



# **BORDER BIOSURVEILLANCE**

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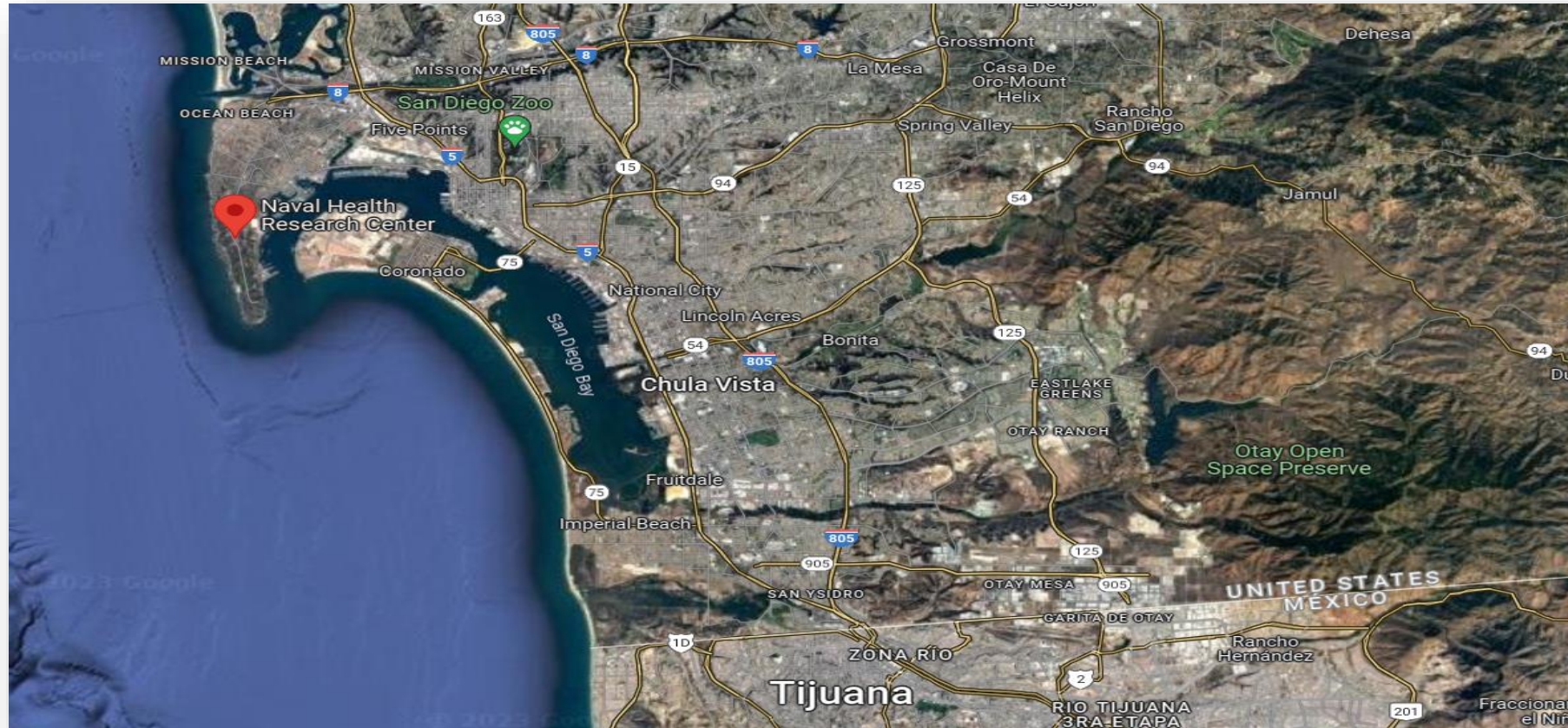


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# NAVAL HEALTH RESEARCH CENTER



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- 📍 The Naval Health Research Center (NHRC) has been designated as the DoD Deployment Health Research Center since 1999.
- 📍 Our core research areas are Operational Readiness and Health, Military Population Health, and Operational Infectious Diseases.



# OPERATIONAL INFECTIOUS DISEASES DIRECTORATE (OID)

## OUR MISSION:

To optimize operational readiness and warfighter health by informing Department of Defense (DoD) policy through research excellence.

