



Photo Monitoring of the Doan Creek Restoration in Whitman Mission National Historic Site

Data Report for 2006-2010

Natural Resource Data Series NPS/UCBN/NRDS—2010/115



ON THE COVER

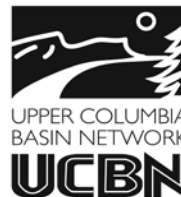
Upper Columbia Basin Network I&M Program staff photograph the restoration reach of Doan Creek, WHMI, in 2008.

Photograph courtesy of the Upper Columbia Basin Network

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All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner. This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data.

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Introduction

Doan Creek, which flows through Whitman Mission National Historic Site (WHMI), was diverted into an irrigation ditch almost 100 years ago. The original channel was filled and the water used to irrigate pasture, eliminating the creek's connection to the Mill Creek watershed and its viability as a stream with suitable habitat for steelhead (*Oncorhynchus mykiss*). The National Park Service (NPS) and numerous partner organizations have joined forces in an ambitious effort to restore Doan Creek by constructing a more natural meandering channel with pools, gravel riffles, and woody debris jams. This will create habitat for steelhead and other native fish. A riparian vegetation buffer consisting of willows and other native woody vegetation has been planted along the stream to facilitate recovery by promoting bank stability, cooler water temperatures, and habitat for birds and other wildlife.

The NPS Upper Columbia Basin Network Inventory and Monitoring Program (UCBN) initiated a photo monitoring project in WHMI in 2006 to capture the changes underway along Doan Creek. This project is associated with the UCBN riparian condition vital sign although it is considered an ancillary project and follows a US Forest Service protocol developed by Hall (2002). Eight camera stations serving 18 permanent photo points were strategically located along Doan Creek. Measurements of the distance between the camera and photo points, camera focal length, and camera height above ground were made in order to facilitate replication of photos each year. This careful approach may allow quantitative as well as qualitative interpretation of the changes that occur over time. To date, substantial changes have occurred as weedy non-native herbaceous vegetation has been replaced by native willows and wild rye, which were planted in 2007. Periodic re-photography of these points will continue to provide graphic documentation of the restoration success over time. This report provides a brief overview of the photographic data collected to date, documents methods, and establishes the baseline against which future change can be compared.

Methods

Site Establishment

Photographs were collected along Doan Creek in 2006, 2007, 2008, and 2010. The timing of surveys was either during the last week of May or the first week of June each year. We used methods that followed those outlined in the protocol by Hall (2002). Camera stations, the point from which photographs were taken, were established in strategic locations along the stream to facilitate the collection of useful photographs over time. Multiple photo points (point of photograph focus) were monitored from one camera station. An azimuth was used to describe the line between a camera station and a photo point. The photo point is the objective point in the center of the photograph around which the central topic of the photo was concentrated. This typically was marked in each photograph by a meter board. We used a 2-meter tall board painted in yellow with black decimeter and 0.5 meter tick marks. The meter board was placed at the photo point during each photography session. However, some photo points included landscape perspectives with distances too far for the use of a meter board. Both camera stations and photo points were permanently marked with "t"-shaped metal fence posts and embossable aluminum tags wired to each fence post. As of 2010, some markers were destroyed during mowing and other restoration activities and will need to be replaced. The locations of camera stations and

photo points were established by collecting Universal Transverse Mercator (UTM) zone 11 coordinates, in meters, using the North American Datum from 1983 (NAD 83). We included paper labels on clipboards placed on easels in photographs where the photo point was close enough to be read and where the meter board was used so as to embed location information directly into photographs. Labels were not used in landscape photo points where the focal point was too far away.

Photography

We used both film and digital cameras during the first 3 years of the project, and migrated entirely to use of a digital single lens reflex (slr) camera in 2010. We recommend that only the digital slr camera be used in the future. Archived photographs collected during 2006-2008 were obtained with a Pentax K1000 slr camera with a 50 mm lens, 100 iso film, and a shutter speed of 60. In 2010 we used a Nikon D-40 slr digital camera, and matched focal length as close as possible to previous photographs. Camera height was fixed at 1.3 m above ground using a tripod with bubble levels. We did not use a level on the meter board but recommend this for future re-photography. We printed photographs from each successive year and glued them into a Rite-in-the-Rain all-weather field notebook, with camera station and photo point information (e.g., azimuth, F-stop, etc...) as a field reference notebook which aided in aligning photographs across years. This field notebook is stored in the WHMI resource manager's office and should be updated after each successive photographic resurvey.

