

<b>County</b>	Dawson	<b>Upstream River Mile</b>	67.8
<b>Classification</b>	PCA: Partially confined anabranching	<b>Downstream River Mile</b>	56.3
<b>General Location</b>	Lowermost Dawson County, Richland County	<b>Length</b>	11.50 mi (18.51 km)

## Narrative Summary

Reach D10 is located in lowermost Dawson County and extends into upper Richland County. The reach is an 11.5 mile long Partially Confined Anabranching (PCA) reach type, indicating some valley wall influence and numerous forested islands.

In 2011 there were just about 730 feet of rock riprap in the reach armoring 0.6 percent of the total stream bank. Prior to that some armor had been lost; between 2001 and 2011, almost 500 feet of rock riprap and 1,050 feet of concrete riprap were destroyed. Some of the greatest damage was at RM 64.2L, where several hundred feet of flow deflectors were flanked, and now are in the river over 100 feet off of the bank. The remaining bank protection in this area continues to flank. Another is at RM 60, where the flanking of concrete riprap has been followed by over 200 feet of erosion behind the original armor.

Similar to many reaches in the Lower Yellowstone Valley, the river channel in Reach D10 has gotten smaller since 1950. The channel contracted by about 404 acres in this reach since 1950, and about 406 acres of riparian vegetation has encroached into old channel areas. This pattern has been consistent in the lower river, and relates primarily to a reduction in flows due to human development. The encroachment was at the expense of open gravel bars; between 1950 and 2001, the reach lost 151 acres of mid-channel bar habitat. Floodplain turnover rates have dropped as well; prior to 1976 measured floodplain turnover rates in this reach were 13.9 acres per year, and post-1976 rates were 7.0 acres per year.

Reach D10 has a relatively high concentration of mapped wetlands; the NWI mapping shows a total of 278 acres of mapped wetland, much of which is emergent marsh and wet meadow.

Land use is dominated by agriculture, with 230 acres of pivot irrigation development since 1950. Some of the irrigation development took place in historic riparian areas; a total of 457 acres of riparian lands were converted for agricultural and other land uses since 1950. This equates to 15 percent of the entire 1950 riparian footprint. There are 97 acres of land under pivot irrigation within the Channel Migration Zone (CMZ) of the river, making these areas especially prone to river erosion.

About 38 percent of the historic 5-year floodplain has become isolated, primarily due to flow alterations.

Reach D10 was sampled as part of the avian study. A total of 57 species were identified in the reach, indicating relatively high bird species richness on the Yellowstone River. Four species identified are considered Potential Species of Concern (PSOC) by the Montana Natural Heritage Center: The Black and White Warbler, Dickcissel, Ovenbird, and Plumbeous Vireo. The Red-headed Woodpecker was also identified which is a Species of Concern. Similar to Reach D9 upstream, Reach D10 has seen an increase in the amount of forest area considered at low risk of cowbird parasitism. In 1950, there were 92 acres per valley mile of such forest, and by 2001, that number had increased to 112 acres per valley mile.

There are about 12 acres of mapped Russian olive in the reach.

A hydrologic evaluation of flow depletions indicates that flow alterations over the last century have been major in this reach. The 2-year flood, which strongly influences overall channel form, has dropped by 22 percent. Low flows have also been impacted; severe low flows described as 7Q10 (the lowest average 7-day flow anticipated every ten years) for summer months has dropped from an estimated 4,850 cfs to 2,810 cfs with human development, a reduction of 43 percent. More typical summer low flows, described as the summer 95% flow duration, have dropped from 6,940 cfs under unregulated conditions to 3,270 cfs under regulated conditions, a reduction of 53 percent.