## BIOSURVEILLANCE TARGETS

- Respiratory surveillance ~25 years (GEIS funded)
- Enteric surveillance ~11 years (GEIS funded)
- Serology ~15 years (GEIS, IHB, CDC, Barr Pharma, JPEO, NIH/NIAD, IHD, Henry Jackson Foundation, MERK)

## POPULATION TARGETS

- Recruit population (1998–present)
- U.S.-Mexico border (2000–present)
- DoD Beneficiary population (2007–2023)

## ENROLLMENTS

~125,000 (GEIS funded)



# OID: LAB HISTORY

NHRC is one of eight laboratories in the Naval Medical Research Enterprise within the US Navy Bureau of Medicine and Surgery.

The GEIS program was established in 1997. NHRC has been a part of the GEIS global network since 1998. NHRC-OID has been funded to perform respiratory and enteric diseases biosurveillance among military recruits and DoD beneficiaries. NHRC-OID conducts biosurveillance among US-Mexico Border populations through a partnership with the CDC-BIDS program.

**In April 2009, through our GEIS-funded biosurveillance program, NHRC collected the FIRST confirmed isolate of swine influenza that caused the 2009 H1N1 pandemic.**

- *This sample was collected at a US-Mexico border surveillance site.*



# US-MEXICO BORDER OBJECTIVES

1. Determine the etiology and incidence rates of respiratory and enteric disease, identify and characterize the causative agent of disease
2. Determine antimicrobial resistance profiles among bacterial pathogens isolated from US and foreign civilians living in proximity of the US-MX border
3. Identify viral, bacterial, parasitic, and vaccine-preventable pathogens in wastewater
4. Provide global and local epidemiological context through pre-syndromic biosurveillance and dashboards (historical/real time)
5. Use metagenomics for pathogen discovery
6. Serve as an **early warning system** for respiratory and enteric disease outbreaks

