START
NATIONAL CONSORTIUM FOR THE STUDY OF TERRORISM AND RESPONSES TO TERRORISM

RESEARCH BRIEF

Countering the Inhumane: Modeling Probable Pathways for Human Smuggling and Trafficking Along the U.S.-Mexico Border

OVERVIEW

One of the key challenges in securing the U.S.-Mexico border is the smuggling of illicit goods and humans between Ports-of-Entry (POEs). A confluence of factors advantageous to traffickers— inconsistent levels of fencing, favorable terrain, and expansive knowledge of specific pathways— has contributed to the establishment of preferred routes of illicit transit. Although the potential pathways for illegal entry into the United States are varied, they are constrained by a number of factors that could concentrate those routes into specific corridors and chokepoints. To understand the probable pathways by which human smugglers and traffickers transport individuals from Mexico into Arizona, START developed a pilot geospatial simulation.

METHODOLOGY

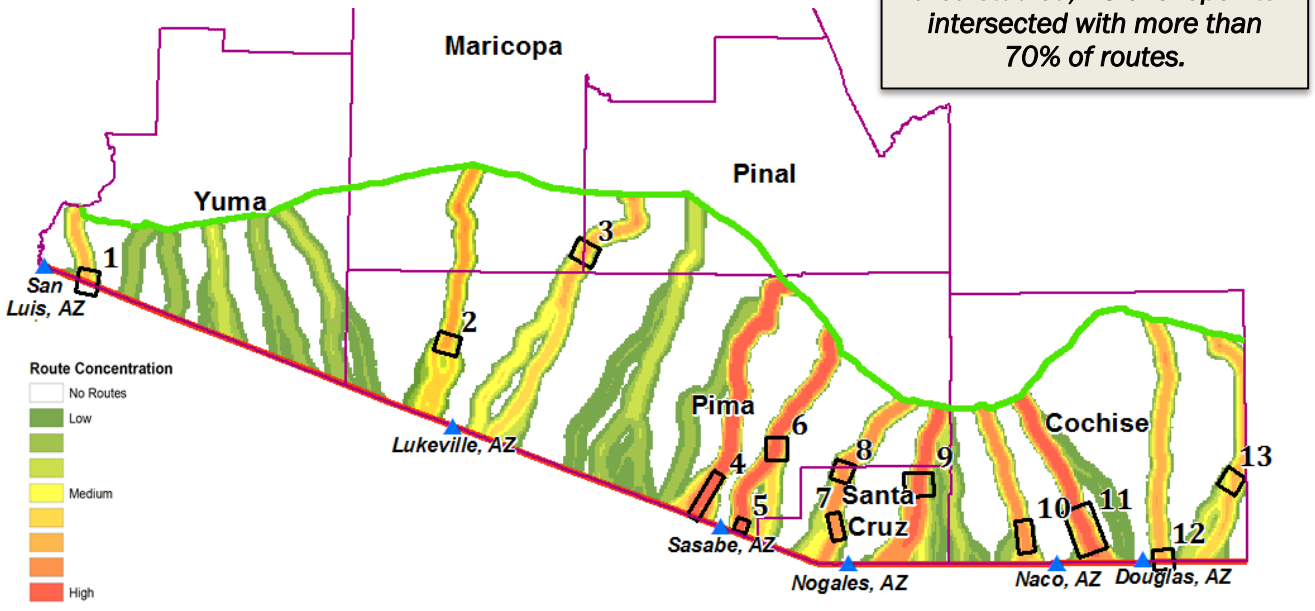
A multi-modal, two-way network model was created by combining open-source roadway networks with computationally-efficient triangulated irregular networks (TINs) for off-road pathways. This model allows for the simulation of probable routes that smugglers would take within the environment, prioritizing the shortest path from an origination to end point. Route selection was weighted by dynamic costs which increase the likelihood of detection or interdiction (such as rapid elevation changes and proximity to border patrol stations) as well as incentives which decrease those likelihoods (such as known smuggling environments and easily-navigable terrain). Originating from points identified by a 2013 survey of those apprehended by U.S. Border Patrol and ending at locations along the I-8/I-10 corridor, nearly 1,000 routes were simulated to construct the final resulting pathways.

FINDINGS

Starting from nearly 1,000 different origins, the simulated routes converged into roughly 20 critical paths within 20 miles of the border.

- Variation in route pathways was determined primarily by geographic features (including mountain ranges and valleys), especially for pathways in Eastern Arizona.
- The distribution of route times was also dependent on the specific starting point, with the majority of routes taking between 50 and 75 hours, or 2.5 to 3.75 days, to walk (roughly 75-130 km, depending on terrain). Travel time varied considerably by starting point, with routes starting near San Luis requiring between 40 and 50 hours, while those starting across from nearby Lukeville POE taking nearly 85 hours to complete on average.

Accounting for just 3% of the area studied, 13 chokepoints intersected with more than 70% of routes.



These 20 critical pathways were then grouped into four key corridors where enforcement efforts could be coordinated among federal, state, and local agencies. These include:

1) a far western corridor near Yuma;
2) a central corridor that runs through the Tohono O'odham Nation (TON) reservation;
3) a corridor from Nogales northward; and
4) a Naco-Douglas corridor.

These corridors developed similar routes which parallel one another by only a few miles, depending on the results of many alternative model specifications.

- Specifically, the TON corridor contained the most variation, as different model parameters either highly incentivized this corridor or discouraged its use. Given this variation across models, however, overall pathways tend to mimic each other from model to model, providing some support for the projection of common pathways for human smugglers and traffickers between the POEs.

Finally, 13 chokepoints in smuggling routes were identified. These chokepoints account for only 3 percent of the area studied, but intersect with more than 70 percent of the identified routes.

- The identified chokepoints represent unique opportunities for law enforcement to increase the likelihood of detection and interdiction of smugglers and migrants. If additional monitoring and interdiction efforts are applied to these chokepoints, it could increase the costs for smugglers and potentially deter some of the traffic.

FUTURE DIRECTIONS

Although a pilot study, the geosimulation provides a preliminary framework for the development of pathway prediction of illicit smuggling and trafficking between POEs. Future opportunities remain for extending this methodology, including the validation of the simulated pathways using interdiction data as well as the simulation of adversary-defender models using game theoretical applications across the multi-modal network.

By using geosimulation within operational planning, agencies working between the POEs could build a more adaptive capability for anticipating illicit pathways and targeting interdiction resources to probable chokepoints. The result could be improved interdiction rates, deterring future attempts at illicit smuggling across the border.

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This Research Brief is based on the report of the same name, "Countering the Inhumane: Modeling Probable Pathways for Human Smuggling and Trafficking along the U.S.-Mexico Border." It is available upon request to infostart@start.umd.edu.

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