CEA-Related observations in Reach D10 include:

- Armor flanking and accelerated erosion behind

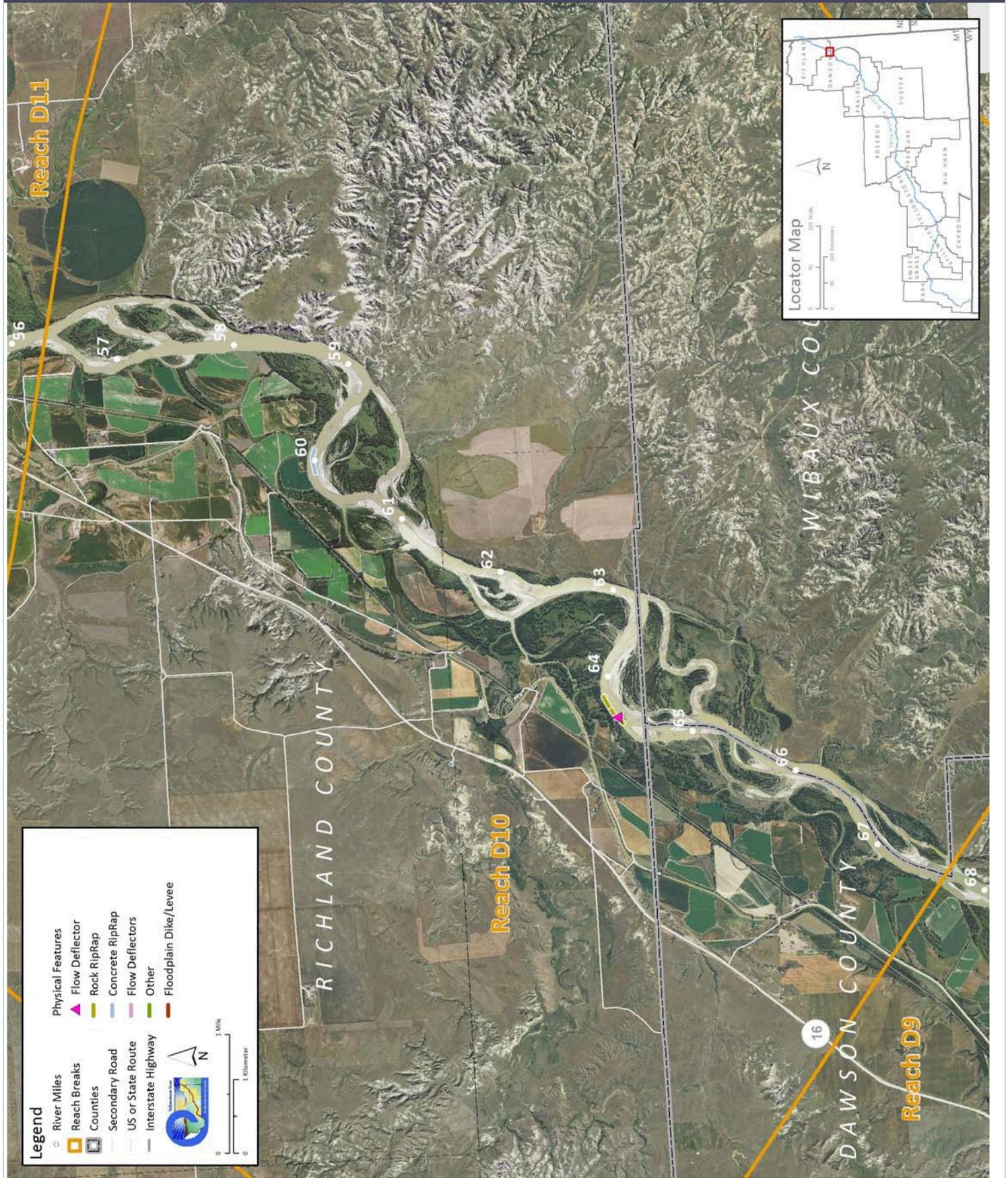
Recommended Practices (May include Yellowstone River Recommended Practices--YRRPs) for Reach D10 include:

- Removal of flanked armor at RM 60 and RM 64.2L
- Russian olive removal

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.

