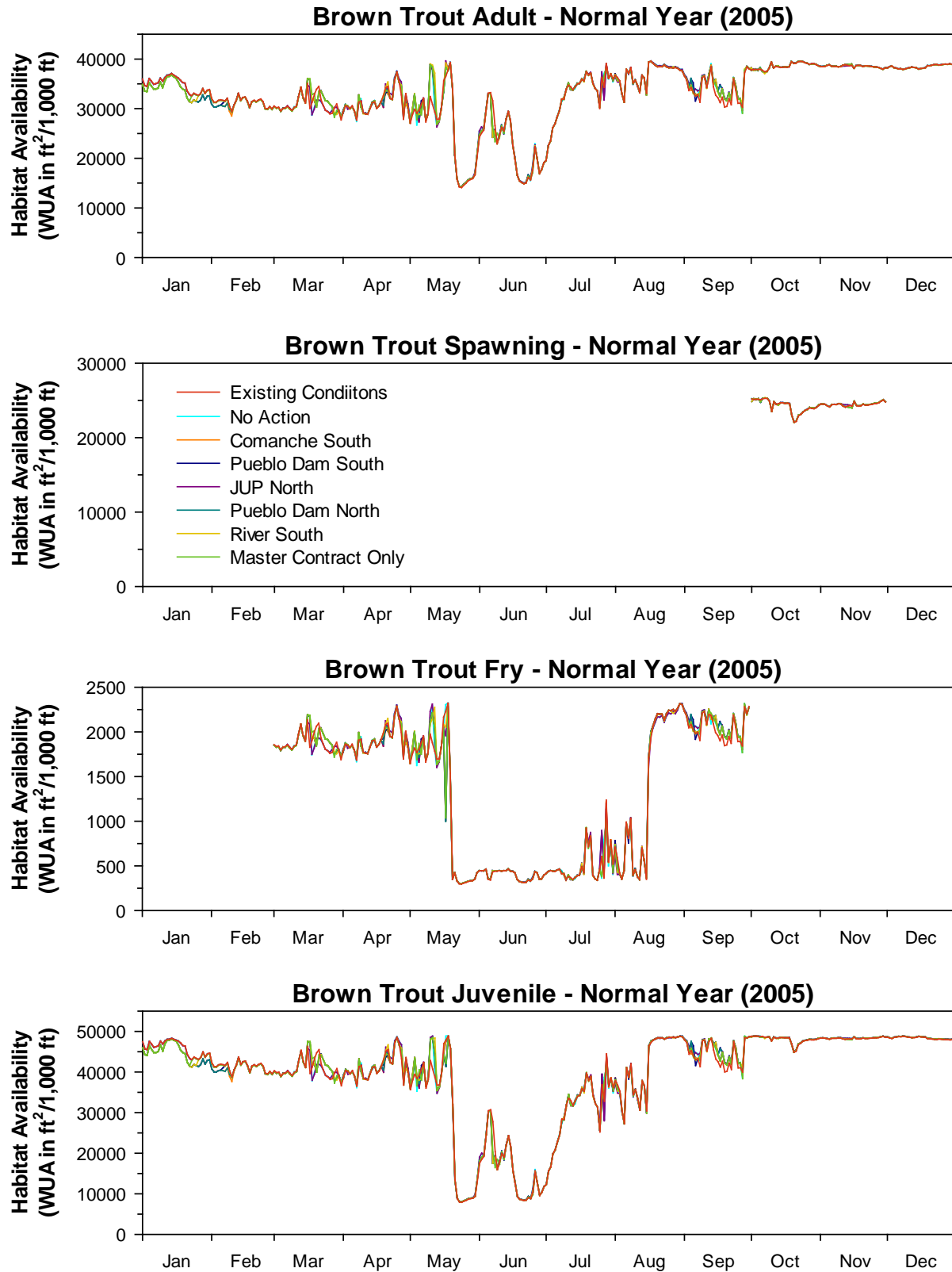


Figure 32. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 4 of the Upper Arkansas River

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**Figure 33. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 5 of the Upper Arkansas River**



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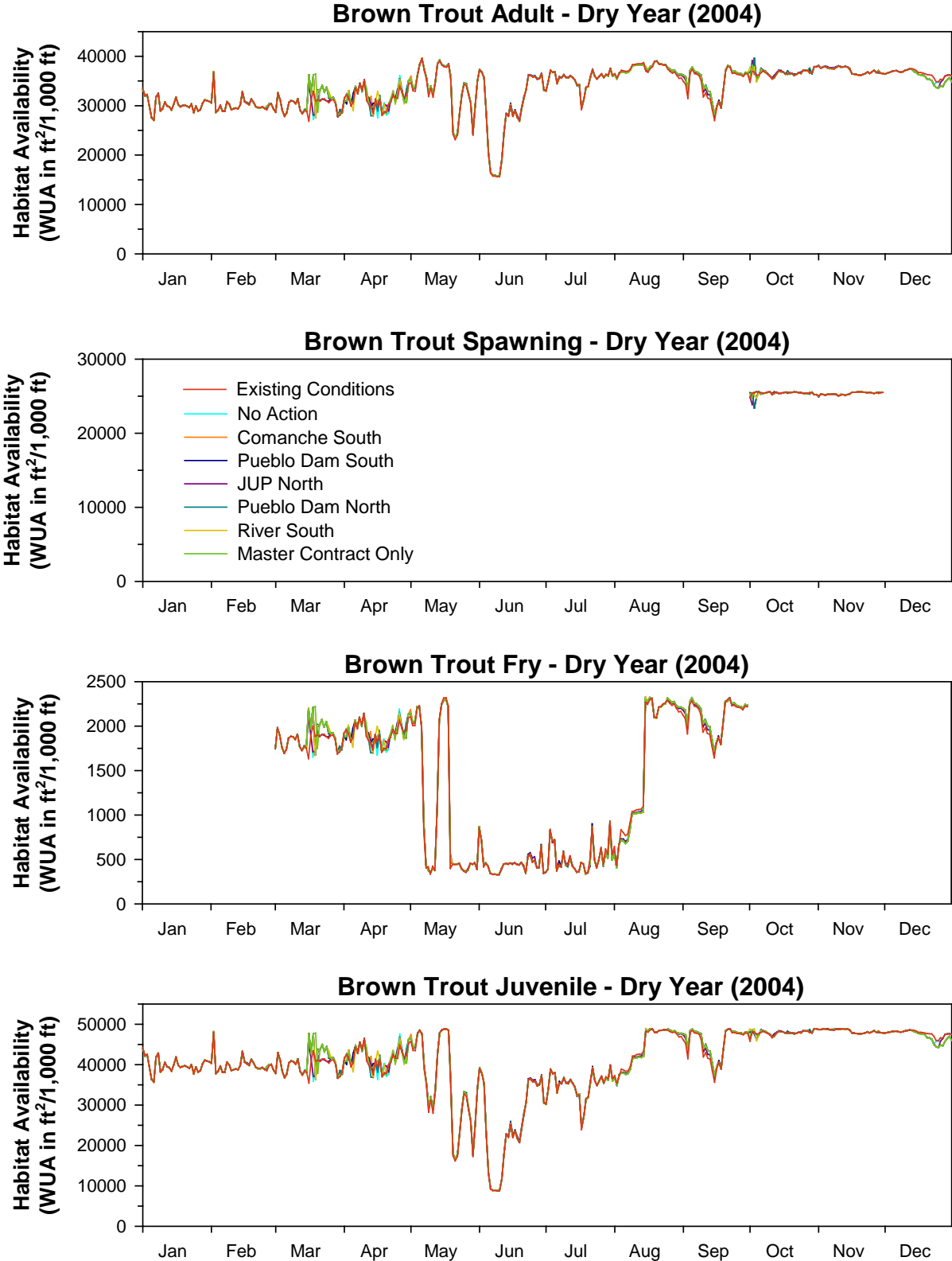
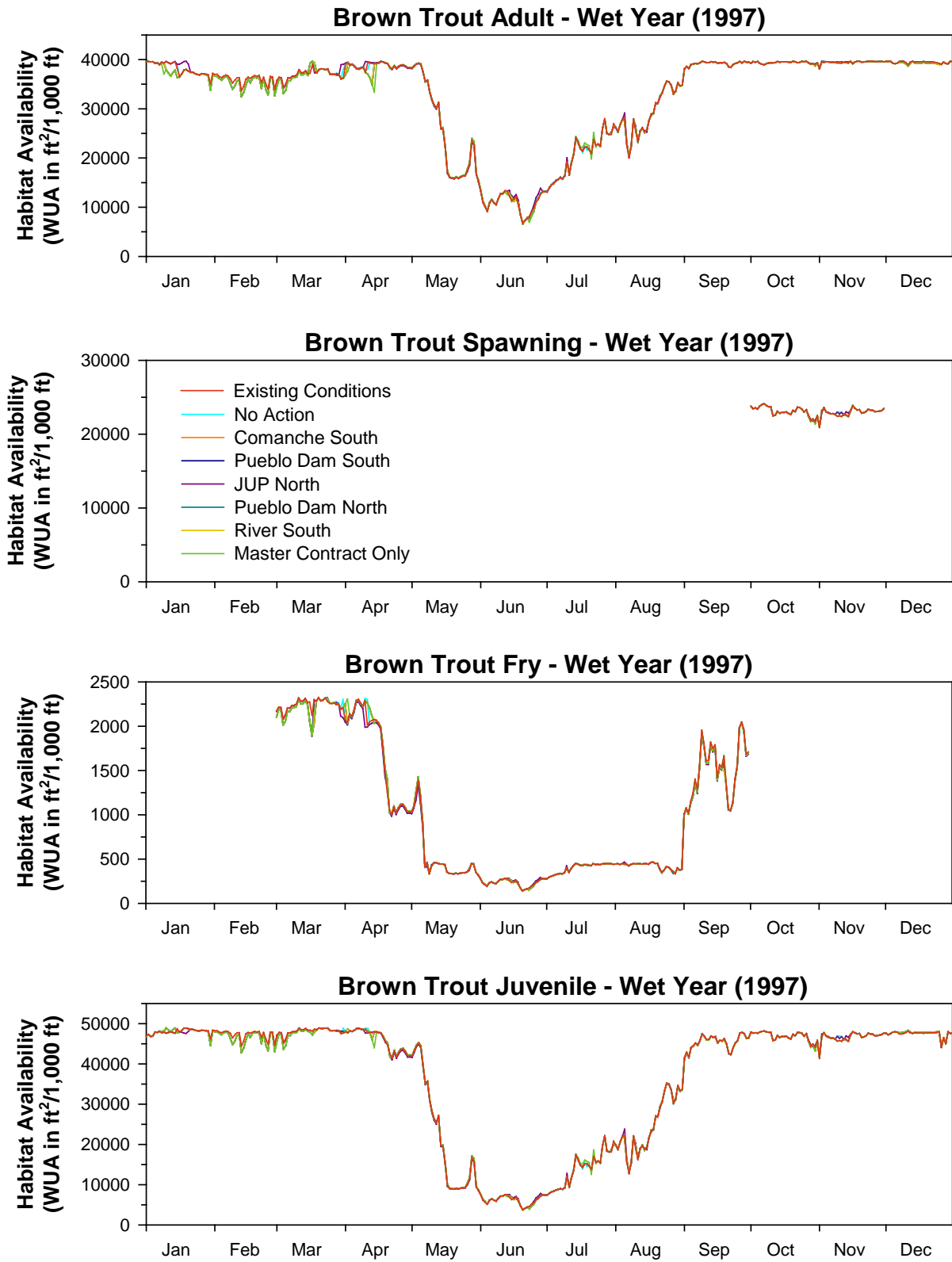


Figure 34. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ $\text{ft}^2/1,000\text{ft}$ ]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 5 of the Upper Arkansas River

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**Figure 35. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 5 of the Upper Arkansas River**

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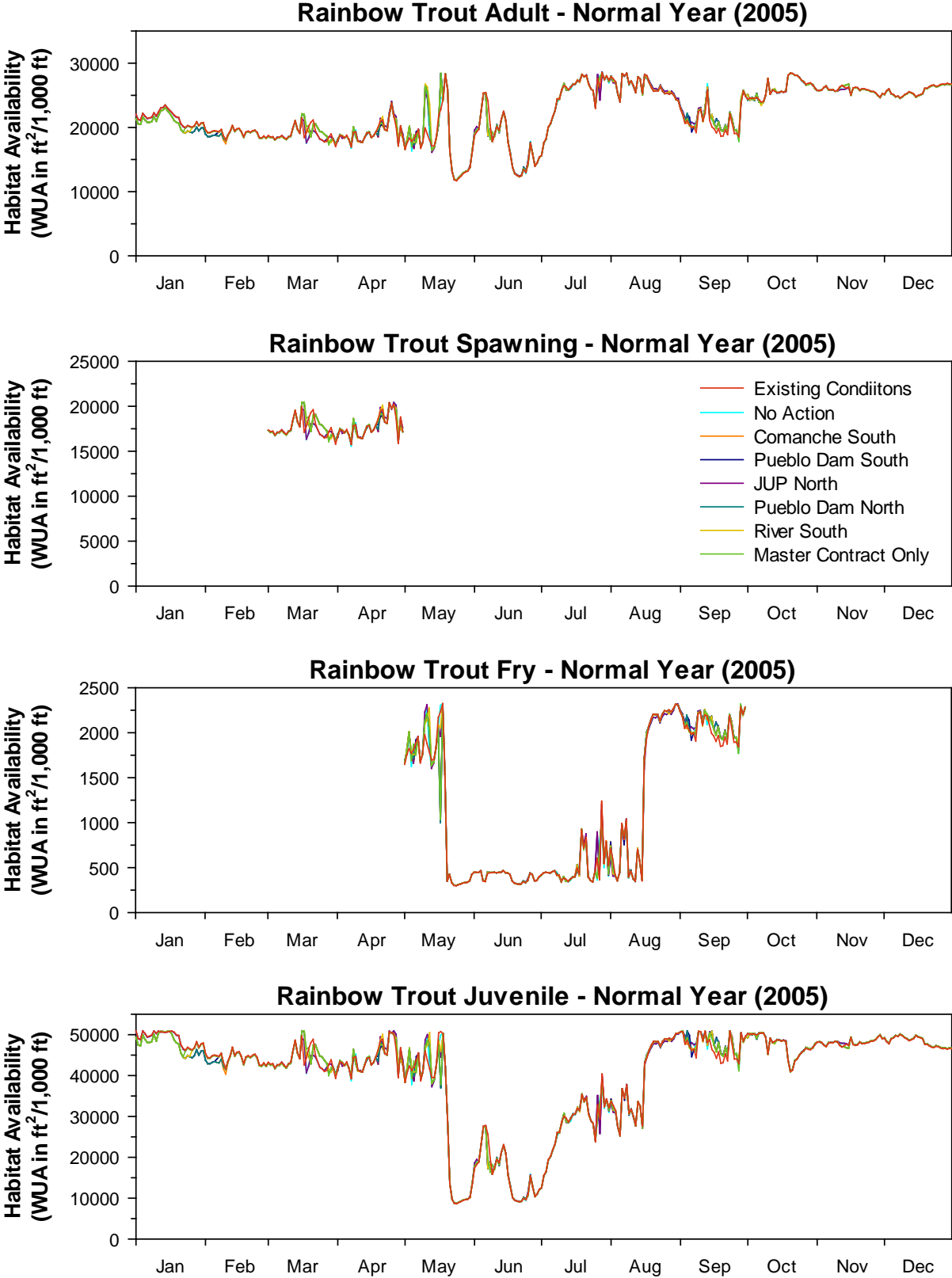
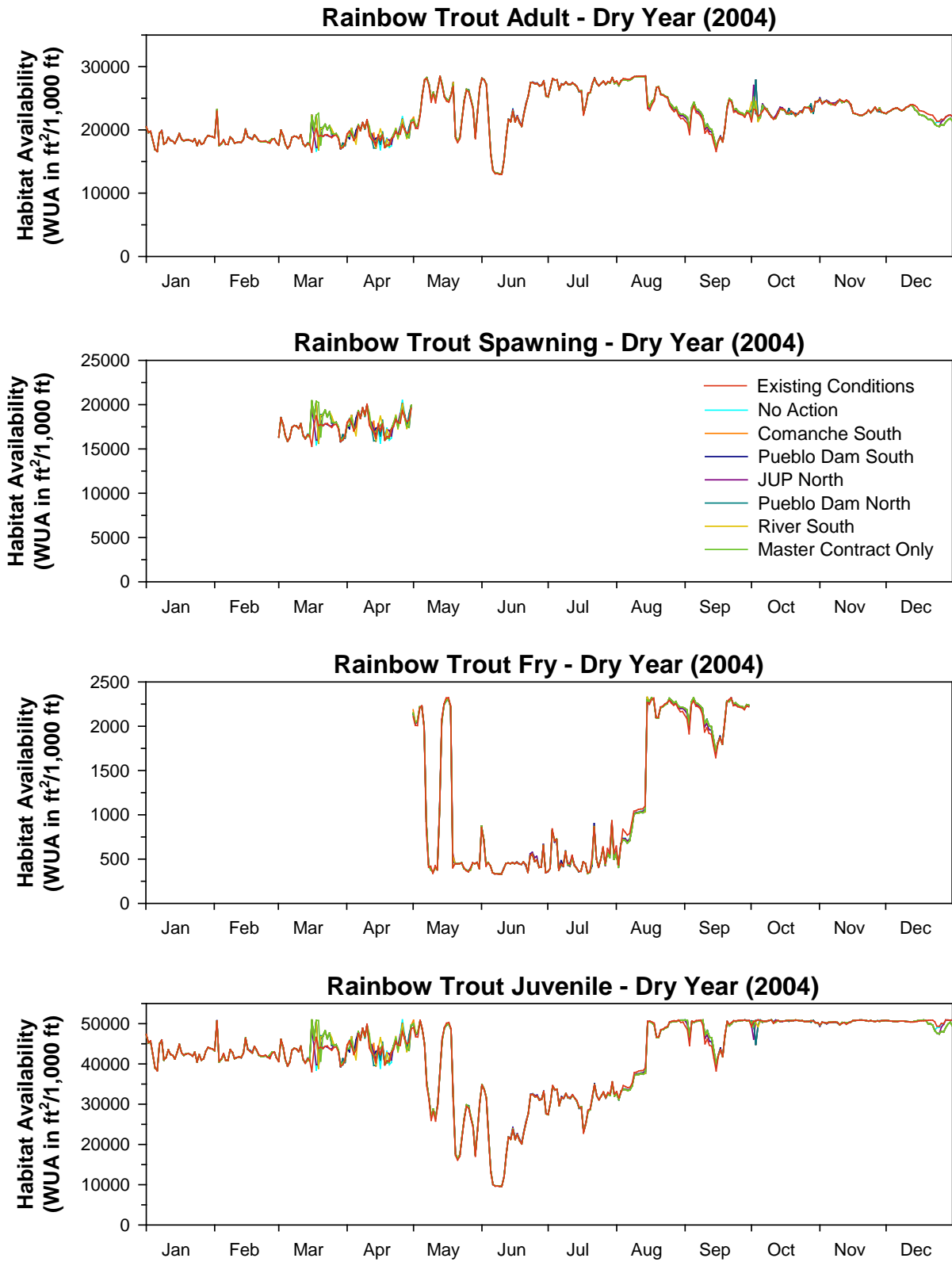


Figure 36. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 5 of the Upper Arkansas River

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**Figure 37. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 5 of the Upper Arkansas River**

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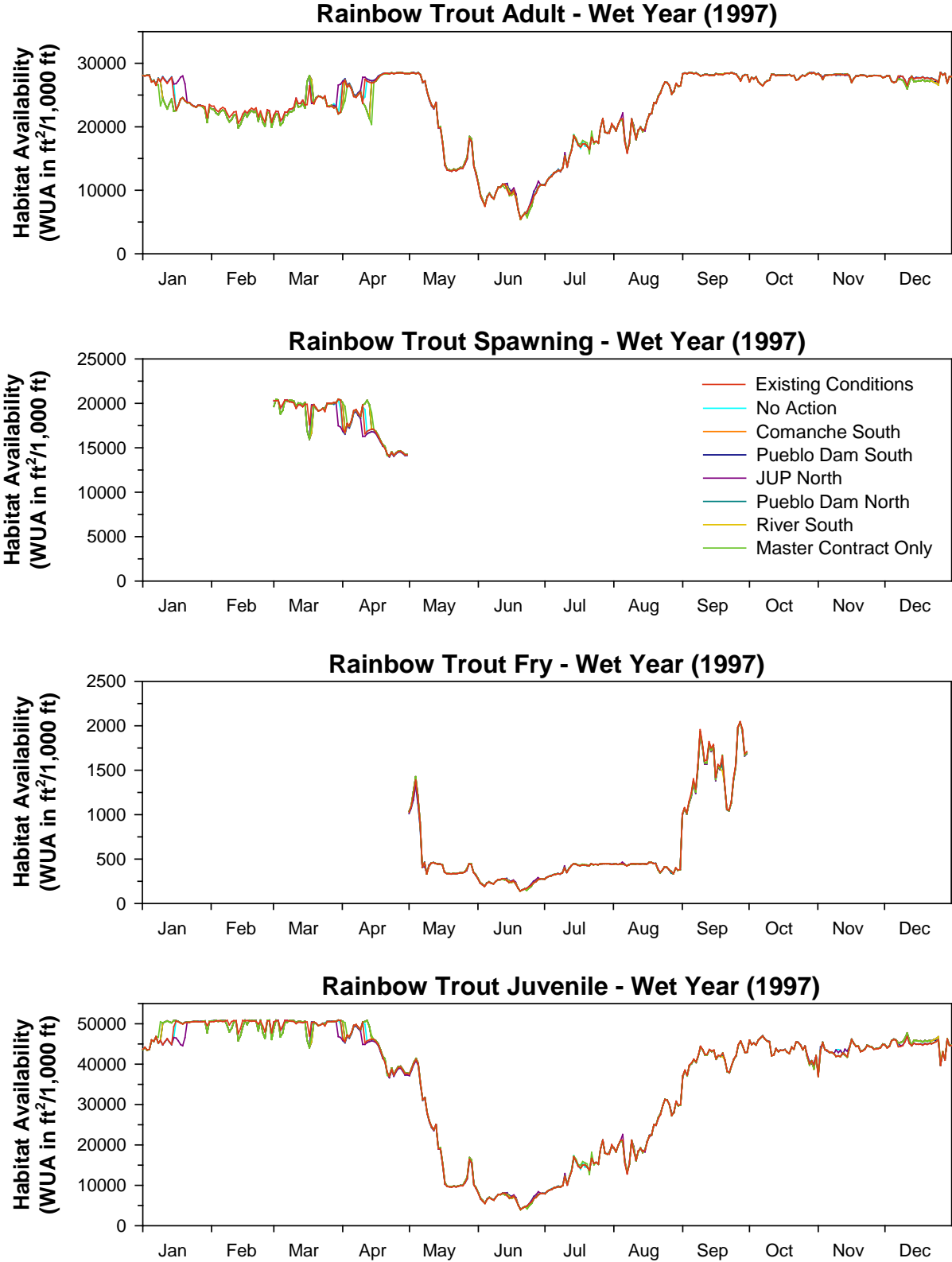
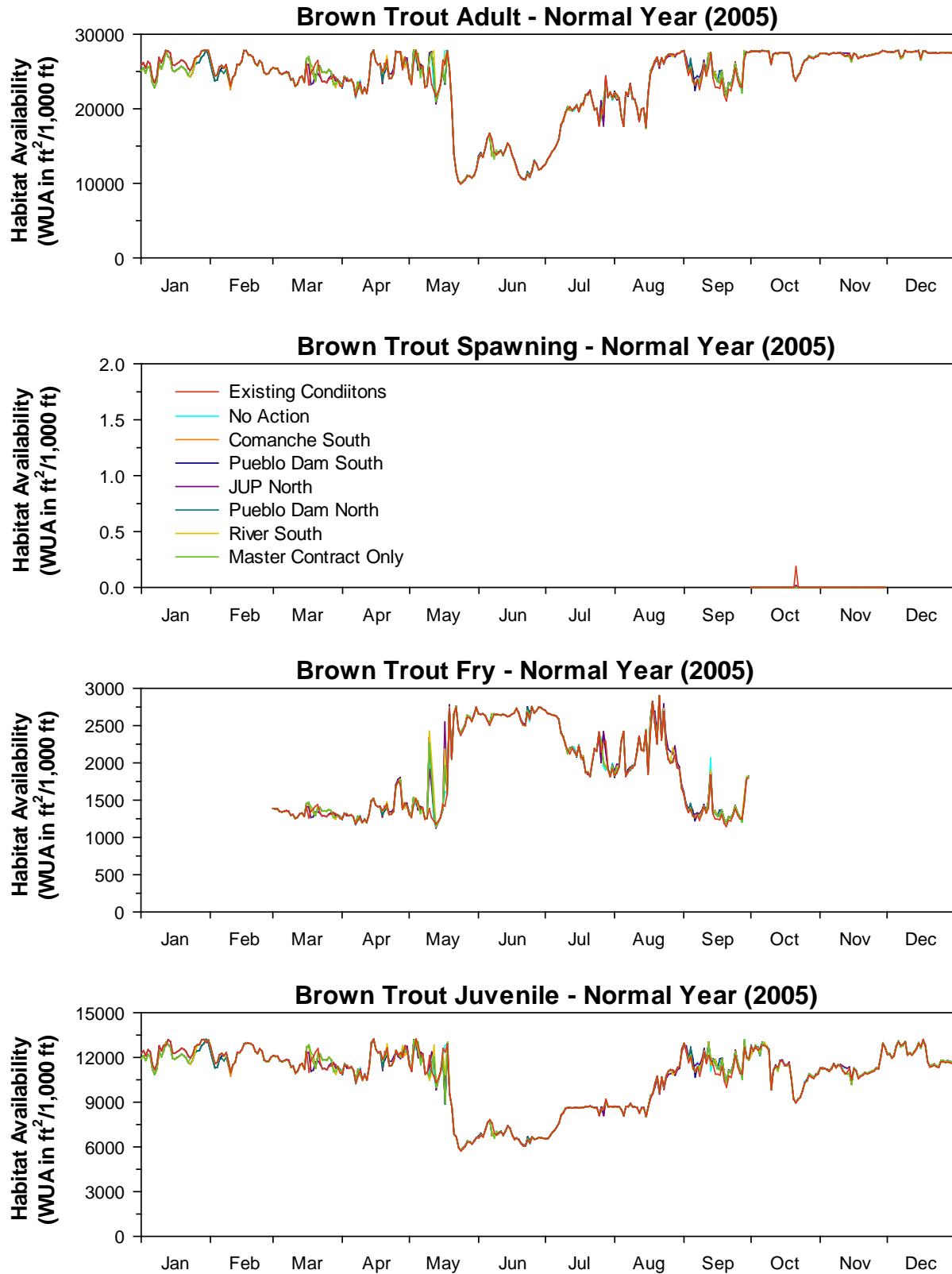


Figure 38. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 5 of the Upper Arkansas River

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**Figure 39. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 6 of the Upper Arkansas River**

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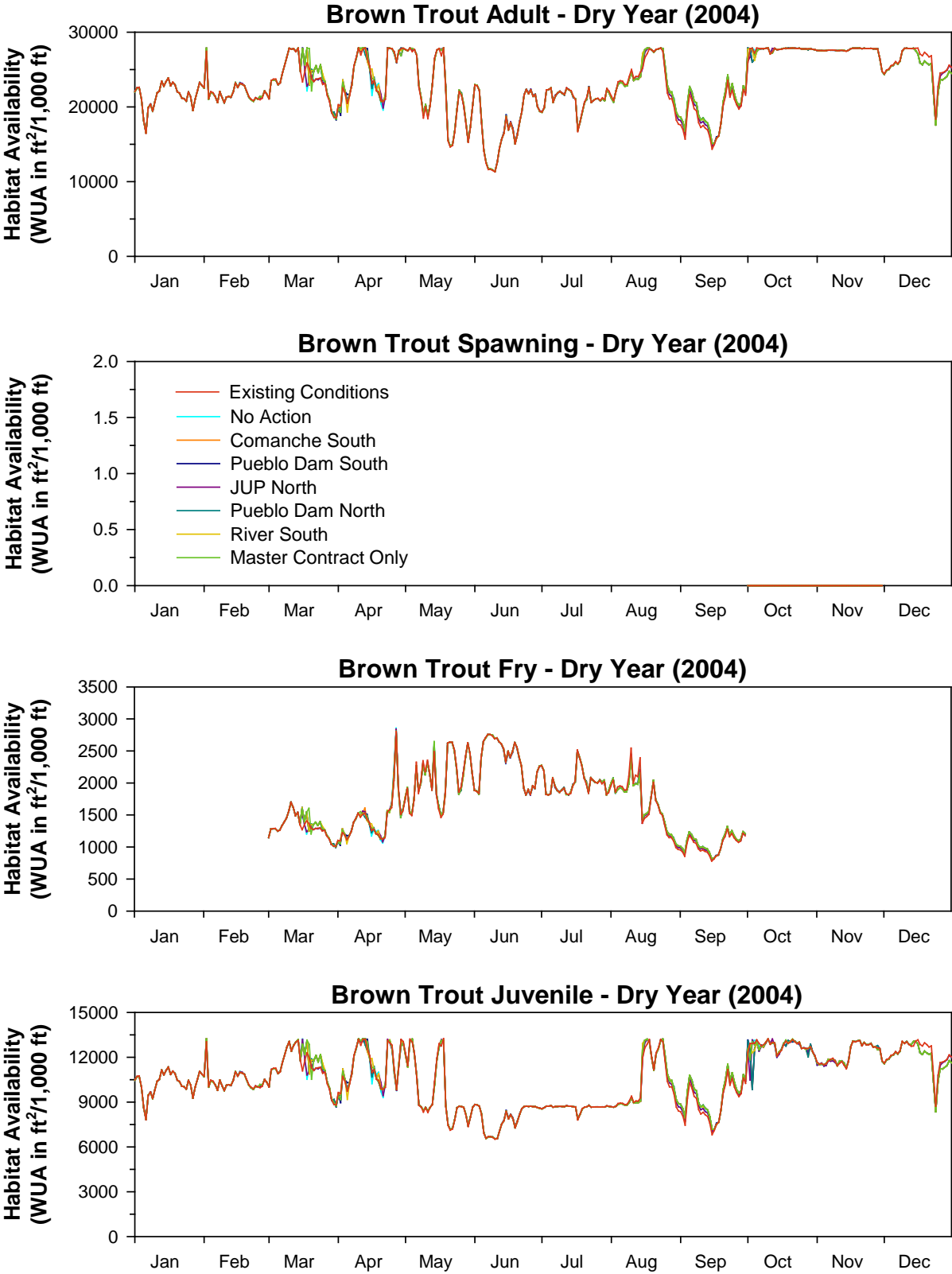
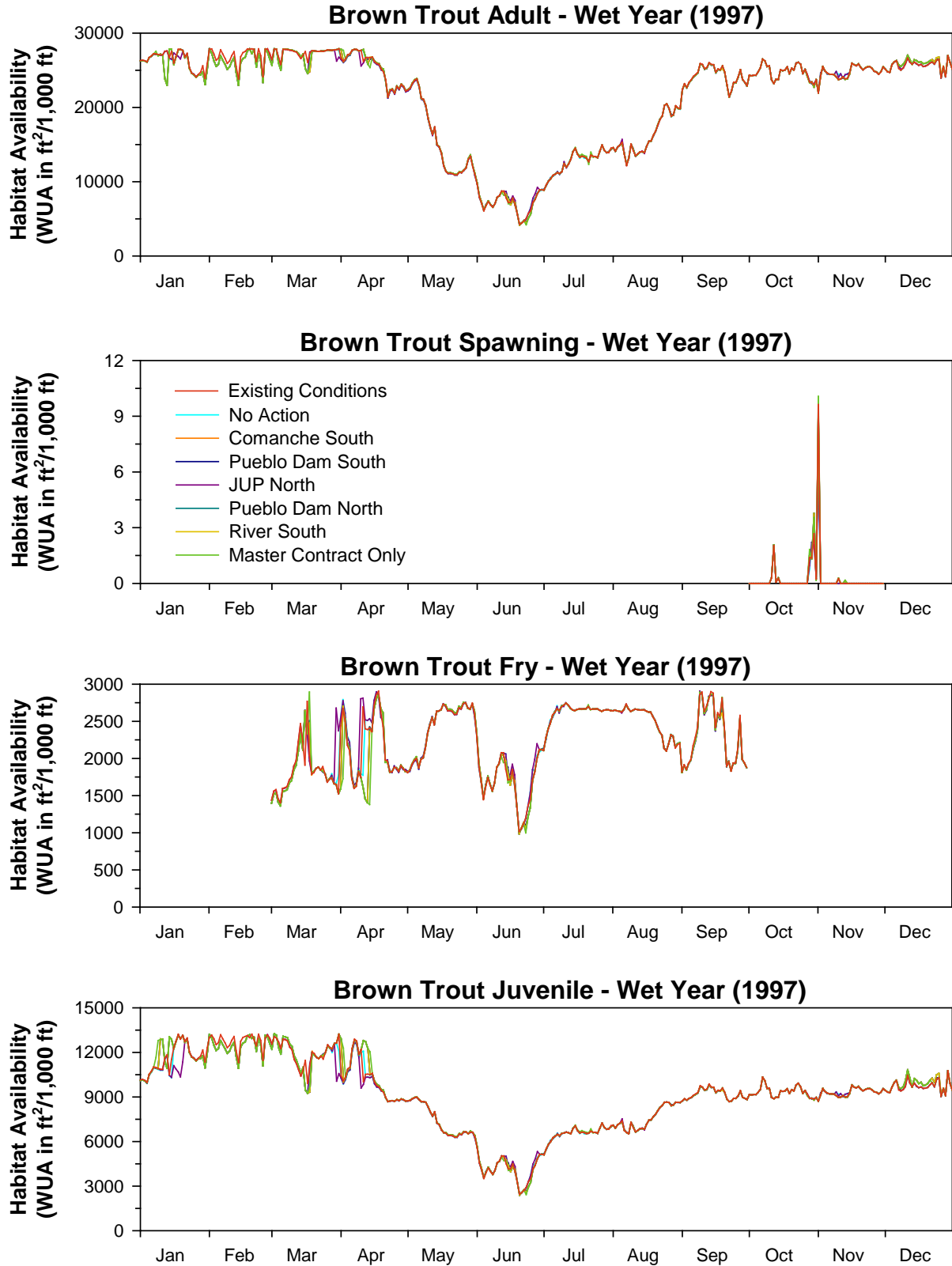


Figure 40. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 6 of the Upper Arkansas River

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**Figure 41. Direct Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA  $\text{ft}^2/1,000\text{ft}$ ) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 6 of the Upper Arkansas River**



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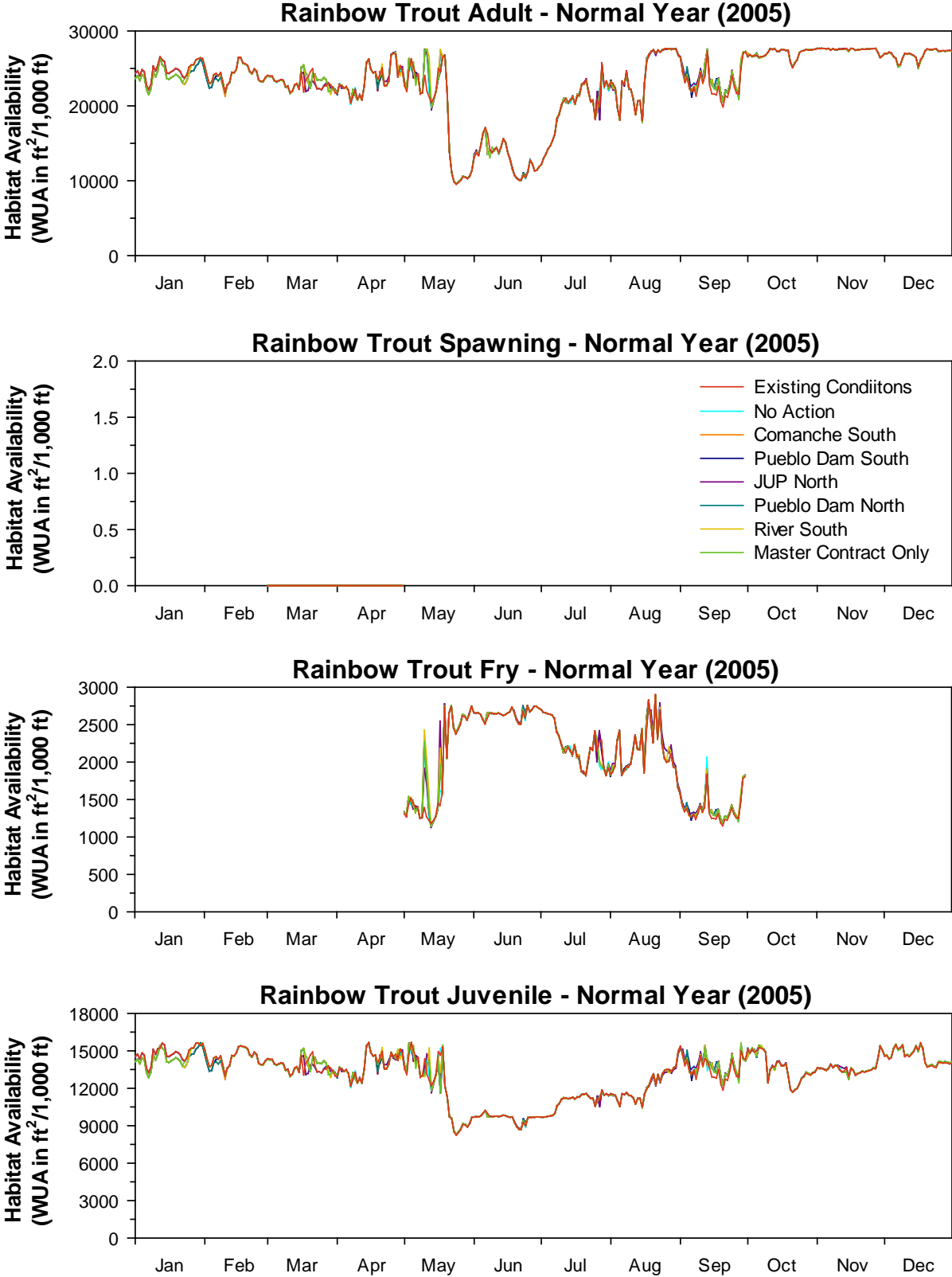
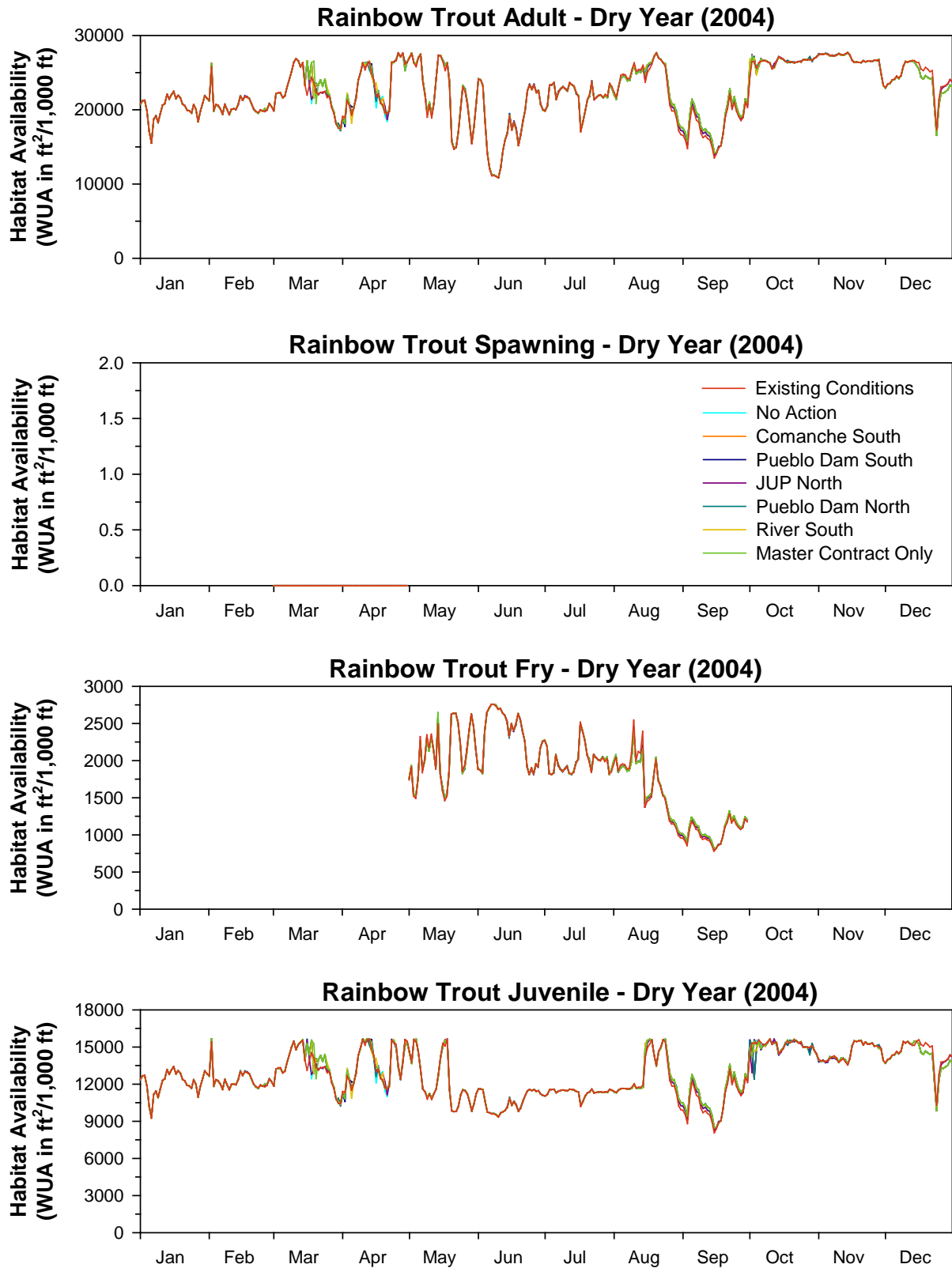


Figure 42. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 6 of the Upper Arkansas River

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**Figure 43. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 6 of the Upper Arkansas River**

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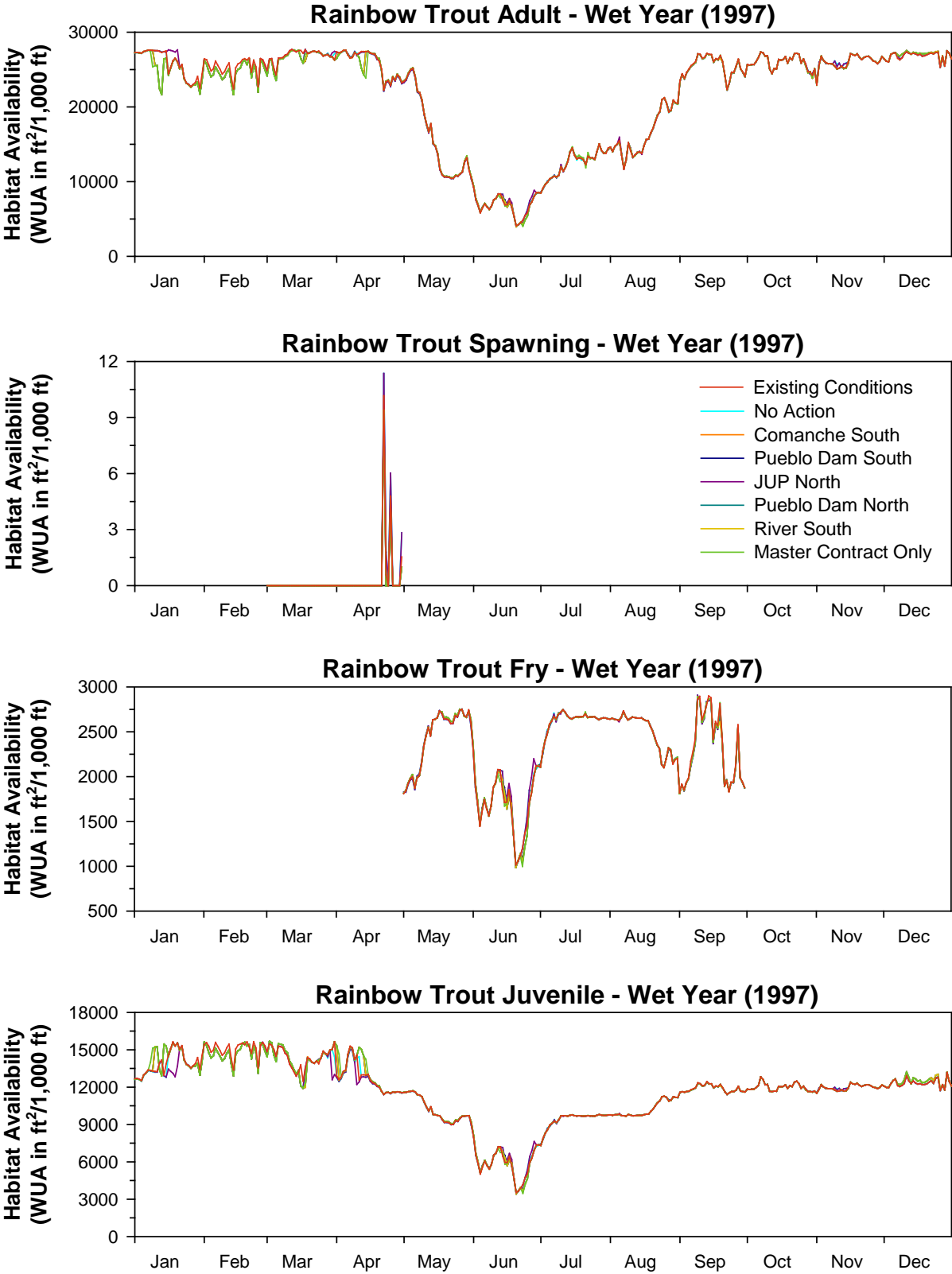









Figure 44. Direct Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 6 of the Upper Arkansas River

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 1. Direct Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 1

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	6,188	6,188	6,188	6,188	6,188	6,188	6,188	6,188
spawning	4,518	4,518	4,518	4,518	4,518	4,518	4,518	4,518
fry	1,278	1,278	1,278	1,278	1,278	1,278	1,278	1,278
juvenile	6,253	6,223	6,223	6,223	6,223	6,223	6,223	6,223
<b>Rainbow trout</b>								
adult	3,335	3,323	3,323	3,323	3,323	3,323	3,323	3,323
spawning	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291
fry	1,915	2,188	2,188	2,188	2,188	2,188	2,188	2,188
juvenile	6,681	6,678	6,678	6,678	6,678	6,678	6,678	6,678
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	0%	0%	0%	0%	0%	0%	0%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	0%	0%	0%	0%	0%	0%	0%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Rainbow trout</b>								
adult	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	14%	14%	14%	14%	14%	14%	14%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	5,380	5,380	5,380	5,380	5,380	5,380	5,380	5,380
spawning	3,687	3,687	3,687	3,687	3,687	3,687	3,687	3,687
fry	1,290	1,290	1,290	1,290	1,290	1,290	1,290	1,290
juvenile	8,469	8,469	8,469	8,469	8,469	8,469	8,469	8,469
<b>Rainbow trout</b>								
adult	2,908	2,908	2,908	2,908	2,908	2,908	2,908	2,908
spawning	2,313	2,313	2,313	2,313	2,313	2,313	2,313	2,313
fry	1,911	2,074	2,074	2,074	2,074	2,074	2,074	2,074
juvenile	7,610	7,574	7,574	7,574	7,574	7,574	7,574	7,574
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	0%	<1%	0%	0%	0%	0%	0%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	0%	0%	0%	0%	0%	0%	0%
juvenile	--	0%	0%	0%	0%	0%	0%	0%

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	0%	0%	0%	0%	0%	0%	0%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	8%	8%	8%	8%	8%	8%	8%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	4,097	4,096	4,096	4,096	4,096	4,096	4,096	4,096
spawning	7,174	7,174	7,174	7,174	7,174	7,174	7,174	7,174
fry	1,795	1,795	1,795	1,795	1,795	1,795	1,795	1,795
juvenile	3,921	3,919	3,919	3,919	3,919	3,919	3,919	3,919
<b>Rainbow trout</b>								
adult	2,139	2,138	2,138	2,138	2,138	2,138	2,138	2,138
spawning	3,217	3,217	3,217	3,217	3,217	3,217	3,217	3,217
fry	2,201	2,204	2,204	2,204	2,204	2,204	2,204	2,204
juvenile	4,568	4,566	4,566	4,566	4,566	4,566	4,566	4,566
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	0%	0%	0%	0%	0%	0%	0%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Rainbow trout</b>								
adult	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 2. Direct Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 1

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	11,715	12,134	12,134	12,134	12,134	12,134	12,134	12,134
spawning	7,177	7,177	7,177	7,177	7,177	7,177	7,177	7,177
fry	2,512	2,544	2,544	2,544	2,544	2,544	2,544	2,544
juvenile	17,808	18,293	18,293	18,293	18,293	18,293	18,293	18,293
<b>Rainbow trout</b>								
adult	6,807	6,976	6,976	6,976	6,976	6,976	6,976	6,976
spawning	2,710	2,786	2,786	2,786	2,786	2,786	2,786	2,786
fry	2,639	2,661	2,660	2,660	2,660	2,660	2,660	2,660
juvenile	19,185	19,346	19,346	19,346	19,346	19,346	19,346	19,346
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	4%	4%	4%	4%	4%	4%	4%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	1%	1%	1%	1%	1%	1%	1%
juvenile	--	3%	3%	3%	3%	3%	3%	3%
<b>Rainbow trout</b>								
adult	--	2%	2%	2%	2%	2%	2%	2%
spawning	--	3%	3%	3%	3%	3%	3%	3%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	11,996	12,492	12,492	12,492	12,492	12,492	12,492	12,492
spawning	5,581	5,581	5,581	5,581	5,581	5,581	5,581	5,581
fry	2,573	2,628	2,628	2,628	2,628	2,628	2,628	2,628
juvenile	18,431	18,472	18,472	18,472	18,472	18,472	18,472	18,472
<b>Rainbow trout</b>								
adult	6,603	6,998	6,998	6,998	6,998	6,998	6,998	6,998
spawning	4,439	4,534	4,534	4,534	4,534	4,534	4,534	4,534
fry	2,636	2,682	2,685	2,685	2,682	2,685	2,685	2,685
juvenile	20,230	20,256	20,256	20,256	20,256	20,256	20,256	20,256
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	4%	4%	4%	4%	4%	4%	4%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	2%	2%	2%	2%	2%	2%	2%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	6%	6%	6%	6%	6%	6%	6%
spawning	--	2%	2%	2%	2%	2%	2%	2%
fry	--	2%	2%	2%	2%	2%	2%	2%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	12,970	12,925	12,925	12,925	12,925	12,925	12,925	12,925
spawning	8,283	8,283	8,283	8,283	8,283	8,283	8,283	8,283
fry	3,111	3,130	3,130	3,130	3,130	3,130	3,130	3,130
juvenile	19,545	19,749	19,749	19,749	19,749	19,749	19,749	19,749
<b>Rainbow trout</b>								
adult	7,561	7,575	7,575	7,575	7,575	7,575	7,575	7,575
spawning	4,427	4,522	4,522	4,522	4,522	4,522	4,522	4,522
fry	4,540	4,563	4,563	4,563	4,563	4,563	4,563	4,563
juvenile	22,036	22,040	22,040	22,040	22,040	22,040	22,040	22,040
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	1%	1%	1%	1%	1%	1%	1%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	2%	2%	2%	2%	2%	2%	2%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

# Arkansas Valley Conduit EIS

## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)








Table 3. Direct Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 2

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	11,328	11,328	10,369	10,369	11,328	10,369	11,324	11,324
spawning	3,521	3,551	3,517	3,517	3,551	3,517	3,517	3,515
fry	1,470	1,490	1,491	1,491	1,491	1,491	1,490	1,491
juvenile	8,232	8,232	7,536	7,536	8,232	7,536	8,229	8,229
<b>Rainbow trout</b>								
adult	9,153	9,153	8,378	8,378	9,153	8,378	9,149	9,149
spawning	2,006	2,031	2,054	2,054	2,031	2,054	2,054	2,054
fry	1,470	1,490	1,491	1,491	1,491	1,491	1,490	1,491
juvenile	9,850	9,850	9,016	9,016	9,850	9,016	9,846	9,846
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	0%	-8%	-8%	0%	-8%	<-1%	<-1%
spawning	--	<1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
fry	--	1%	1%	1%	1%	1%	1%	1%
juvenile	--	0%	-8%	-8%	0%	-8%	<-1%	<-1%
<b>Rainbow trout</b>								
adult	--	0%	-8%	-8%	0%	-8%	<-1%	<-1%
spawning	--	1%	2%	2%	1%	2%	2%	2%
fry	--	1%	1%	1%	1%	1%	1%	1%
juvenile	--	0%	-8%	-8%	0%	-8%	<-1%	<-1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	11,593	11,294	11,200	11,200	11,297	11,200	11,200	11,200
spawning	2,254	2,254	2,253	2,253	2,254	2,253	2,253	2,253
fry	1,552	1,567	1,566	1,566	1,567	1,566	1,566	1,566
juvenile	8,425	8,208	8,139	8,139	8,210	8,139	8,139	8,139
<b>Rainbow trout</b>								
adult	9,367	9,125	9,049	9,049	9,128	9,049	9,049	9,049
spawning	1,901	1,920	1,919	1,919	1,920	1,919	1,919	1,919
fry	1,643	1,659	1,660	1,660	1,659	1,660	1,660	1,660
juvenile	10,080	9,820	9,738	9,738	9,823	9,738	9,738	9,738
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-3%	-3%	-3%	-3%	-3%	-3%	-3%
spawning	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	-3%	-3%	-3%	-3%	-3%	-3%	-3%



Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	-3%	-3%	-3%	-3%	-3%	-3%	-3%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	<1%	1%	1%	<1%	1%	1%	1%
juvenile	--	-3%	-3%	-3%	-3%	-3%	-3%	-3%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	7,838	7,740	7,384	7,436	7,872	7,376	7,436	6,858
spawning	3,277	3,378	3,254	3,254	3,383	3,253	3,254	3,260
fry	567	560	534	538	569	533	538	496
juvenile	5,191	5,125	4,890	4,925	5,213	4,884	4,925	4,542
<b>Rainbow trout</b>								
adult	7,003	6,915	6,597	6,644	7,033	6,590	6,644	6,128
spawning	2,231	2,183	2,216	2,202	2,185	2,202	2,203	2,173
fry	567	560	534	538	569	533	538	496
juvenile	7,013	6,925	6,607	6,654	7,043	6,600	6,654	6,136
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-1%	-6%	-5%	<1%	-6%	-5%	-13%
spawning	--	3%	<-1%	<-1%	3%	<-1%	<-1%	<-1%
fry	--	-1%	-6%	-5%	<1%	-6%	-5%	-13%
juvenile	--	-1%	-6%	-5%	<1%	-6%	-5%	-13%
<b>Rainbow trout</b>								
adult	--	-1%	-6%	-5%	<1%	-6%	-5%	-13%
spawning	--	-2%	<-1%	-1%	-2%	-1%	-1%	-3%
fry	--	-1%	-6%	-5%	<1%	-6%	-5%	-13%
juvenile	--	-1%	-6%	-5%	<1%	-6%	-5%	-13%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 4. Direct Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 2

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	23,334	23,640	23,417	23,568	23,716	23,437	23,446	23,534
spawning	4,247	4,259	4,228	4,228	4,250	4,227	4,227	4,231
fry	2,841	2,930	2,895	2,910	2,895	2,893	2,897	2,897
juvenile	16,114	16,103	16,099	16,112	16,082	16,132	16,132	16,108
<b>Rainbow trout</b>								
adult	19,640	19,660	19,570	19,612	19,744	19,576	19,660	19,659
spawning	2,808	2,771	2,867	2,867	2,773	2,867	2,867	2,860
fry	3,140	3,188	3,167	3,169	3,194	3,164	3,192	3,192
juvenile	20,358	20,564	20,516	20,562	20,563	20,555	20,553	20,559
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	1%	<1%	1%	2%	<1%	<1%	<1%
spawning	--	<1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
fry	--	3%	2%	2%	2%	2%	2%	2%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<1%	<1%	<-1%
<b>Rainbow trout</b>								
adult	--	<1%	<-1%	<-1%	<1%	<-1%	<1%	<1%
spawning	--	-1%	2%	2%	-1%	2%	2%	2%
fry	--	2%	<1%	<1%	2%	<1%	2%	2%
juvenile	--	1%	<1%	1%	1%	<1%	<1%	<1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	21,051	21,077	21,252	21,240	21,187	21,243	21,321	21,185
spawning	3,638	3,598	3,602	3,602	3,595	3,602	3,625	3,618
fry	3,067	3,172	3,243	3,242	3,173	3,242	3,242	3,274
juvenile	15,219	15,222	15,317	15,325	15,243	15,317	15,317	15,312
<b>Rainbow trout</b>								
adult	17,009	17,030	17,171	17,162	17,119	17,164	17,227	17,118
spawning	2,913	2,974	2,955	2,964	2,992	2,955	2,962	3,036
fry	3,992	4,034	3,995	3,995	4,034	3,995	3,995	3,995
juvenile	18,304	18,326	18,479	18,468	18,422	18,471	18,538	18,421
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	1%	<1%
spawning	--	-1%	<-1%	<-1%	-1%	<-1%	<-1%	<-1%
fry	--	3%	6%	6%	3%	6%	6%	7%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	1%	<1%
spawning	--	2%	1%	2%	3%	1%	2%	4%
fry	--	1%	<1%	<1%	1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	1%	<1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	25,447	25,472	24,326	24,329	25,633	24,329	24,329	24,247
spawning	4,092	4,121	4,082	4,082	4,120	4,082	4,082	4,078
fry	2,576	2,568	2,576	2,576	2,576	2,577	2,576	2,574
juvenile	15,912	15,920	15,892	15,909	15,945	15,909	15,907	15,906
<b>Rainbow trout</b>								
adult	21,125	21,122	20,959	20,970	21,171	20,959	20,959	20,959
spawning	2,976	2,918	2,943	2,943	2,918	2,943	2,943	2,806
fry	2,381	2,368	2,373	2,373	2,368	2,373	2,373	2,413
juvenile	20,569	20,568	20,562	20,562	20,568	20,561	20,560	20,560
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	-4%	-4%	<1%	-4%	-4%	-5%
spawning	--	<1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
fry	--	<-1%	<-1%	<-1%	<-1%	<1%	<-1%	<-1%
juvenile	--	<1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
<b>Rainbow trout</b>								
adult	--	<-1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
spawning	--	-2%	-1%	-1%	-2%	-1%	-1%	-6%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	1%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 5. Direct Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 3

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	9,634	9,714	9,727	9,727	9,705	9,727	9,717	9,717
spawning	14,753	14,802	14,746	14,746	14,802	14,747	14,747	14,743
fry	1,278	1,253	1,252	1,252	1,279	1,250	1,241	1,251
juvenile	7,558	7,621	7,631	7,631	7,614	7,631	7,624	7,624
<b>Rainbow trout</b>								
adult	7,816	7,880	7,891	7,891	7,873	7,891	7,883	7,883
spawning	10,040	9,965	10,117	10,117	10,018	10,117	10,117	10,117
fry	1,278	1,253	1,252	1,252	1,279	1,250	1,241	1,251
juvenile	10,292	10,377	10,391	10,391	10,367	10,391	10,380	10,380
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
fry	--	-2%	-2%	-2%	<1%	-2%	-3%	-2%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<-1%	<1%	<1%	<-1%	<1%	<1%	<1%
fry	--	-2%	-2%	-2%	<1%	-2%	-3%	-2%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	10,333	10,392	10,397	10,397	10,392	10,397	10,397	10,397
spawning	12,536	12,535	12,533	12,533	12,535	12,533	12,533	12,533
fry	1,315	1,262	1,307	1,308	1,305	1,307	1,287	1,283
juvenile	8,106	8,153	8,157	8,157	8,153	8,157	8,157	8,157
<b>Rainbow trout</b>								
adult	8,382	8,430	8,434	8,434	8,430	8,434	8,434	8,434
spawning	9,937	9,996	9,993	9,993	9,996	9,993	9,993	9,993
fry	1,315	1,262	1,307	1,308	1,305	1,307	1,287	1,283
juvenile	11,038	11,101	11,107	11,107	11,101	11,107	11,107	11,107
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	-4%	<-1%	<-1%	<-1%	<-1%	-2%	-2%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	-4%	<-1%	<-1%	<-1%	<-1%	-2%	-2%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	5,254	5,227	5,144	5,144	5,263	5,144	5,144	5,183
spawning	14,002	14,194	13,965	13,963	14,208	13,962	13,963	13,962
fry	723	720	708	708	725	708	708	714
juvenile	4,122	4,101	4,035	4,035	4,129	4,035	4,035	4,066
<b>Rainbow trout</b>								
adult	4,262	4,240	4,173	4,173	4,270	4,173	4,173	4,204
spawning	8,719	8,590	8,793	8,706	8,590	8,705	8,714	8,566
fry	723	720	708	708	725	708	708	714
juvenile	5,612	5,584	5,495	5,495	5,622	5,495	5,495	5,536
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	-2%	-2%	<1%	-2%	-2%	-1%
spawning	--	1%	<-1%	<-1%	1%	<-1%	<-1%	<-1%
fry	--	<-1%	-2%	-2%	<1%	-2%	-2%	-1%
juvenile	--	<-1%	-2%	-2%	<1%	-2%	-2%	-1%
<b>Rainbow trout</b>								
adult	--	<-1%	-2%	-2%	<1%	-2%	-2%	-1%
spawning	--	-1%	<1%	<-1%	-1%	<-1%	<-1%	-2%
fry	--	<-1%	-2%	-2%	<1%	-2%	-2%	-1%
juvenile	--	<-1%	-2%	-2%	<1%	-2%	-2%	-1%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 6. Direct Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 3

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	18,102	18,095	17,964	17,997	18,221	18,026	17,990	17,961
spawning	16,168	16,179	16,172	16,172	16,184	16,170	16,173	16,182
fry	1,870	1,845	1,877	1,877	1,839	1,877	1,877	1,877
juvenile	15,232	15,329	15,072	15,059	15,322	15,068	15,121	15,058
<b>Rainbow trout</b>								
adult	14,648	14,588	14,789	14,742	14,609	14,814	14,812	14,674
spawning	11,979	11,982	12,116	12,057	11,861	12,117	12,116	12,113
fry	1,678	1,669	1,646	1,638	1,665	1,643	1,638	1,647
juvenile	19,264	19,417	19,076	18,988	19,356	19,077	19,092	19,071
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	-1%	<1%	<1%	-2%	<1%	<1%	<1%
juvenile	--	<1%	-1%	-1%	<1%	-1%	<-1%	-1%
<b>Rainbow trout</b>								
adult	--	<-1%	<1%	<1%	<-1%	1%	1%	<1%
spawning	--	<1%	1%	<1%	<-1%	1%	1%	1%
fry	--	<-1%	-2%	-2%	<-1%	-2%	-2%	-2%
juvenile	--	<1%	<-1%	-1%	<1%	<-1%	<-1%	-1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	17,679	17,610	17,671	17,647	17,666	17,618	17,673	17,687
spawning	16,491	16,197	16,257	16,260	16,219	16,264	16,311	16,305
fry	1,829	1,830	1,832	1,838	1,837	1,823	1,832	1,838
juvenile	14,436	14,542	14,615	14,600	14,642	14,600	14,600	14,615
<b>Rainbow trout</b>								
adult	14,486	14,493	14,501	14,501	14,485	14,501	14,530	14,523
spawning	11,545	11,672	12,062	11,962	11,811	11,891	12,113	12,144
fry	1,608	1,608	1,607	1,607	1,608	1,608	1,608	1,608
juvenile	18,214	18,392	18,495	18,468	18,515	18,459	18,473	18,515
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<1%
spawning	--	-2%	-1%	-1%	-2%	-1%	-1%	-1%
fry	--	<1%	<1%	<1%	<1%	<-1%	<1%	<1%
juvenile	--	<1%	1%	1%	1%	1%	1%	1%

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	1%	4%	4%	2%	3%	5%	5%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	2%	1%	2%	1%	1%	2%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	19,761	19,754	19,707	19,691	19,907	19,691	19,691	19,669
spawning	15,432	15,465	15,431	15,431	15,461	15,431	15,431	15,431
fry	1,507	1,505	1,510	1,509	1,502	1,510	1,512	1,513
juvenile	15,942	15,765	15,611	15,611	15,946	15,611	15,611	15,568
<b>Rainbow trout</b>								
adult	16,052	16,512	15,720	15,720	17,180	15,720	15,720	15,674
spawning	12,842	12,485	12,615	12,615	12,655	12,614	12,606	12,508
fry	1,467	1,471	1,476	1,476	1,477	1,476	1,476	1,476
juvenile	19,409	18,948	18,903	18,903	19,176	18,903	18,948	18,865
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	-1%	-2%	-2%	<1%	-2%	-2%	-2%
<b>Rainbow trout</b>								
adult	--	3%	-2%	-2%	7%	-2%	-2%	-2%
spawning	--	-3%	-2%	-2%	-1%	-2%	-2%	-3%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	-2%	-3%	-3%	-1%	-3%	-2%	-3%

# Arkansas Valley Conduit EIS

## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)








Table 7. Direct Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 4

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	15,360	15,500	15,521	15,521	15,483	15,521	15,505	15,505
spawning	25,940	26,103	25,894	25,894	26,103	25,895	25,895	25,884
fry	712	712	715	715	712	713	711	715
juvenile	11,697	11,803	11,820	11,820	11,791	11,820	11,807	11,807
<b>Rainbow trout</b>								
adult	12,398	12,510	12,528	12,528	12,497	12,528	12,514	12,514
spawning	33,899	33,495	34,537	34,032	33,929	34,132	34,032	34,102
fry	712	712	715	715	712	713	711	715
juvenile	12,729	12,844	12,862	12,862	12,830	12,862	12,848	12,848
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	1%	1%	<1%	1%	<1%	<1%
spawning	--	<1%	-<1%	-<1%	<1%	-<1%	-<1%	-<1%
fry	--	-<1%	<1%	<1%	<1%	<1%	-<1%	<1%
juvenile	--	<1%	1%	1%	<1%	1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	<1%	1%	1%	<1%	1%	<1%	<1%
spawning	--	-1%	2%	<1%	<1%	<1%	<1%	<1%
fry	--	-<1%	<1%	<1%	<1%	<1%	-<1%	<1%
juvenile	--	<1%	1%	1%	<1%	1%	<1%	<1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	17,014	17,094	17,104	17,104	17,094	17,104	17,104	17,104
spawning	33,704	32,965	29,065	29,071	30,355	29,071	33,632	33,209
fry	712	712	711	711	712	711	711	711
juvenile	12,957	13,018	13,025	13,025	13,018	13,025	13,025	13,025
<b>Rainbow trout</b>								
adult	13,733	13,797	13,805	13,805	13,798	13,805	13,805	13,805
spawning	32,897	33,227	33,614	33,719	34,003	33,719	33,717	34,067
fry	712	712	711	711	712	711	711	711
juvenile	14,099	14,166	14,173	14,173	14,166	14,173	14,173	14,173
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	-2%	-14%	-14%	-10%	-14%	-<1%	-1%
fry	--	-<1%	-<1%	-<1%	-<1%	-<1%	-<1%	-<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%



Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	1%	2%	2%	3%	2%	2%	4%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	7,317	7,263	7,123	7,123	7,325	7,123	7,123	7,297
spawning	22,698	23,268	22,769	22,765	23,346	22,762	22,765	22,607
fry	354	351	344	344	354	344	344	353
juvenile	5,572	5,531	5,424	5,424	5,578	5,424	5,424	5,557
<b>Rainbow trout</b>								
adult	5,906	5,862	5,749	5,749	5,912	5,749	5,749	5,890
spawning	14,023	13,592	14,307	14,307	13,592	14,307	14,307	14,307
fry	354	351	344	344	354	344	344	353
juvenile	6,063	6,019	5,902	5,902	6,070	5,902	5,902	6,047
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%
spawning	--	3%	<1%	<1%	3%	<1%	<1%	<-1%
fry	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%
juvenile	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%
<b>Rainbow trout</b>								
adult	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%
spawning	--	-3%	2%	2%	-3%	2%	2%	2%
fry	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%
juvenile	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

**Table 8. Direct Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 4**

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	37,238	37,259	37,250	37,250	37,259	37,247	37,258	37,289
spawning	32,203	32,257	32,211	32,211	32,266	32,208	32,197	32,220
fry	1,476	1,471	1,480	1,481	1,469	1,481	1,481	1,475
juvenile	34,597	34,610	34,495	34,495	34,607	34,481	34,484	34,526
<b>Rainbow trout</b>								
adult	27,640	27,714	27,609	27,632	27,851	27,600	27,711	27,795
spawning	36,646	36,643	36,656	36,652	36,637	36,652	36,650	36,637
fry	931	932	932	933	933	932	933	932
juvenile	41,026	41,044	40,883	40,883	41,040	40,863	40,867	40,926
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	37,139	37,138	37,138	37,150	37,135	37,138	37,175	37,138
spawning	35,293	35,251	35,185	35,232	35,271	35,239	35,238	35,239
fry	1,448	1,445	1,443	1,448	1,452	1,442	1,448	1,445
juvenile	37,886	37,843	37,845	37,845	37,871	37,831	37,845	37,886
<b>Rainbow trout</b>								
adult	27,259	27,275	27,584	27,584	27,302	27,559	27,584	27,559
spawning	36,645	36,637	36,627	36,628	36,650	36,628	36,624	36,628
fry	878	877	878	878	877	878	878	878
juvenile	45,811	45,873	45,841	45,841	45,835	45,802	45,807	45,859
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	<1%	1%	1%	<1%	1%	1%	1%
spawning	--	<-1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
juvenile	--	<1%	<1%	<1%	<1%	<-1%	<-1%	<1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	35,736	35,768	35,757	35,755	35,744	35,750	35,754	35,747
spawning	28,163	28,170	28,206	28,206	28,172	28,206	28,206	28,173
fry	934	932	936	935	933	935	935	935
juvenile	26,862	26,945	26,916	26,910	26,881	26,899	26,907	26,890
<b>Rainbow trout</b>								
adult	30,616	30,532	30,342	30,342	30,550	30,342	30,342	30,195
spawning	34,180	34,087	34,442	34,442	31,986	34,435	34,442	34,734
fry	889	892	891	891	891	891	891	891
juvenile	31,255	31,358	31,323	31,315	31,279	31,301	31,311	31,290
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	<-1%	<1%	<1%	<-1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	-1%
spawning	--	<-1%	<1%	<1%	-6%	<1%	<1%	2%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 9. Direct Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 5

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	14,157	14,285	14,305	14,305	14,270	14,305	14,290	14,290
spawning	22,089	22,159	22,069	22,069	22,159	22,069	22,070	22,065
fry	298	301	301	301	300	301	301	301
juvenile	7,969	8,041	8,052	8,052	8,032	8,052	8,043	8,044
<b>Rainbow trout</b>								
adult	11,697	11,803	11,820	11,820	11,791	11,820	11,807	11,807
spawning	15,763	15,575	16,060	15,825	15,777	15,872	15,825	15,858
fry	298	301	301	301	300	301	301	301
juvenile	8,626	8,704	8,717	8,717	8,695	8,717	8,707	8,707
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	1%	1%	<1%	1%	<1%	<1%
spawning	--	<1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
fry	--	<1%	1%	1%	<1%	1%	<1%	<1%
juvenile	--	<1%	1%	1%	<1%	1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	<1%	1%	1%	<1%	1%	<1%	<1%
spawning	--	-1%	2%	<1%	<1%	<1%	<1%	<1%
fry	--	<1%	1%	1%	<1%	1%	<1%	<1%
juvenile	--	<1%	1%	1%	<1%	1%	<1%	<1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	15,682	15,755	15,764	15,764	15,755	15,764	15,764	15,764
spawning	24,736	24,754	23,404	23,406	23,847	23,406	24,760	24,847
fry	330	331	332	332	331	332	332	332
juvenile	8,827	8,868	8,873	8,873	8,868	8,873	8,873	8,873
<b>Rainbow trout</b>								
adult	12,957	13,018	13,025	13,025	13,018	13,025	13,025	13,025
spawning	15,297	15,451	15,631	15,679	15,812	15,680	15,679	15,841
fry	330	331	332	332	331	332	332	332
juvenile	9,555	9,600	9,605	9,605	9,600	9,605	9,605	9,605
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	-5%	-5%	-4%	-5%	<1%	<1%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	1%	2%	2%	3%	2%	2%	4%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	6,744	6,694	6,565	6,565	6,751	6,565	6,565	6,725
spawning	20,915	21,105	20,939	20,937	21,131	20,936	20,937	20,885
fry	142	141	138	138	142	138	138	142
juvenile	3,796	3,768	3,695	3,695	3,800	3,695	3,695	3,786
<b>Rainbow trout</b>								
adult	5,572	5,531	5,424	5,424	5,578	5,424	5,424	5,557
spawning	14,035	13,958	14,086	14,086	13,958	14,086	14,086	14,086
fry	142	141	138	138	142	138	138	142
juvenile	4,109	4,079	4,000	4,000	4,113	4,000	4,000	4,098
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%
spawning	--	<1%	<1%	<1%	1%	<1%	<1%	<-1%
fry	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%
juvenile	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%
<b>Rainbow trout</b>								
adult	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%
spawning	--	<-1%	<1%	<1%	<-1%	<1%	<1%	<1%
fry	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%
juvenile	--	<-1%	-3%	-3%	<1%	-3%	-3%	<-1%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

**Table 10. Direct Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 5**

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	34,094	34,263	33,904	33,990	34,278	33,999	34,067	33,990
spawning	24,480	24,499	24,483	24,483	24,502	24,482	24,478	24,486
fry	1,790	1,784	1,795	1,795	1,782	1,795	1,795	1,788
juvenile	42,659	42,780	42,369	42,369	43,048	42,358	42,673	42,979
<b>Rainbow trout</b>								
adult	21,800	21,868	21,657	21,657	21,868	21,664	21,662	21,631
spawning	17,383	17,289	17,338	17,378	17,276	17,372	17,375	17,358
fry	593	563	568	566	575	576	567	566
juvenile	45,033	45,319	44,948	44,975	45,318	44,992	45,186	45,344
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<-1%	<1%
fry	--	<-1%	<1%	<1%	<-1%	<1%	<1%	<-1%
juvenile	--	<1%	<-1%	<-1%	<1%	<-1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	<1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
spawning	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	-5%	-4%	-5%	-3%	-3%	-4%	-5%
juvenile	--	<1%	<-1%	<-1%	<1%	<-1%	<1%	<1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	35,082	35,191	35,113	35,139	35,147	35,112	35,139	35,191
spawning	25,438	25,444	25,404	25,406	25,433	25,406	25,408	25,435
fry	1,756	1,752	1,749	1,756	1,761	1,749	1,756	1,752
juvenile	41,358	41,278	41,700	41,660	41,458	41,700	41,750	41,655
<b>Rainbow trout</b>								
adult	22,379	22,363	22,452	22,452	22,342	22,452	22,436	22,432
spawning	17,624	17,603	17,636	17,680	17,612	17,636	17,788	17,609
fry	709	702	705	705	705	705	705	705
juvenile	44,009	43,929	44,215	44,215	44,069	44,151	44,351	43,970
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	<-1%	<-1%	<1%	<1%	<-1%	<-1%	<-1%
juvenile	--	<-1%	<1%	<1%	<1%	<1%	<1%	<1%

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	<-1%	<1%	<1%	<-1%	<1%	<1%	<1%
spawning	--	<-1%	<1%	<1%	<-1%	<1%	<1%	<-1%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
juvenile	--	<-1%	<1%	<1%	<1%	<1%	<1%	<-1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	37,559	37,683	37,238	37,285	37,981	37,285	37,285	37,102
spawning	23,041	23,044	23,059	23,059	23,045	23,059	23,059	23,045
fry	448	448	448	448	448	448	448	448
juvenile	46,384	46,280	45,962	45,962	46,331	45,962	45,962	45,962
<b>Rainbow trout</b>								
adult	25,096	25,367	24,595	24,595	26,498	24,595	24,595	24,469
spawning	19,193	19,026	19,225	19,225	18,296	19,225	19,225	19,250
fry	434	434	435	435	434	435	435	436
juvenile	43,358	43,436	43,409	43,403	43,376	43,393	43,400	43,385
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<-1%	<-1%	1%	<-1%	<-1%	-1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Rainbow trout</b>								
adult	--	1%	-2%	-2%	6%	-2%	-2%	-2%
spawning	--	<-1%	<1%	<1%	-5%	<1%	<1%	<1%
fry	--	<-1%	<1%	<1%	<-1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

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## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)








Table 11. Direct Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 6

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	9,958	10,048	10,062	10,062	10,037	10,062	10,051	10,051
spawning	0	0	0	0	0	0	0	0
fry	1,148	1,129	1,150	1,150	1,126	1,150	1,145	1,146
juvenile	5,744	5,796	5,804	5,804	5,790	5,804	5,798	5,798
<b>Rainbow trout</b>								
adult	9,527	9,613	9,626	9,626	9,603	9,626	9,616	9,616
spawning	0	0	0	0	0	0	0	0
fry	1,148	1,129	1,150	1,150	1,126	1,150	1,145	1,146
juvenile	8,226	8,300	8,312	8,312	8,291	8,312	8,303	8,303
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	1%	1%	<1%	1%	<1%	<1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	-2%	<1%	<1%	-2%	<1%	<1%	<1%
juvenile	--	<1%	1%	1%	<1%	1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	<1%	1%	1%	<1%	1%	<1%	<1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	-2%	<1%	<1%	-2%	<1%	<1%	<1%
juvenile	--	<1%	1%	1%	<1%	1%	<1%	<1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	11,300	11,339	11,345	11,344	11,339	11,344	11,343	11,343
spawning	0	0	0	0	0	0	0	0
fry	780	800	821	822	800	821	821	821
juvenile	6,518	6,541	6,544	6,544	6,541	6,544	6,543	6,543
<b>Rainbow trout</b>								
adult	10,811	10,848	10,854	10,853	10,848	10,853	10,852	10,852
spawning	0	0	0	0	0	0	0	0
fry	780	800	821	822	800	821	821	821
juvenile	8,057	8,267	8,479	8,489	8,266	8,477	8,485	8,478
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	3%	5%	5%	3%	5%	5%	5%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%



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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	3%	5%	5%	3%	5%	5%	5%
juvenile	--	3%	5%	5%	3%	5%	5%	5%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	4,264	4,230	4,139	4,139	4,269	4,139	4,139	4,194
spawning	0	0	0	0	0	0	0	0
fry	1,015	1,007	985	985	1,016	985	985	998
juvenile	2,460	2,440	2,387	2,387	2,463	2,387	2,387	2,419
<b>Rainbow trout</b>								
adult	4,080	4,047	3,960	3,960	4,084	3,960	3,960	4,013
spawning	0	0	0	0	0	0	0	0
fry	1,015	1,007	985	985	1,016	985	985	998
juvenile	3,523	3,494	3,419	3,419	3,527	3,419	3,419	3,465
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	-3%	-3%	<1%	-3%	-3%	-2%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	<-1%	-3%	-3%	<1%	-3%	-3%	-2%
juvenile	--	<-1%	-3%	-3%	<1%	-3%	-3%	-2%
<b>Rainbow trout</b>								
adult	--	<-1%	-3%	-3%	<1%	-3%	-3%	-2%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	<-1%	-3%	-3%	<1%	-3%	-3%	-2%
juvenile	--	<-1%	-3%	-3%	<1%	-3%	-3%	-2%

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## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

**Table 12. Direct Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 6**

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	25,500	25,414	25,089	25,132	25,411	25,119	25,245	25,257
spawning	0	0	0	0	0	0	0	0
fry	1,766	1,811	1,818	1,821	1,826	1,824	1,821	1,819
juvenile	11,337	11,343	11,336	11,344	11,344	11,339	11,339	11,338
<b>Rainbow trout</b>								
adult	24,075	24,131	23,764	23,873	24,131	23,806	23,966	23,947
spawning	0	0	0	0	0	0	0	0
fry	2,136	2,159	2,148	2,143	2,165	2,125	2,159	2,124
juvenile	13,538	13,576	13,516	13,582	13,585	13,540	13,554	13,573
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	-2%	-1%	<-1%	-1%	<-1%	<-1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	3%	3%	3%	3%	3%	3%	3%
juvenile	--	<1%	<-1%	<1%	<1%	<1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	<1%	-1%	<-1%	<1%	-1%	<-1%	<-1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	1%	<1%	<1%	1%	<-1%	1%	<-1%
juvenile	--	<1%	<-1%	<1%	<1%	<1%	<1%	<1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	22,786	22,838	22,852	22,840	22,853	22,840	22,853	22,840
spawning	0	0	0	0	0	0	0	0
fry	1,712	1,717	1,719	1,719	1,717	1,719	1,719	1,719
juvenile	10,478	10,493	10,490	10,490	10,476	10,490	10,507	10,490
<b>Rainbow trout</b>								
adult	22,336	22,387	22,447	22,447	22,347	22,447	22,493	22,439
spawning	0	0	0	0	0	0	0	0
fry	1,888	1,887	1,888	1,893	1,887	1,887	1,891	1,890
juvenile	12,423	12,429	12,419	12,420	12,428	12,420	12,431	12,424
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<-1%	<1%	<1%	<1%

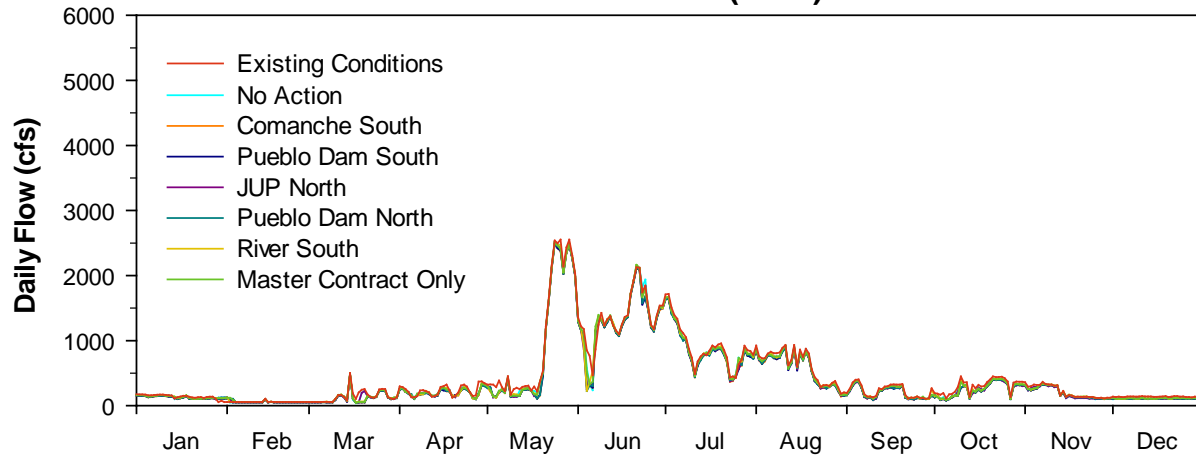
Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

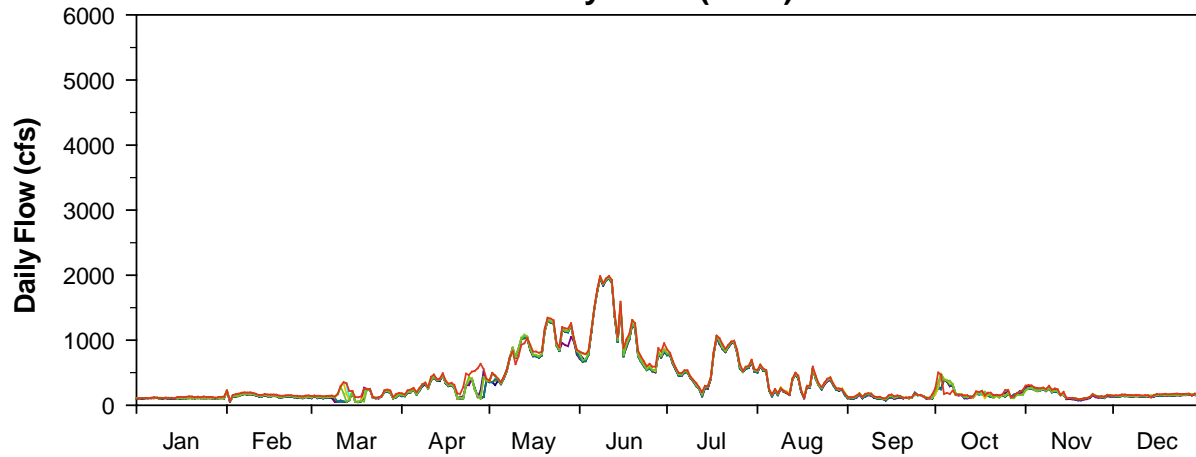
Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	24,535	24,534	24,438	24,438	24,523	24,438	24,438	24,430
spawning	0	0	0	0	0	0	0	0
fry	2,285	2,277	2,213	2,214	2,312	2,213	2,211	2,195
juvenile	9,304	9,284	9,279	9,279	9,284	9,279	9,279	9,280
<b>Rainbow trout</b>								
adult	25,265	25,068	25,061	25,061	25,144	25,060	25,060	25,059
spawning	0	0	0	0	0	0	0	0
fry	2,508	2,517	2,509	2,509	2,514	2,509	2,509	2,510
juvenile	11,960	11,943	11,938	11,938	11,943	11,938	11,938	11,939
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	<1%	-3%	-3%	1%	-3%	-3%	-4%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

**Arkansas Valley Conduit EIS  
Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**

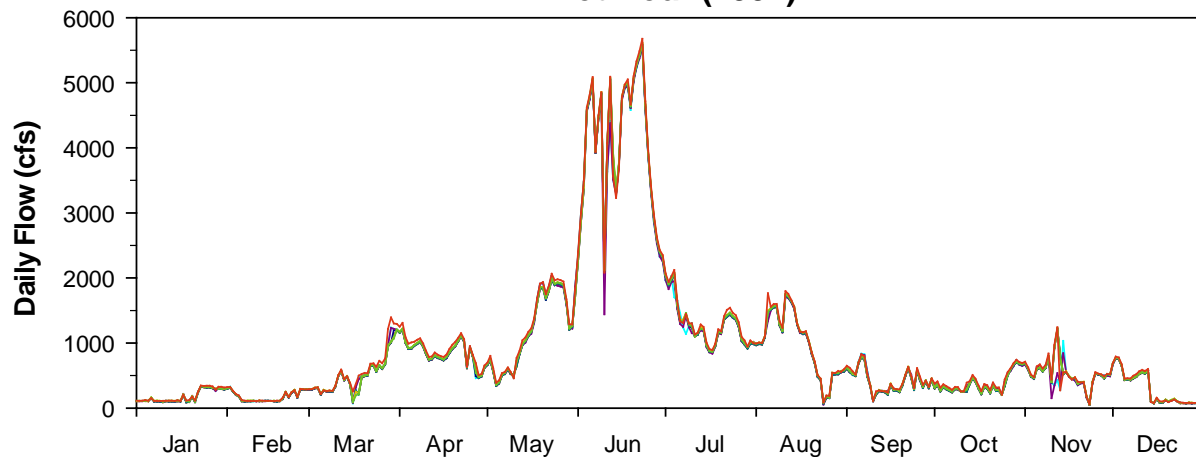
**Lower Arkansas River, Segment 1 – Pueblo Reservoir to Wildhorse Creek  
Normal Year (2005)**



**Dry Year (2004)**



**Wet Year (1997)**



**Figure 45. Direct Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 1 of the Lower Arkansas River at the Above Pueblo Gage**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

