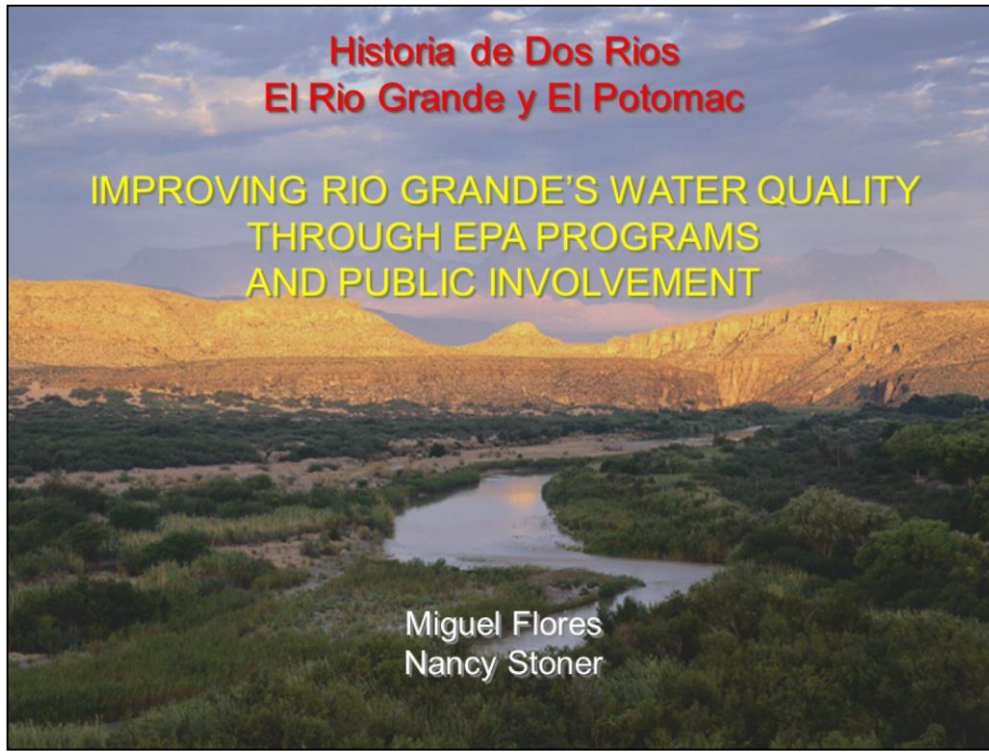
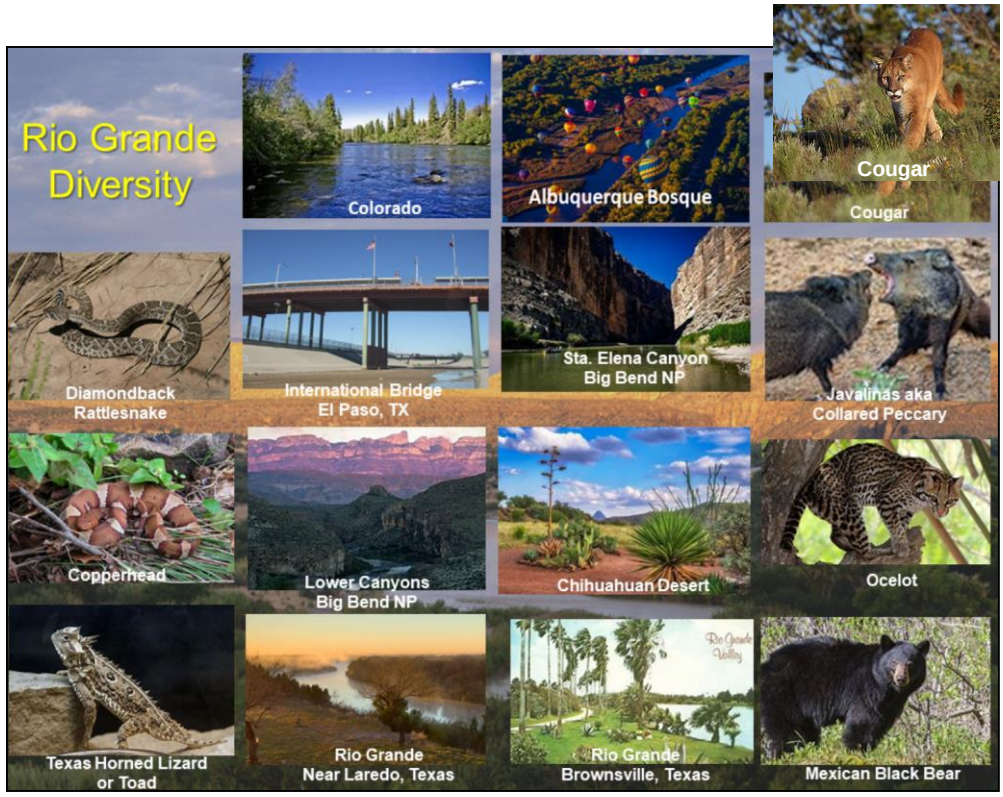


