## Yellowstone River Reach Narratives

Reach PC8

CountyParkUpstream River Mile529ClassificationCM: Confined meanderingDownstream River Mile516.3

General Location Grey Owl to just below Mallard's Rest Length 12.70 mi (20.44 km)

## **Narrative Summary**

Reach PC8 extends from the Grey Owl fishing access site to just below Mallard's Rest. It is almost 13 miles long and is classified as confined meandering, indicating that it has somewhat of a sinuous planform but is largely confined by older terraces or bedrock. This is a remarkably stable reach that shows little evidence of channel migration. Even though migration rates are low, approximately 8 percent of the bankline has been armored by 7,500 feet of rock riprap and 2,760 feet of flow deflectors. About 3,200 feet of that armor was constructed since 2001.

Similar to other reaches in Park County, the extent of flood irrigation has dropped in the reach since 1950, and the amount of sprinkler and pivot irrigation has increased proportionately. There has also been a major expansion of exurban land uses in the reach from 14 acres in 1950 to 1,433 acres in 2011. By comparison, 220 acres are in flood, 170 acres in sprinkler, and 1,014 acres in pivot irrigation. The relative expansion of pivot irrigation in this reach is large compared to the rest of the Paradise Valley. About 30 acres of irrigated land are located within the Channel Migration Zone, and 14 of those are under pivot. In one case (RM 519.5) a pivot occupies the entire core of a meander bend.

The popularity of recreational fishing in this reach is exemplified by the seven boat ramps identified in this 13 mile stretch of river. Fishing Access Sites in this reach include Grey Owl, Paradise, Lock Leven, and Mallard's Rest.

This area of the upper Yellowstone River has seen three severe floods in the last 20 years. The 1996 and 1997 floods were very damaging, early-June events that peaked at 37,100 and 38,000 cfs, respectively. At the time, these were considered to be sequential 100-year floods. Then in late June of 2011, the river peaked at 40,600 cfs, which is currently the flood of record at Livingston. This flood exceeded a 100-year event, with both the 1996/1997 events now considered to have exceeded a 75-year flood.

A hydrologic evaluation of flow depletions indicates that flow alterations over the last century have been relatively small in this reach. The biggest influence has been on low flows: severe low flows described as 7Q10 (the lowest average 7-day flow anticipated every ten years) for summer months has dropped from an estimated 1,470 cfs to 1,430 cfs with human development, a reduction of 2.7 percent.

CEA-Related observations in Reach PC8 include:

- Major expansion from flood irrigation to pivot
- Conversion of agricultural land to exurban development
- Extensive armoring in naturally stable reach

Recommended Practices (may include Yellowstone River Recommended Practices--YRRPs) for Reach PC8 include:

•Channel Migration Zone (CMZ) management

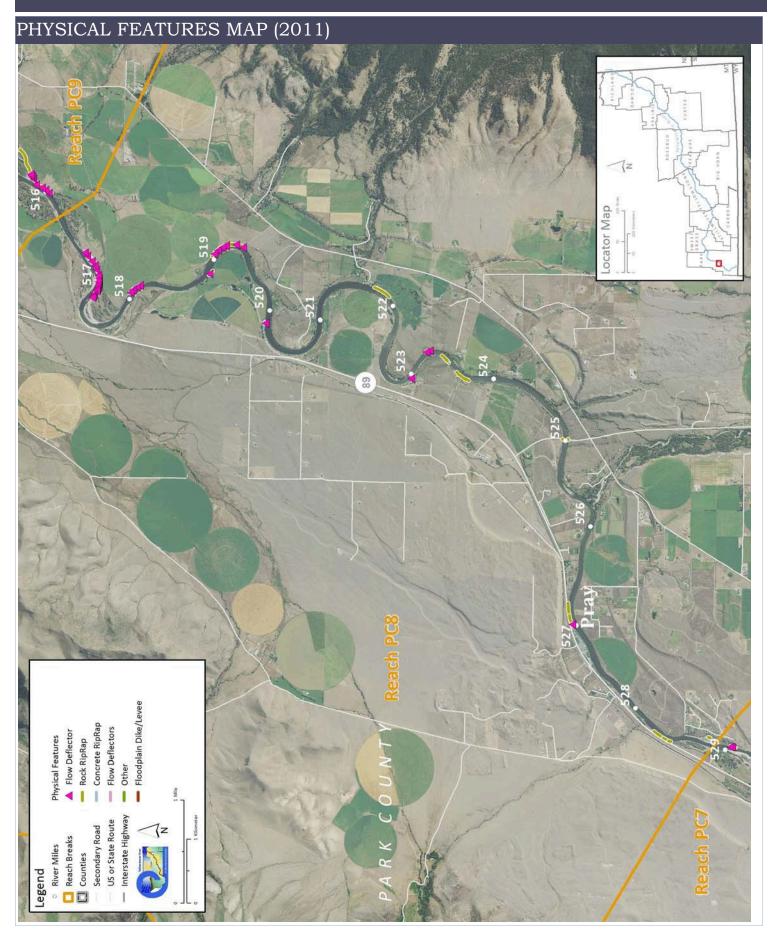
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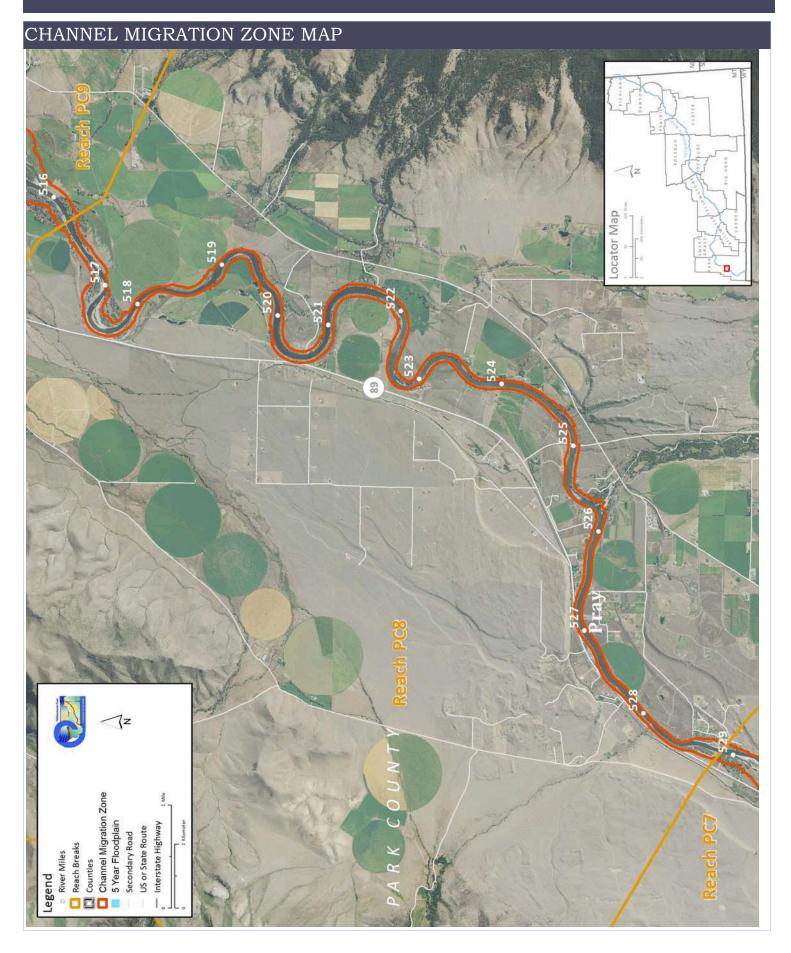
The following table summarizes some key CEA results that have been used to describe overall condition and types of human influences affecting the river. The values are specific to this single reach. Blanks indicate that a particular value was not available for this area. This information is consolidated from a large dataset that is presented in more detail in the full reach narrative report.