Naming Conventions

We established a simple naming convention for camera stations, photo points, and photographs. Digital files of photographs use the photograph name, and are stored as jpeg file types. Camera stations were named as alphanumeric combinations of the park code (WHMI), and consecutive numbers in the order that they were established (e.g., WHMI-01). This generally follows a downstream order, except for the first camera station which was established in the middle of the reach before the 2nd one which was established at the top of the restoration reach where Doan Creek was diverted into the irrigation ditch. Photo points were named as alphanumeric combinations of the park code, camera station number, and a letter, in alphabetical order, from A-C. No camera station had more than 3 photo points established and therefore D was not used. For example, the first photo point for camera station 1 is WHMI-01-A. Photographs were named as the photo point with a collection date appended, for example as WHMI-01-A-20100527.jpg.

Results

We established a total of 8 camera stations and 18 photo points over the course of the project (Figures 1 and 2). However, camera station WHMI-07 and its 3 photo points were discontinued in 2010 because ongoing manipulation of the Doan Creek channel in 2009 led to a permanent change in stream flow away from WHMI-07. WHMI-08 was added in 2010 at the new confluence of Doan Creek and Mill Creek as replacement. Table 1 shows the final suite of camera stations. Table 2 shows the final suite of photo points. Digital files of these tables with additional attributes including distance between camera station and photo point and azimuth, spatial data used to make Figures 1 and 2, and the digital images collected each year are stored on the NRInfo Portal (<http://nrinfo/>) as holdings under the Doan Creek Restoration Photo Monitoring project (project # 2165273), as well as on UCBN and WHMI data servers. Figures A1-A6 in Appendix A illustrates the temporal changes that occurred along the stream during

2006-2010 for selected photo points. The most notable change is the rapid increase in native vegetation that appeared in most photo points in 2010 photographs following planting of willows and other native plants along the reach in 2007.