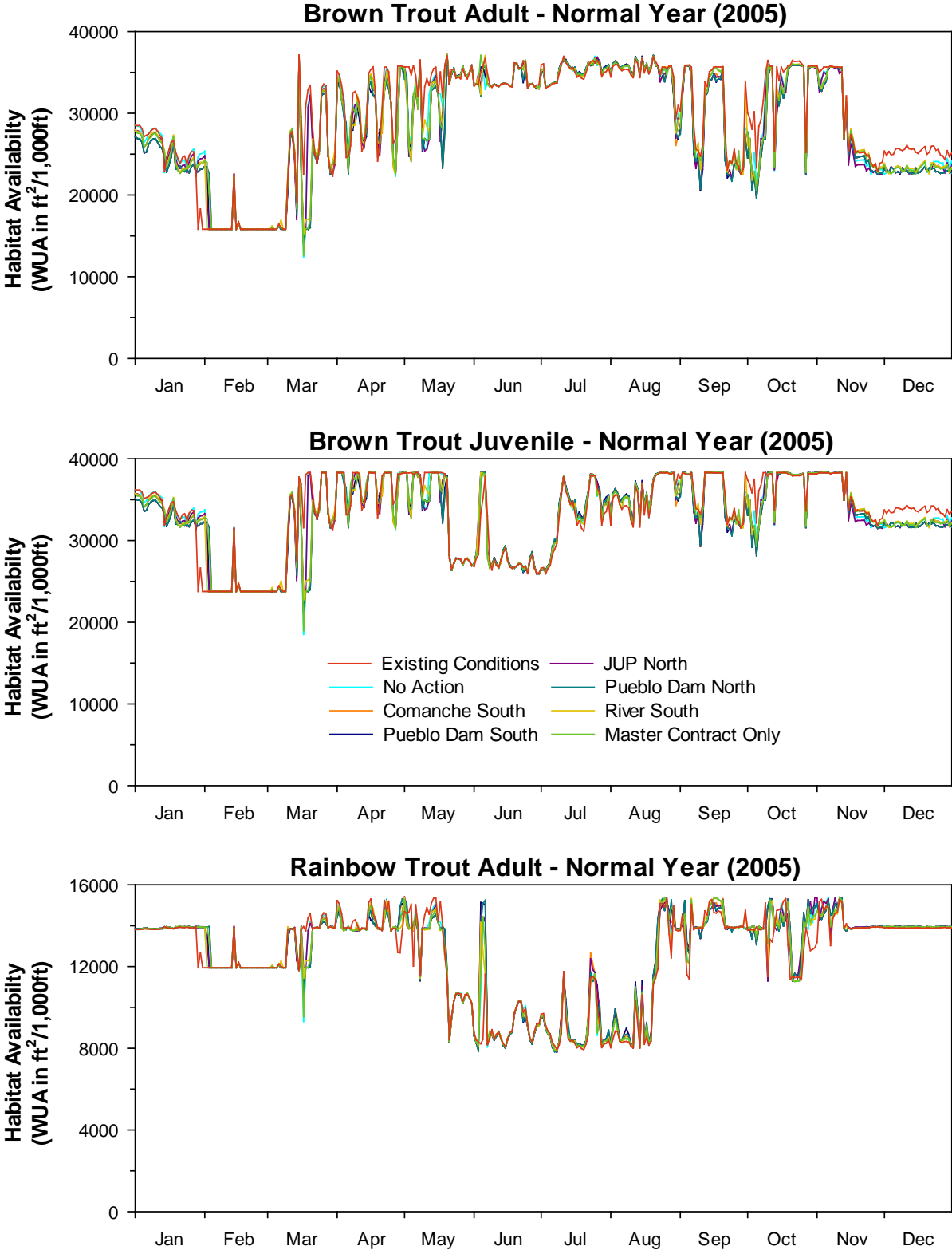
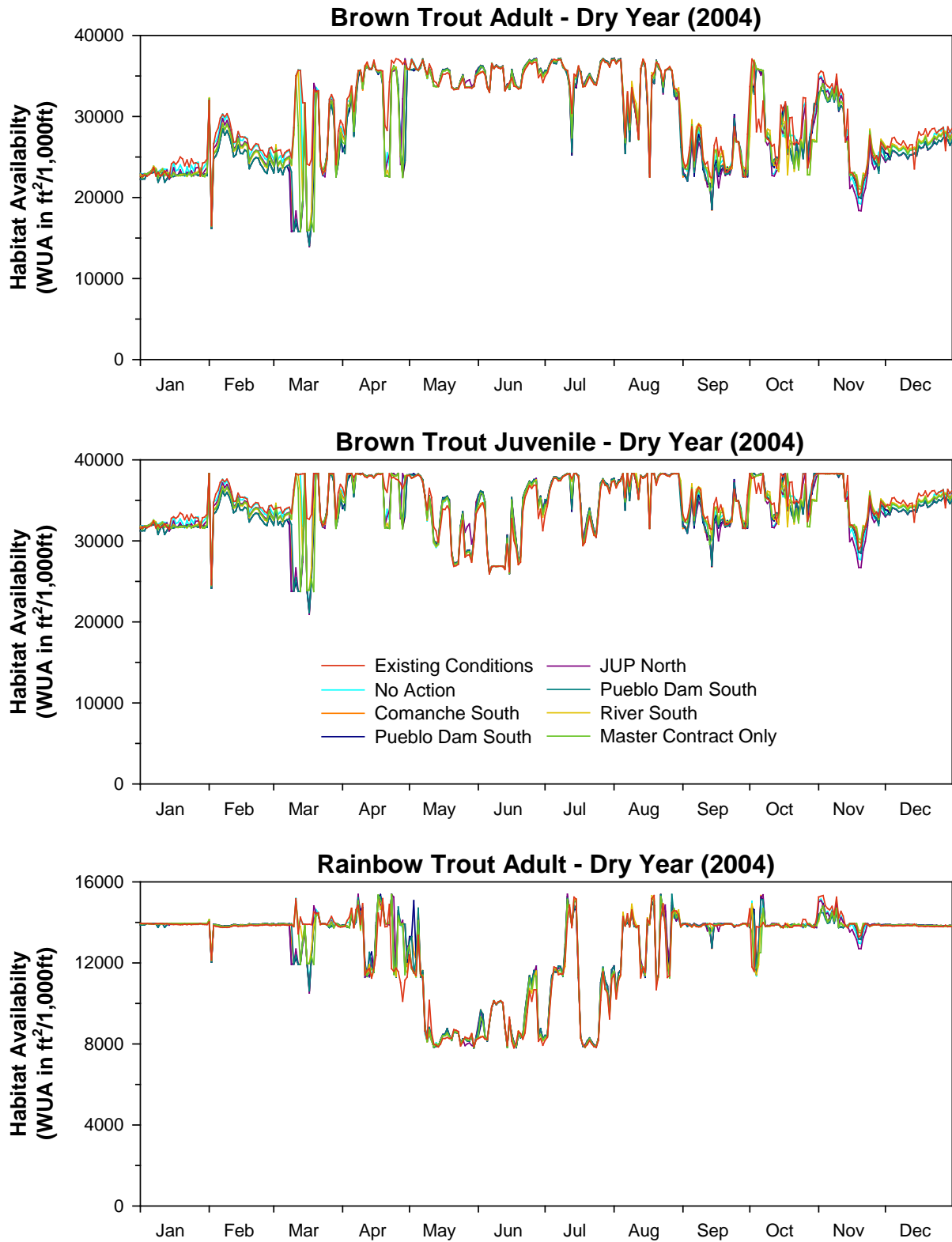


Figure 46. Direct Effects Brown Trout Adult, Brown Trout Juvenile, and Rainbow Trout Adult Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 1 of the Lower Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 47. Direct Effects Brown Trout Adult, Brown Trout Juvenile, and Rainbow Trout Adult Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 1 of the Lower Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

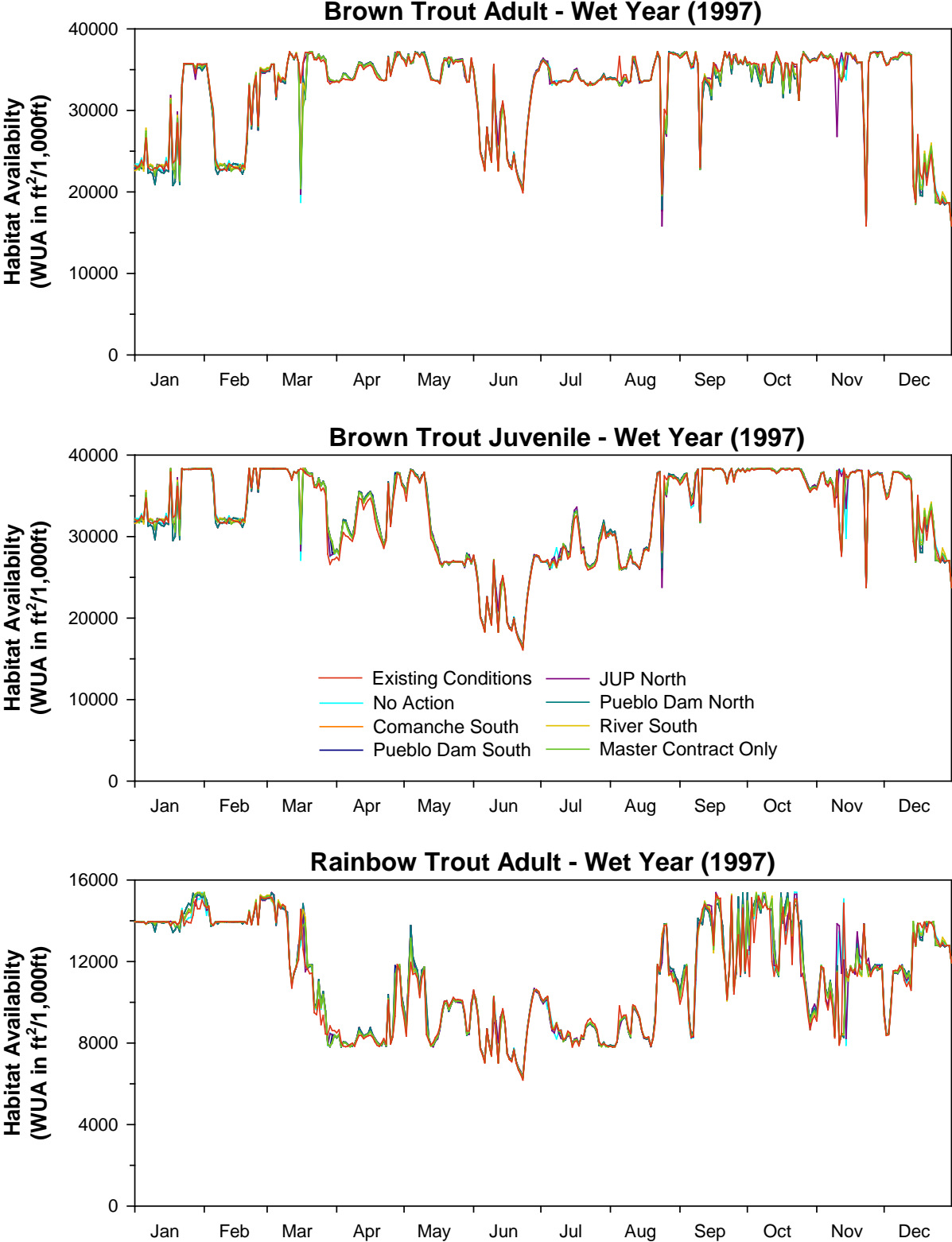









Figure 48. Direct Effects Brown Trout Adult, Brown Trout Juvenile, and Rainbow Trout Adult Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 1 of the Lower Arkansas River

# Arkansas Valley Conduit EIS

## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

**Table 13. Direct Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Lower Arkansas River Segment 1**








Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	15,832	12,334	14,203	14,221	15,832	14,048	15,156	12,653
juvenile	23,769	18,517	21,324	21,351	23,769	21,092	22,755	18,997
<b>Rainbow trout</b>								
adult	7,932	7,852	7,840	7,809	7,813	7,818	7,902	7,853
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-22%	-10%	-10%	0%	-11%	-4%	-20%
juvenile	--	-22%	-10%	-10%	0%	-11%	-4%	-20%
<b>Rainbow trout</b>								
adult	--	-1%	-1%	-2%	-2%	-1%	<-1%	-1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	16,565	14,816	14,096	14,096	13,943	14,098	15,972	15,832
juvenile	24,619	22,245	21,164	21,164	20,934	21,166	23,932	23,769
<b>Rainbow trout</b>								
adult	7,814	7,833	7,828	7,806	7,817	7,808	7,839	7,826
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-11%	-15%	-15%	-16%	-15%	-4%	-4%
juvenile	--	-10%	-14%	-14%	-15%	-14%	-3%	-3%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<-1%	<1%	<-1%	<1%	<1%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	15,832	15,832	15,832	15,832	15,832	15,832	15,832	15,832
juvenile	16,096	16,578	16,445	16,440	16,563	16,442	16,355	16,341
<b>Rainbow trout</b>								
adult	6,185	6,370	6,319	6,317	6,365	6,318	6,284	6,279
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	0%	0%	0%	0%	0%	0%	0%
juvenile	--	3%	2%	2%	3%	2%	2%	2%
<b>Rainbow trout</b>								
adult	--	3%	2%	2%	3%	2%	2%	2%



Arkansas Valley Conduit EIS

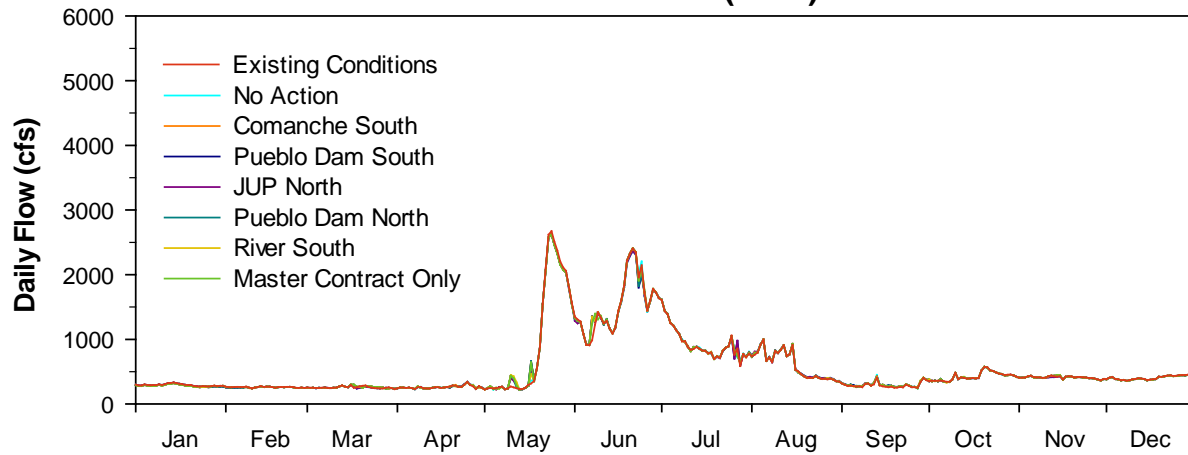
Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 14. Direct Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Lower Arkansas River Segment 1

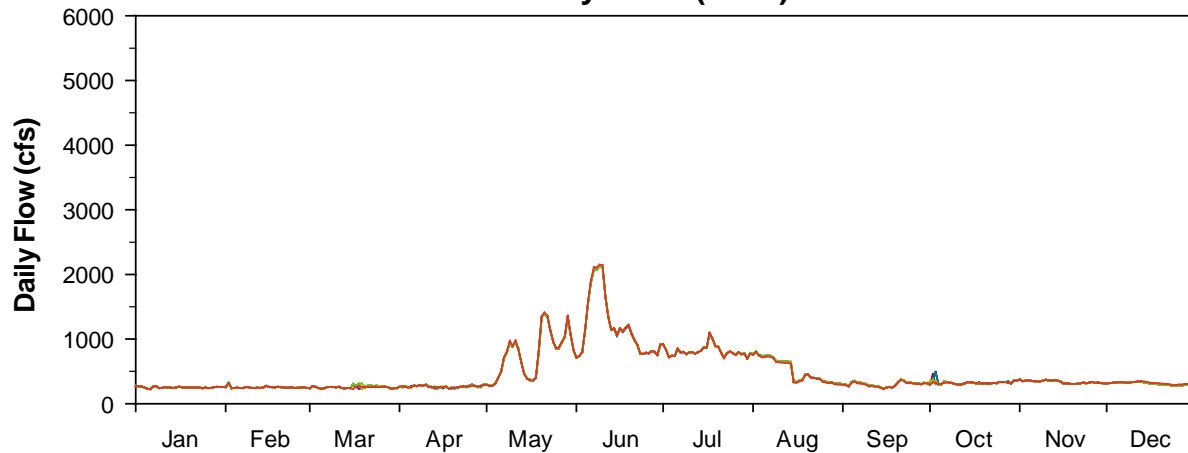
Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	32,955	31,238	28,475	28,721	30,031	28,779	29,746	29,798
juvenile	33,974	33,768	33,227	33,264	33,278	33,214	33,818	33,667
<b>Rainbow trout</b>								
adult	13,810	13,844	13,855	13,855	13,848	13,854	13,844	13,848
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-5%	-14%	-13%	-9%	-13%	-10%	-10%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	29,901	28,868	27,400	27,385	28,085	27,394	28,460	28,047
juvenile	35,016	34,834	34,079	34,011	34,506	34,048	34,539	34,558
<b>Rainbow trout</b>								
adult	13,838	13,847	13,860	13,861	13,850	13,861	13,852	13,849
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-3%	-8%	-8%	-6%	-8%	-5%	-6%
juvenile	--	<-1%	-3%	-3%	-1%	-3%	-1%	-1%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	34,583	34,449	34,246	34,224	34,454	34,224	34,432	34,386
juvenile	34,362	34,629	34,708	34,585	34,632	34,592	34,554	34,599
<b>Rainbow trout</b>								
adult	11,218	11,386	11,422	11,429	11,400	11,423	11,335	11,367
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	<-1%	-1%	<-1%	-1%	<-1%	<-1%
juvenile	--	<1%	1%	<1%	<1%	<1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	1%	2%	2%	2%	2%	1%	1%

**Arkansas Valley Conduit EIS  
Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**

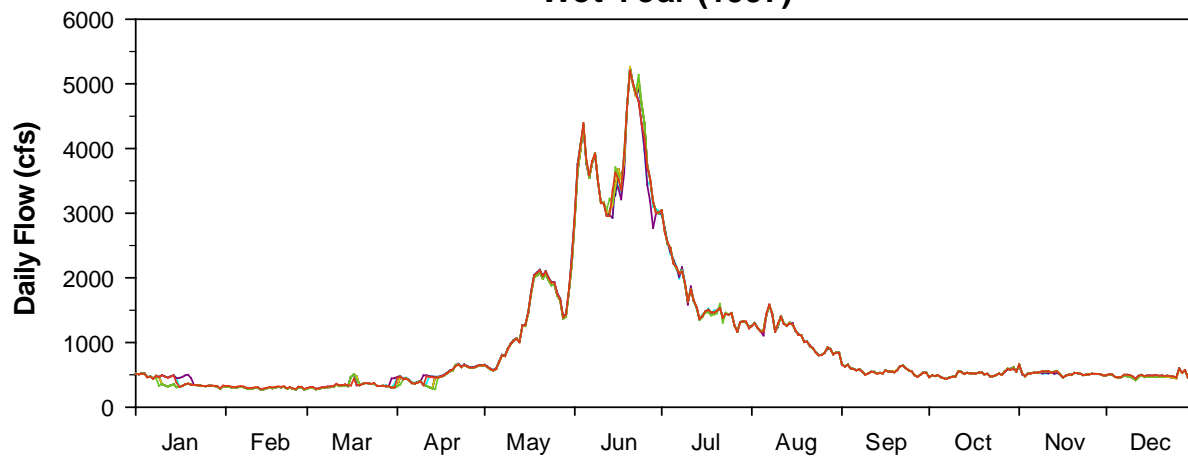
**Lower Arkansas River, Segment 2 – Wildhorse Creek to Fountain Creek  
Normal Year (2005)**



**Dry Year (2004)**



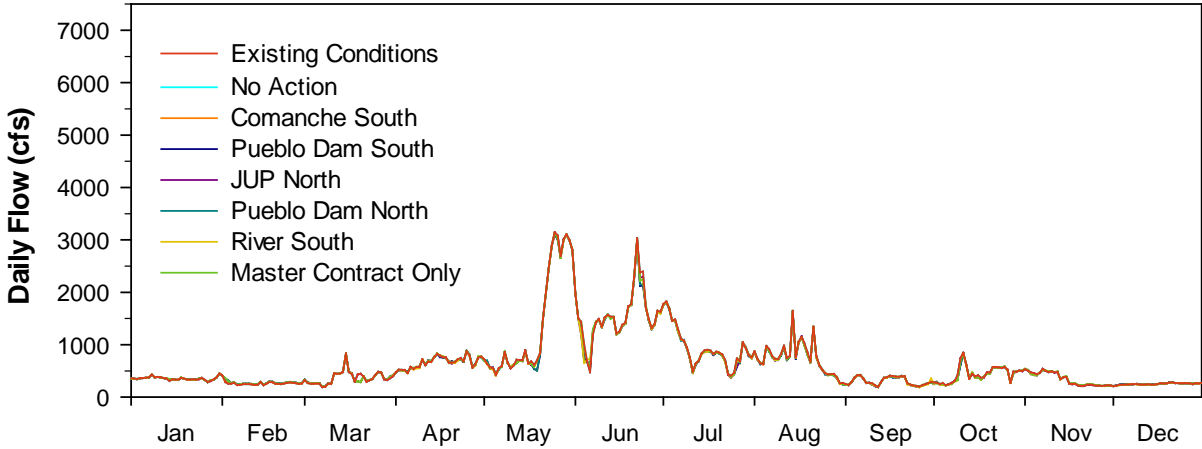
**Wet Year (1997)**



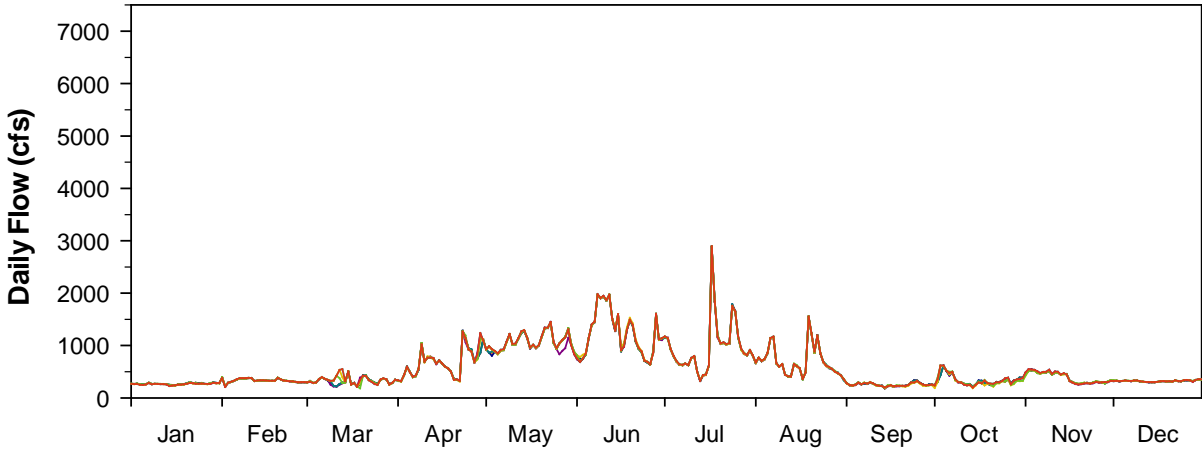
**Figure 49. Direct Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 2 of the Lower Arkansas River at the Moffat Street Gage**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Lower Arkansas River, Segment 3 –Fountain Creek to John Martin Reservoir  
Normal Year (2005)



Dry Year (2004)



Wet Year (1997)

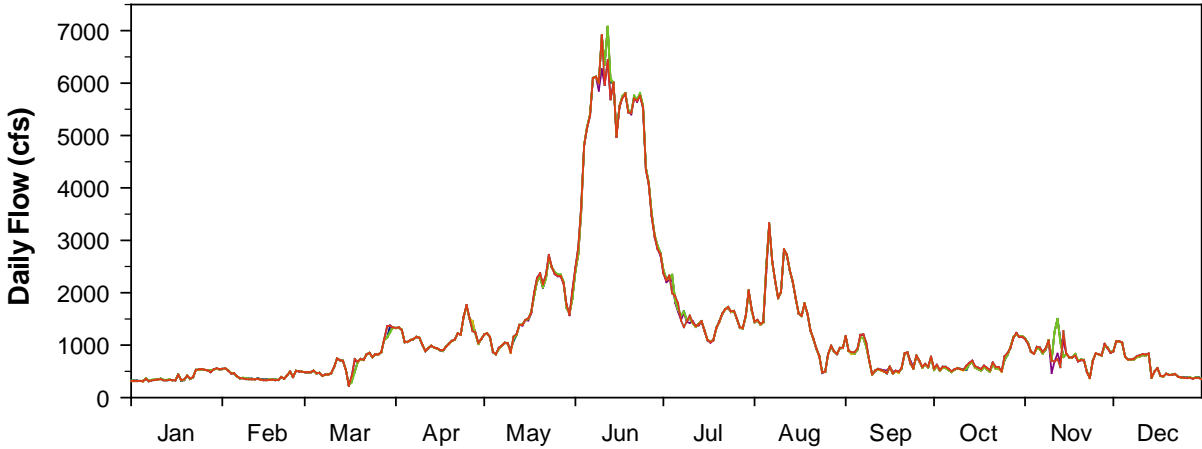


Figure 50. Direct Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 3 of the Lower Arkansas River at the Avondale Gage

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

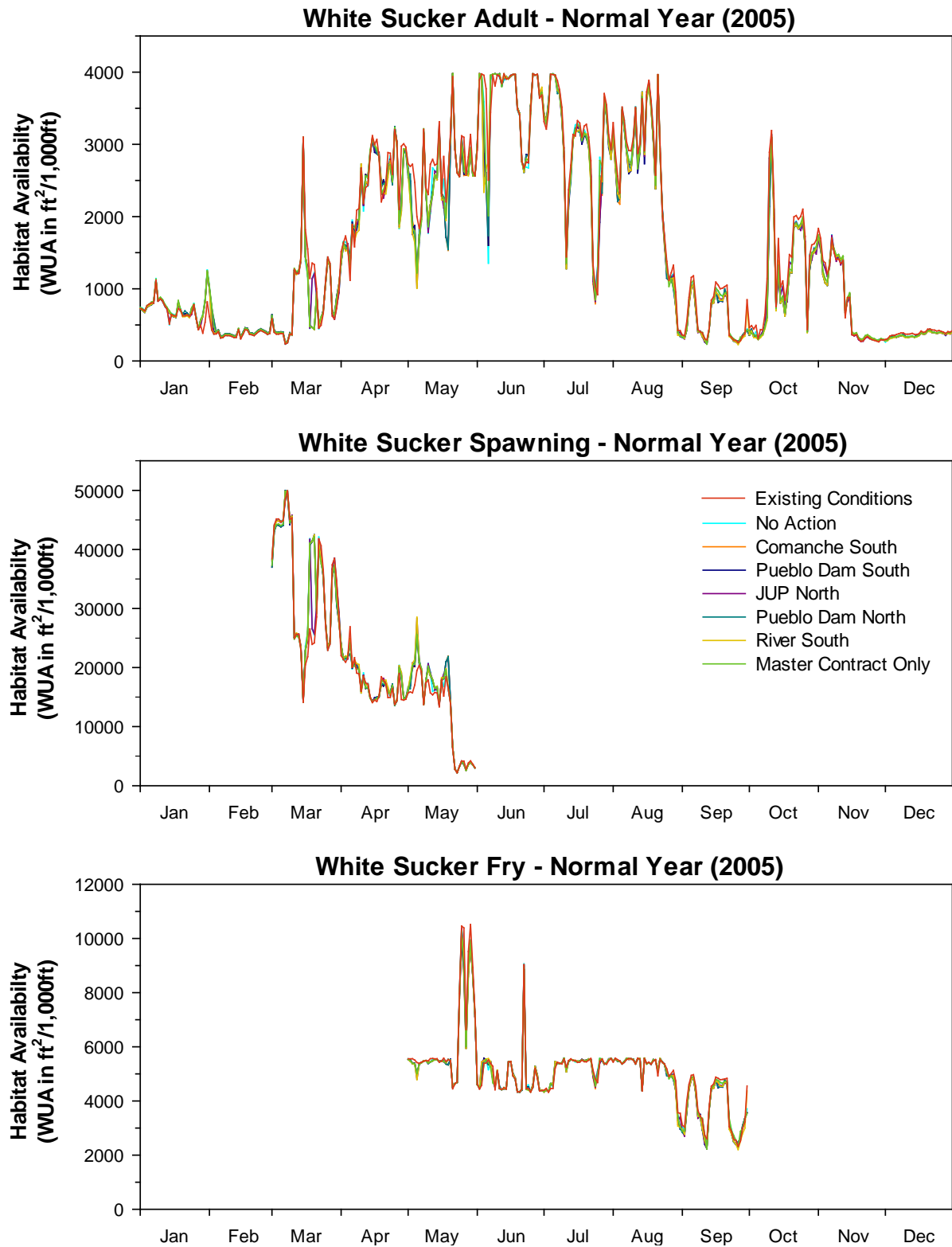


Figure 51. Direct Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of the Lower Arkansas River

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

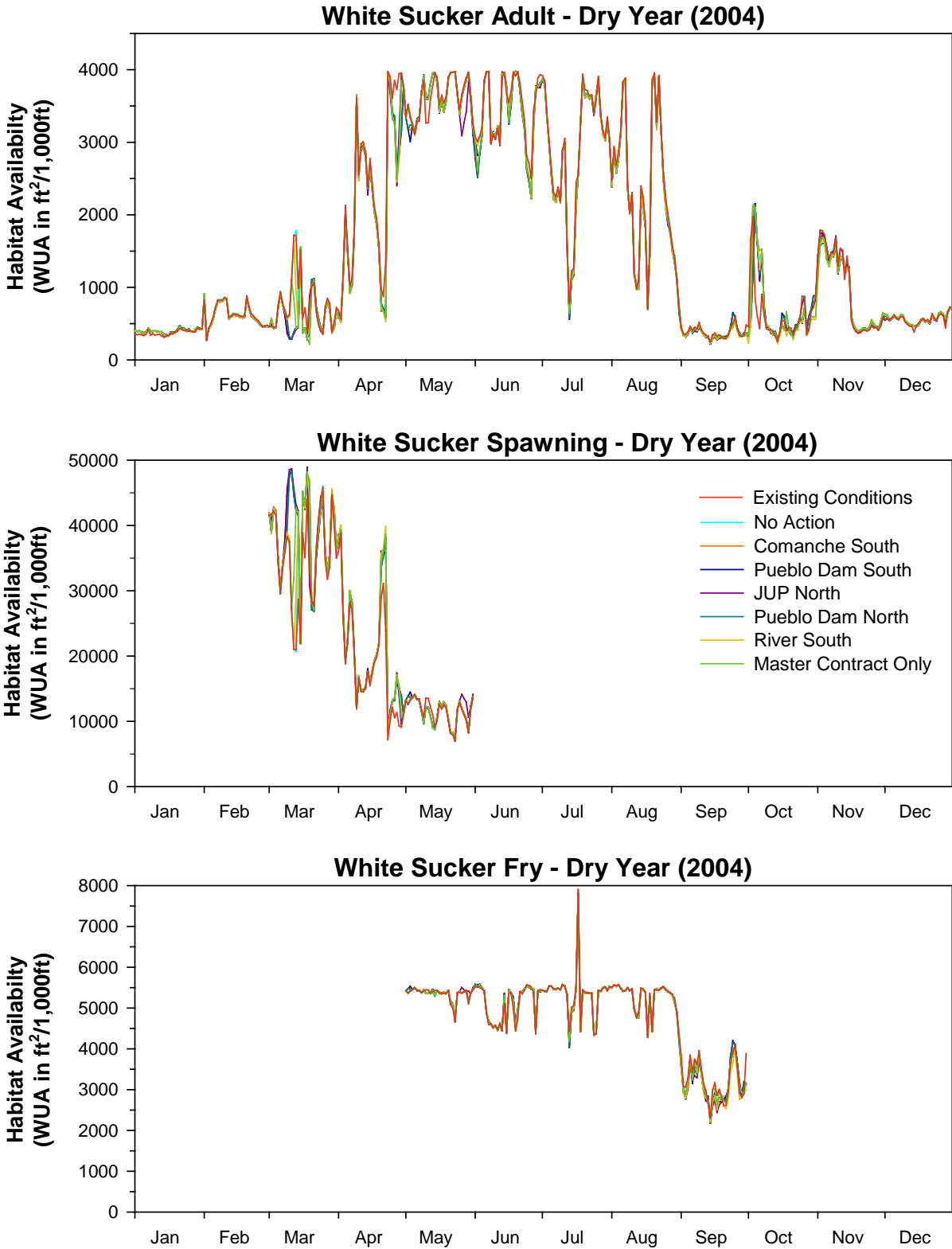


Figure 52. Direct Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of the Lower Arkansas River

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

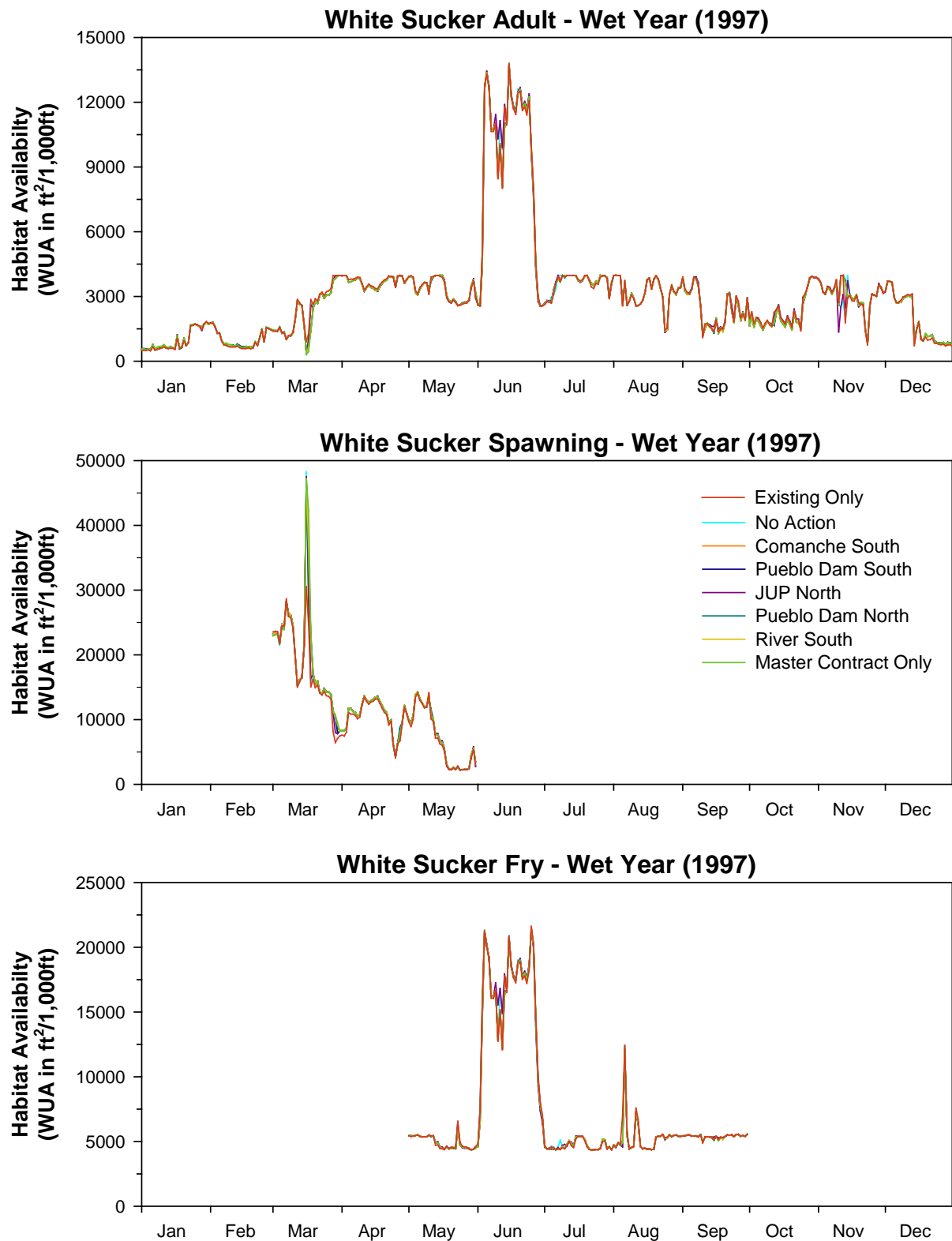


Figure 53. Direct Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of the Lower Arkansas River

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

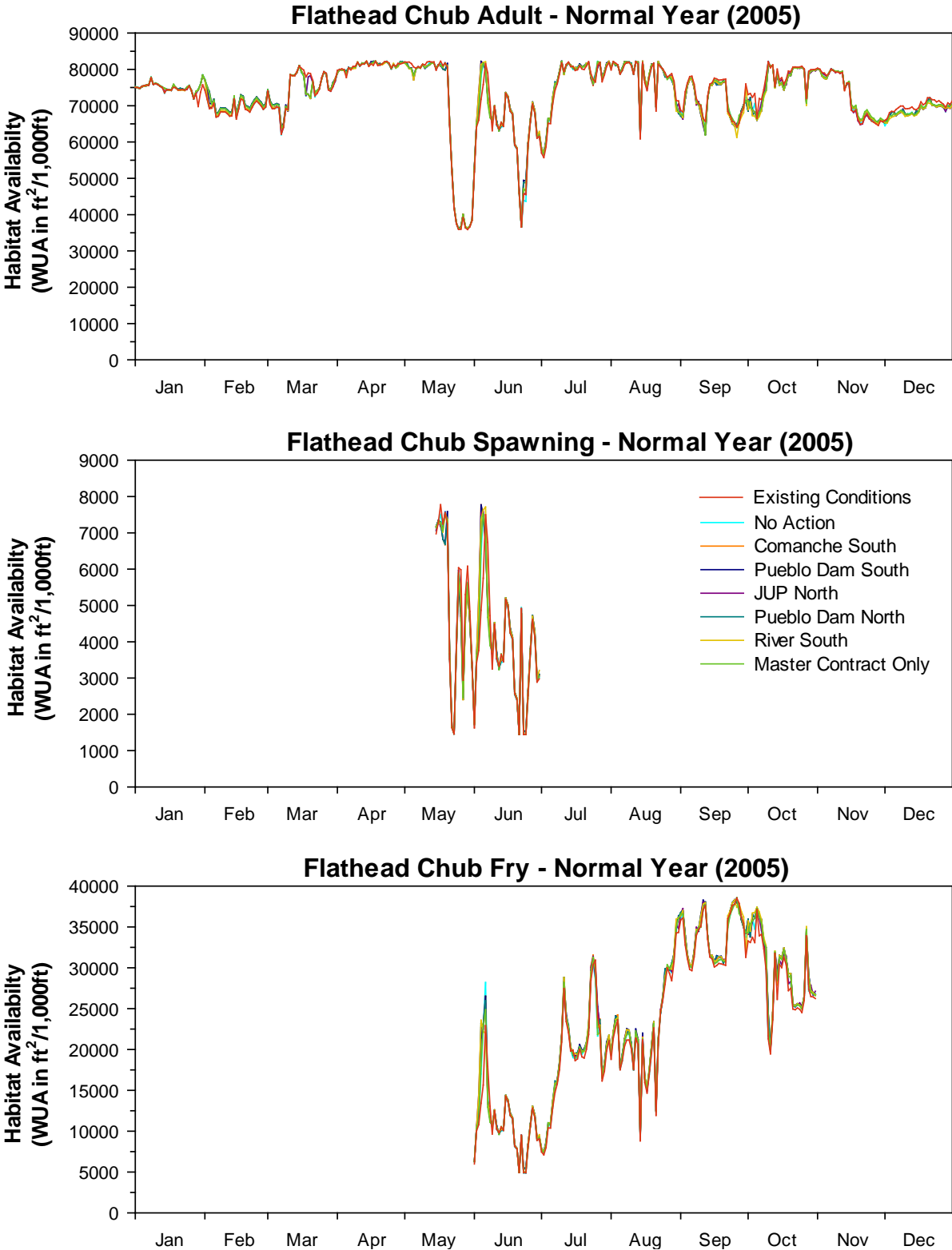


Figure 54. Direct Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of the Lower Arkansas River

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

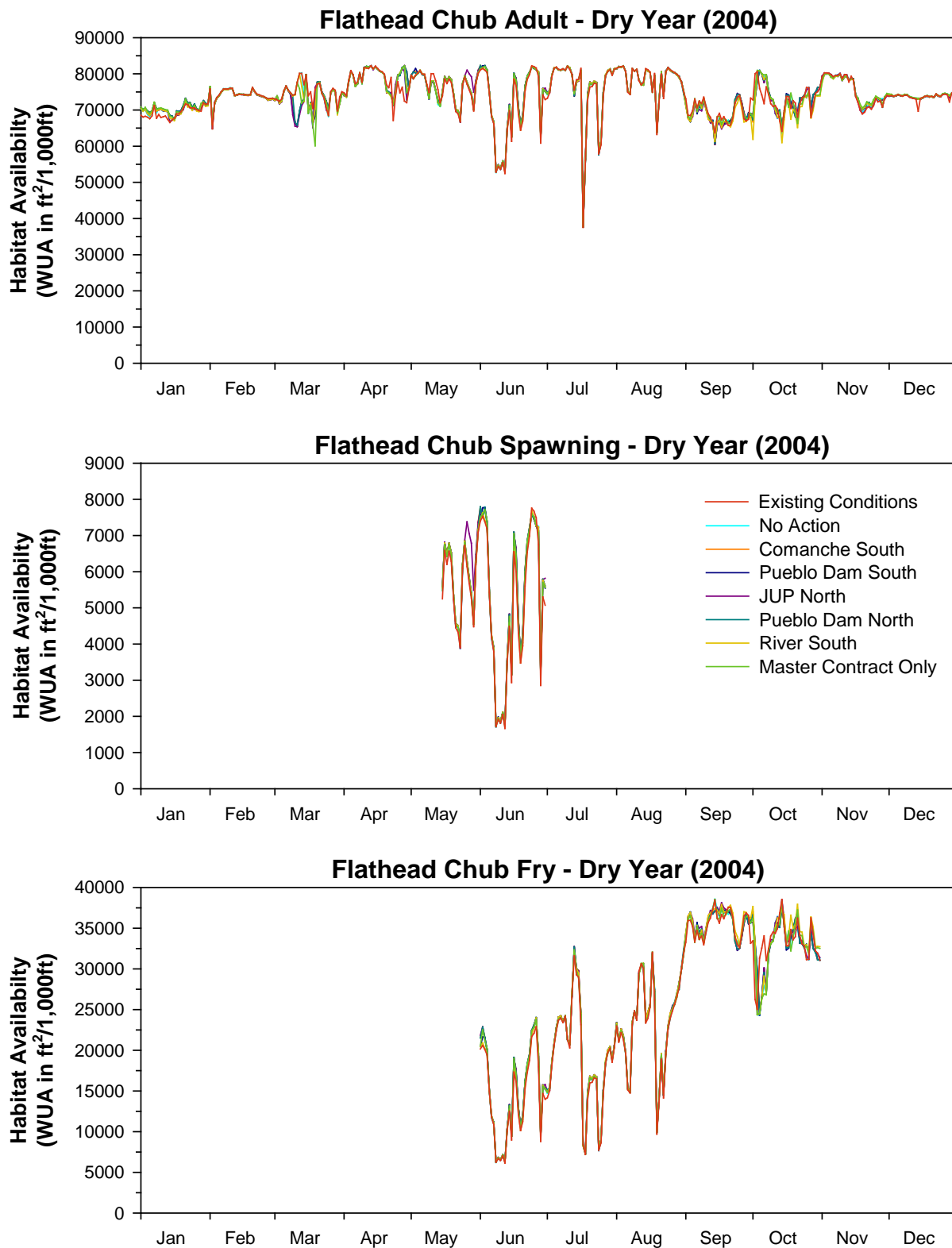


Figure 55. Direct Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of the Lower Arkansas River



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

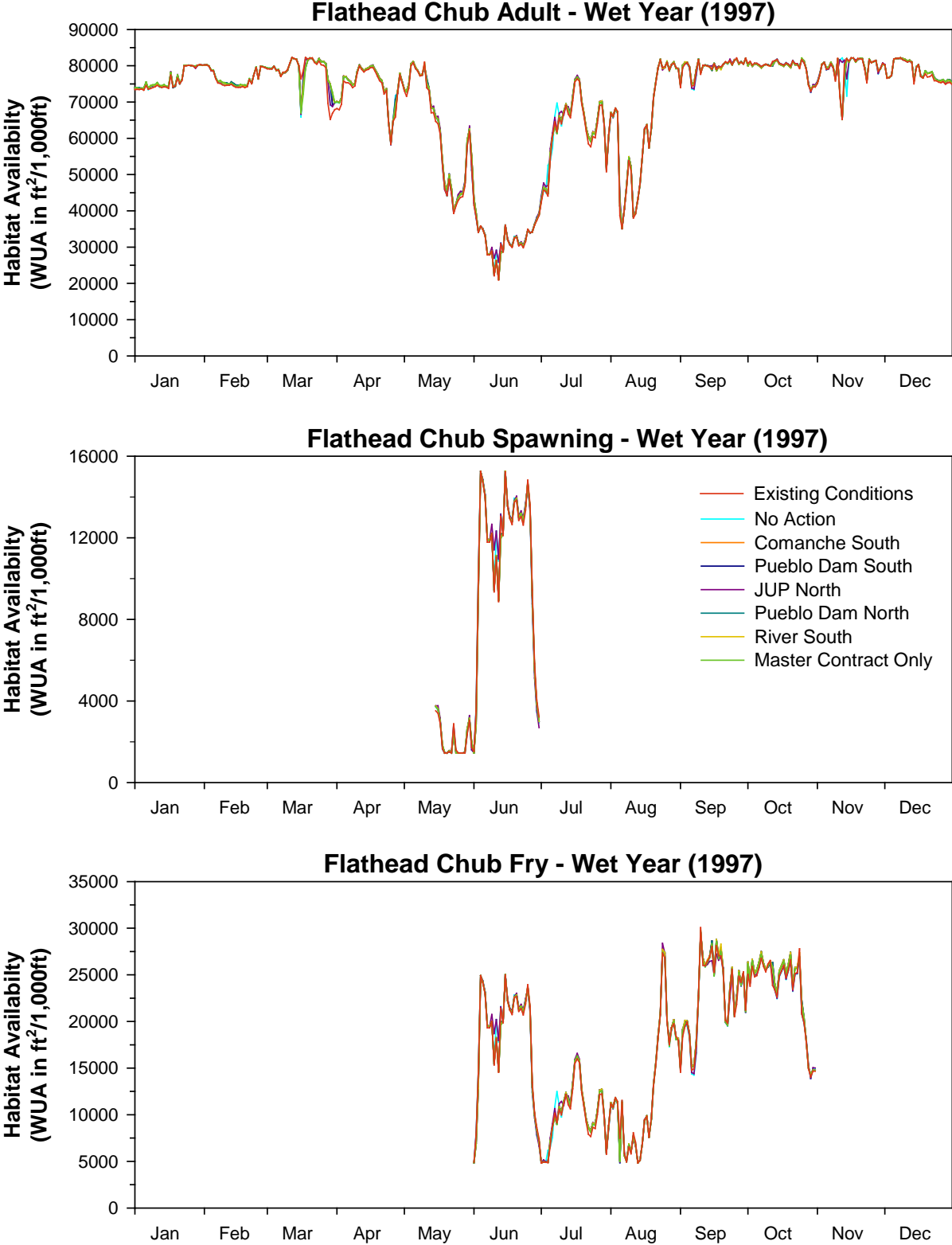
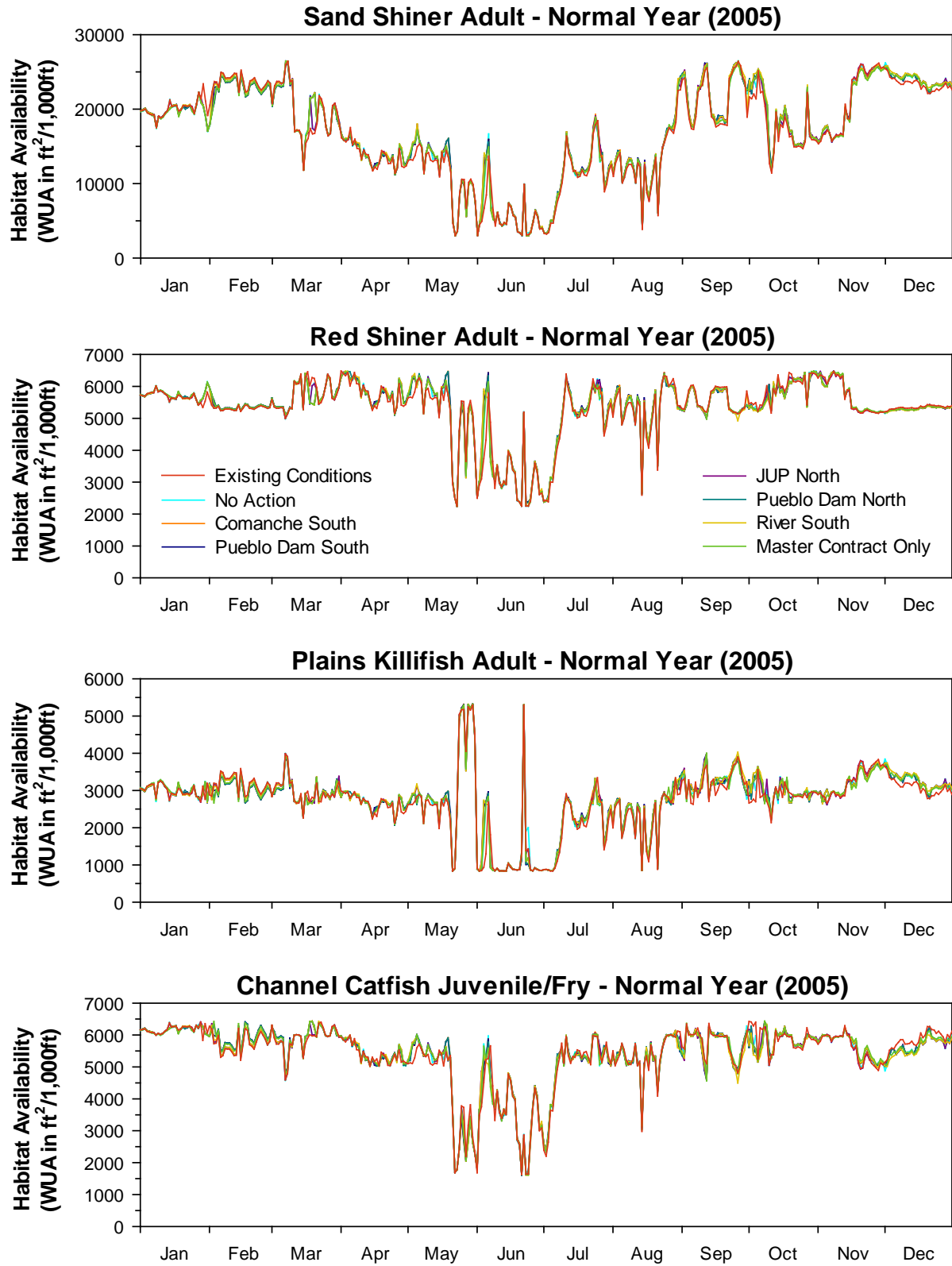


Figure 56. Direct Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of the Lower Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 57. Direct Effects Sand Shiner (Adult), Red Shiner (Adult), Plains Killifish (Adult), and Channel Catfish (Juvenile/Fry) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of the Lower Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

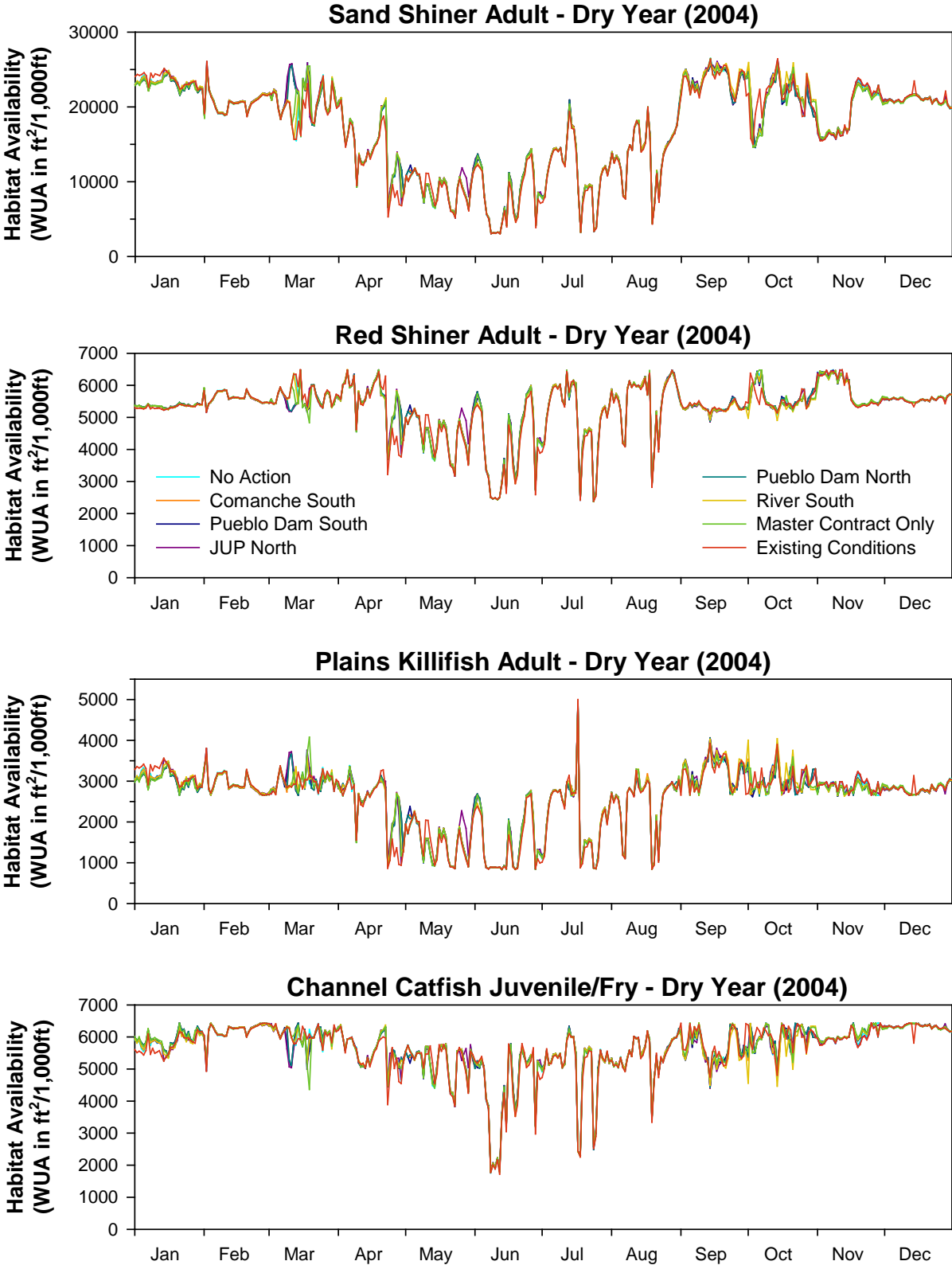
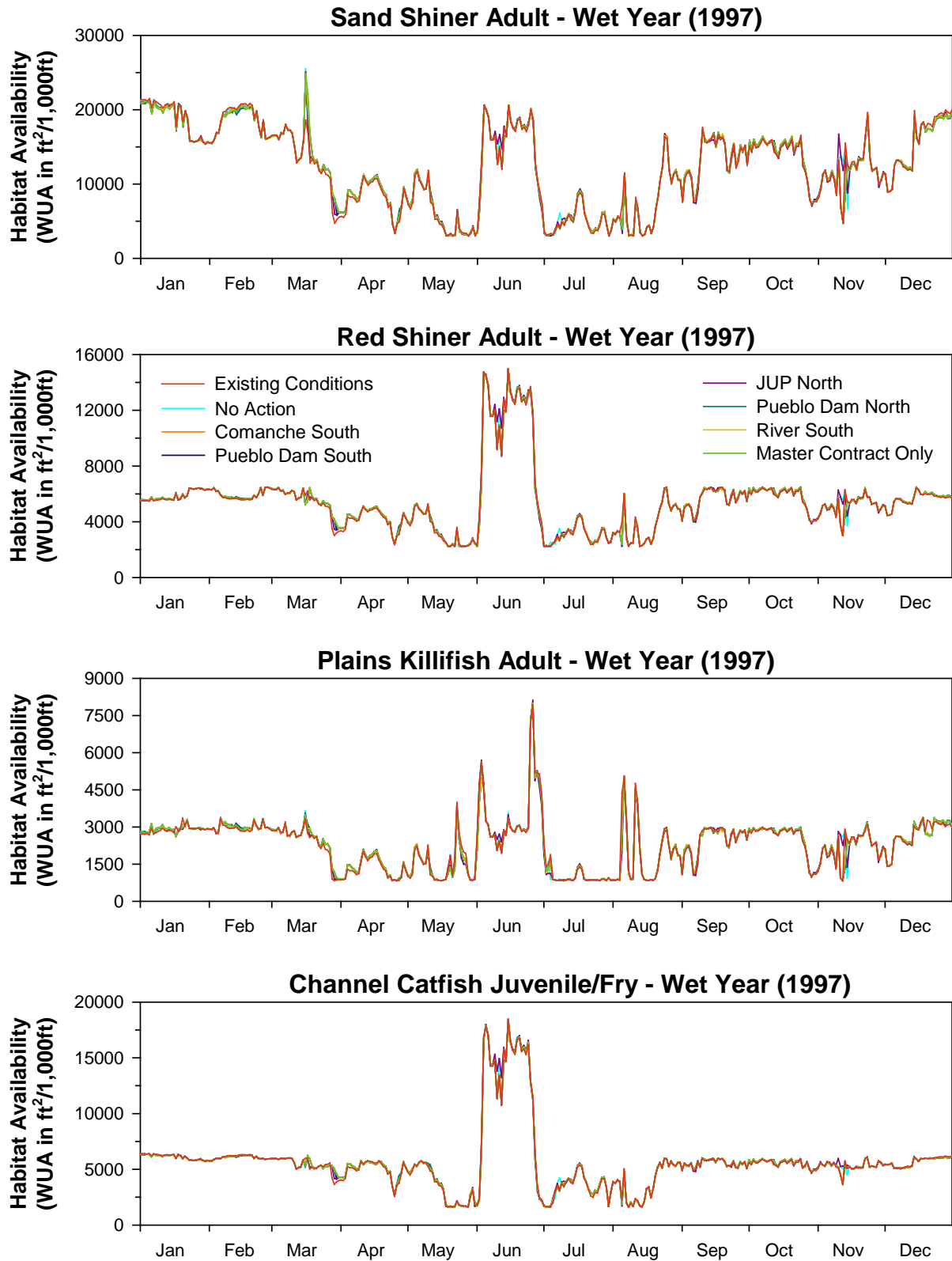


Figure 58. Direct Effects Sand Shiner (Adult), Red Shiner (Adult), Plains Killifish (Adult), and Channel Catfish (Juvenile/Fry) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of the Lower Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**










**Figure 59. Direct Effects Sand Shiner (Adult), Red Shiner (Adult), Plains Killifish (Adult), and Channel Catfish (Juvenile/Fry) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of the Lower Arkansas River**

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 15. Direct Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), Red Shiner (Adult), Plains Killifish (Adult), and Channel Catfish (Juvenile/Fry), Lower Arkansas River Segment 3

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	236	234	235	235	237	240	227	233
spawning	2,189	2,196	2,204	2,204	2,198	2,205	2,203	2,197
fry	2,322	2,260	2,233	2,233	2,260	2,255	2,201	2,226
<b>Flathead chub</b>								
adult/juvenile	35,914	35,978	36,096	36,220	35,983	36,075	36,076	36,028
spawning	1,443	1,444	1,441	1,441	1,442	1,441	1,442	1,441
fry	4,912	4,858	4,949	4,949	4,912	4,946	4,927	4,919
<b>Sand shiner</b>	3,021	3,021	3,027	3,026	3,021	3,027	3,030	3,021
<b>Red shiner</b>	2,247	2,247	2,247	2,247	2,247	2,247	2,247	2,247
<b>Plains killifish</b>	833	834	834	834	834	834	833	833
<b>Channel catfish</b>	1,629	1,637	1,608	1,608	1,628	1,607	1,609	1,614
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	<-1%	<-1%	<-1%	<1%	2%	-4%	-1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	-3%	-4%	-4%	-3%	-3%	-5%	-4%
<b>Flathead chub</b>								
adult/juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	-1%	<1%	<1%	<-1%	<1%	<1%	<1%
<b>Sand shiner</b>	--	<-1%	<1%	<1%	<-1%	<1%	<1%	<-1%
<b>Red shiner</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Plains killifish</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Channel catfish</b>	--	<1%	-1%	-1%	<-1%	-1%	-1%	<-1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	250	248	219	221	220	222	225	216
spawning	7,004	6,975	7,184	7,179	6,988	7,187	7,185	7,158
fry	2,293	2,304	2,171	2,175	2,173	2,181	2,203	2,302
<b>Flathead chub</b>								
adult/juvenile	37,572	37,661	37,753	37,714	37,705	37,756	37,786	37,669
spawning	1,669	1,703	1,756	1,739	1,754	1,756	1,754	1,724
fry	6,122	6,201	6,324	6,284	6,319	6,324	6,319	6,250
<b>Sand shiner</b>	3,034	3,050	3,076	3,068	3,075	3,076	3,075	3,060
<b>Red shiner</b>	2,386	2,374	2,379	2,390	2,376	2,390	2,376	2,374
<b>Plains killifish</b>	837	834	835	835	833	835	835	836
<b>Channel catfish</b>	1,720	1,759	1,820	1,801	1,818	1,821	1,818	1,784
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>White sucker</b>								
adult/juvenile	--	<-1%	-12%	-12%	-12%	-11%	-10%	-14%
spawning	--	<-1%	3%	2%	<-1%	3%	3%	2%
fry	--	<1%	-5%	-5%	-5%	-5%	-4%	<1%
<b>Flathead chub</b>								
adult/juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	2%	5%	4%	5%	5%	5%	3%
fry	--	1%	3%	3%	3%	3%	3%	2%
<b>Sand shiner</b>	--	<1%	1%	1%	1%	1%	1%	<1%
<b>Red shiner</b>	--	<-1%	<-1%	<1%	<-1%	<1%	<-1%	<-1%
<b>Plains killifish</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Channel catfish</b>	--	2%	6%	5%	6%	6%	6%	4%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	480	296	353	329	314	329	329	322
spawning	2,223	2,195	2,197	2,197	2,196	2,196	2,196	2,191
fry	4,319	4,328	4,335	4,334	4,341	4,334	4,334	4,327
<b>Flathead chub</b>								
adult/juvenile	20,957	22,252	21,154	21,154	25,886	21,154	21,154	21,073
spawning	1,442	1,442	1,442	1,442	1,443	1,442	1,442	1,442
fry	4,820	4,810	4,839	4,839	4,815	4,838	4,838	4,833
<b>Sand shiner</b>	3,023	3,021	3,021	3,021	3,021	3,021	3,021	3,021
<b>Red shiner</b>	2,247	2,247	2,247	2,247	2,247	2,247	2,247	2,247
<b>Plains killifish</b>	833	834	833	833	835	833	833	833
<b>Channel catfish</b>	1,610	1,608	1,610	1,610	1,609	1,610	1,610	1,608
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	-38%	-26%	-31%	-35%	-31%	-31%	-33%
spawning	--	-1%	-1%	-1%	-1%	-1%	-1%	-1%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Flathead chub</b>								
adult/juvenile	--	6%	<1%	<1%	24%	<1%	<1%	<1%
spawning	--	<1%	<-1%	<1%	<1%	<-1%	<-1%	<-1%
fry	--	<-1%	<1%	<1%	<-1%	<1%	<1%	<1%
<b>Sand shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Red shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Plains killifish</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Channel catfish</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 16. Direct Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), Red Shiner (Adult), Plains Killifish (Adult), and Channel Catfish (Juvenile/Fry), Lower Arkansas River Segment 3

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	1,216	1,185	1,142	1,119	1,170	1,140	1,124	1,142
Spawning	18,222	19,377	19,770	19,804	19,272	19,952	19,728	19,647
fry	5,356	5,260	5,338	5,342	5,350	5,348	5,362	5,280
<b>Flathead chub</b>								
adult/juvenile	75,024	75,135	74,941	74,933	74,982	74,948	74,885	75,039
spawning	4,088	3,981	4,135	4,135	4,068	4,137	4,132	3,958
fry	22,680	23,010	24,086	24,087	23,585	23,859	23,370	23,170
<b>Sand shiner</b>	17,159	17,262	17,433	17,531	17,312	17,441	17,507	17,430
<b>Red shiner</b>	5,417	5,416	5,427	5,427	5,425	5,433	5,423	5,427
<b>Plains killifish</b>	2,855	2,897	2,899	2,897	2,888	2,900	2,906	2,890
<b>Channel catfish</b>	5,671	5,649	5,655	5,666	5,622	5,668	5,617	5,668
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	-3%	-6%	-8%	-4%	-6%	-7%	-6%
spawning	--	6%	8%	9%	6%	9%	8%	8%
fry	--	-2%	<-1%	<-1%	<-1%	<-1%	<1%	-1%
<b>Flathead chub</b>								
adult/juvenile	--	<1%	<-1%	<-1%	<-1%	<-1%	<-1%	<1%
spawning	--	-3%	1%	1%	<-1%	1%	1%	-3%
fry	--	1%	6%	6%	4%	5%	3%	2%
<b>Sand shiner</b>	--	<1%	2%	2%	<1%	2%	2%	2%
<b>Red shiner</b>	--	<-1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Plains killifish</b>	--	1%	2%	1%	1%	2%	2%	1%
<b>Channel catfish</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	823	801	735	736	728	738	735	749
spawning	17,334	17,688	17,654	17,826	17,909	17,655	17,655	17,658
fry	5,372	5,366	5,367	5,368	5,375	5,367	5,367	5,367
<b>Flathead chub</b>								
adult/juvenile	74,176	74,306	74,173	74,174	74,163	74,177	74,194	74,315
spawning	5,433	5,696	5,789	5,793	5,991	5,789	5,704	5,700
fry	24,836	24,536	24,798	24,797	24,500	24,804	24,723	24,547
<b>Sand shiner</b>	19,120	19,269	19,723	19,716	19,776	19,706	19,729	19,630
<b>Red shiner</b>	5,431	5,452	5,444	5,442	5,427	5,445	5,435	5,451
<b>Plains killifish</b>	2,815	2,819	2,803	2,802	2,806	2,803	2,809	2,810
<b>Channel catfish</b>	5,820	5,815	5,889	5,885	5,811	5,891	5,830	5,877
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								

# Arkansas Valley Conduit EIS

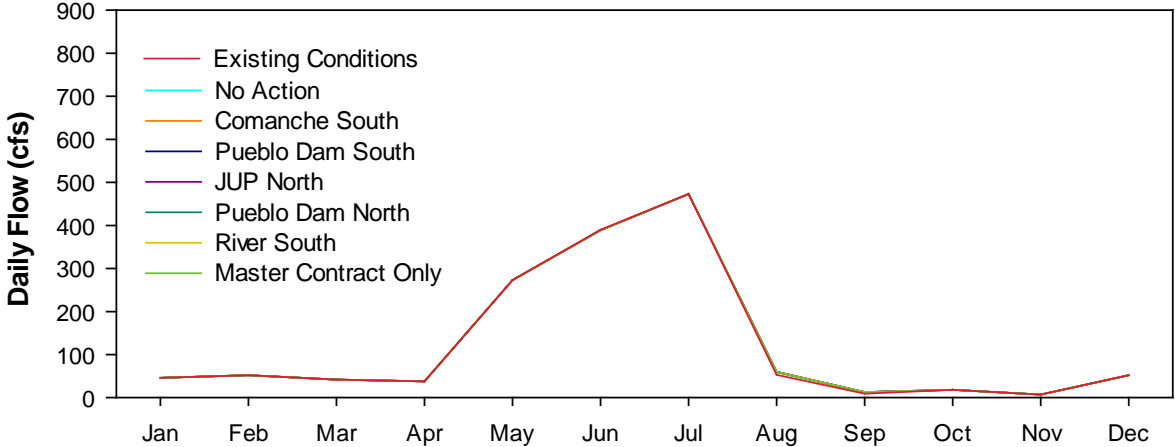
## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>White sucker</b>								
adult/juvenile	--	-3%	-11%	-10%	-12%	-10%	-11%	-9%
spawning	--	2%	2%	3%	3%	2%	2%	2%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Flathead chub</b>								
adult/juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
spawning	--	5%	7%	7%	10%	7%	5%	5%
fry	--	-1%	<-1%	<-1%	-1%	<-1%	<-1%	-1%
<b>Sand shiner</b>	--	<-1%	3%	3%	3%	3%	3%	3%
<b>Red shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Plains killifish</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Channel catfish</b>	--	<-1%	1%	1%	<-1%	1%	<-1%	<-1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	2,901	2,907	2,909	2,912	2,906	2,909	2,910	2,924
spawning	11,093	11,663	11,732	11,731	11,747	11,728	11,730	11,646
fry	5,366	5,368	5,364	5,364	5,368	5,365	5,364	5,365
<b>Flathead chub</b>								
adult/juvenile	75,870	76,429	76,346	76,211	76,402	76,348	76,346	76,351
spawning	9,352	9,417	9,125	9,125	10,001	9,122	9,124	9,267
fry	18,610	19,114	19,134	19,130	19,154	19,125	19,127	18,981
<b>Sand shiner</b>	12,351	12,465	12,521	12,520	12,476	12,521	12,520	12,493
<b>Red shiner</b>	5,477	5,473	5,490	5,489	5,470	5,489	5,489	5,463
<b>Plains killifish</b>	2,596	2,599	2,615	2,615	2,606	2,615	2,611	2,598
<b>Channel catfish</b>	5,533	5,502	5,518	5,512	5,506	5,511	5,512	5,507
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
spawning	--	5%	6%	6%	6%	6%	6%	5%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Flathead chub</b>								
adult/juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
spawning	--	<-1%	-2%	-2%	7%	-2%	-2%	<-1%
fry	--	3%	3%	3%	3%	3%	3%	2%
<b>Sand shiner</b>	--	<-1%	1%	1%	1%	1%	1%	1%
<b>Red shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Plains killifish</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Channel catfish</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%

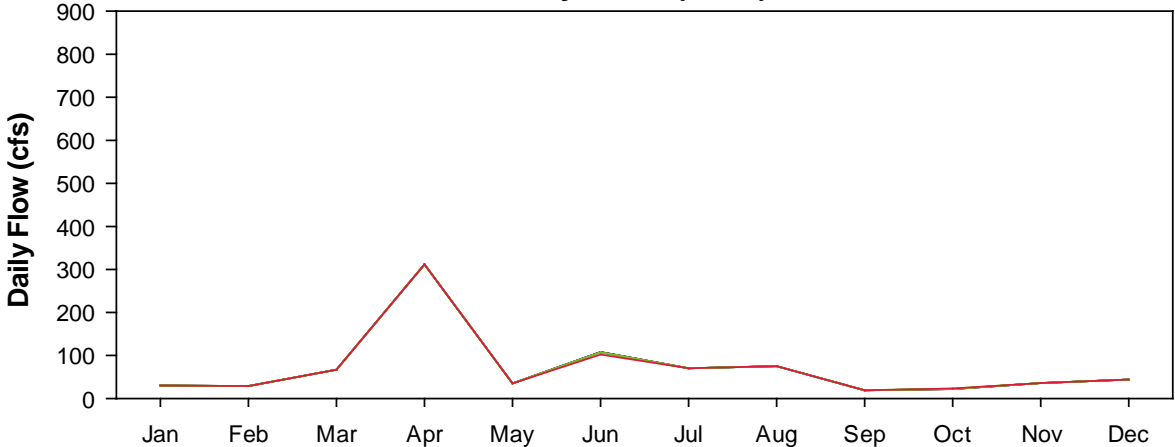


Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Lower Arkansas River, Segment 4 – John Martin Reservoir to Kansas State Line  
Normal Year (2005)



Dry Year (2004)



Wet Year (1997)

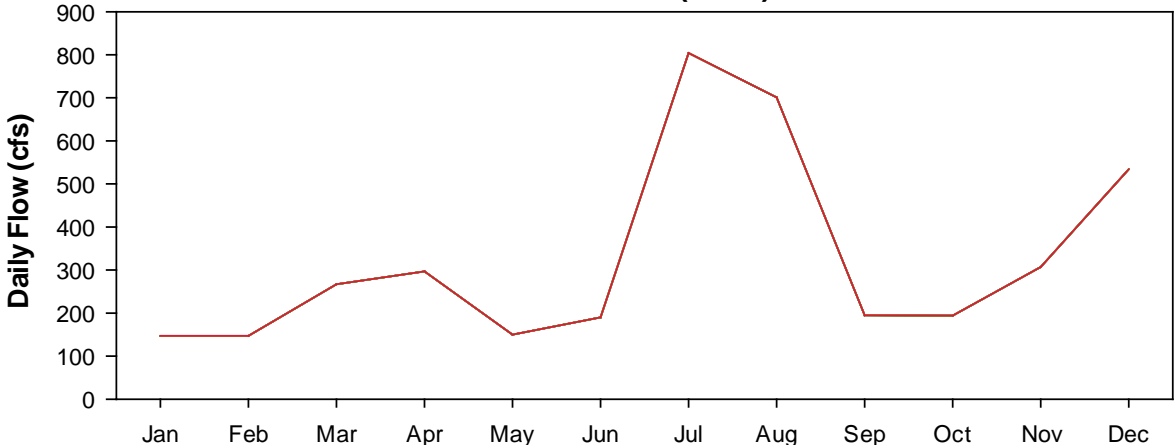
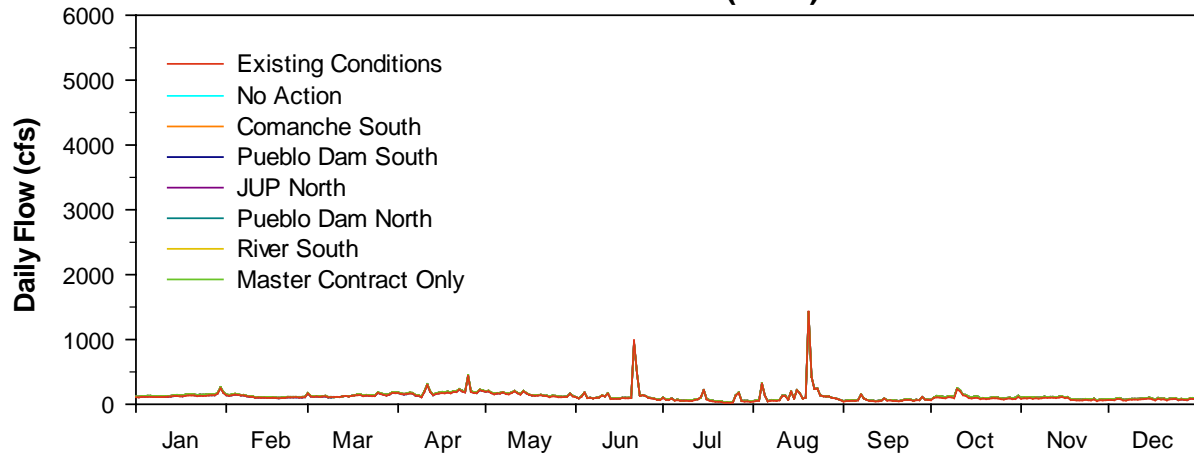


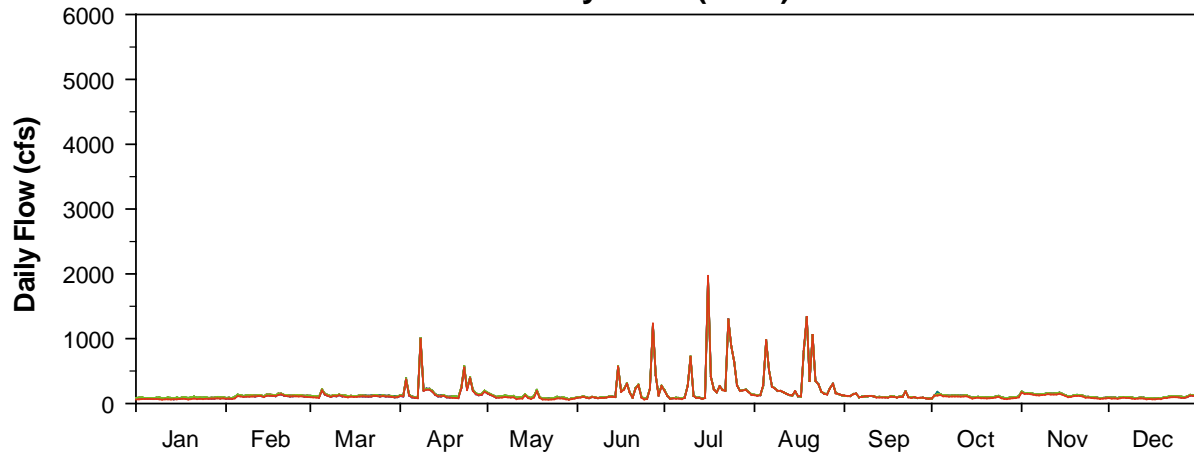
Figure 60. Direct Effects Mean Monthly Streamflow for All Alternatives and Existing Conditions for Segment 4 of the Lower Arkansas River at the Granada Gage

**Arkansas Valley Conduit EIS  
Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**

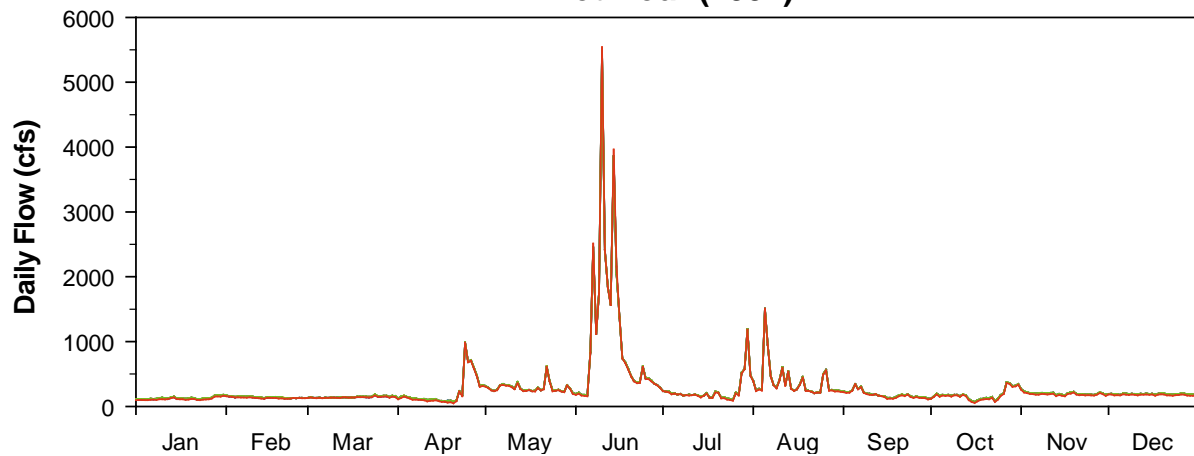
**Fountain Creek, Segment 3 – Security to County Line  
Normal Year (2005)**



**Dry Year (2004)**



**Wet Year (1997)**



**Figure 61. Direct Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 3 of Fountain Creek at the Near Fountain Gage**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

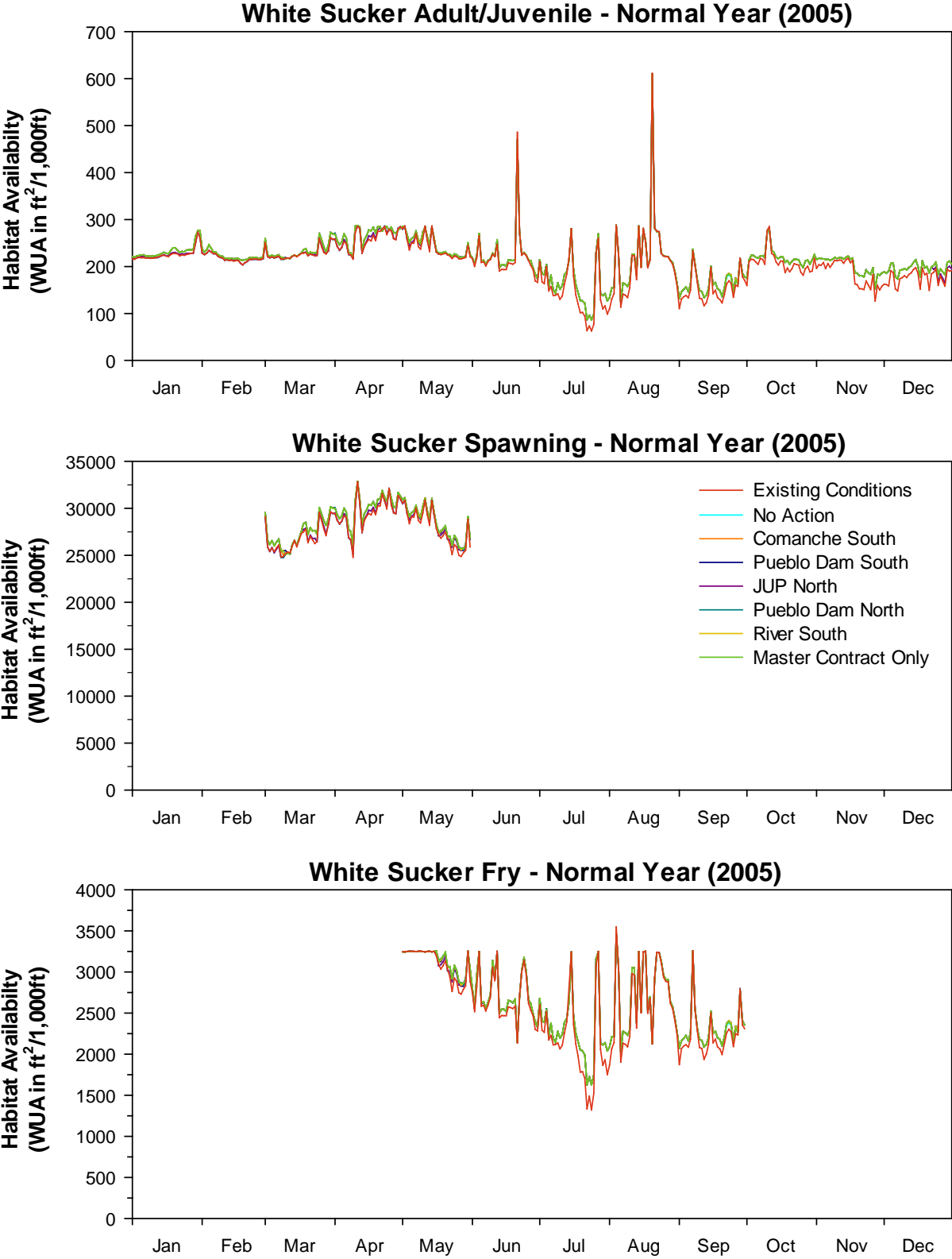


Figure 62. Direct Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of Fountain Creek

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

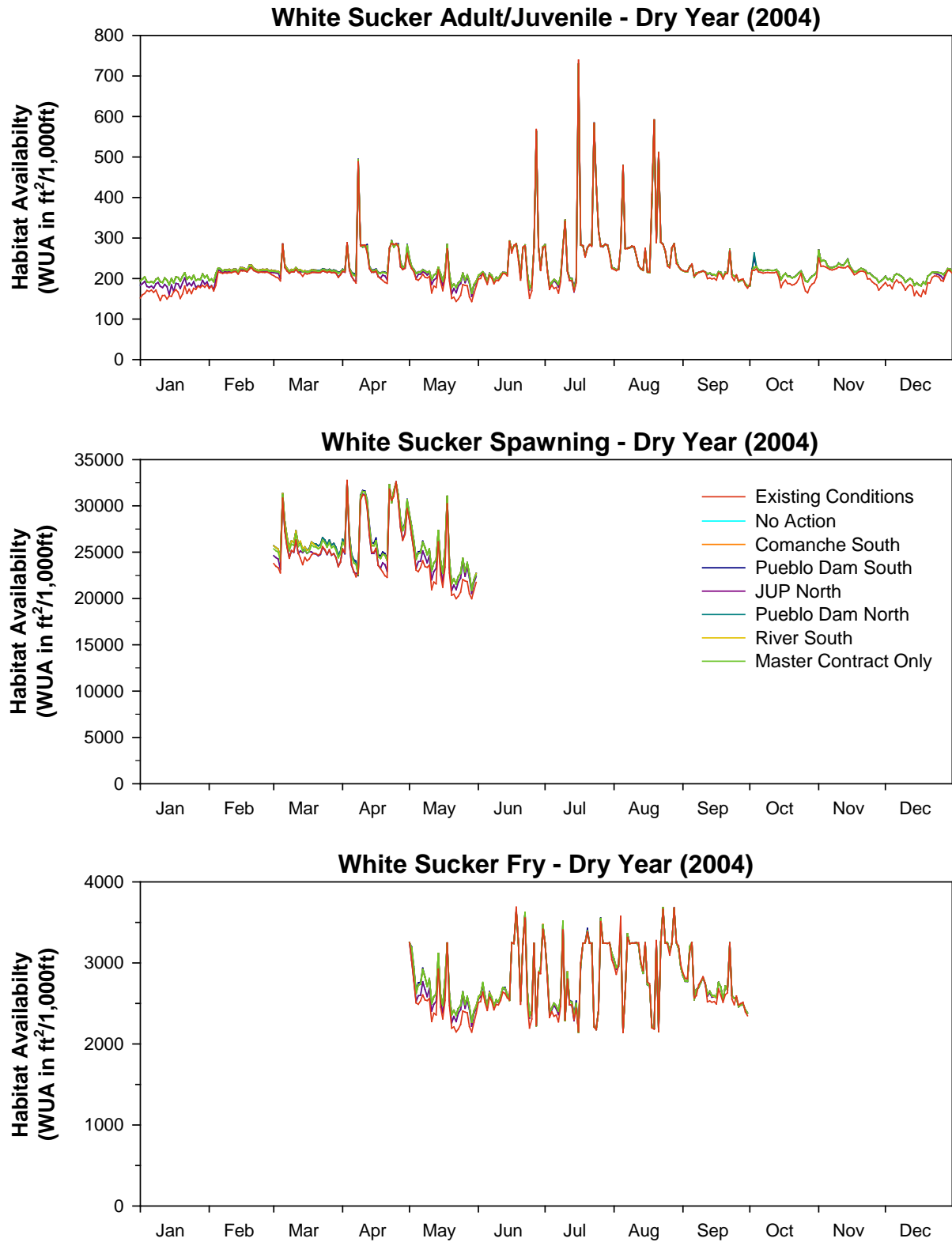


Figure 63. Direct Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of Fountain Creek

