Inventory and Prioritization of Impaired Sites in the Yellow River Watershed in Alabama and Florida

Abstract

The goal of this project was to identify areas contributing to habitat degradation and impairment in the Yellow River Basin as an initial step in conserving and restoring natural function and biodiversity throughout the system. We assessed approximately 209 river miles and identified 140 impaired river corridor sites and identified moderate or high degrees of sedimentation risk at 339 unpaved road crossings throughout the basin. Site-level erosion and sedimentation was by far the predominant factor impairing all sites, commonly resulting in degradation or loss of instream habitat and connectivity at site locations. We prioritized sites for future restoration based on patterns of impairment location, severity, and potential to affect priority ecological resources and designations, with a focus on lands and roads owned and managed primarily by Eglin Air Force Base. Based on these results we also restored a site known as “Dripping Rock”. Dripping Rock was characterized by a denuded and breached riverbank and an unpaved road resulting in an estimated 60 tons of excess sediment per year to the river, directly adjacent to the only known stretch of spawning habitat for the federally threatened Gulf sturgeon in the river basin.

Project Specifics

Description of geographic setting: The Yellow River is a 110-mi long, sandy, black water river with high biodiversity that flows through Alabama and Florida in the Gulf Coastal Plain ecoregion, with a watershed area of 1,372 mi^2 and average annual flow of 1,181 cfs. The Yellow River and its tributaries drain primarily over residuum geology and sand in Alabama; whereas it drains primarily over medium-fine sand and silt and sandy-clay and clay in Florida. It flows through primarily forested and hay/pasture land as well as abutting the northwest portion of Eglin Air Force Base in Florida.

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Partners: Department of Defense Legacy Resource Management Program; U.S. Fish and Wildlife Service; Florida Fish and Wildlife Conservation Commission; several private landowners; and, The Nature Conservancy.

Service branch: Air Force

Project location: Eglin Air Force Base

Installation size: 724 square miles (1,875 square kilometers) of reservation and 97,963 square miles (253,723 square kilometers) of water ranges in the Gulf of Mexico.

Installation primary mission: The mission of Eglin Air Force Base is to research, develop, and test non-nuclear weapons.

Project dates: February 2009 to November 2011

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Purpose/Need

Historically considered relatively undisturbed, the Yellow River Basin is increasingly impacted by excessive sedimentation from bank instability and particularly unpaved road crossings. This has increasingly contributed to habitat degradation, been identified as impacting federally listed and candidate species, and increasingly threaten aquatic biodiversity in the basin. The Yellow River Basin has been identified as a conservation priority by the Eglin Air Force Base, U.S. Fish and Wildlife Service, states of Alabama and Florida, and The Nature Conservancy. In addition to habitat and migratory pathways for fish and wildlife, rivers and their corridors serve as military mission passageways and connections for installations with each other or their partners via greenways. The watersheds within this landscape such as the Yellow River will be essential green corridors among military installations such as Eglin AFB, partner lands, and training areas. Restoration and conservation in the Yellow River Basin will improve habitat quality for fish and wildlife, aide in the recovery of listed species, prevent future listings and reduce regulatory burden, reduce military road maintenance costs, improve military training and recreation areas, and allow mission flexibility through cooperative conservation while maintaining green corridors within military installations.

Picture 1: Excessive sedimentation degrades streams in the Yellow River Basin. Photo credit: The Nature Conservancy.

