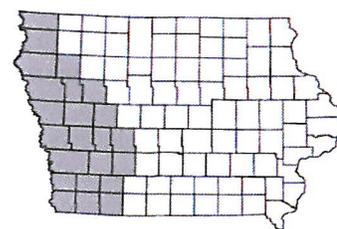


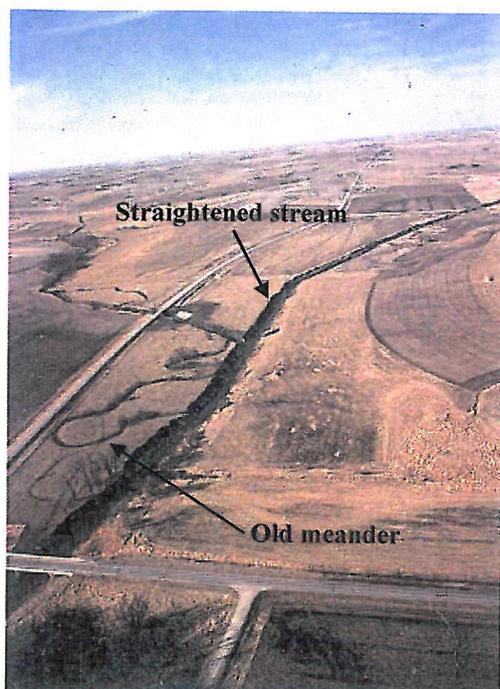
HUNGRY CANYONS ALLIANCE

The Problem

The Hungry Canyons Alliance (HCA) was formed locally to research and implement solutions to the problem of stream channel erosion and degradation in a 23 county area of the deep loess soils region of western Iowa. Channelization of streams and land use changes during the first half of the 1900's caused stream channels to erode, causing an estimated \$1.1 billion in damages to public and private infrastructure (bridges, culverts, utility lines, etc.), loss of farmland, and increased sediment loads. A survey of western Iowa bridges in 2000 revealed that 404 were endangered due to stream channel degradation. Golden Hills RC&D in Oakland, Iowa helped to form and currently provides office space and administrative assistance to the Hungry Canyons Alliance.



23 counties eligible for Hungry Canyons Alliance cost share.



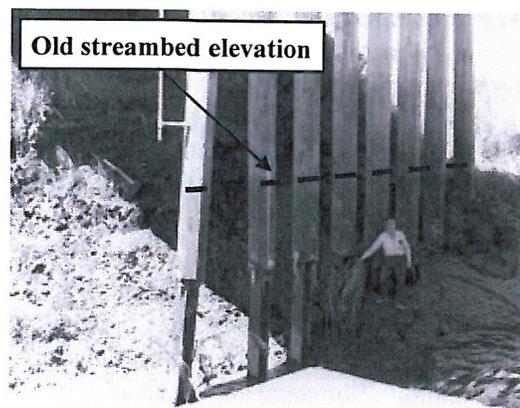
Straightened versus meandering stream.
(Walnut Creek, Pottawattamie County).

The Solution

A proven, affordable solution to this problem is to build grade control structures in streams. Grade control structures (GCS) at regular intervals help streams stabilize by changing their longitudinal profile from an erosive steep incline to a stable stair-step pattern. Streambed stabilization is the key to preventing further erosion and protecting infrastructure. GCS design is largely dependent on drainage area. Small drainage areas can often be controlled with reinforced concrete box (RCB) or corrugated metal pipe (CMP) culverts with drop inlets and/or flume outlets. Large drainage areas are often controlled with weirs constructed with steel sheet pile, driven into the streambed, with a riprap and concrete grout slope immediately downstream, a riprap stilling basin downstream of the weir slope, and riprap covered banks. Both RCB/CMP and weir designs allow the stream elevation to drop in a controlled setting, restore lost stream grade, prevent further degradation, and reduce streambed slope upstream creating a calm backwater condition where silt can settle out, decreasing sediment loads and turbidity and increasing water quality. Sediment re-deposited upstream also helps support exposed bridge pilings.