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

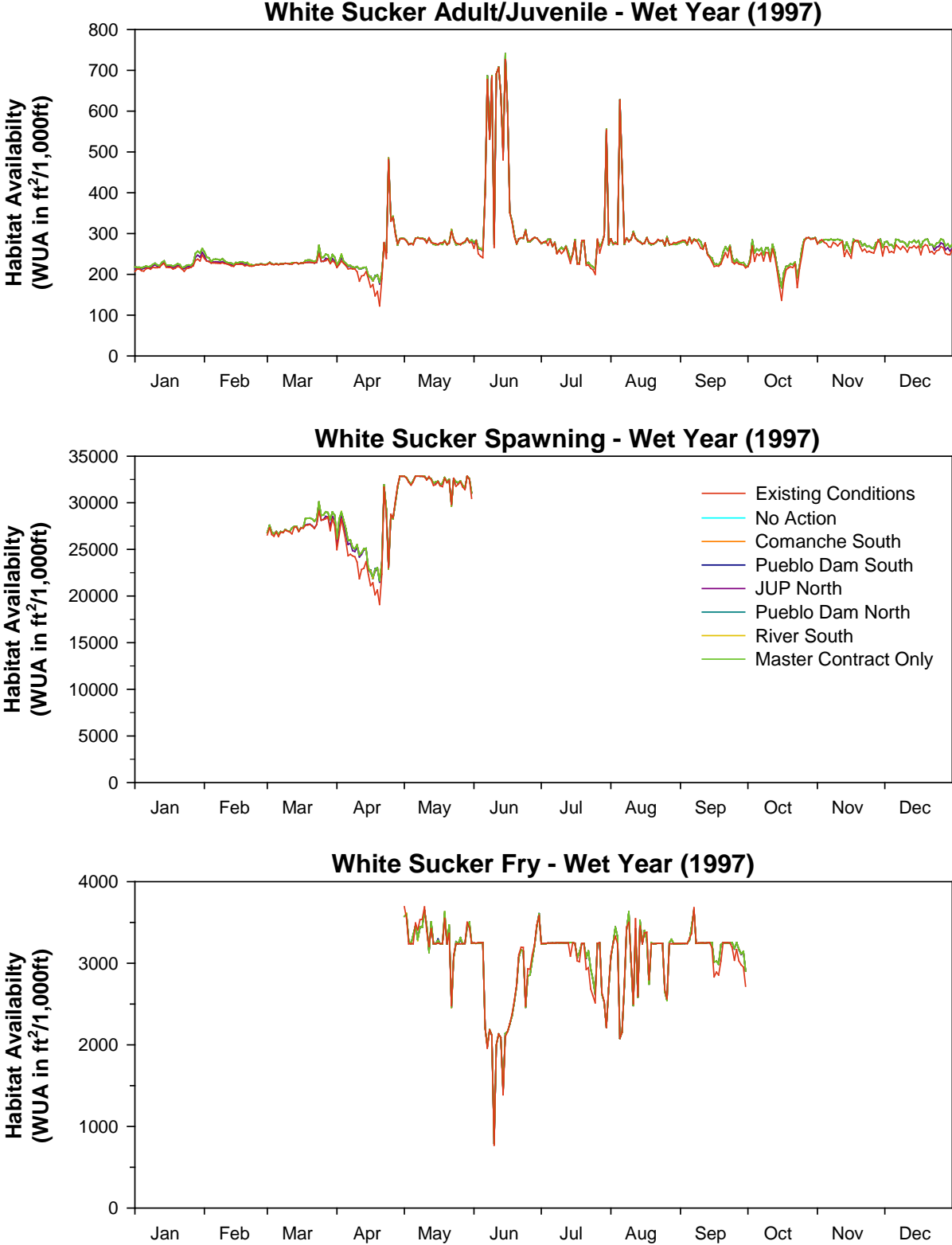
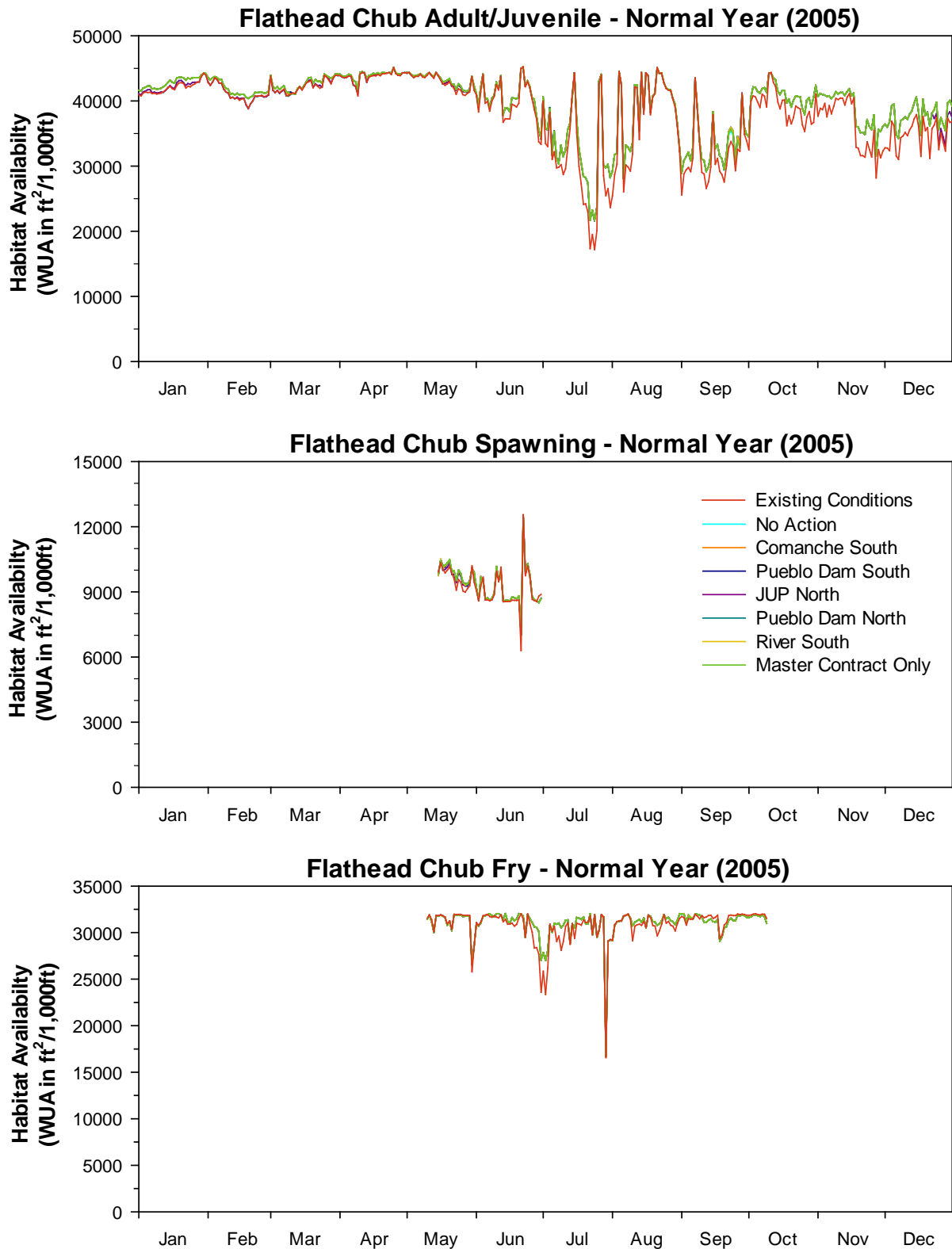


Figure 64. Direct Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of Fountain Creek

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 65. Direct Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of Fountain Creek**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

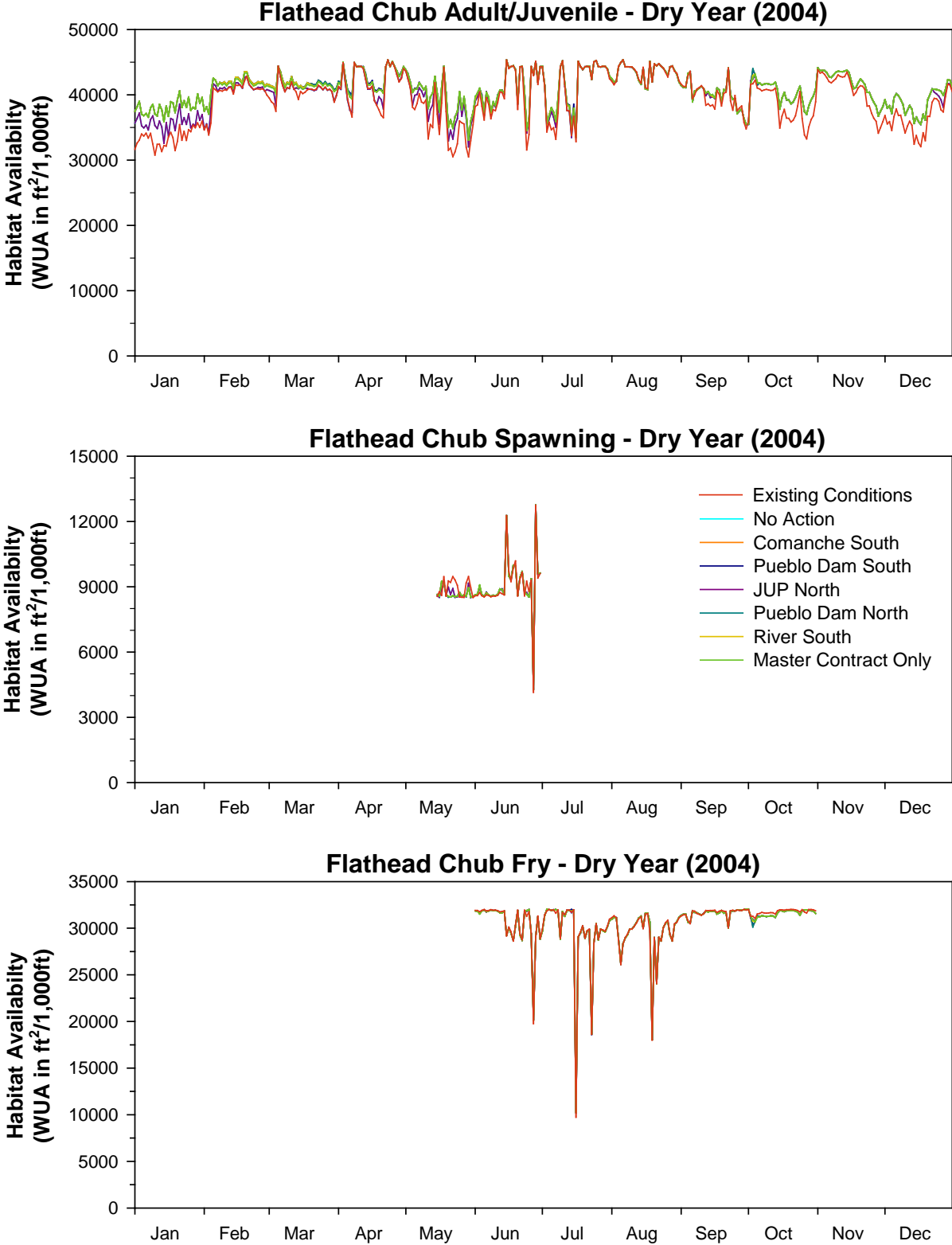


Figure 66. Direct Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of Fountain Creek

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

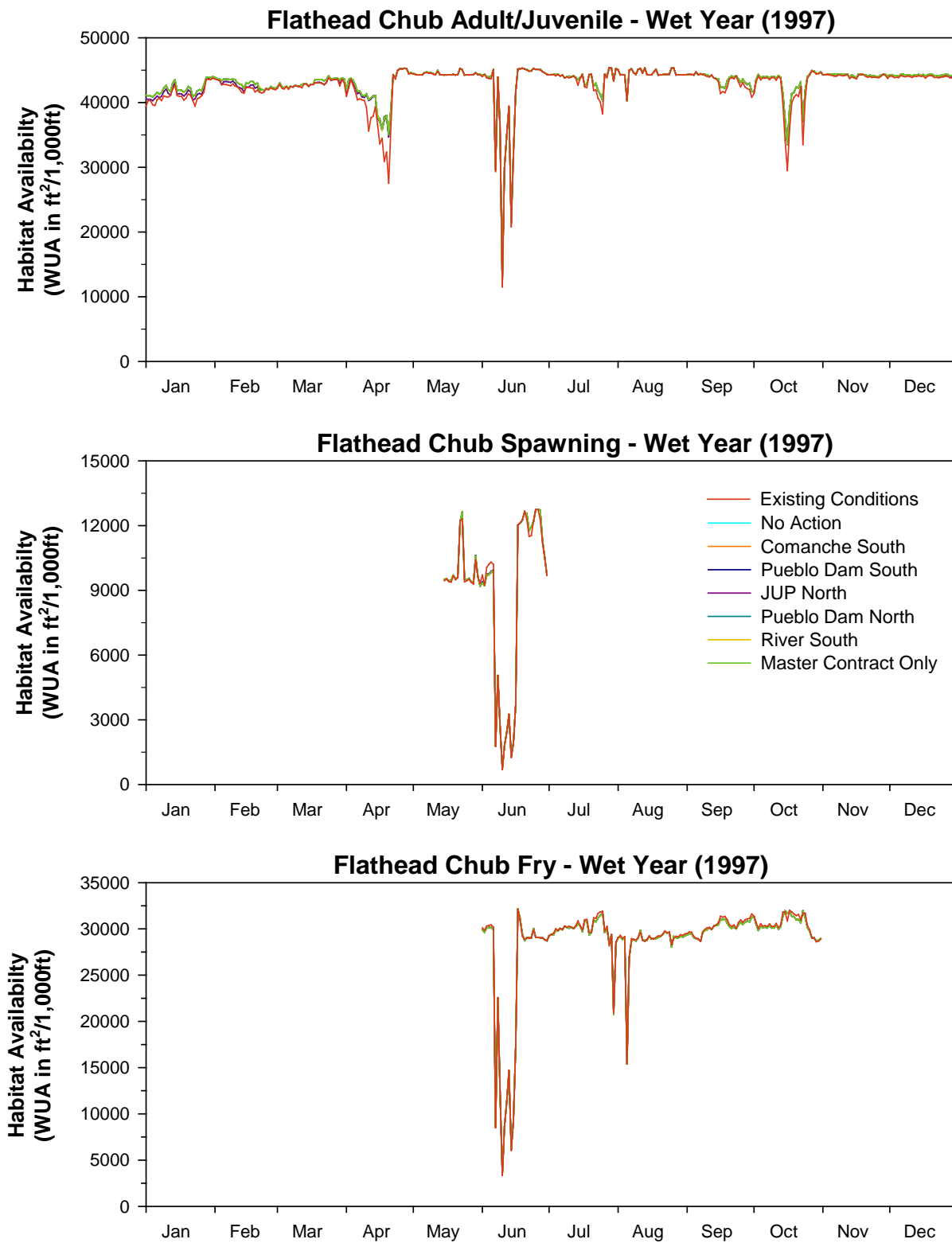


Figure 67. Direct Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of Fountain Creek



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

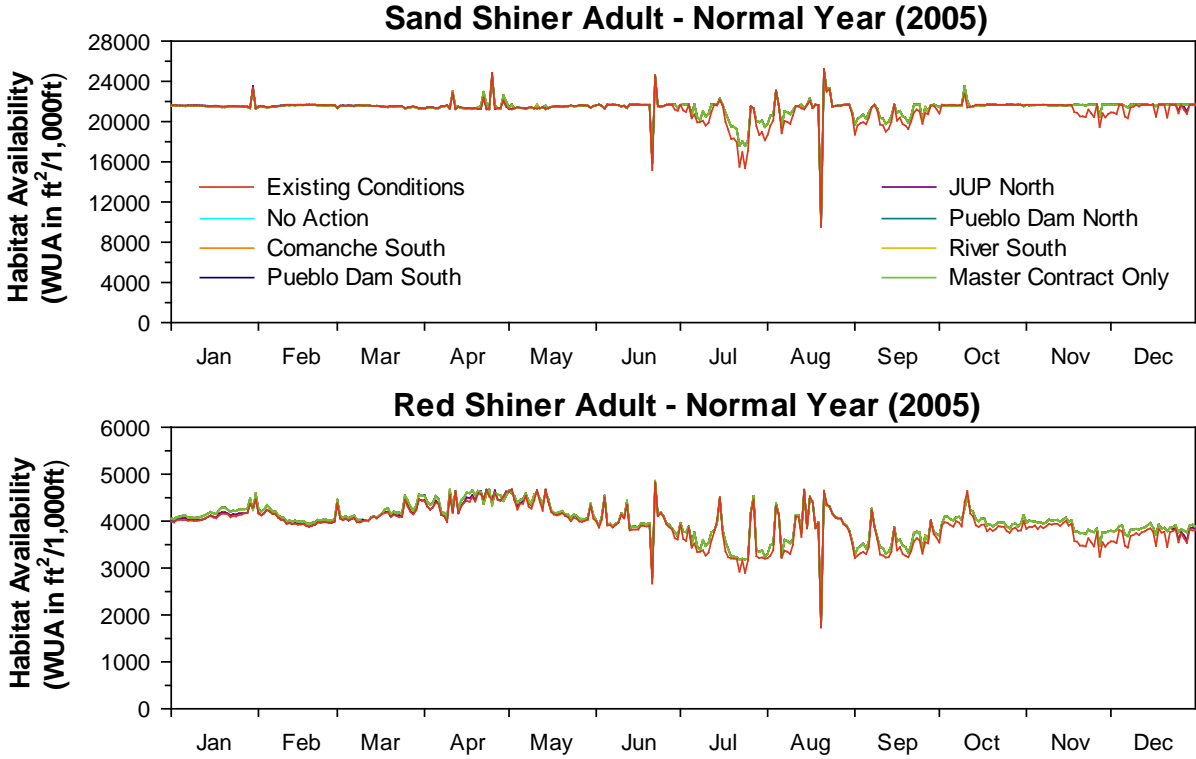


Figure 68. Direct Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of Fountain Creek.

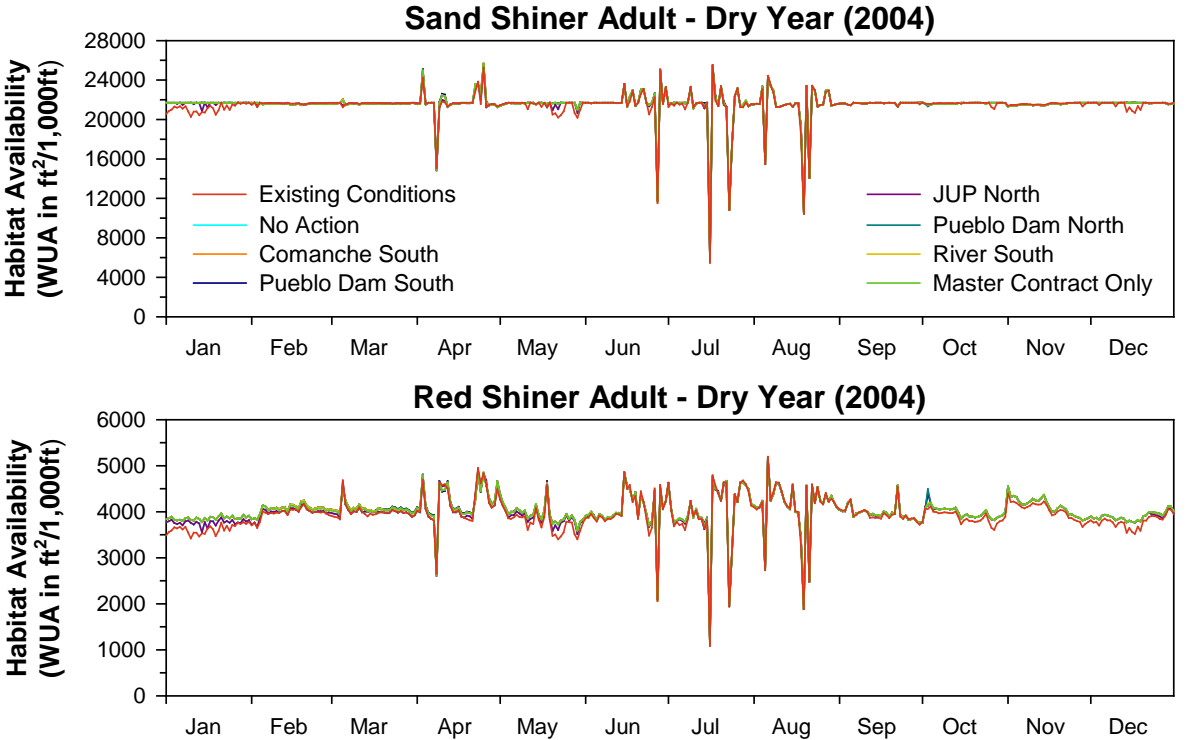


Figure 69. Direct Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of Fountain Creek

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

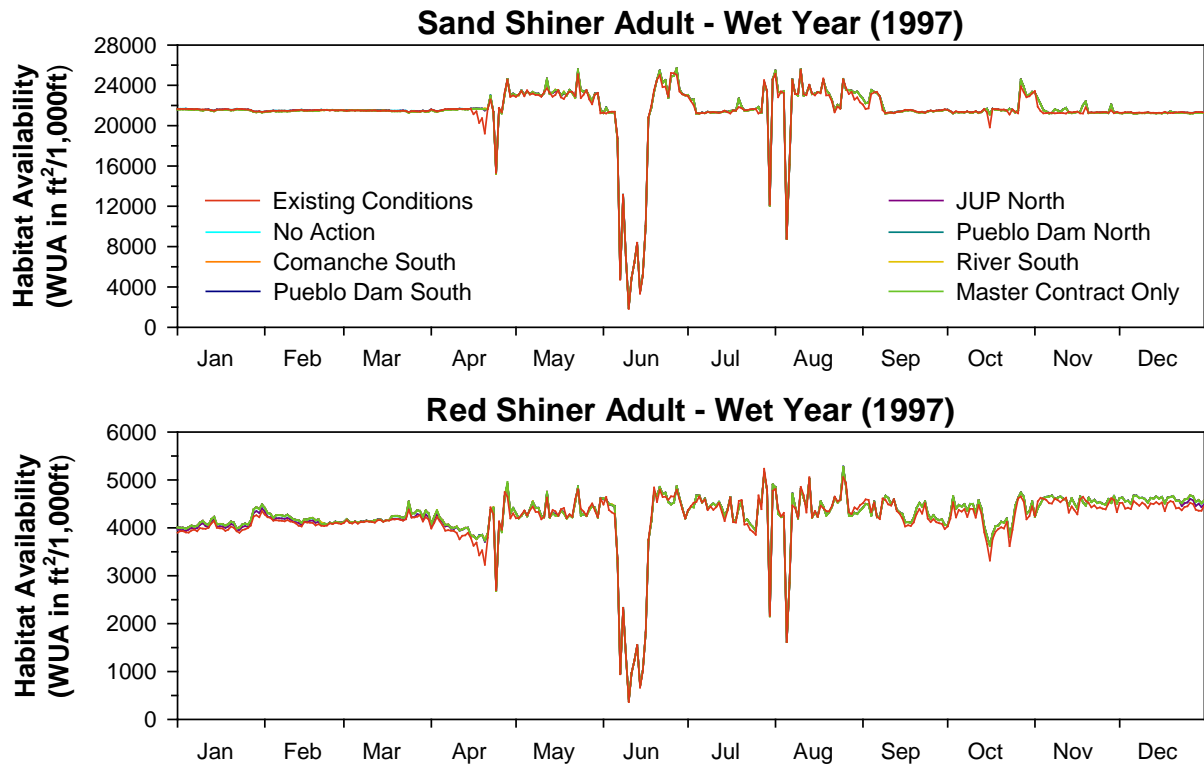









Figure 70. Direct Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of Fountain Creek

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 17. Direct Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), and Red Shiner (Adult), Fountain Creek Segment 3

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	63	86	87	87	86	86	86	86
spawning	24,792	24,756	25,068	25,140	24,759	24,770	25,090	25,090
fry	1,321	1,624	1,625	1,625	1,624	1,624	1,624	1,624
<b>Flathead chub</b>								
adult/juvenile	17,170	21,636	21,650	21,650	21,636	21,646	21,648	21,648
spawning	6,302	7,032	7,024	7,021	7,032	7,025	7,025	7,024
fry	16,568	16,726	16,726	16,726	16,726	16,726	16,726	16,726
<b>Sand shiner</b>	9,547	9,646	9,646	9,646	9,646	9,646	9,646	9,646
<b>Red shiner</b>	1,739	1,755	1,755	1,755	1,755	1,755	1,755	1,755
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	37%	37%	37%	37%	37%	37%	37%
spawning	--	<1%	1%	1%	<1%	<1%	1%	1%
fry	--	23%	23%	23%	23%	23%	23%	23%
<b>Flathead chub</b>								
adult/juvenile	--	26%	26%	26%	26%	26%	26%	26%
spawning	--	12%	11%	11%	12%	11%	11%	11%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Sand shiner</b>	--	1%	1%	1%	1%	1%	1%	1%
<b>Red shiner</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	144	156	164	164	156	164	164	164
spawning	19,984	20,534	20,911	20,914	20,534	20,911	20,906	20,904
fry	2,142	2,143	2,142	2,142	2,143	2,142	2,142	2,142
<b>Flathead chub</b>								
adult/juvenile	30,492	32,025	33,077	33,085	32,025	33,077	33,063	33,058
spawning	4,149	4,295	4,273	4,283	4,295	4,274	4,273	4,274
fry	9,730	10,287	10,264	10,221	10,287	10,252	10,264	10,264
<b>Sand shiner</b>	5,478	5,807	5,793	5,767	5,807	5,786	5,793	5,793
<b>Red shiner</b>	1,083	1,136	1,134	1,130	1,136	1,133	1,134	1,134
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	8%	14%	14%	8%	14%	14%	14%
spawning	--	3%	5%	5%	3%	5%	5%	5%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Flathead chub</b>								
adult/juvenile	--	5%	8%	9%	5%	8%	8%	8%
spawning	--	4%	3%	3%	4%	3%	3%	3%
fry	--	6%	5%	5%	6%	5%	5%	5%
<b>Sand shiner</b>	--	6%	6%	5%	6%	6%	6%	6%
<b>Red shiner</b>	--	5%	5%	4%	5%	5%	5%	5%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	122	168	168	168	168	168	168	168
spawning	19,091	21,484	21,767	21,628	21,484	21,628	21,877	21,628
fry	768	793	793	793	793	793	793	793
<b>Flathead chub</b>								
adult/juvenile	11,516	11,887	11,881	11,885	11,887	11,881	11,885	11,877
spawning	695	718	717	717	718	717	717	717
fry	3,337	3,444	3,442	3,443	3,444	3,442	3,443	3,441
<b>Sand shiner</b>	1,875	1,936	1,935	1,935	1,936	1,935	1,935	1,934
<b>Red shiner</b>	373	385	385	385	385	385	385	385
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	37%	37%	37%	37%	37%	37%	37%
spawning	--	13%	14%	13%	13%	13%	15%	13%
fry	--	3%	3%	3%	3%	3%	3%	3%
<b>Flathead chub</b>								
adult/juvenile	--	3%	3%	3%	3%	3%	3%	3%
spawning	--	3%	3%	3%	3%	3%	3%	3%
fry	--	3%	3%	3%	3%	3%	3%	3%
<b>Sand shiner</b>	--	3%	3%	3%	3%	3%	3%	3%
<b>Red shiner</b>	--	3%	3%	3%	3%	3%	3%	3%

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 18. Direct Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), and Red Shiner (Adult), Fountain Creek Segment 3

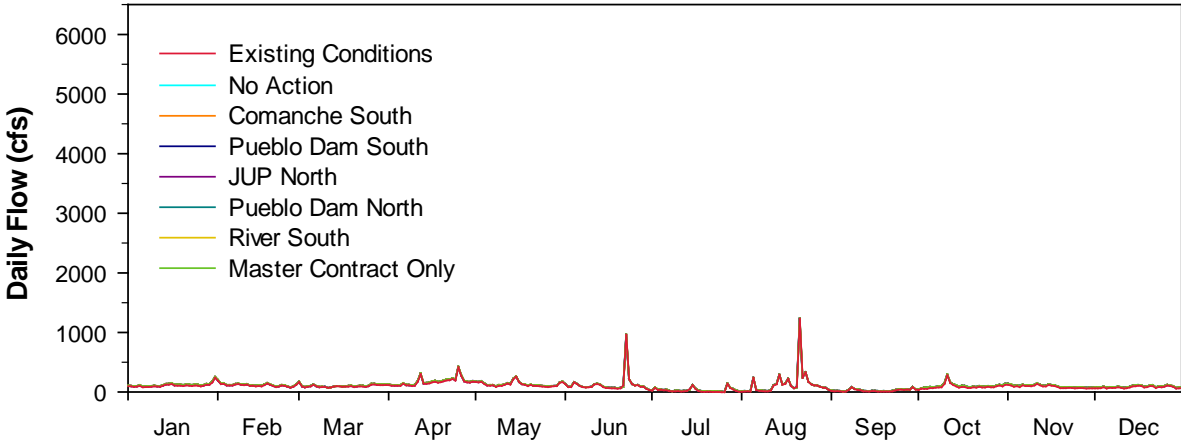
Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	214	217	218	219	217	218	219	219
Spawning	28,329	28,472	28,938	28,947	28,472	28,921	28,936	28,889
fry	2,524	2,552	2,554	2,555	2,552	2,554	2,554	2,554
<b>Flathead chub</b>								
adult/juvenile	40,614	41,049	41,211	41,295	41,051	41,209	41,237	41,237
spawning	9,085	9,326	9,362	9,443	9,326	9,397	9,440	9,442
fry	31,343	31,398	31,408	31,408	31,398	31,408	31,400	31,400
<b>Sand shiner</b>	21,558	21,582	21,579	21,579	21,585	21,579	21,579	21,579
<b>Red shiner</b>	3,964	4,001	4,020	4,023	4,001	4,020	4,020	4,020
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	1%	2%	2%	1%	2%	2%	2%
spawning	--	<1%	2%	2%	<1%	2%	2%	2%
fry	--	1%	1%	1%	1%	1%	1%	1%
<b>Flathead chub</b>								
adult/juvenile	--	1%	1%	2%	1%	1%	2%	2%
spawning	--	3%	3%	4%	3%	3%	4%	4%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Sand shiner</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Red shiner</b>	--	<1%	1%	1%	<1%	1%	1%	1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	213	215	218	218	215	218	218	217
spawning	24,379	24,774	25,688	25,688	24,774	25,688	25,525	25,458
fry	2,598	2,671	2,701	2,703	2,671	2,701	2,701	2,701
<b>Flathead chub</b>								
adult/juvenile	40,423	40,763	41,210	41,210	40,763	41,210	41,181	41,084
spawning	8,732	8,640	8,645	8,645	8,640	8,645	8,644	8,643
fry	31,556	31,405	31,362	31,358	31,405	31,362	31,362	31,362
<b>Sand shiner</b>	21,649	21,668	21,661	21,661	21,668	21,661	21,661	21,661
<b>Red shiner</b>	3,929	3,970	4,001	4,004	3,970	4,001	3,998	3,996
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	<1%	2%	2%	<1%	2%	2%	2%
spawning	--	2%	5%	5%	2%	5%	5%	4%
fry	--	3%	4%	4%	3%	4%	4%	4%

# Arkansas Valley Conduit EIS

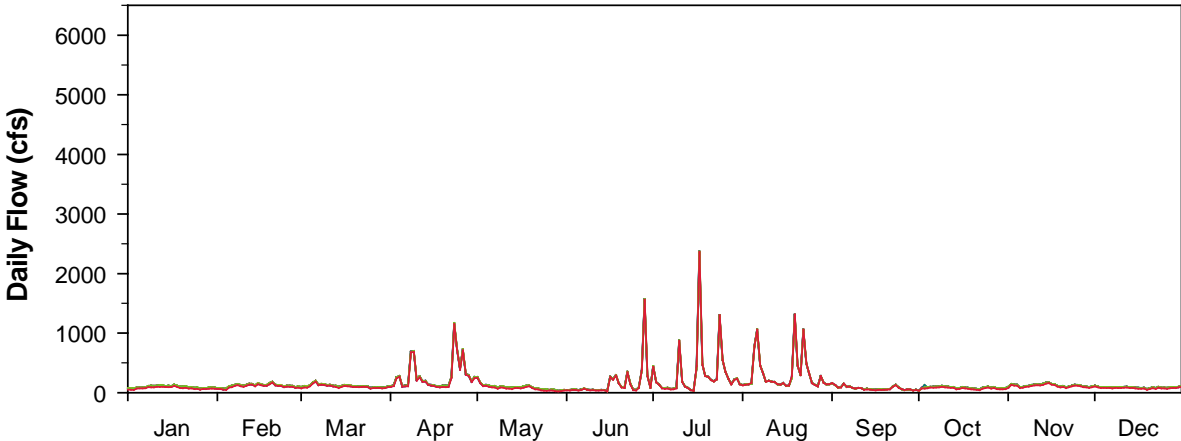
## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Flathead chub</b>								
adult/juvenile	--	<1%	2%	2%	<1%	2%	2%	2%
spawning	--	-1%	-1%	-1%	-1%	-1%	-1%	-1%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Sand shiner</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Red shiner</b>	--	1%	2%	2%	1%	2%	2%	2%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	254	266	269	269	266	269	269	269
spawning	27,901	28,141	28,501	28,501	28,141	28,499	28,501	28,501
fry	3,239	3,240	3,241	3,241	3,240	3,241	3,241	3,240
<b>Flathead chub</b>								
adult/juvenile	43,817	44,014	44,027	44,035	44,014	44,027	44,027	44,035
spawning	9,611	9,611	9,626	9,618	9,611	9,626	9,618	9,629
fry	29,863	29,737	29,733	29,733	29,737	29,733	29,733	29,733
<b>Sand shiner</b>	21,549	21,547	21,541	21,541	21,547	21,541	21,541	21,541
<b>Red shiner</b>	4,270	4,294	4,308	4,310	4,294	4,310	4,308	4,304
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	5%	6%	6%	5%	6%	6%	6%
spawning	--	<1%	2%	2%	<1%	2%	2%	2%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Flathead chub</b>								
adult/juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<-1%	<1%	<1%	<-1%	<1%	<1%	<1%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Sand shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Red shiner</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

Fountain Creek, Segment 4 – County Line to Arkansas River  
Normal Year (2005)



Dry Year (2004)



Wet Year (1997)

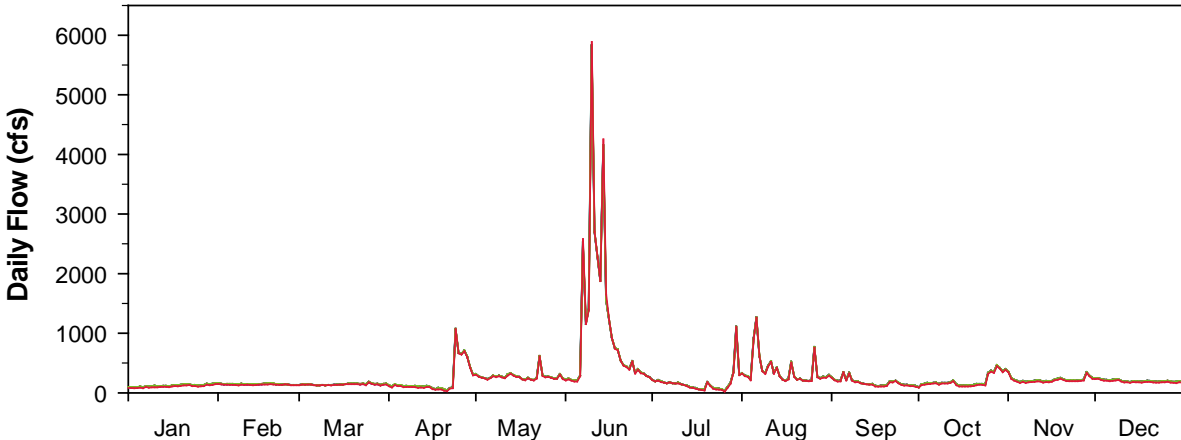


Figure 71. Direct Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 4 of Fountain Creek at the Pueblo Gage

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

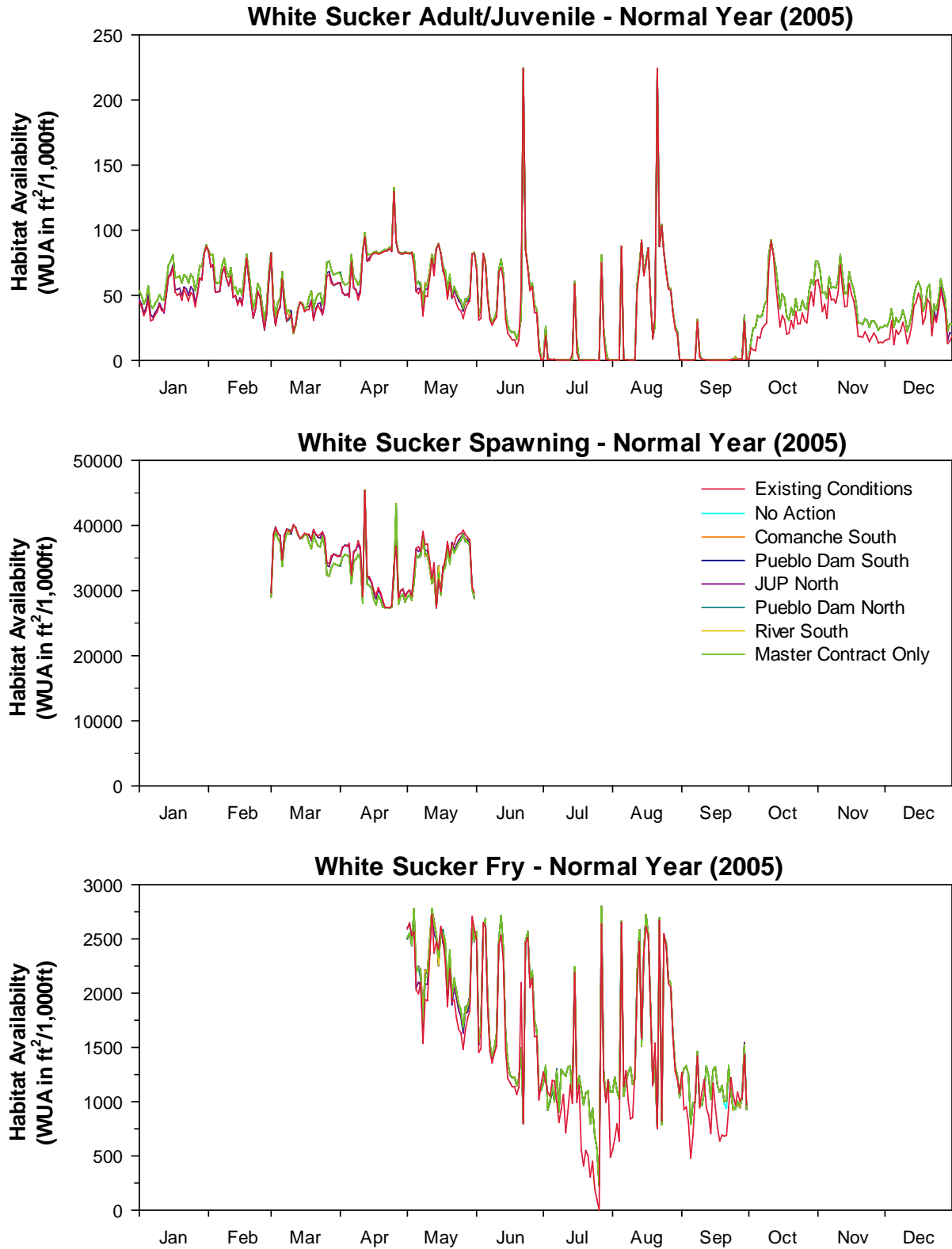


Figure 72. Direct Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 4 of Fountain Creek



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

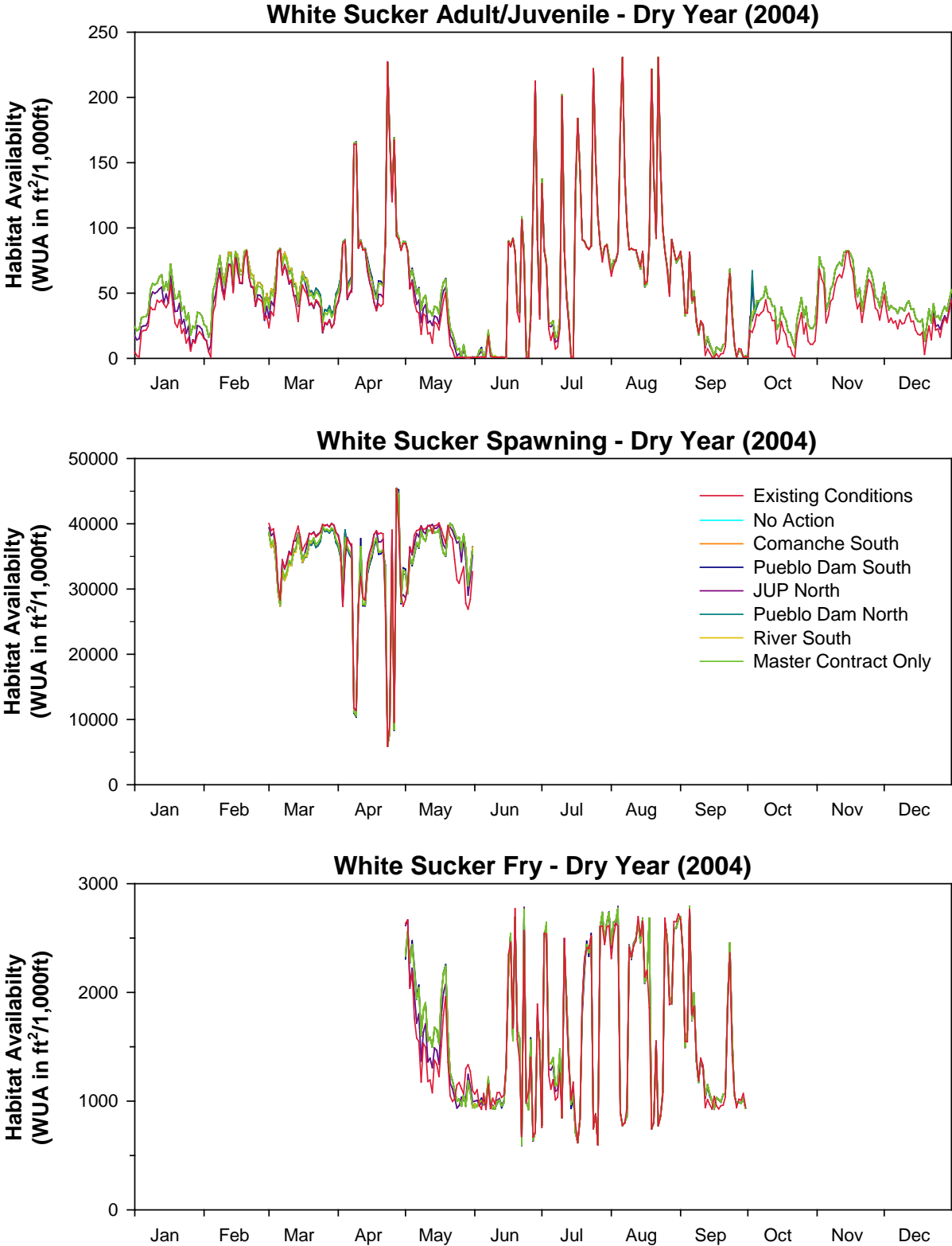
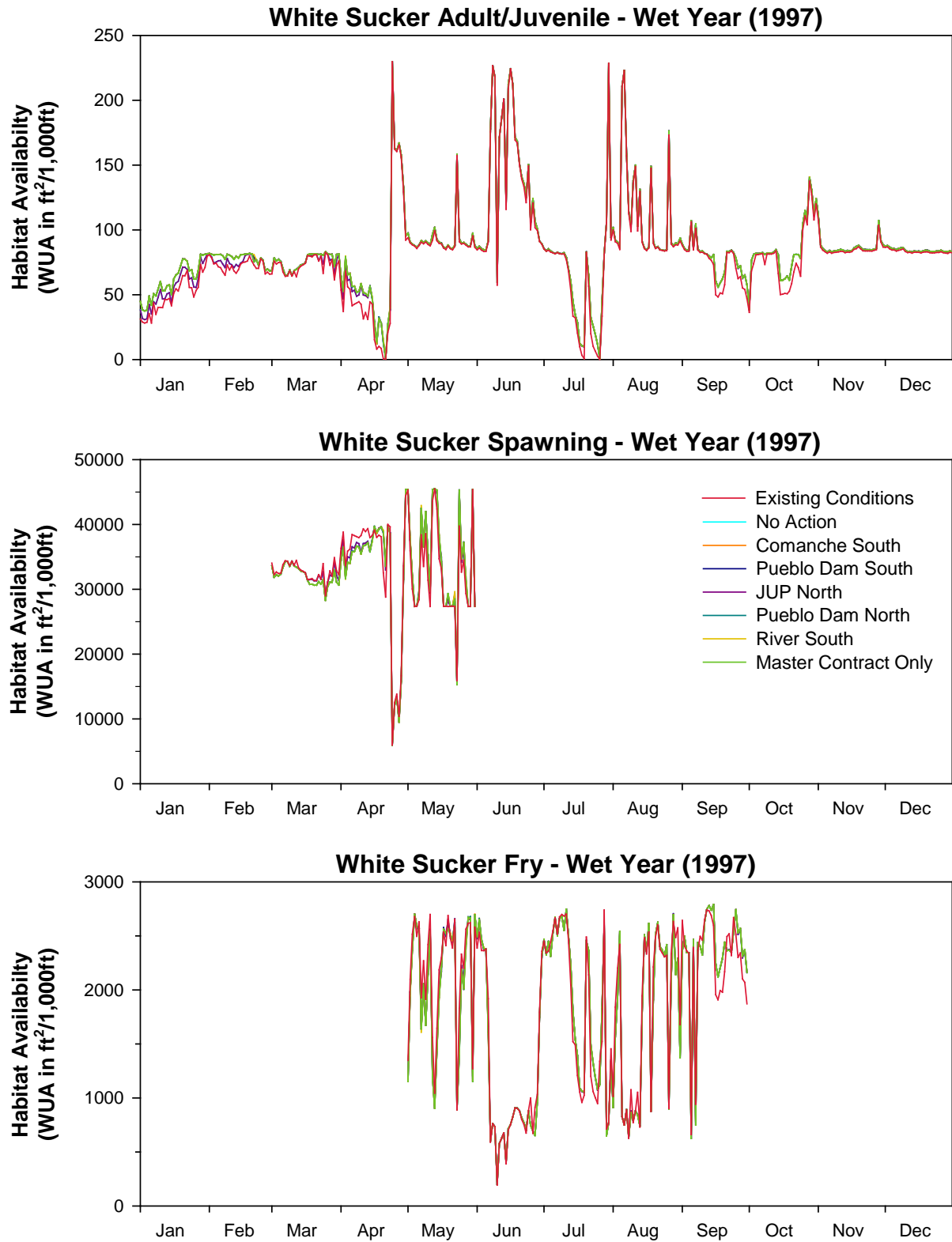


Figure 73. Direct Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 4 of Fountain Creek

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 74. Direct Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 4 of Fountain Creek**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

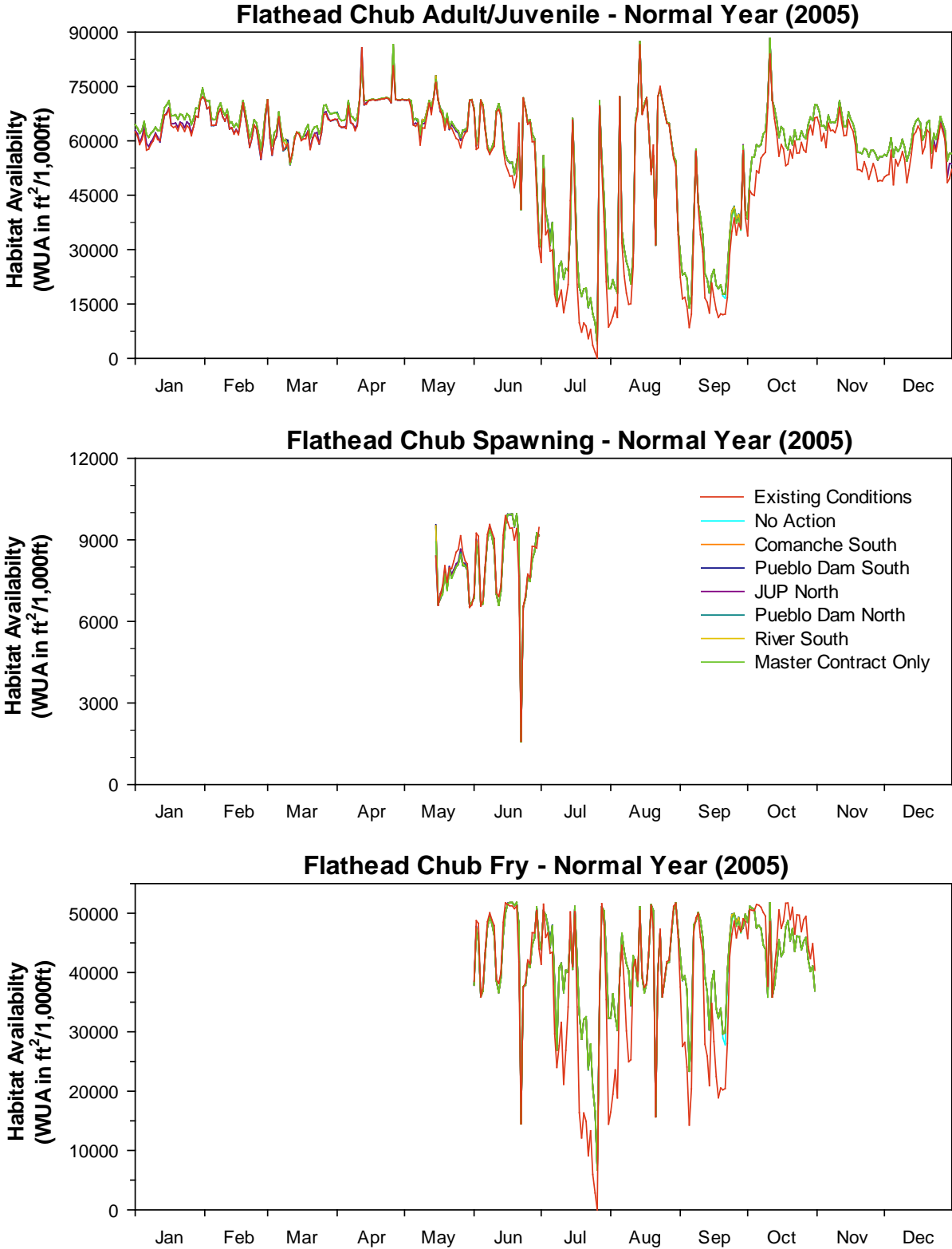


Figure 75. Direct Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 4 of Fountain Creek

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

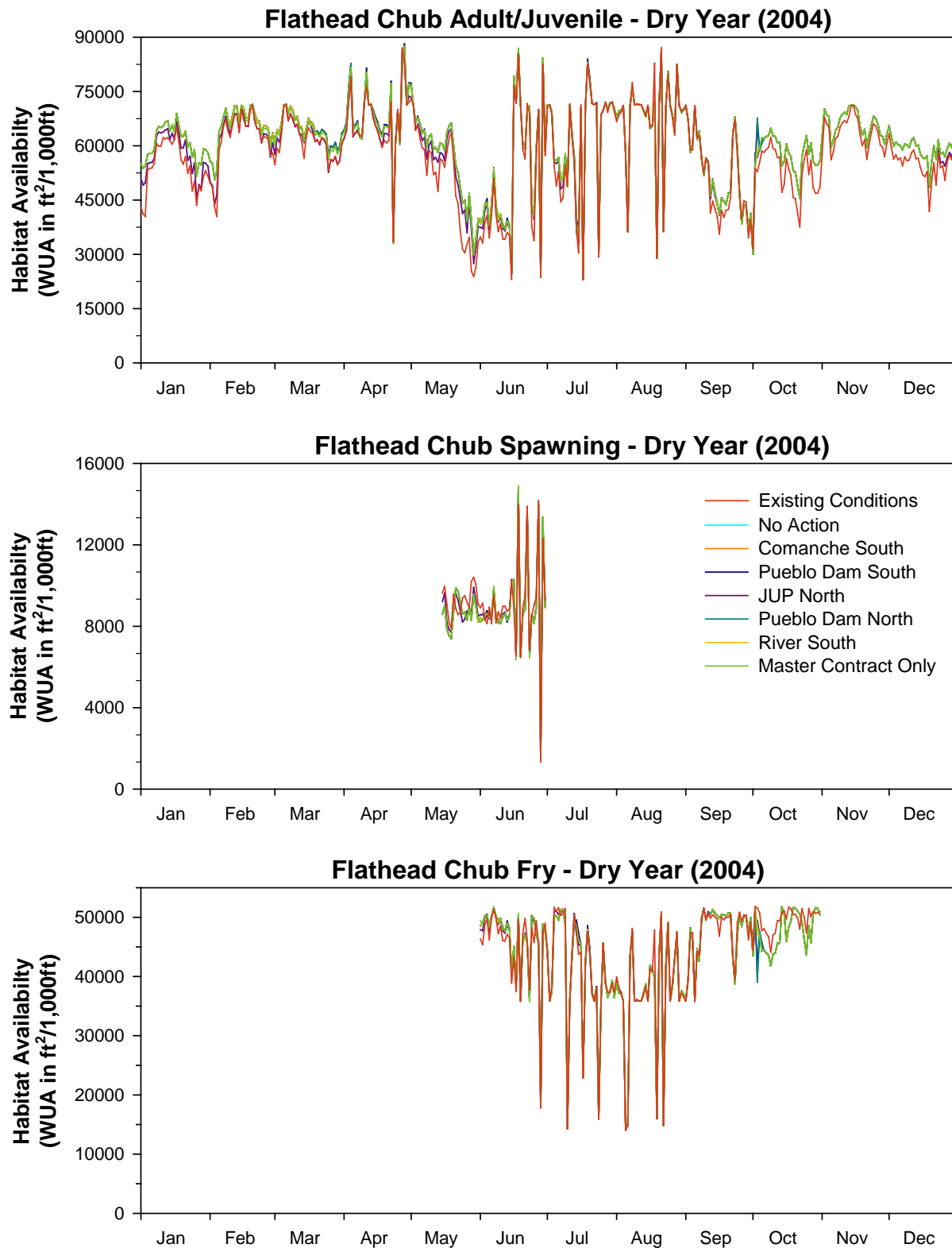


Figure 76. Direct Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 4 of Fountain Creek

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

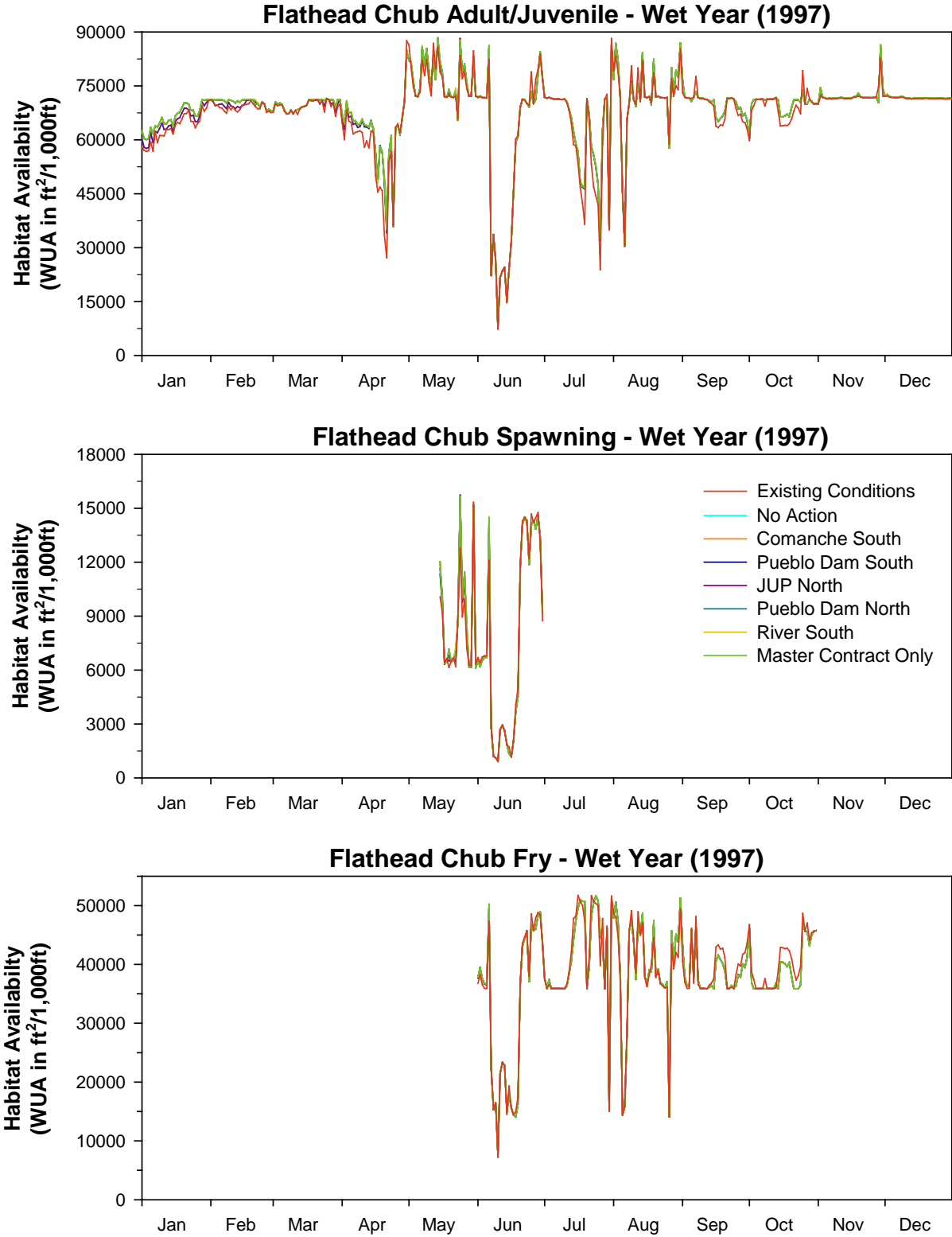
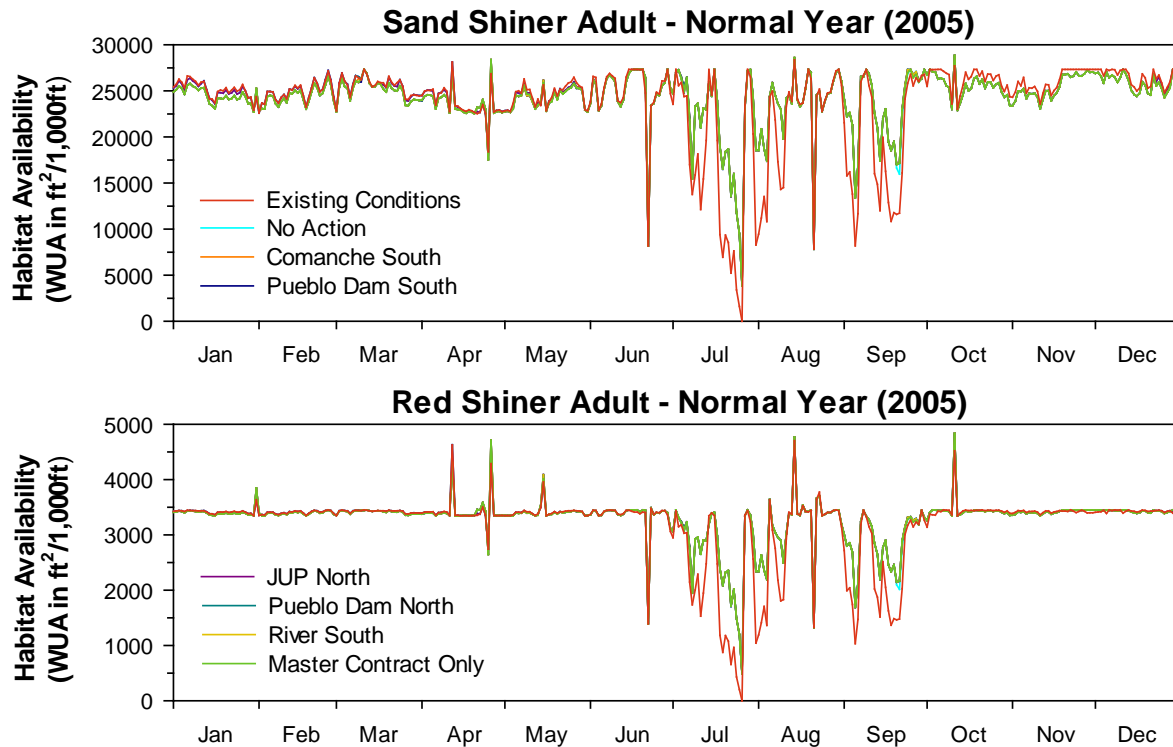
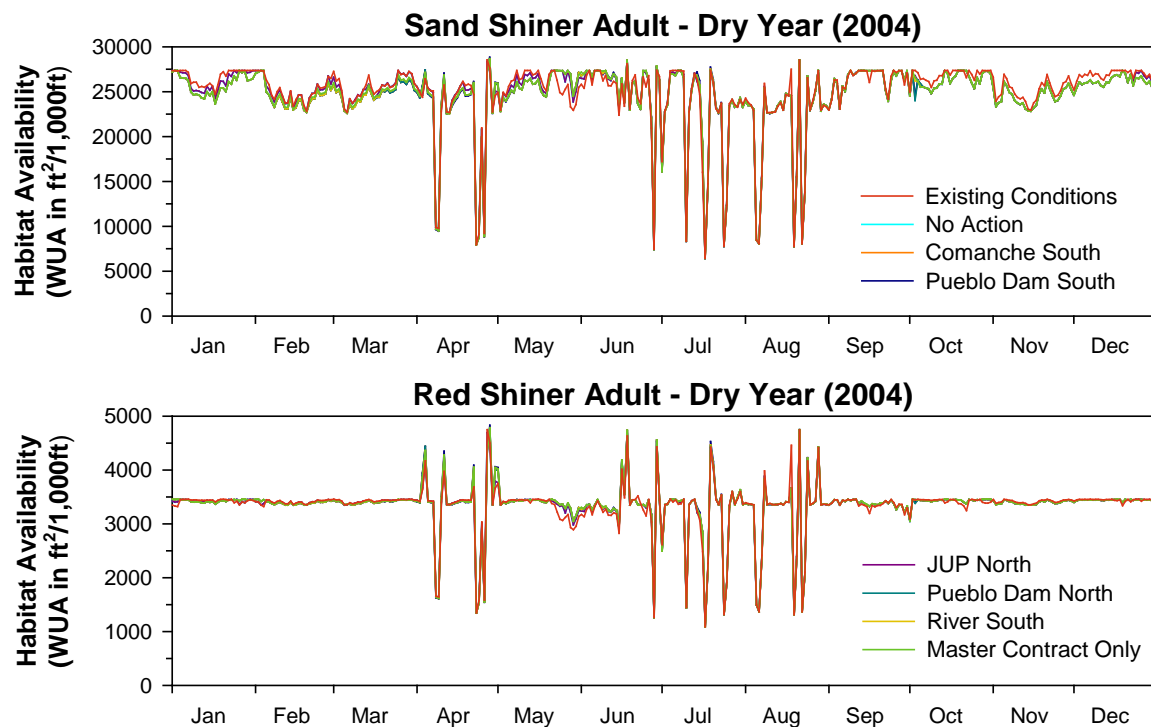


Figure 77. Direct Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 4 of Fountain Creek

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 78. Direct Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 4 of Fountain Creek**



**Figure 79. Direct Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 4 of Fountain Creek**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

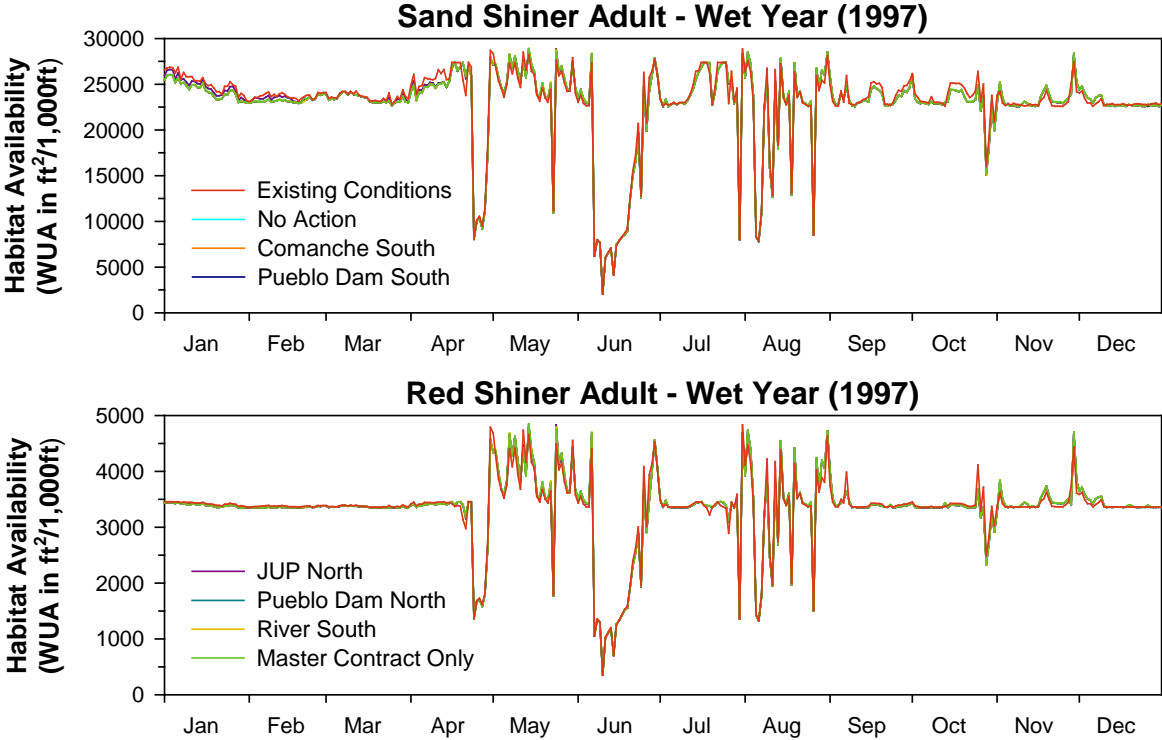









Figure 80. Direct Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 4 of Fountain Creek

# Arkansas Valley Conduit EIS

## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)








Table 19. Direct Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), and Red Shiner (Adult), Fountain Creek Segment 4

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	0	0	0	0	0	0	0	0
spawning	27,383	27,379	27,362	27,362	27,379	27,362	27,362	27,362
fry	0	226	227	227	226	227	227	227
<b>Flathead chub</b>								
adult/juvenile	0	3,989	4,013	4,013	3,989	4,004	4,008	4,008
spawning	1,590	1,576	1,574	1,573	1,576	1,574	1,574	1,574
fry	0	6,697	6,737	6,737	6,697	6,721	6,729	6,729
<b>Sand shiner</b>	0	3,846	3,869	3,869	3,846	3,859	3,864	3,864
<b>Red shiner</b>	0	485	488	488	485	487	488	488
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	--	--	--	--	--	--	--
spawning	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	--	--	--	--	--	--	--
<b>Flathead chub</b>								
adult/juvenile	--	--	--	--	--	--	--	--
spawning	--	<-1%	-1%	-1%	<-1%	-1%	-1%	-1%
fry	--	--	--	--	--	--	--	--
<b>Sand shiner</b>	--	--	--	--	--	--	--	--
<b>Red shiner</b>	--	--	--	--	--	--	--	--
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	0	0	1	1	0	1	1	1
spawning	5,905	5,899	5,889	5,887	5,899	5,889	5,889	5,889
fry	596	592	595	595	592	595	595	595
<b>Flathead chub</b>								
adult/juvenile	23,088	23,076	23,068	23,049	23,076	23,068	23,068	23,068
spawning	1,346	1,365	1,369	1,369	1,365	1,374	1,369	1,369
fry	14,110	14,105	14,109	14,109	14,105	14,109	14,109	14,109
<b>Sand shiner</b>	6,421	6,418	6,416	6,410	6,418	6,416	6,415	6,415
<b>Red shiner</b>	1,088	1,087	1,087	1,086	1,087	1,087	1,087	1,087
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	10%	13%	13%	10%	13%	17%	13%
spawning	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%



Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Flathead chub</b>								
adult/juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
spawning	--	1%	2%	2%	1%	2%	2%	2%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Sand shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Red shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	0	1	1	1	1	1	1	1
spawning	5,981	5,978	5,976	5,976	5,978	5,977	5,976	5,977
fry	194	201	201	201	201	201	201	201
<b>Flathead chub</b>								
adult/juvenile	7,243	7,513	7,509	7,511	7,513	7,509	7,511	7,506
spawning	903	937	936	937	937	936	937	936
fry	7,202	7,471	7,466	7,469	7,471	7,466	7,469	7,463
<b>Sand shiner</b>	2,014	2,089	2,088	2,089	2,089	2,088	2,089	2,087
<b>Red shiner</b>	341	354	354	354	354	354	354	354
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	55%	58%	58%	55%	58%	58%	58%
spawning	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	4%	4%	4%	4%	4%	4%	4%
<b>Flathead chub</b>								
adult/juvenile	--	4%	4%	4%	4%	4%	4%	4%
spawning	--	4%	4%	4%	4%	4%	4%	4%
fry	--	4%	4%	4%	4%	4%	4%	4%
<b>Sand shiner</b>	--	4%	4%	4%	4%	4%	4%	4%
<b>Red shiner</b>	--	4%	4%	4%	4%	4%	4%	4%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

**Table 20. Direct Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), and Red Shiner (Adult), Fountain Creek Segment 4**

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	39	44	47	48	44	47	48	48
Spawning	36,359	36,147	34,978	34,954	36,147	34,982	34,986	34,985
fry	1,220	1,326	1,328	1,328	1,326	1,328	1,328	1,328
<b>Flathead chub</b>								
adult/juvenile	60,590	62,174	62,935	62,967	62,174	62,933	62,965	62,964
spawning	8,224	8,113	8,020	8,005	8,113	8,006	8,006	8,000
fry	42,371	42,805	42,817	42,817	42,805	42,813	42,815	42,815
<b>Sand shiner</b>	25,183	24,963	24,730	24,730	24,963	24,730	24,730	24,731
<b>Red shiner</b>	3,412	3,408	3,399	3,399	3,408	3,399	3,399	3,399
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	12%	20%	21%	12%	20%	21%	21%
spawning	--	<-1%	-4%	-4%	<-1%	-4%	-4%	-4%
fry	--	9%	9%	9%	9%	9%	9%	9%
<b>Flathead chub</b>								
adult/juvenile	--	3%	4%	4%	3%	4%	4%	4%
spawning	--	-1%	-2%	-3%	-1%	-3%	-3%	-3%
fry	--	1%	1%	1%	1%	1%	1%	1%
<b>Sand shiner</b>	--	<-1%	-2%	-2%	<-1%	-2%	-2%	-2%
<b>Red shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	38	44	50	50	44	50	50	48
spawning	37,470	37,202	36,134	36,133	37,202	36,131	36,280	36,303
fry	1,313	1,356	1,458	1,459	1,356	1,458	1,459	1,482
<b>Flathead chub</b>								
adult/juvenile	59,379	61,708	62,845	62,945	61,708	62,844	62,670	62,668
spawning	8,979	8,609	8,591	8,597	8,609	8,591	8,589	8,596
fry	47,122	45,981	45,854	45,853	45,981	45,854	45,899	45,901
<b>Sand shiner</b>	25,871	25,575	25,337	25,313	25,575	25,337	25,367	25,368
<b>Red shiner</b>	3,417	3,416	3,408	3,407	3,416	3,408	3,410	3,412
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	16%	30%	32%	16%	30%	30%	27%
spawning	--	<-1%	-4%	-4%	<-1%	-4%	-3%	-3%
fry	--	3%	11%	11%	3%	11%	11%	13%

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Flathead chub</b>								
adult/juvenile	--	4%	6%	6%	4%	6%	6%	6%
spawning	--	-4%	-4%	-4%	-4%	-4%	-4%	-4%
fry	--	-2%	-3%	-3%	-2%	-3%	-3%	-3%
<b>Sand shiner</b>	--	-1%	-2%	-2%	-1%	-2%	-2%	-2%
<b>Red shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	83	83	83	83	83	83	83	83
spawning	33,232	33,261	33,261	33,261	33,261	33,261	33,261	33,261
fry	2,186	2,206	2,172	2,168	2,206	2,162	2,191	2,191
<b>Flathead chub</b>								
adult/juvenile	70,465	71,043	71,088	71,088	71,043	71,088	71,088	71,088
spawning	6,685	6,564	6,691	6,691	6,564	6,691	6,672	6,691
fry	38,274	37,845	37,824	37,845	37,845	37,824	37,845	37,845
<b>Sand shiner</b>	23,586	23,519	23,363	23,353	23,519	23,371	23,353	23,380
<b>Red shiner</b>	3,375	3,380	3,375	3,375	3,380	3,375	3,375	3,375
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	<1%	<-1%	<-1%	<1%	-1%	<1%	<1%
<b>Flathead chub</b>								
adult/juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	-2%	<1%	<1%	-2%	<1%	<-1%	<1%
fry	--	-1%	-1%	-1%	-1%	-1%	-1%	-1%
<b>Sand shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Red shiner</b>	--	<1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%

### Cumulative Effects

#### Upper Arkansas River, Upstream of Pueblo Reservoir

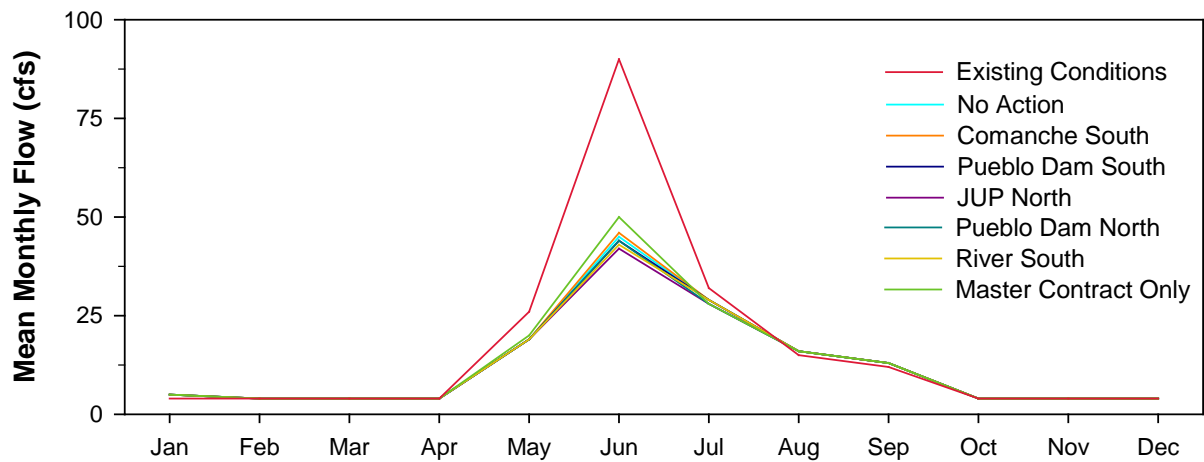


Figure 81. Cumulative Effects Mean Monthly Streamflow for All Alternatives and Existing Conditions in Lake Fork Creek

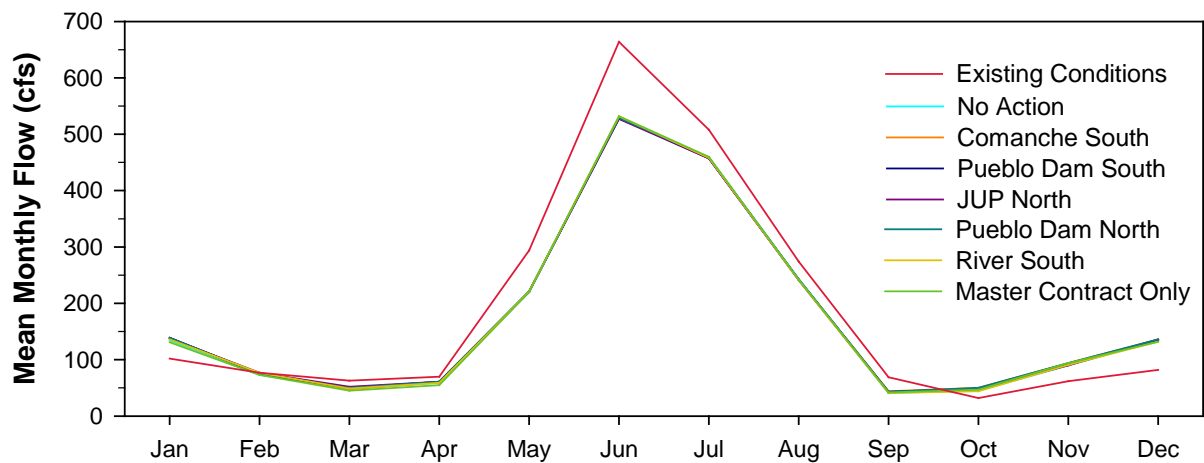


Figure 82. Cumulative Effects Mean Monthly Streamflow for All Alternatives and Existing Conditions in Lake Creek

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

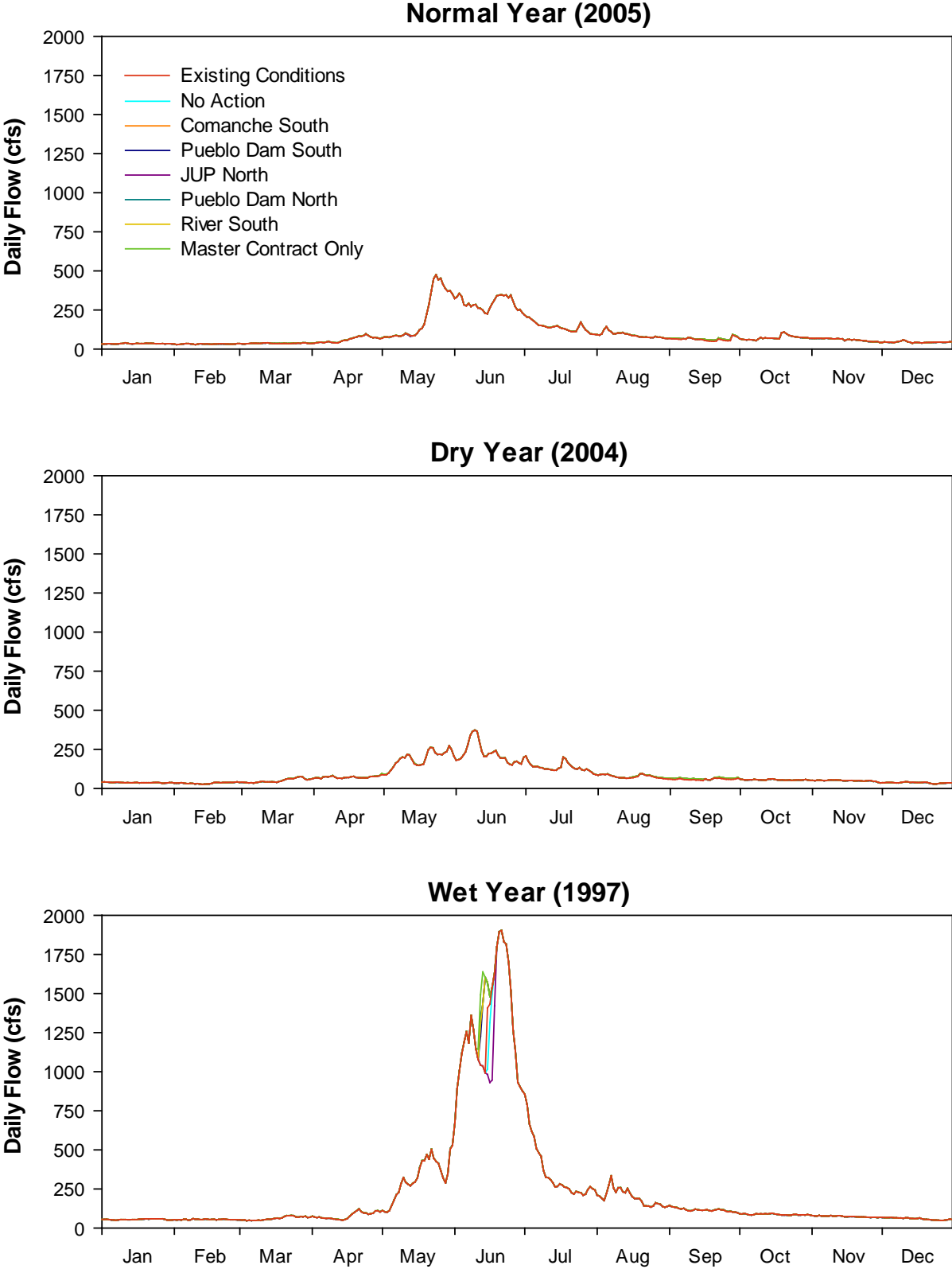
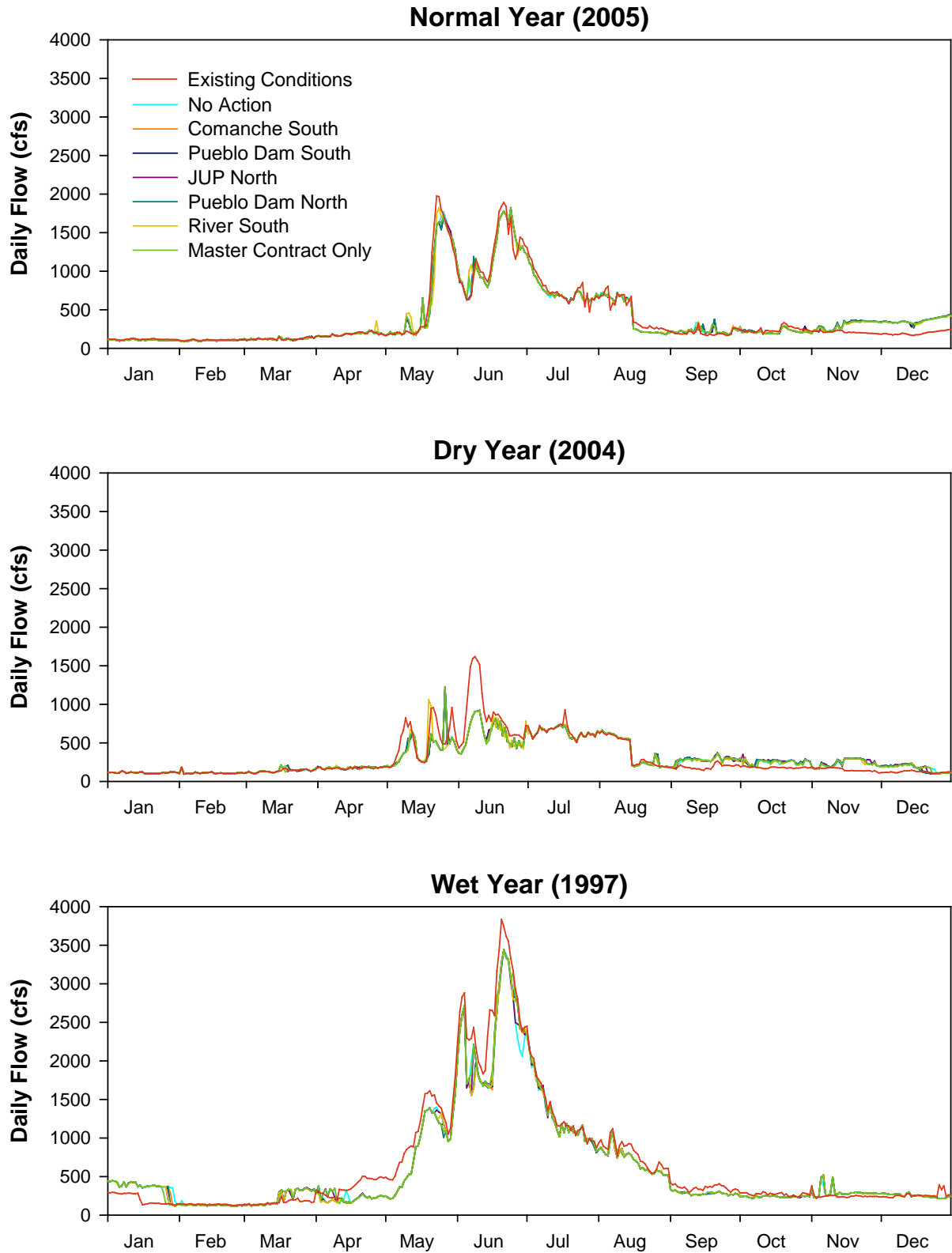


Figure 83. Cumulative Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 1 of the Upper Arkansas River at the Malta Gage

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 84. Cumulative Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 2 of the Upper Arkansas River at the Buena Vista Gage**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

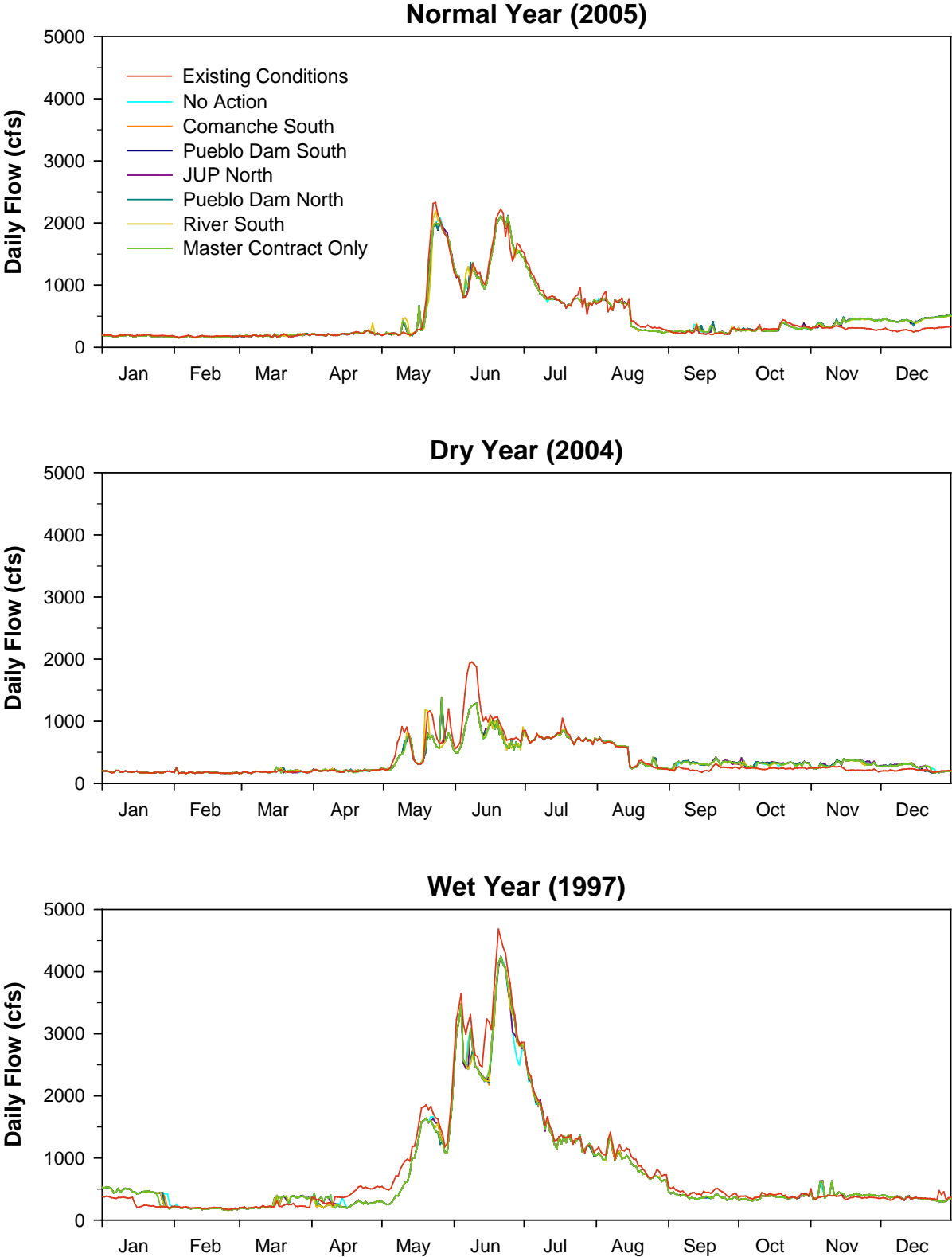
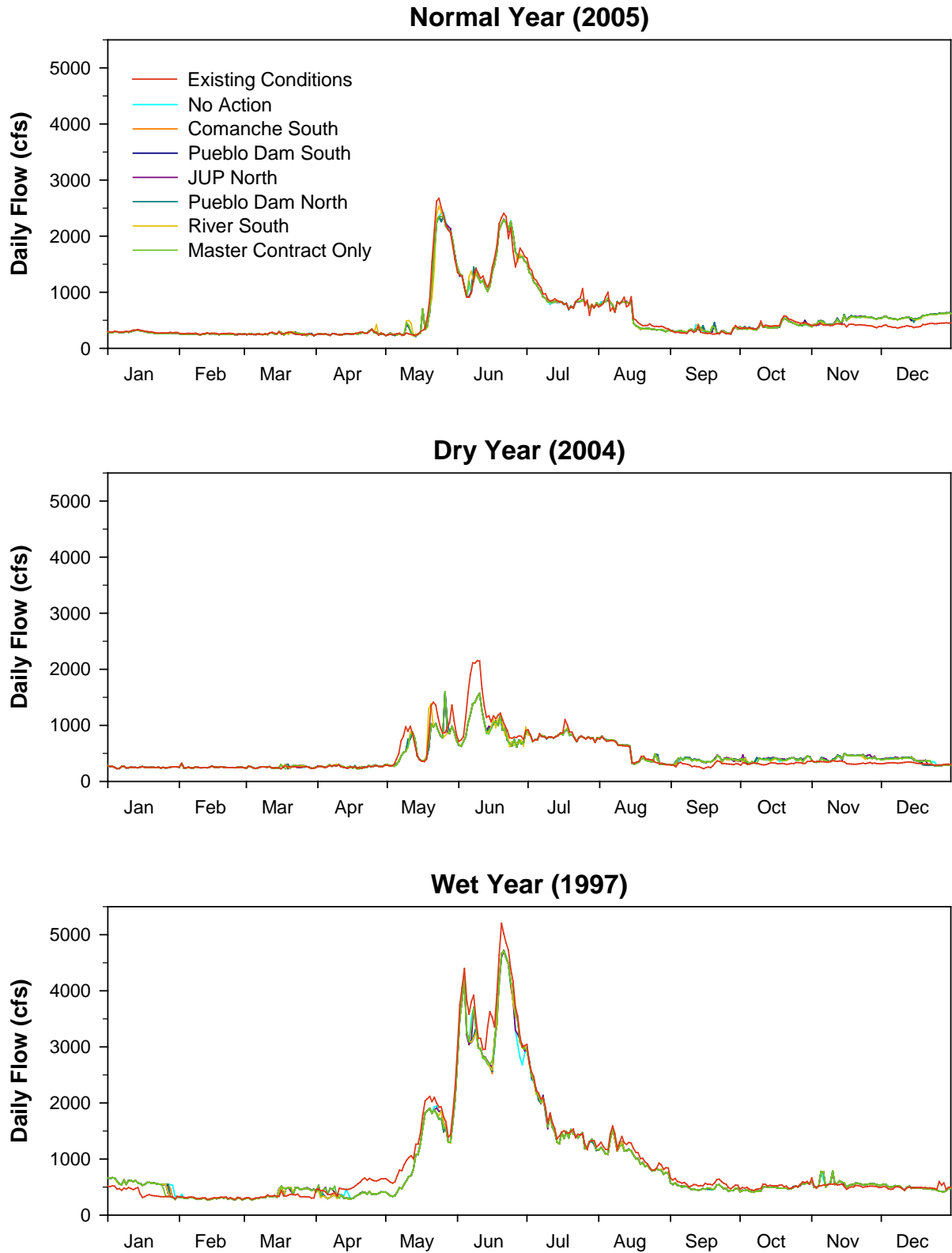


Figure 85. Cumulative Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 3 of the Upper Arkansas River at the Nathrop Gage