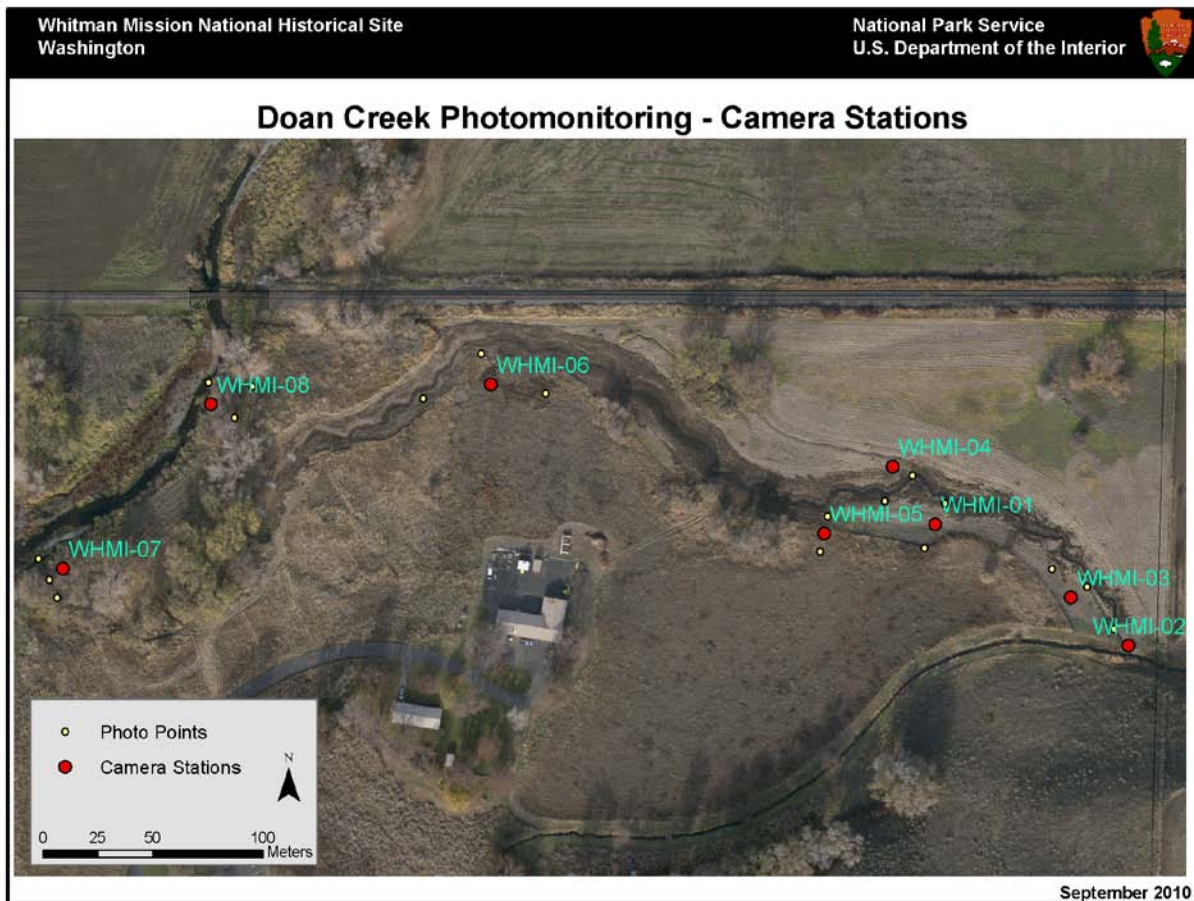


Figure 1. A map of 8 photo monitoring camera stations established along the restoration reach of Doan Creek that flows through WHMI into Mill Creek.



Doan Creek Photomonitoring - Camera Stations



Figure 2. A map of 18 photo points established along the restoration reach of Doan Creek.

Table 1. Locations and names of camera stations established for photo monitoring the restoration reach of Doan Creek in WHMI.

Station	UTM X	UTM Y	# Photopoints	Name
WHMI-01	387019	5099941	2	MiddleReach1
WHMI-02	387107	5099885	1	DiversionBox
WHMI-03	387081	5099907	2	UpperReach
WHMI-04	387000	5099967	2	MiddleReach2
WHMI-05	386968	5099936	1	MiddleReach3
WHMI-06	386817	5100004	3	TelephonePole
WHMI-07	386623	5099920	3	OldConfluence
WHMI-08	386690	5099995	3	PumpStation

Table 2. Locations and names of photo points and the most recent (2010) archived photograph file names.

Photopoint	UTM X	UTM Y	2010 photo file name
WHMI-01-A	387023	5099950	WHMI-01-A-20100527.jpg
WHMI-01-B	387014	5099930	WHMI-01-B-20100527.jpg
WHMI-02-A	387100	5099893	WHMI-02-A-20100527.jpg
WHMI-03-A	387088	5099912	WHMI-03-A-20100527.jpg
WHMI-03-B	387072	5099920	WHMI-03-B-20100527.jpg
WHMI-04-A	387009	5099963	WHMI-04-A-20100527.jpg
WHMI-04-B	386996	5099951	WHMI-04-B-20100527.jpg
WHMI-05-A	386970	5099944	WHMI-05-A-20100527.jpg
WHMI-05-B	386967	5099928	WHMI-05-B-20100527.jpg
WHMI-06-A	386813	5100018	WHMI-06-A-20100527.jpg
WHMI-06-B	386842	5100000	WHMI-06-B-20100527.jpg
WHMI-06-C	386787	5099998	WHMI-06-C-20100527.jpg
WHMI-07-A	386617	5099915	NA
WHMI-07-B	386620	5099907	NA
WHMI-07-C	386612	5099925	NA
WHMI-08-A	386701	5099989	WHMI-08-A-20100527.jpg
WHMI-08-B	386709	5100003	WHMI-08-B-20100527.jpg
WHMI-08-C	386689	5100005	WHMI-08-C-20100527.jpg