I want thank the EPA Alumni Assn for providing me this opportunity to speak to you about the Rio Grande, a river that I have a lot of history with and roots in. I was born and raised in Laredo, TX, which is on the banks of the river across from Nuevo Laredo, MX, one of seven sister cities where most border residents live.

Will Rogers once described the Rio Grande as "the only river I know of… that is in need of irrigating," a prophetic observation considering how fragmented this fabled river has become.

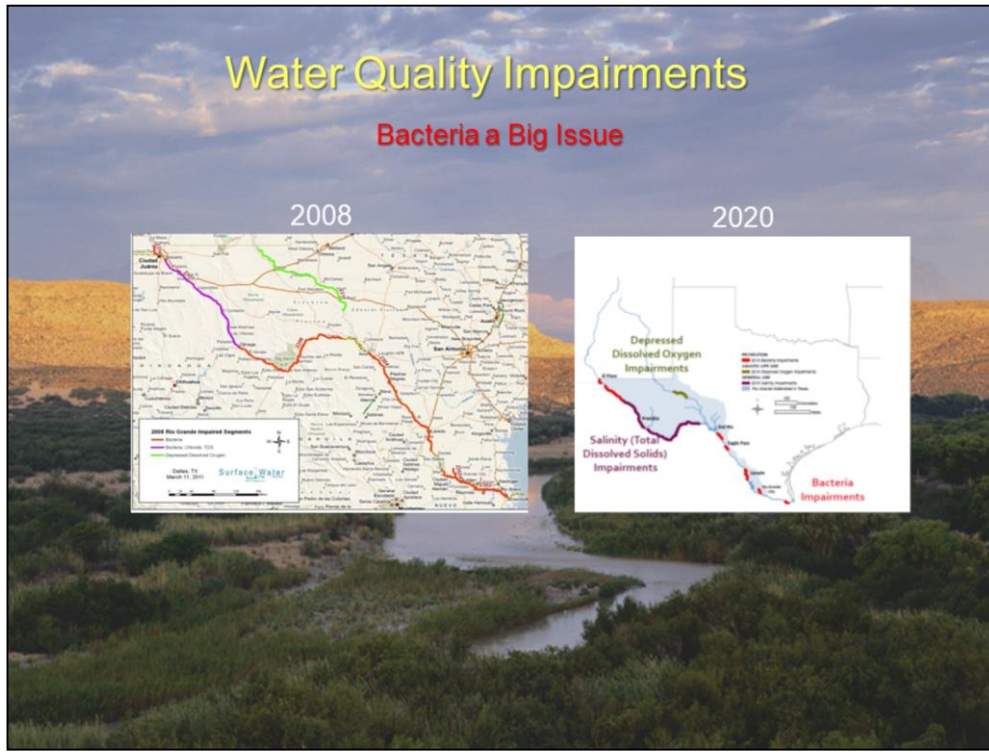
- At 1,900 miles, the Rio Grande is the 4th longest river in North America—3rd in the US, flowing through 7 states, 3 U.S. and 4 Mexican, and more than a dozen Pueblos and Tribal lands.
- Headwaters: San Juan Mountains of Colorado more than 12,000 feet above sea level, emptying into the Gulf of Mexico after flowing through diverse landscapes
- Forms approximately 1,250 miles of Texas-Mexico
- Watershed is expansive covering some 336,000 square miles on both sides of the US-Mexico border. The Mexican portion is the largest watershed in Mexico comprising 20% of Mexico's land area, and more than twice the size of any other Mexican watershed. Diverse geography and ecosystems, much of which are arid or semi-arid, and includes the 200,000 sq. mi. Chihuahuan Desert, largest in North America and home to 5,000 plant species, and 500 of the world's 1,500 species of cactus.
- 15 dams and diversions place stresses on water availability, the riverine ecosystem, and create conflicts between states and the US and Mexico, especially during severe and extreme droughts.
- 260 mi of RG is designated a National Wild and Scenic River in parts of NM and TX,
- WWF and American Rivers have designated it as of most endangered rivers, globally and in the US, respectively
- Within the ovals are features worth noting. The Rio Conchos in Mexico provides most of the water that flows in the river from Presidio, TX up river from Big Bend down to the Gulf, with contributions from the Pecos and Devils River that empty into Amistad Reservoir, which along the Falcon Reservoir south of Laredo maintain water for use by municipalities and other water users. The International Boundary and Water Commission, a binational institution having US and Mexico sections, regulates the water in the river to ensure Mexico's obligations are met under a 1944 treaty to deliver 350,000 AF of water annually to the US on averaged over a five year period. On occasions Mexico has not met its obligation creating a hot political



