County	Dawson	**Upstream River Mile**	81.4
Classification	PCA: Partially confined anabranching	**Downstream River Mile**	71.1
General Location	Intake	**Length**	10.30 mi (16.58 km)

Narrative Summary

Reach D8 is located in Dawson County, and includes Intake Diversion Dam. The reach is a Partly Confined Anabranching reach type, indicating distinct side channels around forested islands, and some valley wall influence on the active channel. Intake Diversion Dam is located on the lower end of the reach at RM 73.

The primary form of bank stabilization in Reach D8 is rock riprap, with 4,576 feet or 1.9 percent of the total bankline mapped as armored in 2011. All of the bank armor in Reach D8 is protecting either Intake Diversion or the railroad grade; the majority (3,178 feet) is against the rail line. In the uppermost part of the reach at RM 81L, over 1,500 feet of flow deflectors were flanked between 2001 and 2011. At RM 77L, the river has flanked two sections of rock riprap protecting the rail line, forming two large scallops in the bank that currently threaten to undermine the toe of the railroad embankment.

The largest diversion dam on the Yellowstone River is Intake Diversion Dam at RM 73. Construction of the dam began in 1905, in response to authorization under the Reclamation Act of 1902 (http://www.fws.gov/yellowstonerivercoordinator/Intake.html). Intake Dam was completed in 1911 and is used to irrigate 50,000 acres of land in eastern Montana and western North Dakota. The original dam crest was 12 feet above the river bed; and the structure stretches 700 feet across the river. With a diversion capacity of 1,200 cfs, it feeds Intake Canal and a ~225 mile network of lateral canals that distribute water to approximately 500 farms. Fish passage issues at this structure are currently being addressed by the Bureau Reclamation, US Army Corps of Engineers, MT Fish Wildlife and Parks, US Fish and Wildlife Service, and Lower Yellowstone Irrigation District.

Reach D8 has lost almost three miles of side channel length since 1950, and none of this loss is attributable to floodplain dikes. Similar to other reaches in the lower Yellowstone River valley, side channel loss has occurred to both intentional blockages, as well as lost connectivity due to flow alterations. Flow alterations have also resulted in lost connectivity to the 5-year floodplain; development in the basin has resulted in the isolation of 58 percent of the historic 5-year floodplain.

There are 110 acres of sprinkler irrigation and 19 acres of exurban land in the Channel Migration Zone in Reach D8, making these areas especially susceptible to threats of river erosion.

There has been a net increase of woody riparian vegetation in Reach D8 of approximately 210 acres since 1950, indicating riparian colonization of open gravel bars and channel margins.

There are about 10 acres of mapped Russian olive in the reach.

Reach D8 was sampled as part of the avian study. A total of 21 species were identified in the reach, including the Red-headed Woodpecker, which is a Species of Concern.

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 128,000 cfs, which 12 percent lower than it was pre-development (145,000 cfs). 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 4,630 cfs to 2,520 cfs with human development, a reduction of 46 percent. More typical summer low flows, described as the summer 95% flow duration, have dropped from 6,810 cfs under unregulated conditions to 3,030 cfs under regulated conditions, a reduction of 55 percent.

Seasonal low flows have increased by 78 percent in the winter and 62 percent in the fall. Both fall and winter base flows are currently about 3,500 cfs.

CEA-Related observations in Reach D8 include:
- Passive loss of side channels with flow alterations
- Low avian species richness
- Passive loss of 5-year floodplain area

Recommended Practices (may include Yellowstone River Recommended Practices--YRRPs) for Reach D8 include:
- Flanked bank armor removal at RM 77L and RM 81L
- Fish Passage Practices at Intake Diversion Dam (RM 73)
- Watercraft Passage PRACTICE at Intake Diversion Dam (RM 73)
- Irrigation Structure Management at Intake Diversion Dam (RM 73)
- Russian olive removal

Yellowstone River Reach Narratives — Reach D8

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
2 Year (cfs)	69,500	54,200	-22.0%
100 Year (cfs)	145,000	128,000	-11.7%

"Undeveloped" flows represent conditions prior to significant human development, whereas "developed" flows reflect the current condition of both consumptive and non-consumptive water use.

Bankfull Channel Area (Ac)

1950	1976	1995	2001	1950-2001
1,463.9	1,387.3	1,312.1	1,280.0	-183.9

Bankful channel area is the total footprint of the river inundated at approx. the 2-year flood.

Physical Features

	2011 Length (ft)	% of Bankline	2001-2011 Change
Rock RipRap	4,576	4.3%	435
Concrete Riprap	0	0.0%	0
Flow Deflectors	0	0.0%	-763
Total	**4,576**	**4.3%**	**-328**

There are additional types of bank armor such as car bodies and steel retaining walls, but they are relatively minor.

Length of Side Channels Blocked (ft)

Pre-1950s	Post-1950s
0	0

Numerous side channels have been blocked by small dikes.

Floodplain Turnover

	1950 - 1976	1976 - 2001
Total Acres	177.2	104.2
Acres/Year	6.8	4.2
Acres/Year/Valley Mile	1.0	0.6

1950-2001 In-channel riparian encroachment (negative number indicates retreat): 207.5 acres

The rate of floodplain turnover reflects how many acres of land are eroded by the river. Tunover is associated with the creation of riparian habitat.

Open Bar Area

	Point Bars	Bank Attached	Mid-Channel	Total
Change in Area '50 - '01 (Ac)	-121.4	56.3	17.9	-47.1

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.

Floodplain Isolation

	Acres	% of FP
5 Year	612.7	58%
100 Year	99.2	3%

Floodplain isolation refers to area that historically was flooded, but has become isolated do to flow alterations or physical features such as levees.