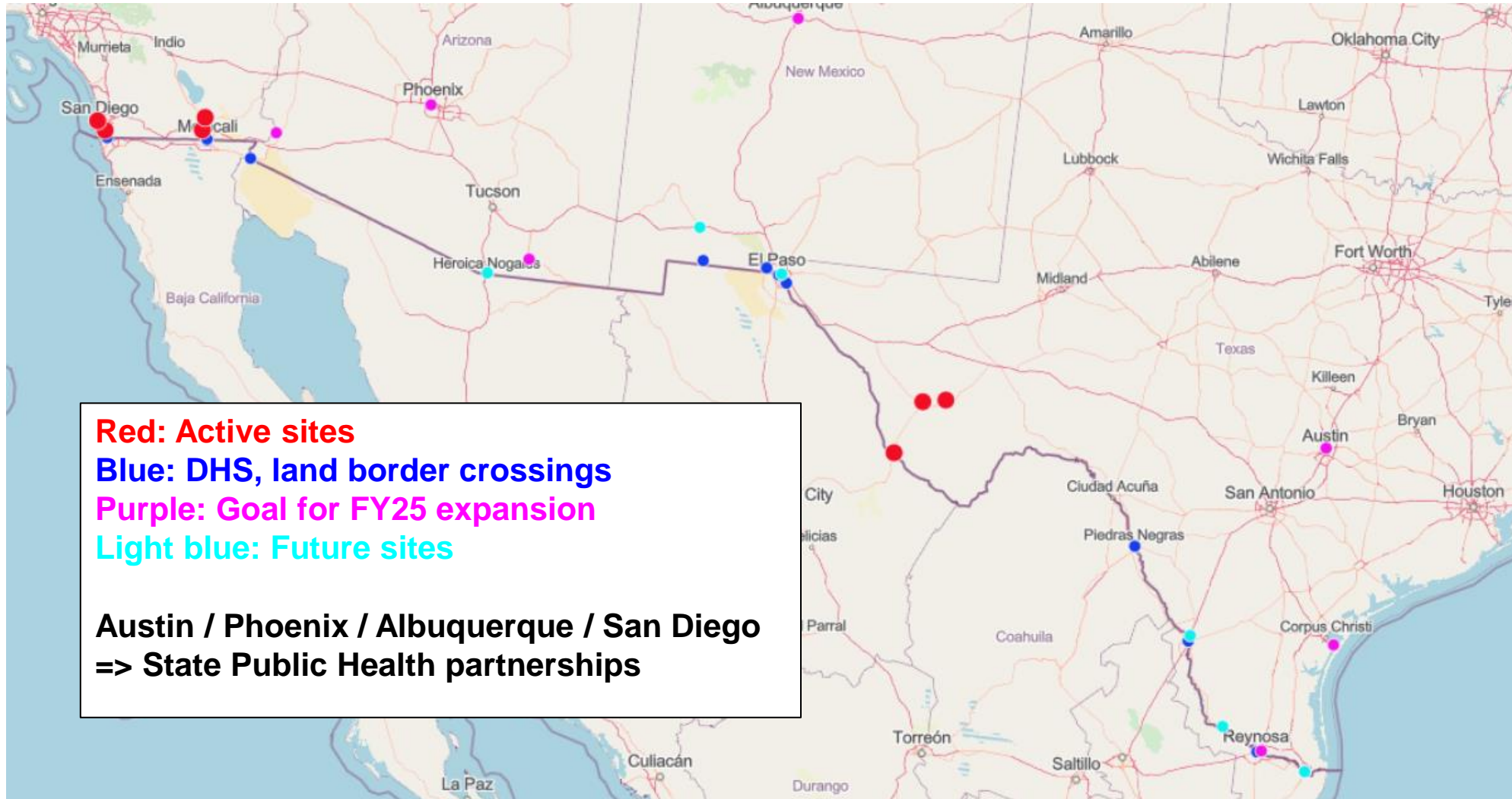


# US-MEXICO BORDER STRATEGY

- ④ Phase 1:
  - Identify partners/network for surveillance across US-Mexico border
  - Establish “Non-Consented de-identified sample collection” (NP/NS, stool sample, isolates)
- ④ Phase 2:
  - Establish “Consented de-identified samples collection” (NP/NS, stool sample)
- ④ Phase 3:
  - Incorporate environmental samples (wastewater, soil, mosquitos, etc.)



# US-MEXICO BORDER SURVEILLANCE



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# US-MEXICO BORDER SURVEILLANCE SITES, BY SETTING TYPE AND AGREEMENT STATUS

Setting Type	Active	Not Initiated	Processing	Total
Inpatient	2	0	0	2
Laboratory	1	1	3	5
Military	0	0	5	5
Outpatient	4	6	1	11
Port of Entry	0	0	12	12
Grand Total	7	6	21	34



# DISEASE SURVEILLANCE

## 📌 Active Sample Collection

- Case definitions
- Enrollment criteria
- Includes wastewater 2x weekly sample collection

## 📌 Passive Sample Collection

- Samples forwarded from State Public Health Laboratories interested in specific AMR targets and outbreak situation

## 📌 GOAL: Expand to vector-borne diseases/wastewater

📌 CDC-BIDS agreement currently includes AMR, respiratory disease, enteric disease, vector-borne diseases, and wastewater

Pathogen Capabilities		
Respiratory	Enteric	
<ul style="list-style-type: none"> <li>➤ Adenovirus</li> <li>➤ Coronavirus               <ul style="list-style-type: none"> <li>• HKU1, NL63, 229E, OC43, SARS CoV-2</li> </ul> </li> <li>➤ Human Bocavirus</li> <li>➤ Human Metapneumovirus</li> <li>➤ Human Rhinovirus/Enterovirus</li> <li>➤ Influenza A               <ul style="list-style-type: none"> <li>• A/H3, A/H1, A/H5, A/H7</li> </ul> </li> <li>➤ Influenza B               <ul style="list-style-type: none"> <li>• B/Yamagata, B/Victoria</li> </ul> </li> <li>➤ Parainfluenza virus               <ul style="list-style-type: none"> <li>• PIV 1, 2, 3, 4</li> </ul> </li> <li>➤ Respiratory Syncytial Virus               <ul style="list-style-type: none"> <li>• RSV A, RSV B</li> </ul> </li> <li>➤ <i>Chlamydomphila pneumoniae</i></li> <li>➤ <i>Mycoplasma pneumoniae</i></li> </ul>	<ul style="list-style-type: none"> <li>➤ Adenovirus F 40/41</li> <li>➤ Astrovirus</li> <li>➤ Norovirus GI/GII</li> <li>➤ Rotavirus A</li> <li>➤ Sapovirus (I, II, IV, V)</li> <li>➤ <i>Campylobacter</i></li> <li>➤ <i>Clostridium difficile</i> (A/B)</li> <li>➤ <i>Plesiomonas shigelloides</i></li> <li>➤ <i>Salmonella</i></li> <li>➤ <i>Yersinia enterocolitica</i></li> <li>➤ <i>Vibrio</i></li> <li>➤ <i>Vibrio cholerae</i></li> </ul>	<ul style="list-style-type: none"> <li>➤ EAEC</li> <li>➤ EPEC</li> <li>➤ ETEC</li> <li>➤ STEC (<i>stx 1/stx 2</i>)</li> <li>➤ <i>E. coli</i> O157</li> <li>➤ <i>Shigella/EIEC</i></li> <li>➤ <i>Cryptosporidium</i></li> <li>➤ <i>Cyclospora cayetanensis</i></li> <li>➤ <i>Entamoeba histolytica</i></li> <li>➤ <i>Giardia lamblia</i></li> </ul>