<b>Discharge</b>	<b>Undev.</b>	<b>Developed</b>	<b>% Change</b>	<b>"Undeveloped" flows represent conditions prior to significant human development, whereas "developed" flows reflect the current condition of both consumptive and non-consumptive water use.</b>		
2 Year (cfs)	69,700	54,200	-22.2%			
100 Year (cfs)	144,000	130,000	-9.7%			
<b>Bankfull Channel Area (Ac)</b>	<b>1950</b>	<b>1976</b>	<b>1995</b>	<b>2001</b>	<b>1950-2001</b>	<b>Bankfull channel area is the total footprint of the river inundated at approx. the 2-year flood.</b>
	1,843.3	1,737.0	1,544.0	1,439.2	-404.1	
<b>Physical Features</b>	<b>2011 Length (ft)</b>	<b>% of Bankline</b>	<b>2001-2011 Change</b>	<b>There are additional types of bank armor such as car bodies and steel retaining walls, but they are relatively minor.</b>		
Rock Riprap	728	0.6%	-447			
Concrete Riprap	0	0.0%	-1,051			
Flow Deflectors	0	0.0%	0			
<b>Total</b>	<b>728</b>	<b>0.6%</b>	<b>-1,498</b>			
<b>Length of Side Channels Blocked (ft)</b>	<b>Pre-1950s</b>	<b>Post-1950s</b>	<b>Numerous side channels have been blocked by small dikes.</b>			
	0	0				
<b>Floodplain Turnover</b>	<b>1950 - 1976</b>	<b>1976 - 2001</b>	<b>1950-2001 In-channel riparian encroachment (negative number indicates retreat)</b>	<b>The rate of floodplain turnover reflects how many acres of land are eroded by the river. Turnover is associated with the creation of riparian habitat.</b>		
Total Acres	361.0	174.9				
Acres/Year	13.9	7.0				
Acres/Year/Valley Mile	1.5	0.8	405.87 acres			
<b>Open Bar Area</b>	<b>Point Bars</b>	<b>Bank Attached</b>	<b>Mid-Channel</b>	<b>Total</b>	<b>The type and extent of open sand and gravel bars reflect in-stream habitat conditions that can be important to fish, amphibians, and ground-nesting birds such as least terns.</b>	
Change in Area '50 - '01 (Ac)	36.4	1.8	-150.8	-112.6		
<b>Floodplain Isolation</b>	<b>Acres</b>	<b>% of FP</b>	<b>Floodplain isolation refers to area that historically was flooded, but has become isolated do to flow alterations or physical features such as levees.</b>			
5 Year	818.1	38%				
100 Year	650.9	13%				
<b>Restricted Migration Area</b>	<b>Acres</b>	<b>% of CMZ</b>	<b>Channel Migration Zone restrictions refer to the area and percent of the CMZ that has been isolated by features such as bank armor, dikes, levees, and transportation embankments.</b>			
	52.1	1%				
<b>Land Use</b>	<b>1950</b>	<b>2011</b>	<b>1950</b>	<b>2011</b>	<b>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.</b>	
Agricultural Land (Ac)	4,586.0	5,330.0	Flood (Ac)	722.6	1,275.4	
Ag. Infrastructure (Ac)	44.1	52.6	Sprinkler (Ac)	0.0	0.0	
Exurban (Ac)	0.0	5.7	Pivot (Ac)	0.0	229.5	
Urban (Ac)	0.0	0.0				
Transportation (Ac)	25.7	25.7				
<b>1950s Riparian Vegetation Converted to a Developed Land Use (ac)</b>	<b>To Irrigated</b>	<b>To Other Use</b>	<b>Total Rip. Converted</b>	<b>% of 1950s Rip.</b>	<b>Changes in the extents of riparian vegetation are influenced by land use changes within the corridor.</b>	
	455.3	2.2	457.5	15.0%		
<b>National Wetlands Inventory</b>	<b>Acres</b>	<b>Acres per Valley Mi</b>	<b>Total Wetland Acres</b>	<b>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).</b>		
Riverine	21.6	2.3	<b>278.7</b>			
Emergent	136.8	14.7				
Scrub/Shrub	120.4	12.9				
<b>Russian Olive (2001) (Appx. 100-yr Floodplain)</b>	<b>Acres</b>	<b>%</b>	<b>Russian olive is considered an invasive species and its presence in the corridor is fairly recent. Its spread can be used as a general indicator of invasive plants within the corridor.</b>			
	11.9	0.2%				
<b>Riparian Forest at low risk of Cowbird Parasitism (Ac/Valley Mile)</b>	<b>1950</b>	<b>1976</b>	<b>2001</b>	<b>Change 1950-2011</b>	<b>Cowbirds are associated with agricultural and residential development, displacing native bird species by parasitizing their nests.</b>	
	92.0	111.0	111.8	19.8		

## PHYSICAL FEATURES MAP (2011)



## CHANNEL MIGRATION ZONE MAP