Discharge 2 Year (cfs) 100 Year (cfs)	Undev. 19,500 36,800	Developed 19,400 36,800	% Change -0.5% 0.0%	"Undeveloped" flows represent conditions prior to significant human development, whereas "developed" flows reflect the current condition of both consumptive and non-consumptive water use.				
Bankfull Channel Area (Ac)	<b>1950</b> 499.3	1976	1995	<b>2001</b> 497.1	<b>1950-200</b> -2.3		ful channel area is the total footprint of the inundated at approx. the 2-year flood.	
Rock RipRap Concrete Riprap Flow Deflectors Total	2011 Length (ft) 7,494 0 2,757 10,251	% of Bankline 5.6% 0.0% 2.1% 7.7%	2001-2011 Change 3,036 0 163 3,199	There are additional types of bank armor such as car bodies and steel retaining walls, but they are relatively minor.				
Length of Side Channels Blocked (ft)	Pre-1950s 0	Post-1950s 0		Numerous side channels have been blocked by small dikes.				
Floodplain Turnover  Total Acres  Acres/Year  Acres/Year/Valley Mile	1950 - 1976	1976 - 2001	rip	1950-2001 In-channel riparian encroachment tive number indicates retreat) acres  The rate of floodplain turnover reflects how many acres of land are eroded by the river. Tunover is associated with the creation of riparian habitat.				
Open Bar Area Change in Area '50 - '01 (Ac)	Point Bars	Bank Attached	Mid- Channel	Total	The type and extent of open sand and gravel bars reflect in- Total stream habitat conditions that can be important to fish, amphibians, and ground-nesting birds such as least terns.			
Floodplain Isolation 5 Year 100 Year	Acres	% of FP		Floodplain isolation refers to area that historically was flooded, but has become isolated do to flow alterations or physical features such as levees.				
Restricted Migration Area	Acres 14.5	% of CMZ 2%	_				rea and percent of the CMZ that has been vees, and transportation embankments.	
Land Use  Agricultural Land (Ac)  Ag. Infrastructure (Ac)  Exurban (Ac)  Urban (Ac)  Transportation (Ac)	1950 4,334.7 72.8 13.6 0.0 17.1	2011 2,838.2 100.0 1,433.0 3.5 63.7	Flood (A Sprinkle Pivot (A	Ac) 1 er (Ac)	1950 .,368.9 0.0 0.0	2011 221.1 171.1 1,014.3	Changes in land use reflect the development of the river corridor through time. The irrigated agricultural are is a sub-set of the mapped agricultural land.	
1950s Riparian Vegetation Converted to a Developed Land Use (ac)	To Irrigated	To Other Use	Total Rip. Converted	% of 1950s Rip.	Changes		nts of riparian vegetation are influenced by ithin the corridor.	
National Wetlands Inventory  Riverine Emergent Scrub/Shrub Russian Olive (2001) (Appx. 100-yr Floodplain)	3.3 43.2 1.6	Acres per Valley Mi 0.3 4.5 0.2	Wet Ac 48  Russian olive i		Wetlands units summarized from National Wetlands Inventory Mapping include Riverine (typically open water sloughs), Emergent (marshes and wet meadows) and Shrub-Scrub (open bar areas with colonizing woody vegetation).			
Riparian Forest at low risk of Cowbird Parasitism (Ac/Valley Mile)	0.7 1950	0.3% 1976	2004	Change Cowbirds are associated with agricultural and residential development, displacing native bird species by parasitizing their nests.				

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