The Hydrological Impacts of the U.S. - Mexico Border Fence along the Rio Grande River, Texas

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Despite considerable evidence of the impact the U.S.-Mexico border fence has on flood regimes along the border region, the hydrological ramifications of fence presence have not been fully predicted or studied. Along the Rio Grande River, border fence sections total almost 200 kilometers at varying distances from the channel. In addition, the federal government is currently breaking ground on 53 km of additional fence in the Rio Grande Valley, 90 km near Laredo, and private entities continue to construct independent fence sections throughout the border region. Therefore, understanding the impact of the fence on the Rio Grande is crucial to knowing how this infrastructure may be impacting residents and the surrounding ecosystem.

To begin to model the impacts of the fence on flooding we must first examine past and present river flow. This study first determines where gaging station data exists near fence locations and analyzes flood recurrence intervals in order to later determine how current and future fence sections may impact flood regimes. For example, in the summers of 2013 and 2014, the sister cities of Eagle Pass, Texas and Piedras Negras, Coahuila experienced two back-to-back large floods that inundated the fence and were initially thought by locals to be 100-year events. However, research conducted as a result of IGS funding using flood recurrence analysis shows that these flows were merely five- and six-year events, respectively. Additional flood recurrence analysis will determine the 5-, 10-, 25-, 50-, and 100-year floods at all fence locations. Thus far I have mapped all fence sections along the Rio Grande and identified, via GIS, the USGS/IBWC (International Boundary and Water Commission) gaging stations that are closest to these locations (Table 1).

Following flood analysis for all fence locations I will use the model Nays 2D Flood to model the extent of floods in these locations given fence presence. LiDAR data, purchased with IGS funds via TNRIS (Texas Natural Resource Information Service) has been obtained and will serve as the boundary conditions for the model. I have also run through the sample data to learn the model and become familiar with the format of the input files I will be creating to run the model at my sites.

This research project is the first to examine the hydrological and geomorphic impacts of the U.S.-Mexico border fence. Thus far any work regarding the impact of the fence, including work I have conducted, has examined its social implications. Next semester I will be on sabbatical and will dedicate that time to begin the modeling of flood flows.

Table 1. Gaging station locations near fence sections

Code	Name
8364000	USGS 08364000 Rio Grande at El Paso, Tx
8451800	USIBW 08451800 USIBW Rio Grande at Del Rio, TX & Acuna, MX
8458000	USIBW 08458000 USIBW Rio Grande at Eagle Pass, TX
8459000	USGS 08459000 Rio Grande at Laredo, TX
8464700	USGS 08464700 Rio Grande at Ft Ringgold, Rio Grande City,TX
8469200	USGS 08469200 Rio Grande bl Anzald Dam nr Misson, TX
8473700	USGS 08473700 Rio Grande nr San Benito, TX & Ramirez, MX
8475000	USGS 08475000 Rio Grande nr Brownsville, TX