- This illustrates some of the diversity in the landscapes of the river as it flows from Colorado to the Gulf (the 8 frames in the middle of the slide). Note that at times the river runs dry or nearly so in El Paso where the river is a concrete channel as a result of US-Mexico border realignment. The Albuquerque Bosque is part of the largest Cottonwood Forest in the US extending from Santa Fe, NM to the Border along the river. Also are pictures some of the fauna found along the river.
- The black bears found in Big Bend NP crossed over from Mexico, illegally I might add, but returned to Mexico due to prolonged droughts, but have returned.
- The pre-historic critter on the bottom left, one of my favorites, some of you may recognize as the Horned Toad, also known as the Horned Frog to TCU alums.

- The Texas **Lower Rio Grande Valley** area is home to many tropical bird species found nowhere else in the United States.
- It is a major bird migration corridor; the convergence of two major flyways (the Central and Mississippi) affords the birder an abundance of Northern species migrating to avoid the winter cold and to take advantage of northern breeding habitats.

- Here are some of the causes of water pollution in the region as many residents lack basic sanitary services or failing infrastructure. In the past, and even today, cities discharged raw or poorly treated sewage into the river.
- There is a growing number of unincorporated settlements known as *Colonias, which* the Texas Office of the Secretary of State defines “as residential areas along the Texas-Mexico border that may lack basic living necessities like potable water, septic or sewer systems, electricity, paved roads, or safe and sanitary housing.” There are more than 1,000 colonias in Texas, with an estimated population of 500,000. Not all housing is sub-standard, however.