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 86. Cumulative Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 4 and Segment 5 of the Upper Arkansas River at the Wellsville Gage**



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

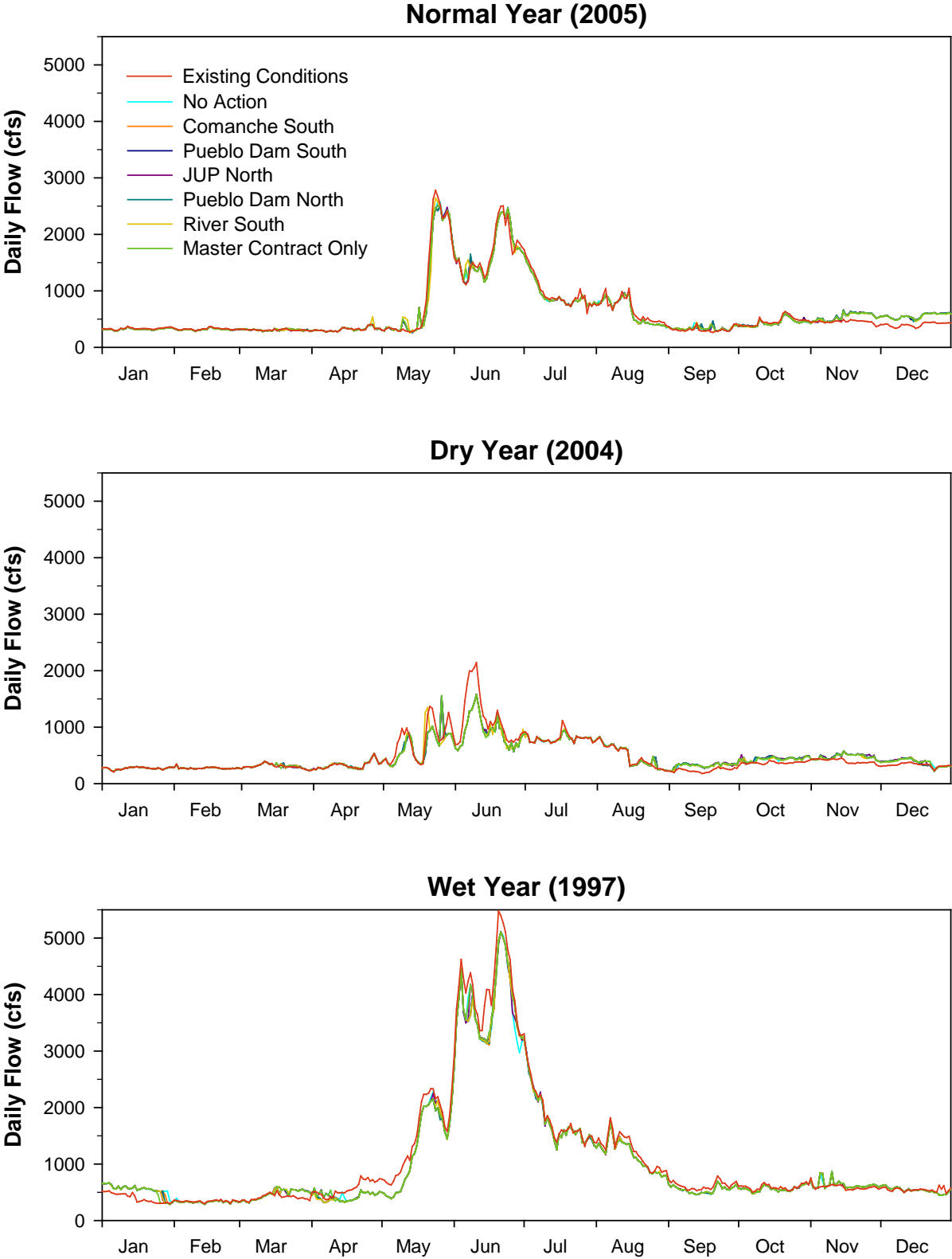
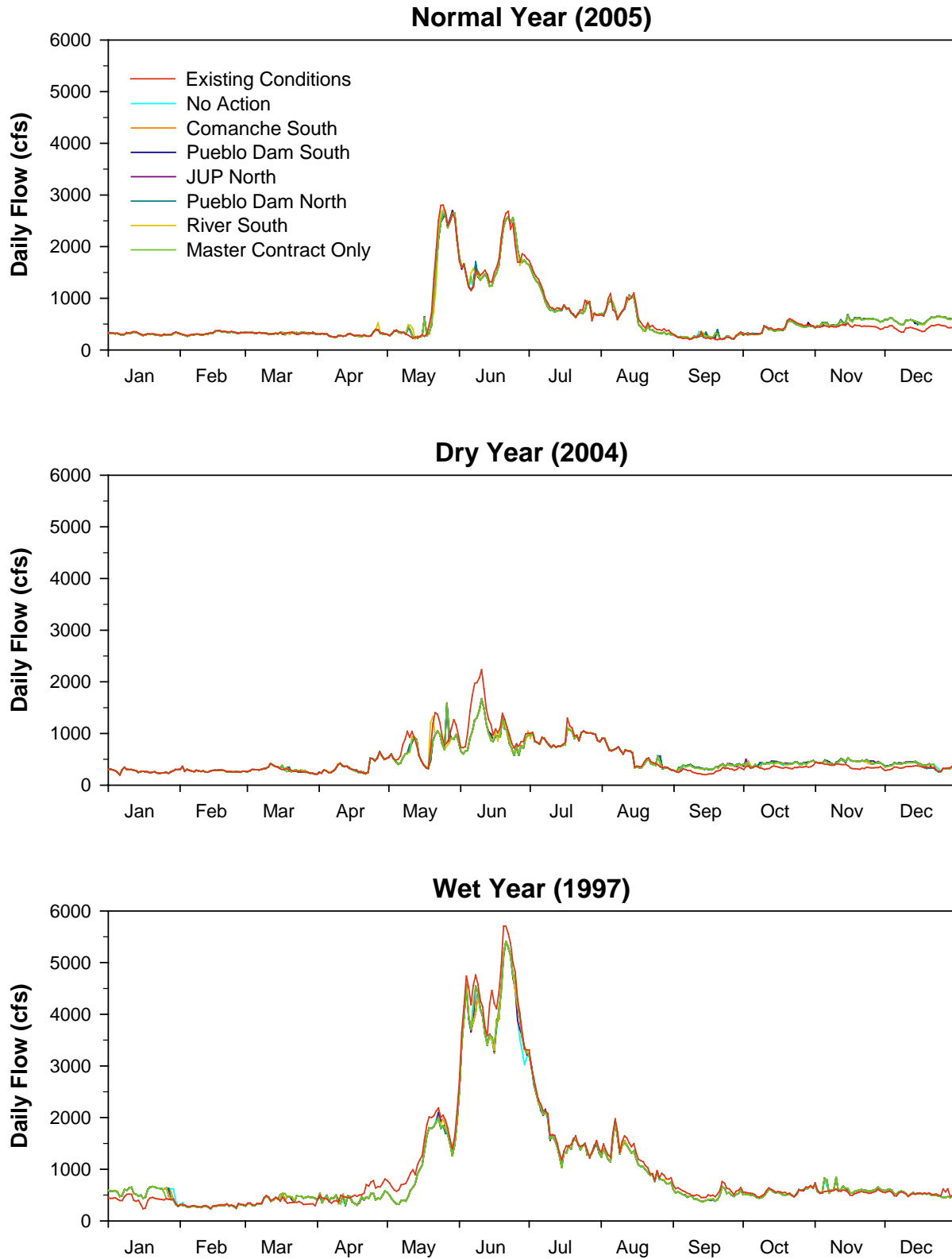


Figure 87. Cumulative Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 6 of the Upper Arkansas River at the Parkdale Gage

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 88. Cumulative Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 7 of the Upper Arkansas River at the Portland Gage**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

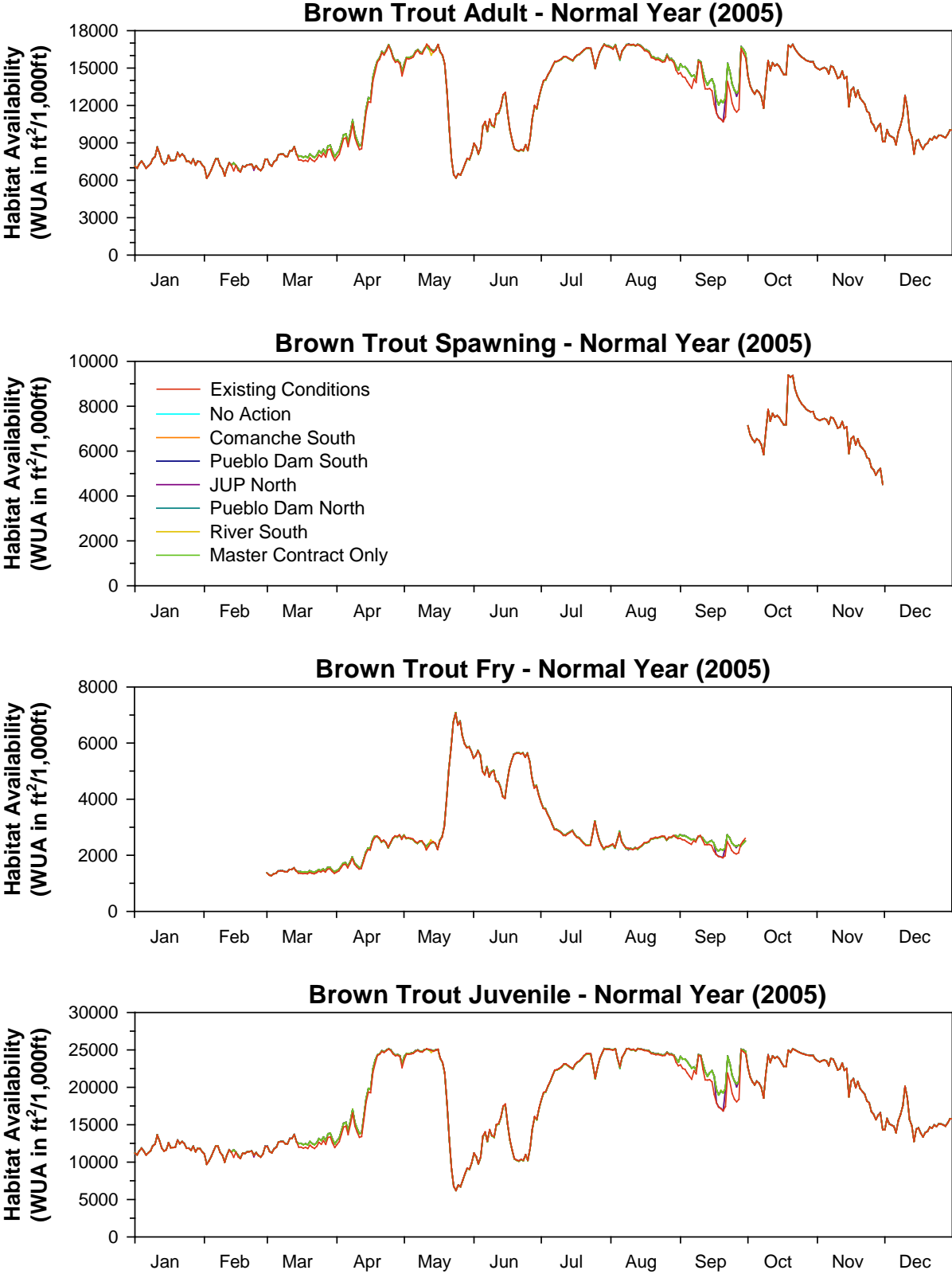
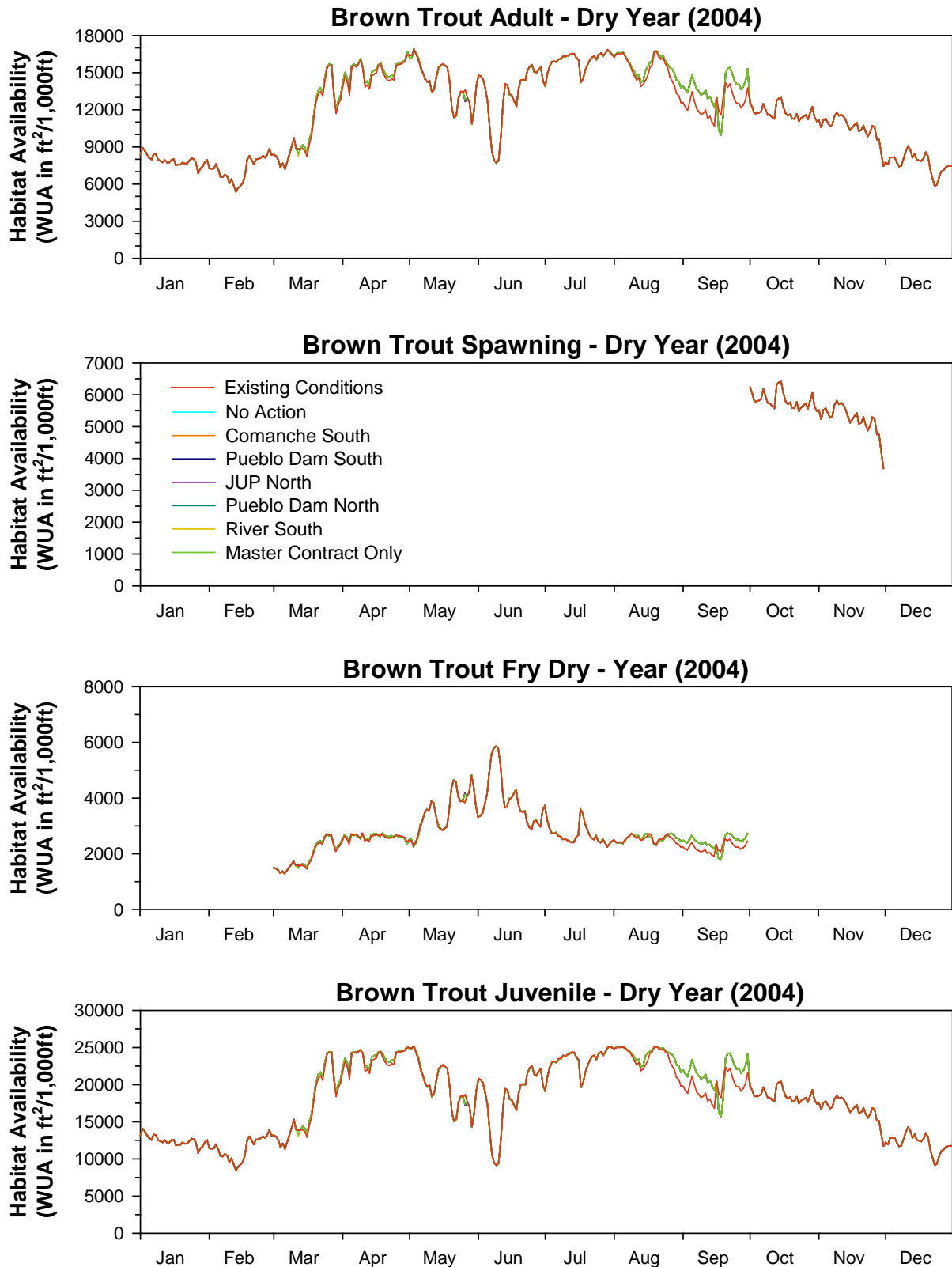


Figure 89. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 1 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 90. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 1 of the Upper Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

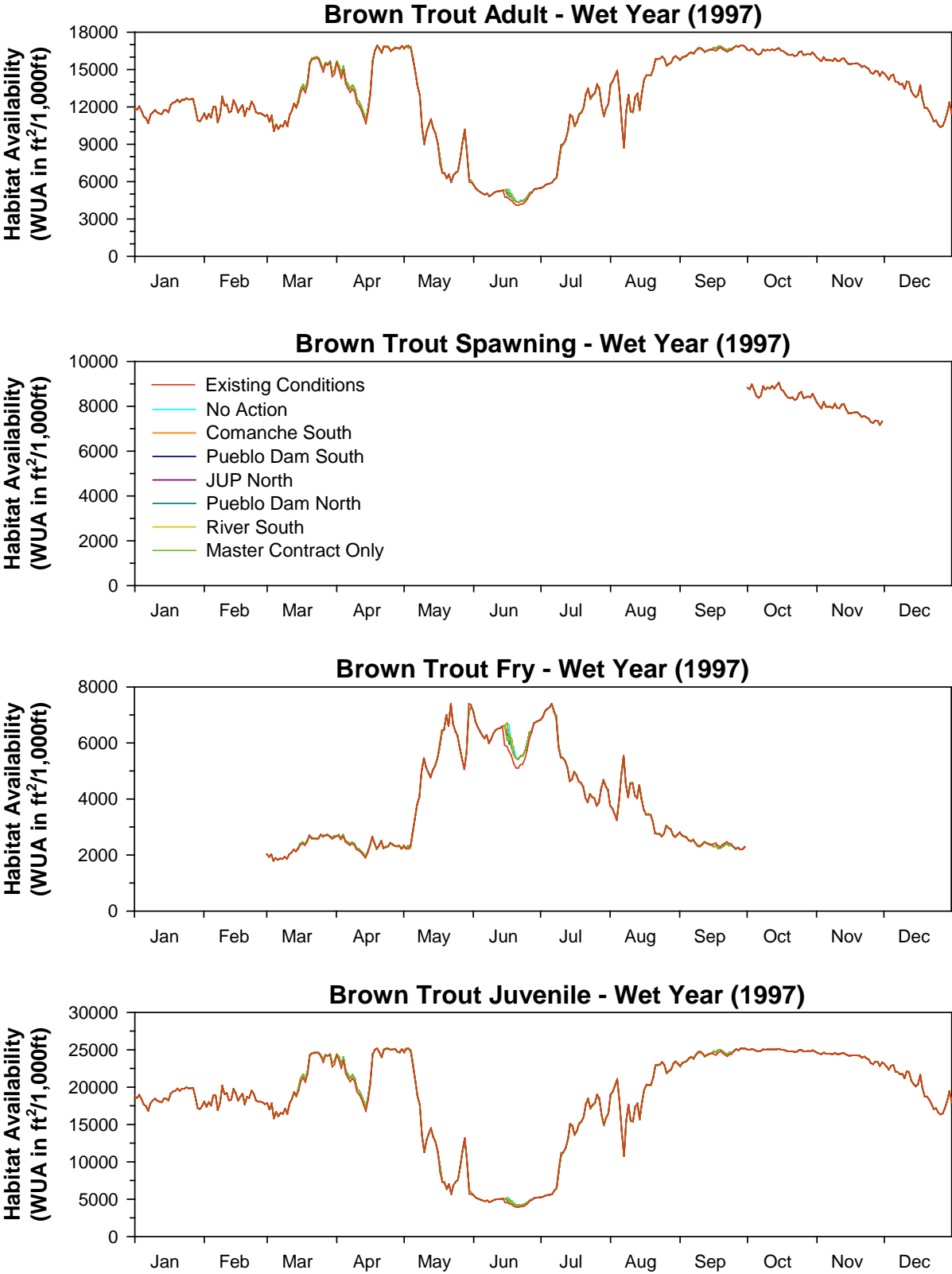


Figure 91. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 1 of the Upper Arkansas River

Arkansas Valley Conduit EIS  
 Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

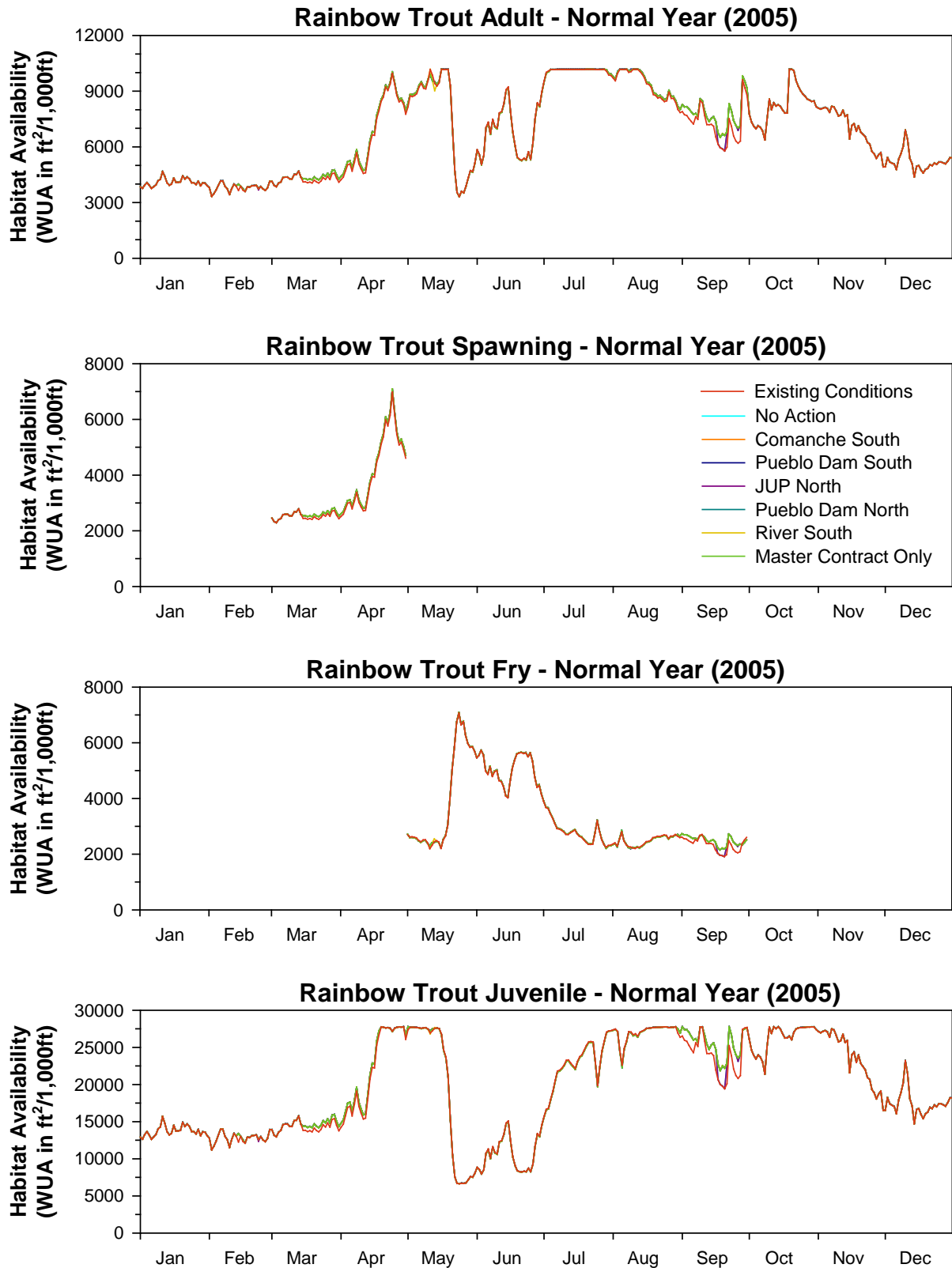


Figure 92. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ $\text{ft}^2/1,000\text{ft}$ ]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 1 of the Upper Arkansas River

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

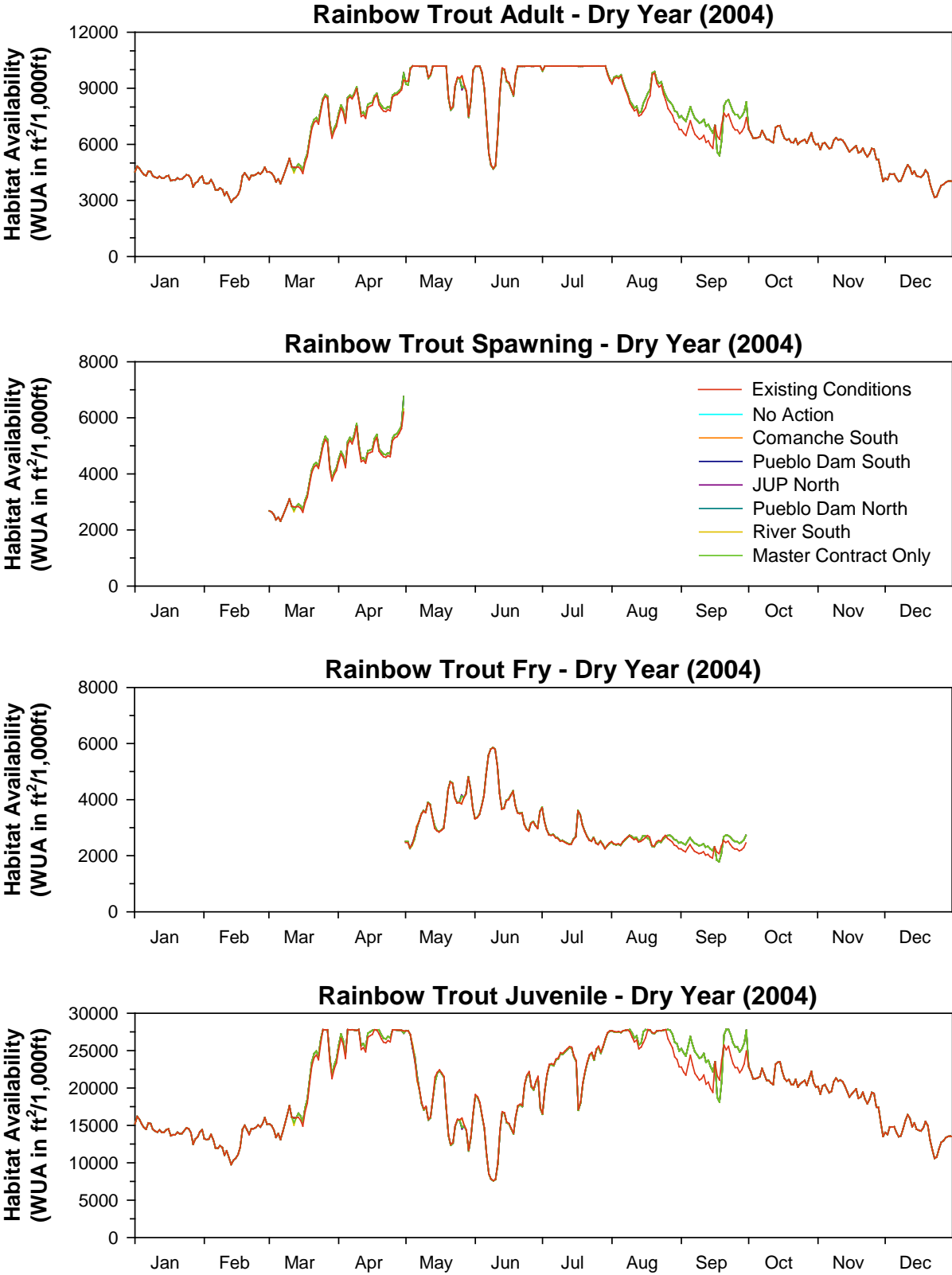
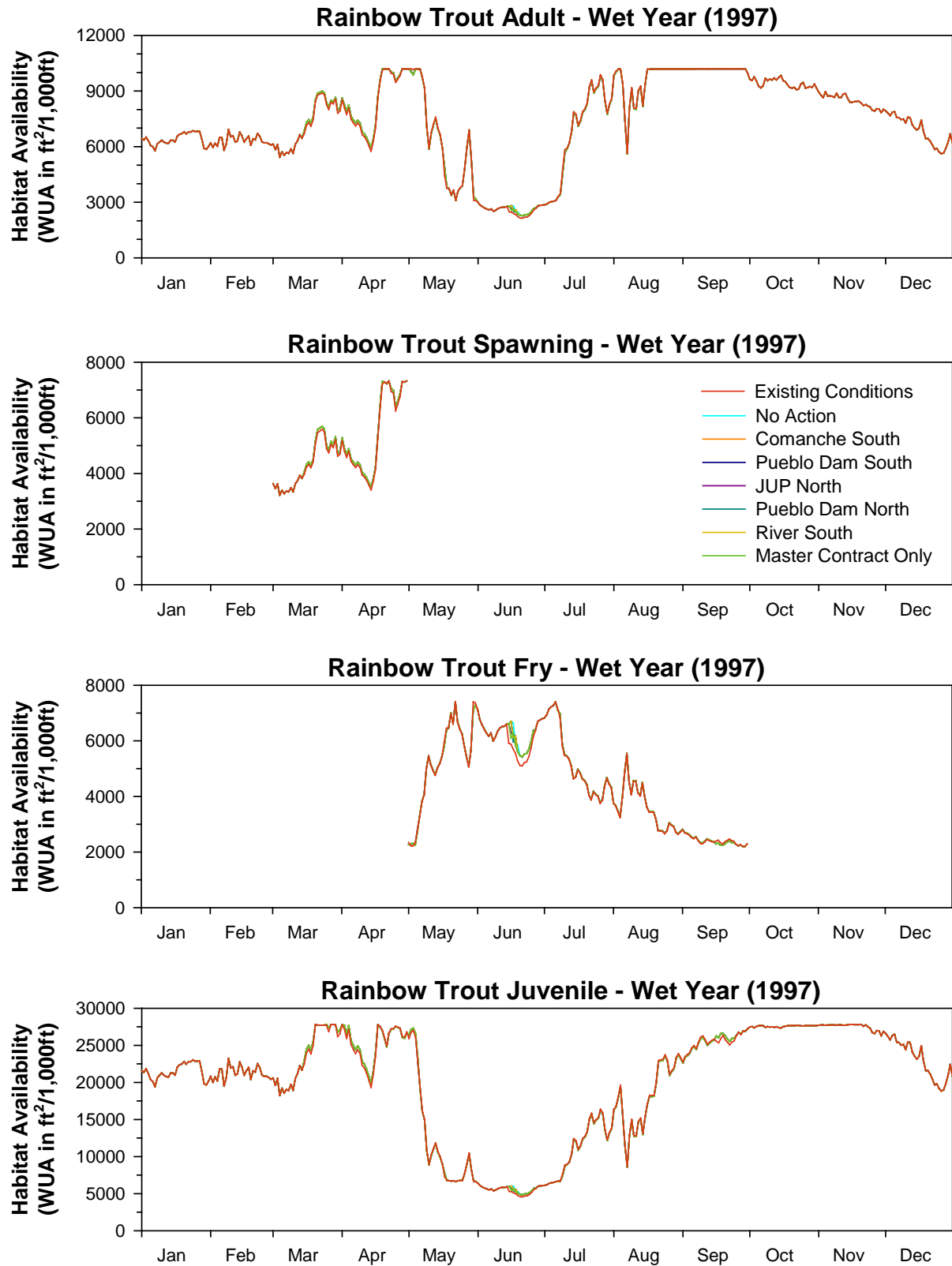


Figure 93. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 1 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 94. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 1 of the Upper Arkansas River**



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

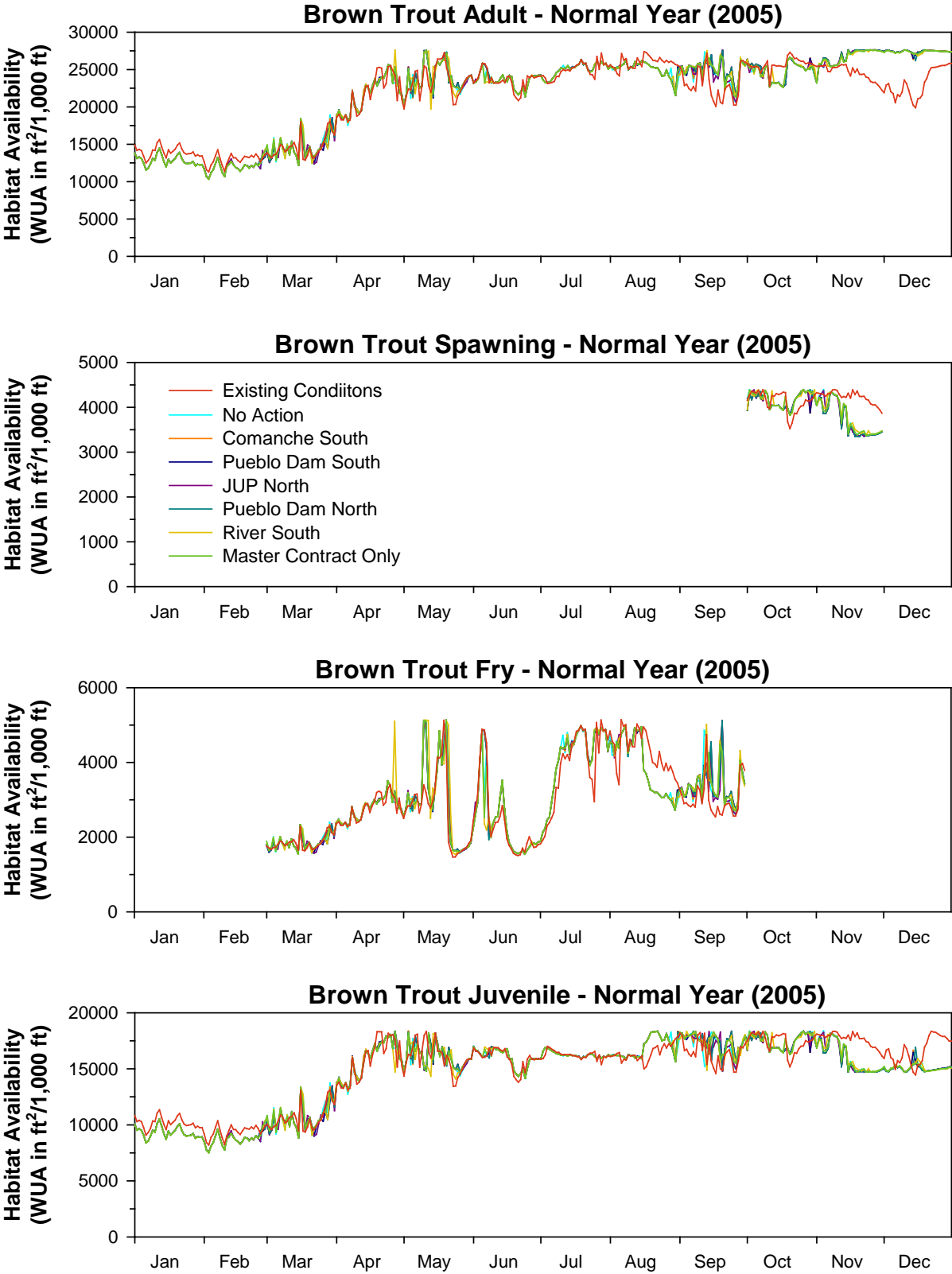
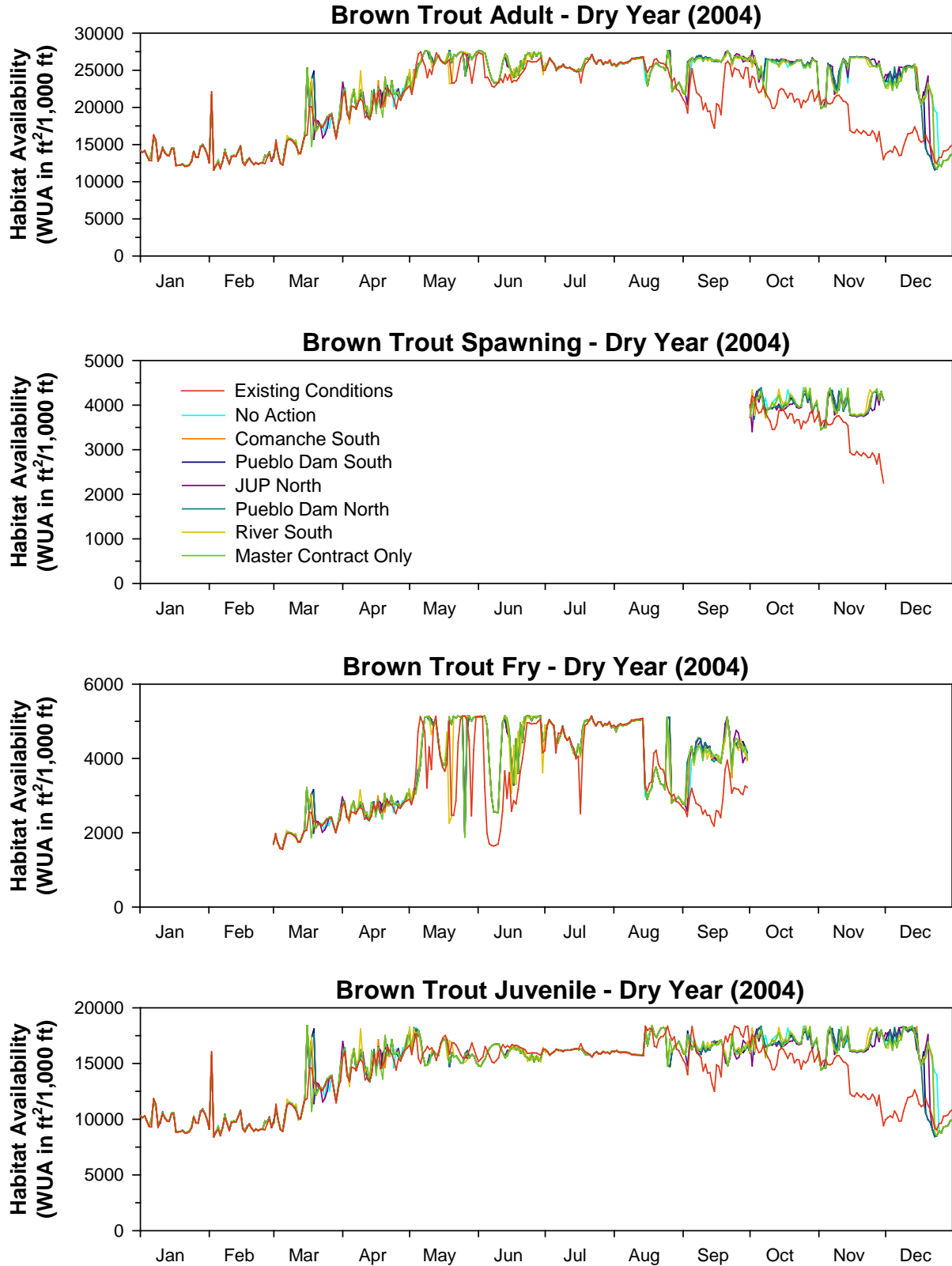


Figure 95. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 2 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 96. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 2 of the Upper Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

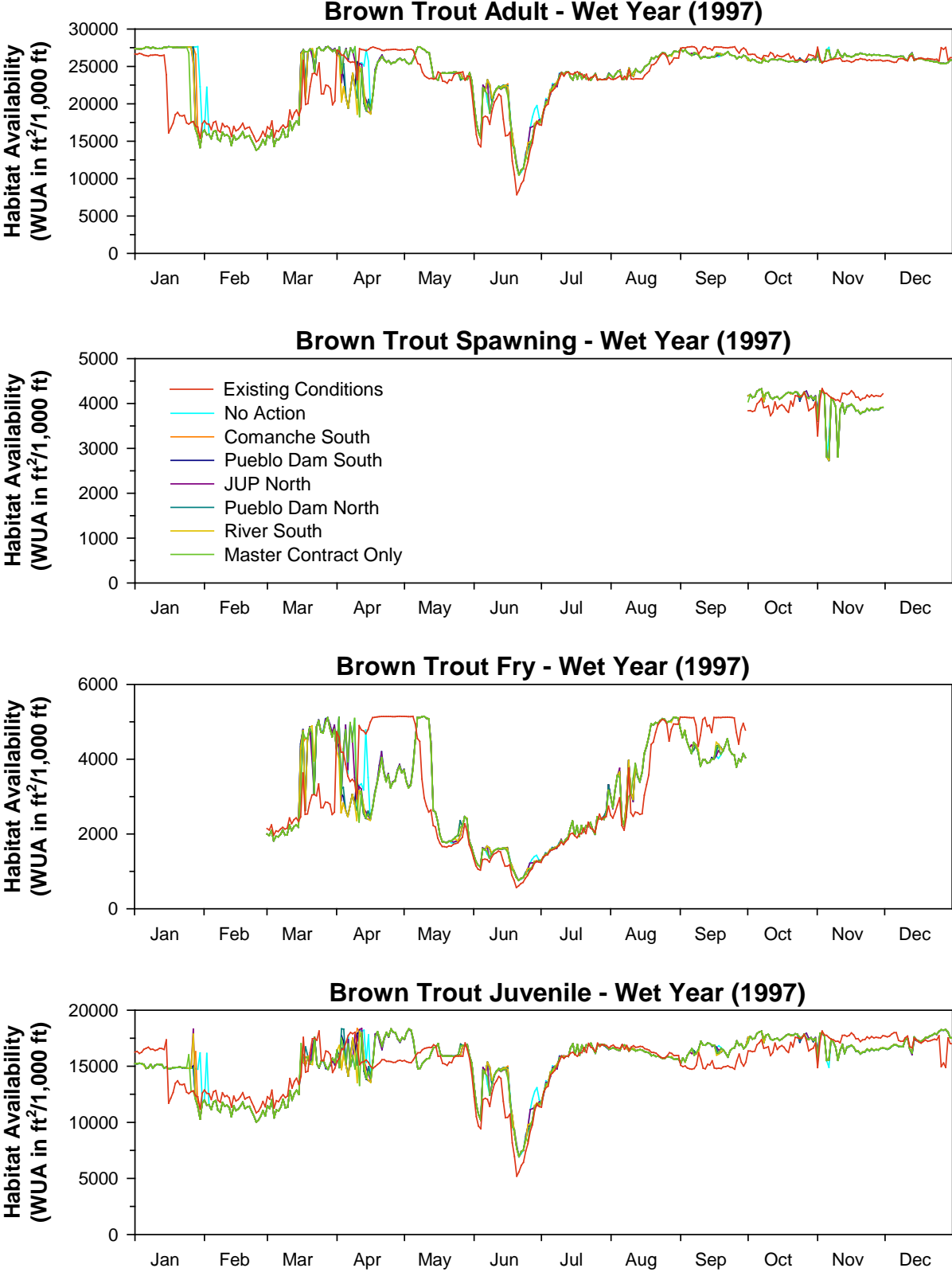


Figure 97. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 2 of the Upper Arkansas River

Arkansas Valley Conduit EIS  
 Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

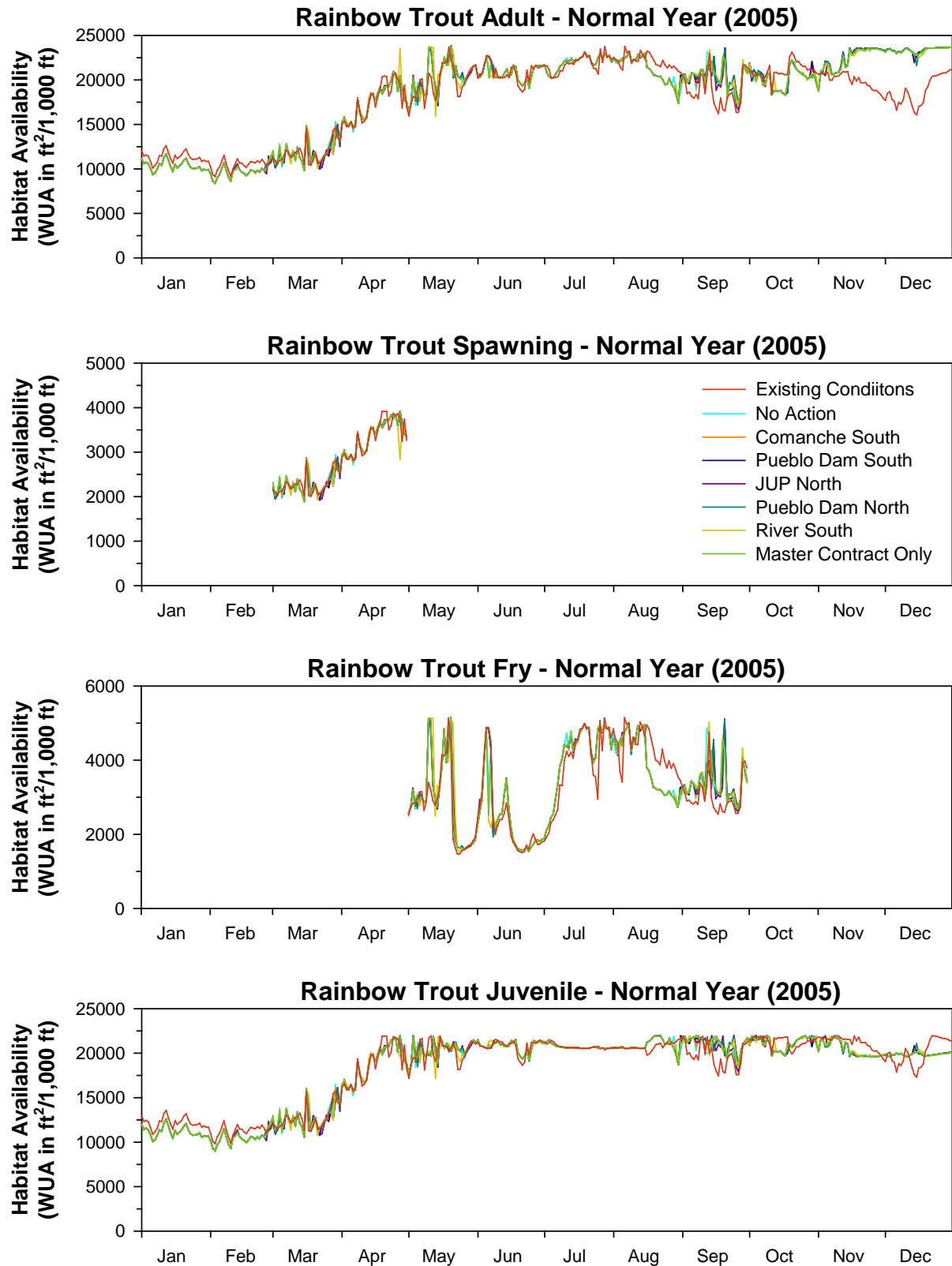


Figure 98. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 2 of the Upper Arkansas River

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

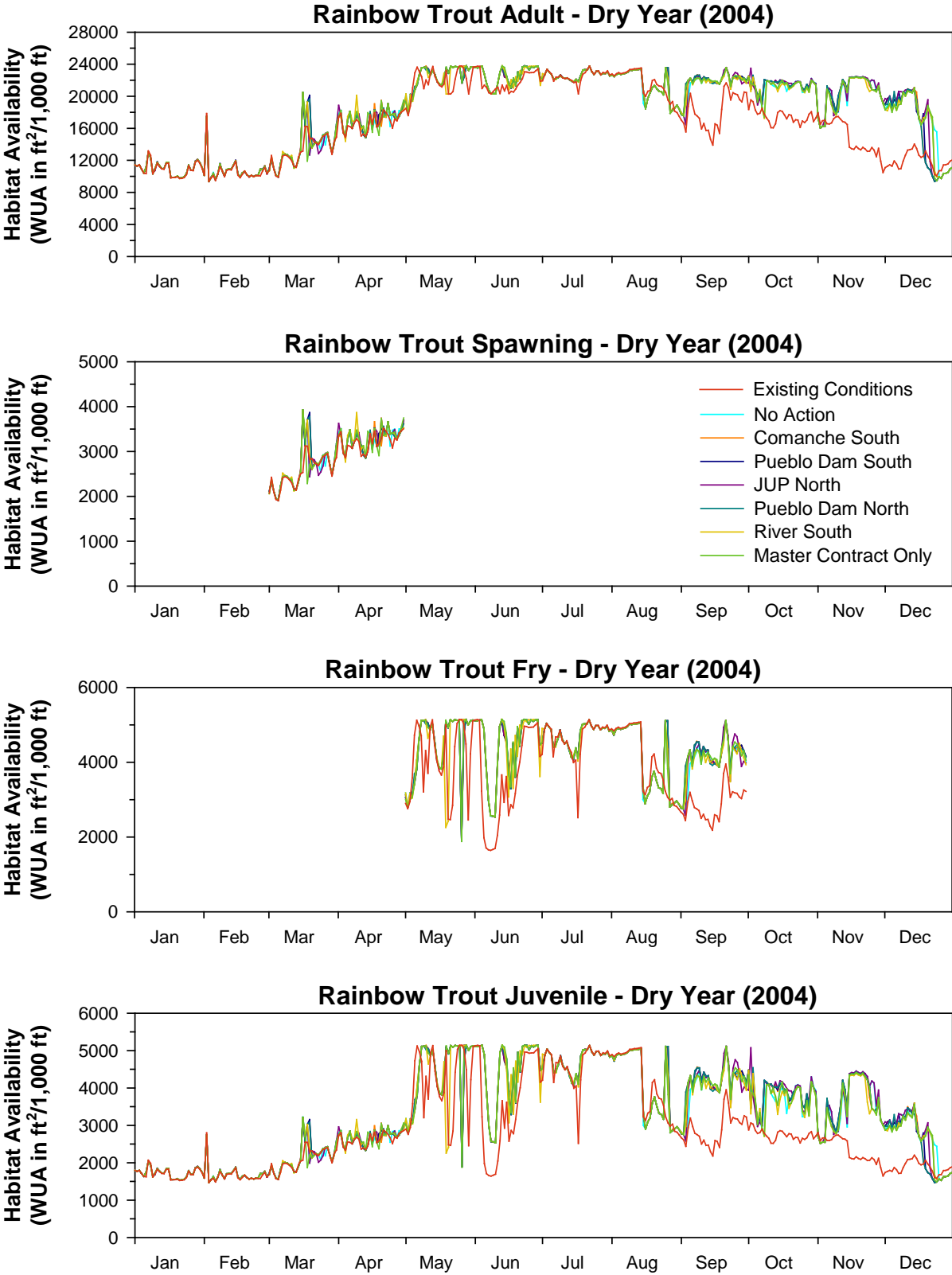
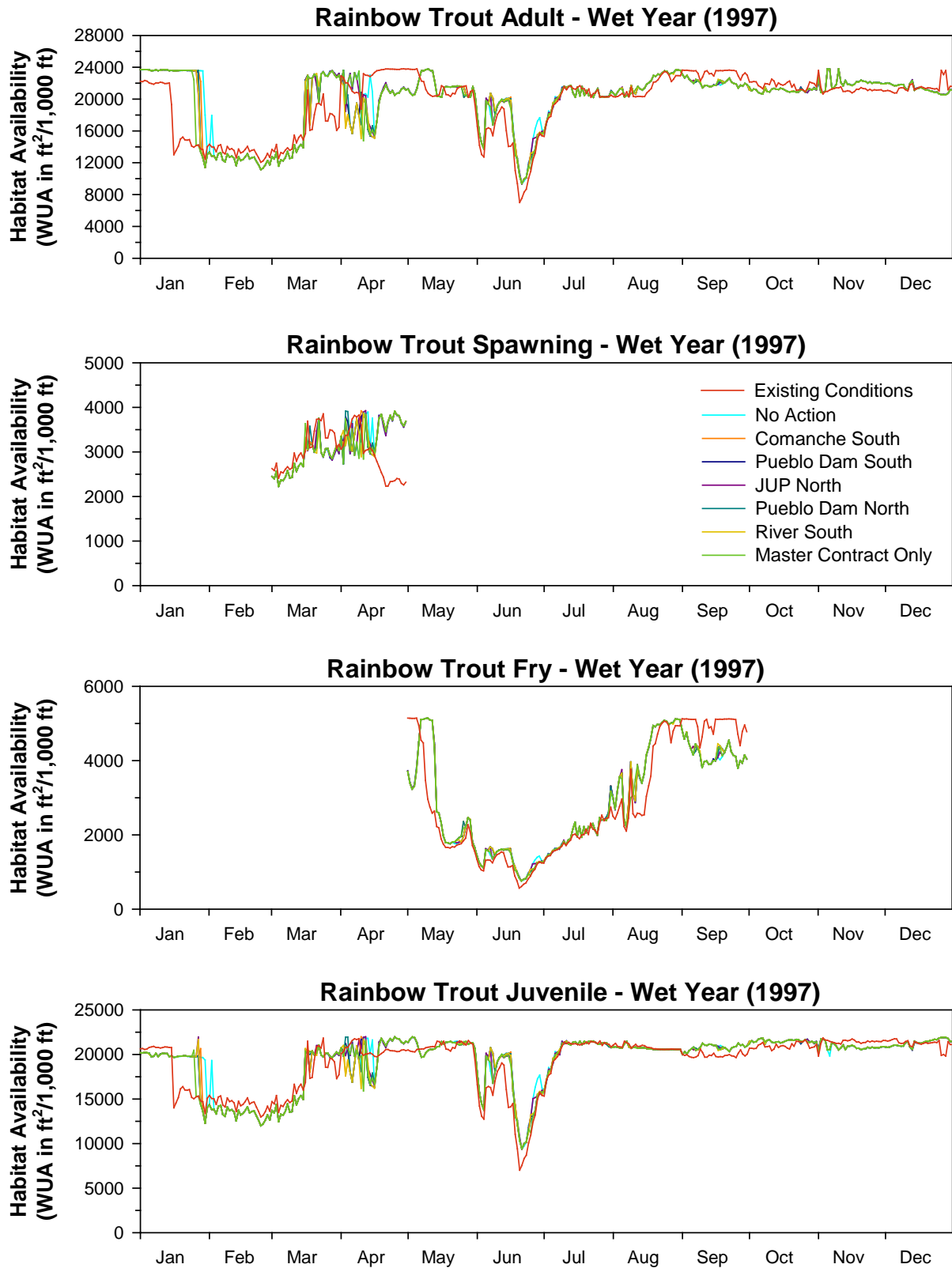


Figure 99. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 2 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 100. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 2 of the Upper Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

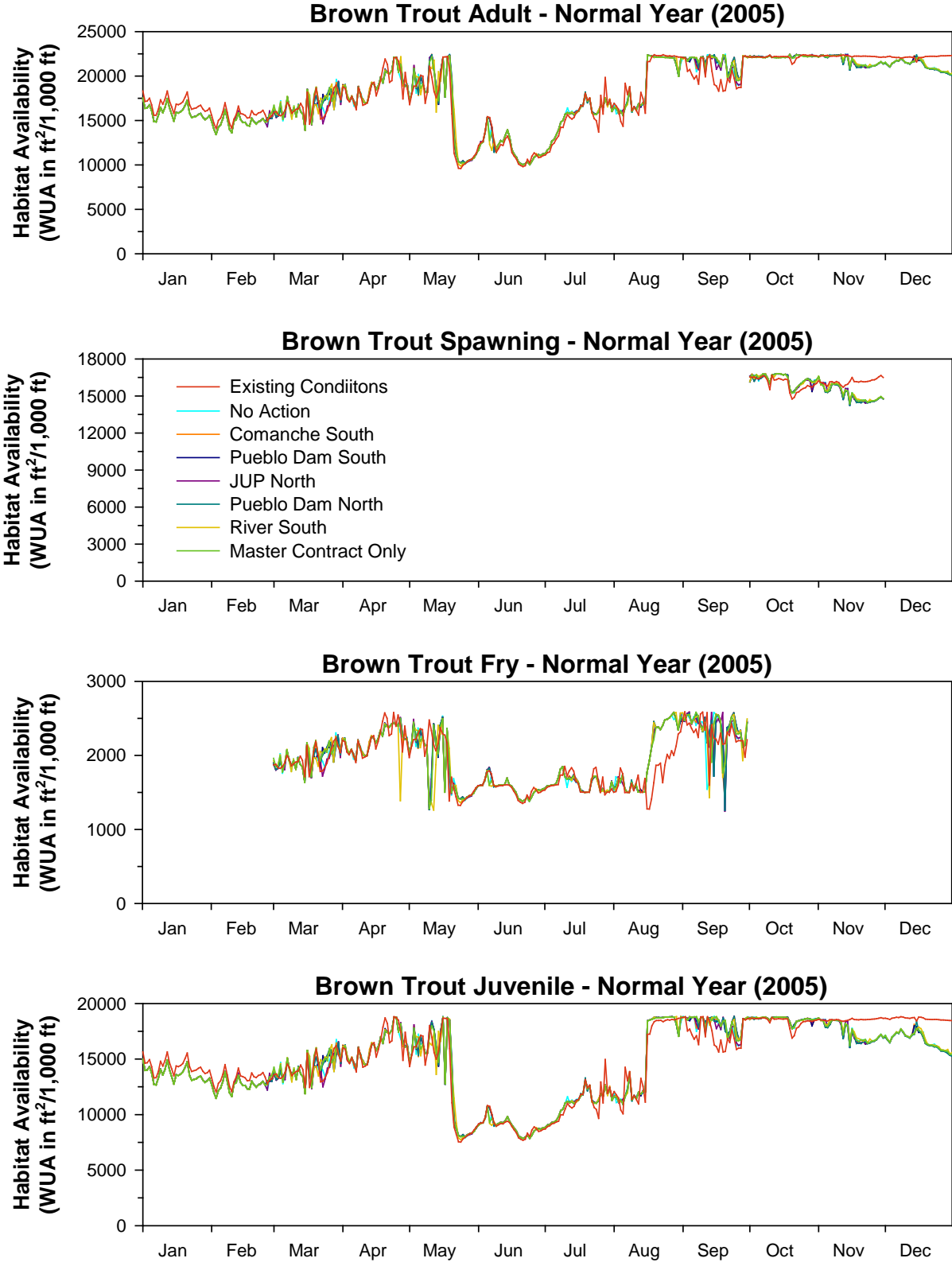
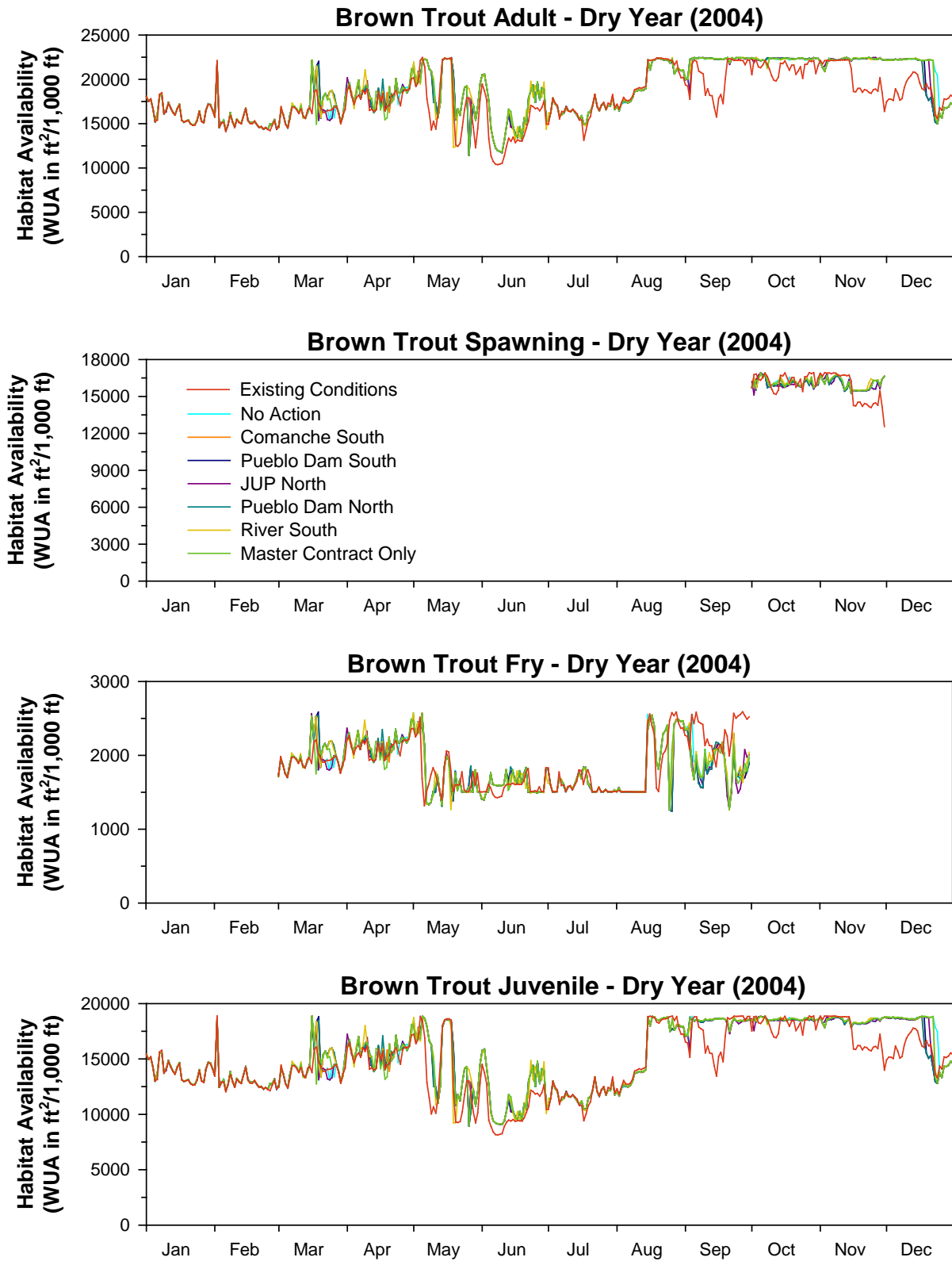


Figure 101. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 102. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of the Upper Arkansas River**



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

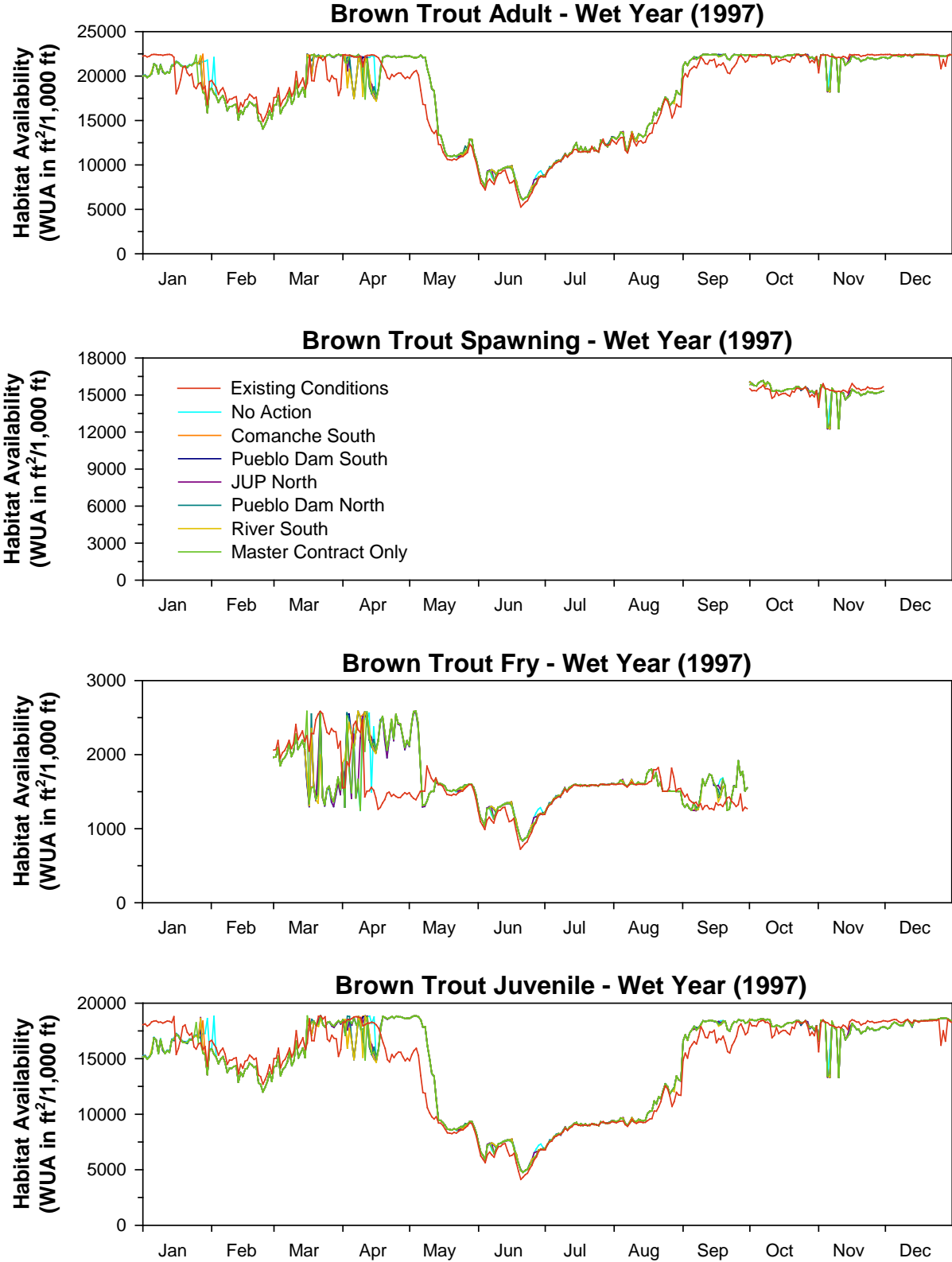
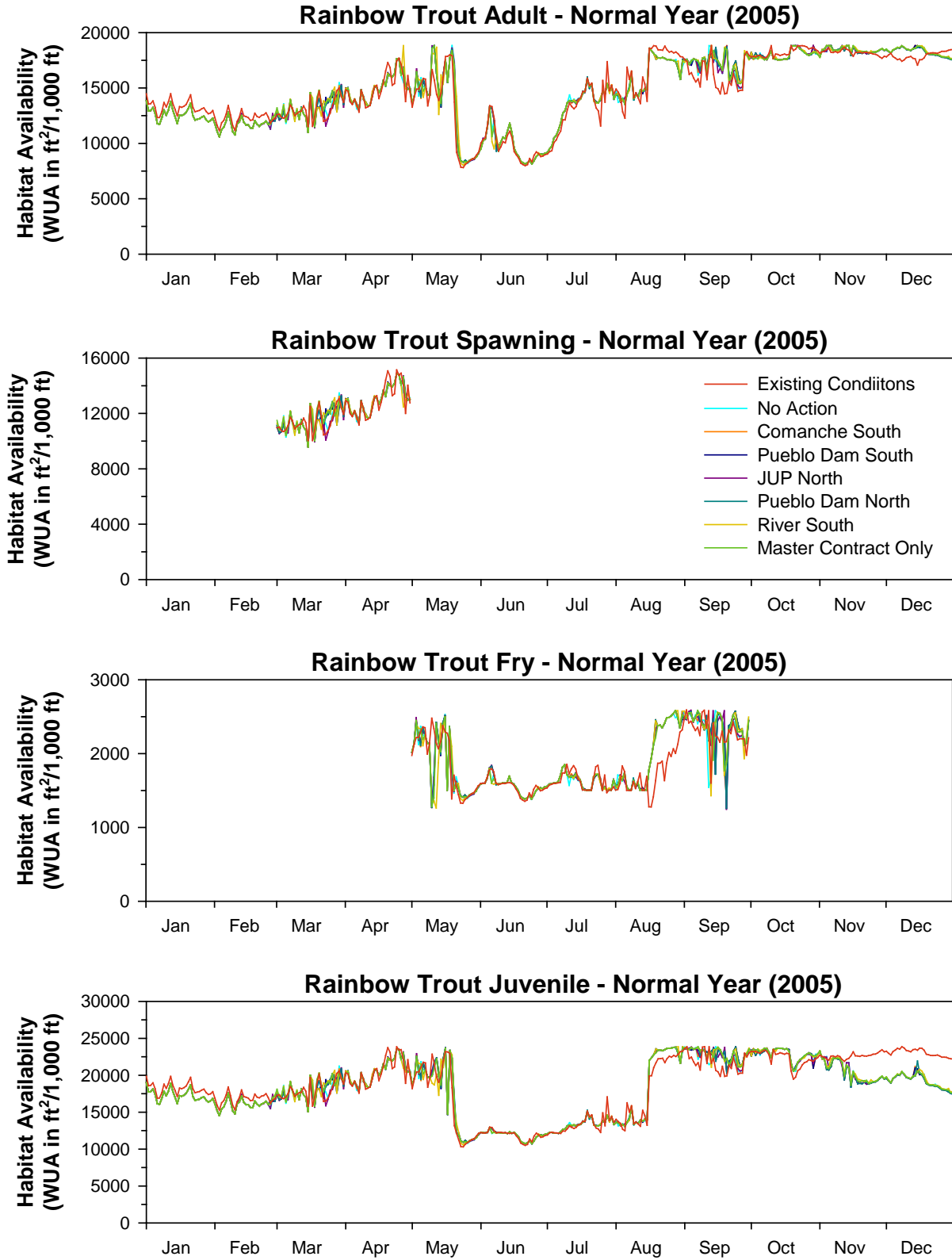


Figure 103. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 104. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of the Upper Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

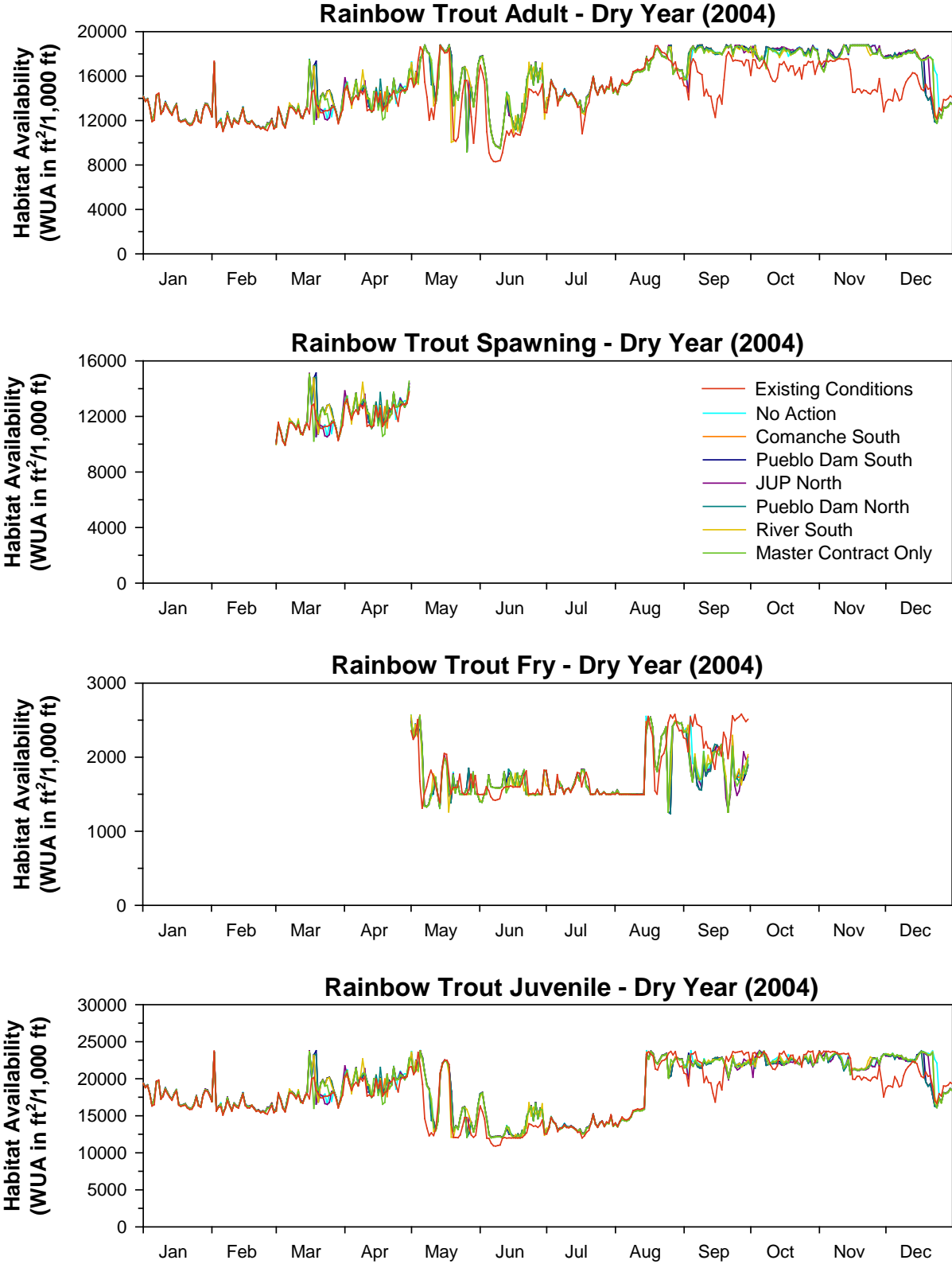
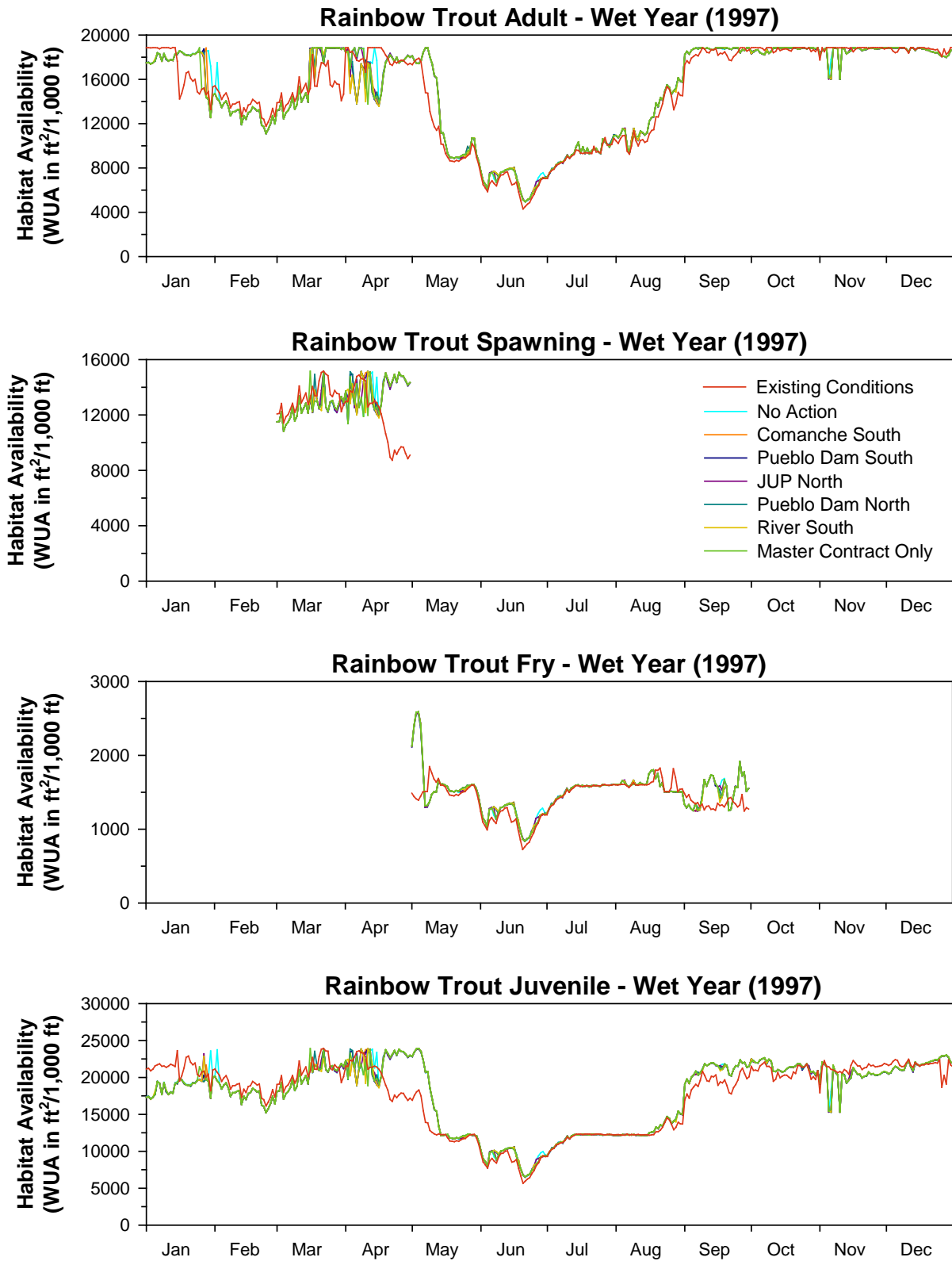


Figure 105. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 106. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of the Upper Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

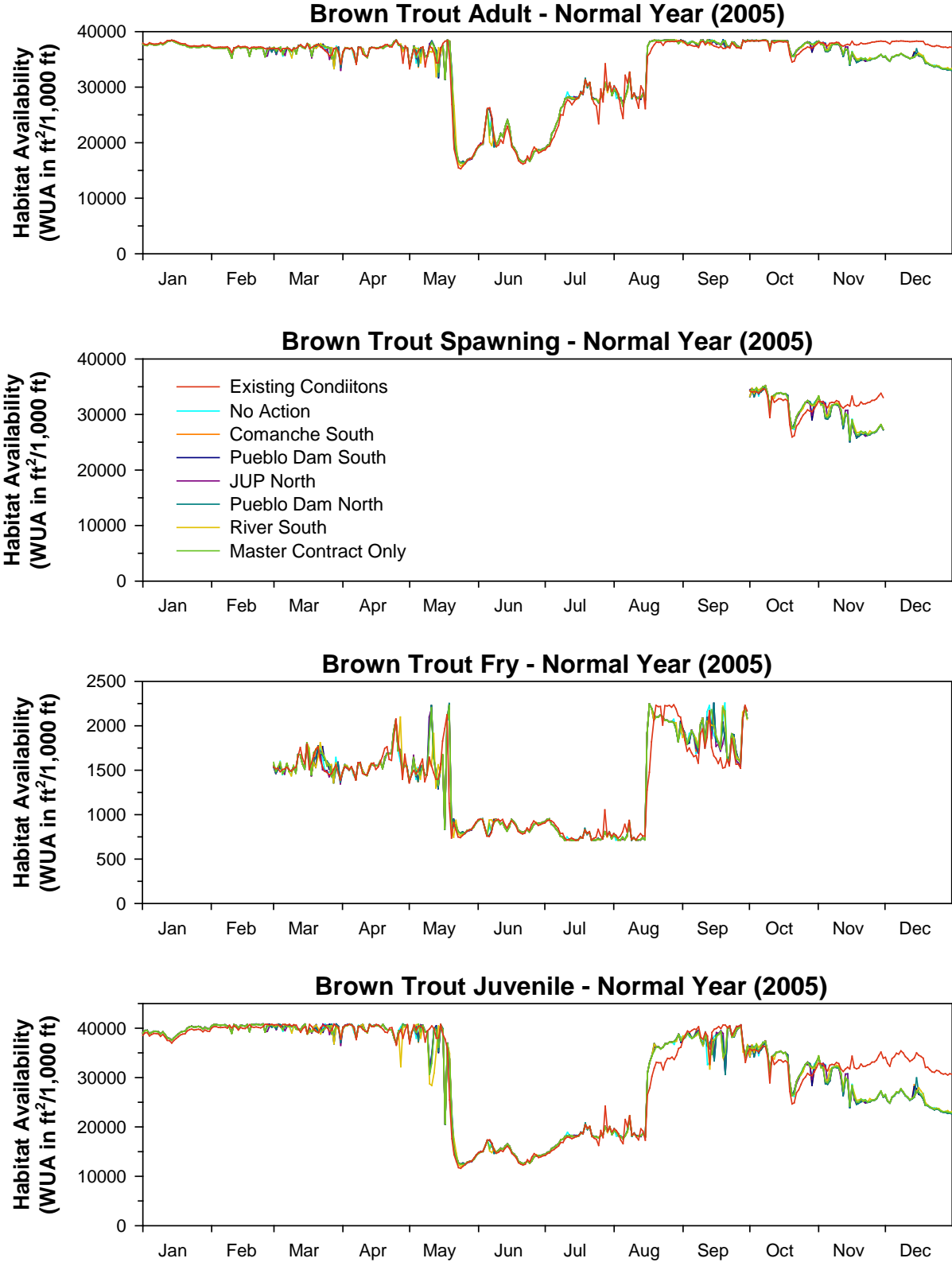
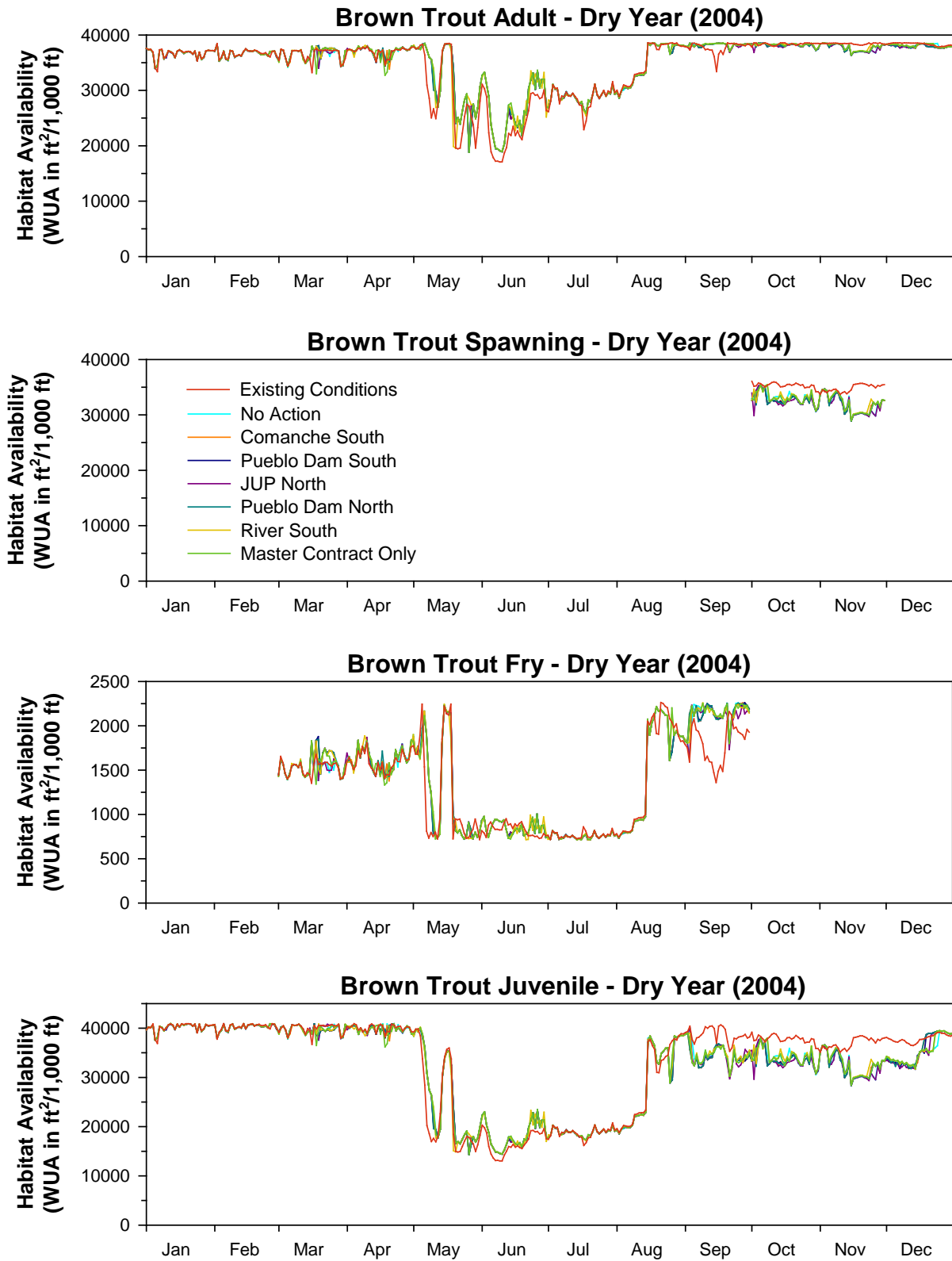


Figure 107. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 4 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 108. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 4 of the Upper Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

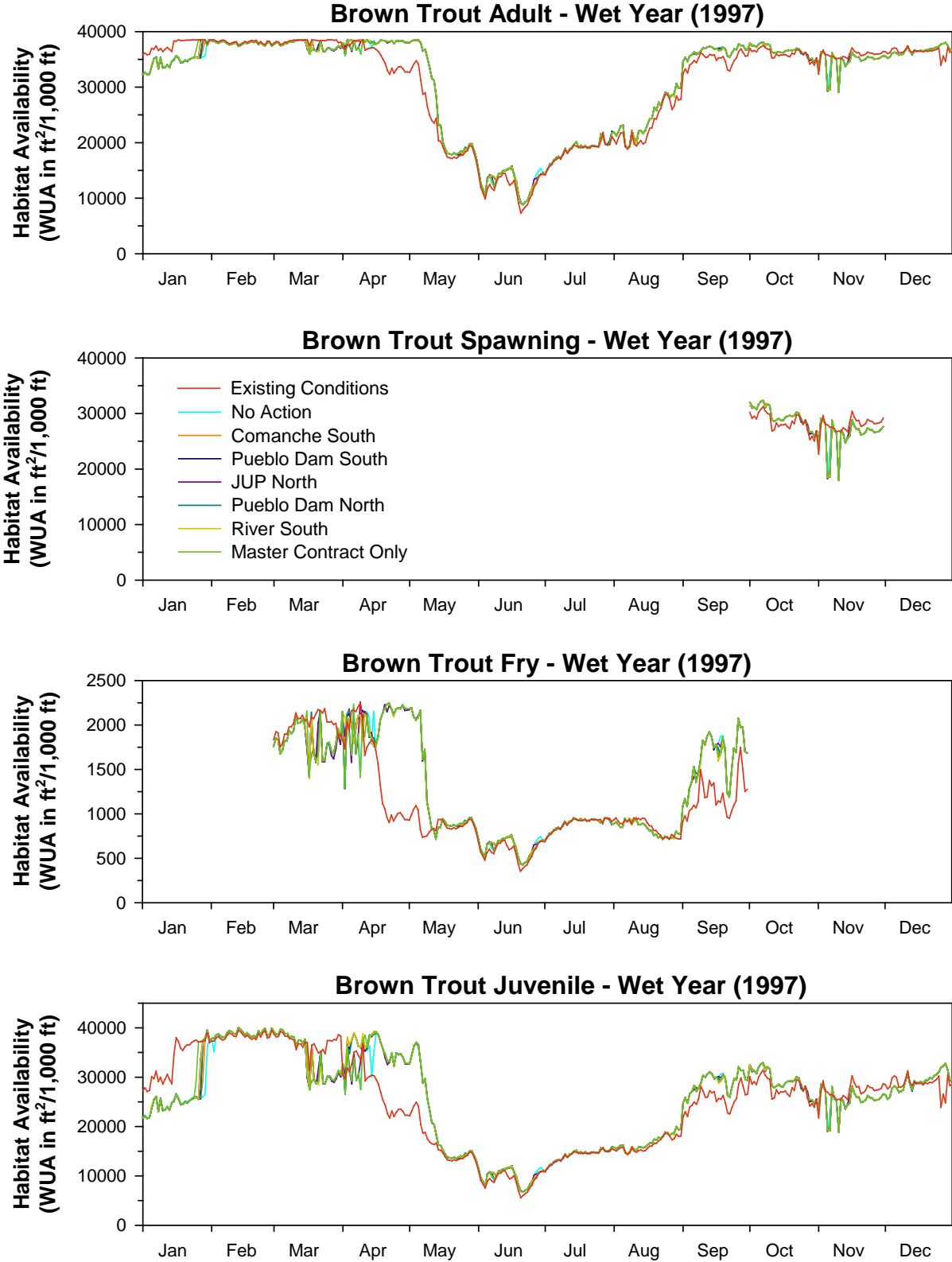


Figure 109. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 4 of the Upper Arkansas River

Arkansas Valley Conduit EIS  
 Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

