

County	Yellowstone	Upstream River Mile	340.6
Classification	UB: Unconfined braided	Downstream River Mile	331.8
General Location	To Pompey's Pillar	Length	8.80 mi (14.16 km)

Narrative Summary

Reach B7 is located just upstream of Pompey's Pillar. The Reach is almost nine miles long and is currently largely unconfined with a primary channel thread and numerous mid-channel bars and point bars. In the 1950's, the main channel flowed more closely along the north valley wall; southward migration since that time has reduced the influence of the valley wall on stream geomorphology. The valley is wide in this area, which is typical where the bounding rock units are made up of the relatively erodible Cretaceous-age Bearpaw shale.

Only 290 feet of the streambank in Reach B7 is armored, and no side channels have been blocked.

Land uses in the reach are primarily agricultural, with about 1,340 acres of flood irrigated land mapped as of 2011. The Channel Migration Zone (CMZ) has been developed for primarily flood irrigation; as of 2011, there were 390 acres of flood irrigated land in the CMZ, and about 4 percent of the total CMZ footprint has become restricted by bank armor and road prisms. The modern 5-year floodplain contains over 275 acres of flood-irrigated ground.

Reach B7 shows major southward migration of the river since 1950, with one area experiencing over 1,600 feet of migration over the past 60 years. The river has gained length, and the valley wall influence has become much less prevalent, as virtually all migration in this and adjacent reaches has been to the south. Since 1950 this section of river has lost almost 20,000 feet of anabranching channel length, and there is no strong indication that this loss is directly associated with floodplain dikes. Rather, it appears that significant lengths of anabranching channels were passively abandoned, which may be the consequence of a 19 percent reduction in the mean annual flood due to human influences.

South of the river over 600 acres of historic 100-year floodplain have been isolated from the river by the railroad. This includes a very broad area between the railroad and Interstate that will likely remain isolated since it is over 3,000 feet from the modern river. This area represents 22 percent of the total historic 100-year floodplain area.

The mouth of Arrow Creek is in Reach B7, and the lower portion of the creek has been captured by the river, shortening the tributary and likely driving downcutting upstream.

Reach B7 has 56 mapped acres of Russian olive that can be found in dense stands, however the extensive lateral migration of the river has promoted extensive recruitment of new woody riparian habitat. Since the 1950s there has been about 640 acres of riparian recruitment in the reach. The acreage of recruitment has exceeded that of erosion of riparian areas by 131 acres. Additionally, there are 260 mapped wetlands in the reach, including 135 acres of wet meadows and marsh.

Reach B7 was sampled as part of the avian study. The average species richness in this reach was 8.8, which indicates the average number of species observed during site visits to the reach in cottonwood habitats. The average species richness for sites evaluated is 8. One bird species identified by the Montana Natural Heritage Program as a Potential Species of Concern (PSOC) was identified, the Dickcissel. Another species identified as a Species of Concern (SOC) was identified, the Red-headed Woodpecker.

A hydrologic evaluation of flow depletions indicates that flow alterations over the last century have been major in this reach. The mean annual flood is estimated to have dropped from 27,200 cfs to 22,100 cfs, a drop of about 19 percent. The 2-year flood, which strongly influences overall channel form, has dropped by 11 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 3,010 cfs to 2,060 cfs with human development, a reduction of 32 percent. More typical summer low flows, described as the summer 95% flow duration, have dropped from 3,846 cfs under unregulated conditions to 2,227 cfs under regulated conditions at the Billings gage, a reduction of 42 percent.

Because of the flow alterations, about 28 percent of the 5-year floodplain has become isolated in Reach B7. Much of that 5-year floodplain isolation is within irrigated fields on the south side of the river.

CEA-Related observations in Reach B7 include:

- Migration away from valley wall resulting in loss of bluff pool habitat.
- Passive abandonment of anabranching channels likely associated with reduced mean annual flows.
- Rapid channel migration through cleared, often flood irrigated fields.