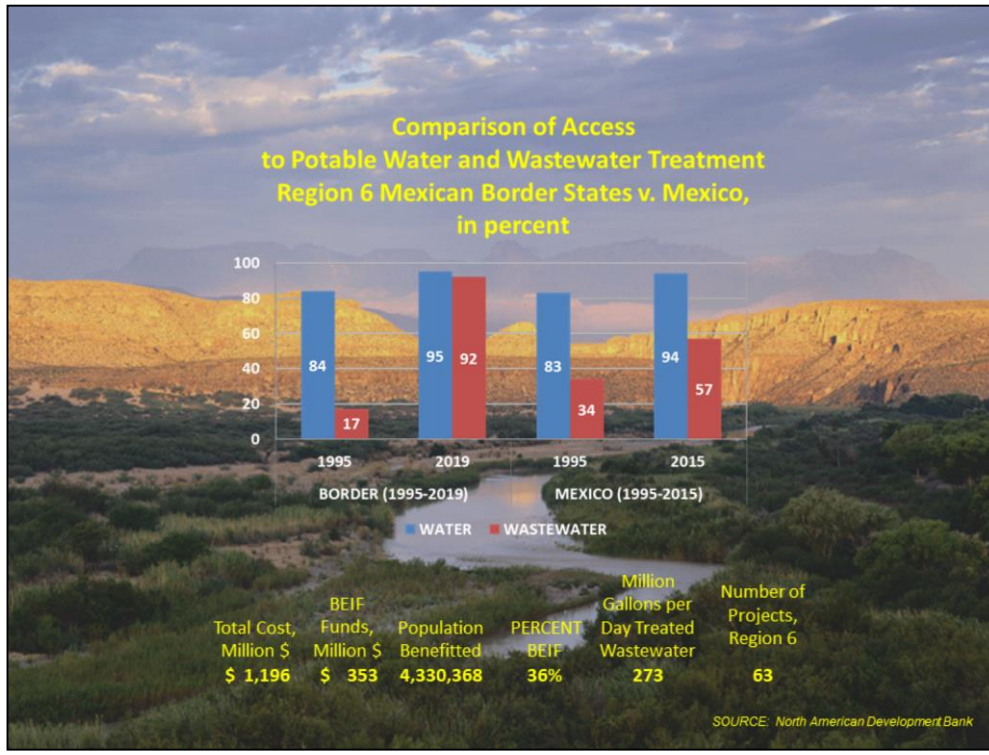


- As a result of these problems , the Rio Grande has water quality impairments, i.e., fail to meet WQ standards primarily for bacteria and other pollutants. Bacteria impairs the entire stretch.
- As the slide shows improvements have been made, especially for bacteria, where fewer segments are now impaired, however, there has been an increase in salinity, which is very worrisome for agricultural users.

- NAFTA was enacted in 1994, creating two binational institutions: the Border Environment Cooperation Commission (BECC) and the North American Development Bank (NADBank).
- Also in 1994, the EPA established the Border Water Infrastructure Program to provide grants and funding through the NADBank for the construction of water and wastewater treatment plants and related improvements along both sides of the US-Mexico Border, inclusive of *colonias*.
- The BECC provides planning and design services to communities using EPA funds, while the NADBank puts together financial packages. inclusive of EPA grant funds and oversees project construction.
- EPA Region 6 personnel work closely with the BECC and NADBank in overseeing the prioritization, project planning and design, financial and construction oversight.
- Without EPA assistance many low income communities would not have these services.
- Mexico's National Water Commission is the primary funder of Mexican projects.
- Other partners include the States of NM and TX (EDAP, CW & DW SRFs)

- Photo shows Mayors from Laredo & Nuevo Laredo, local Congressman, and US Consul posing with a check representing an EPA grant for a new sewer collector line in Nuevo Laredo that will prevent millions of gallons per day of sewage discharged into the river.

- Here are just a few examples of the completed projects in Region 6
- State and community leaders attend ground breaking or plant inauguration ceremonies, which in Mexico are attended by State Governors.
- The picture top left shows how many residents obtain potable water prior to the completion of WTPs. Many *colonia* residents travel miles to fill their water tanks with potable water provided by local communities at water filling stations.
- As of today many *colonias* still lack drinking water in their homes



- Since 1994— throughout the entire border region, inclusive of Region 9 states, CA and AZ and adjacent Mexican states, the EPA Border Infrastructure Program has provided grants for 25 WTPs and 61 WWTPs completed projects with a capacity of 160 Million Gallon per Day (MGD) for drinking water, and 442 MGD for treated wastewater--that previously was discharged as sewage into waterways untreated.
- More than half of the projects were built along Texas-Mexico border & parts of NM
- As seen on the slide EPA has provided 36% of the $1.2 billion total project costs, that benefitted 4.33 million border residents
- 273 MGD of raw or poorly treated sewage is no longer discharged into RG
- The success of the program can be measured by the graphs above that show how the availability of treated water and wastewater has increased substantially in Mexican border states, particularly with respect to wastewater, and far exceed similar statistics for Mexico as a whole. National figures are somewhat inflated because the border states are included in the calculation.
    - Potable water availability has increased from 84% to 95%, not a big difference from nation as a whole (caveat about Mexico nationally: water availability may not be 24/7 for some residents)
    - Treated Wastewater increased dramatically from 17% to 92%, way above the national average
    - National averages are somewhat inflated in that they include border

states with higher averages

- Conditions along the border expose many of the poor to unhealthy living conditions and diseases.
- Discarded tires, illegal dump sites, create breeding grounds promoting the incidence of vector-borne diseases, such as Dengue Fever.
- One Mexican city saw a dramatic drop in cases of Dengue from 2007 to 2008 from more than 300 to less than 10 that officials attribute to tire cleanup and recycling efforts supported by EPA's Border Program.

