County	Park	**Upstream River Mile**	557.2
Classification	CS: Confined straight	**Downstream River Mile**	546.8
General Location	Corwin Springs to Carbella; Yankee Jim Canyon	**Length**	10.40 mi (16.74 km)

Narrative Summary

Reach PC3 is located north of Gardiner, extending from Corwin Springs to Carbella. This reach is highly confined and by glacial terraces on its upper end, and Archean-age gneiss on its lower end. As an Archean-age rock unit, the gneiss is over 2.5 billion years old. This bedrock confined section of river is known as Yankee Jim Canyon, which hosts a steep series of drops that create the most challenging whitewater section of the Yellowstone River outside of Yellowstone National Park. "Yankee Jim" George was a well-known character of the area; he came from the east in the late 1800s to settle on a newly built wagon road that extended from Bozeman to Mammoth Hot Springs in Yellowstone National Park. For 20 years Yankee Jim ran the National Park Toll Road. One hundred years later, Yankee Jim Canyon is highly popular as a recreational resource for both rafting and fishing. There are two boat ramps in the reach, located above and below the canyon. The Slip & Slide (RM 552) and Crystal Cross (RM 548) Fishing Access Sites provide river access but have no boat ramps.

Reach PC3 contains over three miles of bank armor, most of which is rock riprap that protects the highway at the entrance to Yankee Jim Canyon. Of those three miles, 700 feet was constructed since 2001. Channel migration is extremely localized in the reach, and is concentrated at the toe of an alluvial fan at the mouth of Cedar Creek that impinges on the river from the east.

Similar to other reaches in Park County, the extent of flood irrigation has dropped in the reach since 1950, and the amount of sprinkler irrigation has increased. Even so, there has been a net loss of irrigated land of over 200 acres in the reach as exurban land uses have expanded.

This area of the upper Yellowstone River basin experienced three severe floods in the last 20 years. The largest floods were in 1996 and 1997, when the 32,200 cfs peak flow measured at the Corwin Springs gage exceeded a 100-year flood for those two years in a row. The 1974 and 2011 floods were major as well, with both events exceeding 30,000 cfs.

CEA-Related observations in Reach PC3 include:
- Conversion of flood irrigation to sprinkler
- Net loss of irrigated land

No reach-specific Practices have been identified for this reach.

Yellowstone River Reach Narratives — Reach PC3

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)	17,600	17,600	0.0%
100 Year (cfs)	33,500	33,500	0.0%

"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
317.3			295.5	-21.8

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	16,334	15.0%	711
Concrete Riprap	0	0.0%	0
Flow Deflectors	294	0.3%	0
Total	**16,627**	**15.2%**	**711**

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	1950-2001 In-channel riparian encroachment (negative number indicates retreat)
Total Acres			acres
Acres/Year			
Acres/Year/Valley Mile			

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)				

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		
100 Year		

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

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)	1,158.9	1,026.8
Ag. Infrastructure (Ac)	20.8	24.1
Exurban (Ac)	9.2	145.5
Urban (Ac)	0.0	0.0
Transportation (Ac)	35.8	35.8

	1950	2011
Flood (Ac)	635.1	183.7
Sprinkler (Ac)	0.0	188.1
Pivot (Ac)	0.0	32.3

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.

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	0.3	0.0
Emergent	7.3	0.7
Scrub/Shrub	6.4	0.6

Total Wetland Acres: **14.0**

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	%
0.0	0.2%

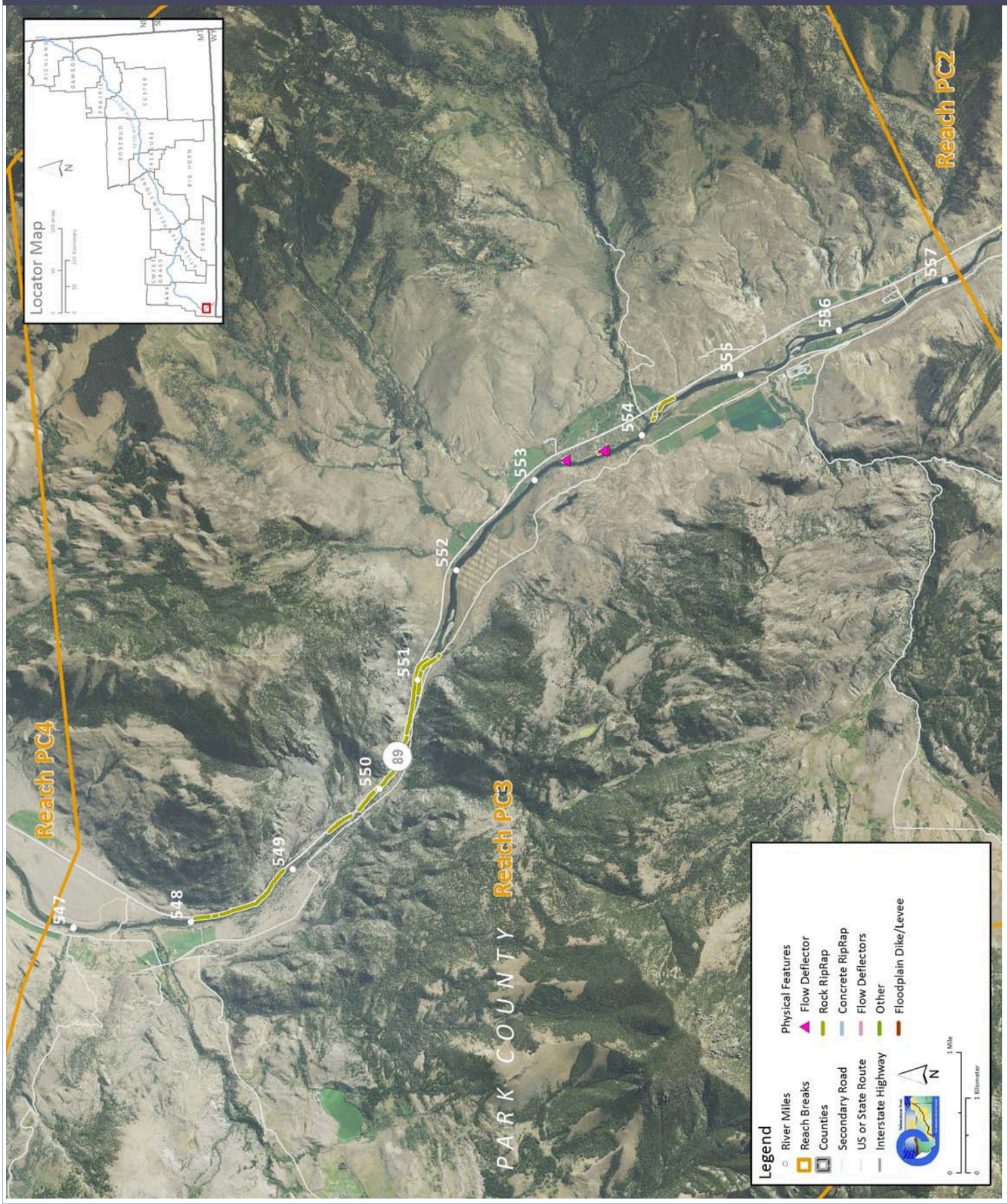
Russian olive is considered an invasive species and its presence in the corridor is fairly recent. Its spread can be used as a general indicator of invasive plants within the corridor.

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

1950	1976	2001	Change 1950-2011

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

PHYSICAL FEATURES MAP (2011)



CHANNEL MIGRATION ZONE MAP