Geomorphology and Vegetation Monitoring

The purposes of geomorphology and in-channel vegetation monitoring are to: 1) document spatial and temporal trends in channel morphology and in-channel vegetation, and 2) evaluate relationships between the documented changes and natural drivers (primarily hydrology) and management actions by the Program and other entities throughout the Associated Habitat Reach (AHR). Several priority hypotheses identified in the Program's Adaptive Management Plan (AMP) are directly linked to river morphology and are also influenced by in-channel vegetation. This monitoring data is used to quantify habitat suitability for whooping cranes, which rely on wide, shallow channels exhibited by the braided morphology of central Platte River. By monitoring the ground conditions within the AHR, we are able to evaluate current conditions and intervene before a tipping point of feasible management is reached. This protocol also serves as effectiveness monitoring for Program management actions implemented under the AMP, and is a resource for evaluating existing and future Program hypotheses. Information gained from the monitoring is summarized for inclusion in planning documents related to implementation of the AMP and the Environmental Account Annual Operating Plan (AOP). As we continue to collect more spatially integrated monitoring data and advance our understanding of species' needs, we will be more able implement actions necessary to achieve the conditions needed.

Where We Have Been:

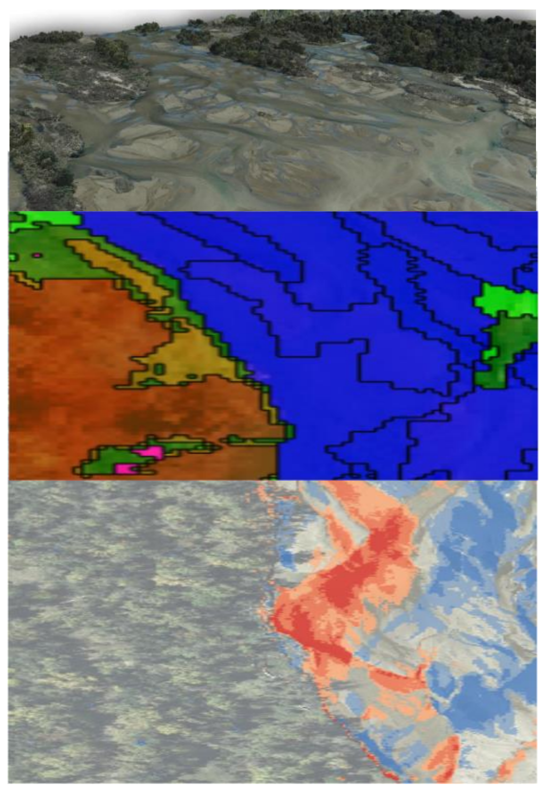
In 2009, the Program developed and implemented a field-based interim draft geomorphology and vegetation monitoring protocol. The protocol was revised in 2010 based on lessons learned from the 2009 effort (Program, 2010), and the revised protocol was implemented for seven (7) more years from 2010 through 2016 (Tetra Tech, 2017). The geomorphology portion of the protocol was designed to document trends in channel geomorphology parameters, including channel width, planform, aggradation/degradation, bed material grain sizes, and sediment loads in the AHR during the 13-year first increment of the Program that was originally scheduled to conclude in 2019.

This protocol resulted in extensive sets of both geomorphic and vegetation data that provide valuable information to the Program related to the above priority hypotheses (documented in Tetra Tech 2017). Despite the extensive data sets, several issues were identified with the field-based approach that led to the development of this remote sensing-based protocol including:

1. Uncertainty in the key data related to a combination of the representativeness of the individual transects and APs to the remainder of the AHR and scatter in the measured data (particularly sediment loads) resulted in substantial uncertainty in the Program's ability to draw firm conclusions about the effects of natural and manmade drivers of change in the system, particularly the overall sediment transport balance,
2. Collection and analysis of the extensive data sets required large annual expenditure, and
3. A large portion of the data (particularly, species-level vegetation data) were determined to be of only limited value in helping the Program meet their objectives.

The decision to transition to a remote-sensing-based protocol stems from, costs, limitations and concerns associated with the previous protocol and recent advances in remote-sensing technology that will facilitate more efficient measurement of a smaller set of key variables over a larger proportion of the AHR than was previously feasible. Major factors considered when making this decision include:

1. Spatial Coverage – The pure panel anchor points (APs) that were measured every year in the previous protocol were spaced at approximately 5-mile intervals along the AHR, and one rotating AP, measured only once every four years, was located between each of the pure panel APs. The total channel length occupied by the individual APs averaged about 1,000 feet; thus, the pure panel APs occupied only about 4 percent of the overall length of the AHR (Tetra Tech, 2017). The limited spatial coverage, coupled with high interannual variability at the individual APs, led to concerns that AP-based monitoring was not adequate to identify reach and system-scale trends,
2. Anchor Point Access – The majority of the APs were located on private lands. Loss of access through time at some locations further limited the spatial and temporal coverage of the monitoring data,
3. Advances in Remote Sensing – Since 2009, it has become both technically and financially feasible for the Program to collect bathymetric LiDAR data annually for the entire AHR. As a result, much, if not all, of the spatial coverage issue with the AP-based protocol will be eliminated because measurements will not be restricted to the Aps,
4. An extensive suite of variables was measured during the field-based protocol. Detailed evaluation of the data and ongoing improvement in the Program's understanding of the needs of the target species indicate that, while potentially useful for assessing general river and vegetation processes, many of the variables could be eliminated from the monitoring without compromising the Program's ability to meet their objectives. This is particularly true for the vegetation data, where all vegetation down to the species level was documented. Current understanding of the habitat needs of the target species indicates that the primary factor related to vegetation is unvegetated channel width, a variable that can be directly measured from the remote sensing data without detailed documentation of the individual species,
5. Based on the more complete spatial coverage, the resulting lower uncertainty, and the lower cost, remote sensing will provide a more cost-effective means of obtaining the data necessary to meet Program objectives.



Where We Are Going:

Beginning in 2018, EDO staff plan to finalize protocol development, collect the first round of field-based data, and implement the protocol that will be useful for informing Program hypotheses outlined in the current and future AMP. These hypotheses are directly linked to river morphology and are influenced by in-channel vegetation. Results of protocol implementation will serve as effectiveness monitoring for Program management actions and a resource for evaluating existing and future Program hypotheses related to implementation of the AMP and the Environmental Account Annual Operating Plan (AOP).