Summary of Results and Recommendations for Future Photo Monitoring

We established a network of permanent photo points that describe baseline conditions along the restored reach of Doan Creek that flows through WHMI. Vegetation conditions improved dramatically between 2008 and 2010 following efforts in 2007 to plant and establish native vegetation. We recommend that future re-photography of Doan Creek occur every 2-3 years, beginning in 2012. Analyses of change can include qualitative methods, such as is shown in the figures in Appendix A by appending photos together in composite figures, or qualitatively following grid analysis methods described by Hall (2002). Grid analysis software has been developed that will enable Hall's method to be updated. Although the spatial precision of photographs among years is relatively low, approximate values of vegetation cover and changes in cover among years might be obtainable. We recommend the use of bubble levels on meter boards to improve precision of repeat photographs. Camera station WHMI-07 was discontinued due to an engineered change in the flow of Doan Creek at the confluence with Mill Creek, and the permanent establishment of a pump at the new confluence. WHMI-08 was established as a replacement. However, WHMI-07 may still contain subject matter of interest (e.g., weed invasion) and could be re-photographed in the future.

Literature Cited

Hall, F.C. 2002. Photo point monitoring handbook, Parts A and B. General Technical Report PNW-GTR-526. U.S. Forest Service Pacific Northwest Research Station, Portland, OR.

Appendix A.

