

<b>County</b>	Dawson	<b>Upstream River Mile</b>	118.1
<b>Classification</b>	PCM/I: Partially confined meandering/islands	<b>Downstream River Mile</b>	107.1
<b>General Location</b>	Hoyt	<b>Length</b>	11.00 mi (17.70 km)

### Narrative Summary

Reach D4 is located in western Dawson County. The reach is 11 miles long and has a meandering planform with forested islands that formed where meanders have cut off.

Approximately 1,500 feet of bank armor have been mapped in the reach, including 920 feet of rock riprap and 590 feet of concrete riprap. This armor collectively covers about 1.3 percent of the bankline.

Prior to 1950, a side channel on the south floodplain at RM 110.8R was blocked by a small dike. This channel remnant is about a mile and a half long and currently has blockages at its middle and lower end.

Similar to many reaches in the Lower Yellowstone Valley, the river channel in Reach D4 has gotten smaller since 1950. The channel contracted by about 115 acres in this reach since 1950, and about 84 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. Although there has been net encroachment of riparian vegetation, most of this cover is either shrub or open timber. The extent of closed timber dropped from 371 acres in 1950 to 191 acres in 2001.

Land use is predominantly agricultural, with about 180 acres of pivot irrigation development since 1950. About 20 acres of land in pivot irrigation has encroached into the Channel Migration Zone (CMZ), making it especially susceptible to damage by river erosion. Although there has been extensive pivot development, most irrigated land had remained in flood irrigation in 2011 (2,300 acres). Approximately 125 acres of flood irrigated land is within the CMZ.

One solid waste dump site was mapped on the right bank at RM 117.8L. Animal handling facilities (corral complexes) were mapped within a few thousand feet of the river at RM 112.2R, RM 114L, and RM 116L.

About 195 acres or 46 percent of the historic 5-year floodplain has become isolated, primarily due to flow alterations.

There are 16 acres of mapped Russian olive in the reach. Most of the Russian olive is in tributary drainages that flow into the Yellowstone River from the north.

Due to a reduction in the extent of closed timber with time, the extent of riparian forest considered at low risk of cowbird parasitism in Reach D4 has been reduced since 1950. At that time, there were 36.5 acres per mile of forest considered less prone to cowbirds, but by 2001 that had dropped to 14.7 acres per mile of such forest.

One ice jam was recorded in Reach D4. On March 4, 1994, a breakup jam forced local evacuations due to flooding.

Bluff pools and terrace pools make up 22 percent of the low flow fish habitat mapped in the reach, indicating that this reach may provide important areas for fish species that prefer this habitat type.

A hydrologic evaluation of flow depletions indicates that flow alterations over the last century have been major in this reach. The magnitude of the 100-year flood is now 121,000 cfs, or 14 percent lower than it was pre-development. 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 4,800 cfs to 2,730 cfs with human development, a reduction of 43 percent. More typical summer low flows, described as the summer 95% flow duration, have dropped from 6,980 cfs under unregulated conditions to 3,220 cfs under regulated conditions, a reduction of 54 percent.

Seasonal low flows have increased by 63 percent in the winter and 76 percent in the fall.

CEA-Related observations in Reach D4 include:

- Increased risk of cowbird parasitism with loss of closed timber

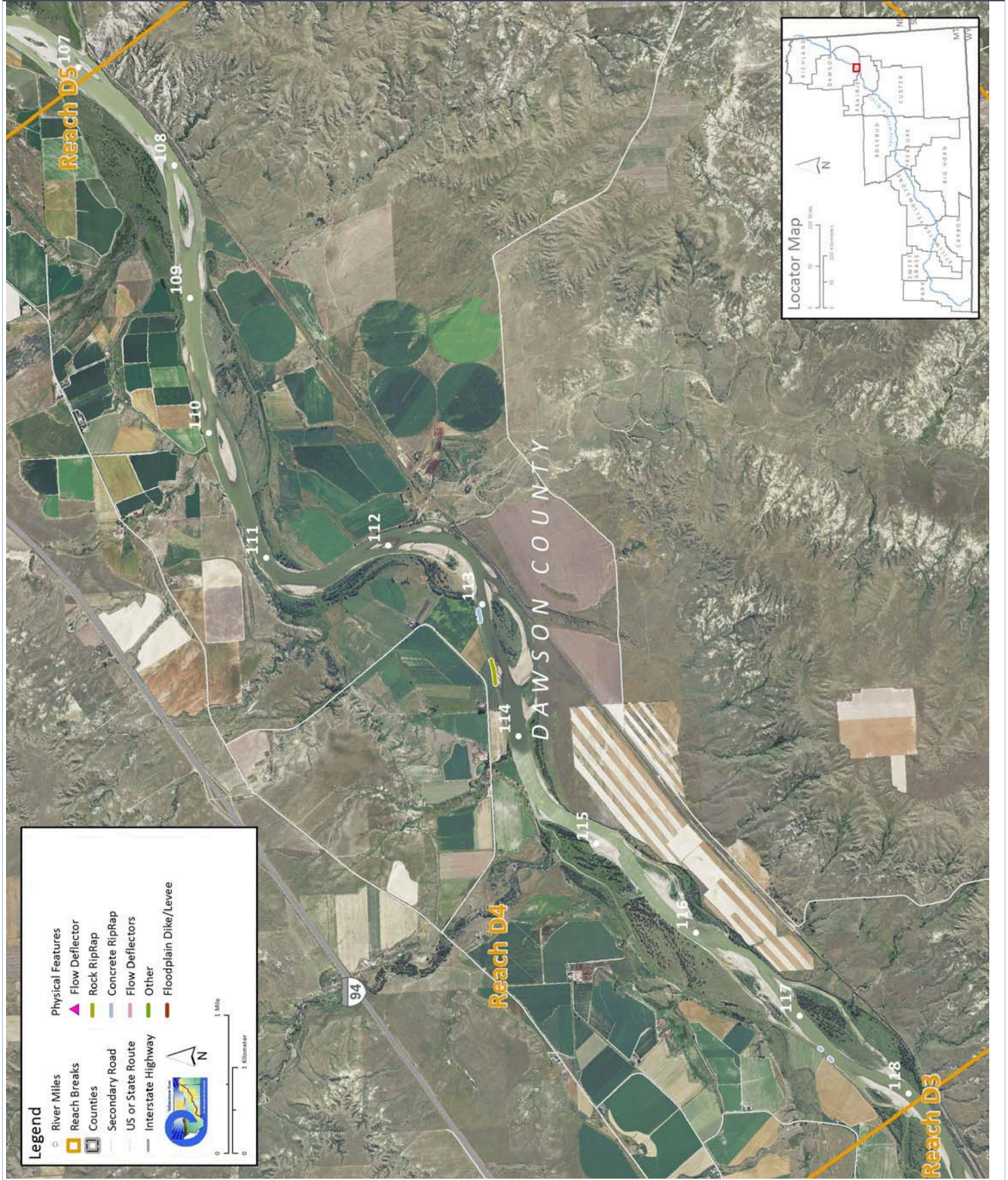
Recommended Practices (may include Yellowstone River Recommended Practices--YRRPs) for Reach D4 include:

- Side channel reactivation at RM 110.3R
- Solid waste (dump site) removal at RM 117.8L
- Russian olive removal
- Nutrient management at corral complexes at RM 112.2R, RM 114L, and RM 116L

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)	69,100	53,900	-22.0%			
100 Year (cfs)	145,000	124,000	-14.5%			
<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>
	1,349.9	1,279.9	1,230.5	1,234.4	-115.5	
<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	921	0.8%	921			
Concrete Riprap	587	0.5%	587			
Flow Deflectors	0	0.0%	0			
<b>Total</b>	<b>1,509</b>	<b>1.3%</b>	<b>1,509</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>			
	8,549	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	143.9	90.3	84.53 acres			
Acres/Year	5.5	3.6				
Acres/Year/Valley Mile	0.5	0.4				
<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)	-1.2	70.4	-36.2	33.1		
<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	194.6	46%				
100 Year	97.9	8%				
<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>			
	55.2	2%				
<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)	7,623.1	7,894.5	Flood (Ac)	1,601.4	2,320.7	
Ag. Infrastructure (Ac)	75.0	142.8	Sprinkler (Ac)	0.0	44.1	
Exurban (Ac)	0.0	0.0	Pivot (Ac)	0.0	180.0	
Urban (Ac)	0.0	0.0				
Transportation (Ac)	87.6	86.8				
<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>	
	3.1	0.2	3.3	0.0%		
<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	8.0	0.8	135.5			
Emergent	103.2	10.1				
Scrub/Shrub	24.3	2.4				
<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>			
	16.3	1.6%				
<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>	
	36.5	23.4	14.7	-21.8		

## PHYSICAL FEATURES MAP (2011)



## CHANNEL MIGRATION ZONE MAP