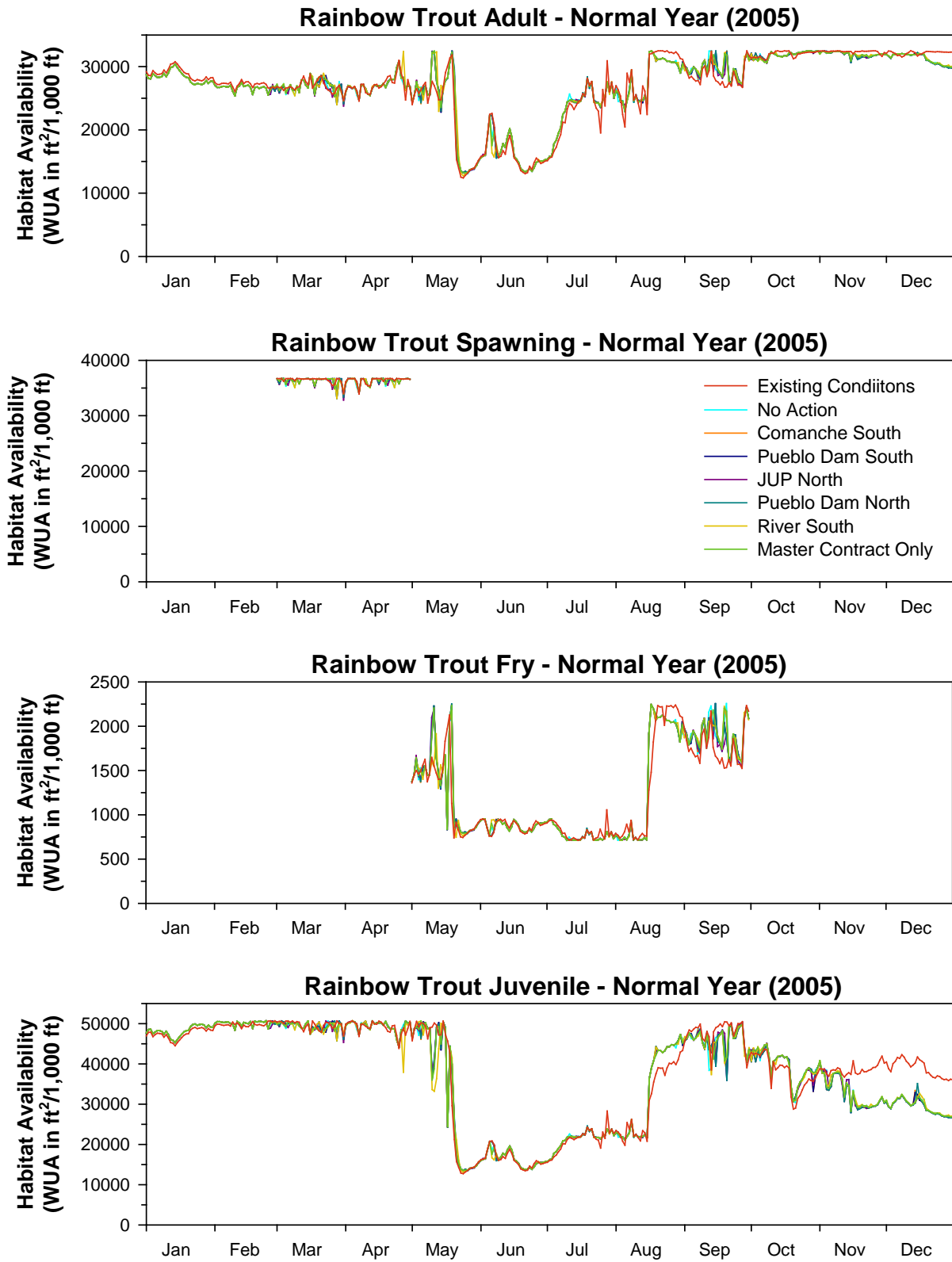


Figure 110. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 4 of the Upper Arkansas River



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

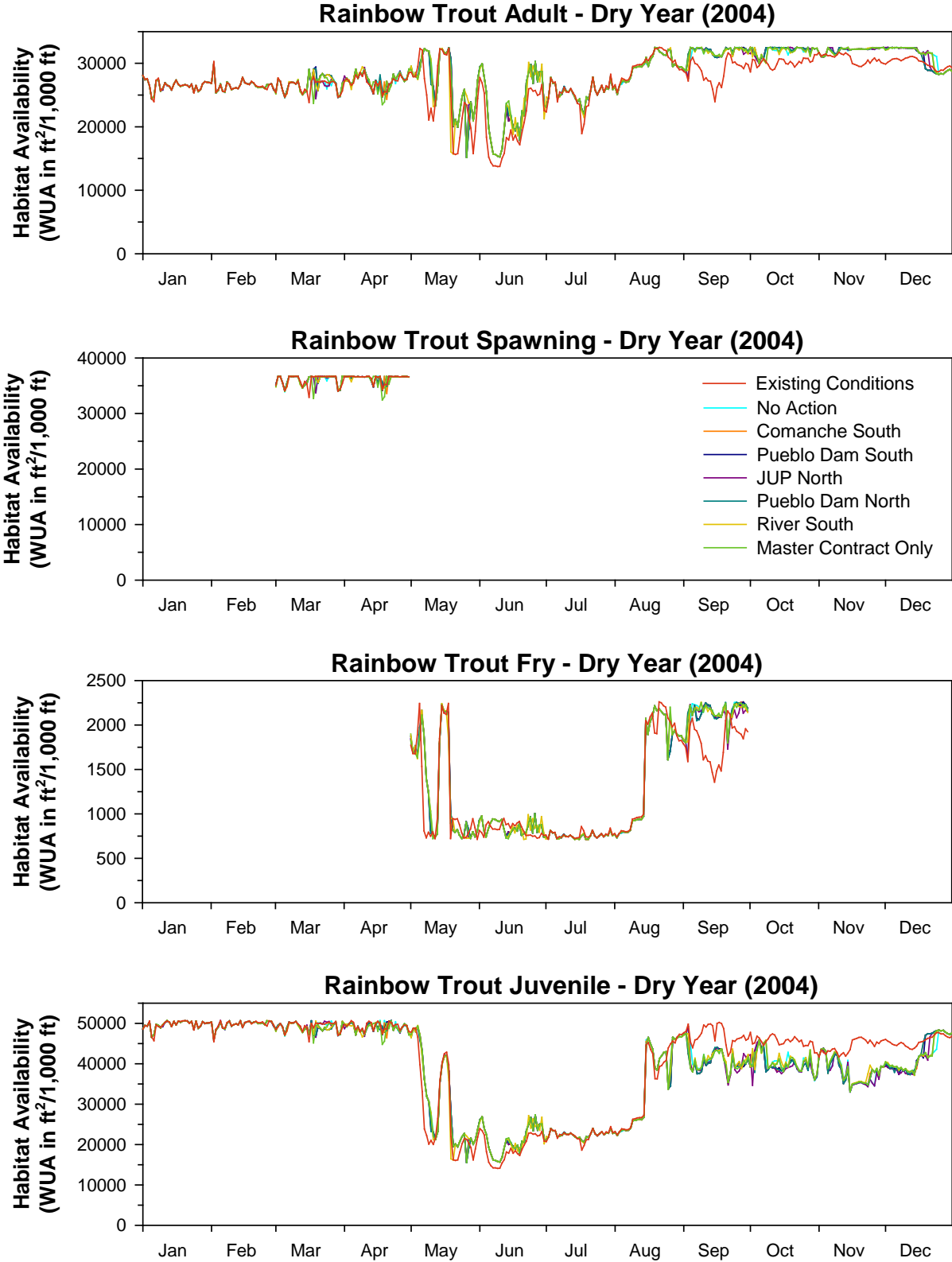
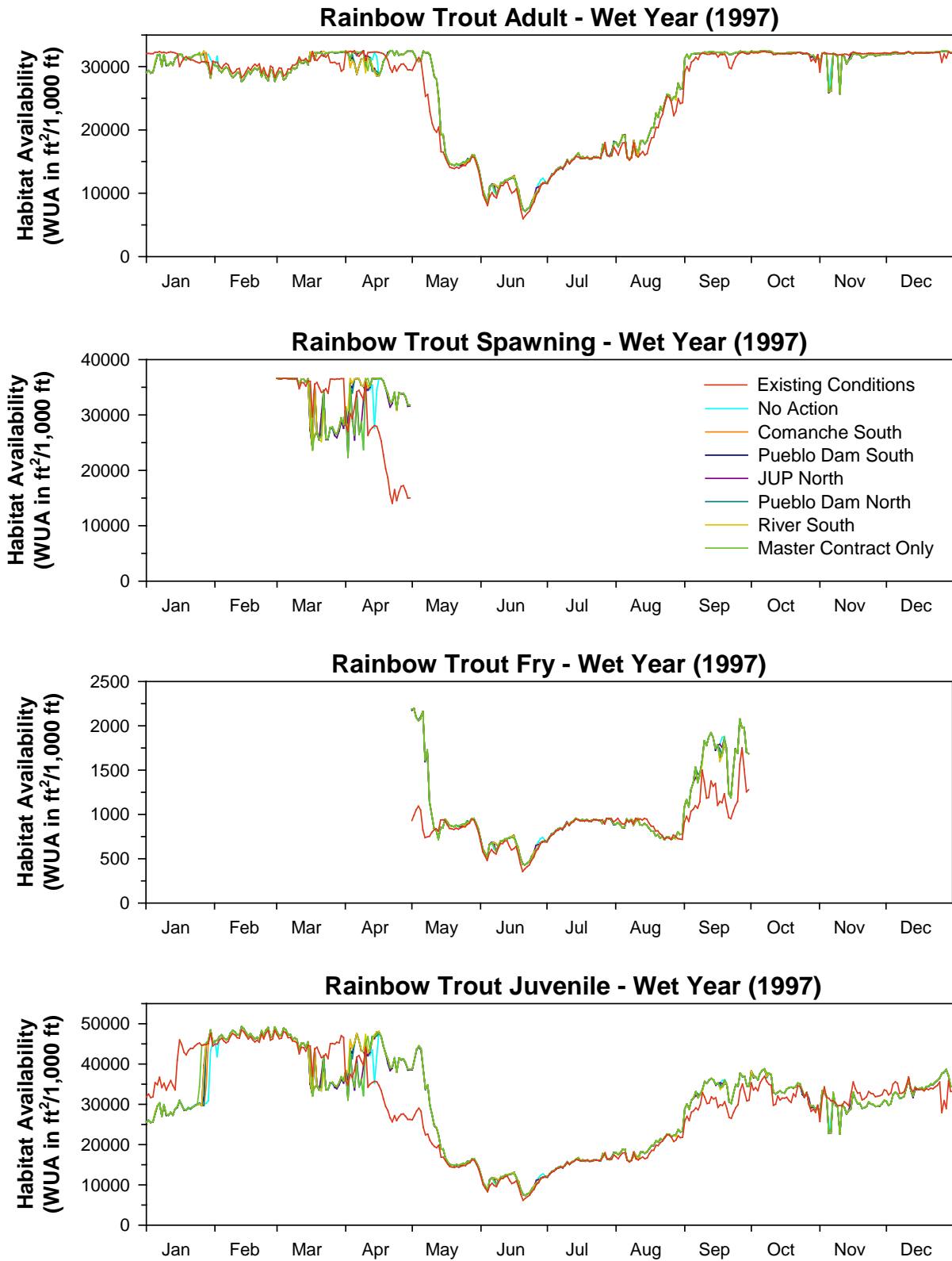


Figure 111. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 4 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 112. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 4 of the Upper Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

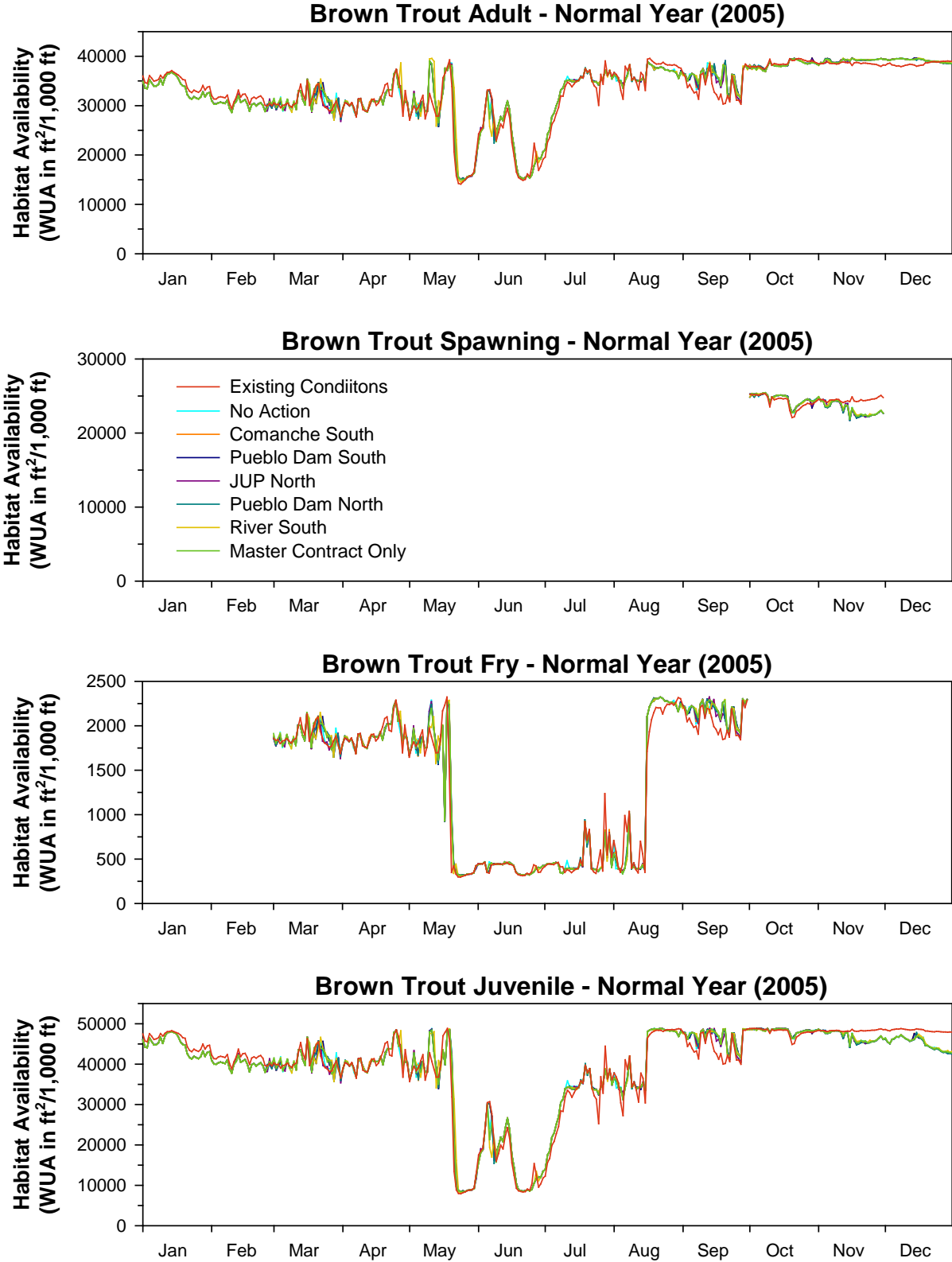
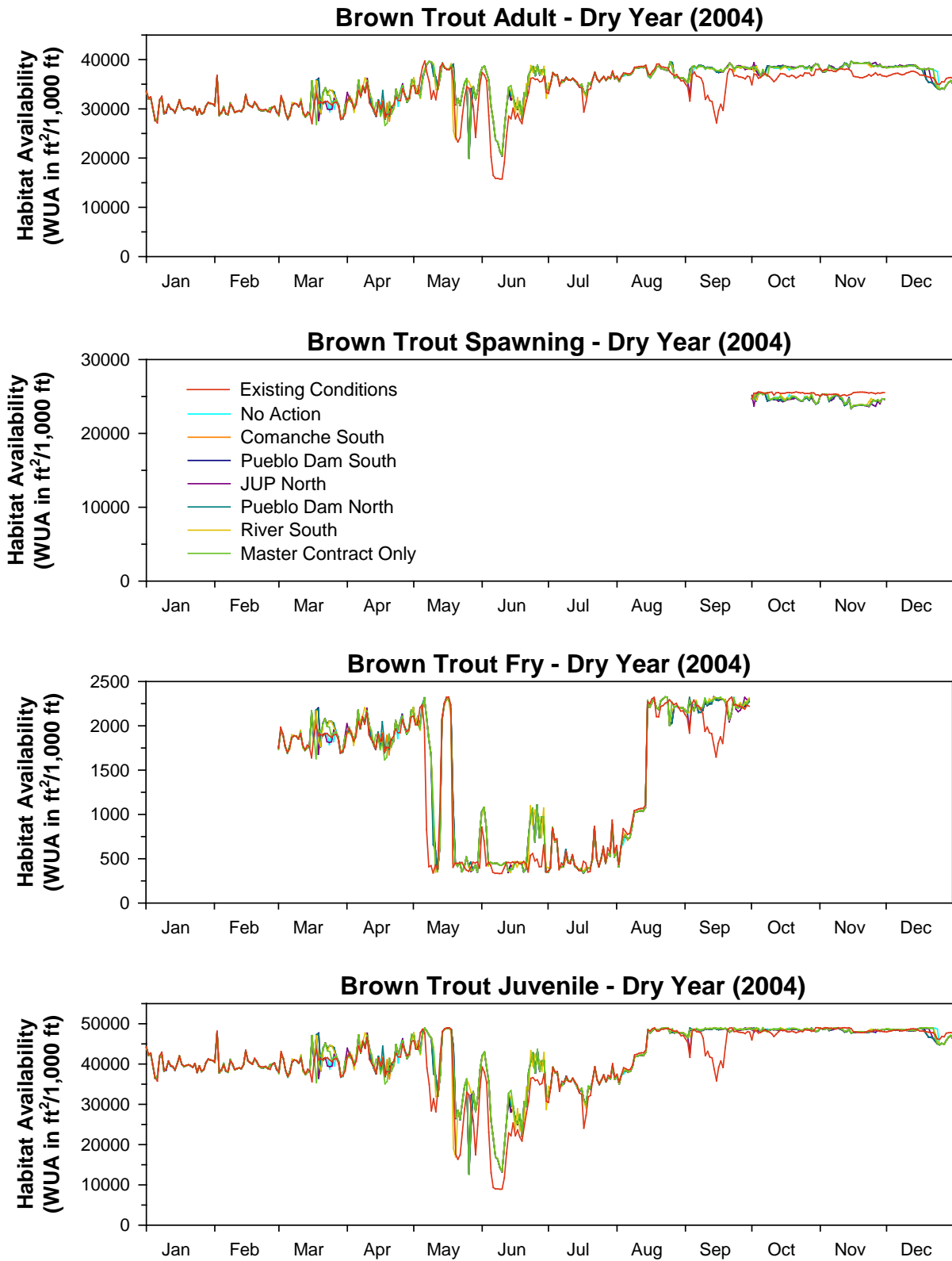


Figure 113. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 5 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 114. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 5 of the Upper Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

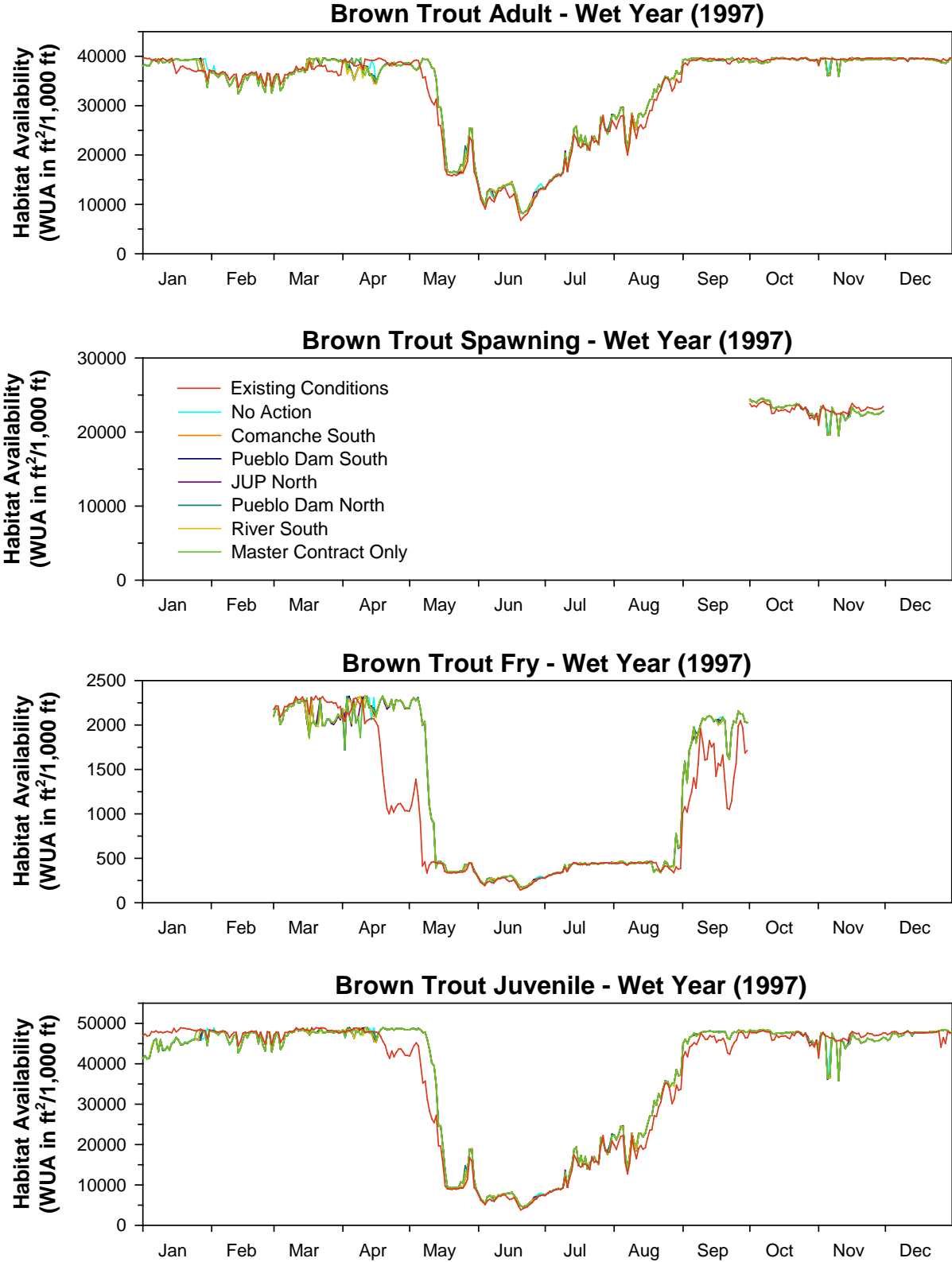
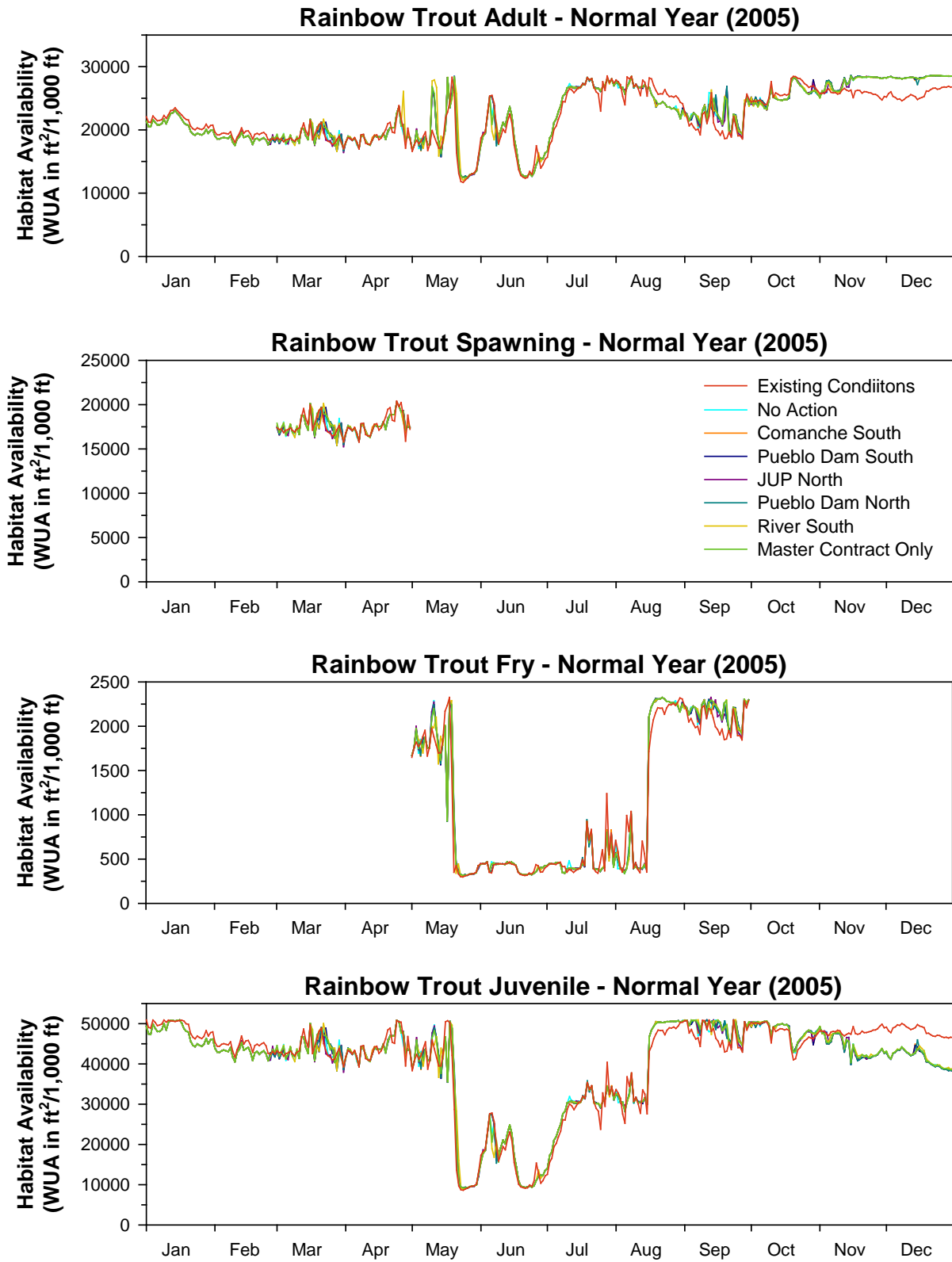


Figure 115. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 5 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 116. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 5 of the Upper Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

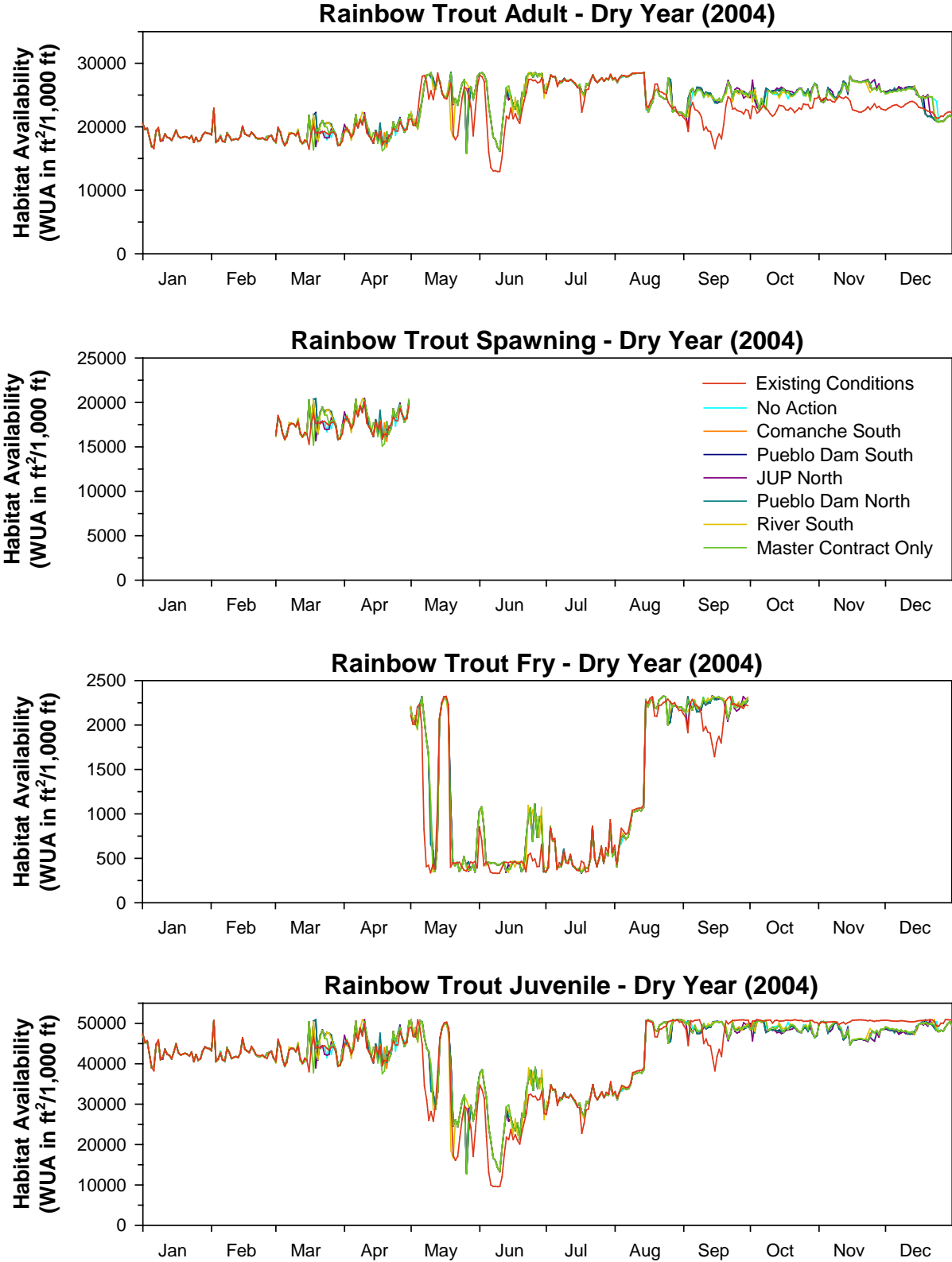
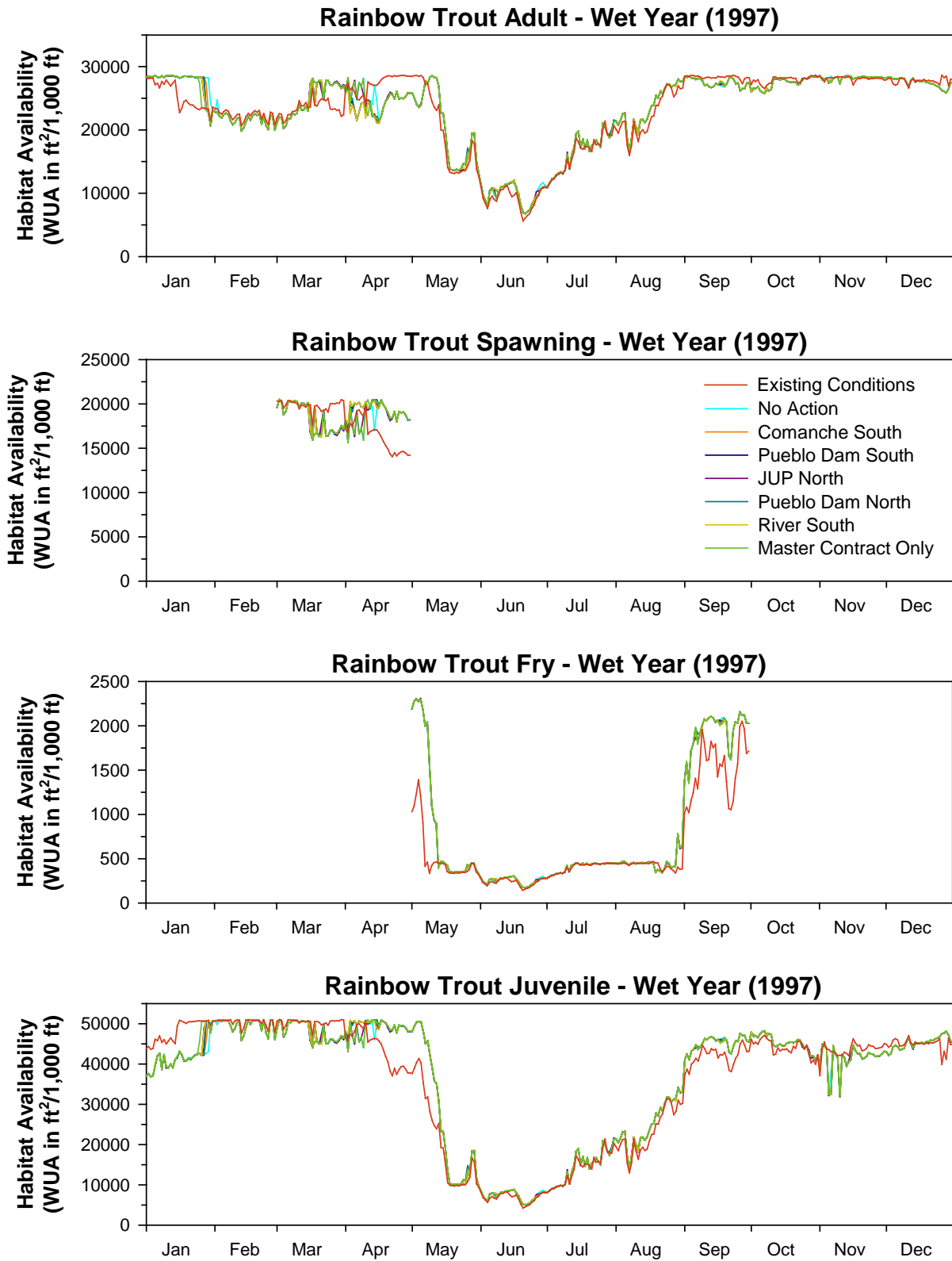


Figure 117. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ $\text{ft}^2/1,000\text{ft}$ ]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 5 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 118. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 5 of the Upper Arkansas River**



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

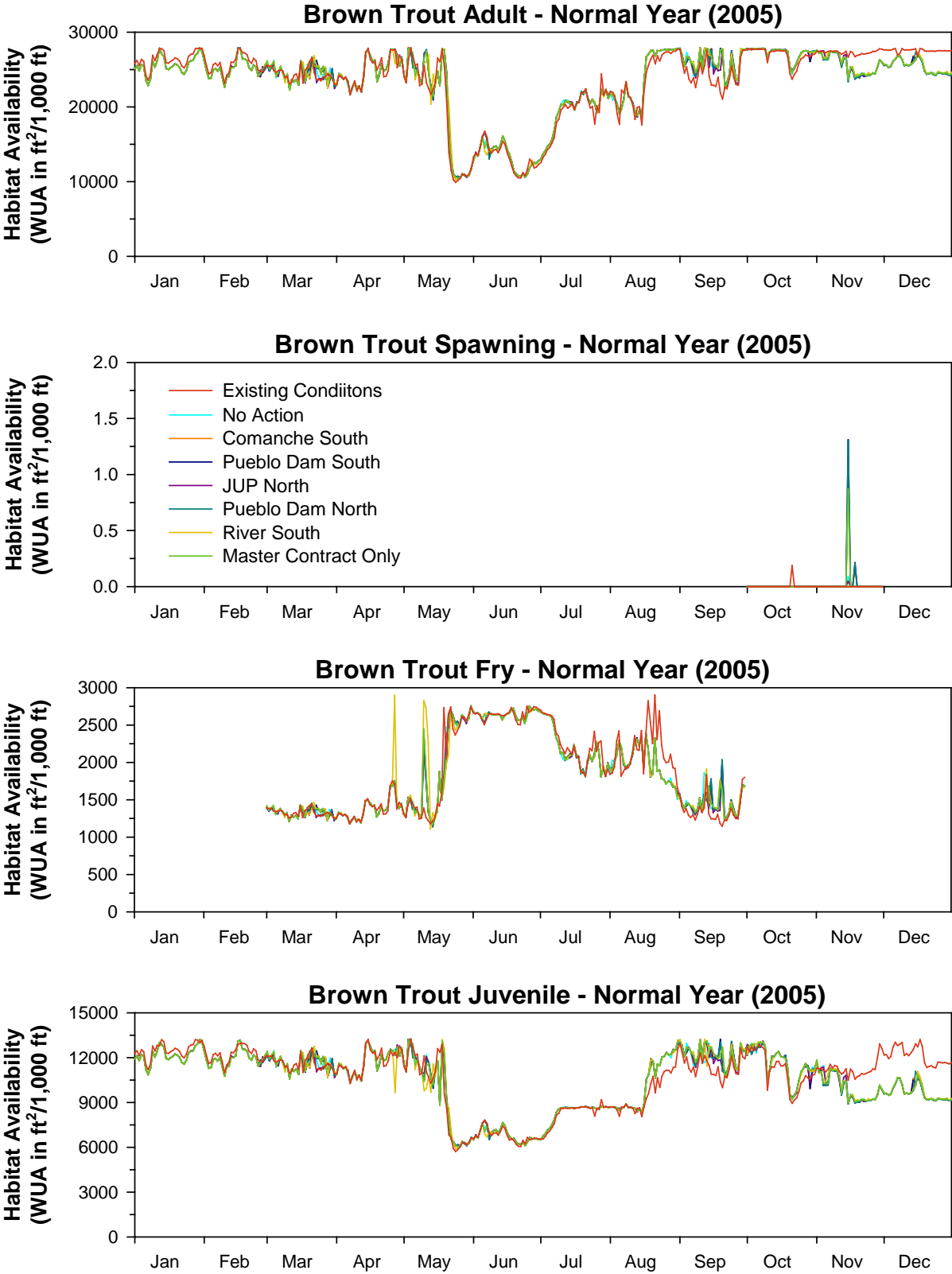
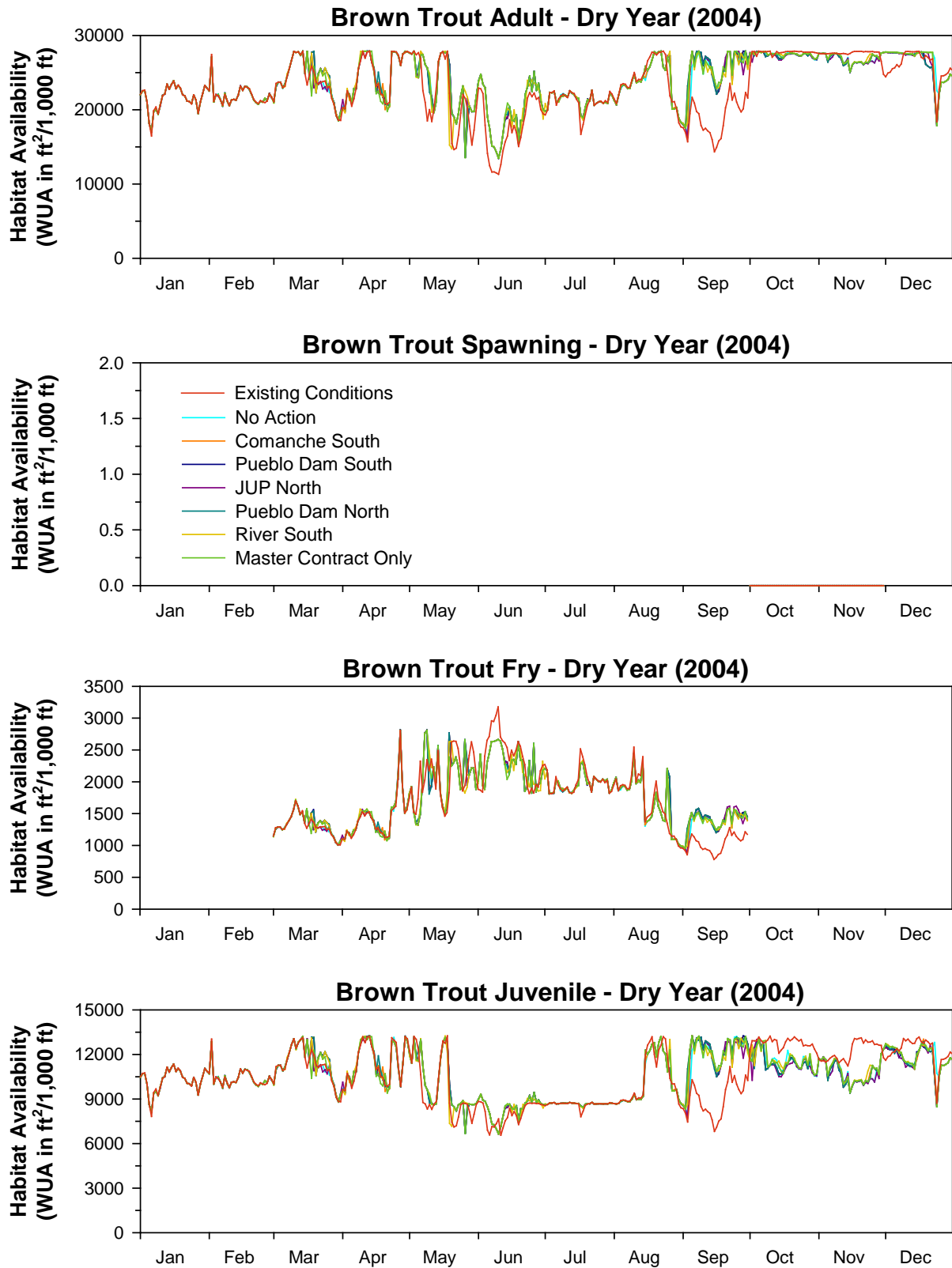


Figure 119. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 6 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 120. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ $\text{ft}^2/1,000\text{ft}$ ]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 6 of the Upper Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

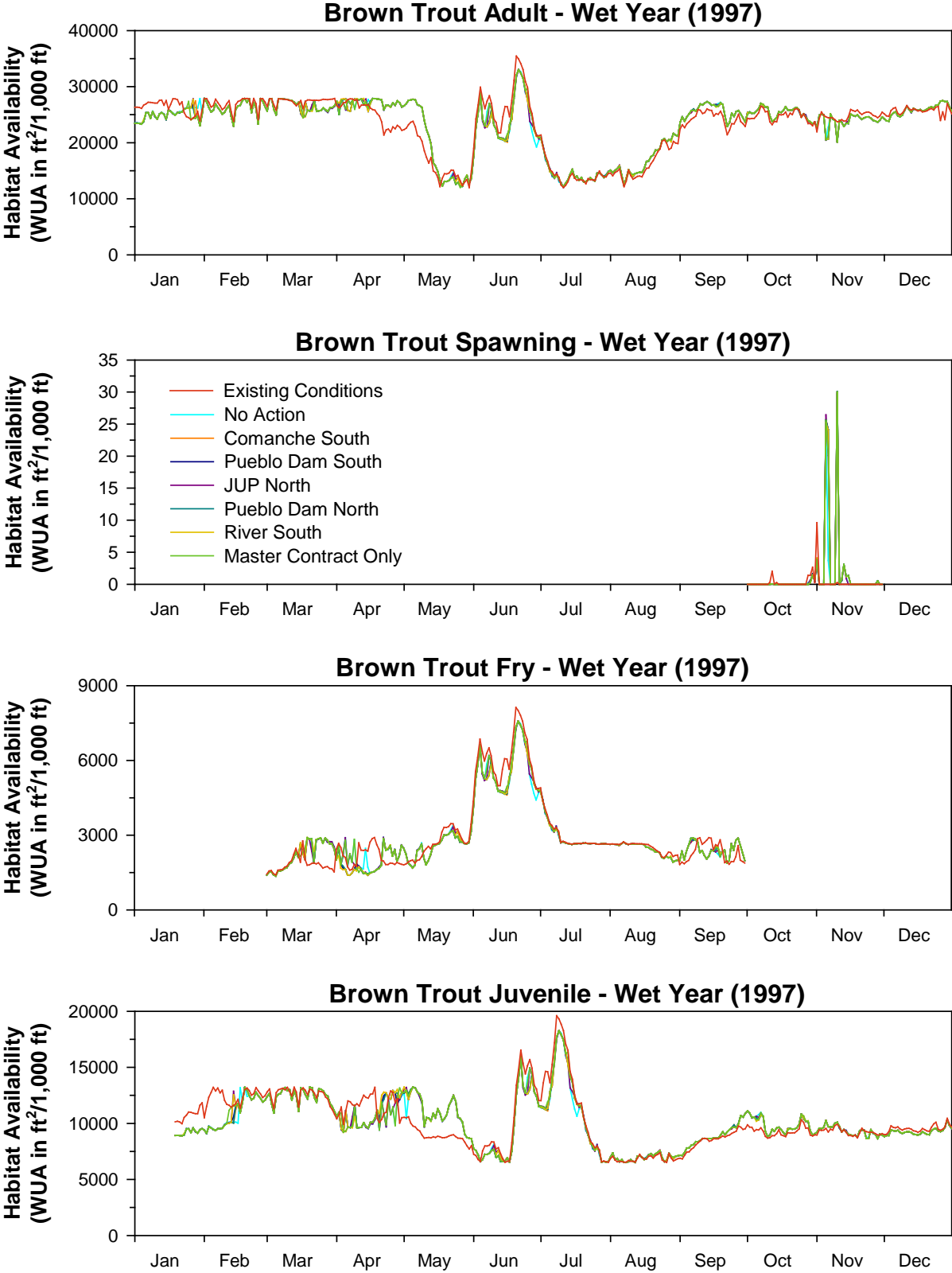


Figure 121. Cumulative Effects Brown Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 6 of the Upper Arkansas River

Arkansas Valley Conduit EIS  
 Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

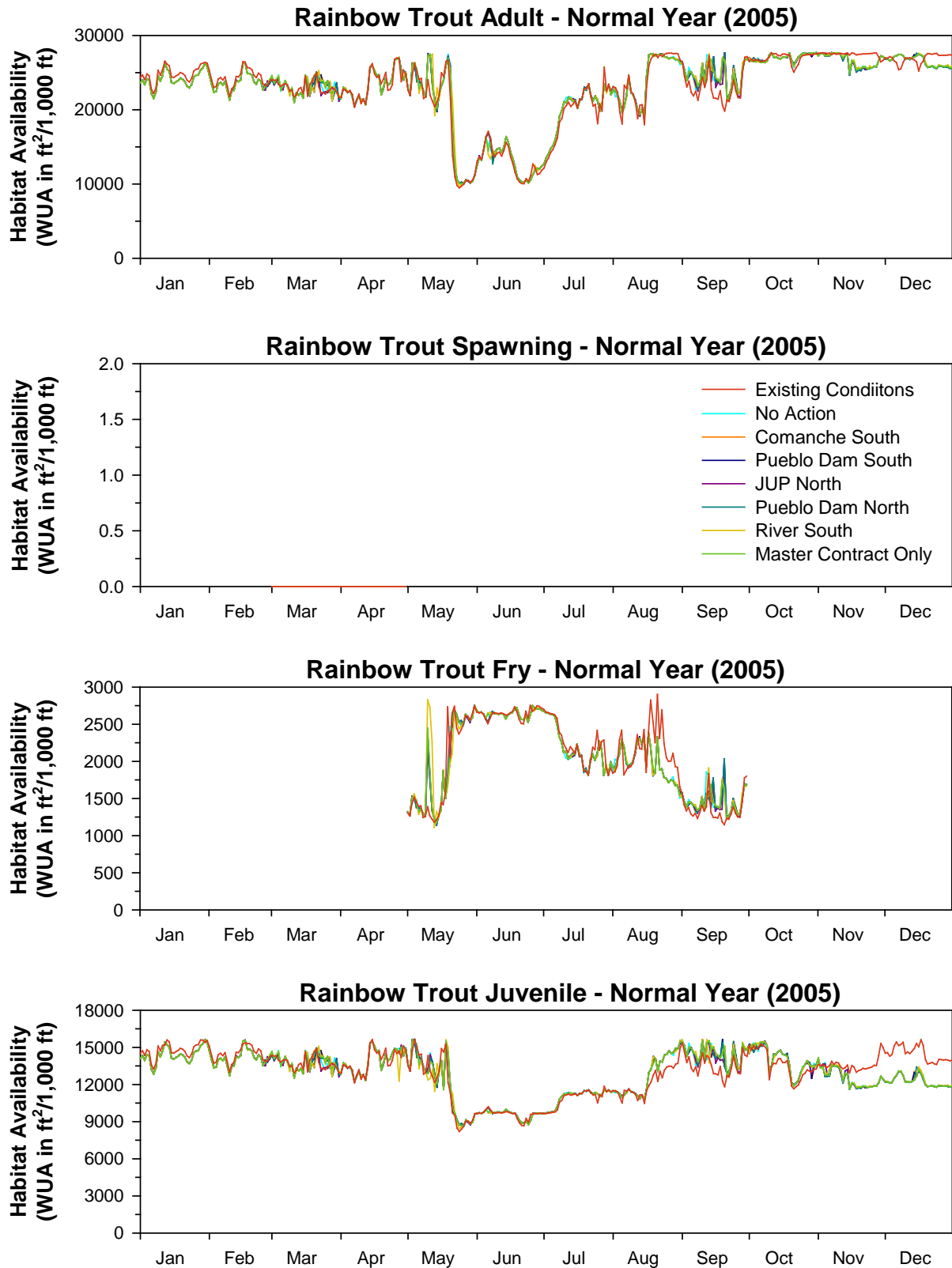


Figure 122. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 6 of the Upper Arkansas River

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

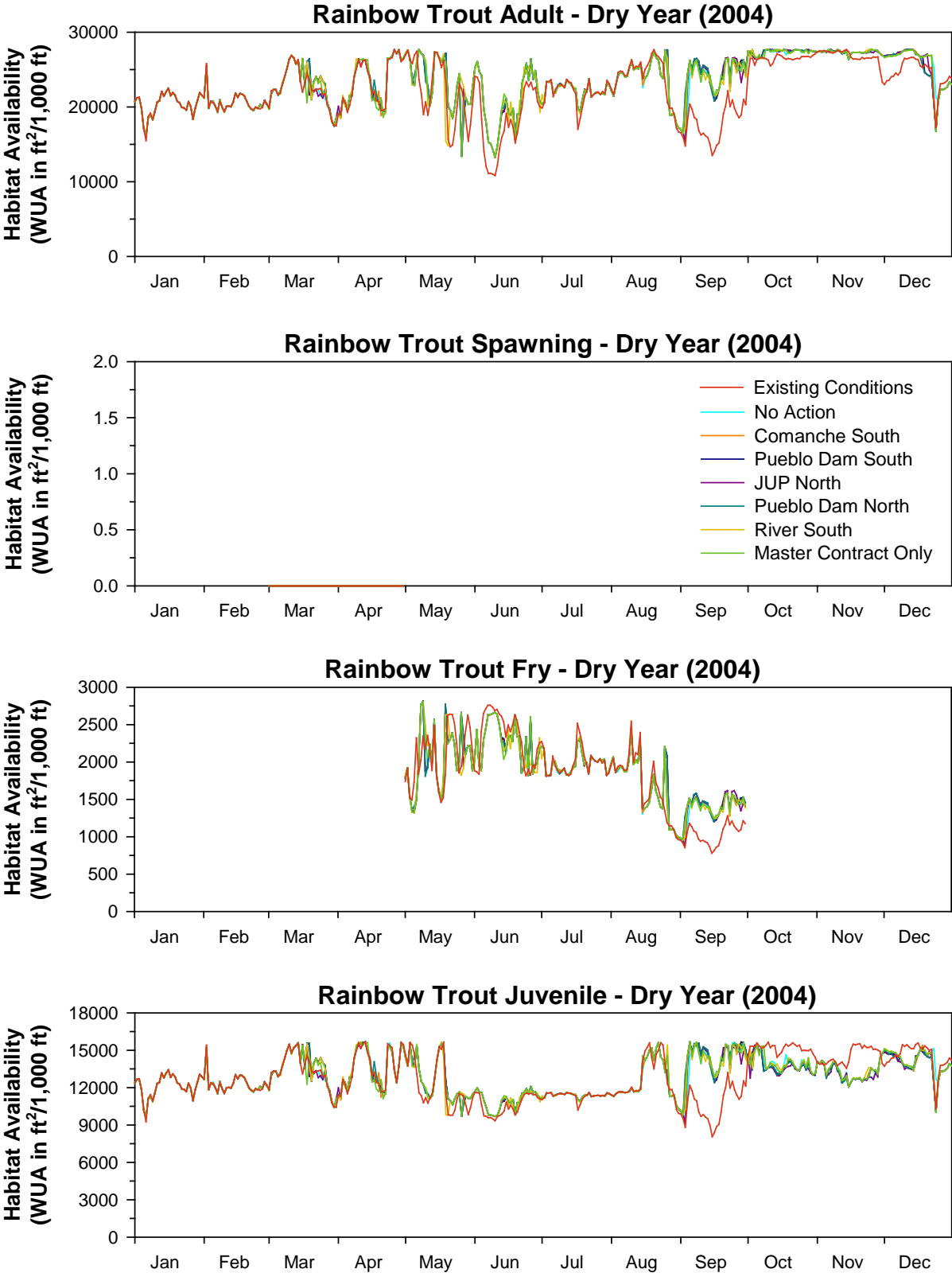
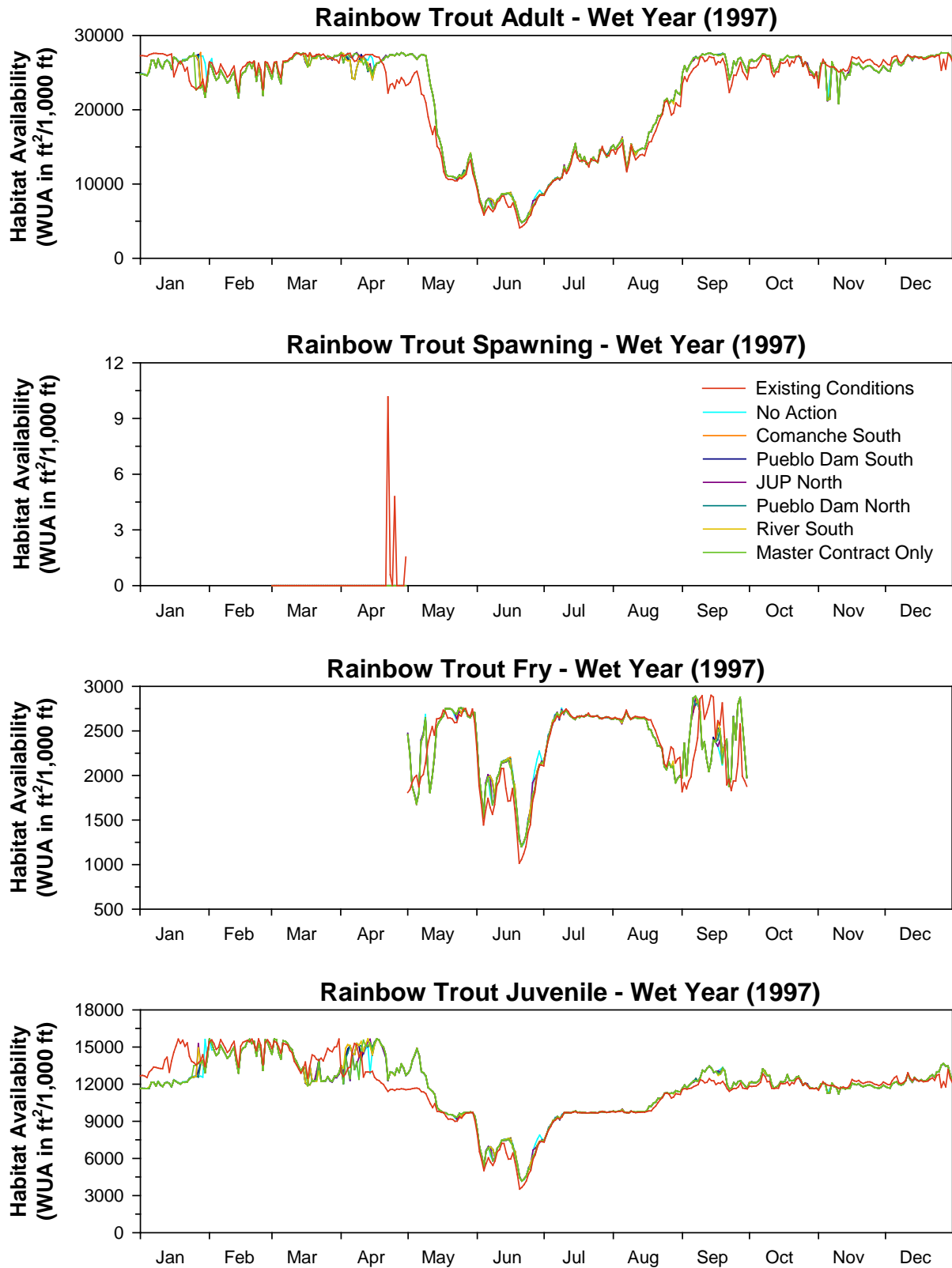


Figure 123. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 6 of the Upper Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**










**Figure 124. Cumulative Effects Rainbow Trout Adult, Spawning, Fry, and Juvenile Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 6 of the Upper Arkansas River**








Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 21. Cumulative Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 1

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	6,188	6,188	6,188	6,188	6,188	6,188	6,188	6,188
spawning	4,518	4,518	4,518	4,518	4,518	4,518	4,518	4,518
fry	1,278	1,278	1,278	1,278	1,278	1,278	1,278	1,278
juvenile	6,253	6,223	6,223	6,223	6,223	6,223	6,223	6,223
<b>Rainbow trout</b>								
adult	3,335	3,323	3,323	3,323	3,323	3,323	3,323	3,323
spawning	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291
fry	1,915	1,915	2,156	2,156	1,915	2,156	2,156	2,156
juvenile	6,681	6,678	6,678	6,678	6,678	6,678	6,678	6,678
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	0%	0%	0%	0%	0%	0%	0%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	0%	0%	0%	0%	0%	0%	0%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Rainbow trout</b>								
adult	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	0%	13%	13%	0%	13%	13%	13%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	5,380	5,380	5,380	5,380	5,380	5,380	5,380	5,380
spawning	3,687	3,687	3,687	3,687	3,687	3,687	3,687	3,687
fry	1,290	1,290	1,290	1,290	1,290	1,290	1,290	1,290
juvenile	8,469	8,469	8,469	8,469	8,469	8,469	8,469	8,469
<b>Rainbow trout</b>								
adult	2,908	2,908	2,908	2,908	2,908	2,908	2,908	2,908
spawning	2,313	2,313	2,313	2,313	2,313	2,313	2,313	2,313
fry	1,911	1,784	1,784	1,784	1,784	1,784	1,784	1,784
juvenile	7,610	7,574	7,574	7,574	7,574	7,574	7,574	7,574
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	0%	0%	<1%	0%	0%	0%	0%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	0%	0%	0%	0%	0%	0%	0%
juvenile	--	0%	0%	0%	0%	0%	0%	0%

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**








Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	0%	0%	0%	0%	0%	0%	0%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	-7%	-7%	-7%	-7%	-7%	-7%	-7%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	4,097	4,350	4,352	4,352	4,350	4,352	4,352	4,352
spawning	7,174	7,174	7,174	7,174	7,174	7,174	7,174	7,174
fry	1,795	1,795	1,795	1,795	1,795	1,795	1,795	1,795
juvenile	3,921	4,163	4,165	4,165	4,163	4,165	4,165	4,165
<b>Rainbow trout</b>								
adult	2,139	2,271	2,271	2,271	2,271	2,271	2,271	2,271
spawning	3,217	3,217	3,217	3,217	3,217	3,217	3,217	3,217
fry	2,201	2,201	2,201	2,201	2,201	2,201	2,201	2,201
juvenile	4,568	4,851	4,852	4,852	4,850	4,852	4,852	4,852
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	6%	6%	6%	6%	6%	6%	6%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	0%	0%	0%	0%	0%	0%	0%
juvenile	--	6%	6%	6%	6%	6%	6%	6%
<b>Rainbow trout</b>								
adult	--	6%	6%	6%	6%	6%	6%	6%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	0%	0%	0%	0%	0%	0%	0%
juvenile	--	6%	6%	6%	6%	6%	6%	6%



Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 22. Cumulative Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 1

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	11,715	11,822	12,072	12,072	11,822	12,072	12,071	12,071
spawning	7,177	7,177	7,177	7,177	7,177	7,177	7,177	7,177
fry	2,512	2,541	2,541	2,541	2,541	2,541	2,544	2,541
juvenile	17,808	17,836	18,293	18,293	17,836	18,293	18,293	18,293
<b>Rainbow trout</b>								
adult	6,807	6,913	6,923	6,923	6,913	6,923	6,923	6,923
spawning	2,710	2,786	2,786	2,786	2,786	2,786	2,786	2,786
fry	2,639	2,660	2,660	2,660	2,660	2,660	2,660	2,660
juvenile	19,185	19,346	19,346	19,346	19,346	19,346	19,346	19,346
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	3%	3%	<1%	3%	3%	3%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	1%	1%	1%	1%	1%	1%	1%
juvenile	--	<1%	3%	3%	<1%	3%	3%	3%
<b>Rainbow trout</b>								
adult	--	2%	2%	2%	2%	2%	2%	2%
spawning	--	3%	3%	3%	3%	3%	3%	3%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	11,996	12,365	12,365	12,365	12,365	12,365	12,365	12,365
spawning	5,581	5,581	5,581	5,581	5,581	5,581	5,581	5,581
fry	2,573	2,627	2,627	2,627	2,627	2,628	2,627	2,627
juvenile	18,431	18,431	18,431	18,431	18,431	18,431	18,432	18,431
<b>Rainbow trout</b>								
adult	6,603	6,988	6,988	6,988	6,988	6,988	6,988	6,988
spawning	4,439	4,534	4,534	4,534	4,534	4,534	4,534	4,534
fry	2,636	2,682	2,682	2,682	2,682	2,685	2,682	2,682
juvenile	20,230	20,181	20,181	20,181	20,181	20,181	20,181	20,181
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	3%	3%	3%	3%	3%	3%	3%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	2%	2%	2%	2%	2%	2%	2%
juvenile	--	0%	0%	0%	0%	0%	<1%	0%








# Arkansas Valley Conduit EIS

## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	6%	6%	6%	6%	6%	6%	6%
spawning	--	2%	2%	2%	2%	2%	2%	2%
fry	--	2%	2%	2%	2%	2%	2%	2%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	12,970	12,925	12,925	12,925	12,925	12,925	12,925	12,925
spawning	8,283	8,283	8,283	8,283	8,283	8,283	8,283	8,283
fry	3,111	3,130	3,130	3,130	3,130	3,130	3,130	3,130
juvenile	19,545	19,749	19,749	19,749	19,749	19,749	19,749	19,749
<b>Rainbow trout</b>								
adult	7,561	7,575	7,575	7,575	7,575	7,575	7,575	7,575
spawning	4,427	4,522	4,522	4,522	4,522	4,522	4,522	4,522
fry	4,540	4,563	4,563	4,563	4,563	4,563	4,563	4,563
juvenile	22,036	22,040	22,040	22,040	22,040	22,040	22,040	22,040
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	1%	1%	1%	1%	1%	1%	1%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	2%	2%	2%	2%	2%	2%	2%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 23. Cumulative Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 2

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	11,328	10,374	10,374	10,374	10,374	10,374	10,374	10,374
spawning	3,521	3,373	3,352	3,348	3,355	3,348	3,379	3,371
fry	1,470	1,542	1,546	1,546	1,546	1,546	1,542	1,546
juvenile	8,232	7,539	7,539	7,539	7,539	7,539	7,539	7,539
<b>Rainbow trout</b>								
adult	9,153	8,382	8,382	8,382	8,382	8,382	8,382	8,382
spawning	2,006	1,894	1,894	1,894	1,894	1,894	1,894	1,894
fry	1,470	1,542	1,549	1,549	1,546	1,549	1,542	1,548
juvenile	9,850	9,020	9,020	9,020	9,020	9,020	9,020	9,020
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-8%	-8%	-8%	-8%	-8%	-8%	-8%
spawning	--	-4%	-5%	-5%	-5%	-5%	-4%	-4%
fry	--	5%	5%	5%	5%	5%	5%	5%
juvenile	--	-8%	-8%	-8%	-8%	-8%	-8%	-8%
<b>Rainbow trout</b>								
adult	--	-8%	-8%	-8%	-8%	-8%	-8%	-8%
spawning	--	-6%	-6%	-6%	-6%	-6%	-6%	-6%
fry	--	5%	5%	5%	5%	5%	5%	5%
juvenile	--	-8%	-8%	-8%	-8%	-8%	-8%	-8%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	11,593	11,593	11,593	11,593	11,593	11,593	11,593	11,593
spawning	2,254	3,451	3,451	3,451	3,407	3,451	3,451	3,451
fry	1,552	1,552	1,562	1,562	1,562	1,562	1,565	1,560
juvenile	8,425	8,425	8,425	8,425	8,425	8,425	8,425	8,425
<b>Rainbow trout</b>								
adult	9,367	9,367	9,367	9,367	9,367	9,367	9,367	9,367
spawning	1,901	1,901	1,913	1,913	1,913	1,913	1,918	1,911
fry	1,643	1,891	1,891	1,891	1,917	1,891	2,257	1,882
juvenile	10,080	10,080	10,080	10,080	10,080	10,080	10,080	10,080
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	0%	0%	0%	0%	0%	0%	0%
spawning	--	53%	53%	53%	51%	53%	53%	53%
fry	--	0%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	0%	0%	0%	0%	0%	0%	0%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	0%	0%	0%	0%	0%	0%	0%
spawning	--	0%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	15%	15%	15%	17%	15%	37%	15%
juvenile	--	0%	0%	0%	0%	0%	0%	0%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	7,838	10,440	10,491	10,488	10,461	10,491	10,490	10,544
spawning	3,277	2,814	2,731	2,730	2,806	2,730	2,732	2,795
fry	567	755	759	758	756	759	759	762
juvenile	5,191	6,914	6,947	6,946	6,927	6,948	6,947	6,983
<b>Rainbow trout</b>								
adult	7,003	9,328	9,373	9,371	9,347	9,374	9,372	9,421
spawning	2,231	2,224	2,224	2,224	2,224	2,224	2,224	2,224
fry	567	755	759	758	756	759	759	762
juvenile	7,013	9,342	9,387	9,384	9,360	9,387	9,386	9,435
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	33%	34%	34%	33%	34%	34%	35%
spawning	--	-14%	-17%	-17%	-14%	-17%	-17%	-15%
fry	--	33%	34%	34%	33%	34%	34%	35%
juvenile	--	33%	34%	34%	33%	34%	34%	35%
<b>Rainbow trout</b>								
adult	--	33%	34%	34%	33%	34%	34%	35%
spawning	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	33%	34%	34%	33%	34%	34%	35%
juvenile	--	33%	34%	34%	33%	34%	34%	35%

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 24. Cumulative Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 2

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	23,334	24,099	24,186	24,200	24,099	24,200	24,156	24,132
spawning	4,247	4,048	4,013	4,013	4,042	4,035	4,042	4,040
fry	2,841	2,940	2,974	2,964	2,960	2,965	2,983	2,953
juvenile	16,114	15,882	15,897	15,894	15,895	15,894	15,882	15,894
<b>Rainbow trout</b>								
adult	19,640	20,317	20,392	20,405	20,351	20,392	20,336	20,339
spawning	2,808	2,809	2,859	2,844	2,843	2,856	2,825	2,839
fry	3,140	3,188	3,212	3,217	3,199	3,203	3,199	3,199
juvenile	20,358	20,107	20,186	20,186	20,115	20,158	20,209	20,186
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	3%	4%	4%	3%	4%	4%	3%
spawning	--	-5%	-6%	-6%	-5%	-5%	-5%	-5%
fry	--	3%	5%	4%	4%	4%	5%	4%
juvenile	--	-1%	-1%	-1%	-1%	-1%	-1%	-1%
<b>Rainbow trout</b>								
adult	--	3%	4%	4%	4%	4%	4%	4%
spawning	--	<1%	2%	1%	1%	2%	<1%	1%
fry	--	2%	2%	2%	2%	2%	2%	2%
juvenile	--	-1%	<-1%	<-1%	-1%	<-1%	<-1%	<-1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	21,051	24,827	24,937	24,984	24,939	25,082	24,914	24,890
spawning	3,638	4,006	4,003	3,995	3,950	3,976	4,053	3,994
fry	3,067	4,078	4,129	4,129	4,033	4,114	4,048	4,099
juvenile	15,219	15,926	15,900	15,922	15,912	15,888	15,911	15,920
<b>Rainbow trout</b>								
adult	17,009	20,476	20,668	20,656	20,677	20,601	20,465	20,532
spawning	2,913	2,972	3,023	3,023	2,973	3,023	3,050	2,968
fry	3,992	4,591	4,576	4,578	4,612	4,593	4,541	4,576
juvenile	18,304	20,411	20,504	20,507	20,496	20,501	20,431	20,457
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	18%	18%	19%	18%	19%	18%	18%
spawning	--	10%	10%	10%	9%	9%	11%	10%
fry	--	33%	35%	35%	32%	34%	32%	34%
juvenile	--	5%	4%	5%	5%	4%	5%	5%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	20%	22%	21%	22%	21%	20%	21%
spawning	--	2%	4%	4%	2%	4%	5%	2%
fry	--	15%	15%	15%	16%	15%	14%	15%
juvenile	--	12%	12%	12%	12%	12%	12%	12%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	25,447	25,698	25,630	25,612	25,645	25,612	25,628	25,641
spawning	4,092	4,127	4,118	4,103	4,117	4,103	4,118	4,118
fry	2,576	3,118	2,827	2,863	3,037	2,864	2,791	3,033
juvenile	15,912	16,142	16,102	16,053	16,105	16,093	16,027	16,031
<b>Rainbow trout</b>								
adult	21,125	21,263	21,201	21,194	21,245	21,180	21,180	21,219
spawning	2,976	3,073	3,138	3,110	3,140	3,123	3,080	3,069
fry	2,381	2,462	2,465	2,471	2,462	2,475	2,465	2,465
juvenile	20,569	20,696	20,649	20,662	20,689	20,683	20,662	20,642
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	21%	10%	11%	18%	11%	8%	18%
juvenile	--	1%	1%	<1%	1%	1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	3%	5%	4%	5%	5%	4%	3%
fry	--	3%	4%	4%	3%	4%	4%	4%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 25. Cumulative Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 3

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	9,634	10,023	10,044	10,044	10,038	10,044	9,897	10,044
spawning	14,753	14,487	14,346	14,251	14,453	14,253	14,506	14,361
fry	1,278	1,291	1,270	1,259	1,247	1,259	1,263	1,281
juvenile	7,558	7,863	7,880	7,880	7,875	7,880	7,764	7,880
<b>Rainbow trout</b>								
adult	7,816	8,131	8,148	8,148	8,143	8,148	8,028	8,148
spawning	10,040	9,584	9,584	9,584	9,584	9,584	9,584	9,584
fry	1,278	1,291	1,270	1,259	1,247	1,259	1,263	1,281
juvenile	10,292	10,707	10,729	10,729	10,723	10,729	10,572	10,729
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	4%	4%	4%	4%	4%	3%	4%
spawning	--	-2%	-3%	-3%	-2%	-3%	-2%	-3%
fry	--	1%	<-1%	-1%	-2%	-1%	-1%	<1%
juvenile	--	4%	4%	4%	4%	4%	3%	4%
<b>Rainbow trout</b>								
adult	--	4%	4%	4%	4%	4%	3%	4%
spawning	--	-5%	-5%	-5%	-5%	-5%	-5%	-5%
fry	--	1%	<-1%	-1%	-2%	-1%	-1%	<1%
juvenile	--	4%	4%	4%	4%	4%	3%	4%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	10,333	11,416	11,416	11,416	11,457	11,416	11,717	11,395
spawning	12,536	15,276	15,290	15,289	15,126	15,287	15,307	15,291
fry	1,315	1,243	1,243	1,243	1,246	1,243	1,261	1,261
juvenile	8,106	8,957	8,956	8,957	8,989	8,956	9,075	8,939
<b>Rainbow trout</b>								
adult	8,382	9,261	9,261	9,261	9,294	9,261	9,543	9,243
spawning	9,937	9,937	9,977	9,977	9,977	9,977	9,982	9,969
fry	1,315	1,243	1,243	1,243	1,246	1,243	1,261	1,261
juvenile	11,038	12,122	12,121	12,121	12,122	12,121	12,114	12,121
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	10%	10%	10%	11%	10%	13%	10%
spawning	--	22%	22%	22%	21%	22%	22%	22%
fry	--	-5%	-5%	-5%	-5%	-5%	-4%	-4%
juvenile	--	10%	10%	10%	11%	10%	12%	10%

# Arkansas Valley Conduit EIS

## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)








Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	10%	10%	10%	11%	10%	14%	10%
spawning	--	0%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	-5%	-5%	-5%	-5%	-5%	-4%	-4%
juvenile	--	10%	10%	10%	10%	10%	10%	10%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	5,254	6,067	6,081	6,080	6,073	6,081	6,081	6,096
spawning	14,002	12,287	12,261	12,261	12,261	12,259	12,267	12,265
fry	723	835	837	837	836	837	837	839
juvenile	4,122	4,760	4,771	4,770	4,764	4,771	4,771	4,782
<b>Rainbow trout</b>								
adult	4,262	4,922	4,933	4,932	4,926	4,933	4,933	4,945
spawning	8,719	10,831	10,831	10,831	10,831	10,831	10,831	10,831
fry	723	835	837	837	836	837	837	839
juvenile	5,612	6,481	6,496	6,495	6,487	6,496	6,496	6,512
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	15%	16%	16%	16%	16%	16%	16%
spawning	--	-12%	-12%	-12%	-12%	-12%	-12%	-12%
fry	--	15%	16%	16%	16%	16%	16%	16%
juvenile	--	15%	16%	16%	16%	16%	16%	16%
<b>Rainbow trout</b>								
adult	--	15%	16%	16%	16%	16%	16%	16%
spawning	--	24%	24%	24%	24%	24%	24%	24%
fry	--	15%	16%	16%	16%	16%	16%	16%
juvenile	--	15%	16%	16%	16%	16%	16%	16%



Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 26. Cumulative Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 3

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	18,102	18,052	17,892	17,982	17,707	18,001	17,953	18,051
spawning	16,168	15,971	15,922	15,916	15,956	15,935	15,939	15,958
fry	1,870	1,891	1,922	1,910	1,913	1,909	1,886	1,928
juvenile	15,232	15,100	15,177	15,123	15,084	15,127	15,206	15,149
<b>Rainbow trout</b>								
adult	14,648	14,717	14,783	14,723	14,701	14,752	14,786	14,765
spawning	11,979	12,067	12,177	12,087	12,032	12,126	12,184	12,148
fry	1,678	1,658	1,681	1,682	1,680	1,673	1,664	1,669
juvenile	19,264	18,679	18,647	18,598	18,620	18,597	18,698	18,675
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	-1%	<-1%	-2%	<-1%	<-1%	<-1%
spawning	--	-1%	-2%	-2%	-1%	-1%	-1%	-1%
fry	--	1%	3%	2%	2%	2%	<1%	3%
juvenile	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<1%	2%	<1%	<1%	1%	2%	1%
fry	--	-1%	<1%	<1%	<1%	<-1%	<-1%	<-1%
juvenile	--	-3%	-3%	-3%	-3%	-3%	-3%	-3%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	17,679	18,446	18,424	18,358	18,196	18,339	18,570	18,409
spawning	16,491	16,086	16,005	15,991	15,913	15,951	16,185	16,064
fry	1,829	1,800	1,785	1,787	1,786	1,791	1,780	1,793
juvenile	14,436	14,936	15,143	15,154	14,768	15,089	15,118	15,008
<b>Rainbow trout</b>								
adult	14,486	15,296	15,136	15,137	15,245	15,134	15,283	15,252
spawning	11,545	11,702	12,293	12,293	11,704	12,197	12,166	12,148
fry	1,608	1,604	1,605	1,605	1,603	1,607	1,605	1,606
juvenile	18,214	18,590	18,728	18,728	18,547	18,728	18,860	18,743
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	4%	4%	4%	3%	4%	5%	4%
spawning	--	-2%	-3%	-3%	-4%	-3%	-2%	-3%
fry	--	-2%	-2%	-2%	-2%	-2%	-3%	-2%
juvenile	--	3%	5%	5%	2%	5%	5%	4%

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## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	6%	4%	4%	5%	4%	6%	5%
spawning	--	1%	6%	6%	1%	6%	5%	5%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	2%	3%	3%	2%	3%	4%	3%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	19,761	21,226	20,730	20,486	20,987	20,468	20,431	20,718
spawning	15,432	15,318	15,331	15,331	15,318	15,329	15,326	15,318
fry	1,507	1,580	1,578	1,580	1,581	1,581	1,581	1,576
juvenile	15,942	16,782	16,492	16,512	16,585	16,464	16,469	16,442
<b>Rainbow trout</b>								
adult	16,052	17,667	17,459	17,427	17,533	17,434	17,423	17,470
spawning	12,842	13,053	12,910	12,936	13,062	12,936	12,936	12,884
fry	1,467	1,524	1,533	1,533	1,524	1,533	1,524	1,533
juvenile	19,409	19,596	19,401	19,273	19,474	19,399	19,273	19,403
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	7%	5%	4%	6%	4%	3%	5%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	5%	5%	5%	5%	5%	5%	5%
juvenile	--	5%	3%	4%	4%	3%	3%	3%
<b>Rainbow trout</b>								
adult	--	10%	9%	9%	9%	9%	9%	9%
spawning	--	2%	<1%	<1%	2%	<1%	<1%	<1%
fry	--	4%	4%	4%	4%	4%	4%	4%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 27. Cumulative Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 4

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	15,360	16,184	16,407	16,406	16,396	16,408	15,807	16,409
spawning	25,940	26,030	25,378	25,084	26,031	25,091	26,415	25,425
fry	712	712	711	711	712	711	712	712
juvenile	11,697	12,325	12,494	12,493	12,486	12,495	12,037	12,496
<b>Rainbow trout</b>								
adult	12,398	13,063	13,242	13,242	13,234	13,243	12,758	13,244
spawning	33,899	33,730	34,037	33,146	32,808	33,118	30,892	33,939
fry	712	712	711	711	712	711	712	712
juvenile	12,729	13,411	13,596	13,595	13,587	13,597	13,098	13,598
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	5%	7%	7%	7%	7%	3%	7%
spawning	--	<1%	-2%	-3%	<1%	-3%	2%	-2%
fry	--	<-1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
juvenile	--	5%	7%	7%	7%	7%	3%	7%
<b>Rainbow trout</b>								
adult	--	5%	7%	7%	7%	7%	3%	7%
spawning	--	<-1%	<1%	-2%	-3%	-2%	-9%	<1%
fry	--	<-1%	<-1%	<-1%	<1%	<-1%	<-1%	<-1%
juvenile	--	5%	7%	7%	7%	7%	3%	7%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	17,014	18,819	18,819	18,819	18,888	18,818	18,899	18,782
spawning	33,704	28,903	28,937	28,930	28,882	28,920	29,022	28,944
fry	712	712	712	713	711	712	711	712
juvenile	12,957	14,331	14,331	14,331	14,384	14,331	14,392	14,303
<b>Rainbow trout</b>								
adult	13,733	15,189	15,189	15,189	15,245	15,189	15,254	15,160
spawning	32,897	33,718	33,608	34,031	33,726	34,031	34,064	32,423
fry	712	712	712	713	711	712	711	712
juvenile	14,099	15,595	15,594	15,595	15,652	15,594	15,661	15,564
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	11%	11%	11%	11%	11%	11%	10%
spawning	--	-14%	-14%	-14%	-14%	-14%	-14%	-14%
fry	--	<1%	<-1%	<1%	<-1%	<1%	<-1%	<1%
juvenile	--	11%	11%	11%	11%	11%	11%	10%

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## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	11%	11%	11%	11%	11%	11%	10%
spawning	--	2%	2%	3%	3%	3%	4%	-1%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	11%	11%	11%	11%	11%	11%	10%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	7,317	8,845	8,868	8,867	8,854	8,868	8,868	8,893
spawning	22,698	18,099	18,046	18,043	18,100	18,037	18,065	18,045
fry	354	428	429	429	428	429	429	430
juvenile	5,572	6,735	6,753	6,752	6,743	6,753	6,753	6,772
<b>Rainbow trout</b>								
adult	5,906	7,139	7,158	7,157	7,146	7,158	7,157	7,178
spawning	14,023	23,752	25,621	22,394	23,752	22,394	23,569	22,394
fry	354	428	429	429	428	429	429	430
juvenile	6,063	7,329	7,349	7,348	7,337	7,349	7,348	7,369
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	21%	21%	21%	21%	21%	21%	22%
spawning	--	-20%	-20%	-21%	-20%	-21%	-20%	-20%
fry	--	21%	21%	21%	21%	21%	21%	22%
juvenile	--	21%	21%	21%	21%	21%	21%	22%
<b>Rainbow trout</b>								
adult	--	21%	21%	21%	21%	21%	21%	22%
spawning	--	69%	83%	60%	69%	60%	68%	60%
fry	--	21%	21%	21%	21%	21%	21%	22%
juvenile	--	21%	21%	21%	21%	21%	21%	22%

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 28. Cumulative Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 4

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	37,238	36,981	36,994	36,993	36,978	36,999	37,013	36,994
spawning	32,203	31,612	30,952	30,952	31,341	31,335	31,426	31,564
fry	1,476	1,471	1,482	1,484	1,473	1,485	1,476	1,474
juvenile	34,597	35,346	35,212	35,213	35,360	35,207	35,166	35,383
<b>Rainbow trout</b>								
adult	27,640	27,587	27,665	27,608	27,588	27,633	27,611	27,598
spawning	36,646	36,624	36,624	36,643	36,628	36,644	36,638	36,624
fry	931	915	916	916	915	920	924	912
juvenile	41,026	42,076	41,889	41,908	42,096	41,882	41,824	42,128
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
spawning	--	-2%	-4%	-4%	-3%	-3%	-2%	-2%
fry	--	<-1%	<1%	<1%	<-1%	<1%	<-1%	<-1%
juvenile	--	2%	2%	2%	2%	2%	2%	2%
<b>Rainbow trout</b>								
adult	--	<-1%	<1%	<-1%	<-1%	<-1%	<-1%	<-1%
spawning	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	-2%	-2%	-2%	-2%	-1%	<-1%	-2%
juvenile	--	3%	2%	2%	3%	2%	2%	3%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	37,139	37,111	37,129	37,129	37,098	37,129	37,167	37,155
spawning	35,293	32,708	32,413	32,343	32,274	32,268	32,713	32,653
fry	1,448	1,458	1,458	1,456	1,459	1,456	1,458	1,454
juvenile	37,886	34,865	34,520	34,549	34,587	34,538	35,098	34,842
<b>Rainbow trout</b>								
adult	27,259	27,784	28,011	27,980	27,773	28,011	27,906	27,775
spawning	36,645	36,639	36,613	36,609	36,614	36,609	36,612	36,631
fry	878	921	914	913	913	914	922	914
juvenile	45,811	41,402	40,918	40,958	41,012	40,943	41,729	41,369
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<-1%	<-1%	<-1%	<-1%	<-1%	<1%	<1%
spawning	--	-7%	-8%	-8%	-9%	-9%	-7%	-7%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	-8%	-9%	-9%	-9%	-9%	-7%	-8%

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## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	2%	3%	3%	2%	3%	2%	2%
spawning	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	5%	4%	4%	4%	4%	5%	4%
juvenile	--	-10%	-11%	-11%	-10%	-11%	-9%	-10%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	35,736	35,785	35,835	35,832	35,846	35,774	35,839	35,841
spawning	28,163	28,082	28,114	28,114	28,082	28,114	28,071	28,114
fry	934	948	948	949	947	949	948	947
juvenile	26,862	26,989	27,117	27,110	27,145	26,959	27,129	27,133
<b>Rainbow trout</b>								
adult	30,616	31,129	30,785	30,782	30,888	30,666	30,676	30,736
spawning	34,180	33,814	35,030	34,846	33,814	34,745	35,147	33,905
fry	889	884	887	887	883	887	885	891
juvenile	31,255	31,412	31,571	31,562	31,605	31,376	31,586	31,590
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	1%	1%	2%	1%	2%	1%	1%
juvenile	--	<1%	<1%	<1%	1%	<1%	<1%	1%
<b>Rainbow trout</b>								
adult	--	2%	<1%	<1%	<1%	<1%	<1%	<1%
spawning	--	-1%	2%	2%	-1%	2%	3%	<-1%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
juvenile	--	<1%	1%	<1%	1%	<1%	1%	1%

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 29. Cumulative Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 5

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	14,157	14,916	15,121	15,120	15,112	15,122	14,568	15,123
spawning	22,089	22,128	21,846	21,719	22,128	21,722	22,294	21,867
fry	298	314	318	318	318	318	307	318
juvenile	7,969	8,396	8,512	8,511	8,506	8,512	8,200	8,513
<b>Rainbow trout</b>								
adult	11,697	12,324	12,494	12,493	12,486	12,495	12,037	12,495
spawning	15,763	15,684	15,827	15,413	15,256	15,400	15,410	15,782
fry	298	314	318	318	318	318	307	318
juvenile	8,626	9,089	9,214	9,213	9,208	9,214	8,877	9,215
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	5%	7%	7%	7%	7%	3%	7%
spawning	--	<1%	-1%	-2%	<1%	-2%	<1%	-1%
fry	--	5%	7%	7%	7%	7%	3%	7%
juvenile	--	5%	7%	7%	7%	7%	3%	7%
<b>Rainbow trout</b>								
adult	--	5%	7%	7%	7%	7%	3%	7%
spawning	--	<1%	<1%	-2%	-3%	-2%	-2%	<1%
fry	--	5%	7%	7%	7%	7%	3%	7%
juvenile	--	5%	7%	7%	7%	7%	3%	7%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	15,682	20,016	20,015	20,016	20,387	20,013	20,448	19,817
spawning	24,736	23,348	23,360	23,358	23,341	23,354	23,389	23,362
fry	330	337	336	336	335	339	343	339
juvenile	8,827	12,751	12,749	12,750	13,165	12,748	13,233	12,528
<b>Rainbow trout</b>								
adult	12,957	15,912	15,912	15,912	16,156	15,911	16,196	15,782
spawning	15,297	15,679	15,628	15,825	15,683	15,825	15,840	15,077
fry	330	337	336	336	335	339	343	339
juvenile	9,555	12,906	12,904	12,905	13,276	12,903	13,337	12,707
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	28%	28%	28%	30%	28%	30%	26%
spawning	--	-6%	-6%	-6%	-6%	-6%	-5%	-6%
fry	--	2%	2%	2%	1%	3%	4%	3%
juvenile	--	44%	44%	44%	49%	44%	50%	42%

# Arkansas Valley Conduit EIS

## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)








Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	23%	23%	23%	25%	23%	25%	22%
spawning	--	2%	2%	3%	3%	3%	4%	-1%
fry	--	2%	2%	2%	1%	3%	4%	3%
juvenile	--	35%	35%	35%	39%	35%	40%	33%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	6,744	8,152	8,173	8,172	8,160	8,173	8,173	8,196
spawning	20,915	19,534	19,520	19,519	19,534	19,518	19,525	19,520
fry	142	172	172	172	172	172	172	172
juvenile	3,796	4,588	4,601	4,600	4,593	4,601	4,600	4,613
<b>Rainbow trout</b>								
adult	5,572	6,735	6,753	6,752	6,743	6,753	6,753	6,772
spawning	14,035	15,917	16,360	15,679	15,917	15,679	15,884	15,679
fry	142	172	172	172	172	172	172	172
juvenile	4,109	4,967	4,980	4,979	4,972	4,980	4,980	4,994
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	21%	21%	21%	21%	21%	21%	22%
spawning	--	-7%	-7%	-7%	-7%	-7%	-7%	-7%
fry	--	21%	21%	21%	21%	21%	21%	22%
juvenile	--	21%	21%	21%	21%	21%	21%	22%
<b>Rainbow trout</b>								
adult	--	21%	21%	21%	21%	21%	21%	22%
spawning	--	13%	17%	12%	13%	12%	13%	12%
fry	--	21%	21%	21%	21%	21%	21%	22%
juvenile	--	21%	21%	21%	21%	21%	21%	22%



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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 30. Cumulative Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 5

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	34,094	34,606	34,811	34,781	34,667	34,891	34,912	34,860
spawning	24,480	24,278	24,051	24,051	24,185	24,183	24,214	24,261
fry	1,790	1,783	1,797	1,799	1,787	1,801	1,789	1,788
juvenile	42,659	42,343	42,451	42,454	42,216	42,466	42,108	42,503
<b>Rainbow trout</b>								
adult	21,800	22,242	22,347	22,363	22,122	22,363	22,345	22,249
spawning	17,383	17,528	17,528	17,447	17,422	17,532	17,580	17,529
fry	593	468	468	468	467	516	468	468
juvenile	45,033	43,127	43,232	43,145	43,121	43,232	43,388	43,246
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	2%	2%	2%	2%	2%	2%	2%
spawning	--	<1%	-2%	-2%	-1%	-1%	-1%	<1%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	<1%	<1%	<1%	-1%	<1%	-1%	<1%
<b>Rainbow trout</b>								
adult	--	2%	3%	3%	1%	3%	3%	2%
spawning	--	<1%	<1%	<1%	<1%	<1%	1%	<1%
fry	--	-21%	-21%	-21%	-21%	-13%	-21%	-21%
juvenile	--	-4%	-4%	-4%	-4%	-4%	-4%	-4%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	35,082	35,956	35,817	35,833	35,842	35,909	35,847	35,862
spawning	25,438	24,656	24,553	24,529	24,505	24,503	24,658	24,635
fry	1,756	1,778	1,772	1,767	1,777	1,767	1,770	1,766
juvenile	41,358	42,156	42,401	42,362	42,028	42,520	42,288	42,288
<b>Rainbow trout</b>								
adult	22,379	24,588	24,429	24,414	24,465	24,426	24,469	24,505
spawning	17,624	17,603	17,799	17,902	17,615	17,909	17,862	17,784
fry	709	882	883	860	878	860	881	882
juvenile	44,009	44,264	44,738	44,676	44,247	44,814	44,855	44,655
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	2%	2%	2%	2%	2%	2%	2%
spawning	--	-3%	-3%	-4%	-4%	-4%	-3%	-3%
fry	--	1%	<1%	<1%	1%	<1%	<1%	<1%
juvenile	--	2%	3%	2%	2%	3%	2%	2%