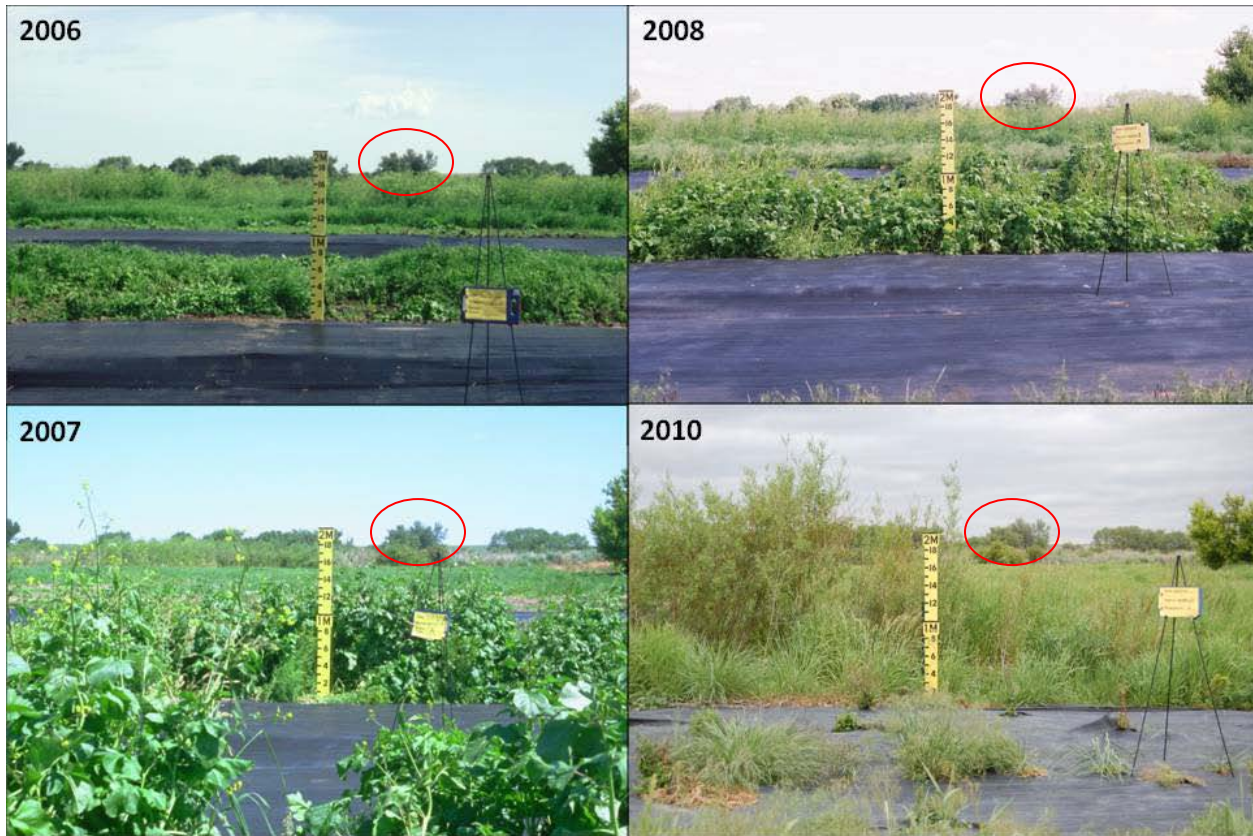


Figure A-1. Photographs of photopoint WHMI-01-A. Note the same tree (circled in red) in the background is visible each year.