- Another EPA program that I just referred to is the Border 2020 program, the latest iteration of a program that began with the La Paz agreement of 1983, which defined the "border area" as an area 100 km on either side of the border.
- The goals of the program are aligned with EPA goals.
- EPA provides small grants competitively to fund high priority projects identified by communities, universities, and NGOs.
- I co-chaired, with my Mexican counterpart, one of the regional workgroups established by at that time the Border 2012 program, and held numerous binational, bilingual public meetings to relate the objectives of the program and to solicit input as to their most pressing environmental issues.
- We also held numerous workshops on topics of interest like climate change, non-point source pollution, and binational emergency preparedness.
- Here are some testimonials

"The Border 2020 Program has allowed us to improve our relationship with EPA and more importantly they are accepting local input. That is important to develop long term relationships and really address U.S. – Mexico Border environmental issues"…Dr. Hector Gonzalez, Laredo Public Health Director

"The Border 2020 work group has allowed a working relationship to become an excellent friendship. It has been a very useful tool for the development of border environmental initiatives. Sonora and Arizona have benefited from multiple projects on water, air, and solid waste." … Luis Carlos Romo Salazar, Commissioner, Commission on Ecology and Sustainable Development, State of Sonora, Mexico

Household Hazardous Waste, Electronics, and Tire Collection

Improper disposal of household hazardous materials, electronics and tires can lead to significant water quality and public health problems and was identified as one of the highest priorities in my regional workgroup resulting in cities to conducting multiple collection events for these wastes, some organized by youth groups. Here are some results from these efforts:

- ***House-Hold Hazardous Waste: 3 communities alone collected 30,250 liters and 25,630 kgs of waste, inclusive of unused medicines for proper disposal***
- ***Used Electronics: 3 cities collected more than 1.3 million pounds of used electronics***

- With respect to tires, in Nuevo Laredo, MX, 175,000 tires were collected and properly disposed of annually between 2000 and 2007.
- In 2010, 3 cities in the lower part of the RG collected 335,500 tires.
- In Region 6, more than 12 million scrap tires were recovered from landfills, waterways, vacant lands for use in cement kilns and other applications, through the Border 2012 Program.
- This effort continues with the Border 2020 Program, and at the end of 2019, more than 20 million scrap tires had been recovered and recycled.
- Trash and illegal dump sites is another serious issue identified leading Community groups to organize EPA-supported trash collection events on both sides of the

border. Over 1,200 volunteers collected over 300 tons of trash in clean up events in over a several days; Earth Day and *Dia del Rio* are 2 events when cleanups occur.

In addition to those successes the program has funded activities such as:.

- Bilingual educational materials related to water pollution prevention such as nonpoint source pollution for use on both sides of the border
- Water quality monitoring for toxics in a lagoon adjacent to a Mexican oil refinery
- Planting of native species
- Environmental Health Education especially for Asthma, and Pesticides Poisoning for farm workers, including preparation of poison diagnostic manual for use by physicians who minimal experience diagnosing poisoning
- Trash collection
- Drainage canal and creek cleanup and restoration

LISTED HERE ARE SOME OF THE CHALLENGES THAT THE RIVER FACES, BUT BECAUSE CLIMATE CHANGE IMPACTS ARE OVERARCHING I'LL FOCUS ON THAT FIRST

- Over the next 20 years models predict a 1 to 5 degree C rise in temperature and drop in precipitation between 5 and 20% along the US-MX border
- Water supply will *decrease* by 1.6 Million Acre-Feet (ACF) but Water demand will *increase* by 1.2 Million ACF. (One ACF= 43,560 gal.) impacting the 5.5 people dependent on RG
- 75% of water use is in support of agriculture, but not all is from surface water; 54% and 33% of municipal and irrigation use, respectively, is from GW from Aquifers that are overexploited 2.5 times beyond their recharge rates. Aquifer Storage and Retrieval as a strategy to recharge aquifers is limited along the border. Decreased precipitation will further some transboundary deplete aquifers.
- Water scarcity and availability historically have been a hot political issue among the US and Mexico, US states, domestic, municipal, agriculture users creating tensions, especially during periods of drought.
- Severe, extreme and exceptional droughts are frequent and at times prolonged, lasting as long as 7.75 yrs. With CC, the frequency, duration and severity will likely increase, it will also alter the pattern & intensity of storms creating heavier rainfall events, and probably more hurricanes entering the Gulf and dump enormous amounts of rain on communities causing flooding, sewer system overflows, and polluted stormwater runoff. Increased temperatures will have serious impacts on water quality: e.g., low DO , higher pollutant concentrations, lower flows, and increased water temperatures.
- Irrigators are selling water rights to municipalities due to water availability deficits projected in the future
- Population growth will stress water availability tremendously. The border pop'n has doubled since the 60's
    - In Mexico, the population was 10.3M in 2005 → 12.7M by 2025 → 20M by 2070
    - Lower RG Region S. of Amistad Reservoir alone: the population was ~2M in 2020 → 2.4M by 2030 → 4M by 2070
    - Municipal demands have and will exceed supplies during droughts: estimated at 13% in 2020 → 22% in 2030 → 50% in 2070
    - As a consequence there will be increased strain on, and insufficiency of, water and wastewater infrastructure, leading to increased raw sewage discharges, poorer water quality and public health.

