

<b>County</b>	Yellowstone	<b>Upstream River Mile</b>	354
<b>Classification</b>	UA: Unconfined anabranching	<b>Downstream River Mile</b>	346.7
<b>General Location</b>	Huntley: includes Spraklin Island	<b>Length</b>	7.30 mi (11.75 km)

### Narrative Summary

Reach B5 is 7.4 miles long and is located near Huntley and Spraklin Island. The reach is an Unconfined Anabranching (UA) reach type, which indicates little influence by the valley wall coupled with relatively extensive forested islands and side channels. These reach types tend to be the most dynamic within the river corridor. Reach B5 flows northward through a wide valley section where the relatively erodible Bearpaw shale has retreated over geologic time, leaving an unusually broad river corridor. In Reach B5 the river crosses the valley from south to north, further contributing to the lack of confinement and allowance for channel migration.

About 12 percent of the bankline in Reach B5 is armored. In 2011, there was about a mile of concrete riprap, a half mile of rock riprap, and 1,500 feet of flow deflectors in the reach. Over the decade prior to that, however, 1,200 feet of concrete riprap and 1,150 feet of flow deflectors had eroded out, and 2,000 feet of rock riprap built, indicating a tendency for concrete and flow deflectors to fail coupled by an overall shift towards rock riprap bank protection between 2001 and 2011.

One of the most spectacular examples of barb failures on the Yellowstone River is in Reach B5, where about 1,300 feet of barbs on the left bank just downstream of the Huntley Bridge were flanked between 2001 and 2005. The river then migrated about 200 feet behind the barbs and the bank has since been armored with rock riprap. The flanked barbs remain visible in the middle of the river in 2011 imagery. Another barb was flanked on the left bank at RM 350, and is prominently exposed 65 feet off of the bank. In the lowermost end of the reach at RM 347, about 900 feet of concrete armor was flanked on the right bank, and the river is now up to 200 feet behind the armor, migrating rapidly to the east. This area has seen over 800 feet of river migration since 1950.

Prior to 1950, about 11,400 feet of side channels were blocked in the reach by small dikes. These channels are on both sides of the river just downstream of the Huntley Bridge at RM 352.5. Further downstream at RM 348 there are numerous older swales south of the river that are also blocked.

Land uses in the reach are primarily agricultural, with about 1,300 acres of flood irrigated land mapped as of 2011. There are also almost 600 acres of urban/exurban development. The Channel Migration Zone (CMZ) has been developed for multiple land uses; as of 2011, there were 389 acres of flood irrigation, 24 acres of urban/exurban land, and 10 acres of transportation infrastructure within the CMZ. About 14 percent of the total CMZ footprint has become restricted by bank armor and road prisms.

Trash dumps have been mapped on the left stream bank at RM 351.2, and up on the north bluff at RM 347.1. One large animal handling facility was mapped about 800 feet south of the river at RM 347.8.

About 55 acres of Russian olive have been mapped in Reach B5. The reach also hosts over 200 acres of mapped wetland areas, about 170 acres of which are emergent marshes and wet meadows.

Riparian recruitment in the reach has exceeded 500 acres since 1950; about half of that recruitment occurred in areas that were 1950s channel and the other half in areas that were eroded between 1950 and 2001.

Reach B5 was sampled as part of the avian study. The average species richness in this reach was 8.4, 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. Two bird species identified by the Montana Natural Heritage Program as Potential Species of Concern (PSOC) were also found, the Plumbeous Vireo and the Ovenbird.

A hydrologic evaluation of flow depletions indicates that flow alterations over the last century have been substantial in this reach. The mean annual flood is estimated to have dropped from 25,600 cfs to 21,200 cfs, a drop of about 17 percent. The 2-year flood, which strongly influences overall channel form, has dropped from 47,400 cfs to 42,600 cfs, which is a reduction of 10 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 3,000 cfs to 2,050 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 22 percent of the 5-year floodplain has become isolated in Reach B5.

CEA-Related observations in Reach B5 include:

- Flanking of flow deflectors and concrete riprap
- Blockage of over two miles of side channel pre-1950

Recommended Practices (may include Yellowstone River Recommended Practices--YRRPs) for Reach B5 include:

- Side channel restoration at RM 352.5
- Flanked flow deflector removal at RM 352.5 and 350.0
- CMZ management due to development within CMZ footprint
- Russian olive removal

