

<b>County</b>	Treasure	<b>Upstream River Mile</b>	278.2
<b>Classification</b>	PCS: Partially confined straight	<b>Downstream River Mile</b>	275
<b>General Location</b>	Hysham	<b>Length</b>	3.20 mi (5.15 km)

## Narrative Summary

Reach C5 is located north of Hysham. The reach is a 3.2 mile long Partially Confined Straight reach type, as the river flows straight eastward along the northern bluff line.

There is no mapped bank armor in the reach.

One side channel in the upper part of the reach has had land use encroachment and appears to have potentially been blocked prior to 1950. It is a small seasonal channel, however, and thus may have decayed naturally.

Land use is dominated by agriculture, with 181 acres of pivot irrigation development since 1950. There are about 260 acres of flood irrigated land within the CMZ, but due to the lack of bank armor, none of the CMZ has become restricted.

Two ice jams have been recorded in Reach C5. The first was in January 1997, and the second was a break-up event in mid-March of 2003.

Reach C5 shows a net loss of 15 acres of gravel bars 1950. Most of that loss has been associated with mid-channel bars. About 23 acres of riparian area has been cleared for irrigation, which is 6 percent of the total mapped 1950 riparian zone. There are 22 acres of Russian olive in the reach.

About 19 percent of the total 100-year floodplain has become isolated due to human development. The 5-year floodplain is even more affected; 68 percent of the historic 5-year floodplain is no longer inundated at that frequency. The isolation of the historic 5-year floodplain, due primarily to flow alterations, has been associated with increased development in these areas; currently there are about 380 acres of flood irrigated land within the historic 5-year floodplain. The vast majority of isolated 5-year floodplain area is within flood irrigated fields south of the river. The isolation is due to flow alterations.

Reach C5 was sampled as part of the avian study. A total of 35 bird species were identified in the reach. One bird species identified by the Montana Natural Heritage Program as Potential Species of Concern (PSOC) was found, the Ovenbird. Reach C5 has seen a decrease in the forested area that is at low risk of cowbird parasitism since 1950. At that time, there were 41 acres per valley mile of such forest, and that number decreased to 26 acres per valley mile by 2001.

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 23 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 4,630 cfs to 2,960 cfs with human development, a reduction of 36 percent. More typical summer low flows, described as the summer 95% flow duration, have dropped from 6,150 cfs under unregulated conditions to 3,320 cfs under regulated conditions at Reach C10 downstream where the analysis begins, a reduction of 46 percent.

CEA-Related observations in Reach C5 include:

- Influence of flow alterations on floodplain inundation

Recommended Practices (may include Yellowstone River Recommended Practices--YRRPs) for Reach C5 include:

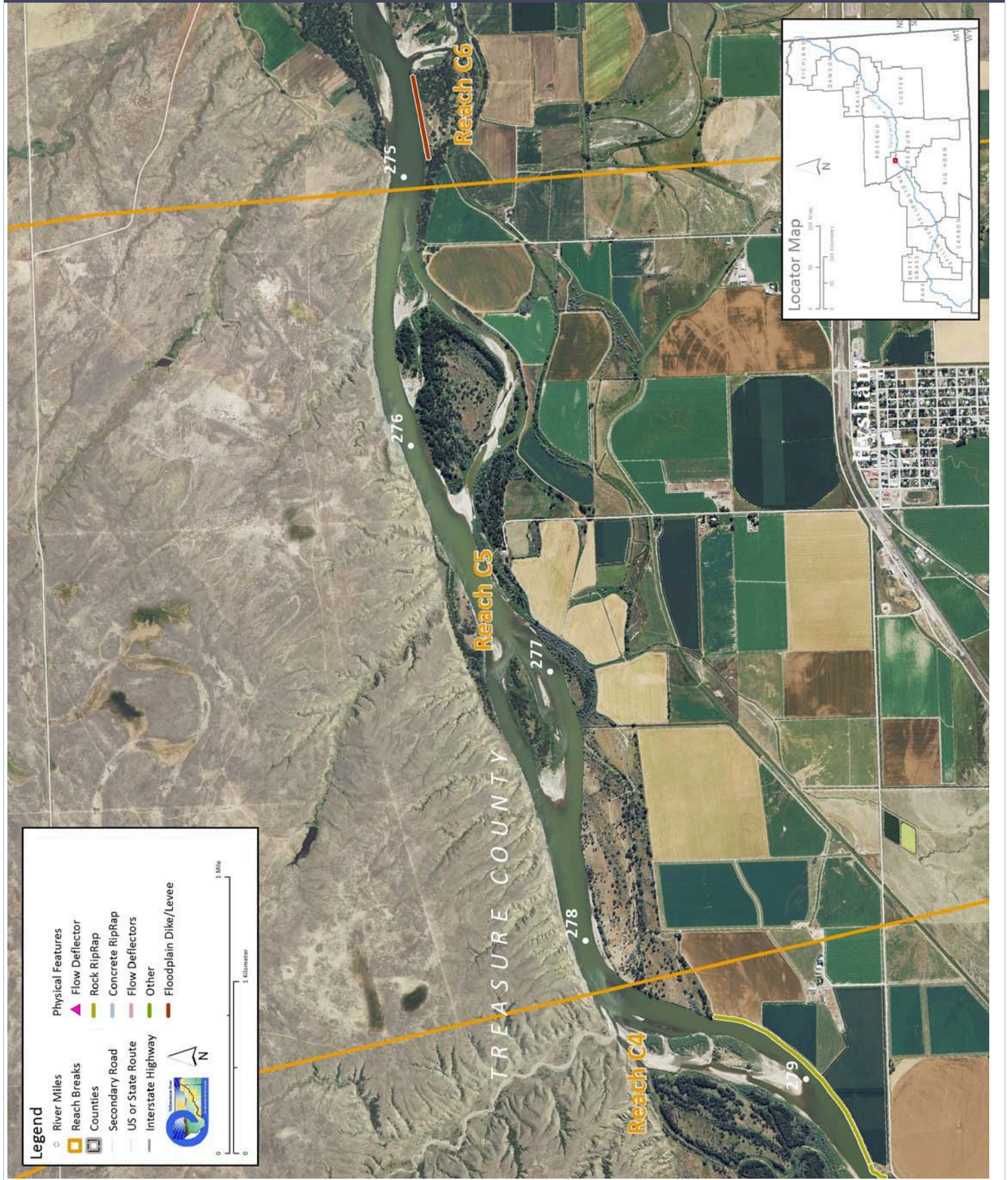
- Russian olive removal

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.

<b>Discharge</b>						
	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)	60,900	47,100	-22.7%			
100 Year (cfs)	120,000	100,000	-16.7%			
<b>Bankfull Channel Area (Ac)</b>						
	1950	1976	1995	2001	1950-2001	Bankful channel area is the total footprint of the river inundated at approx. the 2-year flood.
	317.0	321.7	312.7	318.9	1.8	
<b>Physical Features</b>	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			
<b>Total</b>	<b>0</b>	<b>0.0%</b>	<b>0</b>			
<b>Length of Side Channels Blocked (ft)</b>	Pre-1950s	Post-1950s	Numerous side channels have been blocked by small dikes.			
	8,829	0				
<b>Floodplain Turnover</b>	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	33.5	24.0	14.76 acres			
Acres/Year	1.3	1.0				
Acres/Year/Valley Mile	0.4	0.3				
<b>Open Bar Area</b>	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)	-5.7	3.3	-12.1	-14.5		
<b>Floodplain Isolation</b>	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	635.6	68%				
100 Year	321.5	19%				
<b>Restricted Migration Area</b>	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.			
<b>Land Use</b>	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)	3,273.5	3,245.1	Flood (Ac)	1,866.0	1,492.2	
Ag. Infrastructure (Ac)	66.1	69.8	Sprinkler (Ac)	0.0	0.0	
Exurban (Ac)	0.0	14.6	Pivot (Ac)	0.0	181.2	
Urban (Ac)	29.6	29.5				
Transportation (Ac)	32.6	32.6				
<b>1950s Riparian Vegetation Converted to a Developed Land Use (ac)</b>	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.	
	22.8	0.0	22.8	6.0%		
<b>National Wetlands Inventory</b>	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	13.6	4.5	<b>64.0</b>			
Emergent	43.6	14.4				
Scrub/Shrub	6.9	2.3				
<b>Russian Olive (2001) (Appx. 100-yr Floodplain)</b>	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.			
	22.4	0.8%				
<b>Riparian Forest at low risk of Cowbird Parasitism (Ac/Valley Mile)</b>	1950	1976	2001	Change 1950-2011	Cowbirds are associated with agricultural and residential development, displacing native bird species by parasitizing their nests.	
	41.2	21.1	26.4	-14.8		



## PHYSICAL FEATURES MAP (2011)





## CHANNEL MIGRATION ZONE MAP