    - Thus, the need for EPA's Border Environmental Infrastructure Fund will be even more critical in the future
    - State Water Plan in Texas and Watershed Councils in Mexico address these challenges through strategies, such as water conservation and re-use, more efficient irrigation, switching to less water demanding crops, and desalination
- A transboundary watershed makes addressing the sustainability of water resources more challenging due to the current fragmented governance, existing treaties, state compacts, and the competition among water user groups in both countries. Balancing human and environmental needs with border security will add to these challenges. Aggressive binational cooperative efforts among governments and user groups are necessary now to assure water resource sustainability and mitigate Climate Change impacts in the border region.
- As the old adage says: "Whiskey is for drinking; Water is for fighting."

- Now that I've given you a doomsday scenario let me conclude on a positive note and focus on how public participation and EPA are helping improve water quality in the RG allowing people to reconnect to it, much like Office of Water's Urban Waters Initiative.
- Growing up in Laredo, I recognized the river as the international border, but going back & forth to Mexico frequently to visit relatives, eat real Mexican food and knock down a few tequilas. People never thought of swimming in it due to pollution caused by discharges of raw sewage into the river. More importantly, we didn't learn about river's importance, its ecological significance, nor consider it an asset to be enjoyed.
- As River Navigator for the RG American Heritage River, I was struck as to why the story of RG wasn't incorporated in school curricula for schools along the river. If children learn at a young age, they will have a vested interest in the river, its significance and its protection. Not doing so robs children of their history.
- Very different now. Efforts of local activists along the river, such as the RG Independent Study Center (RGISC), have promoted community efforts to protect the river & its ecosystem, & to sponsor river-related activities that people can enjoy and learn about the RG. Amazing how a small organization can engage 100s to protect the RG and the integrity of the river ecosystem, and sponsor numerous events ranging from water quality sampling, birding festivals, building monarch butterfly gardens, wetlands protection, promoting local ordinances protective of the rivere and much more. They are indeed Riverkeepers.
- Above are some examples: of how local participation can help improve water quality, the river's environs, and make it a place where people can come together to enjoy the many opportunities it provides. I never would have imagined that someone like the world famous cellist, Yo-Yo Ma, would come to Laredo and entertain the community on the banks of the river during a 2019 Earth Day event.
- Dia del Rio on both sides of the river is a day for children, educators, and the public come together to enjoy the river. Kayaking events are now held annually by many communities along the river. The Rio Research Roundup is a binational water sampling event along the river and tributaries extending from Colorado to the Gulf.
- It goes without saying: Everyone lives in a watershed; all of us and the general public need to be involved in protecting our rivers and streams, the lifeline of many communities, whether through the Riverkeeper Network,

like Nancy, or other organizations like American Rivers and the Rio Grande Independent Study Center that I support. Thank You for your attention. Hopefully you'll go away you with a better understanding and appreciation of the Rio Grande. I look forward to your comments and questions.


Kudos to the Region 6 Border Team
El Paso Border Office
• Carlos Rincon, Ph.D, Director
Border Environmental Infrastructure Program
• Gilbert Tellez, Ph.D., P.E., Program Manager
Border 2020 Program
• Debra Tellez
• Maria Sisneros
• Dora Vasquez
Dallas Office
Border Environmental Infrastructure Program
• Claudia Hosch, Branch Chief
• Denise Hamilton, Section Chief
• Sal Gandara, NADBank Project Officer

Border Team Members have over 20 years working in the program.