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## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	10%	9%	9%	9%	9%	9%	10%
spawning	--	<1%	<1%	2%	<1%	2%	1%	<1%
fry	--	25%	25%	21%	24%	21%	24%	24%
juvenile	--	<1%	2%	2%	<1%	2%	2%	1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	37,559	38,184	38,028	37,955	38,137	37,986	37,925	38,092
spawning	23,041	23,007	23,020	23,020	23,007	23,020	23,002	23,020
fry	448	466	467	467	465	467	466	467
juvenile	46,384	46,112	46,082	46,074	46,094	46,068	46,094	46,113
<b>Rainbow trout</b>								
adult	25,096	26,168	25,881	25,822	25,970	25,822	25,860	25,928
spawning	19,193	19,002	19,287	19,287	19,009	19,287	19,446	19,050
fry	434	442	443	443	442	443	443	443
juvenile	43,358	43,476	43,595	43,588	43,621	43,449	43,606	43,609
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	2%	1%	1%	2%	1%	<1%	1%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
fry	--	4%	4%	4%	4%	4%	4%	4%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Rainbow trout</b>								
adult	--	4%	3%	3%	3%	3%	3%	3%
spawning	--	<1%	<1%	<1%	<1%	<1%	1%	<1%
fry	--	2%	2%	2%	2%	2%	2%	2%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 31. Cumulative Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 6

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	9,958	10,406	10,549	10,549	10,530	10,550	10,246	10,540
spawning	0	0	0	0	0	0	0	0
fry	1,148	1,168	1,147	1,141	1,164	1,149	1,111	1,171
juvenile	5,744	6,002	6,085	6,085	6,074	6,086	5,910	6,080
<b>Rainbow trout</b>								
adult	9,527	9,955	10,093	10,092	10,074	10,094	9,802	10,084
spawning	0	0	0	0	0	0	0	0
fry	1,148	1,168	1,147	1,141	1,164	1,149	1,111	1,171
juvenile	8,226	8,596	8,715	8,714	8,699	8,716	8,464	8,707
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	4%	6%	6%	6%	6%	3%	6%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	2%	<-1%	<-1%	1%	<1%	-3%	2%
juvenile	--	4%	6%	6%	6%	6%	3%	6%
<b>Rainbow trout</b>								
adult	--	4%	6%	6%	6%	6%	3%	6%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	2%	<-1%	<-1%	1%	<1%	-3%	2%
juvenile	--	4%	6%	6%	6%	6%	3%	6%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	11,300	13,440	13,462	13,453	13,440	13,463	13,459	13,463
spawning	0	0	0	0	0	0	0	0
fry	780	886	953	953	886	953	953	953
juvenile	6,518	6,636	6,646	6,642	6,636	6,646	6,644	6,646
<b>Rainbow trout</b>								
adult	10,811	13,219	13,246	13,235	13,219	13,247	13,242	13,247
spawning	0	0	0	0	0	0	0	0
fry	780	886	953	953	886	953	953	953
juvenile	8,057	9,149	9,571	9,571	9,152	9,571	9,572	9,571
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	19%	19%	19%	19%	19%	19%	19%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	14%	22%	22%	14%	22%	22%	22%
juvenile	--	2%	2%	2%	2%	2%	2%	2%

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## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	22%	23%	22%	22%	23%	22%	23%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	14%	22%	22%	14%	22%	22%	22%
juvenile	--	14%	19%	19%	14%	19%	19%	19%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	4,264	5,037	5,052	5,051	5,043	5,052	5,051	5,068
spawning	0	0	0	0	0	0	0	0
fry	1,015	1,199	1,202	1,202	1,200	1,202	1,202	1,206
juvenile	2,460	2,905	2,914	2,914	2,909	2,914	2,914	2,923
<b>Rainbow trout</b>								
adult	4,080	4,819	4,833	4,832	4,824	4,833	4,833	4,848
spawning	0	0	0	0	0	0	0	0
fry	1,015	1,199	1,202	1,202	1,200	1,202	1,202	1,206
juvenile	3,523	4,161	4,173	4,173	4,166	4,173	4,173	4,186
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	18%	18%	18%	18%	18%	18%	19%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	18%	18%	18%	18%	18%	18%	19%
juvenile	--	18%	18%	18%	18%	18%	18%	19%
<b>Rainbow trout</b>								
adult	--	18%	18%	18%	18%	18%	18%	19%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	18%	18%	18%	18%	18%	18%	19%
juvenile	--	18%	18%	18%	18%	18%	18%	19%

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 32. Cumulative Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Upper Arkansas River Segment 6

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	25,500	24,805	24,865	24,893	24,807	24,938	24,942	24,938
spawning	0	0	0	0	0	0	0	0
fry	1,766	1,733	1,726	1,727	1,704	1,727	1,729	1,704
juvenile	11,337	11,149	11,139	11,137	11,149	11,134	11,105	11,165
<b>Rainbow trout</b>								
adult	24,075	23,901	23,880	23,875	23,841	23,939	24,020	24,019
spawning	0	0	0	0	0	0	0	0
fry	2,136	2,029	2,006	2,018	2,032	2,028	2,041	2,019
juvenile	13,538	13,300	13,315	13,308	13,310	13,331	13,292	13,328
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-3%	-2%	-2%	-3%	-2%	-2%	-2%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	-2%	-2%	-2%	-3%	-2%	-2%	-3%
juvenile	--	-2%	-2%	-2%	-2%	-2%	-2%	-2%
<b>Rainbow trout</b>								
adult	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	-5%	-6%	-6%	-5%	-5%	-4%	-5%
juvenile	--	-2%	-2%	-2%	-2%	-2%	-2%	-2%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	22,786	23,700	23,730	23,801	23,665	23,806	23,709	23,730
spawning	0	0	0	0	0	0	0	0
fry	1,712	1,659	1,658	1,658	1,651	1,658	1,657	1,625
juvenile	10,478	10,679	10,703	10,686	10,564	10,685	10,775	10,685
<b>Rainbow trout</b>								
adult	22,336	23,391	23,557	23,557	23,335	23,569	23,474	23,441
spawning	0	0	0	0	0	0	0	0
fry	1,888	1,902	1,904	1,900	1,903	1,900	1,901	1,899
juvenile	12,423	12,771	12,771	12,750	12,743	12,772	12,847	12,774
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	4%	4%	4%	4%	4%	4%	4%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	-3%	-3%	-3%	-4%	-3%	-3%	-5%
juvenile	--	2%	2%	2%	<1%	2%	3%	2%

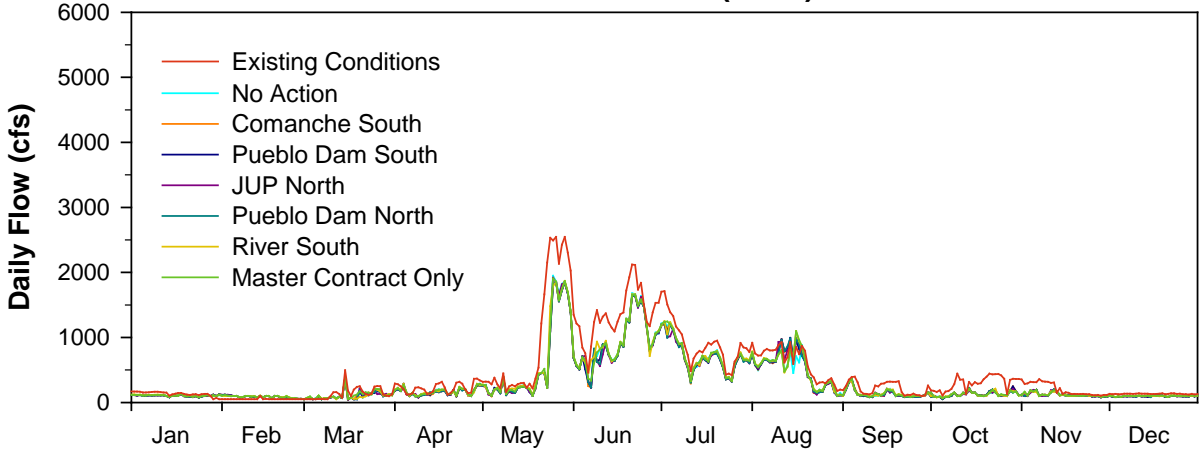
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## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

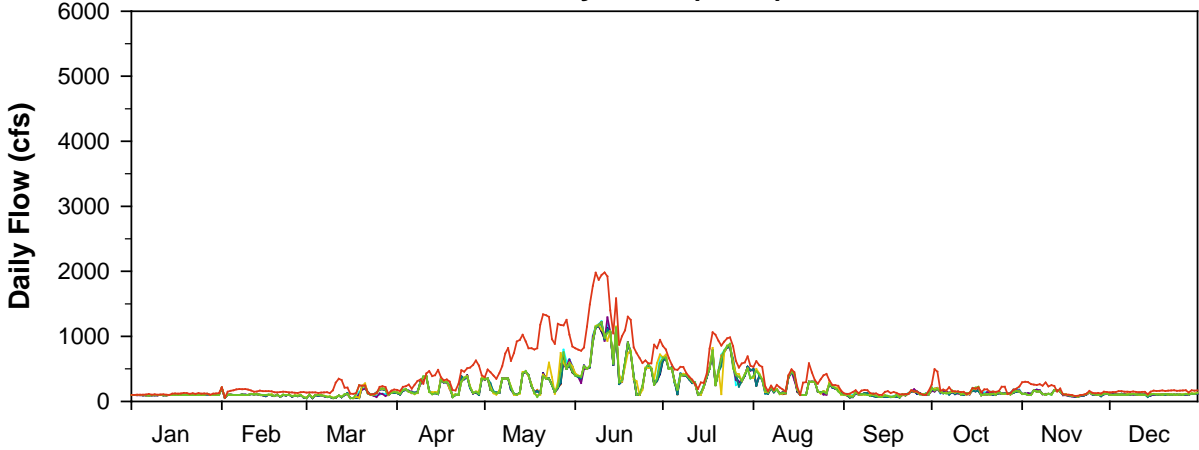
Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Rainbow trout</b>								
adult	--	5%	5%	5%	4%	6%	5%	5%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
juvenile	--	3%	3%	3%	3%	3%	3%	3%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	24,535	24,976	24,961	24,920	24,926	24,920	24,912	24,867
spawning	0	0	0	0	0	0	0	0
fry	2,285	2,386	2,377	2,372	2,366	2,372	2,365	2,379
juvenile	9,304	9,435	9,422	9,421	9,424	9,419	9,435	9,406
<b>Rainbow trout</b>								
adult	25,265	25,804	25,620	25,579	25,705	25,600	25,599	25,600
spawning	0	0	0	0	0	0	0	0
fry	2,508	2,457	2,455	2,455	2,442	2,447	2,455	2,455
juvenile	11,960	12,074	12,063	12,062	12,065	12,061	12,075	12,049
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	2%	2%	2%	2%	2%	2%	1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	4%	4%	4%	4%	4%	4%	4%
juvenile	--	1%	1%	1%	1%	1%	1%	1%
<b>Rainbow trout</b>								
adult	--	2%	1%	1%	2%	1%	1%	1%
spawning	--	0%	0%	0%	0%	0%	0%	0%
fry	--	-2%	-2%	-2%	-3%	-2%	-2%	-2%
juvenile	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Lower Arkansas River, Segment 1 – Pueblo Reservoir to Wildhorse Creek  
Normal Year (2005)



Dry Year (2004)



Wet Year (1997)

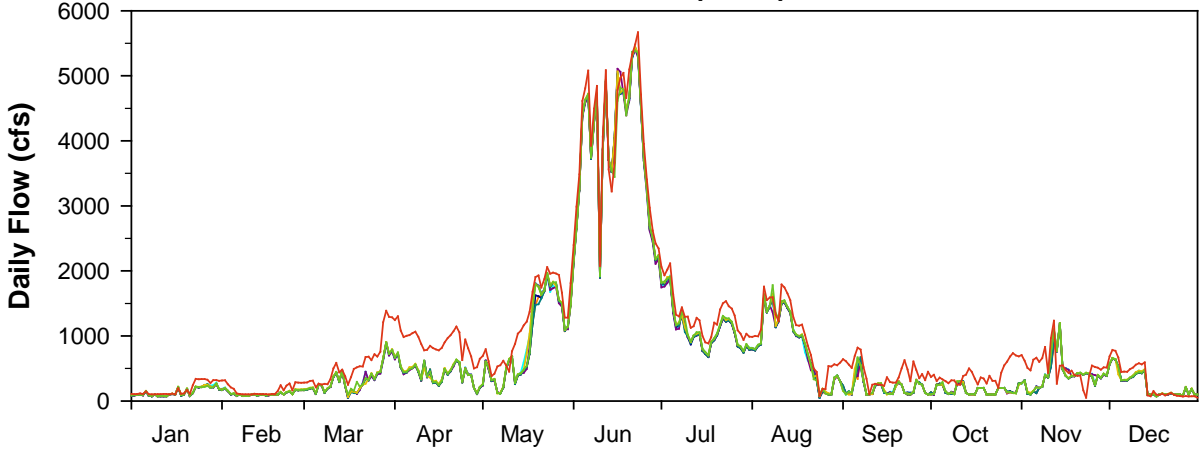
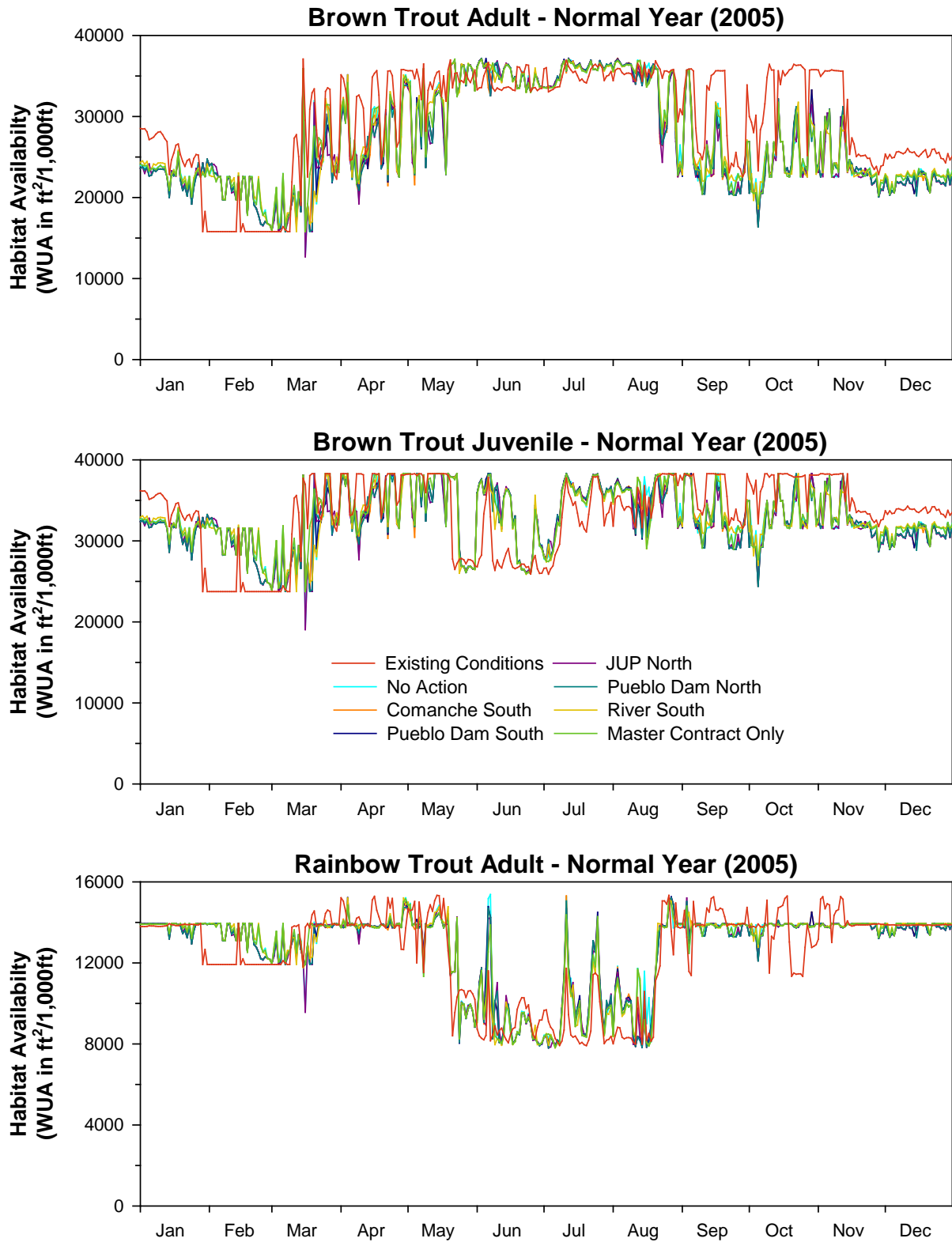


Figure 125. Cumulative Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 1 of the Lower Arkansas River at the Above Pueblo Gage

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 126. Cumulative Effects Brown Trout Adult, Brown Trout Juvenile, and Rainbow Trout Adult Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 1 of the Lower Arkansas River**



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

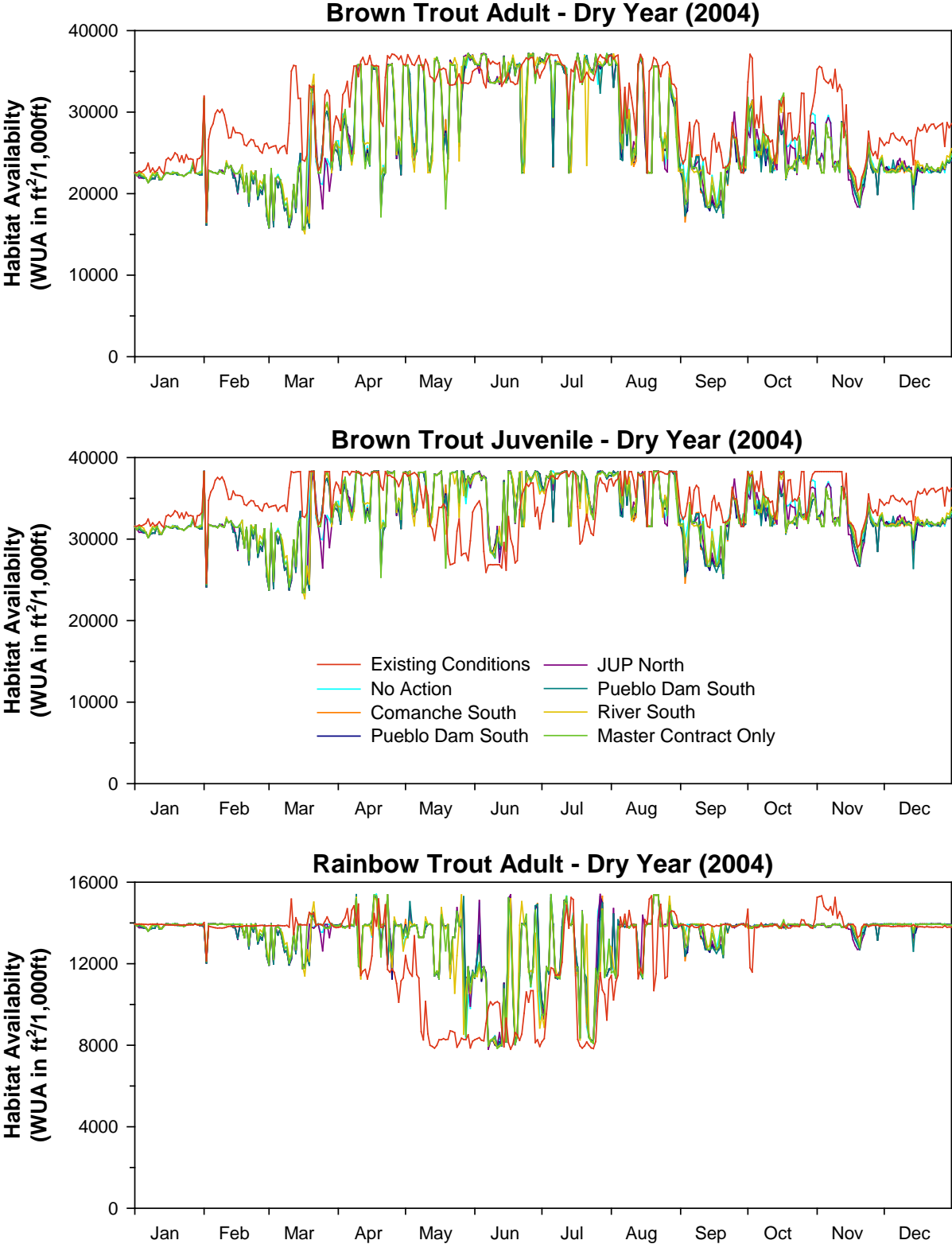
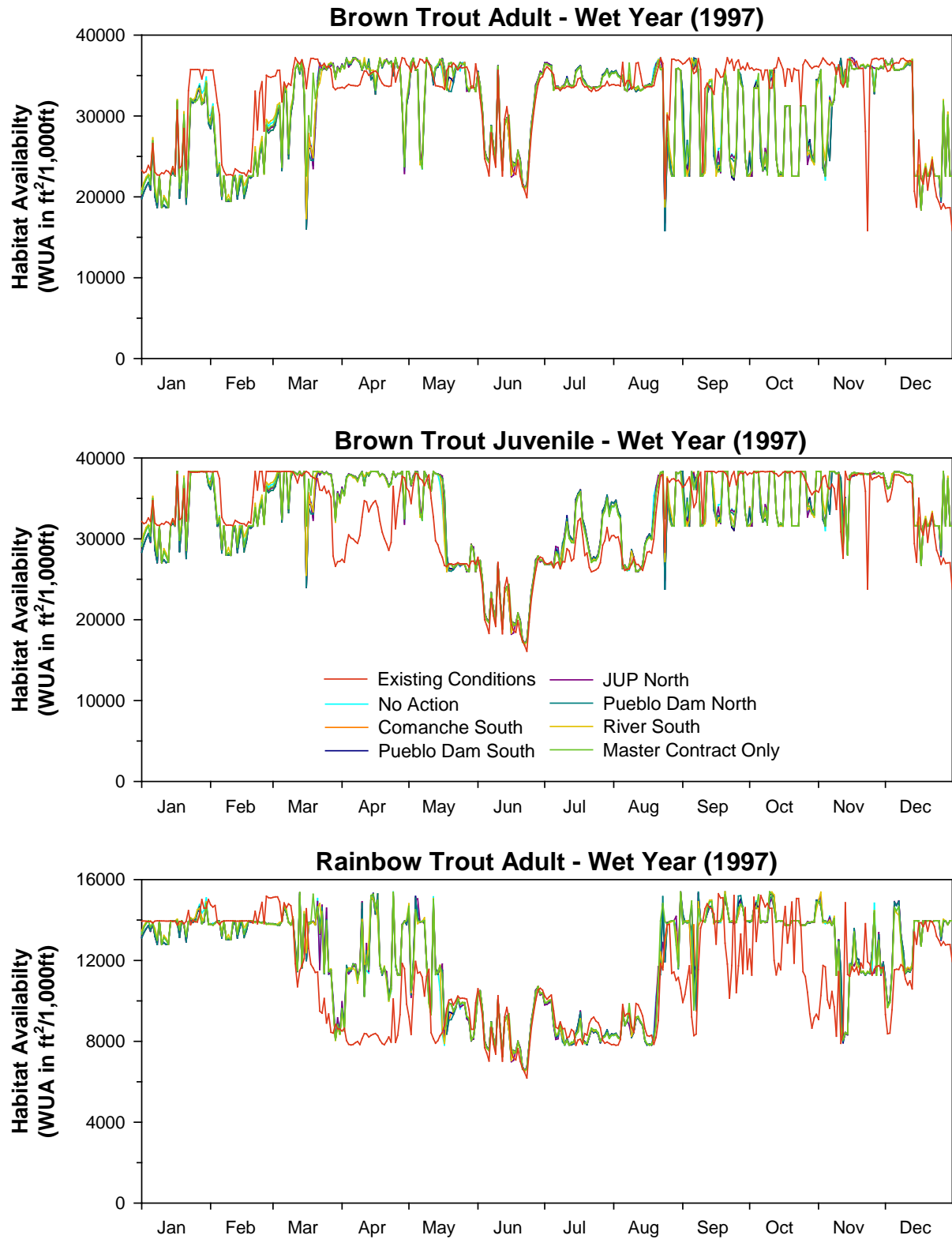


Figure 127. Cumulative Effects Brown Trout Adult, Brown Trout Juvenile, and Rainbow Trout Adult Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 1 of the Lower Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**










**Figure 128. Cumulative Effects Brown Trout Adult, Brown Trout Juvenile, and Rainbow Trout Adult Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 1 of the Lower Arkansas River**

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)








Table 33. Cumulative Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Lower Arkansas River Segment 1

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	15,832	13,012	15,832	15,832	12,693	15,832	15,832	15,839
juvenile	23,769	19,536	23,769	23,769	19,057	23,769	23,769	23,777
<b>Rainbow trout</b>								
adult	7,932	7,829	7,844	7,821	7,807	7,811	7,820	7,830
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-18%	0%	0%	-20%	0%	0%	<1%
juvenile	--	-18%	0%	0%	-20%	0%	0%	<1%
<b>Rainbow trout</b>								
adult	--	-1%	-1%	-1%	-2%	-2%	-1%	-1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	16,565	15,627	15,832	15,832	15,600	15,832	15,132	15,624
juvenile	24,619	23,463	23,769	23,769	23,422	23,769	22,719	23,458
<b>Rainbow trout</b>								
adult	7,814	7,844	7,920	7,915	7,811	7,920	7,904	7,853
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-6%	-4%	-4%	-6%	-4%	-9%	-6%
juvenile	--	-5%	-3%	-3%	-5%	-3%	-8%	-5%
<b>Rainbow trout</b>								
adult	--	<1%	1%	1%	<-1%	1%	1%	<1%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	15,832	16,093	16,040	15,832	16,040	15,832	17,318	18,400
juvenile	16,096	16,980	16,989	17,009	17,071	17,004	16,944	17,136
<b>Rainbow trout</b>								
adult	6,185	6,525	6,528	6,536	6,560	6,534	6,511	6,585
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	2%	1%	0%	1%	0%	9%	16%
juvenile	--	5%	6%	6%	6%	6%	5%	6%
<b>Rainbow trout</b>								
adult	--	5%	6%	6%	6%	6%	5%	6%

# Arkansas Valley Conduit EIS

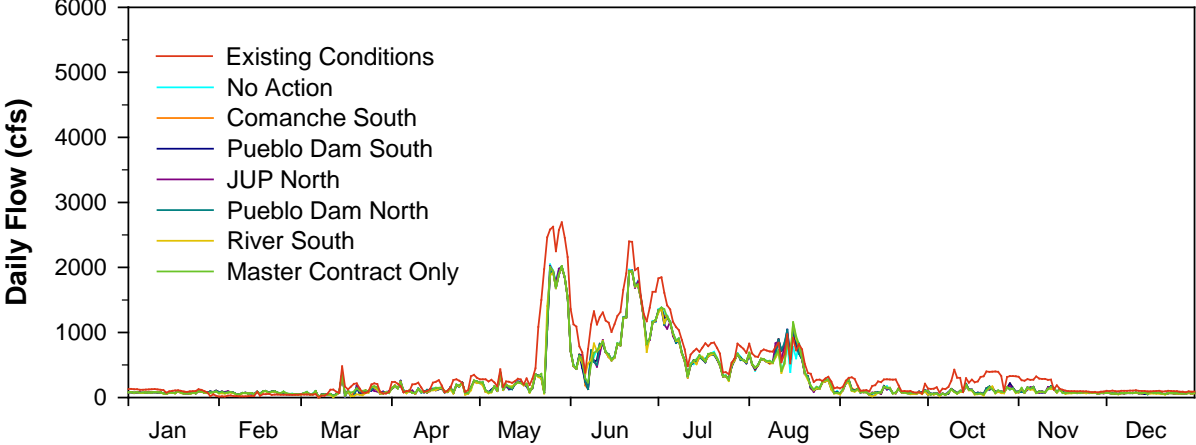
## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

**Table 34. Cumulative Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for Brown and Rainbow Trout, Lower Arkansas River Segment 1**

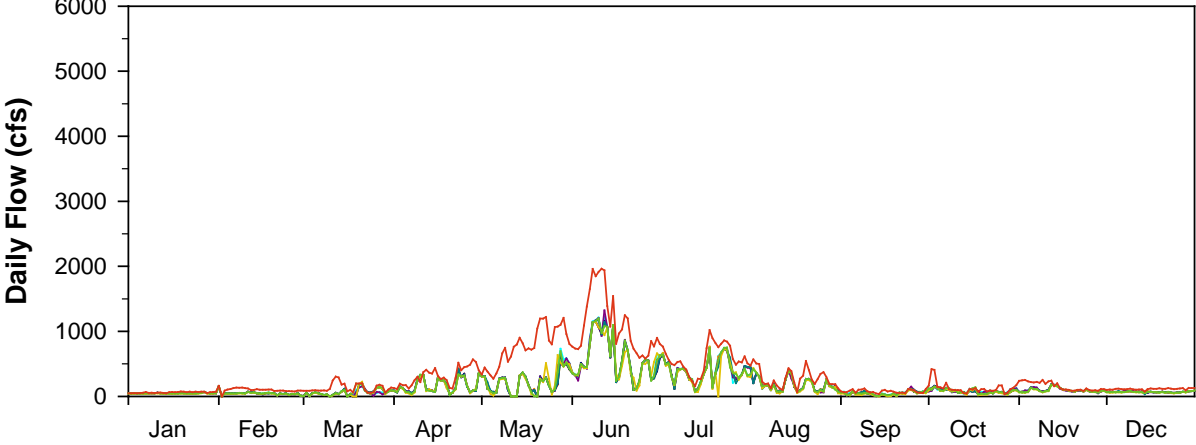
Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	32,955	24,520	24,310	24,231	24,456	24,283	24,490	24,784
juvenile	33,974	32,305	32,315	32,315	32,293	32,317	32,295	32,388
<b>Rainbow trout</b>								
adult	13,810	13,842	13,758	13,773	13,773	13,771	13,848	13,831
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-26%	-26%	-26%	-26%	-26%	-26%	-25%
juvenile	--	-5%	-5%	-5%	-5%	-5%	-5%	-5%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	29,901	24,329	24,060	23,996	24,046	24,110	24,039	24,162
juvenile	35,016	32,764	32,548	32,565	32,606	32,620	32,658	32,631
<b>Rainbow trout</b>								
adult	13,838	13,882	13,874	13,877	13,867	13,872	13,890	13,886
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-19%	-20%	-20%	-20%	-19%	-20%	-19%
juvenile	--	-6%	-7%	-7%	-7%	-7%	-7%	-7%
<b>Rainbow trout</b>								
adult	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>Brown trout</b>								
adult	34,583	33,361	33,243	33,233	33,181	33,229	33,288	33,316
juvenile	34,362	33,684	33,390	33,403	33,595	33,379	33,523	33,716
<b>Rainbow trout</b>								
adult	11,218	13,091	13,108	13,108	12,988	13,108	13,230	13,218
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Brown trout</b>								
adult	--	-4%	-4%	-4%	-4%	-4%	-4%	-4%
juvenile	--	-2%	-3%	-3%	-2%	-3%	-2%	-2%
<b>Rainbow trout</b>								
adult	--	17%	17%	17%	16%	17%	18%	18%

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Lower Arkansas River, Segment 2 – Wildhorse Creek to Fountain Creek  
Normal Year (2005)



Dry Year (2004)



Wet Year (1997)

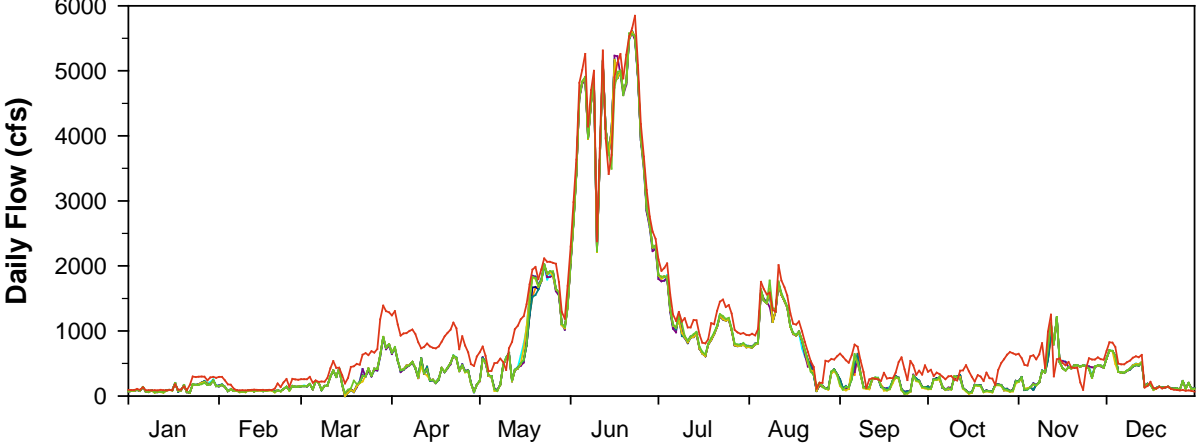
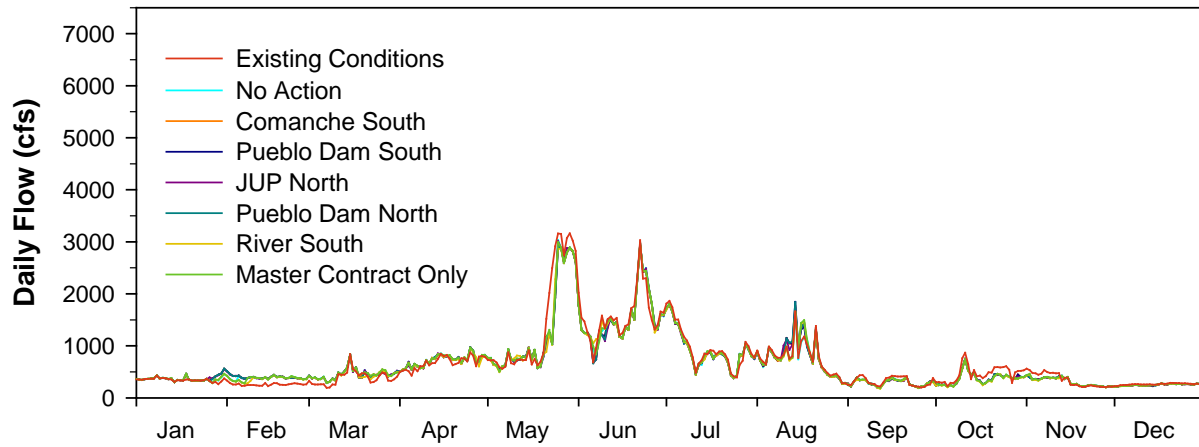


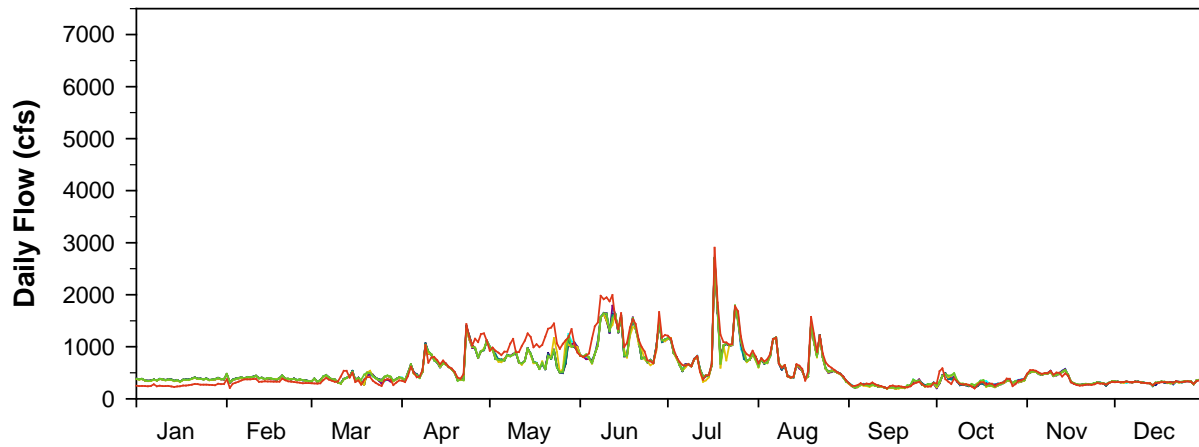
Figure 129. Cumulative Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 2 of the Lower Arkansas River at the Moffat Street Gage

**Arkansas Valley Conduit EIS  
Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**

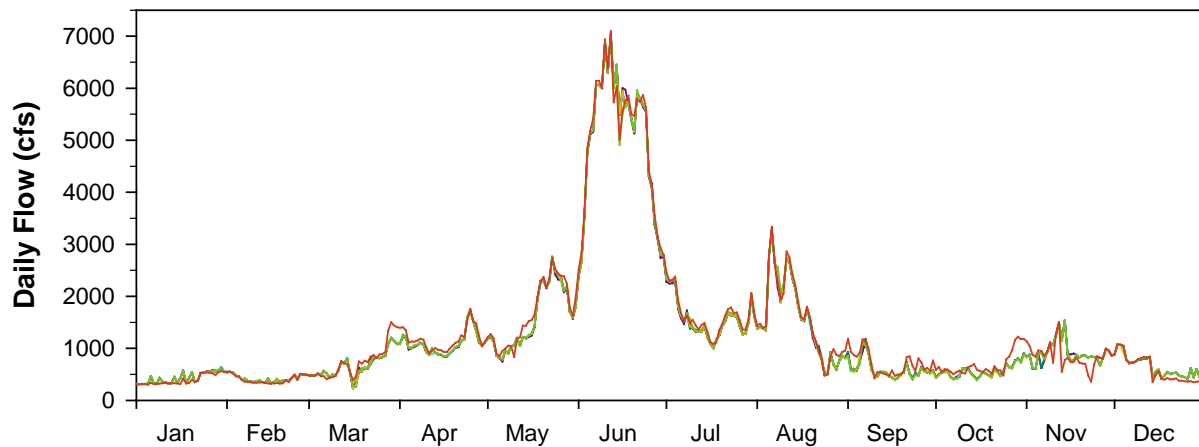
**Lower Arkansas River, Segment 3 –Fountain Creek to John Martin Reservoir  
Normal Year (2005)**



**Dry Year (2004)**



**Wet Year (1997)**



**Figure 130. Cumulative Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 3 of the Lower Arkansas River at the Avondale Gage**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

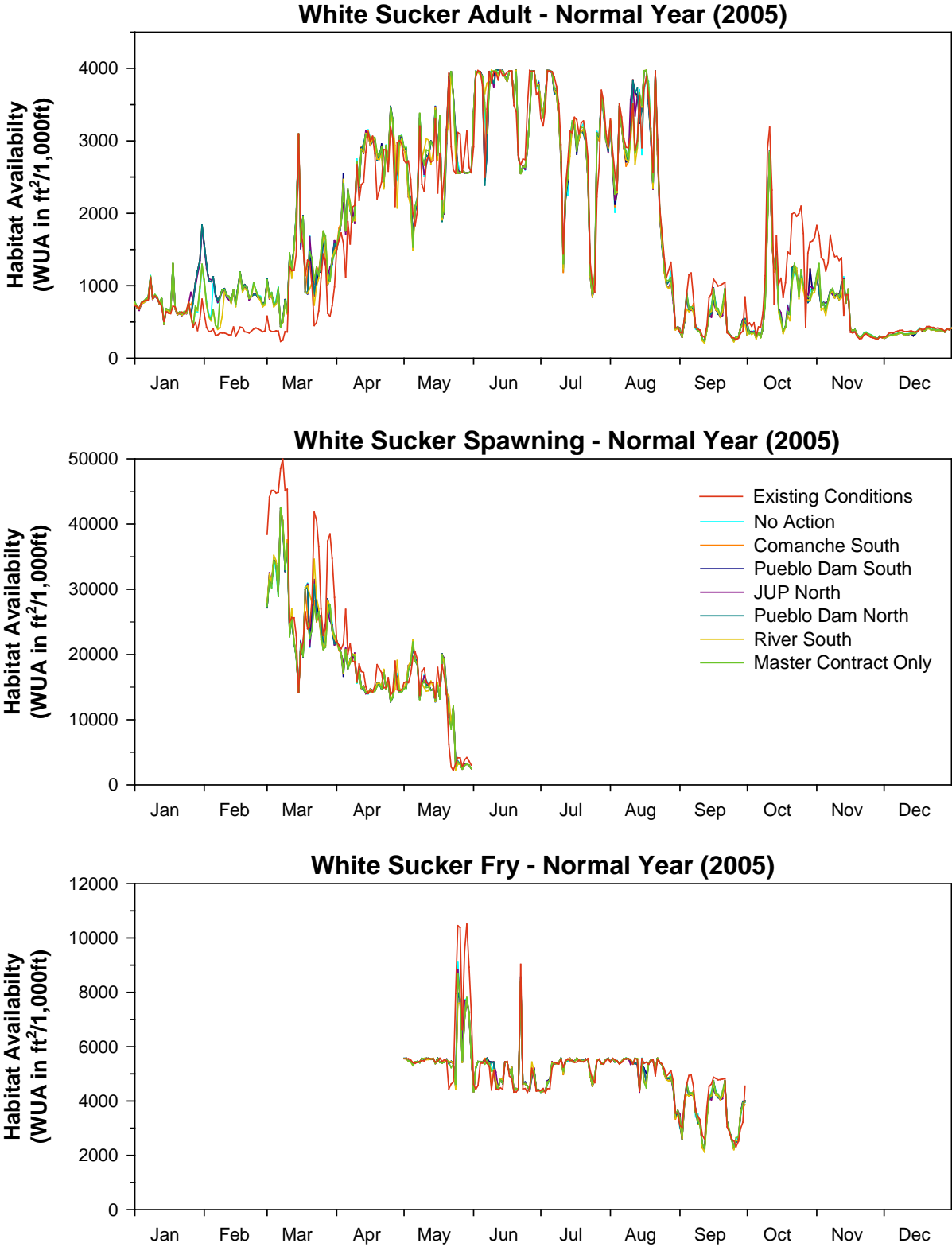


Figure 131. Cumulative Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of the Lower Arkansas River

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

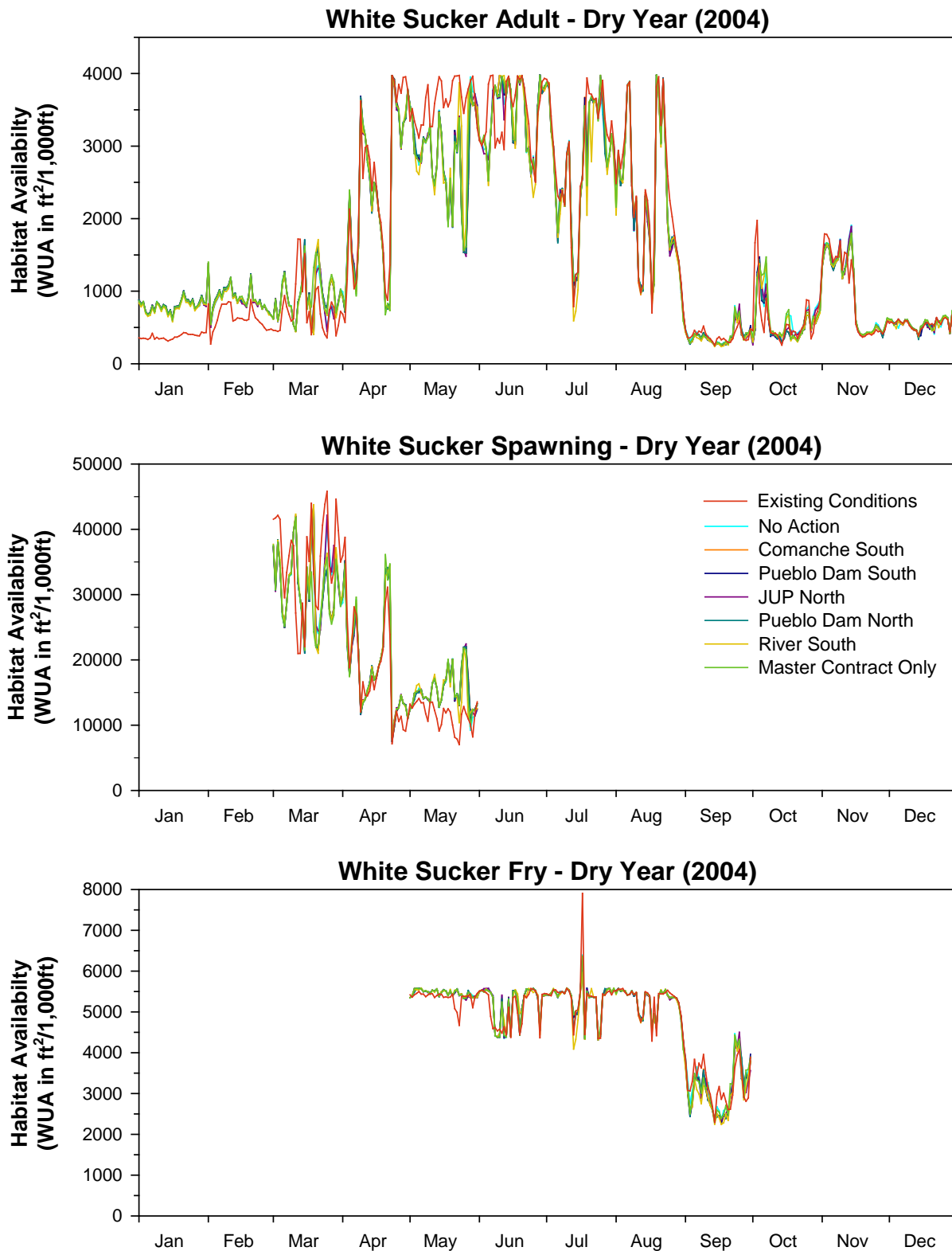


Figure 132. Cumulative Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of the Lower Arkansas River



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

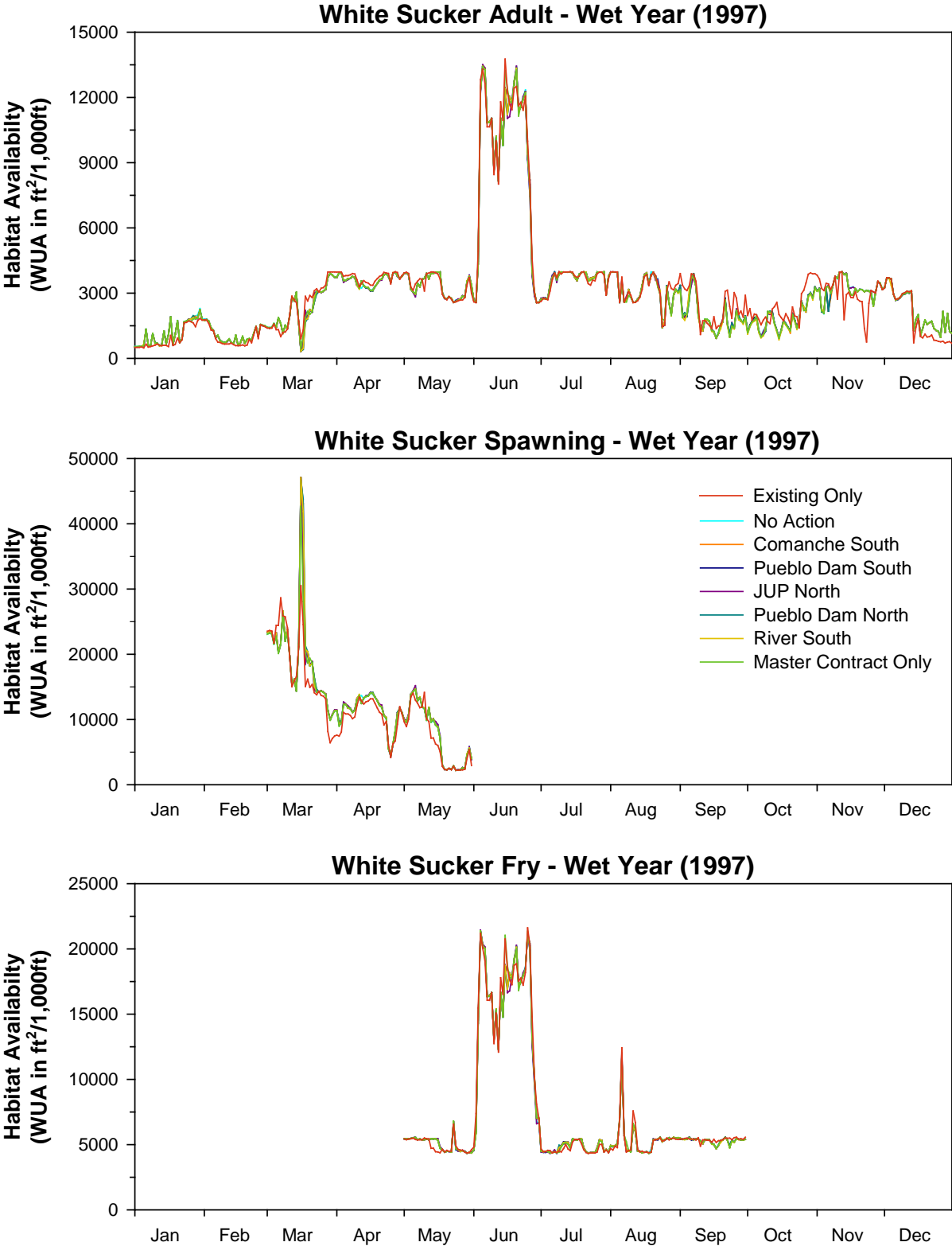
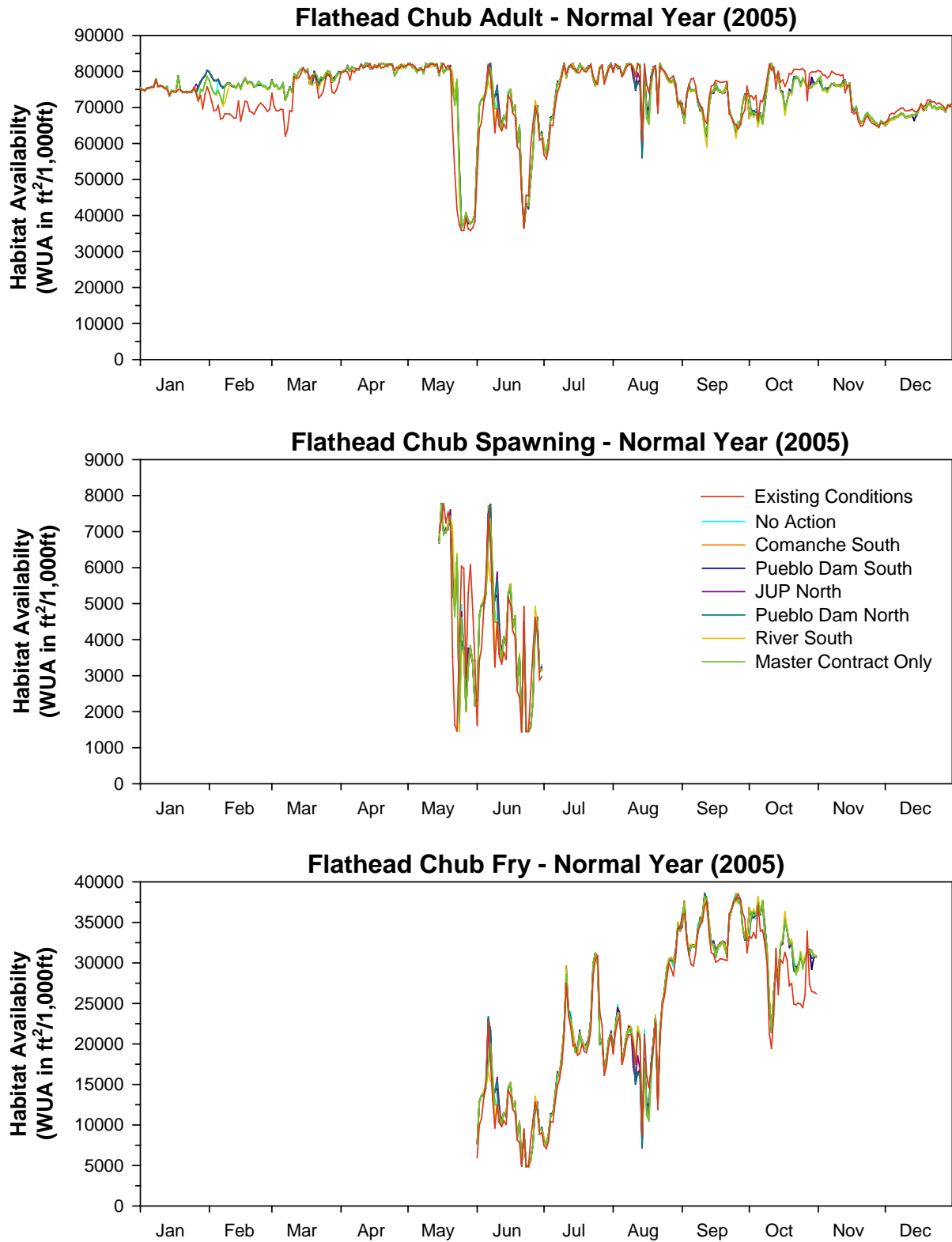


Figure 133. Cumulative Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of the Lower Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 134. Cumulative Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of the Lower Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

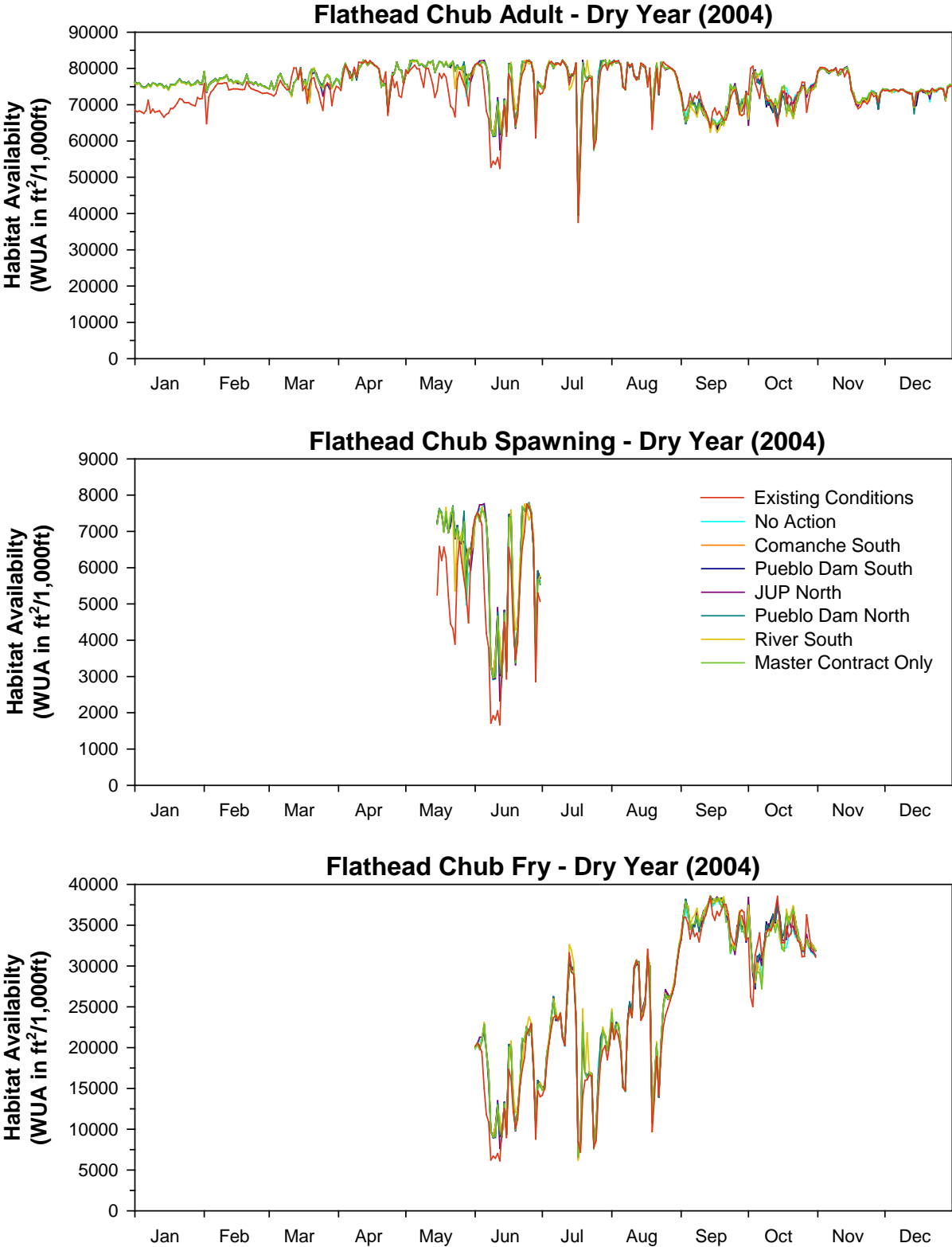


Figure 135. Cumulative Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of the Lower Arkansas River

Arkansas Valley Conduit EIS  
 Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

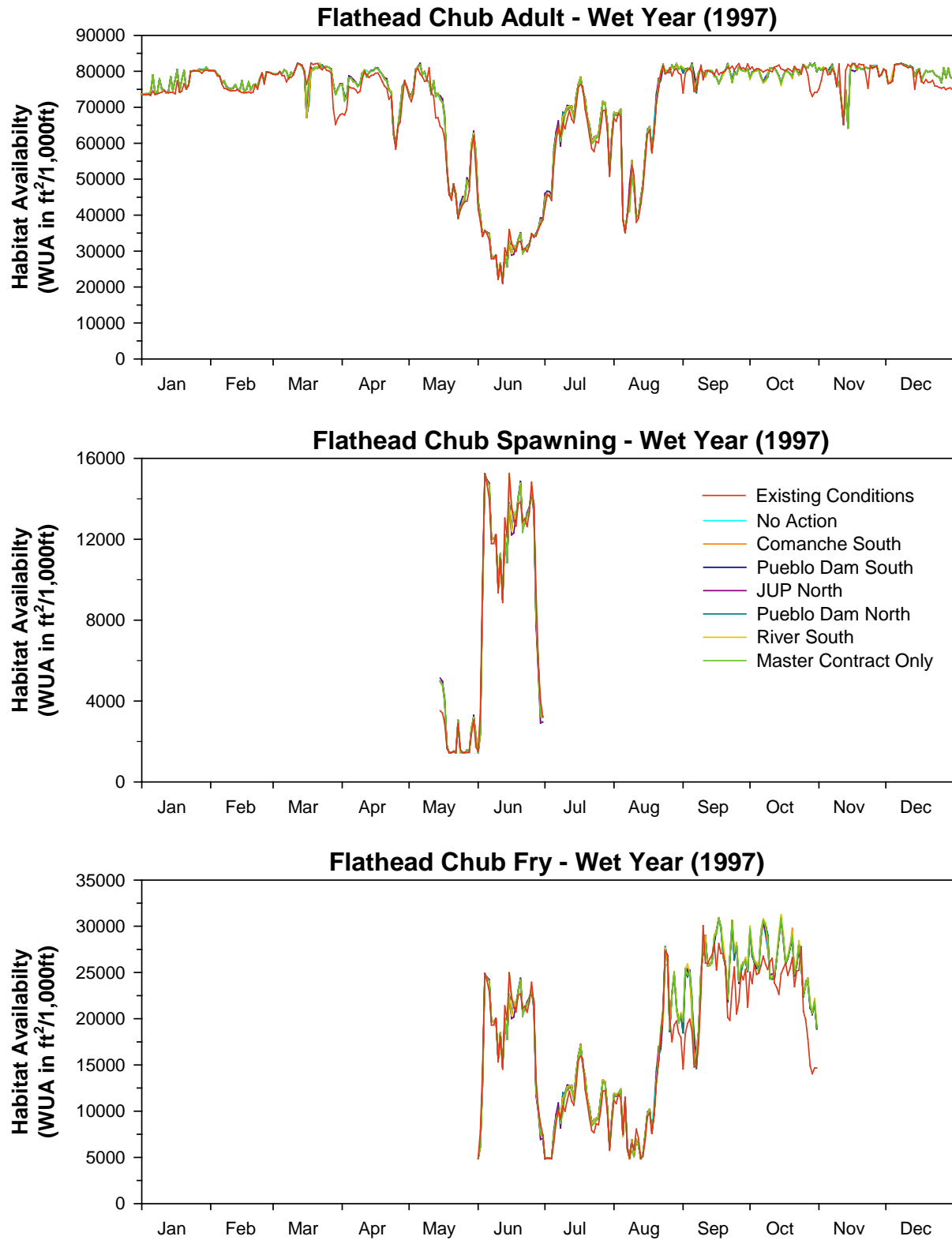


Figure 136. Cumulative Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of the Lower Arkansas River

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

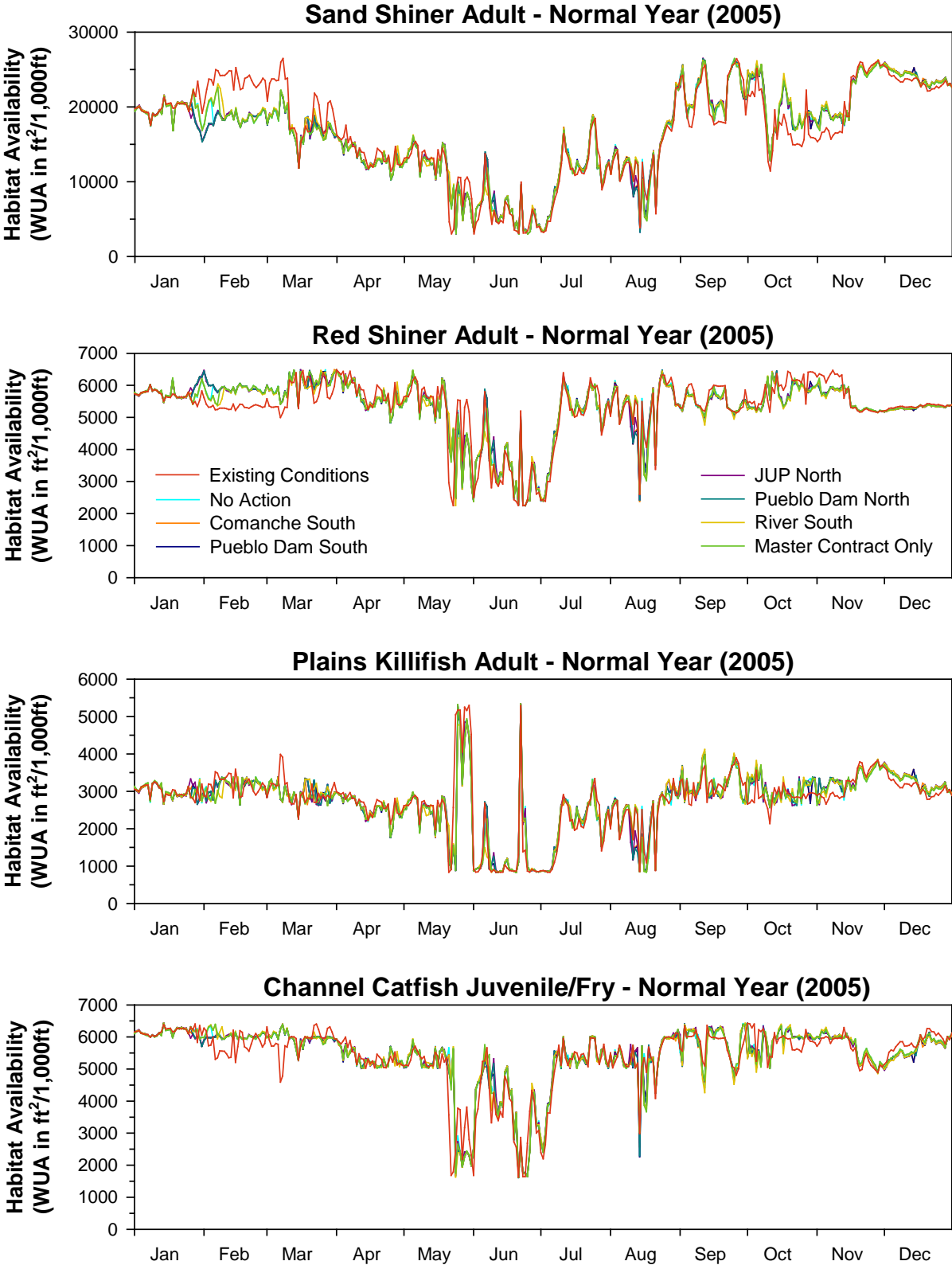
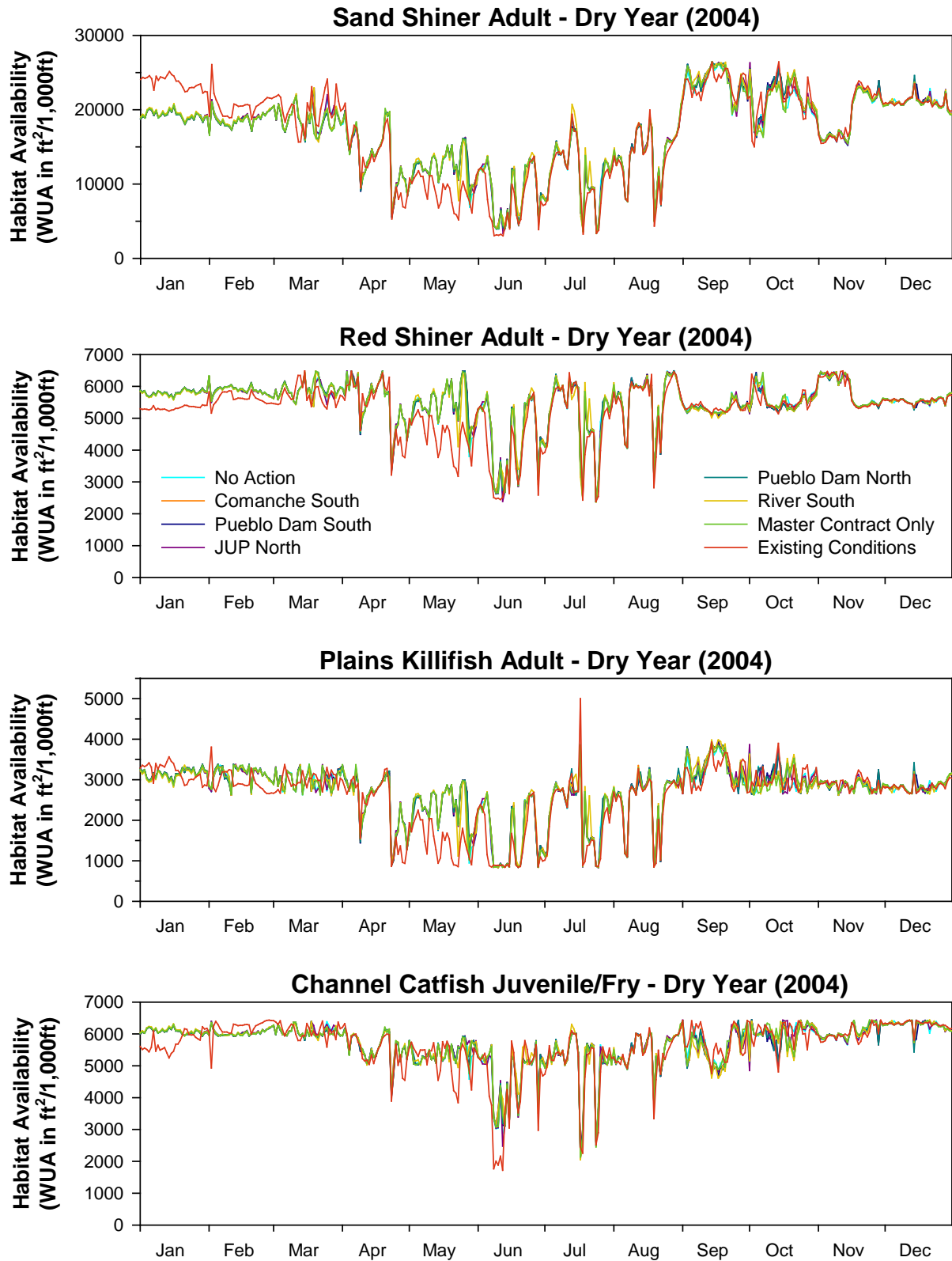


Figure 137. Cumulative Effects Sand Shiner (Adult), Red Shiner (Adult), Plains Killifish (Adult), and Channel Catfish (Juvenile/Fry) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of the Lower Arkansas River

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 138. Cumulative Effects Sand Shiner (Adult), Red Shiner (Adult), Plains Killifish (Adult), and Channel Catfish (Juvenile/Fry) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of the Lower Arkansas River**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

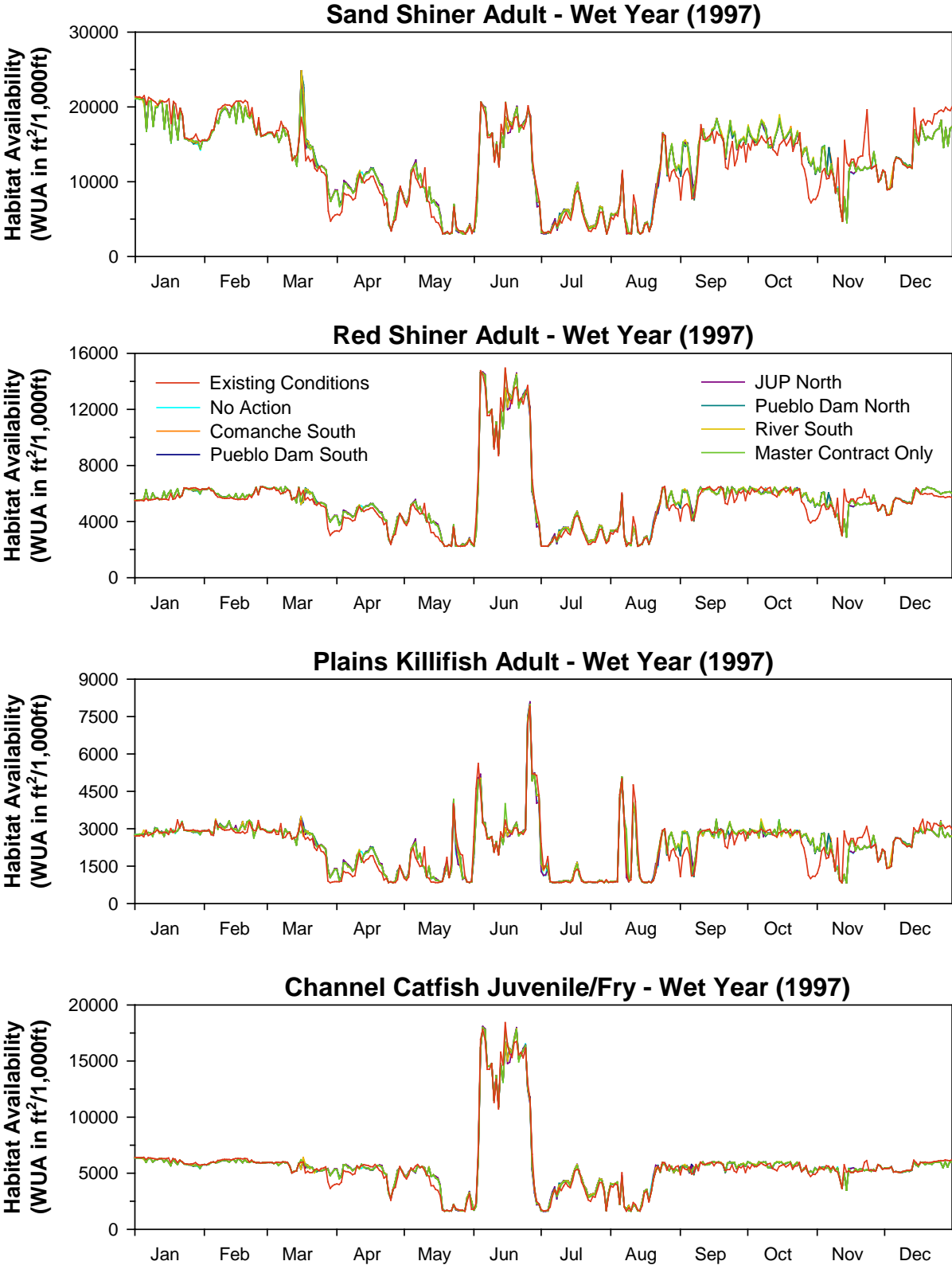









Figure 139. Cumulative Effects Sand Shiner (Adult), Red Shiner (Adult), Plains Killifish (Adult), and Channel Catfish (Juvenile/Fry) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of the Lower Arkansas River

# Arkansas Valley Conduit EIS

## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)








**Table 35. Cumulative Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), Red Shiner (Adult), Plains Killifish (Adult), and Channel Catfish (Juvenile/Fry), Lower Arkansas River Segment 3**

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	236	221	241	239	236	241	207	239
spawning	2,189	2,515	2,425	2,425	2,493	2,425	2,323	2,446
fry	2,322	2,176	2,257	2,248	2,236	2,257	2,121	2,251
<b>Flathead chub</b>								
adult/juvenile	35,914	36,567	36,996	36,996	36,688	36,998	36,997	36,774
spawning	1,443	1,444	1,456	1,456	1,455	1,456	1,443	1,458
fry	4,912	4,803	4,835	4,837	4,808	4,837	4,837	4,832
<b>Sand shiner</b>	3,021	3,023	3,025	3,025	3,022	3,025	3,025	3,025
<b>Red shiner</b>	2,247	2,247	2,248	2,248	2,247	2,248	2,248	2,248
<b>Plains killifish</b>	833	836	833	833	835	833	833	834
<b>Channel catfish</b>	1,629	1,608	1,615	1,619	1,615	1,619	1,619	1,616
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	-6%	2%	1%	<1%	2%	-12%	2%
spawning	--	15%	11%	11%	14%	11%	6%	12%
fry	--	-6%	-3%	-3%	-4%	-3%	-9%	-3%
<b>Flathead chub</b>								
adult/juvenile	--	2%	3%	3%	2%	3%	3%	2%
spawning	--	<1%	<1%	<1%	<1%	<1%	<1%	1%
fry	--	-2%	-2%	-2%	-2%	-2%	-2%	-2%
<b>Sand shiner</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Red shiner</b>	--	<-1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Plains killifish</b>	--	<1%	<-1%	<-1%	<1%	<-1%	<-1%	<1%
<b>Channel catfish</b>	--	-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	250	245	240	246	255	263	237	253
spawning	7,004	8,051	7,651	7,498	8,087	7,527	8,225	8,128
fry	2,293	2,272	2,254	2,277	2,320	2,381	2,242	2,304
<b>Flathead chub</b>								
adult/juvenile	37,572	39,501	39,677	39,677	39,592	39,656	40,044	39,538
spawning	1,669	2,754	3,016	3,012	2,331	3,017	3,016	2,964
fry	6,122	6,709	6,552	6,552	6,628	6,570	6,223	6,676
<b>Sand shiner</b>	3,034	3,403	3,441	3,442	3,353	3,440	3,408	3,342
<b>Red shiner</b>	2,386	2,373	2,383	2,384	2,388	2,383	2,371	2,396
<b>Plains killifish</b>	837	840	833	833	833	838	833	839
<b>Channel catfish</b>	1,720	2,141	2,112	2,112	2,126	2,116	2,053	2,135



Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	-2%	-4%	-2%	2%	5%	-5%	1%
spawning	--	15%	9%	7%	15%	7%	17%	16%
fry	--	<-1%	-2%	<-1%	1%	4%	-2%	<-1%
<b>Flathead chub</b>								
adult/juvenile	--	5%	6%	6%	5%	6%	7%	5%
spawning	--	65%	81%	81%	40%	81%	81%	78%
fry	--	10%	7%	7%	8%	7%	2%	9%
<b>Sand shiner</b>	--	12%	13%	13%	11%	13%	12%	10%
<b>Red shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Plains killifish</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Channel catfish</b>	--	24%	23%	23%	24%	23%	19%	24%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	480	324	336	325	325	336	325	433
spawning	2,223	2,252	2,198	2,198	2,230	2,198	2,198	2,192
fry	4,319	4,318	4,338	4,344	4,318	4,344	4,343	4,338
<b>Flathead chub</b>								
adult/juvenile	20,957	21,266	21,349	21,350	21,350	21,349	21,348	21,265
spawning	1,442	1,444	1,441	1,442	1,444	1,441	1,442	1,443
fry	4,820	4,849	4,837	4,852	4,850	4,847	4,845	4,851
<b>Sand shiner</b>	3,023	3,022	3,021	3,021	3,021	3,021	3,021	3,022
<b>Red shiner</b>	2,247	2,248	2,247	2,247	2,248	2,247	2,247	2,247
<b>Plains killifish</b>	833	835	834	834	834	833	834	833
<b>Channel catfish</b>	1,610	1,608	1,614	1,623	1,609	1,613	1,622	1,616
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	-32%	-30%	-32%	-32%	-30%	-32%	-10%
spawning	--	1%	-1%	-1%	<-1%	-1%	-1%	-1%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Flathead chub</b>								
adult/juvenile	--	1%	2%	2%	2%	2%	2%	1%
spawning	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Sand shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Red shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Plains killifish</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Channel catfish</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

**Table 36. Cumulative Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), Red Shiner (Adult), Plains Killifish (Adult), and Channel Catfish (Juvenile/Fry), Lower Arkansas River Segment 3**

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	1,216	1,045	1,124	1,067	1,101	1,099	996	1,086
Spawning	18,222	17,569	17,585	17,595	17,737	17,570	17,981	17,497
fry	5,356	5,364	5,364	5,367	5,364	5,368	5,369	5,360
<b>Flathead chub</b>								
adult/juvenile	75,024	75,879	75,821	75,881	75,893	75,808	75,427	75,836
spawning	4,088	4,440	4,314	4,383	4,456	4,382	4,270	4,384
fry	22,680	23,471	23,516	23,519	23,578	23,485	23,534	23,167
<b>Sand shiner</b>	17,159	17,847	17,511	17,753	17,609	17,615	18,056	17,671
<b>Red shiner</b>	5,417	5,558	5,574	5,584	5,582	5,573	5,518	5,536
<b>Plains killifish</b>	2,855	2,906	2,898	2,904	2,877	2,895	2,907	2,897
<b>Channel catfish</b>	5,671	5,698	5,684	5,699	5,696	5,698	5,684	5,719
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	-14%	-8%	-12%	-9%	-10%	-18%	-11%
spawning	--	-4%	-3%	-3%	-3%	-4%	-1%	-4%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Flathead chub</b>								
adult/juvenile	--	1%	1%	1%	1%	1%	<1%	1%
spawning	--	9%	6%	7%	9%	7%	4%	7%
fry	--	3%	4%	4%	4%	4%	4%	2%
<b>Sand shiner</b>	--	4%	2%	3%	3%	3%	5%	3%
<b>Red shiner</b>	--	3%	3%	3%	3%	3%	2%	2%
<b>Plains killifish</b>	--	2%	1%	2%	<1%	1%	2%	1%
<b>Channel catfish</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	823	955	971	974	956	972	960	1,003
spawning	17,334	19,752	19,916	19,918	19,702	19,917	19,903	20,066
fry	5,372	5,391	5,389	5,389	5,385	5,387	5,385	5,394
<b>Flathead chub</b>								
adult/juvenile	74,176	75,858	76,005	75,996	75,885	76,005	75,840	76,051
spawning	5,433	6,718	6,972	6,956	6,713	6,889	6,737	6,924
fry	24,836	25,763	26,131	26,153	25,987	25,930	25,995	25,705
<b>Sand shiner</b>	19,120	18,232	18,164	18,152	18,227	18,162	18,214	18,027
<b>Red shiner</b>	5,431	5,625	5,622	5,618	5,609	5,625	5,619	5,652
<b>Plains killifish</b>	2,815	2,846	2,859	2,868	2,857	2,870	2,847	2,855
<b>Channel catfish</b>	5,820	5,957	5,937	5,933	5,941	5,940	5,950	5,943

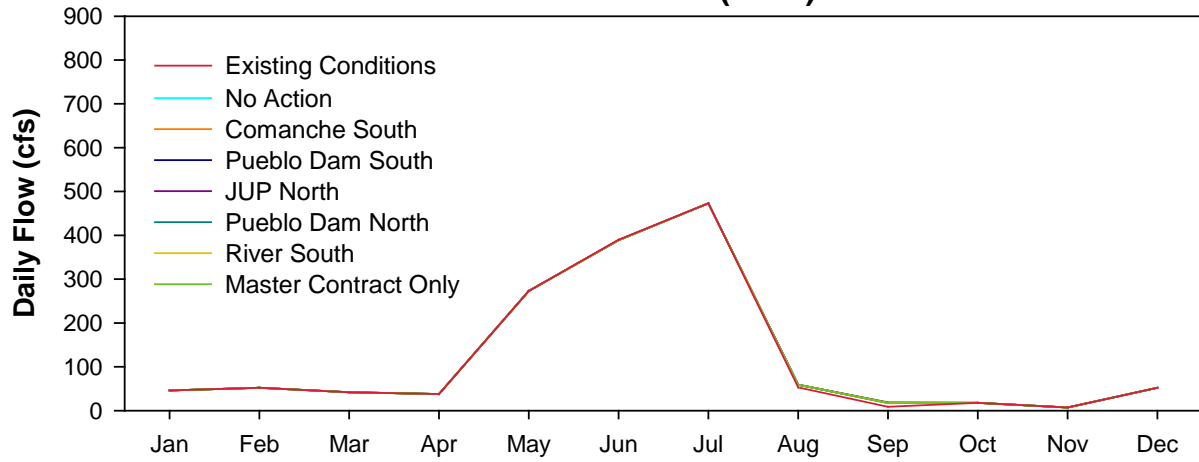
Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

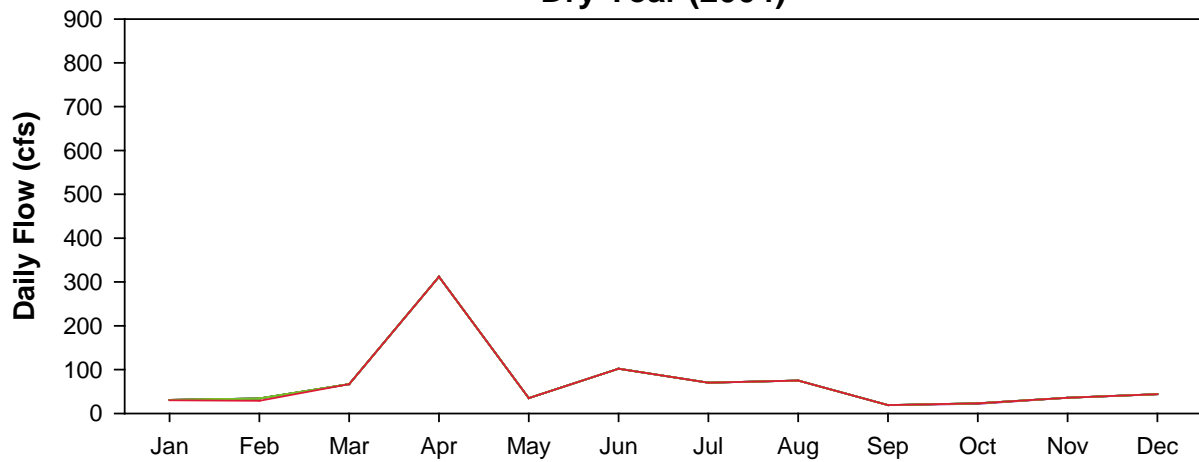
Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	16%	18%	18%	16%	18%	17%	22%
spawning	--	14%	15%	15%	14%	15%	15%	16%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Flathead chub</b>								
adult/juvenile	--	2%	2%	2%	2%	2%	2%	3%
spawning	--	24%	28%	28%	24%	27%	24%	27%
fry	--	4%	5%	5%	5%	4%	5%	4%
<b>Sand shiner</b>	--	-5%	-5%	-5%	-5%	-5%	-5%	-6%
<b>Red shiner</b>	--	4%	4%	3%	3%	4%	3%	4%
<b>Plains killifish</b>	--	1%	2%	2%	1%	2%	1%	1%
<b>Channel catfish</b>	--	2%	2%	2%	2%	2%	2%	2%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	2,901	2,826	2,804	2,804	2,836	2,787	2,815	2,810
spawning	11,093	12,062	11,927	11,949	12,143	11,926	11,944	11,878
fry	5,366	5,376	5,370	5,368	5,374	5,372	5,369	5,375
<b>Flathead chub</b>								
adult/juvenile	75,870	77,885	77,882	77,824	77,875	77,890	77,727	77,711
spawning	9,352	9,000	9,035	9,036	9,036	9,035	9,035	9,000
fry	18,610	20,430	20,588	20,423	20,123	20,442	20,112	20,430
<b>Sand shiner</b>	12,351	12,837	12,954	12,955	12,858	12,996	12,858	12,892
<b>Red shiner</b>	5,477	5,558	5,551	5,530	5,548	5,551	5,532	5,561
<b>Plains killifish</b>	2,596	2,635	2,646	2,645	2,635	2,646	2,644	2,639
<b>Channel catfish</b>	5,533	5,542	5,523	5,507	5,542	5,524	5,527	5,520
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	-3%	-3%	-3%	-2%	-4%	-3%	-3%
spawning	--	9%	8%	8%	9%	8%	8%	7%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Flathead chub</b>								
adult/juvenile	--	3%	3%	3%	3%	3%	2%	2%
spawning	--	-4%	-3%	-3%	-3%	-3%	-3%	-4%
fry	--	10%	11%	10%	8%	10%	8%	10%
<b>Sand shiner</b>	--	4%	5%	5%	4%	5%	4%	4%
<b>Red shiner</b>	--	1%	1%	<1%	1%	1%	<1%	2%
<b>Plains killifish</b>	--	1%	2%	2%	1%	2%	2%	2%
<b>Channel catfish</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%

**Arkansas Valley Conduit EIS  
Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**

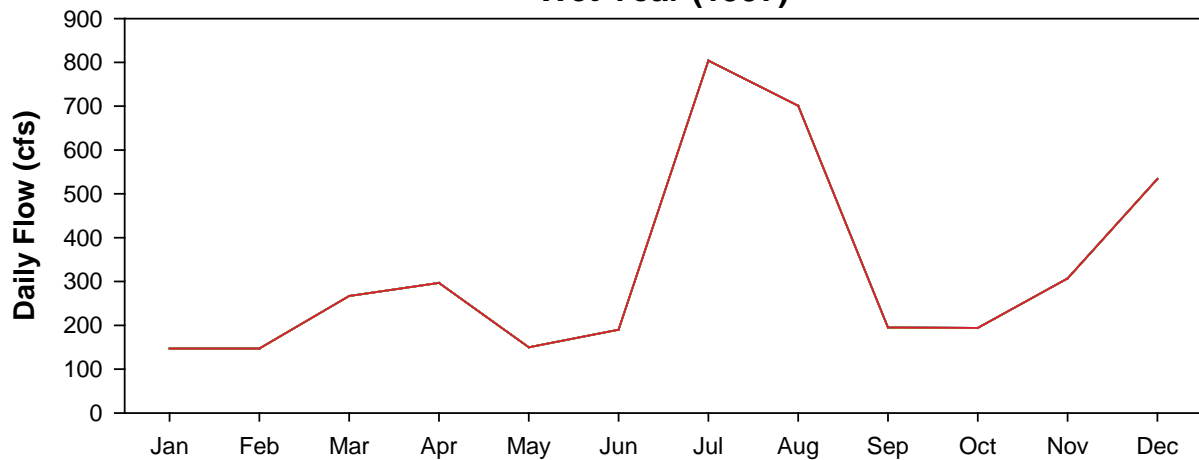
**Lower Arkansas River, Segment 4 – John Martin Reservoir to Kansas State Line  
Normal Year (2005)**



**Dry Year (2004)**



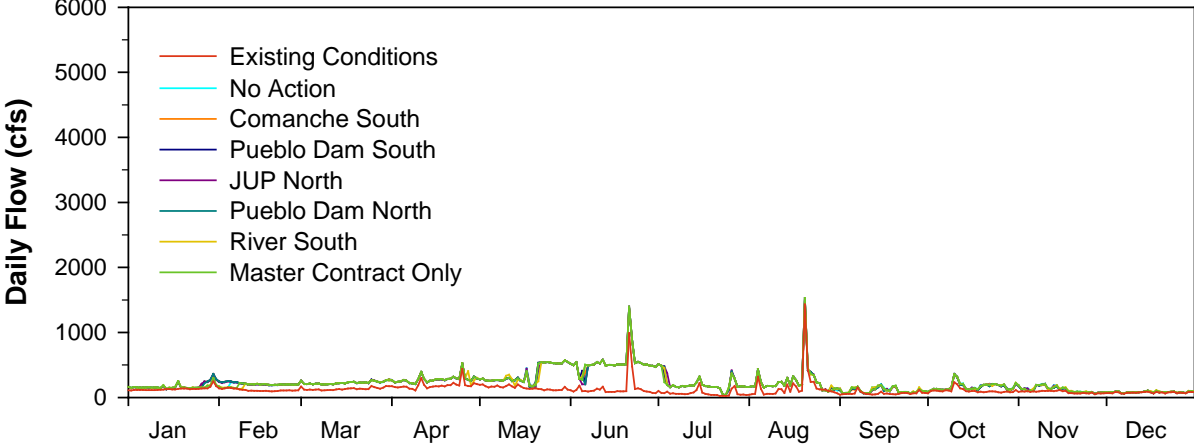
**Wet Year (1997)**



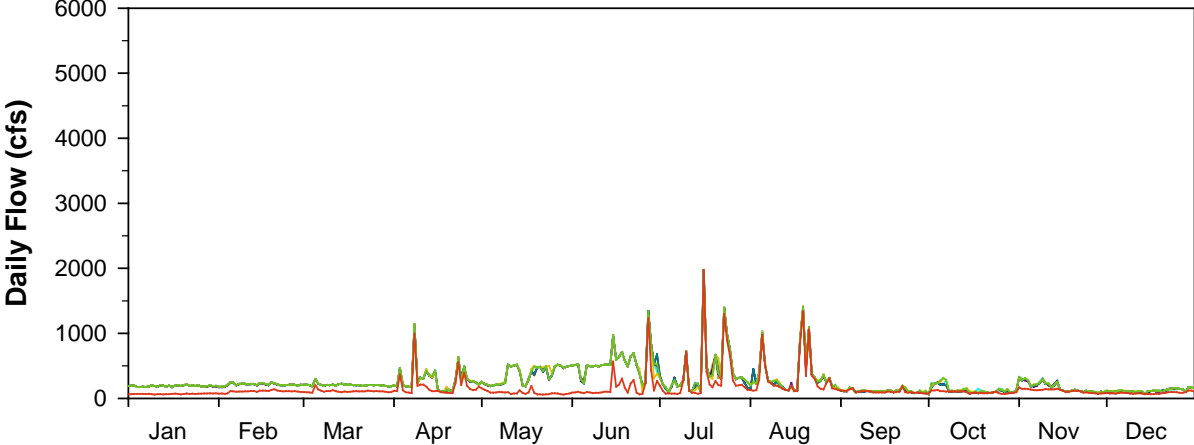
**Figure 140. Cumulative Effects Mean Monthly Streamflow for All Alternatives and Existing Conditions for Segment 4 of the Lower Arkansas River at the Granada Gage**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Fountain Creek, Segment 3 – Security to County Line  
Normal Year (2005)