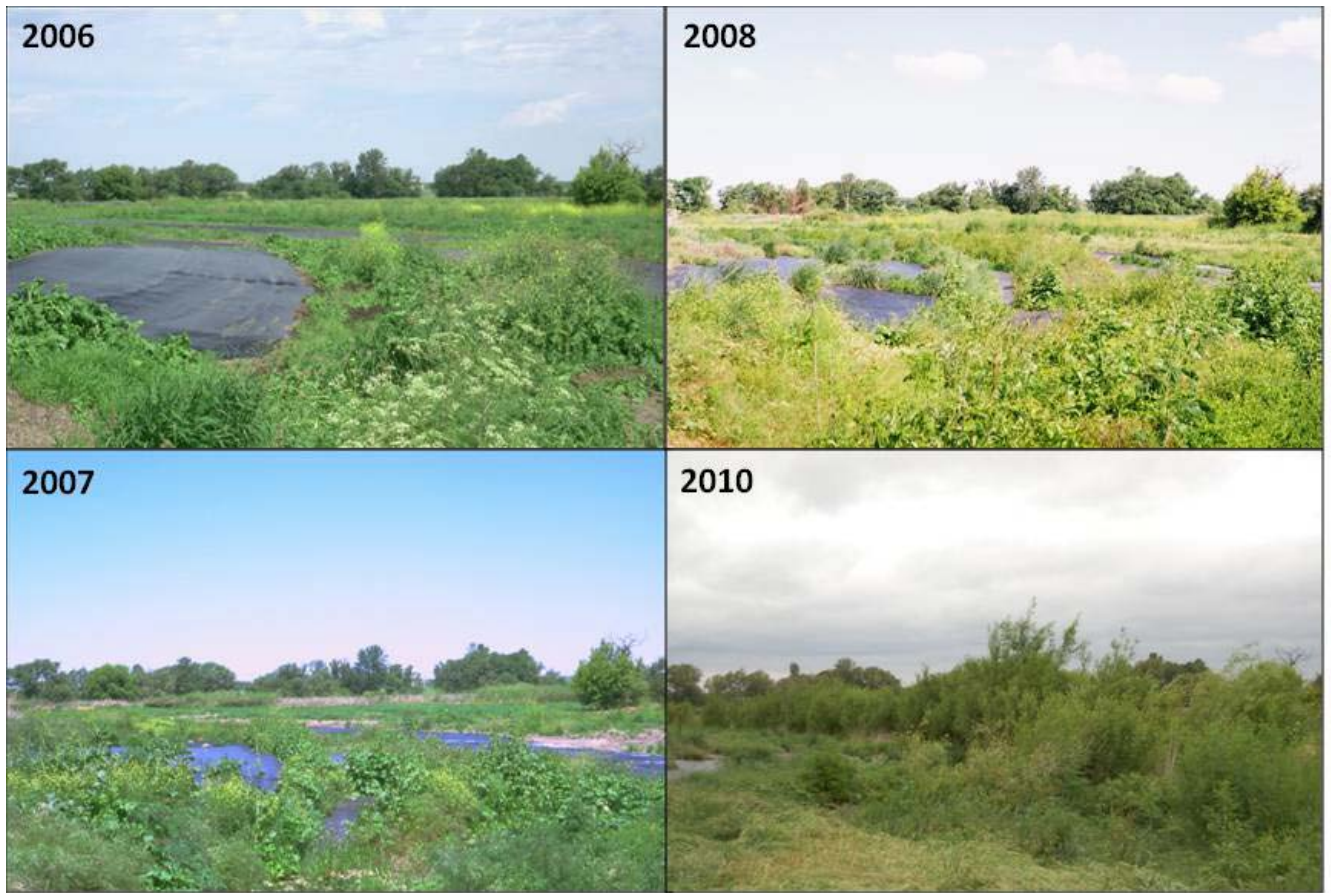


Figure A-2. Photographs of photopoint WHMI-02-A.



Figure A-3. Photographs of photopoint WHMI-03-A.