The Savings

The HCA provides state and federal money available to the 23 counties through a cost share program for grade control structures (GCS). County governments provide a minimum of 20% match for each GCS. Since 1992, the program has provided \$22.3 million in state and federal appropriations and the technical assistance needed to complete 338 GCS in 19 counties in western Iowa. Another 21 GCS are in progress. These GCS will protect an estimated \$84.8 million in property value. It is estimated that 651.6 acres of land, equivalent to 22.8 million tons of sediment, will be protected from erosion by construction of the 359 GCS. HCA grade control structures, with an average cost of \$65,000, protect approximately \$236,300 in property per GCS. **For every \$1 invested in HCA grade control structures, on average more than \$4.20 of property value and one ton of sediment are protected from streambed degradation.** During FY 2012, the HCA



Bridge endangered by exhumation of pilings.

approved 10 GCS for cost share and completed construction on another 11.

A second HCA program provides funding to landowners where grade control is necessary to stabilize active gully erosion. This program is funded with the interest earned from state appropriations. This program has built 113, and approved another one, structures for a total cost share of \$770,160.

The HCA has quarterly meetings at which issues concerning stream erosion and streambed stabilization are discussed. Regular attendees include county engineers, county supervisors, NRCS employees, SWCD commissioners, DNR fisheries biologists, engineer consultants, contractors, and landowners.

Over 1,000 GCS of all types have been constructed in western Iowa by county governments, the HCA, NRCS, NRCS-EWP, SWCD, Iowa DOT, cities, utility (water, gas, telephone, electric, etc.) companies, railroad companies, Army Corps of Engineers, Iowa DNR, and landowners. With so many GCS located in one area, western Iowa has been referred to as a "laboratory" for GCS design. Because western Iowa is still experiencing streambed degradation, the HCA is one of the unheralded leaders in innovative GCS research, design, and construction.



Top: Sheet pile weir with a 20:1 grouted riprap slope in Crawford County. Bottom: RCB flume with 25 feet of fall in Fremont County.

Matching Federal Funding for 2007-2008 Flood Recovery

Abnormally heavy precipitation throughout 2007 and 2008, particularly in May 2007 and June 2008, compounded by the ongoing channel instability, highly erodible loess soils, and steep stream gradients, maximized the erosive power of southwestern Iowa streams resulting in widespread stream channel damage endangering or destroying county road infrastructure. However, Federal Emergency Management Agency (FEMA), NRCS, HCA, and counties have all seen evidence that GCS have directly reduced infrastructure and channel damage costs and in numerous instances the number of FEMA and EWP Program claims. Infrastructure protected by GCS had no damage and the vast majority of GCS were undamaged. Although some GCS suffered minor damage, damages were minimal compared to the total loss of bridges that may have resulted without the GCS.

Federal NRCS-EWP funding was available, but required 25% local match. However, local governments were hurting financially. The HCA agreed to provide 10% match (using state cost share) for all EWP projects which provided grade control or were directly associated with existing GCS projects in order to complete as many projects as possible and reduce the counties' burden to 15% match. A total of 72 GCS projects were completed between September 2008 and January 2011 at a cost of **\$12.83 million**. **The EWP program provided \$9.50 million in cost share, the HCA \$1.28 million, and the sponsor counties \$2.05 million.** This influx of funding for construction came at the perfect time to also help stimulate western Iowa's economy.

HCA quarterly meetings served as important forums for the NRCS and county officials to discuss the EWP program. The HCA also provided technical assistance to the counties by documenting which aspects of past GCS designs have worked and what new techniques could be used to enhance performance of GCS.

HCA Research

Completed HCA research projects include design of GCS to provide fish passage and use of scrap tires in GCS. Ongoing research projects include aerial stream video and classification of western Iowa streams, knickpoint migration study, use of directional drilling in small watershed GCS projects, and a project to relate and monitor stage and discharge on western Iowa streams. Partners in these projects include: NRCS, Iowa DOT Highway Research Board, IIHR-Hydroscience and Engineering at the University of Iowa, Natural Resource Ecology and Management at Iowa State University, Civil Engineering at Iowa State University, Iowa DNR, US Geological Survey, and US Fish and Wildlife Service.