Dry Year (2004)



Wet Year (1997)

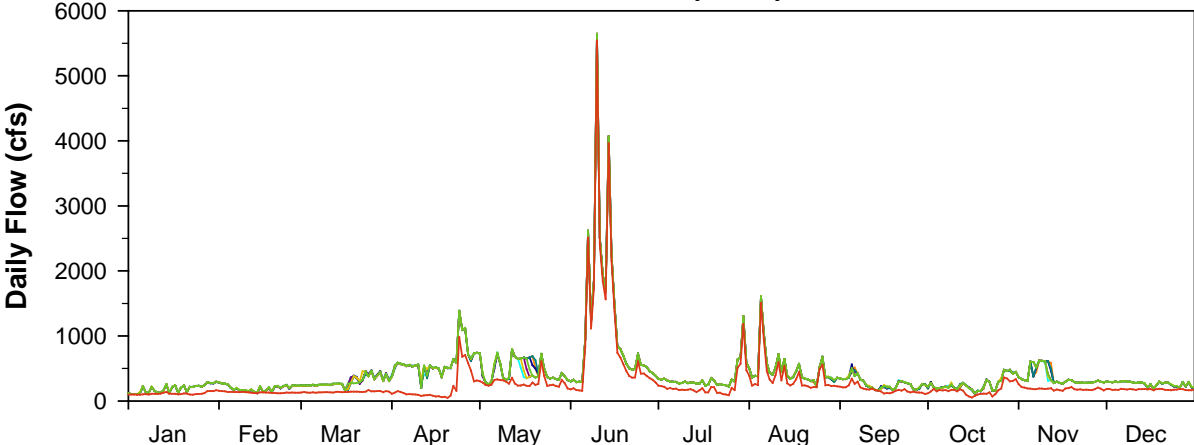


Figure 141. Cumulative Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 3 of Fountain Creek at the Near Fountain Gage

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

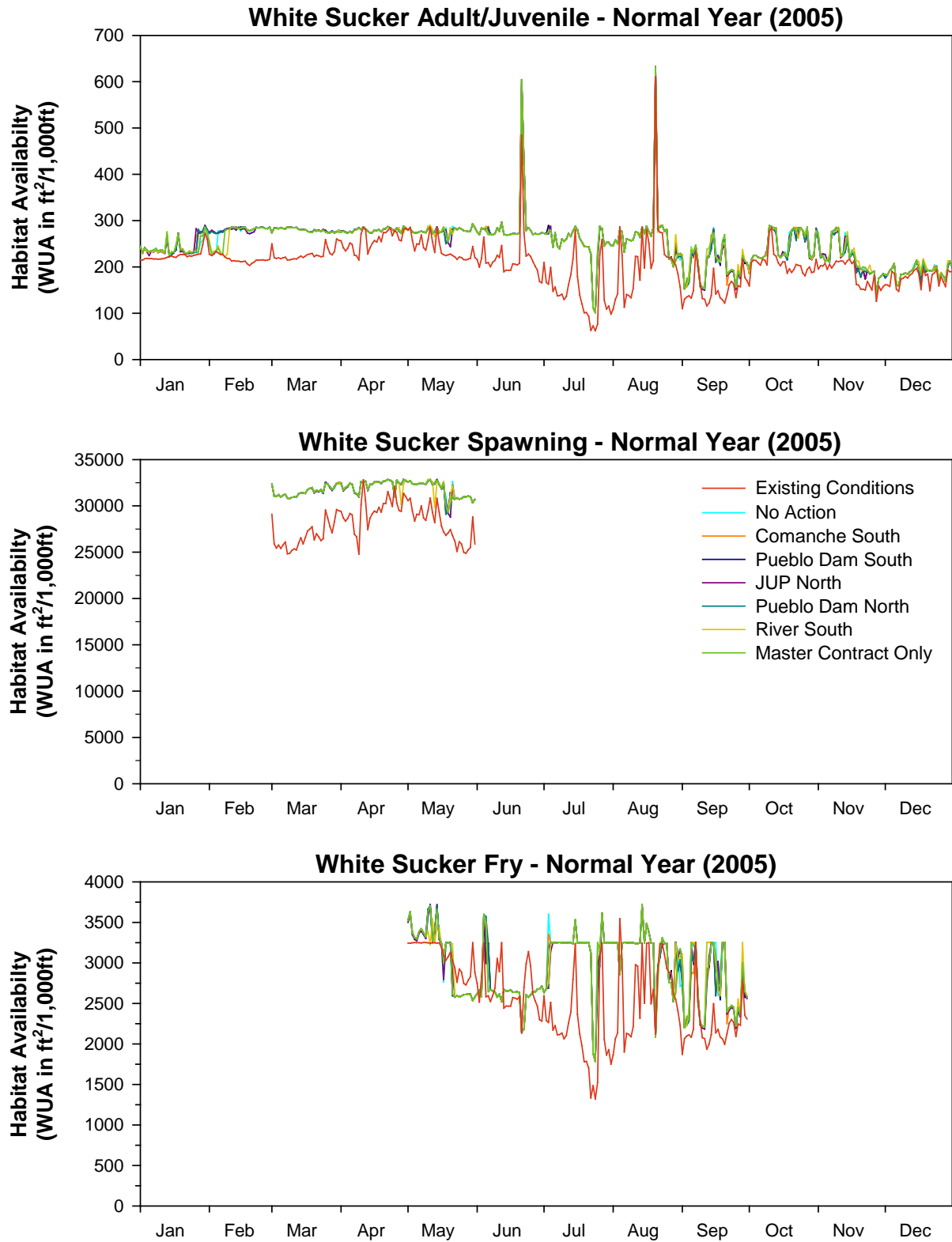


Figure 142. Cumulative Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of Fountain Creek

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

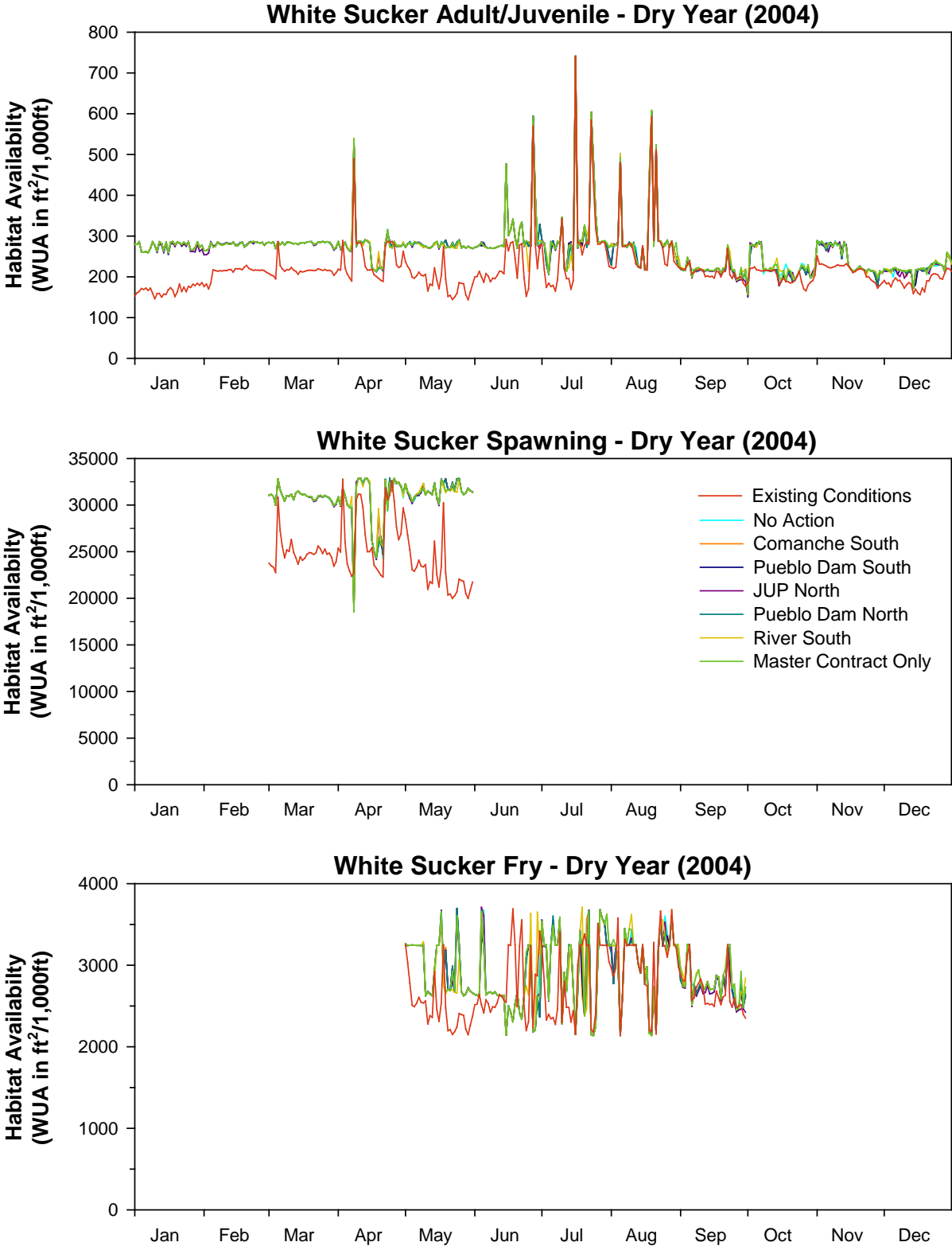


Figure 143. Cumulative Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of Fountain Creek

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

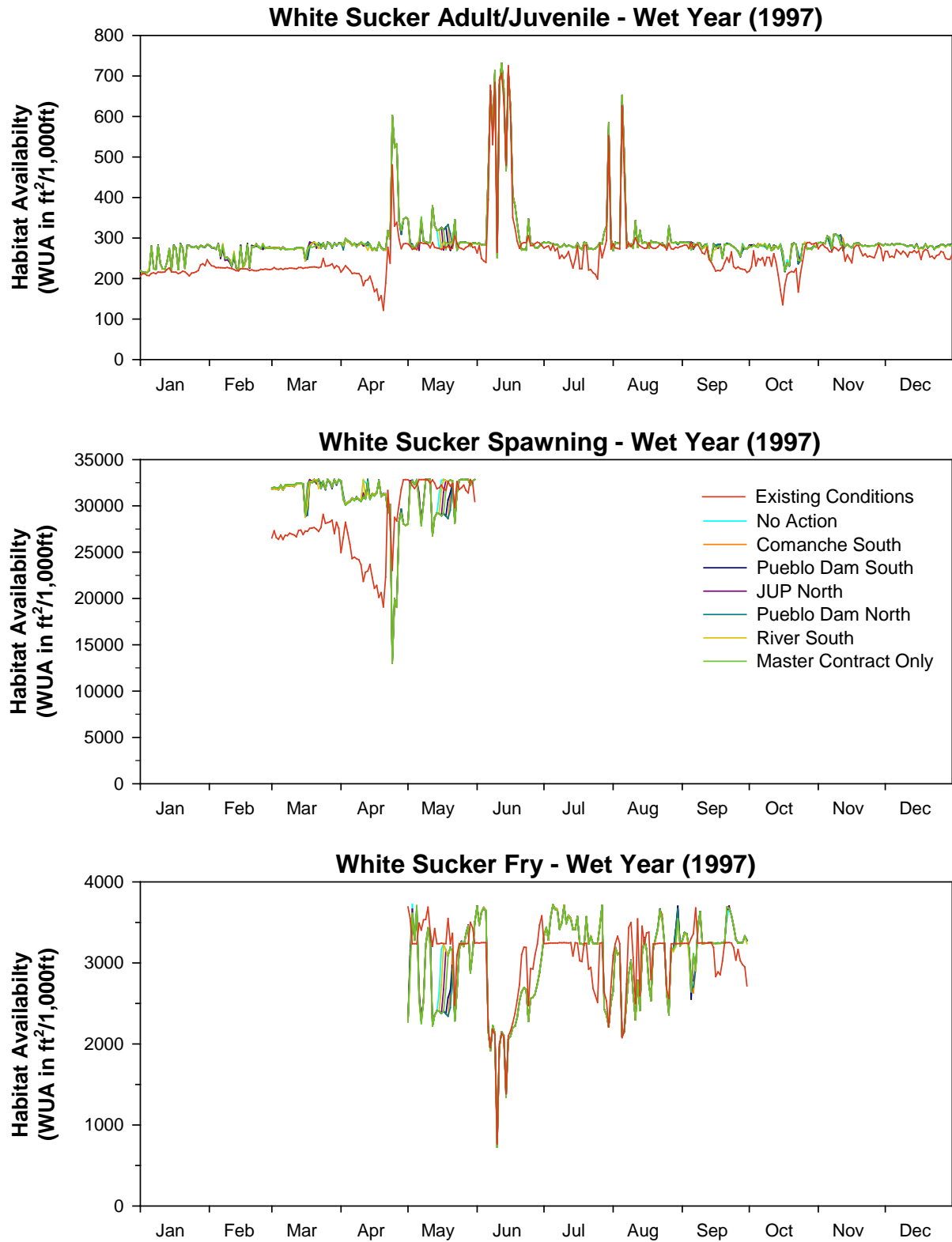


Figure 144. Cumulative Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of Fountain Creek



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

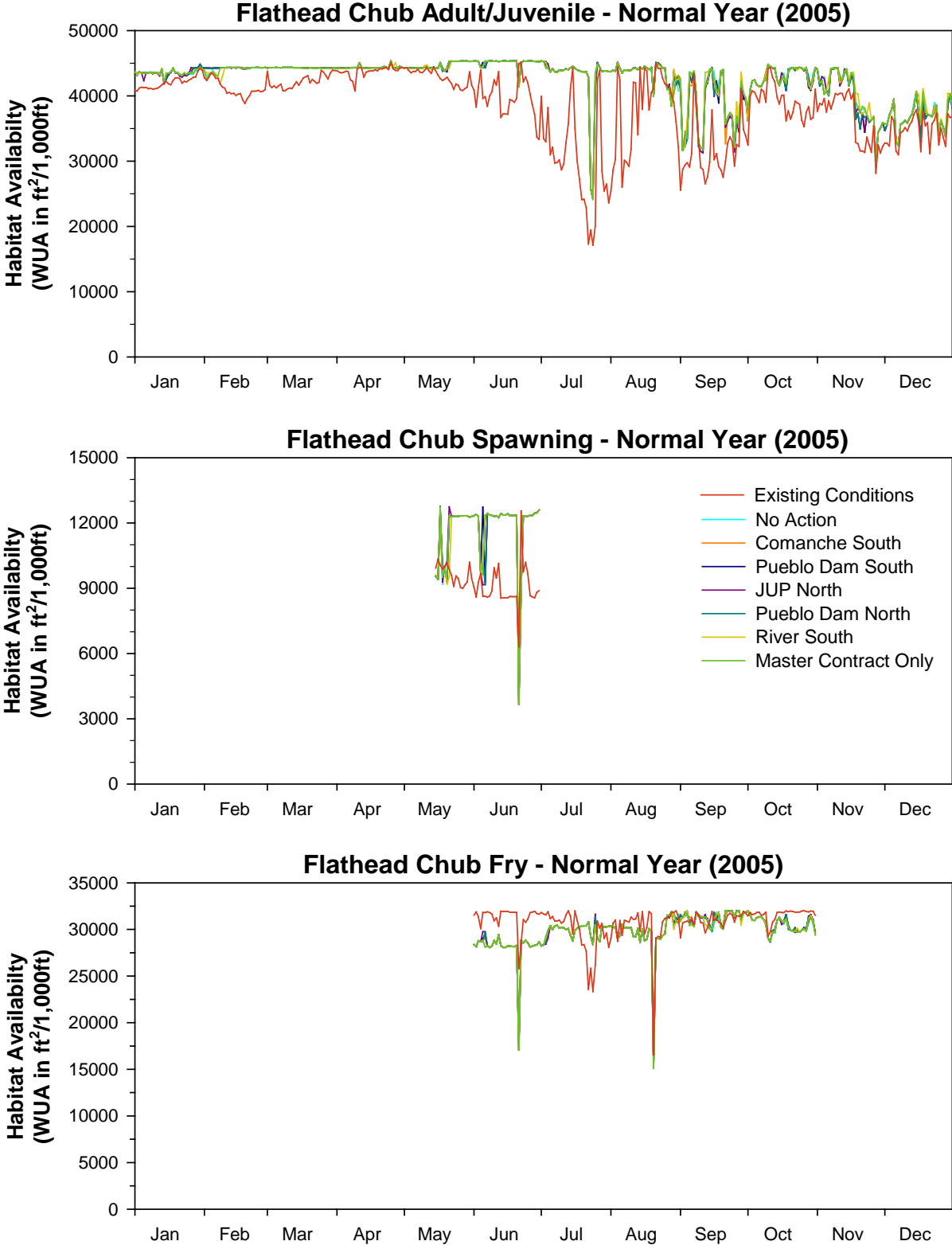


Figure 145. Cumulative Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft²/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of Fountain Creek

Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

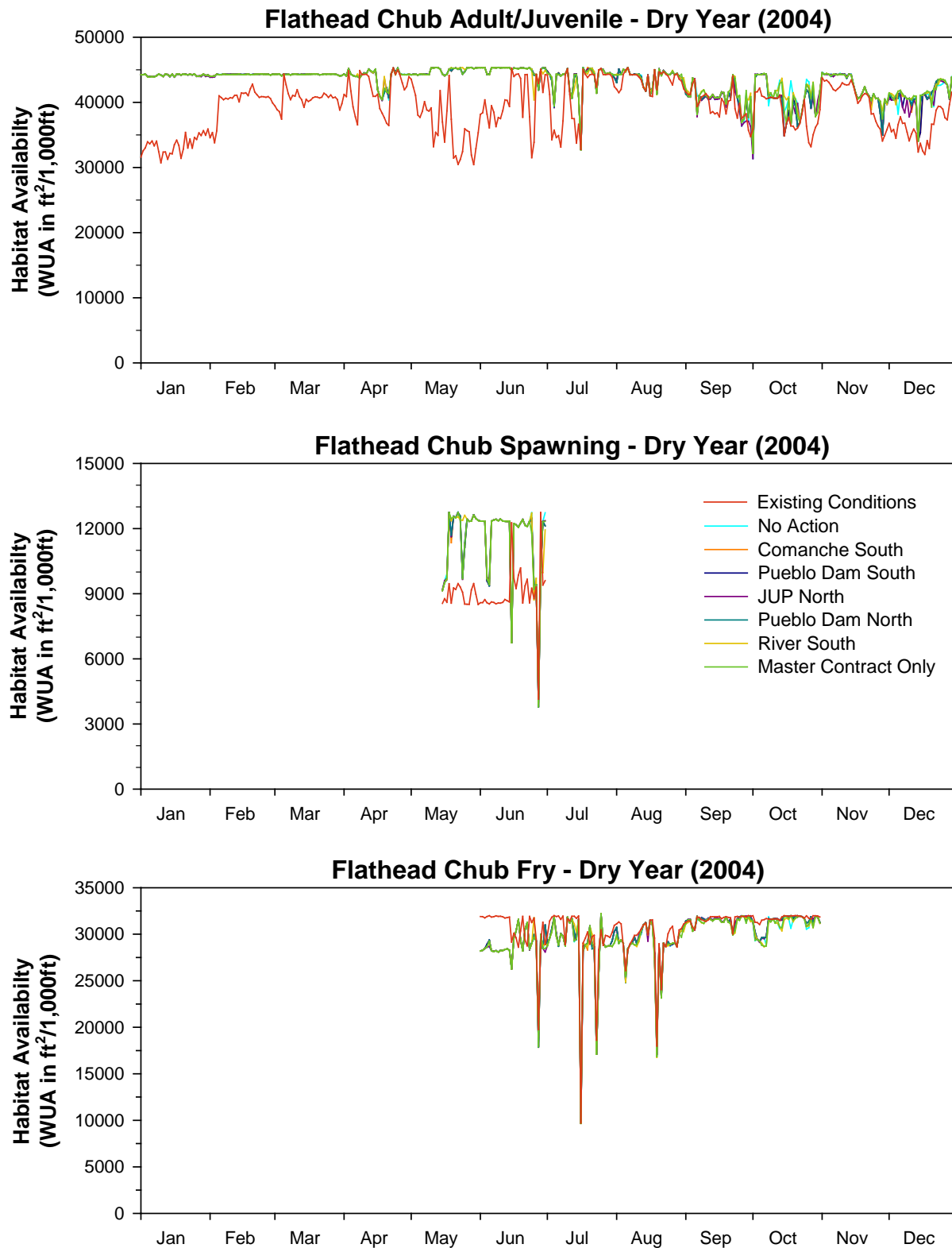


Figure 146. Cumulative Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of Fountain Creek

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

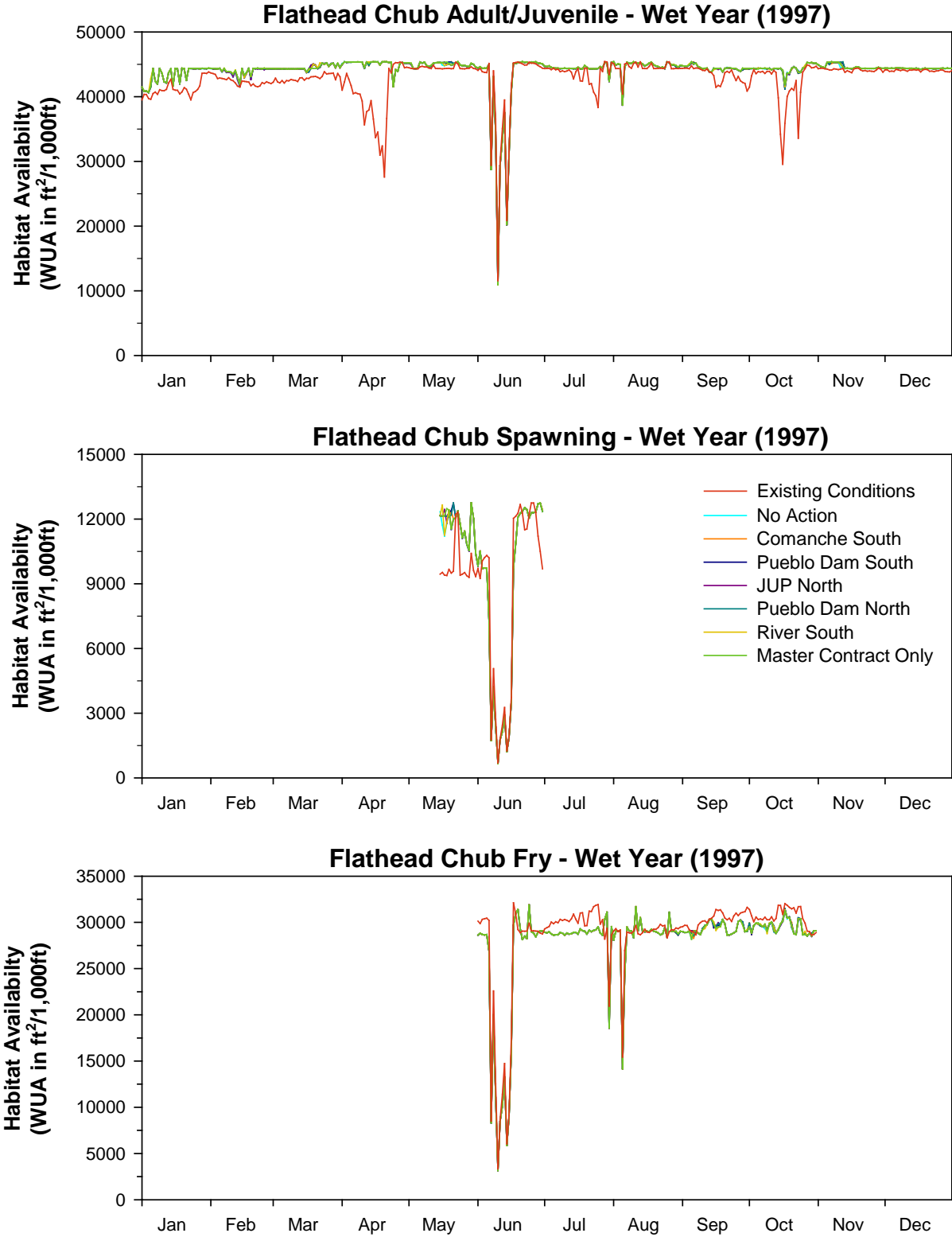


Figure 147. Cumulative Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of Fountain Creek

# Arkansas Valley Conduit EIS

## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

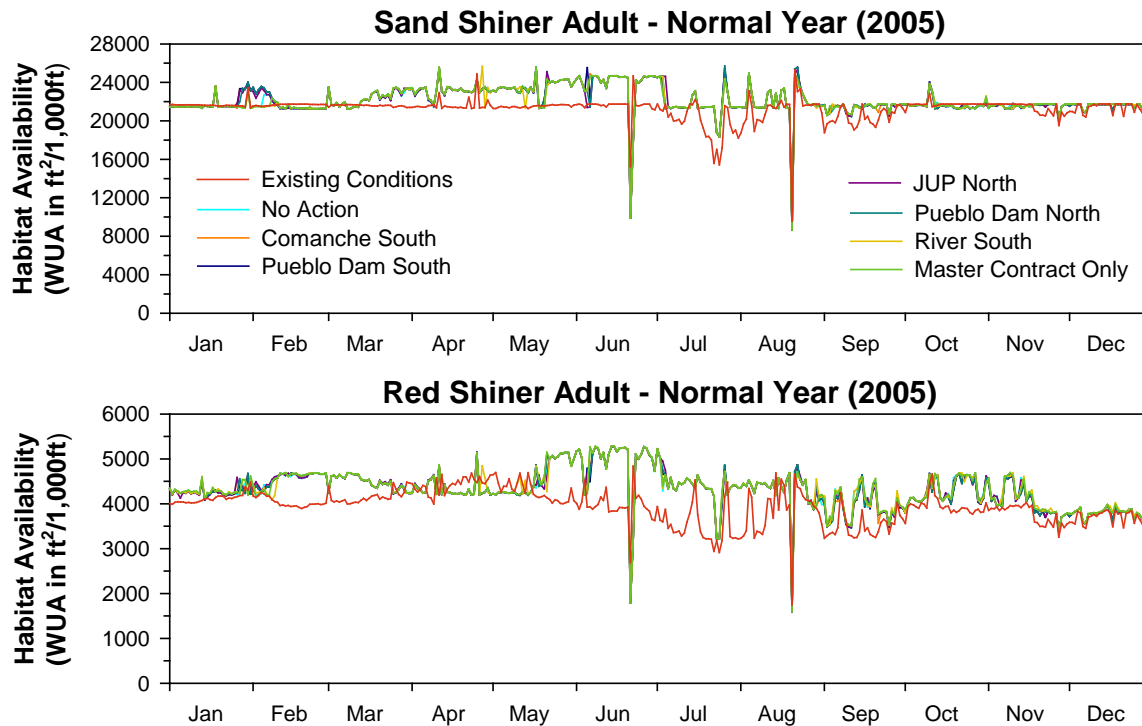


Figure 148. Cumulative Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 3 of Fountain Creek

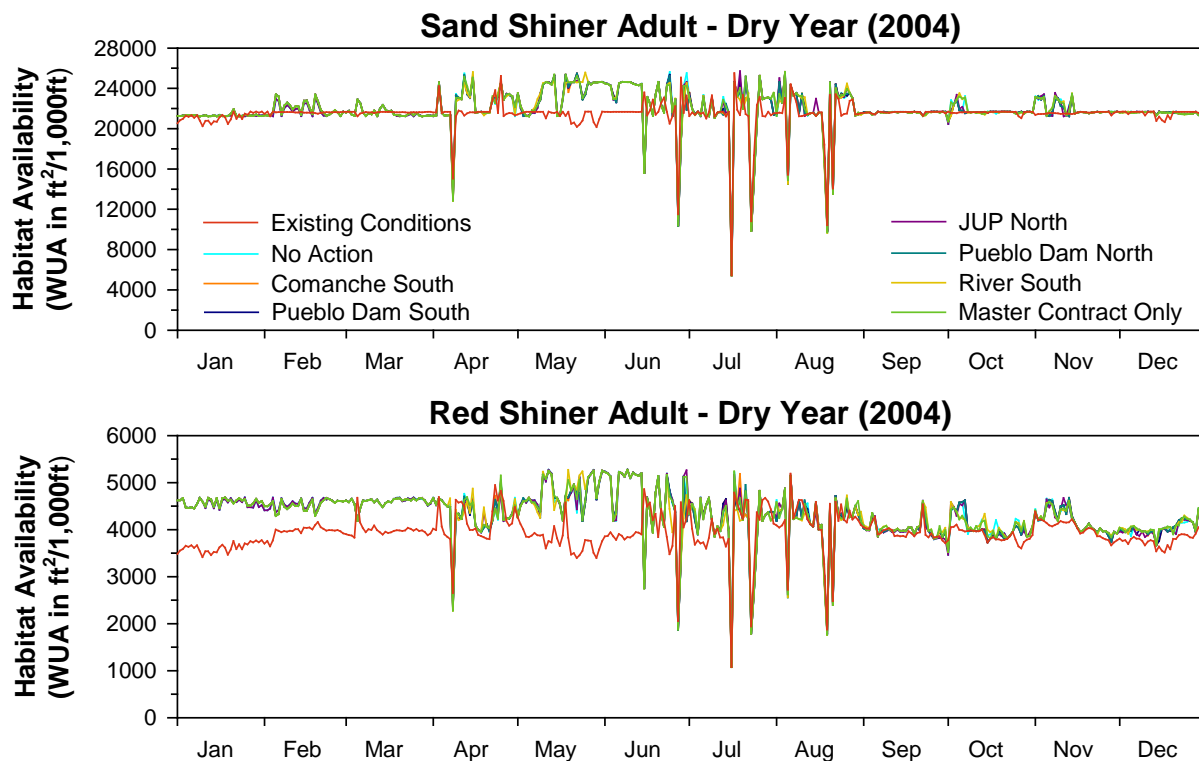


Figure 149. Cumulative Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 3 of Fountain Creek

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

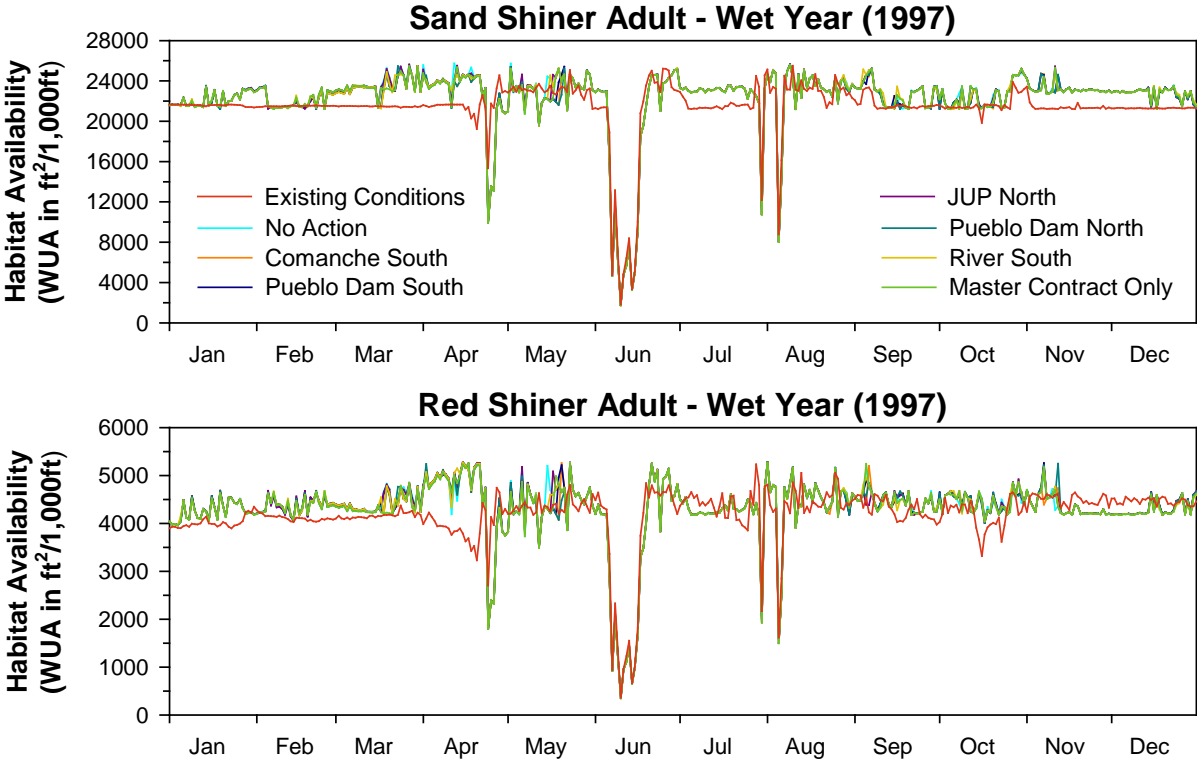









Figure 150. Cumulative Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 3 of Fountain Creek

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 37. Cumulative Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), and Red Shiner (Adult), Fountain Creek Segment 3

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	63	102	102	102	102	102	102	102
spawning	24,792	28,787	29,134	29,155	28,788	29,105	29,341	29,342
fry	1,321	1,784	1,785	1,785	1,784	1,785	1,784	1,785
<b>Flathead chub</b>								
adult/juvenile	17,170	24,191	24,199	24,195	24,191	24,197	24,191	24,197
spawning	6,302	3,675	3,675	3,675	3,675	3,675	3,675	3,675
fry	16,568	15,137	15,136	15,136	15,136	15,136	15,136	15,136
<b>Sand shiner</b>	9,547	8,665	8,665	8,665	8,665	8,665	8,665	8,665
<b>Red shiner</b>	1,739	1,598	1,598	1,598	1,598	1,598	1,598	1,598
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	62%	62%	62%	62%	62%	62%	62%
spawning	--	16%	18%	18%	16%	17%	18%	18%
fry	--	35%	35%	35%	35%	35%	35%	35%
<b>Flathead chub</b>								
adult/juvenile	--	41%	41%	41%	41%	41%	41%	41%
spawning	--	-42%	-42%	-42%	-42%	-42%	-42%	-42%
fry	--	-9%	-9%	-9%	-9%	-9%	-9%	-9%
<b>Sand shiner</b>	--	-9%	-9%	-9%	-9%	-9%	-9%	-9%
<b>Red shiner</b>	--	-8%	-8%	-8%	-8%	-8%	-8%	-8%
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	144	151	158	158	151	158	158	158
spawning	19,984	19,332	18,682	18,703	19,532	18,830	18,530	18,541
fry	2,142	2,134	2,134	2,134	2,131	2,134	2,134	2,131
<b>Flathead chub</b>								
adult/juvenile	30,492	31,392	32,249	32,251	31,392	32,249	32,242	32,249
spawning	4,149	3,814	3,788	3,799	3,801	3,789	3,955	3,799
fry	9,730	9,701	9,682	9,682	9,701	9,682	9,682	9,682
<b>Sand shiner</b>	5,478	5,461	5,450	5,450	5,461	5,450	5,450	5,450
<b>Red shiner</b>	1,083	1,080	1,078	1,078	1,080	1,078	1,078	1,078
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	5%	10%	10%	5%	10%	9%	10%
spawning	--	-3%	-7%	-6%	-2%	-6%	-7%	-7%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%

Arkansas Valley Conduit EIS








Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Flathead chub</b>								
adult/juvenile	--	3%	6%	6%	3%	6%	6%	6%
spawning	--	-8%	-9%	-8%	-8%	-9%	-5%	-8%
fry	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Sand shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Red shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	122	215	215	215	215	215	215	215
spawning	19,091	13,097	13,052	13,081	13,097	13,052	13,081	13,056
fry	768	728	728	728	728	728	728	728
<b>Flathead chub</b>								
adult/juvenile	11,516	10,907	10,912	10,905	10,907	10,912	10,905	10,912
spawning	695	658	659	658	658	659	658	659
fry	3,337	3,160	3,161	3,160	3,160	3,161	3,160	3,161
<b>Sand shiner</b>	1,875	1,776	1,777	1,776	1,776	1,777	1,776	1,777
<b>Red shiner</b>	373	354	354	354	354	354	354	354
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	75%	75%	75%	75%	75%	75%	75%
spawning	--	-31%	-32%	-31%	-31%	-32%	-31%	-32%
fry	--	-5%	-5%	-5%	-5%	-5%	-5%	-5%
<b>Flathead chub</b>								
adult/juvenile	--	-5%	-5%	-5%	-5%	-5%	-5%	-5%
spawning	--	-5%	-5%	-5%	-5%	-5%	-5%	-5%
fry	--	-5%	-5%	-5%	-5%	-5%	-5%	-5%
<b>Sand shiner</b>	--	-5%	-5%	-5%	-5%	-5%	-5%	-5%
<b>Red shiner</b>	--	-5%	-5%	-5%	-5%	-5%	-5%	-5%

# Arkansas Valley Conduit EIS

## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)








**Table 38. Cumulative Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), and Red Shiner (Adult), Fountain Creek Segment 3**

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	214	271	271	271	272	271	270	271
Spawning	28,329	31,922	31,997	32,001	32,005	32,001	31,979	31,997
fry	2,524	3,229	3,048	3,064	3,084	3,041	3,236	3,163
<b>Flathead chub</b>								
adult/juvenile	40,614	44,176	44,250	44,247	44,255	44,250	44,146	44,167
spawning	9,085	12,325	12,322	12,324	12,325	12,322	12,324	12,326
fry	31,343	30,150	30,166	30,167	30,161	30,167	30,150	30,106
<b>Sand shiner</b>	21,558	21,691	21,693	21,695	21,693	21,696	21,671	21,683
<b>Red shiner</b>	3,964	4,306	4,292	4,293	4,307	4,292	4,321	4,292
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	27%	27%	27%	27%	27%	26%	26%
spawning	--	13%	13%	13%	13%	13%	13%	13%
fry	--	28%	21%	21%	22%	21%	28%	25%
<b>Flathead chub</b>								
adult/juvenile	--	9%	9%	9%	9%	9%	9%	9%
spawning	--	36%	36%	36%	36%	36%	36%	36%
fry	--	-4%	-4%	-4%	-4%	-4%	-4%	-4%
<b>Sand shiner</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Red shiner</b>	--	9%	8%	8%	9%	8%	9%	8%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	213	274	274	274	274	274	274	275
spawning	24,379	31,159	31,163	31,163	31,163	31,163	31,163	31,163
fry	2,598	2,803	2,798	2,798	2,765	2,775	2,800	2,873
<b>Flathead chub</b>								
adult/juvenile	40,423	44,271	44,272	44,274	44,270	44,267	44,268	44,279
spawning	8,732	12,339	12,330	12,333	12,339	12,333	12,341	12,334
fry	31,556	29,964	30,234	30,211	30,094	30,294	30,099	29,961
<b>Sand shiner</b>	21,649	21,662	21,662	21,663	21,670	21,661	21,653	21,661
<b>Red shiner</b>	3,929	4,398	4,400	4,408	4,412	4,400	4,380	4,395
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	29%	29%	29%	28%	29%	28%	29%
spawning	--	28%	28%	28%	28%	28%	28%	28%
fry	--	8%	8%	8%	6%	7%	8%	11%



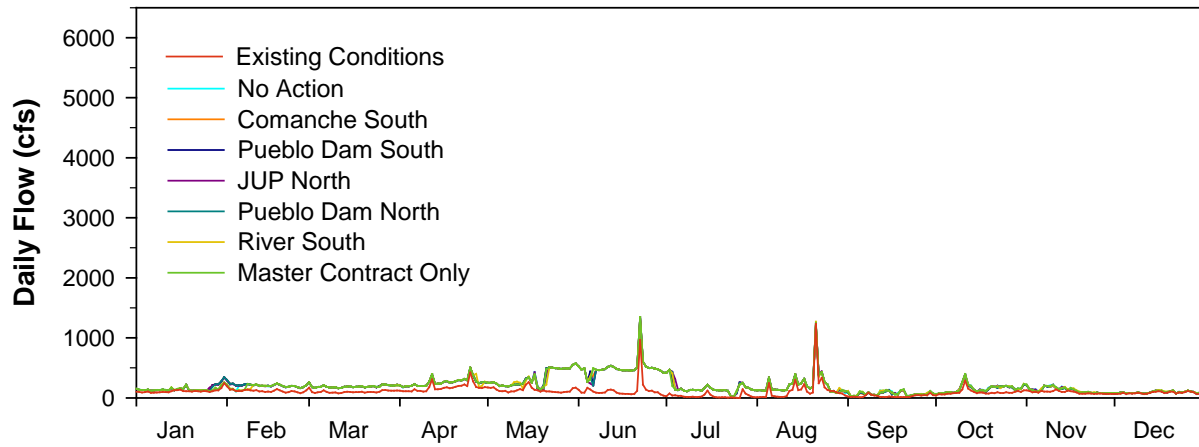
Arkansas Valley Conduit EIS

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

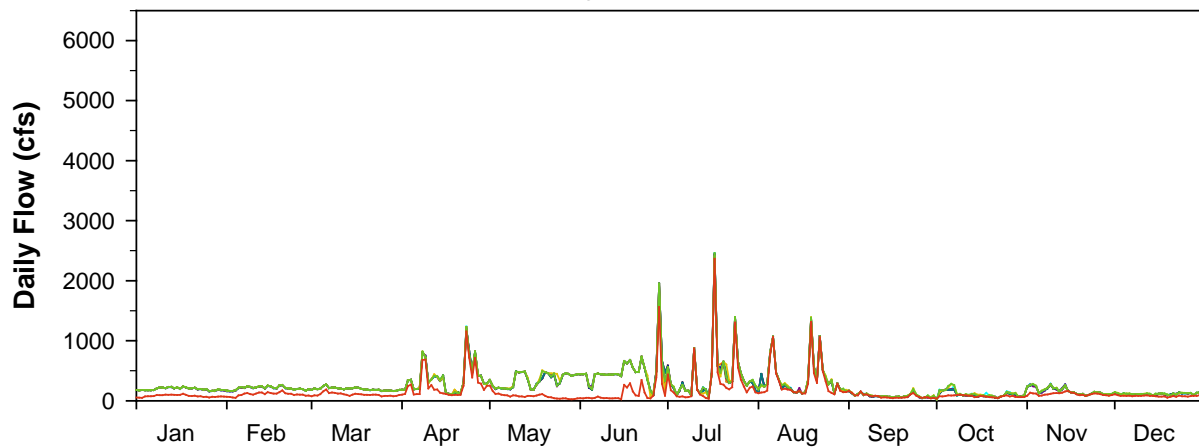
Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>Flathead chub</b>								
adult/juvenile	--	10%	10%	10%	10%	10%	10%	10%
spawning	--	41%	41%	41%	41%	41%	41%	41%
fry	--	-5%	-4%	-4%	-5%	-4%	-5%	-5%
<b>Sand shiner</b>	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Red shiner</b>	--	12%	12%	12%	12%	12%	11%	12%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	254	282	283	283	282	283	282	283
spawning	27,901	32,105	31,895	31,759	31,885	31,896	31,892	31,953
fry	3,239	3,209	3,212	3,207	3,213	3,211	3,209	3,212
<b>Flathead chub</b>								
adult/juvenile	43,817	44,358	44,357	44,357	44,360	44,357	44,357	44,357
spawning	9,611	11,393	11,772	11,790	11,517	11,772	11,442	11,547
fry	29,863	28,995	28,994	29,016	29,029	28,988	29,016	29,016
<b>Sand shiner</b>	21,549	23,076	23,026	23,016	23,065	23,034	23,057	23,065
<b>Red shiner</b>	4,270	4,365	4,365	4,375	4,371	4,363	4,372	4,354
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	11%	11%	11%	11%	11%	11%	11%
spawning	--	15%	14%	14%	14%	14%	14%	15%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Flathead chub</b>								
adult/juvenile	--	1%	1%	1%	1%	1%	1%	1%
spawning	--	19%	22%	23%	20%	22%	19%	20%
fry	--	-3%	-3%	-3%	-3%	-3%	-3%	-3%
<b>Sand shiner</b>	--	7%	7%	7%	7%	7%	7%	7%
<b>Red shiner</b>	--	2%	2%	2%	2%	2%	2%	2%

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**

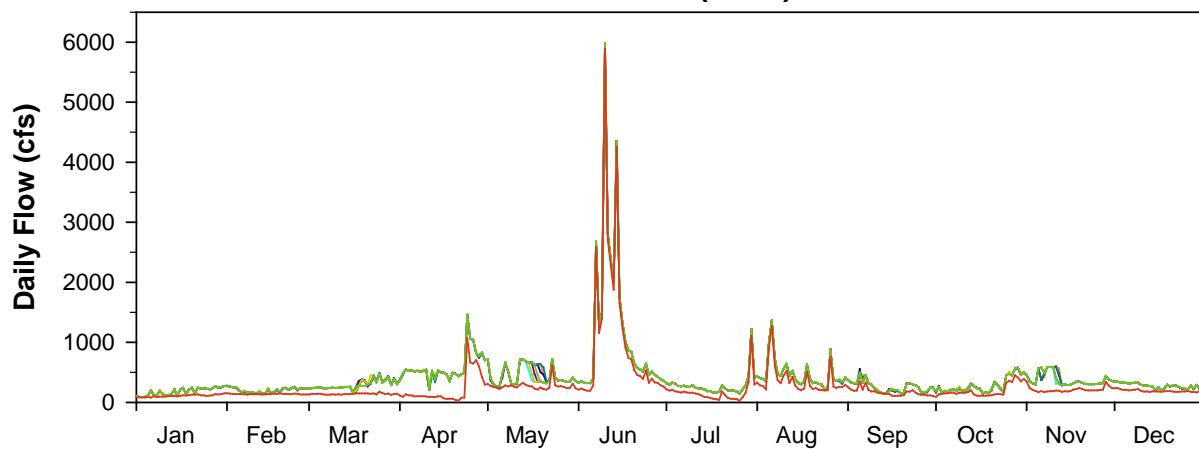
**Fountain Creek, Segment 4 – County Line to Arkansas River  
Normal Year (2005)**



**Dry Year (2004)**



**Wet Year (1997)**



**Figure 151. Cumulative Effects Daily Hydrology for All Alternatives and Existing Conditions for Segment 4 of Fountain Creek at the Pueblo Gage**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

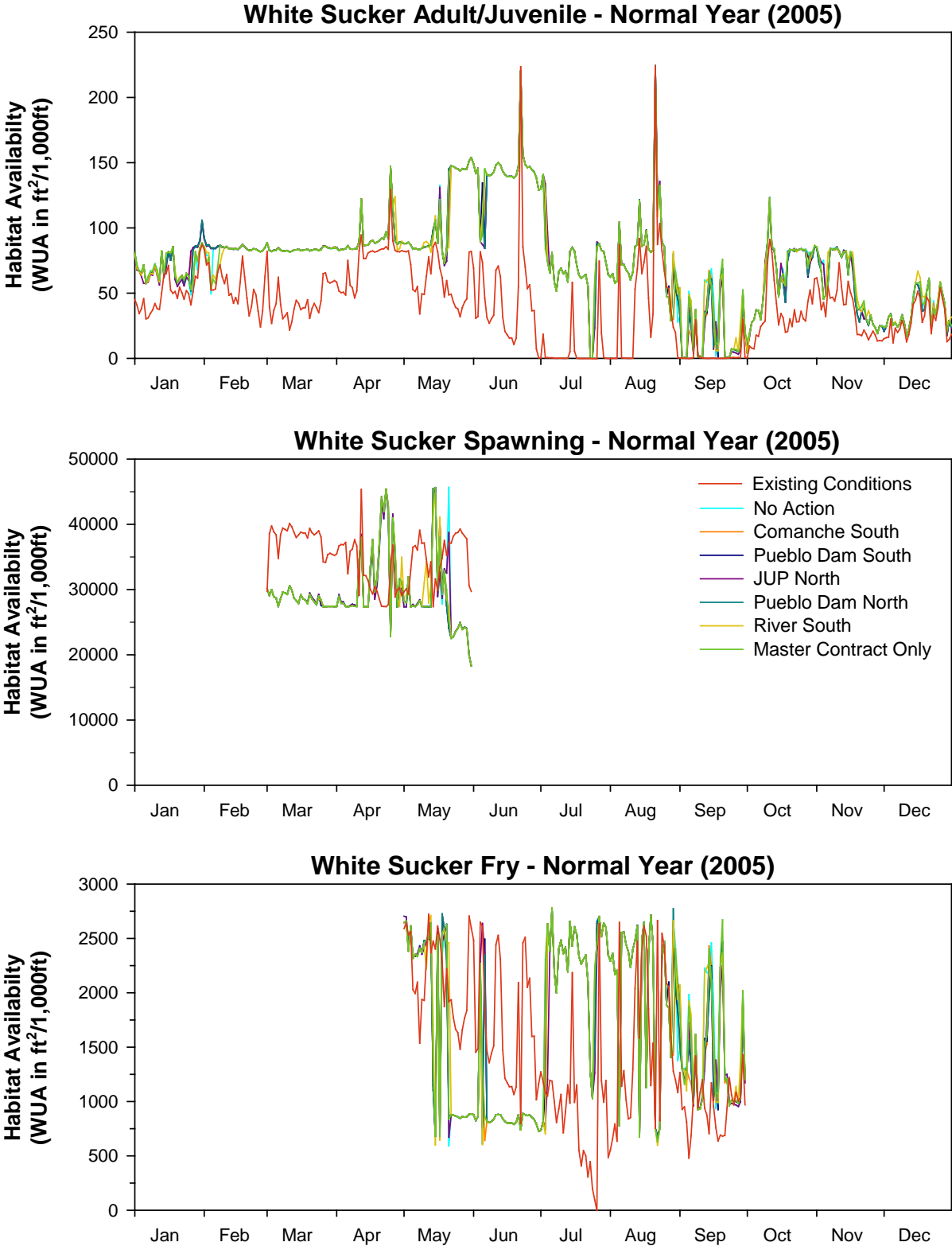


Figure 152. Cumulative Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 4 of Fountain Creek

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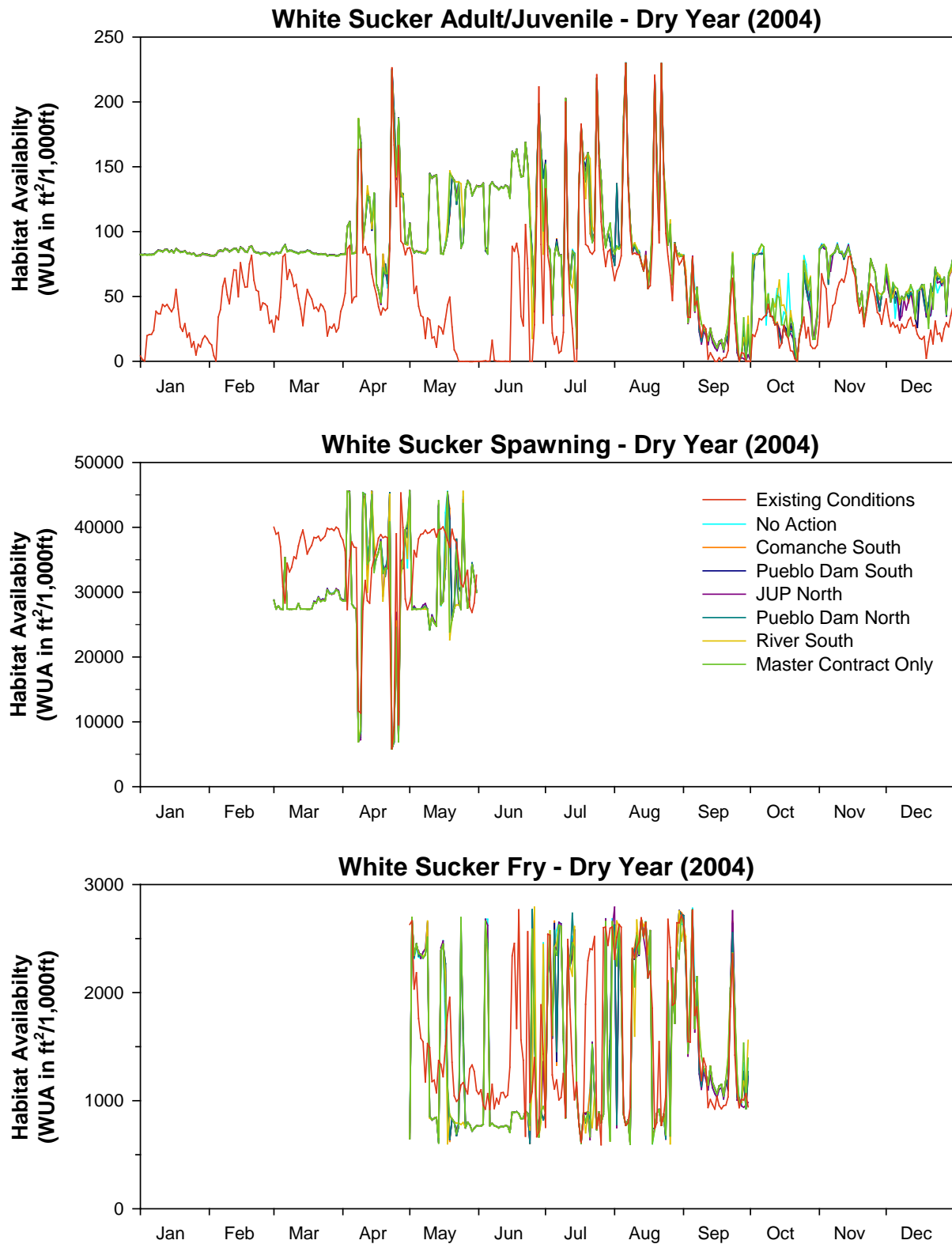


Figure 153. Cumulative Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 4 of Fountain Creek

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

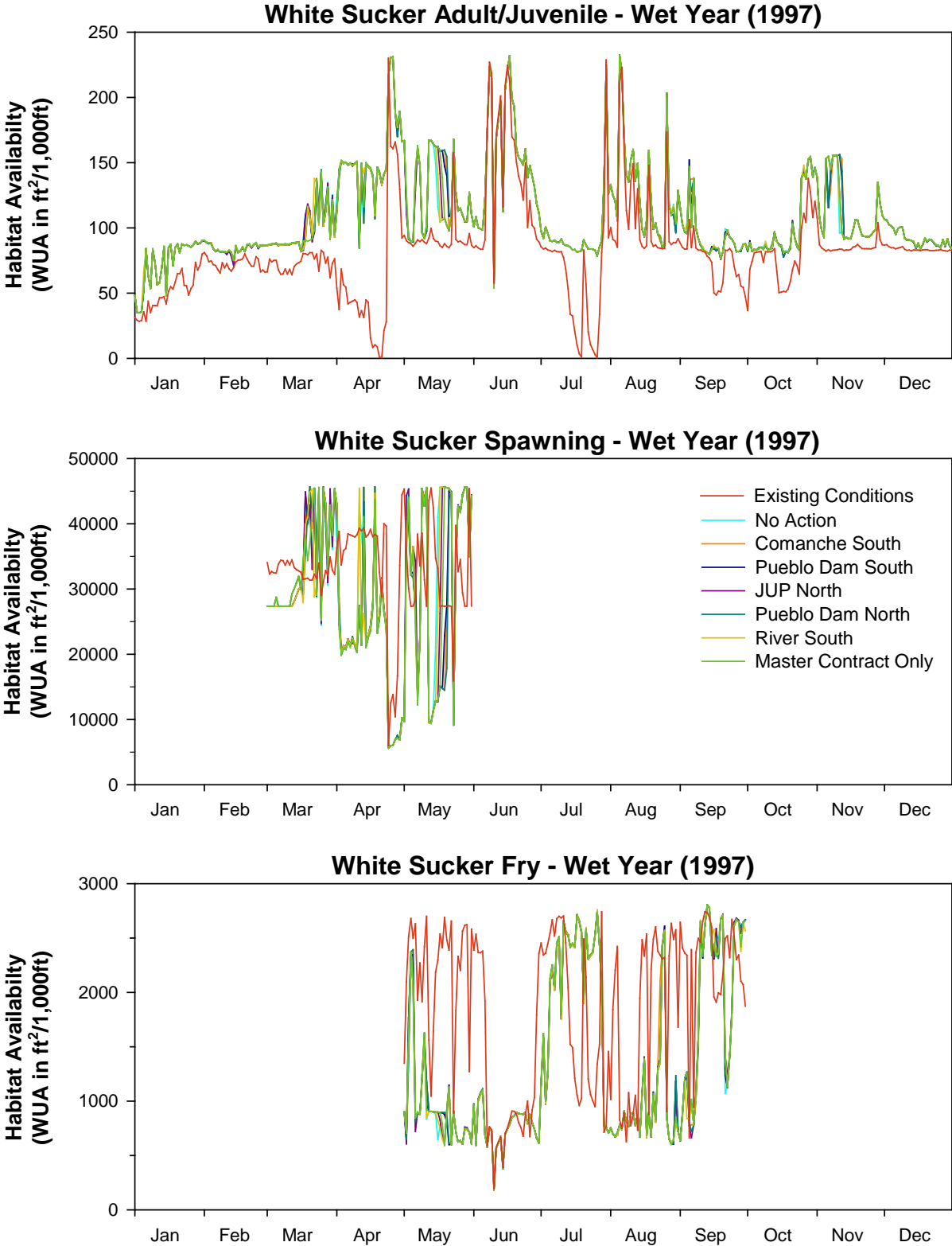
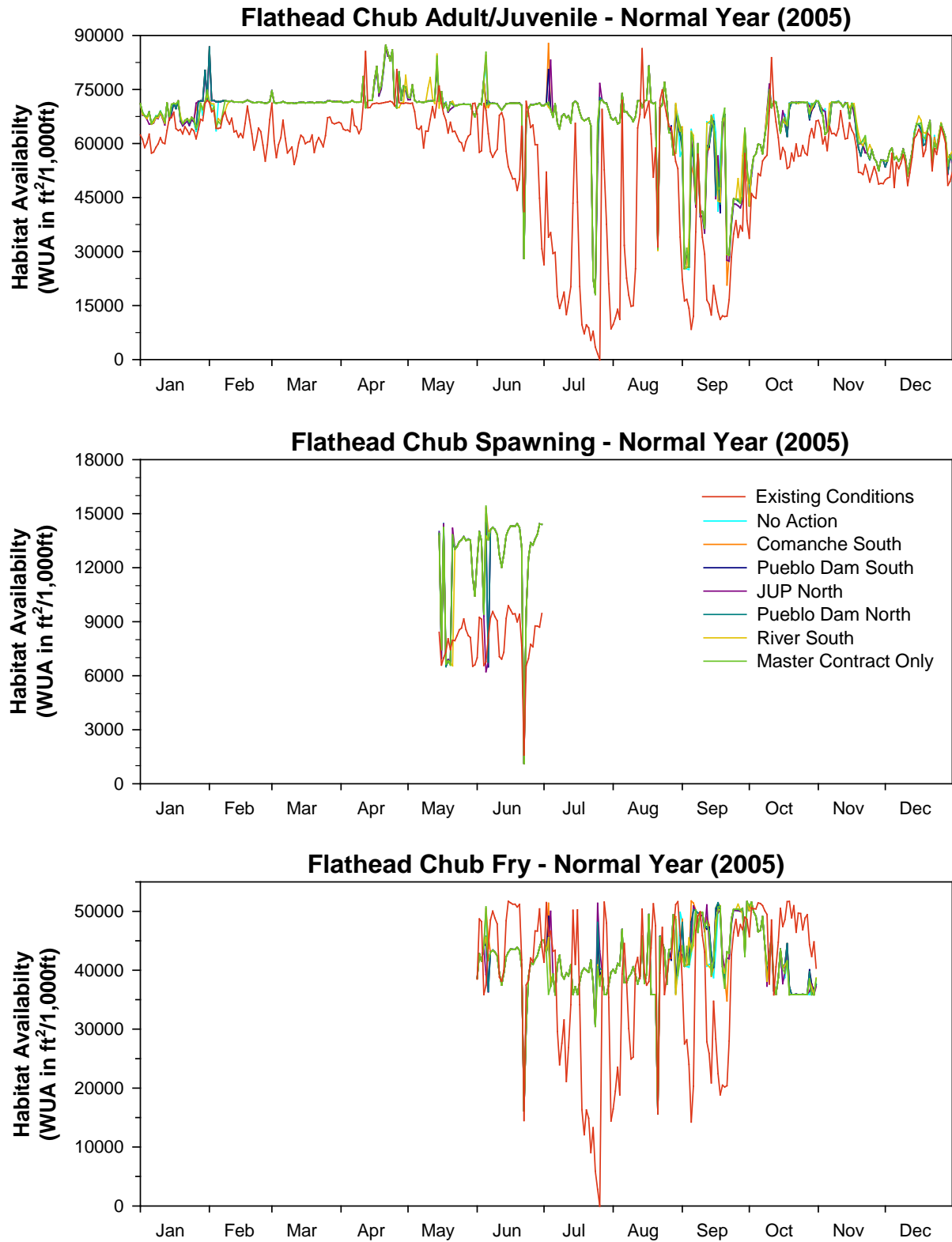


Figure 154. Cumulative Effects White Sucker Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 4 of Fountain Creek

**Arkansas Valley Conduit EIS**  
**Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)**



**Figure 155. Cumulative Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 4 of Fountain Creek**

Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

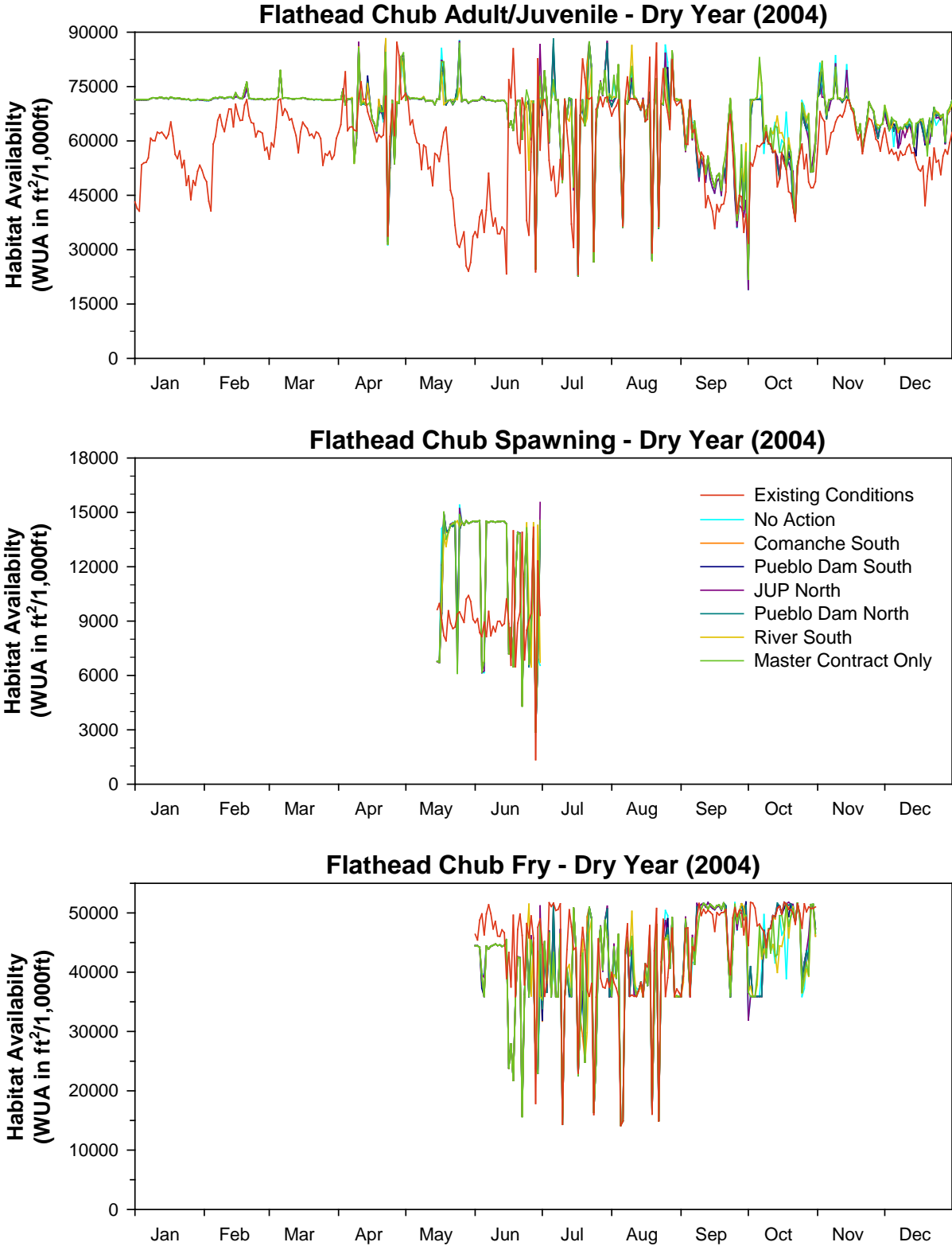


Figure 156. Cumulative Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 4 of Fountain Creek

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

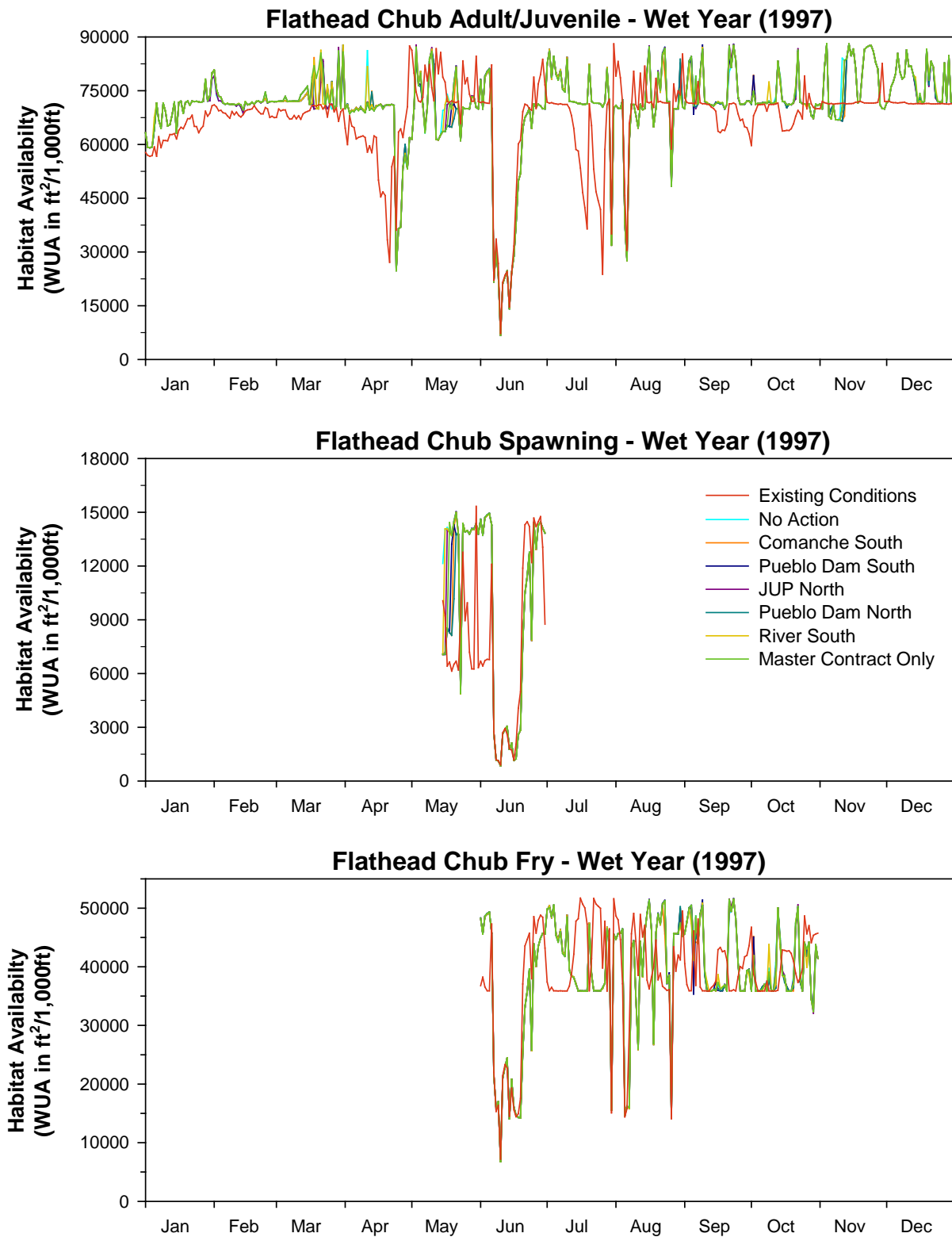


Figure 157. Cumulative Effects Flathead Chub Adult/Juvenile, Spawning, and Fry Habitat Availability (WUA [ft<sup>2</sup>/1,000ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 4 of Fountain Creek



Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

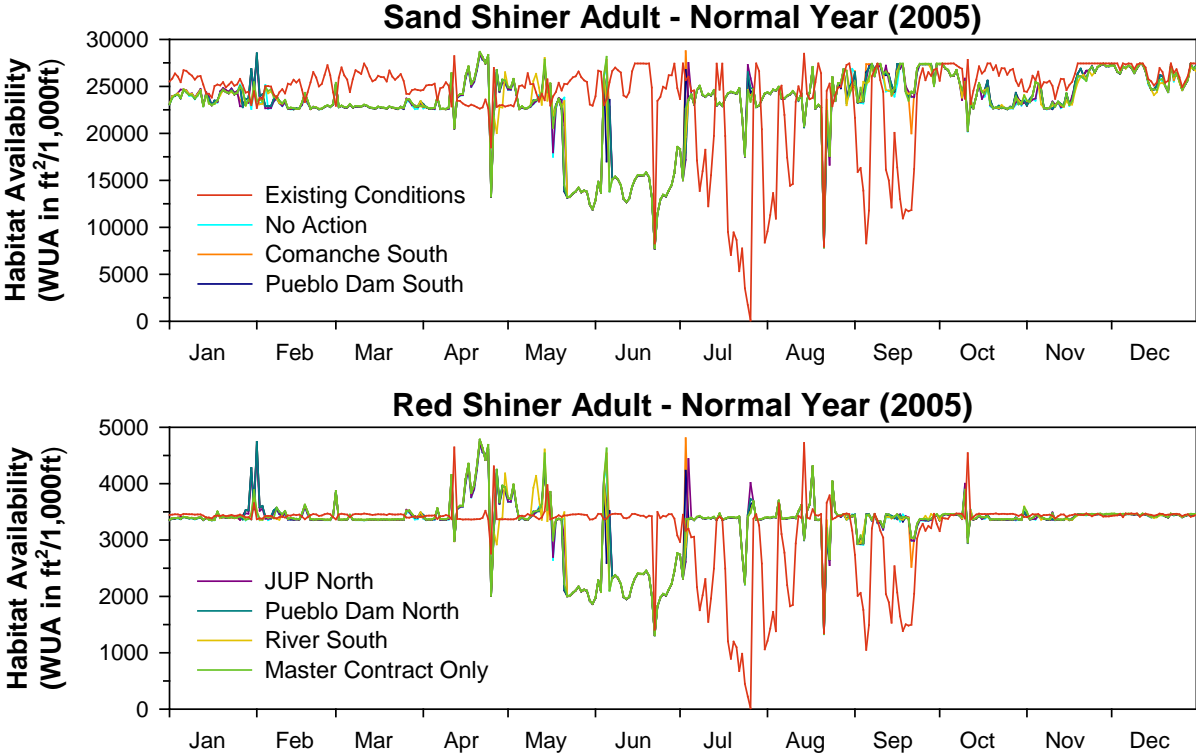


Figure 158. Cumulative Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000 ft]) for Seven Alternatives and Existing Conditions during a Normal Year for Segment 4 of Fountain Creek.

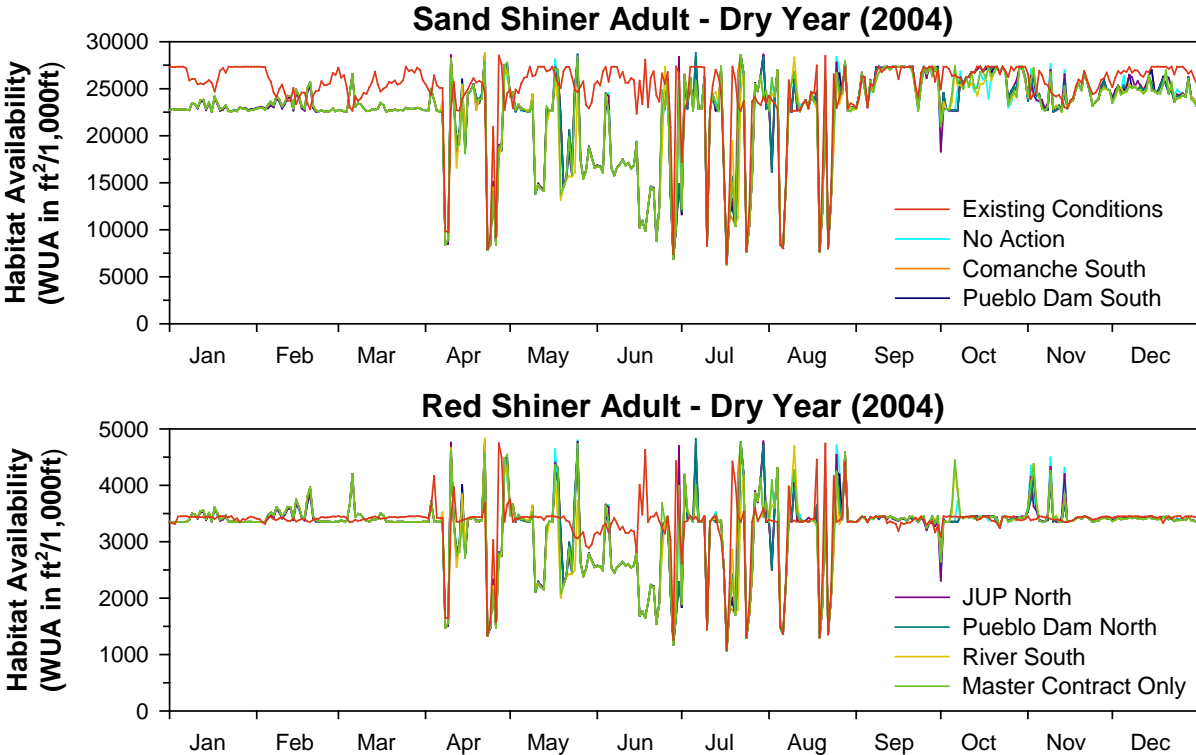


Figure 159. Cumulative Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000 ft]) for Seven Alternatives and Existing Conditions during a Dry Year for Segment 4 of Fountain Creek

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

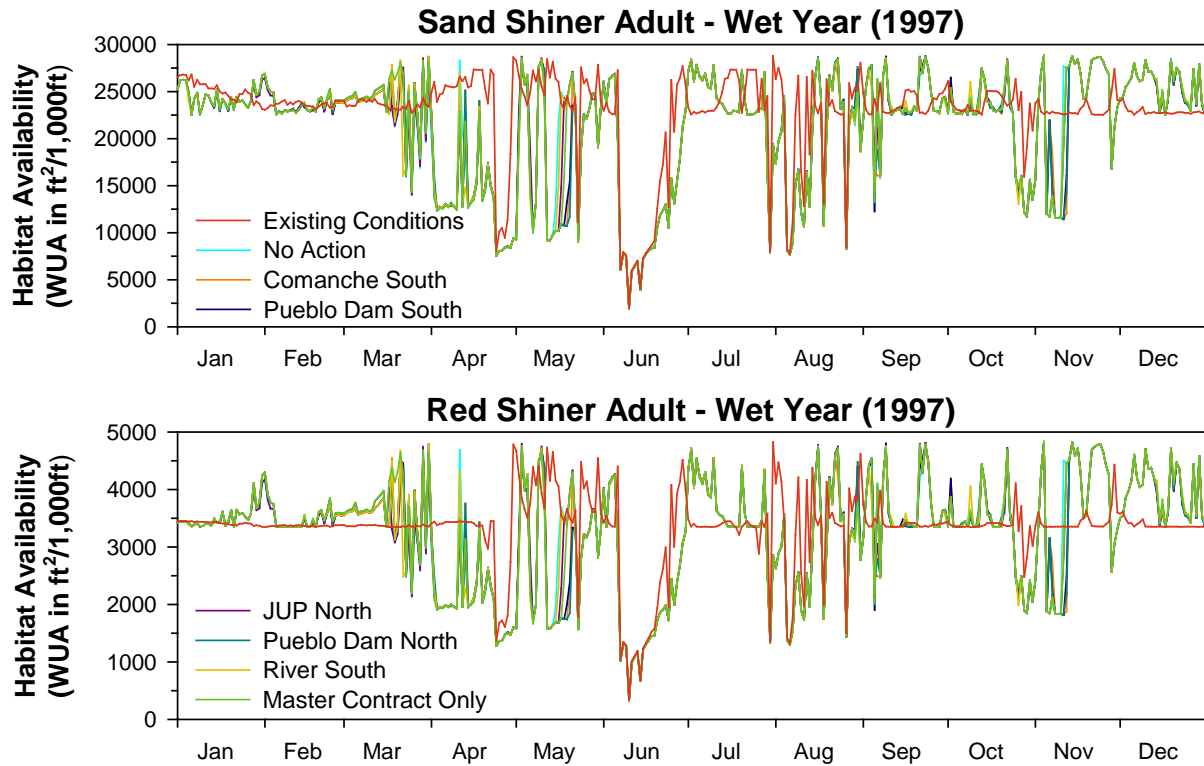









Figure 160. Cumulative Effects Sand Shiner (Adult) and Red Shiner (Adult) Habitat Availability (WUA [ft<sup>2</sup>/1,000 ft]) for Seven Alternatives and Existing Conditions during a Wet Year for Segment 4 of Fountain Creek

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 39. Cumulative Effects Summary of the Percent Change in Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), and Red Shiner (Adult), Fountain Creek Segment 4

Species/ Life Stage	Existing Conditions	 No Action	 Comanche South	 Pueblo Dam South	 JUP North	 Pueblo Dam North	 River South	 Master Contract Only
<b>Normal Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	0	0	0	0	0	0	0	0
spawning	27,383	18,333	18,286	18,286	18,333	18,286	18,285	18,286
fry	0	592	642	654	660	613	599	632
<b>Flathead chub</b>								
adult/juvenile	0	18,159	18,178	18,169	18,159	18,174	18,159	18,174
spawning	1,590	1,140	1,140	1,140	1,140	1,140	1,140	1,140
fry	0	15,735	15,641	15,641	15,641	15,641	15,818	15,747
<b>Sand shiner</b>	0	7,696	7,696	7,696	7,696	7,696	7,696	7,696
<b>Red shiner</b>	0	1,304	1,304	1,304	1,304	1,304	1,304	1,304
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	--	--	--	--	--	--	--
spawning	--	-33%	-33%	-33%	-33%	-33%	-33%	-33%
fry	--	--	--	--	--	--	--	--
<b>Flathead chub</b>								
adult/juvenile	--	--	--	--	--	--	--	--
spawning	--	-28%	-28%	-28%	-28%	-28%	-28%	-28%
fry	--	--	--	--	--	--	--	--
<b>Sand shiner</b>	--	--	--	--	--	--	--	--
<b>Red shiner</b>	--	--	--	--	--	--	--	--
<b>Dry Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	0	0	0	0	0	0	0	0
spawning	5,905	5,829	5,873	5,860	5,835	5,861	5,834	5,835
fry	596	600	601	601	608	601	601	601
<b>Flathead chub</b>								
adult/juvenile	23,088	19,005	21,819	21,824	19,005	21,819	21,795	21,819
spawning	1,346	2,879	2,886	2,886	2,879	2,886	2,885	2,886
fry	14,110	14,185	14,143	14,204	14,161	14,216	14,212	14,161
<b>Sand shiner</b>	6,421	6,300	6,349	6,350	6,320	6,328	6,368	6,304
<b>Red shiner</b>	1,088	1,067	1,076	1,076	1,071	1,072	1,079	1,068
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	-18%	-6%	-6%	-18%	-6%	-6%	-6%
spawning	--	-1%	<-1%	<-1%	-1%	<-1%	-1%	-1%
fry	--	<1%	<1%	<1%	2%	<1%	<1%	<1%

# Arkansas Valley Conduit EIS








## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Flathead chub</b>								
adult/juvenile	--	-18%	-5%	-5%	-18%	-5%	-6%	-5%
spawning	--	114%	114%	114%	114%	114%	114%	114%
fry	--	<1%	<1%	<1%	<1%	<1%	<1%	<1%
<b>Sand shiner</b>	--	-2%	-1%	-1%	-2%	-1%	<-1%	-2%
<b>Red shiner</b>	--	-2%	-1%	-1%	-2%	-1%	<-1%	-2%
<b>Wet Year</b>								
<b>Minimum Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	0	35	35	35	35	35	35	35
spawning	5,981	5,623	5,620	5,622	5,623	5,620	5,622	5,620
fry	194	182	182	182	182	182	182	182
<b>Flathead chub</b>								
adult/juvenile	7,243	6,799	6,802	6,798	6,799	6,802	6,798	6,802
spawning	903	848	848	848	848	848	848	848
fry	7,202	6,761	6,764	6,759	6,761	6,764	6,759	6,764
<b>Sand shiner</b>	2,014	1,891	1,892	1,891	1,891	1,892	1,891	1,892
<b>Red shiner</b>	341	320	321	320	320	321	320	321
<b>Change in Minimum Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	7473%	7473%	7473%	7473%	7473%	7473%	7473%
spawning	--	-6%	-6%	-6%	-6%	-6%	-6%	-6%
fry	--	-6%	-6%	-6%	-6%	-6%	-6%	-6%
<b>Flathead chub</b>								
adult/juvenile	--	-6%	-6%	-6%	-6%	-6%	-6%	-6%
spawning	--	-6%	-6%	-6%	-6%	-6%	-6%	-6%
fry	--	-6%	-6%	-6%	-6%	-6%	-6%	-6%
<b>Sand shiner</b>	--	-6%	-6%	-6%	-6%	-6%	-6%	-6%
<b>Red shiner</b>	--	-6%	-6%	-6%	-6%	-6%	-6%	-6%

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Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Table 40. Cumulative Effects Summary of the Percent Change in Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft) in a Normal, Dry, and Wet Year for All Alternatives Compared to Existing Conditions for White Sucker, Flathead Chub, Sand Shiner (Adult), and Red Shiner (Adult), Fountain Creek Segment 4

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Normal Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	39	82	83	83	83	83	82	82
Spawning	36,359	28,124	28,069	27,949	28,227	28,069	28,354	28,170
fry	1,220	1,858	1,432	1,577	1,523	1,497	1,889	1,637
<b>Flathead chub</b>								
adult/juvenile	60,590	70,668	70,724	70,826	70,880	70,754	70,578	70,609
spawning	8,224	13,553	13,538	13,521	13,522	13,520	13,520	13,538
fry	42,371	40,813	40,977	40,976	41,151	40,981	40,925	40,976
<b>Sand shiner</b>	25,183	23,679	23,699	23,699	23,710	23,701	23,624	23,721
<b>Red shiner</b>	3,412	3,378	3,383	3,383	3,383	3,383	3,378	3,381
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	110%	110%	110%	110%	110%	109%	109%
spawning	--	-23%	-23%	-23%	-22%	-23%	-22%	-23%
fry	--	52%	17%	29%	25%	23%	55%	34%
<b>Flathead chub</b>								
adult/juvenile	--	17%	17%	17%	17%	17%	16%	17%
spawning	--	65%	65%	64%	64%	64%	64%	65%
fry	--	-4%	-3%	-3%	-3%	-3%	-3%	-3%
<b>Sand shiner</b>	--	-6%	-6%	-6%	-6%	-6%	-6%	-6%
<b>Red shiner</b>	--	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%	<-1%
<b>Dry Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	38	84	84	84	83	84	84	84
spawning	37,470	28,768	28,678	28,678	28,768	28,678	28,497	28,564
fry	1,313	1,103	1,098	1,070	1,053	1,070	1,068	1,113
<b>Flathead chub</b>								
adult/juvenile	59,379	71,115	71,101	71,094	71,113	71,101	71,114	71,142
spawning	8,979	14,342	14,026	14,026	14,346	14,049	14,293	14,294
fry	47,122	43,433	44,097	43,909	44,263	43,895	43,646	43,780
<b>Sand shiner</b>	25,871	23,240	23,222	23,183	23,070	23,190	23,309	23,320
<b>Red shiner</b>	3,417	3,377	3,378	3,378	3,372	3,375	3,381	3,382
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	119%	119%	119%	119%	119%	120%	120%
spawning	--	-23%	-23%	-23%	-23%	-23%	-24%	-24%
fry	--	-16%	-16%	-18%	-20%	-18%	-19%	-15%

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## Appendix H.6 – Aquatic Resources Env. Cons. (Compared to Existing Conditions)

Species/ Life Stage	Existing Conditions							
		No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
<b>Flathead chub</b>								
adult/juvenile	--	20%	20%	20%	20%	20%	20%	20%
spawning	--	60%	56%	56%	60%	56%	59%	59%
fry	--	-8%	-6%	-7%	-6%	-7%	-7%	-7%
<b>Sand shiner</b>	--	-10%	-10%	-10%	-11%	-10%	-10%	-10%
<b>Red shiner</b>	--	-1%	-1%	-1%	-1%	-1%	-1%	-1%
<b>Wet Year</b>								
<b>Median Habitat Availability (WUA in ft<sup>2</sup>/1,000 ft)</b>								
<b>White sucker</b>								
adult/juvenile	83	93	93	93	93	93	93	93
spawning	33,232	28,391	27,354	27,362	27,369	27,355	27,366	27,362
fry	2,186	905	904	904	905	901	901	905
<b>Flathead chub</b>								
adult/juvenile	70,465	71,487	71,423	71,436	71,480	71,463	71,488	71,517
spawning	6,685	13,746	12,763	12,926	13,722	11,479	13,763	13,695
fry	38,274	39,394	38,773	38,779	39,383	38,746	38,779	39,322
<b>Sand shiner</b>	23,586	23,260	23,187	23,164	23,217	23,156	23,259	23,266
<b>Red shiner</b>	3,375	3,390	3,368	3,360	3,365	3,369	3,388	3,397
<b>Change in Median Habitat Availability (%) Compared to Existing Conditions</b>								
<b>White sucker</b>								
adult/juvenile	--	13%	13%	13%	13%	13%	13%	13%
spawning	--	-15%	-18%	-18%	-18%	-18%	-18%	-18%
fry	--	-59%	-59%	-59%	-59%	-59%	-59%	-59%
<b>Flathead chub</b>								
adult/juvenile	--	1%	1%	1%	1%	1%	1%	1%
spawning	--	106%	91%	93%	105%	72%	106%	105%
fry	--	3%	1%	1%	3%	1%	1%	3%
<b>Sand shiner</b>	--	-1%	-2%	-2%	-2%	-2%	-1%	-1%
<b>Red shiner</b>	--	<1%	<-1%	<-1%	<-1%	<-1%	<1%	<1%

## **Appendix H.7 – Habitat Suitability Curve Validation**

### **Introduction**

During coordination meetings with Colorado Parks and Wildlife (CPW) for the Arkansas Valley Conduit (AVC) Environmental Impact Statement (EIS), it was agreed upon to use the Physical Habitat Simulation Modeling (PHABSIM) component of the Instream Flow Incremental Methodology (IFIM) (Bovee 1982) as the habitat evaluation tool for the Lower Arkansas River, Segment 3, from Fountain Creek to John Martin Reservoir. GEI collected supplemental fish data in 2011 to validate the habitat suitability curves used for PHABSIM modeling. Based on the species composition present, habitat suitability curves available, and discussions with CPW, sand shiners, red shiners, plains killifish, channel catfish (Conklin et al. 1996), flathead chub (Fannin and Nelson 1986), and white sucker (Twomey et al. 1984) were modeled.