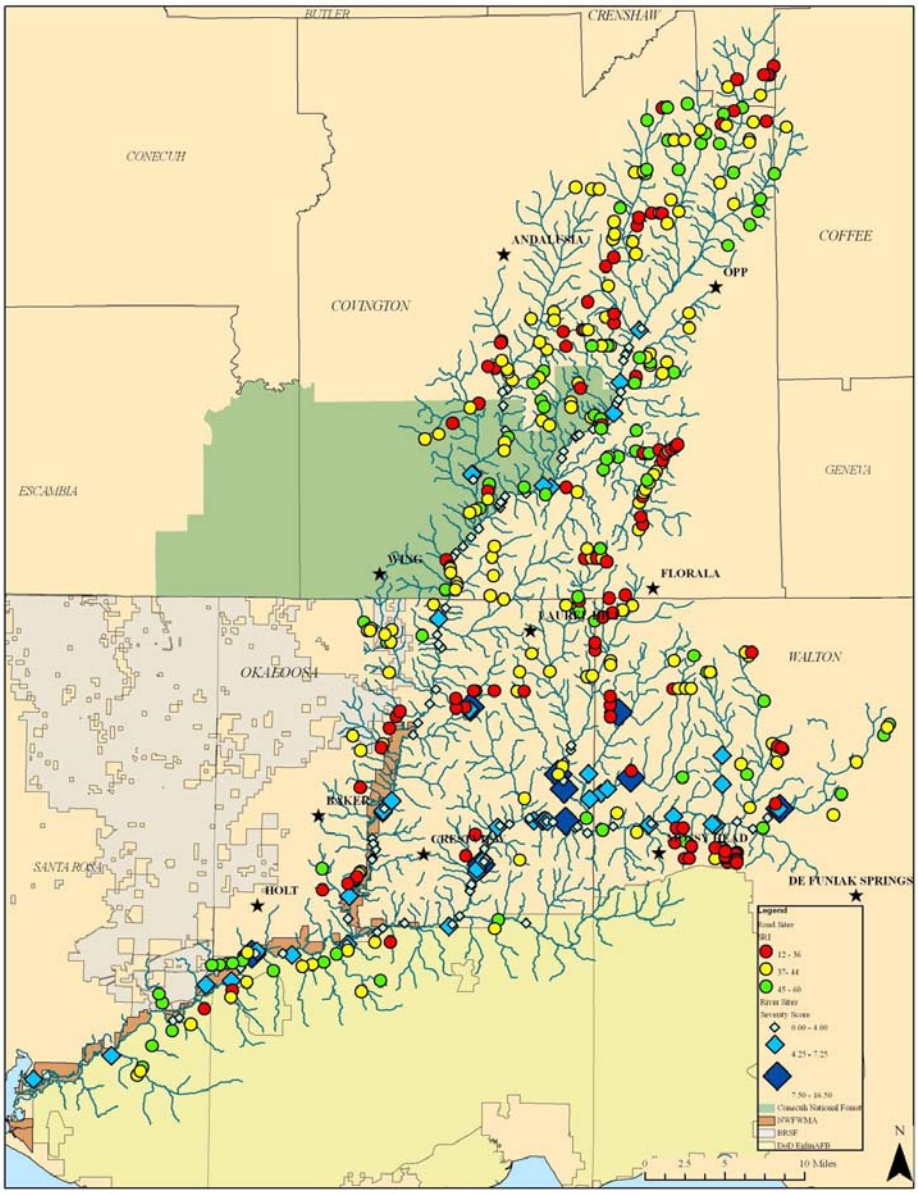
Approach

We identified potential impacts to the corridor of the Yellow River and its tributaries traversable by boat and ranked potentially impaired river corridor sites using a combination of formalized quantitative and qualitative measurements for assessing the ecological condition of stream corridors modified by the USFWS for drainages in the Gulf Coastal Plain ecoregion. We identified potential impacts of all known publically accessible unpaved roads where they crossed a given river or stream throughout the Yellow River Basin by travelling to each unpaved road crossing and calculating potential impacts using the Sediment Risk Index, a standardized method of characterizing sedimentation and other impacts of unpaved road crossings to aquatic resources in the Gulf Coastal Plain ecoregion. We also restored a high-priority site identified during the project using standard river restoration techniques based on natural channel design principles.

We assessed over 209 miles of the Yellow River and its tributaries and identified 140 river corridor sites with “Low-”, “Moderate-”, and “High-” ranked impairments. We also identified 339 unpaved road crossing sites with “Low-”, “Moderate-”, and “High-” ranked impairments throughout the basin. Excessive sedimentation from unpaved roads and streambank erosion was by far the most common impairment in the basin. Nearly 1/3 of all unpaved road crossings assessed were considered highly impaired, with excessive sedimentation and undersized culverts resulting in demonstrable stream degradation and fish passage barriers. In contrast, only 6% of river sites with streambank erosion assessed were highly impaired, though some sites had extensive mass wasting that likely contributes hundreds of tons of sediment to the Yellow River each year.

We prioritized sites based on these patterns of impairment location, severity, and potential to affect priority ecological resources and designations. We designated seven ‘Focal Areas” which are considered primary places for resource conservation, restoration, and management, and provided detailed summaries of types and sources of impairments, how they potentially affect ecological resources, and a plan for prioritizing accomplishing restoration in each area. We also provided specific recommendations for restoring the highest-priority unpaved road restoration area, which comprises lands and roads owned and managed primarily by Eglin Air Force Base.

Lastly, we restored a high-priority area known as “Dripping Rock”. Located on the Yellow River near the Alabama/Florida border, the Dripping Rock area is characterized by a denuded and breached riverbank and an unpaved road resulting in an estimated 60 tons of excess sediment per year to the river. In addition, this area is directly adjacent to the only known stretch of spawning habitat for the federally threatened Gulf sturgeon in the river basin. We restored the site by grading, stabilizing & revegetating the breached bank to floodplain level, and by closing, grading, filling, and seeding the unpaved for long-term sediment stabilization. The primary benefits of restoring the Dripping Rock site is reduction of excessive sediments and which improves spawning substrate of Gulf sturgeon within designated critical habitat. Because Eglin AFB owns land adjacent to its critical habitat, actions that aid in the recovery of federally protected species like the Gulf sturgeon furthers the military’s natural resource stewardship mission while reducing its long-term regulatory burden.



