

County	Custer	Upstream River Mile	180.5
Classification	PCS: Partially confined straight	Downstream River Mile	177.3
General Location	Downstream of Miles City	Length	3.20 mi (5.15 km)

Narrative Summary

Reach C18 is 3.2 miles long and is located just downstream of Miles City. It is a Partially Confined Straight reach type, as the river flows over steep bedrock shelves that create a series of rapids between Miles City and a few miles above Kinsey Bridge. The river flows along the north bluff line through the whole reach, and has consistently maintained this course since at least 1950.

Reach C18 has no mapped bank armor which is indicative of the natural stability provided to this reach by erosion-resistant bedrock. The 2001 physical features inventory identified 1,742 feet of bedrock outcrop in the reach. A total of three discreet sets of rapids were mapped in the reach, all of which have been described as part of the Buffalo Shoals (RM 180, RM 179.9, and RM 178.2).

Between 1950 and 2001 there was about 26 net acres of riparian encroachment into the channel, and the bankfull channel area decreased by ~30 acres, indicating a diminishing river size over the last half-century. This trend is common below the mouth of the Bighorn River, where flow alterations have reduced peak flows and cause the active river channel to shrink. Consumptive water uses, primarily associated with irrigation, have contributed to the reduced flows.

Prior to 1950, a side channel that was just over 1,000 feet long appears to have been blocked at RM 179. There are currently several blockages across this old channel, including two roads that access a large gravel pit on the right bank of the river. This gravel pit at RM 178.4 is partly within the Channel Migration Zone (CMZ) of the river. Although the channel showed clear expression in the 1950s imagery, it is not very visible in the 2011 imagery, suggesting that restoring this feature may be difficult.

About 20 percent of the total 100-year floodplain has become isolated due to human development, and most of the isolation appears to be due to flow alterations rather than floodplain dikes. The 5-year floodplain is even more affected; 59 percent of the historic 5-year floodplain is no longer inundated at that frequency.

Land use is dominated by flood irrigation with additional gravel pit development (mapped as exurban industrial) and transportation infrastructure. There is one Fishing Access Site at Kinsey Bridge. There are two animal handling facilities north of the river that are within several hundred feet of the streambank; both are downstream of Kinsey Bridge, at RM 166.2 and RM 167.8.

There are 65 acres of Russian olive in the reach, most of which is on the south side of the river away from the bluff line to the north. Over half of the low-flow fish habitat in this reach is bluff pool, potentially making it important for fish with bluff pool habitat preferences.

A hydrologic evaluation of flow depletions indicates that flow alterations over the last century have been major in this reach. The 100-year flood has dropped by 19 percent. The 2-year flood, which strongly influences overall channel form, has dropped by 24 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 5,100 cfs to 3,180 cfs with human development, a reduction of 38 percent. More typical summer low flows, described as the summer 95% flow duration, have dropped from 6,730 cfs under unregulated conditions to 3,530 cfs under regulated conditions, a reduction of 48 percent.

CEA-Related observations in Reach C18 include:

- Natural channel stability provided by bedrock
- Minimal bank armoring

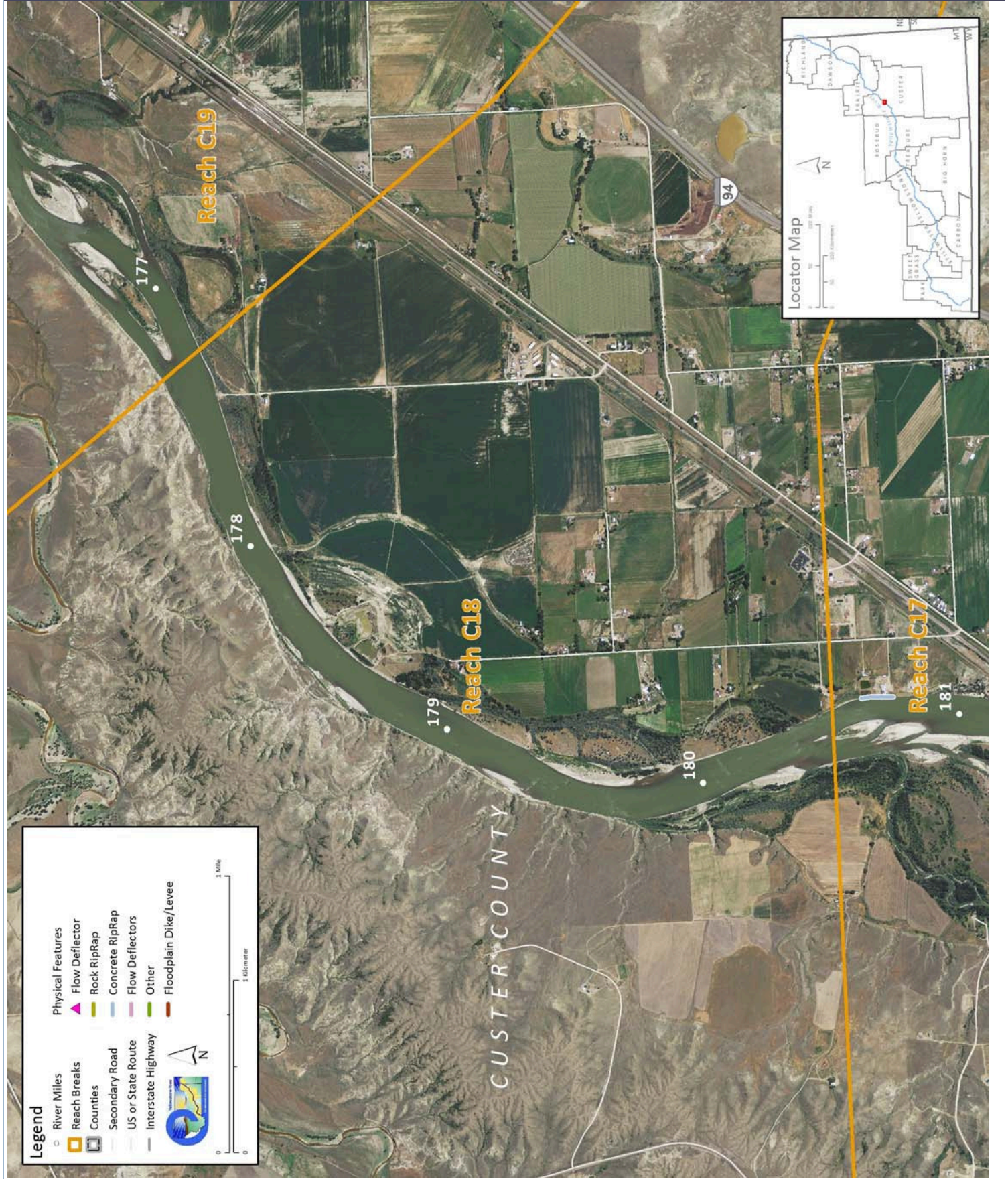
Recommended Practices (may include Yellowstone River Recommended Practices--YRRPs) for Reach C18 include:

- 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)	63,400	48,200	-24.0%			
100 Year (cfs)	117,000	94,400	-19.3%			
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.
	323.6	351.7	346.8	343.9	20.3	
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	0	0.0%	0			
Flow Deflectors	0	0.0%	0			
Total	0	0.0%	0			
Length of Side Channels Blocked (ft)	Pre-1950s	Post-1950s	Numerous side channels have been blocked by small dikes.			
	1,052	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	45.3	21.5	26 acres			
Acres/Year	1.7	0.9				
Acres/Year/Valley Mile	0.6	0.3				
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)	13.9	40.9	-17.3	37.5		
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	67.1	59%				
100 Year	59.4	20%				
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.			
	1.5	0%				
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)	2,390.9	2,289.9	Flood (Ac)	1,319.4	1,305.2	
Ag. Infrastructure (Ac)	29.2	85.0	Sprinkler (Ac)	0.0	0.0	
Exurban (Ac)	3.8	41.6	Pivot (Ac)	0.0	0.0	
Urban (Ac)	0.0	0.0				
Transportation (Ac)	21.4	16.4				
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.	
	31.8	13.0	44.8	17.0%		
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	5.7	1.8	27.5			
Emergent	21.8	7.0				
Scrub/Shrub	0.0	0.0				
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.			
	65.4	5.1%				
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.	
	2.0	0.0	0.0	-2.0		

PHYSICAL FEATURES MAP (2011)



CHANNEL MIGRATION ZONE MAP