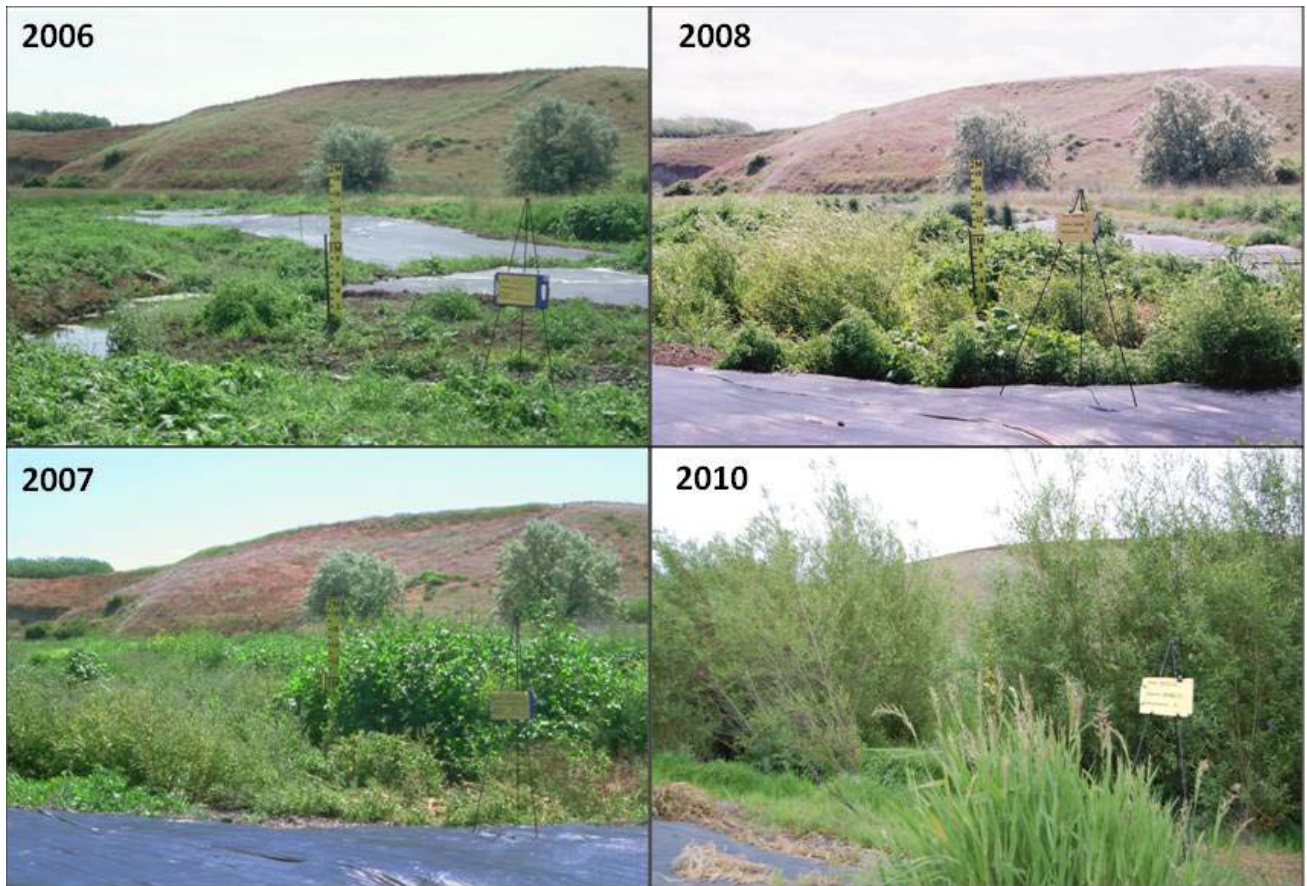


Figure A-4. Photographs of photopoint WHMI-04-A.

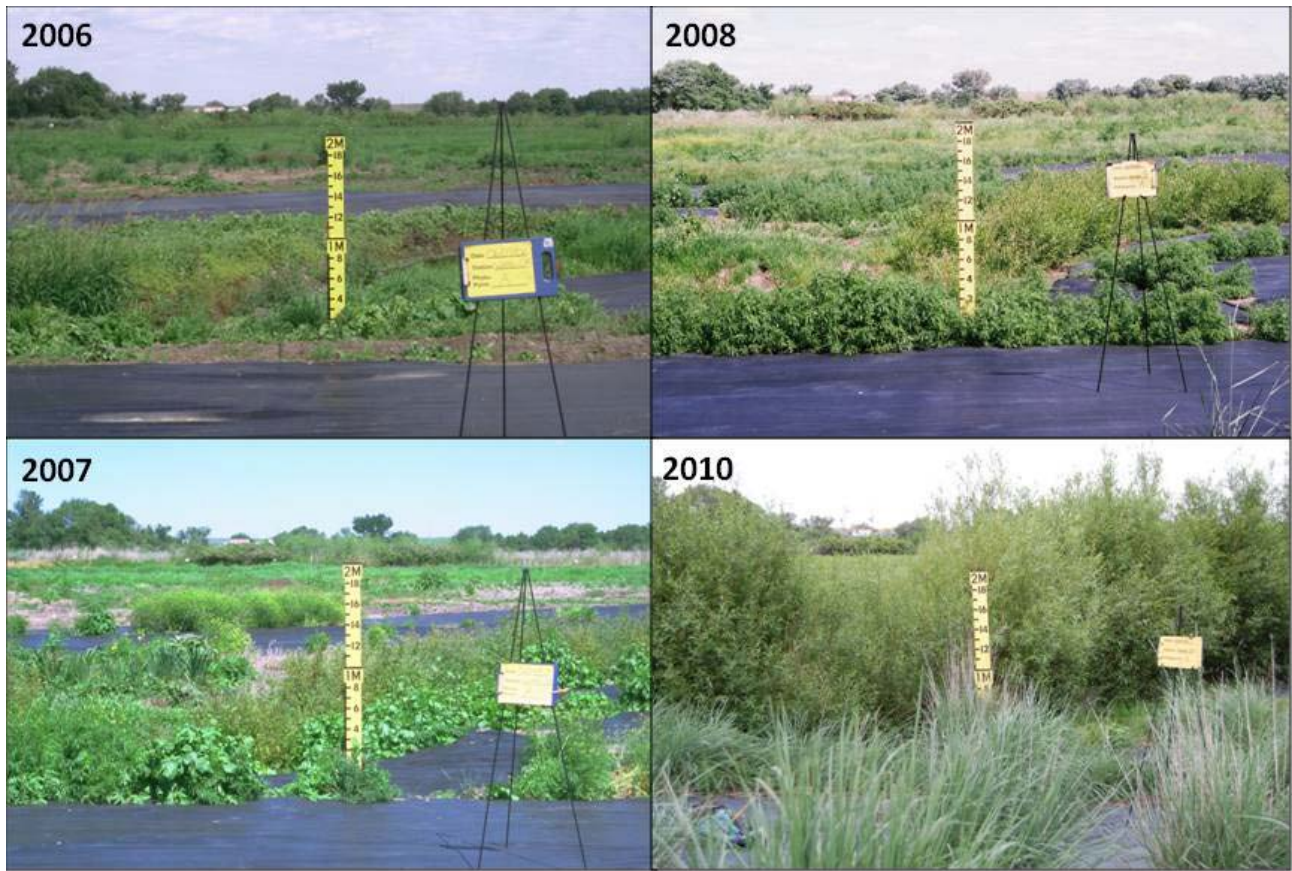


Figure A-5. Photographs of photopoint WHMI-05-A.