Picture 2: A total of 479 impaired sites were identified in the Yellow River Basin.

Recommendations/Lessons learned

General Recommendations: Excessive sedimentation is the primary cause of impairment at nearly all of these sites, a pattern consistent with recent examinations of rivers and streams in other nearby drainage basins. Focusing future resource conservation, restoration, and management efforts in specific areas can maximize the potential to restore priority ecological resources and designations while minimizing the cost for completing restoration actions (i.e., the "biggest bang for the buck"). As such, we recommend that efforts be concentrated in the seven Focal Areas identified in this study. Focal areas with a large proportion of public ownership, such as the Rattlesnake Road and the Conecuh National Forest focal areas, present the most immediate and viable opportunities for restoration because (1) public funding is more readily available in greater amounts for restoration actions on public lands and sovereign resources, (2) state and federal agencies managing these areas generally have greater restoration experience than private landowners, and (3) the number of parties needed to approve

restoration at multiple sites is significantly reduced under one or a few public managing agencies responsible for those areas. It should be noted, however, that while private entities may own the lands abutting river corridor sites and unpaved road crossings, the counties, states, and federal government usually have ownership and/or jurisdiction over sovereign river resources and the unpaved road crossings themselves.

We strongly encourage restoration at multiple sites under one project as stated above. Unpaved roads, which contribute to the greatest and most severe number of impairments, may be the best targets for restoration. We recommend targeting unpaved roads which affect multiple sites to provide maximum reduction in excessive sedimentation and benefit to priority ecological resources and designations. We also recommend initiating improvements at highly impaired river corridor sites. Although these sites tend to contribute excessive sediment to a lesser degree than unpaved road sites, stabilization can provide substantial conservation benefit, especially when completed in tandem with nearby unpaved road sites. The restoration of the Dripping Rock site is an excellent example of such targeted, high-leverage restoration actions. Focal areas may provide heretofore unrecognized mitigation potential for future public and private construction, roads, and related projects. Few mitigation sites have been identified in the Yellow River Basin; however, this study provides hundreds of localities where impairments to rivers, streams, and wetlands have been assessed and prioritized using standard methods. These sites can be used to further develop mitigation credits and plans in both Alabama and Florida. We recommend that any future mitigation investigation be focused within the focal areas identified herein.

Eglin Air Force Base Recommendations: This study identified the Rattlesnake Road Focal Area – the only focal area that directly affecting Eglin AFB – as containing among the highest priority sites recommended for restoration in the study. Several priority resources and designations are located in or near to this focal area, notably the federally threatened Gulf sturgeon and candidate mussels the narrow pigtoe, Southern sandshell, and Choctaw bean. Eglin AFB Ranch Road 211 within this focal area was specifically identified as among the highest priority unpaved roads for restoration and provides access to several impaired river corridor sites owned/used by Eglin AFB for training, boat launching, and recreation. We strongly encourage Eglin AFB to stabilize/restore the unpaved Eglin AFB Ranch Road 211 as a primary action within the Rattlesnake Road Focal Area. Stabilizing/restoring this road can provide multiple benefits to military and natural resource stewardship missions, including:

- Reducing excessive sedimentation originating from the bare-soil road, ditches, and ditch outlets to better maintain road conditions as a consistent and reliable throughway;
- Reducing costs for dirt fill, equipment, supplies, materials, operation hours, administrative, and other costs for road maintenance;
- Improving the quality of Eglin AFB training and recreational areas;
- Reducing sedimentation water quality and habitat impacts to federally protected or incipient protected species and their designated/proposed critical habitats; and,

- Reducing military regulatory burden by aiding in the recovery of federally protected or incipient protected species and their designated/proposed critical habitats.

Picture 3: Dripping Rock restoration site before (A) and after (B) restoration.

Upon reviewing these recommendations, Eglin AFB has implemented sediment control measures at three impaired sites along Eglin AFB Ranch Road, as well as a military recreation site locally known as “Little Gin Hole” identified in the study. Sediment control measures have included construction of earthen berms in ditch outlets, seeding and planting to stabilize berms, Geoweb® sediment stabilization and slope protection, and use of temporary sediment controls such as silt fencing and hay bales to reduce sediment runoff originating from the road, ditches, and ditch outlets at the sites. Eglin AFB is currently developing sediment control measure plans for at least five additional sites located on Eglin AFB Ranch Road 211 and at other training sites identified within the Rattlesnake Road Focal Area. We encourage Eglin AFB to continue to these measures as

well as explore options internally and with partners for restoration actions that further reduce excessive sedimentation to the Yellow River and its tributaries.

Additional Information

Project Publicity:
None.

Technical Reports Produced:
Herrington, S. J., Collins, K., and M. Siple. 2011. Inventory and prioritization of impaired sites in the Yellow River watershed in Alabama and Florida. Final report to: U.S. Department of Defense Legacy Resource Management Program and Florida Fish and Wildlife Conservation Commission, 641 pp.