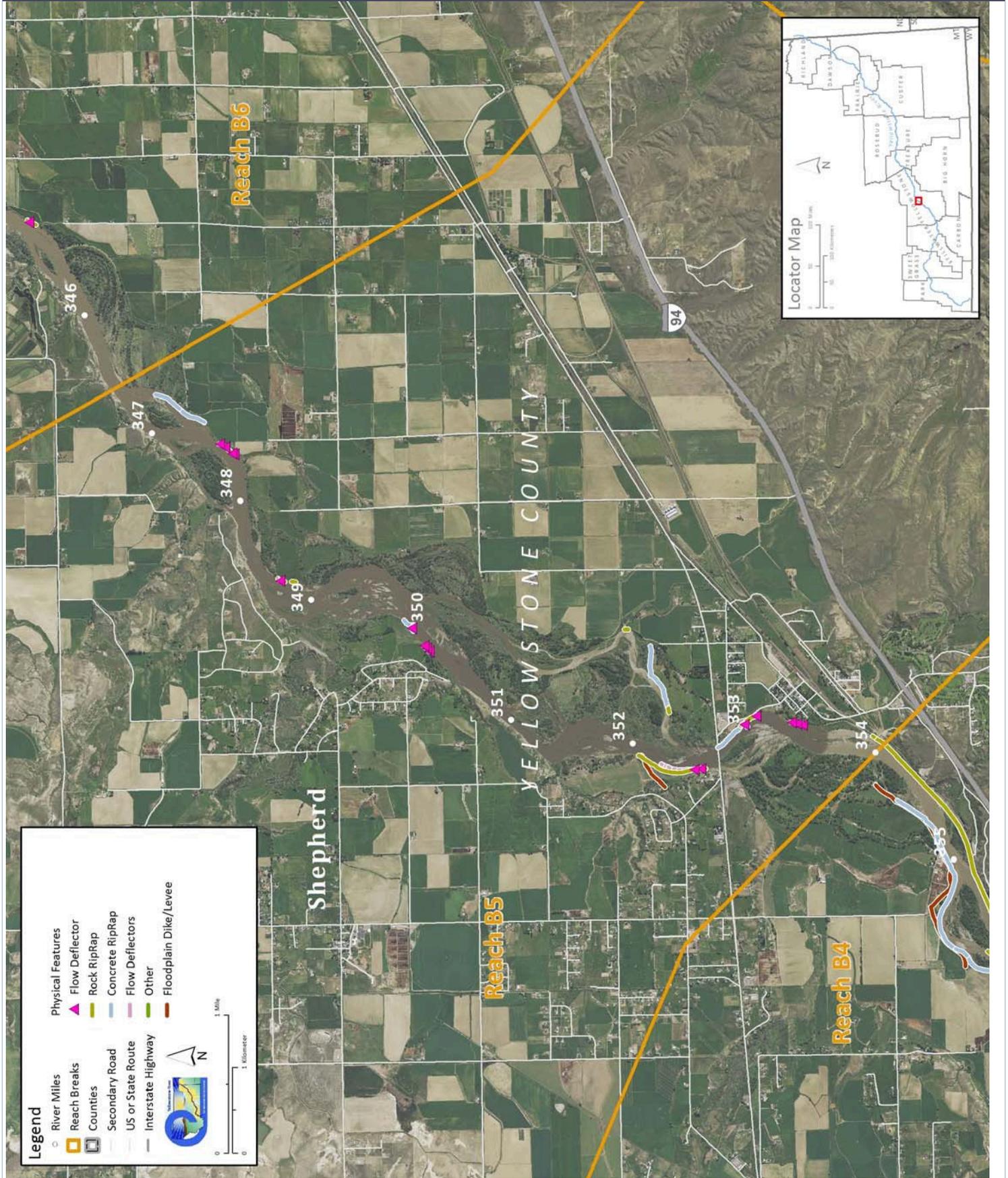
- Nutrient management at animal handling facility at RM 347.8.
- Solid waste removal at RM 351.2L and 347.1L



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)	47,400	42,600	-10.1%			
100 Year (cfs)	84,000	81,200	-3.3%			
<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>
	890.9	992.2	897.6	1,031.9	140.9	
<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	2,399	3.1%	1,847			
Concrete Riprap	5,361	6.8%	-1,218			
Flow Deflectors	1,550	2.0%	-1,153			
<b>Total</b>	<b>9,310</b>	<b>11.9%</b>	<b>-523</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>			
	11,393	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	312.0	278.7	-56.24 acres			
Acres/Year	12.0	11.1				
Acres/Year/Valley Mile	1.9	1.8				
<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>	
<b>Change in Area '50 - '01 (Ac)</b>						
<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	253.4	22%				
100 Year	12.4	1%				
<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>			
	396.2	14%				
<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)	3,731.1	3,041.4	Flood (Ac)	920.7	1,271.2	
Ag. Infrastructure (Ac)	92.8	159.3	Sprinkler (Ac)	0.0	0.0	
Exurban (Ac)	63.0	567.5	Pivot (Ac)	0.0	0.0	
Urban (Ac)	0.0	0.0				
Transportation (Ac)	45.0	48.6				
<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>	
	65.9	22.2	88.1	7.0%		
<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	17.7	2.8	<b>239.8</b>			
Emergent	169.8	27.1				
Scrub/Shrub	52.3	8.3				
<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>			
	54.5	3.2%				
<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>	
	3.5	1.2	0.7	-2.8		

## PHYSICAL FEATURES MAP (2011)



## CHANNEL MIGRATION ZONE MAP