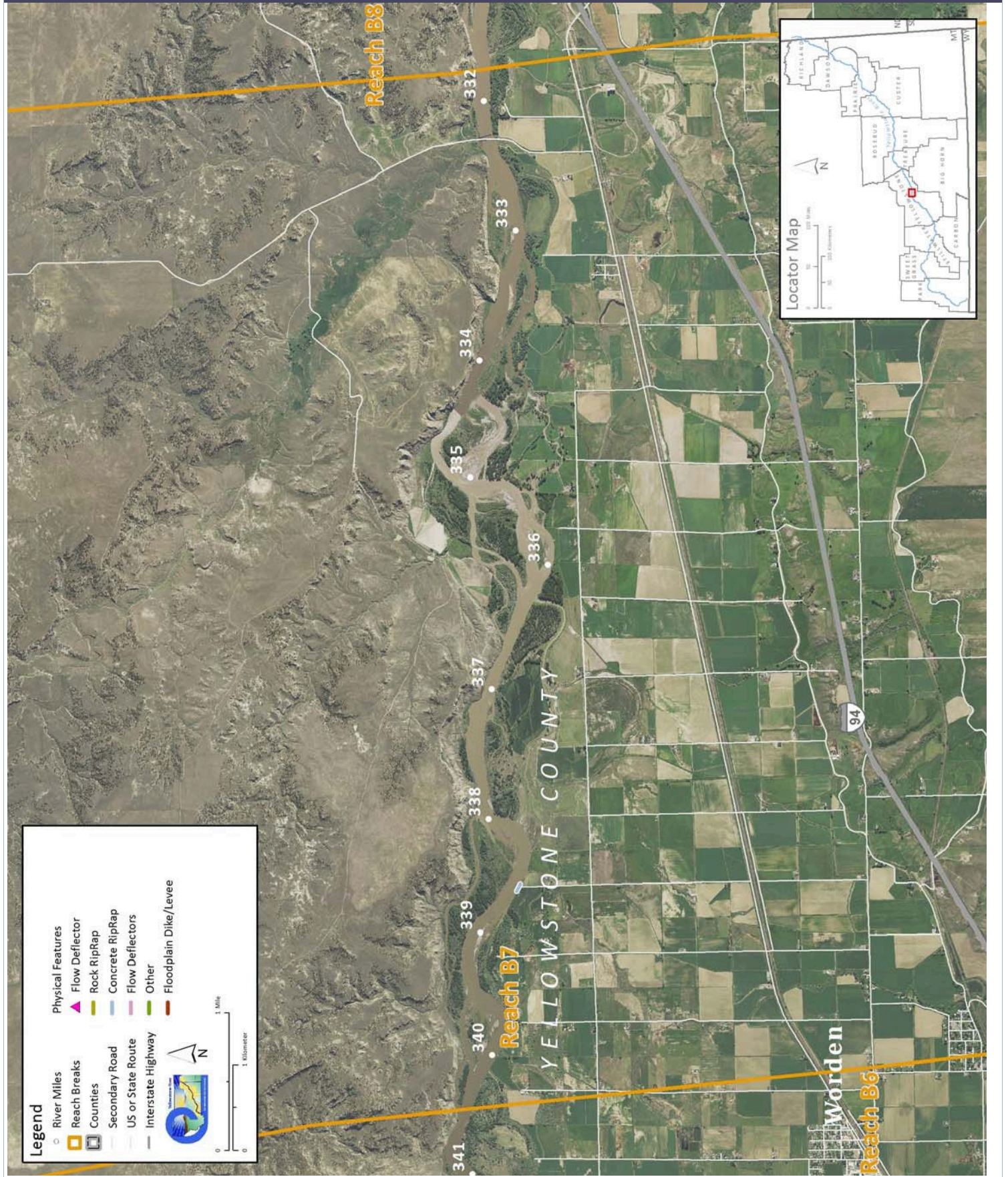
Recommended Practices (may include Yellowstone River Recommended Practices--YRRPs) for Reach B7 include:

- 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.

Discharge	Undev.	Developed	% Change	"Undeveloped" flows represent conditions prior to significant human development, whereas "developed" flows reflect the current condition of both consumptive and non-consumptive water use.		
2 Year (cfs)	50,400	44,900	-10.9%			
100 Year (cfs)	88,800	85,600	-3.6%			
Bankfull Channel Area (Ac)	1950	1976	1995	2001	1950-2001	Bankfull channel area is the total footprint of the river inundated at approx. the 2-year flood.
	956.1	958.6	834.0	914.6	-41.5	
Physical Features	2011 Length (ft)	% of Bankline	2001-2011 Change	There are additional types of bank armor such as car bodies and steel retaining walls, but they are relatively minor.		
Rock RipRap	0	0.0%	0			
Concrete Riprap	289	0.3%	0			
Flow Deflectors	0	0.0%	0			
Total	289	0.3%	0			
Length of Side Channels Blocked (ft)	Pre-1950s	Post-1950s	Numerous side channels have been blocked by small dikes.			
	0	0				
Floodplain Turnover	1950 - 1976	1976 - 2001	1950-2001 In-channel riparian encroachment (negative number indicates retreat)		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.	
Total Acres	319.9	255.1	130.84 acres			
Acres/Year	12.3	10.2				
Acres/Year/Valley Mile	1.6	1.3				
Open Bar Area	Point Bars	Bank Attached	Mid-Channel	Total	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.	
Change in Area '50 - '01 (Ac)						
Floodplain Isolation	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.			
5 Year	611.4	28%				
100 Year	699.0	22%				
Restricted Migration Area	Acres	% of CMZ	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.			
	124.7	4%				
Land Use	1950	2011	1950	2011	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.	
Agricultural Land (Ac)	4,646.5	4,391.6	Flood (Ac)	1,212.2	1,339.3	
Ag. Infrastructure (Ac)	60.6	187.9	Sprinkler (Ac)	0.0	0.0	
Exurban (Ac)	0.0	58.4	Pivot (Ac)	0.0	0.0	
Urban (Ac)	0.0	0.0				
Transportation (Ac)	53.6	60.9				
1950s Riparian Vegetation Converted to a Developed Land Use (ac)	To Irrigated	To Other Use	Total Rip. Converted	% of 1950s Rip.	Changes in the extents of riparian vegetation are influenced by land use changes within the corridor.	
	37.7	4.9	42.6	4.0%		
National Wetlands Inventory	Acres	Acres per Valley Mi	Total Wetland Acres	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).		
Riverine	11.1	1.5	256.9			
Emergent	135.1	17.8				
Scrub/Shrub	110.7	14.6				
Russian Olive (2001) (Appx. 100-yr Floodplain)	Acres	%	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.			
	55.7	2.2%				
Riparian Forest at low risk of Cowbird Parasitism (Ac/Valley Mile)	1950	1976	2001	Change 1950-2011	Cowbirds are associated with agricultural and residential development, displacing native bird species by parasitizing their nests.	
	9.2	3.0	6.4	-2.8		

PHYSICAL FEATURES MAP (2011)



CHANNEL MIGRATION ZONE MAP