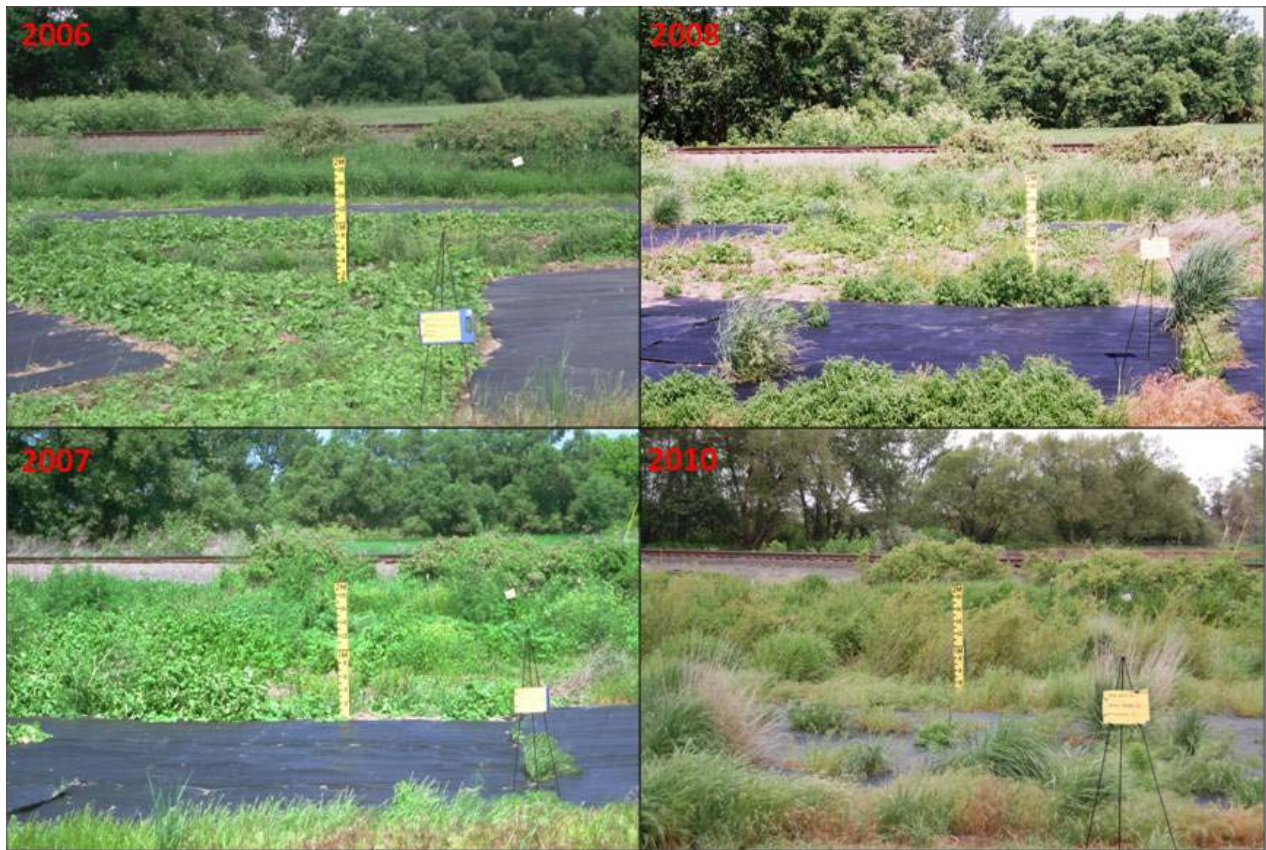


Figure A-6. Photographs of photopoint WHMI-06-A.