Restricted Migration Area

Acres	% of CMZ
28.2	1%

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.

Land Use

	1950	2011
Agricultural Land (Ac)	5,328.8	5,253.4
Ag. Infrastructure (Ac)	39.9	117.3
Exurban (Ac)	17.3	56.5
Urban (Ac)	0.0	0.0
Transportation (Ac)	139.9	115.5

	1950	2011
Flood (Ac)	44.2	270.7
Sprinkler (Ac)	7.0	164.3
Pivot (Ac)	0.0	180.0

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.

1950s Riparian Vegetation Converted to a Developed Land Use (ac)

To Irrigated	To Other Use	Total Rip. Converted	% of 1950s Rip.
151.6	23.2	174.8	6.0%

Changes in the extents of riparian vegetation are influenced by land use changes within the corridor.

National Wetlands Inventory

	Acres	Acres per Valley Mi
Riverine	13.7	2.0
Emergent	46.2	6.6
Scrub/Shrub	24.3	3.5

Total Wetland Acres: **84.2**

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).

Russian Olive (2001) (Appx. 100-yr Floodplain)

Acres	%
9.7	0.2%

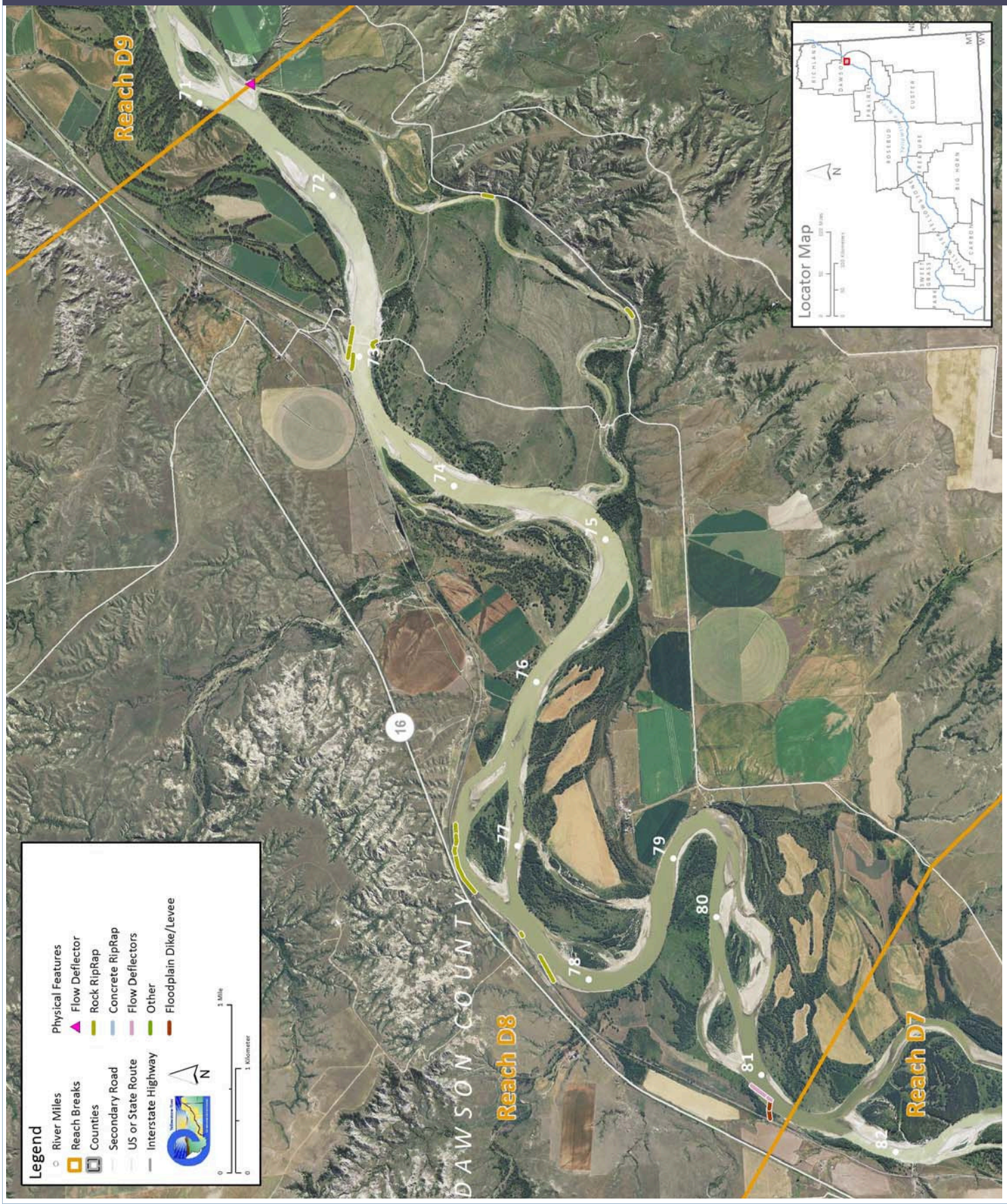
Russian olive is considered an invasive species and its presence in the corridor is fairly recent. Its spread can be used as a general indicator of invasive plants within the corridor.

Riparian Forest at low risk of Cowbird Parasitism (Ac/Valley Mile)

1950	1976	2001	Change 1950-2011
106.2	97.2	85.0	-21.1

Cowbirds are associated with agricultural and residential development, displacing native bird species by parasitizing their nests.

PHYSICAL FEATURES MAP (2011)



CHANNEL MIGRATION ZONE MAP