### **Study Area**

Five sites were sampled in the Lower Arkansas River Segment 3 located near Nyberg Road, Fowler, Rocky Ford State Wildlife Area, Oxbow State Wildlife Area, and the John Martin State Wildlife Area one to three times from June through October 2011. One site was sampled in Pueblo in the Lower Arkansas River Segment 1 study reach. At the site located in Segment 1, of the species modeled for the Arkansas Valley Conduit EIS, only white suckers were collected. These individuals were included for validating the habitat suitability curves for Segment 3, in order to increase the sampling size, as it is unlikely habitat preferences differ substantially between segments.

### **Methods**

Fish sampling was conducted using the systematic random walk methodology (Bovee 1986). The systematic random walk involves sampling the stream at distinct locations using a backpack electrofisher with a 10-foot electrode. The distance between points was set to a uniform value and the bearing between sampling points was randomly selected between +/- 90 degrees, such that the sampling was conducted in an overall upstream approach. Additional nonrandom sampling was conducted using two methods, spot shocking and continuous shocking to increase the number of fish observances. Nonrandom shocking data was considered adequate for use in validating habitat suitability curves. Systematic random walk data and nonrandom shocking data are depicted separately in histograms to allow for comparisons between the data, if differences are detected. Nonrandom continuous shocking data was not included in habitat availability in this analysis.

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At each sampling location fish were enumerated by species and lifestage and released. If no fish were collected, zero fish were recorded. Lifestages were recorded as fry, juvenile, and adult, based on professional judgment by experienced fisheries biologists. At each sampling location, regardless of if fish were present or absent, total depth, mean column velocity, substrate, and cover were measured to develop fish-habitat associations and to validate the habitat suitability curves that were used for Segment 3 of the Arkansas River.

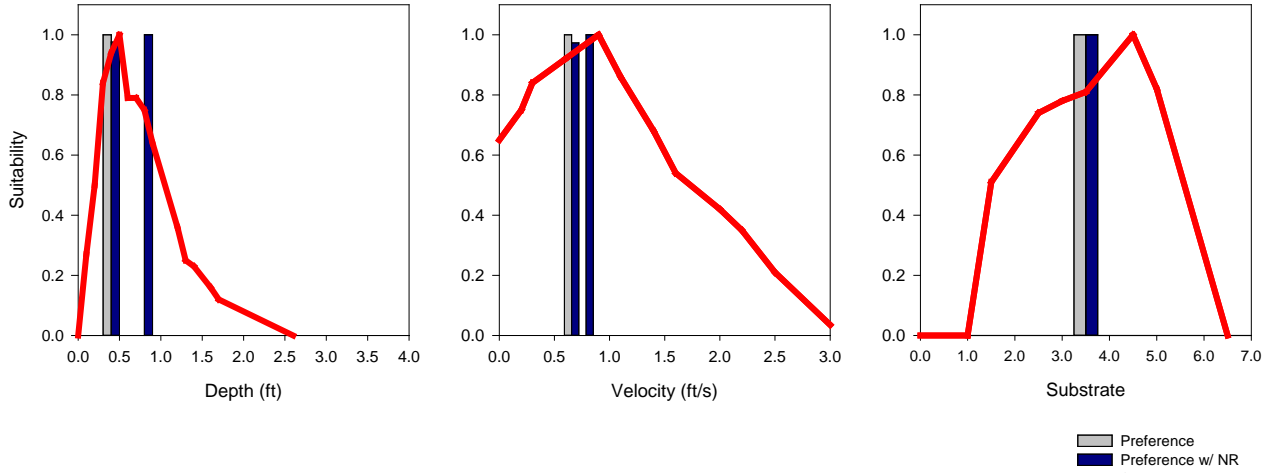
Preference histograms were developed for each species and habitat variable and compared to habitat suitability curves. Preference was found by dividing habitat utilization by habitat availability. This value was then normalized to a 0 to 1 scale by dividing each preference value by the maximum preference value (Bovee 1986). Habitat utilization is the frequency of the presence of a fish species inside a range of habitat values. Habitat availability was frequency of a habitat metric within a range of values. For the nonrandom preference histograms, availability includes the habitat values from the nonrandom spot shocking, but not from the nonrandom continuous shocking. Depending on the number of observations, minor disagreement between the preference histograms and habitat suitability curves may occur, especially at the tails of the distribution; however, the optimum ranges should demonstrate fairly good agreement (Bovee 1986).

### **Results and Conclusions**

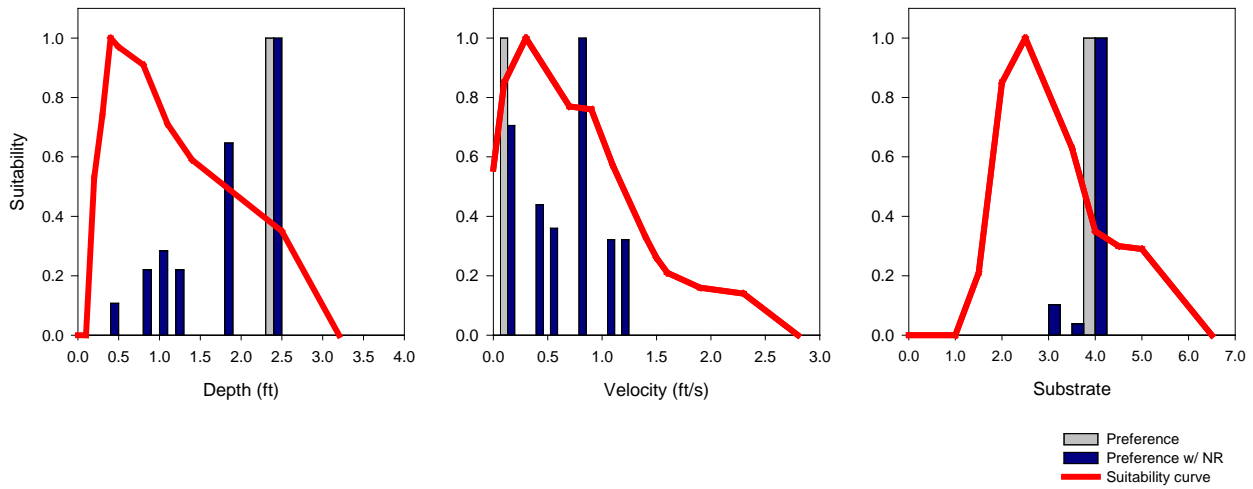
Despite a low number of observations, the preference histograms demonstrate an overall agreement with the suitability curves for most species (Figures 1-7). There was little difference between the random and nonrandom histograms. The depth preference histogram for adult red shiners demonstrate a greater preference for deeper habitat than the suitability curve (Figure 2), but only 8 individuals were captured, including those from nonrandom sampling (Table 1). The addition of the nonrandom individuals increased the sample size from 1 to 8, and increased the amount of the histogram under the suitability curve. The preference histograms for juvenile white suckers showed a greater preference for shallower and faster habitat than the suitability curves. This could be a result of low sample sizes, as the histograms did not exhibit a clear pattern in preference.



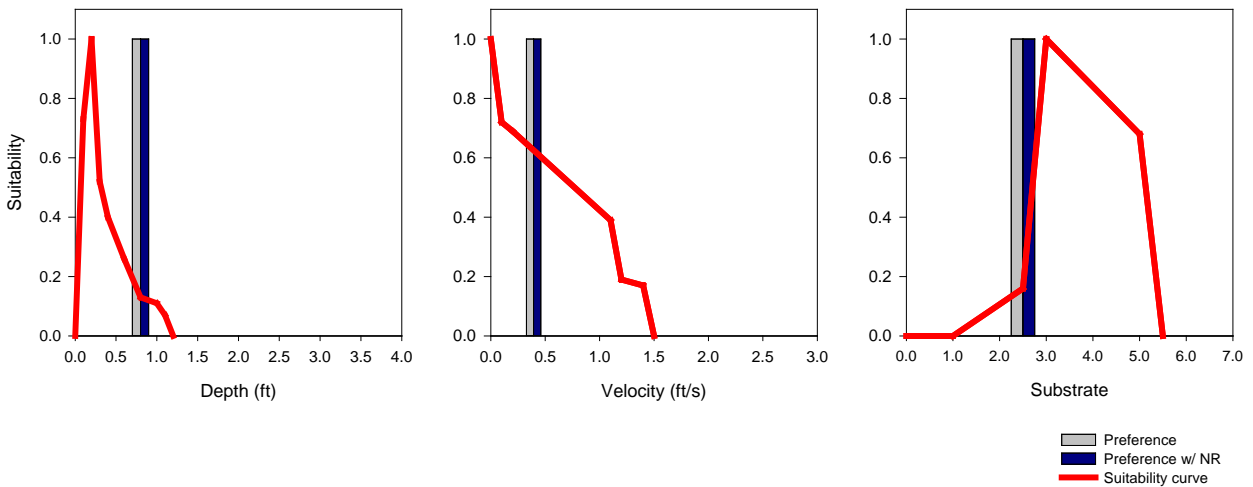
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**Figure 1. Depth, Velocity, and Substrate Habitat Utilization and Preference Suitability Curves for Adult Sand Shiners in the Arkansas River, Colorado. NR = Nonrandom.**

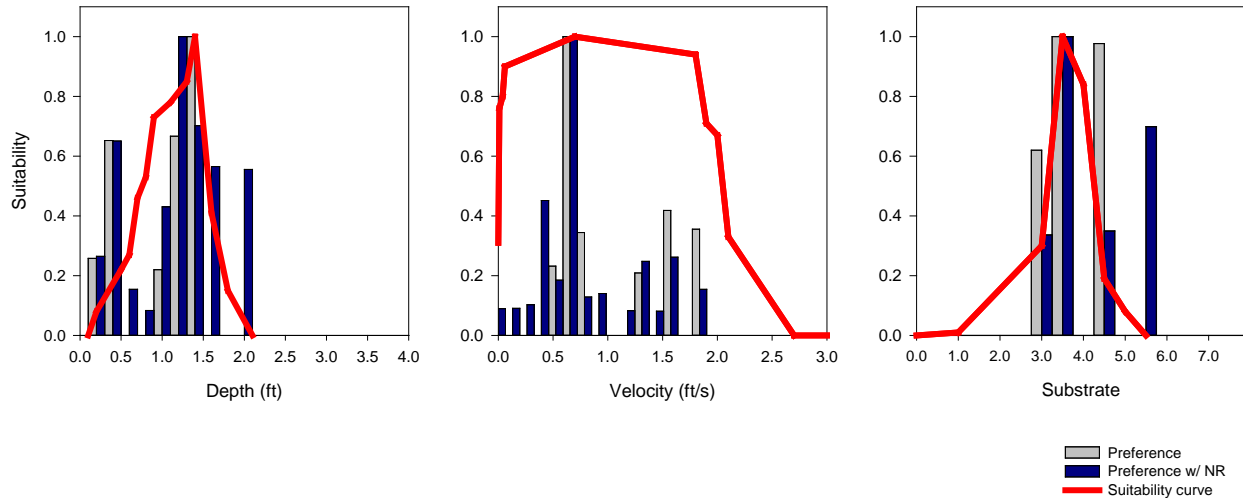


**Figure 2. Depth, Velocity, and Substrate Habitat Utilization and Preference Suitability Curves for Adult Red Shiners in the Arkansas River, Colorado. NR = Nonrandom.**

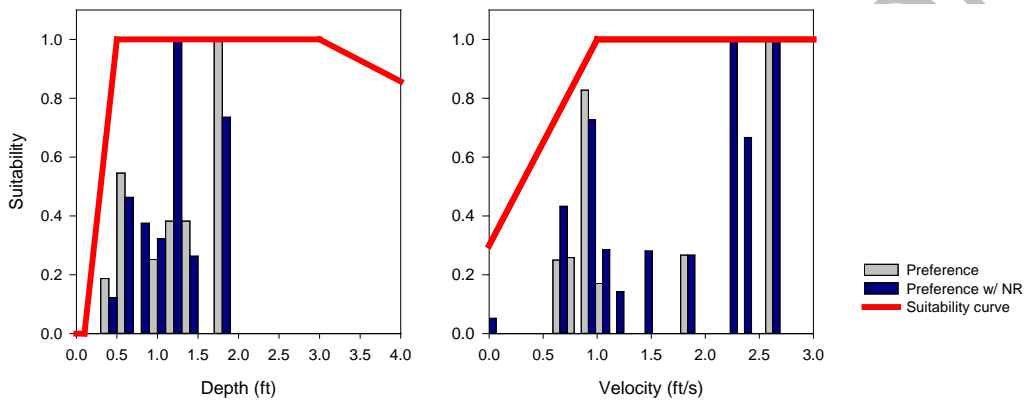


**Figure 3. Depth, Velocity, and Substrate Habitat Utilization and Preference Suitability Curves for Adult Plains Killifish in the Arkansas River, Colorado. NR = Nonrandom.**

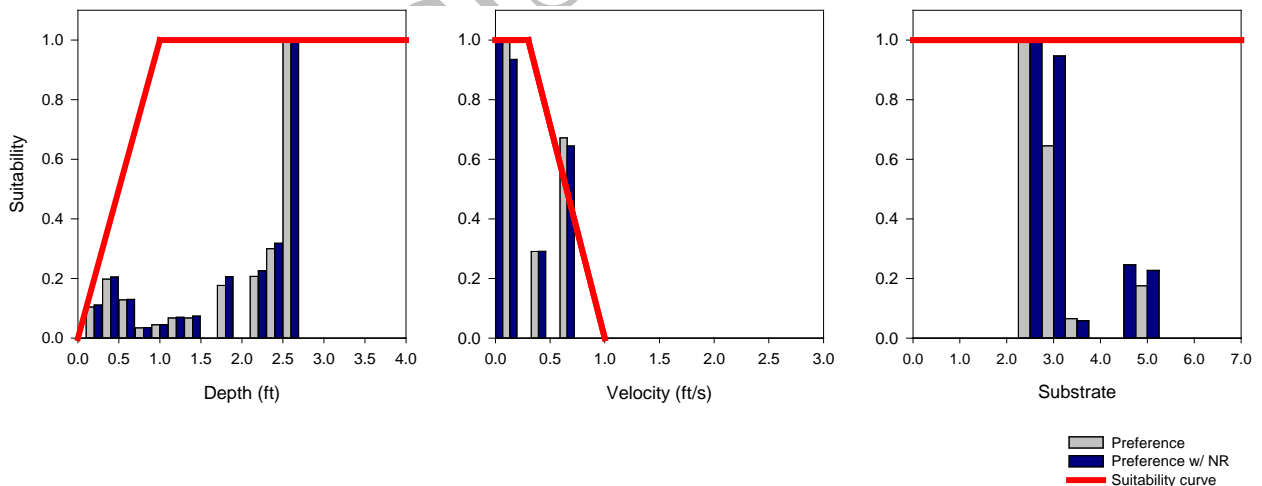
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**Figure 4. Depth, Velocity, and Substrate Habitat Utilization and Preference Suitability Curves for Fry / Juvenile Channel Catfish in the Arkansas River, Colorado. NR = Nonrandom.**

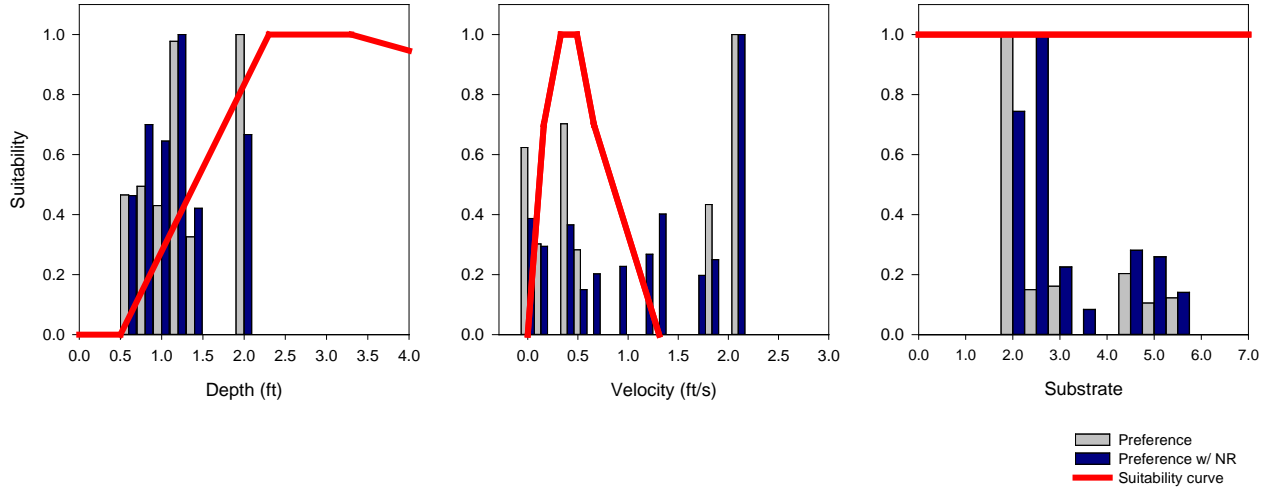


**Figure 5. Depth and Velocity Utilization and Preference Suitability Curves for Juvenile / Adult Flathead Chub in the Arkansas River, Colorado. NR = Nonrandom.**



**Figure 6. Depth, Velocity, and Substrate Habitat Utilization and Preference Suitability Curves for White Sucker Fry in the Arkansas River, Colorado. NR = Nonrandom.**

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**Figure 7. Depth, Velocity, and Substrate Habitat Utilization and Preference Suitability Curves for Juvenile White Sucker in the Arkansas River, Colorado. NR = Nonrandom.**

**Table 1. Number of Observations of Fish Species During Random and Nonrandom Sampling in the Arkansas River, Colorado, 2011**

Species	Number of Observations	Number of Observations Including Nonrandom Sampling
Sand shiner (adult)	1	2
Red shiner (adult)	1	8
Plains killifish (adult)	1	1
Channel catfish (fry / juveniles)	11	30
Flathead chub (juveniles / adult)	8	16
White sucker (fry)	20	20
White sucker (juveniles)	13	25

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### References

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- Conklin, D. J., S. P. Canton, J. W. Chadwick, and W. J. Miller. 1996. Habitat suitability curves for selected fish species in the Central Platte River, Nebraska. *Rivers* 5(4):250-266.
- Fannin, T. E., and P. Nelson. 1986. Habitat suitability index curves for channel catfish, common carp, sand shiner, plains killifish, and flathead chub developed by consensus discussion for use in the Instream Flow Incremental Methodology on the Central Platte River. Final Report No. 14-16-0009-1542, Research Work Order No. 55, Modification No. 2. U.S. Fish and Wildlife Service, Wyoming Fish and Wildlife Cooperative Research Unit, University of Wyoming, Laramie.
- Twomey, K. A., K. L. Williamson, and P. C. Nelson. 1984. Habitat suitability index models and instream flow suitability curves: white sucker. U.S Fish and Wildlife Service. FWS/OBS-82/10.64. 56 pp.

# Appendix I.1 – Vegetation Common and Scientific Names and Supplemental Information

## Introduction

This appendix contains a list of common and scientific names used in the Vegetation and Wetlands section of the EIS, and a list of perennial rivers and streams pipeline crossings.

**Table 1. Plant Species Common and Scientific Names**

Common Name	Scientific Name
Blue grama	<i>Chondrosium gracile</i>
Cattail	<i>Typha latifolia</i> and <i>T. angustifolium</i>
Canada thistle	<i>Breea arvense</i>
Cholla	<i>Cylindropuntia imbricata</i>
Common reed	<i>Phragmites australis</i>
Dwarf milkweed	<i>Asclepias uncialis</i>
Four-winged saltbush	<i>Atriplex canescens</i>
Golden blazingstar	<i>Nuttallia chrysantha</i>
Greasewood	<i>Sarcobatus vermiculatus</i>
Juniper	<i>Sabina monosperma</i>
Kochia	<i>Bassia sieversiana</i>
Little bluestem	<i>Schizachyrium scoparium</i>
Plains cottonwood	<i>Populus deltoides monilifera</i>
Pueblo goldenweed	<i>Oonopsis puebloensis</i>
Roundleaf four-o'clock	<i>Oxybaphus rotundifolia</i>
Rubber rabbitbrush	<i>Ericameria nauseosa</i>
Russian olive	<i>Elaeagnus angustifolia</i>
Sagebrush	<i>Seriphidium tridentatum</i>
Sand sage	<i>Oligosporus filifolia</i>
Saltcedar	<i>Tamarix ramosissima</i>
Saltgrass	<i>Distichlis spicata</i>
Sandbar willow	<i>Salix exigua</i>
Sand dropseed	<i>Sporobolus cryptandrus</i>
Sandhill goosefoot	<i>Chenopodium cycloides</i>
Sand sage	<i>Artemisia filifolia</i>
Siberian elm	<i>Ulmus pumila</i>
Snakeweed	<i>Gutierrezia sarothrae</i>
Threesquare	<i>Schoenoplectus pungens</i>
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>
Western wheatgrass	<i>Pascopyrum smithii</i>

Source: Weber, W.A. and R.C. Wittmann. 2001. Colorado Flora – Eastern Slope. University Press of Colorado.

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**Table 2. Perennial Rivers/Streams Pipeline Crossings**

<b>Perennial Rivers/Streams</b>	<b>No Action</b>	<b>Comanche South</b>	<b>Pueblo Dam South</b>	<b>JUP North</b>	<b>Pueblo Dam North</b>	<b>River South</b>	<b>Master Contract Only</b>
Apishapa River	1	1	1			1	1
Arkansas River	2	7	6	11	11	7	2
Chicosa Creek		1	1			1	
Crooked Arroyo		1	1	1	1	1	
Fountain Creek				1	1		
Graveyard Creek		1	1	1	1	1	
Haynes Creek				1	1		
Horse Creek				1	1	1	
Huerfano River		1	1			1	
King Arroyo		1	1	1	1	1	
Limestone Creek		1	1	1	1	1	
Prowers Arroyo		1	1	1	1	1	
Saint Charles River		1	1			1	
Salt Creek		1	1			1	
Timpas Creek		1	1	1	1	1	
Tributary to Graveyard Creek		1	1		1	1	
Wild Horse Creek				1	1		
<b>Total</b>	<b>3</b>	<b>19</b>	<b>18</b>	<b>21</b>	<b>22</b>	<b>20</b>	<b>3</b>

## Appendix J.1 – Wildlife Common and Scientific Names

This appendix includes tables with federal endangered, threatened, candidate, and proposed species; state threatened and endangered species and Colorado Natural Heritage species; common and scientific names of terrestrial wildlife species; and birds of conservation concern discussed in the Wildlife section of the EIS.

**Table 1. Federal Endangered, Threatened, Candidate, and Proposed Species**

Common Name	Scientific Name	Status <sup>(1)</sup>	General Colorado Range/Habitat Affinity	Habitat in Project Area
<b>Birds</b>				
Interior least tern	<i>Sternula antillarum</i>	FE, SE	Southeastern Colorado; sandy/pebble beaches on lakes, reservoirs, and rivers	Potential
Lesser prairie chicken	<i>Tympanuchus pallidicinctus</i>	FC, ST	Southeastern Colorado; sandhills and shrublands	Potential
Mexican spotted owl	<i>Strix occidentalis lucida</i>	FT, ST	Front Range mountains, southwestern Colorado; closed canopy forests in steep canyons	No
Piping plover	<i>Charadrius melodus</i>	FT, ST	Southeastern Colorado; sandy lakeshore beaches and river sandbars	Potential
<b>Fish</b>				
Arkansas darter	<i>Etheostoma cragini</i>	FC, ST	Arkansas River Basin; clear waters, low current with sandy bottoms, and abundant aquatic vegetation	Potential
Greenback cutthroat trout	<i>Oncorhynchus clarkii stomias</i>	FT, ST	Historic range includes streams and rivers in the upper Arkansas River Basin and Fountain Creek tributaries	No
<b>Mammals</b>				
Black-footed ferret	<i>Mustela nigripes</i>	FE, SE	Historic range includes eastern and western Colorado; active prairie dog towns or complex > 80 acres	No
Canada lynx	<i>Lynx canadensis</i>	FT, ST	Colorado mountains; climax boreal forest with a dense understory of thickets and windfalls	No
Gunnison's prairie dog	<i>Cynomys gunnisoni</i>	FC	Central Colorado; shortgrass or midgrass prairies, grass-shrub habitats in low valleys or mountain meadows	No
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	FT, ST	North-central/northeastern Colorado; wetland and riparian areas with shrubs (mesic grass/shrub/ woodlands)	No
<b>Vegetation</b>				
Ute ladies'-tresses orchid	<i>Spiranthes diluvialis</i>	FT	Subirrigated alluvial soils along the South Platte River and other river systems in Colorado; one historical record (1886) along Fountain Creek in El Paso County	No

Notes:

<sup>(1)</sup> FE = Federally Endangered, FT = Federally Threatened, FC = Federal Candidate, SE = State Endangered, ST = State Threatened.

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## Appendix J – Wildlife Common and Scientific Names

**Table 2. State Endangered, Threatened, and Species of Concern that are not also Federally Listed and Colorado Natural Heritage Program Species of Concern**

Common Name	Scientific Name	Status <sup>(1)</sup>	General Colorado Range/Habitat Affinity	Habitat in Project Area
<b>Amphibians</b>				
Couch's spadefoot	<i>Scaphiopus couchii</i>	SC	Southeastern Colorado; shortgrass prairie	Potential
Northern leopard frog	<i>Rana pipiens</i>	SC	Throughout Colorado; rivers, wet meadows, and stock ponds	Potential
Plains leopard frog	<i>Rana blairi</i>	SC	East-central Colorado including Arkansas/Republican River basins; rivers, wet meadows, and stock ponds	Potential
<b>Birds</b>				
American peregrine falcon	<i>Falco peregrinus anatum</i>	SC	West/Central Colorado; cliffs, bluffs, and canyons	No
Bald eagle	<i>Haliaeetus leucocephalus</i>	SC	Throughout Colorado; nests and roosts along lakes, reservoirs, and streams; forages over open water and prairie dog towns	Potential
Ferruginous hawk	<i>Buteo regalis</i>	SC	Northwestern and eastern Colorado; short- mid-grass prairie and shrublands	Potential
Long-billed curlew	<i>Numenius americanus</i>	SC	Nests in eastern Colorado; shortgrass prairie, often near water	Potential
Mountain plover	<i>Charadrius montanus</i>	SC	Eastern Colorado and South Park; shortgrass prairie and plowed agricultural fields	Potential
Western burrowing owl	<i>Athene cunicularia</i>	ST	Throughout Colorado; grassland, shrubland, and desert with ground squirrels	Potential
Western snowy plover	<i>Charadrius alexandrinus</i>	SC	Southeastern Colorado; shortgrass prairie near lakes, ponds, and playas	Potential
<b>Fish</b>				
Plains minnow	<i>Hybognathus placitus</i>	SE	Introduced into Arkansas River below Canon City	Potential
Suckermouth minnow	<i>Phenacobius mirabilis</i>	SE	Arkansas River Basin	Potential
Southern red-belly dace	<i>Phoxinus erythrogaster</i>	SE	Arkansas River Basin in Fremont and Pueblo counties	Potential
Flathead chub	<i>Platygobio gracilus</i>	SC	Arkansas River Basin	Potential
<b>Mammals</b>				
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	SC	Eastern Colorado; shortgrass prairie	Potential
Swift fox	<i>Vulpes velox</i>	SC	Eastern Colorado; prairie	Potential
Townsend's big-eared bat	<i>Corynorhinus townsendii pallescens</i>	SC	Throughout Colorado; woodlands with rocky outcrops; roosts in caves, mines, and rock crevices	Potential
<b>Reptiles</b>				
Common kingsnake	<i>Lampropeltis getula</i>	SC	Southeastern Colorado; grasslands, agricultural areas, and canyons	Potential
Massasauga	<i>Sistrurus catenatus</i>	SC	Southeastern Colorado; grasslands and sandhills	Potential
Roundtail horned lizard	<i>Phrynosoma modestum</i>	SC	Otero County; grasslands and upland shrublands	Potential
Texas horned lizard	<i>Phrynosoma cornutum</i>	SC	Southeastern Colorado; grasslands and upland shrublands	Potential



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Common Name	Scientific Name	Status <sup>(1)</sup>	General Colorado Range/Habitat Affinity	Habitat in Project Area
Triploid checkered whiptail	<i>Cnemidophorus neotesselatus</i>	SC	Southeastern Colorado; canyons, arroyos, and riparian uplands associated with streams and grasslands	Potential
<b>Invertebrates</b>				
Colorado buckwheat blue butterfly	<i>Euphilotes rita coloradensis</i>	S1	Southeast Colorado; grasslands containing blue grama and buckwheat	Potential
<b>Vegetation</b>				
Dwarf milkweed	<i>Asclepias uncialis</i>	S2, USFS/BLM	Eastern Colorado; sandstone soils and gravelly/rocky slopes' associated with juniper woodlands; flowering/fruiting period is April/May	Potential
Golden blazingstar	<i>Nuttallia chrysantha</i>	S2, BLM	Lower Arkansas River Valley; barren slopes of limestone, shale, or alkaline clay; associated with juniper woodlands; flowering/fruiting period is July through September	Potential
Pueblo goldenweed	<i>Oonopsis puebloensis</i>	S2	Freemont and Pueblo counties, Colorado; compacted silty clays to looser rocky and sandy soils in open grasslands; flowering/fruiting period is July	Potential
Roundleaf four o'clock	<i>Oxybaphus rotundifolius</i>	S2	Lower Arkansas River Valley; barren shale outcrops of the Smokey Hill member of the Niobrara Formation in sparse shrublands or piñon/juniper woodlands; flowering/fruiting period is June	Potential
Sandhills goosefoot	<i>Chenopodium cycloides</i>	S1, USFS	Southeast Colorado; sandy soils, frequently found on vegetated edge of sand blowouts; fruiting period is early summer to fall	Potential

Notes:

- <sup>(1)</sup> ST = State Threatened, SC = State Special Concern (not a statutory category), USFS = Listed by the U.S. Forest Service, BLM = Listed by the Bureau of Land Management, S1 = CNHP Critically imperiled in Colorado, S2 = CNHP Imperiled in Colorado.

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**Table 3. Common and Scientific Names of Terrestrial Wildlife Species**

Common Name	Scientific Name
<b>Amphibians</b>	
Bullfrog	<i>Rana catesbeiana</i>
Great Plains toad	<i>Bufo cognatus</i>
New Mexico spadefoot	<i>Spea multiplicata</i>
Tiger salamander	<i>Ambystoma tigrinum</i>
Woodhouse's toad	<i>Bufo woodhousii</i>
<b>Birds</b>	
American avocet	<i>Recurvirostra americana</i>
American coot	<i>Fulica americana</i>
American robin	<i>Turdus migratorius</i>
American kestrel	<i>Falco sparverius</i>
American widgeon	<i>Anas americana</i>
Barn swallow	<i>Hirundo rustica</i>
Black-billed magpie	<i>Pica pica</i>
Blue-winged teal	<i>Anas discors</i>
Bullock's oriole	<i>Icterus bullockii</i>
Cassin's sparrow	<i>Aimophila cassinii</i>
Chickadee	<i>Poecile</i> spp.
Chipping sparrow	<i>Spizella passerina</i>
Cooper's hawk	<i>Accipiter cooperii</i>
Dusky flycatcher	<i>Empidonax oberholseri</i>
Eastern kingbird	<i>Tyrannus tyrannus</i>
Great blue heron	<i>Ardea herodias</i>
Great horned owl	<i>Bubo virginianus</i>
Greater sage grouse	<i>Centrocercus urophasianus</i>
Horned lark	<i>Eremophila alpestris</i>
House sparrow	<i>Passer domesticus</i>
House wren	<i>Troglodytes aedon</i>
Killdeer	<i>Charadrius vociferus</i>
Lark bunting	<i>Calamospiza melanocorys</i>
Lark sparrow	<i>Chondestes grammacus</i>
Lewis's woodpecker	<i>Melanerpes lewis</i>
Mallard	<i>Anas platyrhynchos</i>
Mourning dove	<i>Zenaida macroura</i>
Northern bobwhite	<i>Colinus virginianus</i>
Northern harrier	<i>Circus cyaneus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Ring-necked pheasant	<i>Phasianus colchicus</i>
Rio Grande turkey	<i>Meleagris gallopavo intermedia</i>
Rough-legged hawk	<i>Buteo lagopus</i>
Scrub jay	<i>Aphelocoma californica</i>

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Common Name	Scientific Name
Song sparrow	<i>Melospiza melodia</i>
Spotted sandpiper	<i>Pipilo maculatus</i>
Spotted towhee	<i>Pipilo maculatus</i>
Swainson's hawk	<i>Buteo swainsoni</i>
Tree swallow	<i>Tachycineta bicolor</i>
Western meadowlark	<i>Sturnella neglecta</i>
Yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>
Mammals	
American badger	<i>Taxidea taxus</i>
American beaver	<i>Castor canadensis</i>
American elk	<i>Cervus elaphus</i>
American pronghorn	<i>Antilocapra americana</i>
Black-tailed jackrabbit	<i>Lepus californicus</i>
Coyote	<i>Canis latrans</i>
Deer mouse	<i>Peromyscus maniculatus</i>
Desert cottontail	<i>Sylvilagus audubonii</i>
Hispid pocket mouse	<i>Chaetodipus hispidus</i>
Hoary bat	<i>Lasiurus cinereus</i>
House mouse	<i>Mus musculus</i>
Little brown myotis	<i>Myotis lucifugus</i>
Meadow vole	<i>Microtus pennsylvanicus</i>
Mexican woodrat	<i>Neotoma mexicana</i>
Mule deer	<i>Odocoileus hemionus</i>
Muskrat	<i>Ondatra zibethicus</i>
Northern rock mouse	<i>Peromyscus nasutus</i>
Ord's kangaroo rat	<i>Dipodomys ordii</i>
Plains pocket gopher	<i>Geomys bursarius</i>
Plains pocket mouse	<i>Perognathus flavescens</i>
Prairie vole	<i>Microtus ochrogaster</i>
Pronghorn	<i>Antilocapra americana</i>
Raccoon	<i>Procyon lotor</i>
Red fox	<i>Vulpes vulpes</i>
Silky pocket mouse	<i>Perognathus flavus</i>
Silver-haired bat	<i>Lasionycteris noctivagans</i>
Spotted ground squirrel	<i>Spermophilus spilosoma</i>
Swift fox	<i>Vulpes velox</i>
Thirteen-lined ground squirrel	<i>Spermophilus tridecemlineatus</i>
Western harvest mouse	<i>Reithrodontomys megalotis</i>
White-footed mouse	<i>Peromyscus leucopus</i>
White-tailed deer	<i>Odocoileus virginianus</i>
White-tailed jackrabbit	<i>Lepus townsendii</i>
Reptiles	
Bullsnake	<i>Pituophis catenifer</i>

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Common Name	Scientific Name
Eastern fence lizard	<i>Sceloporus undulatus</i>
Northern water snake	<i>Nerodia sipedon</i>
Painted turtle	<i>Chrysemys picta</i>
Plains gartersnake	<i>Thamnophis radix</i>
Short-horned lizard	<i>Phrynosoma hernandesi</i>
Snapping turtle	<i>Chelydra serpentina</i>
Soft-shelled turtle	<i>Apalone spinifera</i>
Western rattlesnake	<i>Crotalus viridis</i>
Western terrestrial gartersnake	<i>Thamnophis elegans</i>
Invertebrates	
Colorado blue butterfly	<i>Euphilotes rita coloradensis</i>

**Table 4. Birds of Conservation Concern**

Common Name	Scientific Name	Habitat in Project Area
Bald eagle	<i>Haliaeetus leucocephalus</i>	Winters along Arkansas River
Bell's vireo	<i>Vireo bellii</i>	No
Burrowing owl	<i>Athene cunicularia</i>	Potential
Chestnut-collared longspur	<i>Calcarius ornatus</i>	No – Northeast Colorado
Golden eagle	<i>Aquila chrysaetos</i>	Foraging/winter habitat
Lark bunting	<i>Calamospiza melanocorys</i>	Potential
Lesser prairie-chicken	<i>Tympanuchus pallidicinctus</i>	Far eastern edge
Lewis's woodpecker	<i>Melanerpes lewis</i>	No
Long-billed curlew	<i>Numenius americanus</i>	Potential
McCown's longspur	<i>Calcarius mccownii</i>	No – Northeast Colorado
Mountain plover	<i>Charadrius montanus</i>	Potential
Peregrine falcon	<i>Falco peregrinus</i>	West of Lake Pueblo
Prairie falcon	<i>Falco mexicanus</i>	Potential
Snowy plover	<i>Charadrius alexandrinus</i>	Potential
Sprague's pipit	<i>Anthus spragueii</i>	No – Possible migrant
Upland sandpiper	<i>Bartramia longicauda</i>	No – Possible migrant
Willow flycatcher	<i>Empidonax traillii</i>	No

# Appendix K.1 - Human Environment

## Introduction

This appendix presents utilities within the buffer area alternative alignments in Pueblo County and areas east of Pueblo County. Sanitary sewer and water lines used in this analysis were filtered to 10 inches in diameter or larger. Gas lines were filtered to 4 inches in diameter and larger. Storm water utility lines along Highway 50 were filtered to 10 inches in diameter or larger. Storm water utility diameters were not available in other locations. Utility lines less than 10 inches in diameter may also be present and would need to be confirmed prior to construction activities. Table 1 shows the miles of existing utilities within the buffer areas of Pueblo County. Table 2 shows the miles of existing utilities within the buffer areas east of Pueblo County.

**Table 1. Pueblo County Utility Lines Within Buffer**

Type of Utility	No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
	Utility Lines (miles)						
Communication	0	0	0	0	0	0	0
Electric	0	0.18	0.18	0.01	0.01	0.18	0
Fiber Optic	0	21.04	21.66	40.31	40.31	37.54	0
Natural Gas	0	1.3	1.36	11.05	11.05	1.21	0
Irrigated Water	0	0	0	0	0	0	0
Overhead Utility	0	19.88	21.42	13	12.98	27.44	0
Sanitary Sewer	0	0.43	0.36	5.13	5.23	0.85	0
Storm Sewer	0	0.05	1.47	1.81	1.81	0.16	0
Telecommunication	0	0	0	1.98	1.98	0	0
Telephone	0	18.44	18.46	5.22	5.22	26.02	0
Water	0	0.48	2.02	6.73	8.95	0.16	0
<b>TOTAL</b>	<b>0</b>	<b>61.8</b>	<b>66.93</b>	<b>85.24</b>	<b>87.54</b>	<b>93.56</b>	<b>0</b>

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**Table 2. East of Pueblo County Utility Lines Within Buffer**

Type of Utility	No Action	Comanche South	Pueblo Dam South	JUP North	Pueblo Dam North	River South	Master Contract Only
	Utility Lines (miles)						
Communication	0	0.13	0.13	0.13	0.13	0.13	0
Electric	0.06	0.06	0.74	0.74	0.74	0.16	0.06
Fiber Optic	9.45	25.46	99.88	70.07	70.07	60.93	9.45
Natural Gas	2.39	5.44	15.37	10.63	10.63	11.19	2.39
Irrigated Water	0.1	0.1	0.93	0.87	0.87	0.46	0.1
Overhead Utility	1.61	8.83	39.07	42.1	42.08	21.31	1.61
Sanitary Sewer	0.44	0.6	2.78	2.98	0.45	0.91	0.44
Storm Sewer	0.06	0.07	0.16	0.16	0.16	0.16	0.06
Telecommunication	0	0	0	1.98	1.98	0	0
Telephone	2.25	3.12	71.29	40.33	40.33	30.2	2.25
Water	10.91	10.58	12.58	13.06	13.06	10.68	10.91
<b>TOTAL</b>	<b>27.27</b>	<b>54.38</b>	<b>242.93</b>	<b>183.07</b>	<b>180.52</b>	<b>136.14</b>	<b>27.27</b>

## **Appendix L.1 - Socioeconomics and Environmental Justice Supplement**

Appendix L.1 supplements the Socioeconomics and Environmental Justice sections of Chapter 3 and Chapter 4 in the EIS.

### **Personal Income, Employment and Unemployment**

Table 1 and Table 2 display the total personal income, earnings by sector, total employment and employment by sector for counties within the analysis area.

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**Table 1. Personal Income and Earnings**

County	Chaffee		Custer		Fremont		El Paso		Pueblo	
	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009
<b>Income <sup>(1)</sup></b>										
Total Personal Income	\$365,379	\$562,127	\$78,774	\$136,929	\$886,517	\$1,244,712	\$15,687,908	\$23,133,425	\$3,326,552	\$4,970,269
<b>Earnings By Industry <sup>(1)</sup></b>										
Farm	\$1,061	\$911	\$618	\$1,376	\$1,109	<sup>(2)</sup>	\$4,087	<sup>(2)</sup>	-\$40	\$2,819
Agriculture Serv., Forestry, Fishing, and other support services	\$561	<sup>(2)</sup>	<sup>(2)</sup>	<sup>(2)</sup>	\$2,486	<sup>(2)</sup>	\$44,886	\$3,774	\$7,941	<sup>(2)</sup>
Mining	<sup>(2)</sup>	<sup>(2)</sup>	\$325	\$284	\$9,636	\$8,383	\$19,281	\$133,259	\$2,569	<sup>(2)</sup>
Construction	\$27,909	\$30,849	\$10,390	\$11,749	\$65,597	\$46,870	\$980,664	\$984,664	\$187,974	\$285,348
Manufacturing	\$6,819	\$6,236	\$580	<sup>(2)</sup>	\$39,269	\$38,336	\$1,580,509	\$993,711	\$227,094	\$297,333
Wholesale Trade	\$5,208	\$7,558	<sup>(2)</sup>	\$662	\$5,049	\$6,540	\$356,816	\$372,186	\$56,696	\$68,809
Retail Trade	\$35,306	\$34,090	\$3,956	\$3,934	\$49,349	\$48,893	\$1,155,715	\$1,006,875	\$287,738	\$238,001
Transportation, Utilities, and Communications	\$8,471	\$13,725	\$1,528	\$1,528	\$22,201	\$35,663	\$1,207,424	\$1,011,894	\$132,427	\$215,718
Finance, Insurance, and Real Estate	\$16,004	\$26,209	\$3,597	\$6,166	\$27,575	\$20,476	\$951,109	\$1,077,860	\$169,695	\$120,839
Services	\$45,394	\$69,795	\$4,051	\$10,290	\$94,389	\$163,306	\$3,762,081	\$6,100,432	\$580,904	\$1,068,353
<b>Earnings by Government <sup>(1)</sup></b>										
Federal	\$6,933	\$9,641	\$919	\$1,604	\$81,788	\$115,543	\$2,078,624	\$4,536,483	\$55,381	\$122,576
State and Local	\$53,892	\$78,042	\$5,528	\$3,888	\$164,295	\$222,166	\$1,075,193	\$1,820,753	\$394,867	\$584,885



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**Table 1. Personal Income and Earnings (continued)**

County	Crowley		Otero		Bent		Prowers		Kiowa	
	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009
<b>Income <sup>(1)</sup></b>										
Total Personal Income	\$87,818	\$96,274	\$457,769	\$574,861	\$113,485	\$149,416	\$324,276	\$386,380	\$51,475	\$55,787
<b>Earnings By Industry <sup>(1)</sup></b>										
Farm	\$23,625	\$5,228	\$18,948	\$28,425	\$8,850	\$18,726	\$37,951	\$45,035	\$23,409	\$16,994
Agriculture Serv., Forestry, Fishing, and other Support Services	(2)	(2)	\$4,792	(2)	(2)	\$2,771	\$4,208	\$9,021	(2)	(2)
Mining	\$490	\$415	\$490	(2)	\$490	\$252	\$4,100	\$4,822	(2)	(2)
Construction	\$1,063	(2)	\$10,037	\$8,735	\$3,373	(2)	\$7,813	\$12,559	(2)	\$1,450
Manufacturing	(2)	\$66	\$20,876	\$22,583	(2)	(2)	\$31,869	\$12,836	\$144	(2)
Wholesale Trade	\$0	(2)	\$12,351	\$12,967	(2)	(2)	\$7,352	\$5,818	\$688	\$628
Retail Trade	\$3,039	\$2,791	\$29,949	\$24,381	\$3,340	\$2,251	\$24,966	\$22,713	\$864	\$942
Transportation, Utilities, and Communications	(2)	(2)	\$31,169	\$31,506	\$1,896	(2)	\$10,491	\$13,033	\$3,251	(2)
Finance, Insurance, and Real Estate	\$1,051	(2)	\$18,749	\$21,124	\$2,530	\$3,262	\$10,924	\$14,823	(2)	(2)
Services	\$12,801	\$4,749	\$57,340	\$70,780	\$9,941	\$8,373	\$40,656	\$40,405	\$932	\$791
<b>Earnings by Government <sup>(1)</sup></b>										
Federal	\$925	\$1,536	\$7,637	\$10,007	\$30,728	\$6,294	\$3,462	\$4,743	\$834	\$1,722
State and Local	\$20,170	\$26,375	\$52,770	\$63,359	\$12,218	\$29,818	\$46,132	\$64,616	\$6,044	\$8,474

Source: U.S. Department of Commerce, Bureau of Economic Analysis 2010

Notes:

- (1) Estimates are in 2011 thousand dollars.
- (2) Not shown to avoid disclosure or confidential information.

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**Table 2. Total Employment by Sector**

County	Chaffee		Custer		Fremont		El Paso		Pueblo	
	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009
Farm	309	254	175	215	726	935	1,348	1,552	738	960
Agriculture Serv., Forestry, Fishing, and other Support Services	(1)	(1)	(1)	(1)	1,972	1,318	2,941	430	564	(1)
Mining	(1)	(1)	(1)	23	1,151	751	528	1,667	76	(1)
Construction	1,048	1,008	329	309	231	200	21,317	20,073	5,310	5,060
Manufacturing	313	191	39	(1)	3,123	2,200	29,715	14,631	5,117	4,245
Wholesale Trade	228	212	(1)	17	501	739	8,194	6,612	1,669	1,440
Retail Trade	2,135	1,412	297	192	1,303	1,530	55,346	36,442	15,308	8,385
Transportation, Utilities, and Communications	200	310	50	38	4,669	6,005	15,848	14,927	2,780	3,482
Finance, Insurance, and Real Estate	956	1,253	286	375	1,972	1,318	31,340	38,203	5,323	5,990
Services	2,534	3,800	380	508	1,151	751	102,269	143,124	22,009	31,856
Federal Government	156	140	28	26	1,296	1,236	39,205	47,241	1,169	1,462
State and Local Government	1,509	1,616	203	236	3,981	4,107	27,727	35,089	10,625	11,624
Total <sup>(3)</sup>	9,519	10,721	1,882	2,283	22,076	21,090	335,778	359,991	70,688	74,897

**Table 2. Total Employment by Sector (continued)**

County	Crowley		Otero		Bent		Prowers		Kiowa	
	2000	2009	2000	2009	2000	2009	2000	2009	2000	2009
Farm	295	294	690	698	507	460	849	753	506	478
Agriculture Serv., Forestry, Fishing, and other Support Services	(1)	(1)	199	(1)	(1)	50	206	164	(1)	(1)
Mining	(2)	18	(1)	(1)	(2)	23	111	129	(1)	(1)
Construction	60	(1)	391	306	94	(1)	258	294	(1)	34
Manufacturing	(1)	(1)	701	517	(1)	(1)	1,188	332	24	(1)
Wholesale Trade	(2)	(1)	497	343	(1)	(1)	282	146	33	23
Retail Trade	202	138	1,741	1,082	244	152	1,485	978	84	70
Transportation, Utilities, and Communications	(1)	(1)	671	528	61	(1)	286	276	54	(1)
Finance, Insurance, and Real Estate	75	(1)	641	674	108	135	523	570	(1)	(1)
Services	520	127	2,636	1,711	451	296	1,406	1,595	76	(1)
Federal Government	33	31	189	158	1,440	82	100	77	25	31
State and Local Government	515	506	1,857	1,770	505	692	1,499	1,453	243	250
Total <sup>(3)</sup>	1,784	1,822	10,219	9,409	3,410	2,362	8,193	6,967	1,152	1,229

Source: Department of Commerce, Bureau of Economic Analysis 2010

Notes:

- (1) Not shown to avoid disclosure or confidential information, but estimates for these items are included in totals.
- (2) Less than 10 jobs, but the estimates for this item are included in the totals.
- (3) Summation of Earnings by Industry may not match the total due to confidentiality issues.

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## **Agriculture**

Agricultural and irrigation data from the 2007 and 2002 Census of Agriculture (U.S Department of Agriculture 2002, 2007) are in Table 3 for the counties located within the analysis area.

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**Table 3. County Agricultural Data**

County	Chaffee		Custer		Fremont		El Paso		Pueblo	
	2002	2007	2002	2007	2002	2007	2002	2007	2002	2007
Number of Farms	212	223	158	226	700	924	1,175	1,529	801	881
Average Farm size (acres)	336	356	771	610	378	320	691	403	967	1,034
Total Farm Acreage	71,188	79,405	121,882	137,799	264,650	295,893	811,931	616,418	774,352	910,566
Total Irrigated Land (acres)	8,818	15,139	3,487	18,217	11,882	11,845	10,025	15,915	24,734	24,606
Market Value of Products Sold (in thousands)	\$8,536	\$8,091	\$2,741	\$8,424	\$14,638	\$19,306	\$31,964	\$39,423	\$41,652	\$49,251
Crop Sales (% of total sales)	--	38%	--	27%	--	25%	--	50%	--	32%
Livestock (% of total sales)	--	62%	--	73%	--	75%	--	50%	--	68%
<b>Primary Irrigated Crops (Harvested Acres)</b>										
Corn (grain)	3,733	5,340	--	--	4,093	4,949	4,828	2,087	2,181	3,680
Hay, Alfalfa	2,158	5,121	564	1,300	1,834	3,368	2,169	4,357	8,734	10,243
Hay, other	--	--	3,702	16,500	--	--	--	--	2,194	1,406
Sorghum (grain)	--	--	--	--	--	--	--	--	(1)	114
Wheat (all)	--	--	--	--	--	--	--	--	265	680
County	Crowley		Otero		Bent		Prowers		Kiowa	
	2002	2007	2002	2007	2002	2007	2002	2007	2002	2007
Number of Farms	217	268	488	569	265	311	357	425	531	638
Average Farm size (acres)	1,730	1,684	1,120	1,097	2,777	2,820	2,512	2,254	1,623	1,631
Total Farm Acreage	375,413	451,225	546,396	624,123	735,826	877,142	896,772	957,937	861,778	1,037,336
Total Irrigated Land (acres)	6156	9,849	39,230	55,217	30,219	50,450	3,606	3,266	94,175	103,205
Market Value of Products Sold (in thousands)	\$53,384	\$110,922	\$105,991	\$11,187	\$82,152	\$82,220	\$18,984	\$68,390	\$182,575	\$263,321
Crop Sales (% of total sales)	--	1%	--	24%	--	23%	--	76%	--	31%
Livestock (% of total sales)	--	99%	--	76%	--	77%	--	24%	--	69%
<b>Primary Irrigated Crops (Harvested Acres)</b>										
Corn (grain)	121	553	4,088	9,145	1,340	8,410	83,790	71,990	8,014	19,705
Hay, Alfalfa	3,848	5,821	18,161	29,257	22,080	28,748	(1)	(1)	62,641	53,739
Hay, other	368	818	2,648	2,662	566	2,502	1,040	576	1,577	1,501
Sorghum (grain)	--	(1)	(1)	(1)	692	1,587	(1)	(1)	988	3,596
Wheat (all)	(1)	(1)	2,493	3,398	1,227	3,604	18,889	18,841	11,669	15,652

Source: U.S Department of Agriculture 2002, 2007

Note:

(1) Data not published separately to avoid disclosure of individual operations.

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**Attachment A – Minority and Low Income Populations Data**

Attachment A contains information used in the Environmental Justice effects analysis.

<u>Alternative Analysis</u>			Median	% below	%Minority-	%	Total Minority
<u>averages over the Analysis area</u>				16.9%			41.2%
No Action/Master Contract			Househld Incn	Poverty level	nonhispanic	Hispan Pop	% Pop
Pueblo County			\$32,775	<b>14.9%</b>			<b>42.2%</b>
101	08101	003400	\$29,583	13.6%	1.6%	23.3%	24.9%
Otero County Tracts			\$29,738	<b>18.8%</b>			<b>40.6%</b>
089	08089	988200	\$28,911	10.6%	1.2%	11.9%	13.1%
089	08089	987900	\$38,976	10.5%	2.4%	31.9%	34.3%
089	08089	988100	\$27,969	<b>24.2%</b>	2.4%	32.0%	34.4%
089	08089	987600	\$33,641	11.6%	2.5%	16.2%	18.6%
089	08089	987700	\$27,977	<b>23.3%</b>	4.3%	48.0%	<b>52.3%</b>
089	08089	987800	\$34,235	17.2%	2.9%	29.6%	32.5%
Prowers County Tracts			<b>\$29,935</b>	<b>23.10%</b>			<b>34.8%</b>
099	08099	000100	\$38,750	14.6%	0.8%	12.5%	13.3%
099	08099	000300	\$30,000	16.7%	2.3%	25.0%	27.2%
099	08099	000400	\$38,021	17.1%	2.2%	17.8%	19.9%
099	08099	500	\$26,536	23.0%	1.8%	48.9%	<b>50.8%</b>
Crowley County Tracts			<b>\$26,803</b>	<b>19%</b>			<b>33.0%</b>
025	08025	989600	\$26,803	18.5%	10.5%	22.5%	33.0%
Bent County Tracts			<b>\$34,096</b>	<b>19.5%</b>			<b>36.7%</b>
011	08011	986700	\$28,125	19.5%	6.5%	30.2%	36.7%
<u>averages over the Analysis area No Action</u>				17.0%			30.1%

For this alternative -Out of 13 Census tracts, only 3 had greater poverty rates and greater minority pop than their respective county data. 2 in Otero and 1 in Prowers county

<u>Alternative Analysis</u>			Median	% below	%Minority-	%	Total Minority
<u>averages over the Analysis area</u>				16.9%			41.2%
No Action/Master Contract			Househld Incn	Poverty level	nonhispanic	Hispan Pop	% Pop
Comanche South Alt 1							
Pueblo County			<b>\$32,775</b>	<b>14.9%</b>			<b>42.2%</b>
101	08099	000300	\$0		2.3%	25.0%	27.2%
101	08101	002806	\$47,000	4.1%	1.2%	9.6%	10.8%
101	08101	002807	\$44,425	4.8%	2.9%	35.7%	38.6%
101	08101	002808	\$75,525	1.6%	1.8%	24.5%	26.3%
101	08101	002909	\$42,241	7.5%	2.7%	17.9%	20.6%
101	08101	003102	\$53,783	5.9%	2.0%	28.9%	30.9%
101	08101	003103	\$33,242	<b>17.0%</b>	2.7%	53.5%	<b>56.2%</b>
101	08101	003104	\$40,441	4.6%	1.7%	24.9%	26.6%
101	08101	003200	\$36,211	12.1%	1.9%	29.1%	31.0%
101	08101	003400	\$29,583	13.6%	1.6%	23.3%	24.9%
Otero County Tracts			<b>\$29,738</b>	<b>18.8%</b>			<b>40.6%</b>
089	08089	988200	\$28,911	10.6%	1.2%	11.9%	13.1%
089	08089	987900	\$38,976	10.5%	2.4%	31.9%	34.3%
089	08089	988000	\$20,479	<b>27.6%</b>	2.8%	65.9%	<b>68.7%</b>
089	08089	988100	\$27,969	<b>24.2%</b>	2.4%	32.0%	34.4%
089	08089	987600	\$33,641	11.6%	2.5%	16.2%	18.6%
089	08089	987700	\$27,977	<b>23.3%</b>	4.3%	48.0%	<b>52.3%</b>
089	08089	987800	\$34,235	17.2%	2.9%	29.6%	32.5%
Prowers County Tracts			<b>\$29,935</b>	<b>23.10%</b>			<b>34.8%</b>
099	08099	000100	\$38,750	14.6%	0.8%	12.5%	13.3%
099	08099	000300	\$30,000	16.7%	2.3%	25.0%	27.2%
099	08099	000400	\$38,021	17.1%	2.2%	17.8%	19.9%
099	08099	500	\$26,536	23.0%	1.8%	48.9%	<b>50.8%</b>
Crowley County Tracts			<b>\$26,803</b>	<b>19%</b>			<b>33.0%</b>
025	08025	989600	\$26,803	18.5%	10.5%	22.5%	33.0%
Bent County Tracts			<b>\$34,096</b>	<b>19.5%</b>			<b>36.7%</b>
011	08011	986700	\$28,125	19.5%	6.5%	30.2%	36.7%
<u>averages over the Analysis area ALT1</u>				13.9%			31.9%

For this alternative -Out of 22 Census tracts, only 5 had greater poverty rates and greater minority pop than their respective county data. 2 of the 5 are diff than NOA.

Alternative Analysis

			Median	% below	%Minority-	%	Total Minority
			Median	% below	%Minority-	%	Total Minority
			Househd Incn	Poverty level	nonhispanic	Hispan Pop	% Pop
Pueblo Dam South Alt 2							
Pueblo County			<b>\$32,775</b>	<b>14.9%</b>			<b>42.2%</b>
101	08101	000300	\$0	0.0%	2.3%	25.0%	27.2%
101	08101	001500	\$32,228	15.6%	2.7%	27.3%	30.0%
101	08101	001600	\$38,516	1.8%	2.2%	20.8%	22.9%
101	08101	001700	\$35,625	6.4%	2.6%	22.6%	25.1%
101	08101	001800	\$29,833	11.1%	3.0%	31.9%	34.9%
101	08101	001900	\$25,043	27.6%	4.9%	43.3%	48.3%
101	08101	002000	\$24,212	19.8%	7.7%	63.3%	70.9%
101	08101	002100	\$18,006	35.0%	10.3%	70.9%	81.2%
101	08101	002500	\$28,646	21.4%	5.4%	46.5%	51.9%
101	08101	002802	\$35,521	15.3%	4.7%	33.8%	38.5%
101	08101	002806	\$47,000	4.1%	1.2%	9.6%	10.8%
101	08101	002909	\$42,241	7.5%	2.7%	17.9%	20.6%
101	08101	003102	\$53,783	5.9%	2.0%	28.9%	30.9%
101	08101	003103	\$33,242	17.0%	2.7%	53.5%	56.2%
101	08101	003104	\$40,441	4.6%	1.7%	24.9%	26.6%
101	08101	003200	\$36,211	12.1%	1.9%	29.1%	31.0%
101	08101	003400	\$29,583	13.6%	1.6%	23.3%	24.9%
Otero County Tracts			<b>\$29,738</b>	<b>18.8%</b>			<b>40.6%</b>
089	08089	988200	\$28,911	10.6%	1.2%	11.9%	13.1%
089	08089	987900	\$38,976	10.5%	2.4%	31.9%	34.3%
089	08089	988000	\$20,479	27.6%	2.8%	65.9%	68.7%
089	08089	988100	\$27,969	24.2%	2.4%	32.0%	34.4%
089	08089	987600	\$33,641	11.6%	2.5%	16.2%	18.6%
089	08089	987700	\$27,977	23.3%	4.3%	48.0%	52.3%
089	08089	987800	\$34,235	17.2%	2.9%	29.6%	32.5%
Prowers County Tracts			<b>\$29,935</b>	<b>23.10%</b>			<b>34.8%</b>
099	08099	000100	\$38,750	14.6%	0.8%	12.5%	13.3%
099	08099	000300	\$30,000	16.7%	2.3%	25.0%	27.2%
099	08099	000400	\$38,021	17.1%	2.2%	17.8%	19.9%
099	08099	500	\$26,536	23.0%	1.8%	48.9%	50.8%
Crowley County Tracts			<b>\$26,803</b>	<b>19%</b>			<b>33.0%</b>
025	08025	989600	\$26,803	18.5%	10.5%	22.5%	33.0%
Bent County Tracts			<b>\$34,096</b>	<b>19.5%</b>			<b>36.7%</b>
011	08011	986700	\$28,125	19.5%	6.5%	30.2%	36.7%
averages over the Analysis area ALT2				16.2%			37.1%

For this alternative, only the Pueblo County tracts are different from the No Action. Out of 16 Census tracts, 7 tracts had greater poverty rates and/or greater minority pop than their respective county data. 16 of the tracts were in Pueblo County and different tracts from NOA.

JUP North Alt3

Pueblo County			<b>\$32,775</b>	<b>14.9%</b>			<b>42.2%</b>
101	08101	002901	\$21,788	26.2%	5.6%	63.1%	68.7%
101	08101	000300	\$0	0.0%	2.3%	25.0%	27.2%
101	08101	000200	\$30,337	20.2%	4.4%	52.8%	57.2%
101	08101	000600	\$20,685	26.9%	5.5%	52.8%	58.3%
101	08101	000700	\$12,406	29.6%	5.5%	42.2%	47.6%
101	08101	000800	\$21,288	33.2%	5.7%	65.6%	71.3%
101	08101	000902	\$35,570	12.6%	5.6%	38.0%	43.6%
101	08101	001000	\$23,953	28.2%	5.6%	67.9%	73.5%
101	08101	001600	\$38,516	1.8%	2.2%	20.8%	22.9%
101	08101	002802	\$35,521	15.3%	4.7%	33.8%	38.5%
101	08101	002806	\$47,000	4.1%	1.2%	9.6%	10.8%
101	08101	002909	\$42,241	7.5%	2.7%	17.9%	20.6%
101	08101	003001	\$36,092	10.4%	3.4%	31.4%	34.8%
101	08101	003003	\$22,132	24.7%	5.1%	66.8%	72.0%
101	08101	003102	\$53,783	5.9%	2.0%	28.9%	30.9%
101	08101	003200	\$36,211	12.1%	1.9%	29.1%	31.0%
101	08101	003400	\$29,583	13.6%	1.6%	23.3%	24.9%
averages over the Analysis area ALT3				16.9%			39.0%

For this alternative - Out of 30 Census tracts, 10 tracts had greater poverty rates and/or greater minority pop than their respective county data. 7 of the tracts were in Pueblo County and different tracts from NOA. The average of these tracts was 50% greater in minority population over the county average and 80% greater in Poverty levels



Alternative Analysis

			Median	% below	%Minority-	%	Total Minority
Pueblo Dam North Alt4							
<b>Pueblo County</b>			<b>\$32,775</b>	<b>14.9%</b>			<b>42.2%</b>
101	08101	002901	\$21,788	26.2%	5.6%	63.1%	68.7%
101	08101	000300	\$0	0.0%	2.3%	25.0%	27.2%
101	08101	000200	\$30,337	20.2%	4.4%	52.8%	57.2%
101	08101	000600	\$20,685	26.9%	5.5%	52.8%	58.3%
101	08101	000700	\$12,406	29.6%	5.5%	42.2%	47.6%
101	08101	000800	\$21,288	33.2%	5.7%	65.6%	71.3%
101	08101	000902	\$35,570	12.6%	5.6%	38.0%	43.6%
101	08101	001000	\$23,953	28.2%	5.6%	67.9%	73.5%
101	08101	001600	\$38,516	1.8%	2.2%	20.8%	22.9%
101	08101	002802	\$35,521	15.3%	4.7%	33.8%	38.5%
101	08101	002806	\$47,000	4.1%	1.2%	9.6%	10.8%
101	08101	002909	\$42,241	7.5%	2.7%	17.9%	20.6%
101	08101	003001	\$36,092	10.4%	3.4%	31.4%	34.8%
101	08101	003003	\$22,132	24.7%	5.1%	66.8%	72.0%
101	08101	003102	\$53,783	5.9%	2.0%	28.9%	30.9%
101	08101	003200	\$36,211	12.1%	1.9%	29.1%	31.0%
101	08101	003400	\$29,583	13.6%	1.6%	23.3%	24.9%
Impacts same as Alt 3							
averages over the Analysis area ALT3				16.9%			39.0%
River South Alt 5							
<b>Pueblo County</b>			<b>\$32,775</b>	<b>14.9%</b>			<b>42.2%</b>
101	08101	000300	\$0	0.0%	2.3%	25.0%	27.2%
101	08101	001300	\$13,476	27.2%	3.9%	53.1%	57.0%
101	08101	001400	\$21,903	29.2%	6.1%	50.8%	56.9%
101	08101	002000	\$24,212	19.8%	7.7%	63.3%	70.9%
101	08101	003102	\$53,783	5.9%	2.0%	28.9%	30.9%
101	08101	003103	\$33,242	17.0%	2.7%	53.5%	56.2%
101	08101	003104	\$40,441	4.6%	1.7%	24.9%	26.6%
101	08101	003200	\$36,211	12.1%	1.9%	29.1%	31.0%
101	08101	003400	\$29,583	13.6%	1.6%	23.3%	24.9%
averages over the Analysis area ALT3				11.7%			26.3%



counties	Median Household Income 2000	Per capita Income 2000	Poverty Level 2000	% Minority Population 2000
Pueblo	\$32,775	17,163	14.900%	42.2%
Crowley	26,803	12,836	19%	33.0%
Otero	29,738	15,113	18.8%	40.6%
Bent	34,096	13,567	19.5%	36.7%
Prowers	29,935	14,150	23.10%	34.8%
Colorado	\$55,735	\$29,679	18.96%	37.46%
			12.60%	

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## **Appendix M.1 – Consultation and Distribution Lists**

This appendix presents a list of tribes and associated correspondence regarding the EIS, and the distribution list for the draft EIS.

### **Native American Consultation**

The following tribes and contacts were requested to provide assistance in identifying Indian Trust Assets within the area of potential effects (letter dated June 20, 2011):

Mr. Alonzo Chalepah, Chairman  
Apache Tribe of Oklahoma  
PO Box 1220  
Anadarko, OK 73005

Mr. Johnny Wakua, Chairman  
Comanche Nation of Oklahoma  
PO Box 908  
Lawton, OK 73502

Mr. Donnie Tofpi, Chairman  
Kiowa Tribe of Oklahoma  
PO Box 369  
Carnegie, OK 73015.

Janice Boswell, Governor  
Cheyenne-Arapaho Tribe of  
Oklahoma  
PO Box 38  
Concho, OK 73022

Leroy Spang, President  
Northern Cheyenne Tribe  
PO Box 128  
Lame Deer, MT 59043

Levi Pesata  
Jicarilla Apache Nation  
PO Box 507  
Dulce, NM 87528

Norman Willow, Councilman  
Northern Arapaho Tribe  
PO Box 396  
Ft. Washakie, WY 82514

In consultation with the Colorado State Historic Preservation Office (SHPO), Reclamation transmitted a letter and the Class I cultural resource report to define the Area of Potential Effect [36 CFR 800.4(a) (1)] and identify any entities [36 CFR 800.3(f)] entitled to be consulting parties and invite them to participate (letter dated January 17, 2012):

Mr. Darrin Cisco  
Apache Tribe of Oklahoma  
PO Box 1330  
Anadarko, OK 73005

THPO  
Comanche Nation of Oklahoma  
PO Box 908  
Lawton, OK 73502

Mr. Jimmy Arterberry

Mr. Dale Old Horn

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THPO  
Crow Nation  
PO Box 159  
Crow Agency, MT 59022

Ms. April Darrow  
Fort Sill Apache  
Rt 2, Box 121  
Apache, OK 73006

Ms. JameLynn Eskew  
Kiowa Tribe of Oklahoma  
PO Box 369  
Carnegie, OK 73015

Mr. Conrad Fisher  
THPO  
Northern Cheyenne Tribe  
PO Box 128  
Lame Deer, MT 59043

Mr. Wilmer Mesteth  
THPO  
Oglala Sioux  
PO Box 419  
Pine Ridge, SD 57770

Ms. Lynette Gray  
THPO  
Cheyenne-Arapaho Tribe of  
Oklahoma  
PO Box 38  
Concho, OK 73022

Ms. Wanda Wells  
THPO  
Crow Creek Sioux  
PO Box 50  
Fort Thompson, SD 57339

Mr. Wilford Ferris  
THPO  
Eastern Shoshone  
PO Box 538  
Ft. Washakie, WY 82514

Dr. Jeffrey Blythe  
THPO  
Jicarilla Apache  
PO Box 507  
Dulce, NM 87528

Ms. Holly Boughton  
THPO  
Mescalero Apache  
PO Box 227  
Mescalero, NM 88340

Ms. Darlene Conrad  
THPO  
Northern Arapaho Tribe  
PO Box 396  
Ft Washakie, WY 82514

Cultural Resource Coordinator  
Ohkay Owingeh  
PO Box 1099  
San Juan Pueblo, NM 87566

Mr. Gordon Adams  
THPO  
Pawnee Nation of Oklahoma  
PO Box 470  
Pawnee, OK 74058

Mr. Walter Cristobal  
THPO  
Pueblo of Santa Ana  
02 Dove Rd, Cultural Resources  
Dept  
Santa Ana Pueblo, NM 87004

Mr. Ben Chavarria  
Cultural Resource Coordinator  
Pueblo of Santa Clara  
PO Box 580  
Española, NM 87532

Ms Stacey Oberley  
Southern Ute  
PO Box 737  
Ignacio, CO 81137

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Mr. Terry Knight  
THPO  
Ute Mountain Ute  
PO Box 468  
Towaoc, CO 81334

Mr. Vernon Garcia  
Pueblo de Cochiti  
PO Box 70  
Cochiti, NM 87072

Cultural Resource Coordinator  
Pueblo of San Ildefonso  
Route 5, Box 315-A  
Santa Fe, NM 87501

Mr. Russell Eagle Bear  
THPO  
Rosebud Sioux  
PO Box 809  
Rosebud, SD 57570

Ms Was'teWin Young  
THPO  
Standing Rock Sioux  
PO Box D  
Fort Yates, ND 58538

Mr Kurt Dongoske  
THPO  
Zuni Pueblo  
PO Box 1149  
Zuni Pueblo, NM 87327

# Arkansas Valley Conduit Draft Environmental Impact Statement

## Appendix M.1 – Consultation and Distribution Lists

### Distribution List

The entities listed below were notified via mail or e-mail regarding the availability of the draft EIS.

#### *U.S. Federal Agencies and Officials*

##### **Air Force**

Phyllis Duff

##### **Army**

Cathy Akins

##### **Army Corps of Engineers**

Joshua Carpenter

Jeremy Decker

Karen Downey

Gregory Everhart

Dana Price

Van Truan

Jonathan Van Hoose

Lt. Col. Jason Williams

##### **Bureau of Reclamation**

Howard Bailey

Gary Campbell

Mike Collins

Gary Davis

Doug Epperly

Andrew Gilmore

Jaci Gould

Tyler Johnson

Kara Lamb

Elizabeth McPhillips

Tim Meyer

Carlie Ronca

Roxanne Peterson

Sara Salber

Signe Snortland

Peter Soeth

Valda Terauds

Karl Thiel

Roy Vaughan

#### **Colorado Congressional Delegation**

Honorable Michael Bennet – Senator

Honorable Cory Gardner –  
Representative

Honorable Doug Lamborn –  
Representative

Honorable Scott Tipton –  
Representative

Honorable Mark Udall – Senator

#### **Environmental Protection Agency**

Suzanne Bohan

Julie Kinsey

Deborah Lebow

Maggie Pierce

Brent Truskowski

Gene Reetz

Michael Wenstrom

#### **Department of Agriculture**

Joe Kost

Delores Sanchez Maes

#### **Department of the Interior**

Deanna Archuleta

#### **Federal Highway Administration**

Douglas Bennett

#### **Natural Resources Conservation Service**

John Knapp

Patty Knupp

Rich Rhoades

Lorenz Sutherland

#### **U.S. Fish and Wildlife Service**

Susan Linner

Adam Misztal



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**U.S. Forest Service**

Misty DeSalvo

**U.S. Geological Survey**

David Mau

Rodger Ortiz

**Rural Development**

Gigi Dennis

***State Agencies and Officials***

**Colorado**

Joseph Barth – Colorado Parks and  
Wildlife

Craig Clark – Colorado Department of  
Transportation

Donna Davis – Department of Public  
Health and Environment

Mardell DeDomenico – District Water  
Court, Division 2

Veva DeHeza – Colorado Water  
Conservation Board

Todd Doherty – Colorado Water  
Conservation Board

Mike Dowd – Colorado Parks and  
Wildlife

Paul Foutz – Colorado Parks and  
Wildlife

Deb Frazier – Department of Natural  
Resources

Don Garcia – Colorado Department of  
Transportation

Timothy Gates – Colorado State  
University

John Geerdes – Colorado Parks and  
Wildlife

John Gillogley – Department of  
Corrections

Jennifer Gimbel – Colorado Water  
Conservation Board

Mary Halstead – Colorado Division of  
Water Resources

Brad Henley – Colorado Parks and  
Wildlife

Greg Hobbs – Colorado Supreme Court

Diane Hoppe – Colorado Water  
Conservation Board

Representative Kenneth Kester –  
Colorado House of Representative

Ard Kirt – Colorado Parks and Wildlife

Ken Knope – Department of Public  
Health and Environment

Doug Kreiger – Colorado Parks and  
Wildlife

Ann Lopkoff – Colorado Water and  
Power Development Authority

David Lovell – Colorado Parks and  
Wildlife

Representative Wes McKinley –  
Colorado Houses of Representatives

Vicki Milano – Colorado Parks and  
Wildlife

Rebecca Mitchell – Colorado  
Department of Natural Resources

Monique Mullis – Colorado Parks and  
Wildlife

Del Nimmo – Colorado State University,  
Pueblo

Carl Otteman – Otero Junior College  
Representative Sal Pace – Colorado

House of Representatives

Michael Rendon – Fort Lewis College

Ji Rogers – Arkansas River Compact  
Administration (Colorado)

Kirk Russell – Colorado Water  
Conservation Board

Honorable Larry Schwartz – 10th  
Judicial District

Jack Seilheimer – Colorado State  
University, Pueblo

Lisa Streisfield – Colorado Department  
of Transportation

John Stulp – Governors Office

Don Sullivan – Colorado State  
University, Pueblo

John Tonko – Colorado Parks and  
Wildlife

Bill Tyner – Colorado Division of Water  
Resources

Joe Trevizo – Colorado Department of  
Transportation

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Jim Valliant – Colorado State University  
Cooperative Extension  
John Weiner – University of Colorado  
Steve Witte – Division of Water  
Resources  
Dick Wolfe – Division of Water  
Resources

### **Kansas**

Lawrence Gennette  
David Barfield – Kansas Division of  
Water Resources  
Chris Beightel – Kansas Division of  
Water Resources  
Rachel Claucherty – Kansas Division of  
Water Resources  
Kevin Salter – Kansas Division of Water  
Resources

### ***Participants***

Shirley Adams – Town of Manzanola  
Tobe Allumbaugh – Crowley County  
Carle Aragon-Quezada – Lower  
Arkansas Valley Water Conservancy  
District  
Jennifer Baker – Town of Sugar City  
Ken Baker – Upper Arkansas Water  
Conservancy District  
Bob Barnhart – West Holbrook Pipeline  
Jerry Bay – East End Water Company  
Barbara Berry – Town of Boone  
Steve Berry – Colorado Springs Utilities  
Terry Book – Board of Water Works of  
Pueblo  
Van Brown – Town of Eads Water and  
Sanitation  
Betty Bruch – Town of Ordway  
Bob Chambers – Town of Cheraw  
Cynthia Crouch – Town of Ordway  
Herman Darrell – Newdale Grand  
Valley/Hilltop Water Company  
Rick Dell – Town of Swink  
Deb Devore – Town of Olney Springs  
Brett Dougherty – Bents Fort Water  
Association  
Mike Fink – City of Fountain

Clay Fitzsimmons – AVC Advisory  
Committee St. Charles Mesa Water  
District  
Kristen Flannery – Colorado Springs  
Utilities  
Sam Fosdick – Valley Water Company  
Mike French – Pueblo West  
Metropolitan District  
Corrin Garcia – City of Florence  
Ron Gasser – Penrose Water District  
Lynden Gill – Lower Arkansas Valley  
Water Conservancy District  
Brett Gracely – Colorado Springs  
Utilities  
Nicholas Gradisar – Board of Water  
Works of Pueblo  
Jack Hall – Beehive Water Association  
Chuck Hanagan – Town of Swink  
Bob Hancock – Formerly Hancock  
Water Inc.  
Keith Hannan – 96 Pipeline Company  
Hans Hansen – South Side Water  
Association  
Bob Hartzman – City of Canon City  
Roy Heald – Security Water District  
Darrell Herman – West Grand Valley  
Water Inc.  
Matthew Heimerch – AVC Advisory  
Committee Crowley County  
Daniel Higgins – Pueblo West Metro  
District  
Chuck Hitchcock – City of Fowler  
Dave Howard – Town of Cheraw  
Scott Howell – Colorado Springs  
Utilities  
Lee Huffstetter – Board of Water Works  
of Pueblo  
Daniel Hyatt – Town of Fowler  
George Johnson – Town of Ordway  
Water Department  
Jack Johnston – Pueblo West Metro  
District  
Joe Kelley – City of La Junta  
Kim Juul – Valley Water Company  
Jerry LaStrange – Town of Poncha  
Springs

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Greg Lamont – Pueblo West Metro District  
Kevin Lindahl – Eureka Water  
John Lyons – Town of Rocky Ford  
Dara MacDonald – City of Salida  
Leroy Mauch – AVC Advisory Committee Prowers County  
Bruce McCormick – Colorado Springs Utilities  
Bill McCurdy – AVC Advisory Committee Crowley County  
Larry Michael – Town of Eads  
Curtis Mitchell – City of Fountain  
Pete Moore – Lower Arkansas Valley Water Conservancy District  
Denise Mosher – North Holbrook Water Company  
Mark Murphy – Colorado Springs Utilities  
Albert Muth – West Grand Valley Water Inc.  
Norman Noe – Homestead Improvement Association, South Swink Water  
Abby Ortega – Colorado Springs Utilities  
Lonnie Oversole – City of Salida  
Mike Patterson – City of Florence  
Joe Petramala – South Swink Water  
Mark Pifher – Colorado Springs Utilities  
Bert Potestio – Avondale Water  
Ralph Ravenscroft – Stratmoor Hills Water District  
Terry Ray – Town of Boone  
Bill and Jo Rich – Hasty Water Company  
Keith Riley – Colorado Springs Utilities  
Jim Robinson – City of Florence  
Gerald Ross – Town of Sugar City  
Janet Rummel – Colorado Springs Utilities  
Julie Roesch – McClave Water Association  
John Sandefur – Penrose Water District  
Chris Sandoval – City of Lamar  
Terry Scanga – Upper Arkansas Water Conservancy District

Claude Schultz – May Valley Water Association  
John Schweizer – Fayette Water Association  
Scott Shewey – Colorado Springs Utilities  
Greg Smith – City of Poncha Springs  
Lois Smith – Patterson Valley Water Company  
Len Talkington – Crowley County Water Association  
Ken Wagner – City of Las Animas  
Alan Ward – Pueblo Board of Water Works  
Steve Watkins – South Side Water Association  
Wayne Whittaker – City of Rocky Ford/Catlin Canal Company  
Dori Williams – City of Florence  
Greg Williams – Vroman Water Company  
Darla Wyeno – Town of Crowley  
Carol Wilson – Vroman Water Company  
Debbie Wilson – Town of Wiley  
Steve Wilson – Widefield Water/Sanitation District  
Jay Winner – Lower Arkansas Valley Water Conservancy District

***Southeastern***

Christine Arbogast  
Edward Bailey (Past Director)  
Gary Bostrom (Director)  
Jim Broderick (Assistant Secretary-Treasurer)  
Reed Dils (Director)  
Carl Genova (Past Director)  
Tom Goodwin (Director)  
Alan Hamel (Advisory Board, Past Director)  
Bob Hamilton - Southeastern  
Gibson Hazard (Director)  
Greg Johnson (Director)  
Kevin Karney (Director)  
Ray Kogovsek  
Bill Long (Director, President)

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Leroy Mauch (AVC Advisory  
Committee Prowers County, Past  
Director)  
Carl McClure (Director)  
Kevin Meador  
Margie Medina  
Bill Milenski (Past Director)  
Howard Miller (Director)  
Lee Miller  
Harold Miskel (Director, Vice President)  
Ann Nichols (Director, Treasurer)  
Vera Ortegon (Director, Secretary)  
Lissa Pinello (Past Director)  
Leonard Pruett (Director)  
Scott Reed (Past Director)  
David Simpson (Director)  
Lee Simpson (Past Director)  
David Shohet (Past Director)  
W.R. Stealey (Past Director)  
Orville Tomky (Past Director)  
Jean Van Pelt  
Shawn Yoxey (Director)

### ***Other Local Agencies and Officials***

Tobe Allumbaugh – Crowley County  
Joan Armstrong – Pueblo County  
Steve Bach – Colorado Springs  
Jim Baldwin – Otero County  
Elizabeth Baston – Colorado Springs  
Jack Benson – City of Manitou Springs  
Michael Bordognal – Lake County  
Bryan Bryant – Otero County  
Frank Bryant – Bent County  
Karen Crumbaker – Custer County  
Extension  
Rochelle Cruz – Pueblo County  
Jo Dorenkamp – Prowers County  
Tom Florczak – City of Pueblo  
Karl Gabrielson – City of Trinidad  
Roy Gertson – Town of Buena Vista  
Gary Gibson – Crowley County  
Keith Goodwin – Otero County  
Frank Grant – Crowley County  
Kim Headley – Pueblo County (retired)  
Jim Hinkle – Otero County  
Scott Hobson – City of Pueblo

Frank Holman – Chaffee County  
Rick Kienitz – City of Aurora  
Gerald Knapp – City of Aurora Water  
Department  
Mike Leslie – City of Manitou Springs  
M. McHugh – City of Aurora  
Rich Muzzy – Pikes Peak Area Council  
of Governments  
Jim Sandoval – Otero County  
Carl Schaefer – Lake County  
Henry Schnabel – Prowers County  
Richard Scott – Kiowa County  
Tom Simpson – City of Aurora  
Larry Small - Fountain Creek  
Watershed, Flood Control and  
Greenway District  
Mike Stiehl – Fremont County  
Barbara Vidmar – City of Pueblo  
Frank Wallace – Bent County  
Julie Ann Woods – Pueblo County

### ***Tribal Officials***

See previous section.

### ***Organizations and Firms***

Ron Aschermann – Aurora Range  
Project  
Audubon Society  
Gary Barber – Two Rivers Water Co.  
LLC  
Janet Barnhart – Fremont Conservation  
District  
Michael Bartolo – Arkansas Valley  
Research Center  
Jeff Baylor – Las Animas Consolidated  
Ditch Company  
Richard Belt – XCEL Energy  
Ron Bergmann – West Maysville Ditch  
Douglas Brown – Water Technology  
Leader  
Scott Campbell – Twin Lakes Reservoir  
and Colorado Canal Company  
Anthony Cesar – Wagner Ditch  
*Chaffee County Times*  
Bruce Cogan – Cogan Day Ditch/Frantz  
Ditch

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Joe Cogan – Helena Ditch  
Coral Cosway – Atkins Global  
Cynthia Covell – Alperstein & Covell,  
P.C.  
Jill Crockett – JACOBS Engineering  
Jeris Danielson – Purgatoire River Water  
Conservancy District  
Paul Davis – Platte River Power  
Authority  
Roger Dekloe – Fountain Valley Sod  
Farm  
Dan DiRezza – Herman Klinkerman  
Ditch  
Ron Dorn – DeWeese Ditch and  
Reservoir Company  
Mike Drabing – Sundance Investments  
Chad Ellington – CH2MHill  
Earthjustice  
Marie Evans – Michigan Ditch  
Jim Felt – Felt, Houghton, Monson  
Greg Felt – ArkAnglers  
Nathan Fey – American Whitewater  
*Fishing and Hunting News*  
Paul Flack – Resource Based  
International  
Peter Fleming – Colorado River Water  
Conservation District  
Delbert Fountain – Fountain Livestock  
Randy Freed – Arkansas River  
Conservancy District  
Jay Frost – Frost Livestock  
Cathy Garcia – Action 22  
Mike Gaylord – Canon Heights  
Irrigation  
Gail Gonzales – Fruitland Ditch  
Bill Grassmick – Lower Arkansas Water  
Management Association  
Bob Hamel – Arkansas River Outfitters  
Association  
Mary Mead Hammond – Carlson,  
Hammond and Paddock, LLC  
Hanna Ranches  
Donny Hansen – Holbrook Mutual  
Irrigating Company  
Daniel Henrichs – High Line Canal  
Company/Arkansas Valley Ditch  
Association  
Howard Herrington – Riverside Dairy  
Ditch  
Don Higbee – Lower Arkansas Water  
Management Association  
Mike Hill – Bessemer Ditch  
Ernie Hofmeister – Lamar Canal  
Bob Houston – Parkdale Water  
Association  
Steve Howell – Ninyo and Moore  
Terry Howland – Amity Mutual  
Irrigation Company  
Jane Zinno – Joseph Corporation  
Dave Kaess – Otero Ditch Company  
Tony Keenan – Arkansas River  
Outfitters Association  
Doug Kemper – Colorado Water  
Congress  
John Kisiel – Housing and Building  
Association of Colorado Springs  
KKTV Television  
KMGH Television  
Ken Knox – URS Engineering  
Bruce Kroeker – TZA Engineers  
KOAA Television  
Bob Krassa – Krassa and Miller, LLC  
Eric Kuhn – Colorado River Water  
Conservation District  
KWAY Radio  
KXRM Radio  
La Junta *Tribune Democrat*  
*Lamar Ledger*  
*Leadville Herald Democrat*  
Stephen Leonhardt - Burns, Figa & Will,  
P.C.  
Fayne Long – East Florence Water  
Association  
Becky Long – Colorado Environmental  
Coalition  
Scott Lorenz – Arkansas Groundwater  
Users Association  
Kent Lusk – Riverside Water Company  
Malcome MacDougall - MacDougall,  
Woldridge & Worley, P.C.

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Deborah Marsicano – Park Center Water District

The Masciantonios – Wood Valley Ditch

Larry Mason – Oxford Ditch Company

Larry McElroy – Laguna Ditch

Brian McPeck – The Nature Conservancy

Bart Miller – Western Resources Advocates

Sally Miller - Cherry Creek Farms Lot Owner's Assn.

Matthew Moorhead – The Nature Conservancy

Glen Mullins – Gummar Ditch

Harry Nelson – Rocky Ford Ditch Company

Tasha Newland – Holland and Hart

David Nickum – Trout Unlimited

William Paddock – Carlson, Hammond & Paddock

Drew Peterzell – Trout Unlimited

Ray Petros – Petros and White

Thomas Pope – Riverside Dairy Ditch

Dwight Proctor – Potter Ditch

Purgatoire River Water Conservancy District

Bickel Randine – Sunset View Water Company

Scott Rappold – Colorado Springs Gazette

Robert Rawlings – *Pueblo Chieftain*

Jane Rawlings – *Pueblo Chieftain*

Jeffrey Reber – O'Neal Water Works

David Robbins – Hill and Robbins

Thomas Rusler – Bessemer Ditch

Tom Sanders – Beaver Park Water, Inc.

Nicole Seltzer – Colorado Foundation for Water Education

Lisa Sigler – Sigler Communications

John Sliman – Southwest Farms Inc.

Lowell Soester – Ewing-Koppe Ditch

Jason Sorter – Trout Unlimited

Robert Barr - Steele Ditches

T Cross Ranch

Colin Thompson – Amity Canal

Curtis Thompson – Merrick Company

Gary Thompson – WW Wheeler and Associates

Lavette Thorson-Whitney – Collier Ditch

Mary Lou Totten – Totten Ranch

Sam Turner – Canaday Canal/Turner Ranch

George Turner – Canon City and Oil Creek Ditch Company

Amy Van Horn – Fort Lyon Canal Company

Ross Vincent – Sierra Club Volunteers Outdoor Colorado

Tony Walisky – Riverside Water Association

Bill Warmack – Applegate Group Inc.

Dick Westmore – GEI Consultants

Rob White – Arkansas Headwaters Recreation Area

Mely Whiting – Trout Unlimited Wilderness Society

Thomas Williamsen – Helton and Williamsen, P.C.

Chris Woodka – *Pueblo Chieftain*

Lane Wyatt – Colorado Northwest Council of Governments

Eustice Zacher – Classon Ditch

Pam Zubeck – *Colorado Springs Independent*

### ***Interested Parties***

Ron Ackerman

Jeff Berman

David Brenn

Greg Brophy

Darrow Dennis

Kelly DiNatale

Bob Foltz

Howard Geller

German Gonzales

Rebecca Goodwin

George Gotto

Aaron Greco

Jason Hagerman

Jason Hayson

Randy Hayzlett

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Hal Holder  
Robin Jennison  
Aaron Johnson  
Elise Jones  
Anthony Lane  
Steve Lopez  
Dan Luecke  
Jim McCormick  
Wendy McDermott  
L. Medina  
Bart Mendenhall  
Curtis Miller  
Jay Moore  
J.L. Morris  
Rosa Nicole  
Tim Oliver  
John Orr  
Warren Paul  
Paula Plamer  
Yeshabet Quezada  
Jace Ratzlaff

D. Ready  
Sherry Richardson  
Jim Robinson  
Chandra Rosenthal  
Ron Sering  
Sloan Shoemaker  
John Singletary  
Greg Smith  
Jacob Smith  
Matt Snider  
Perla Sosa  
John Stansfield  
Bill Thiebaut  
Tom Tomky  
Jerry Unruh  
Ken Weber  
Shane Williams  
Naomi Yoder  
Josh Zaffos  
Rob Zuber

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