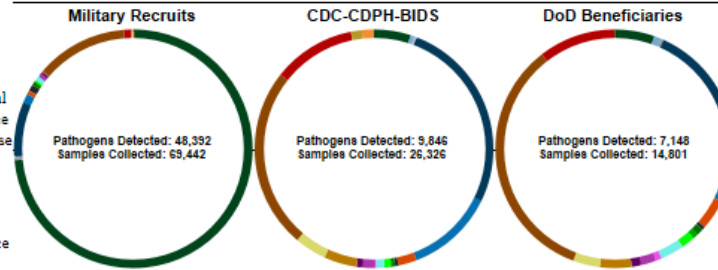
# SURVEILLANCE DASHBOARD



Welcome to the NHRC-OID Dashboard

**Purpose:** To summarize over 24 years of FRI surveillance data among Military Recruit, DoD beneficiary, and U.S.-Mexico border (CDC-CDPH-BIDS) populations. The Naval Health Research Center (NHRC) has conducted surveillance for febrile respiratory illness (FRI) at Department of Defense across the United States since 1996.

**Instructions:** Use the drop-down menu to select the visualization of interest. Map visualization displays number of pathogens detected and % positive by surveillance site. Pathogen detection trend graph shows over 24 years of detections at NHRC. Note: 1998 to 2006, NHRC did not subtype influenza A, influenza B and Adenovirus. Since 2017, NHRC tested all specimens with the viral panel. Anomaly Detection Graph is based on number of recruits meeting FRI case definition by Military Sites from 2000 to present.

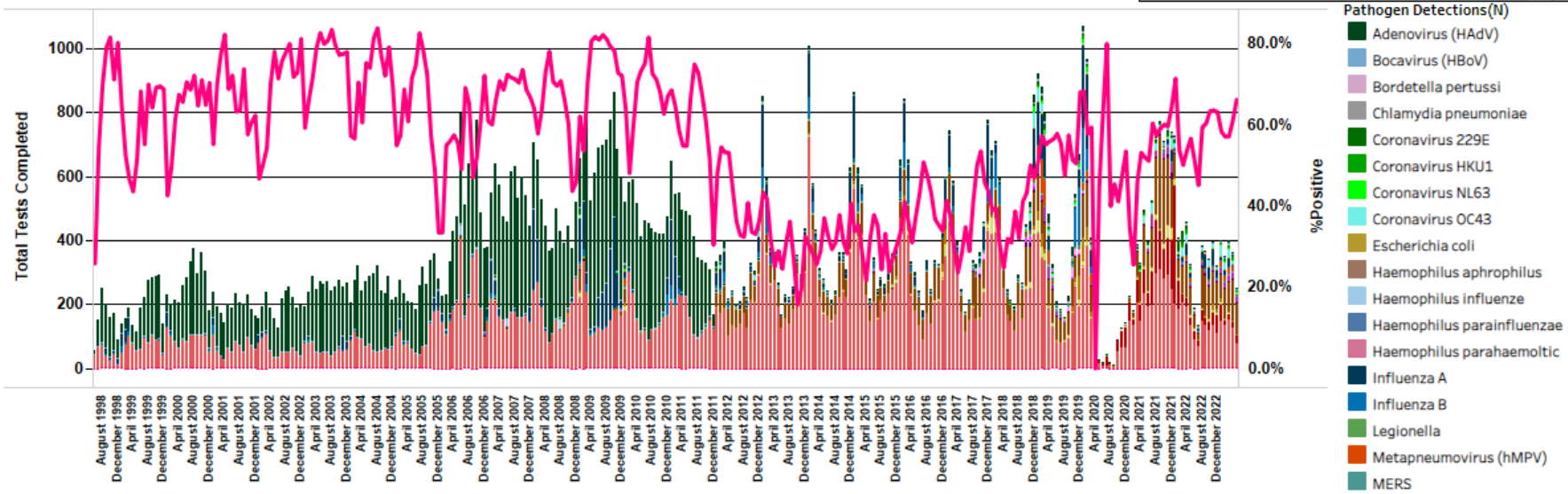
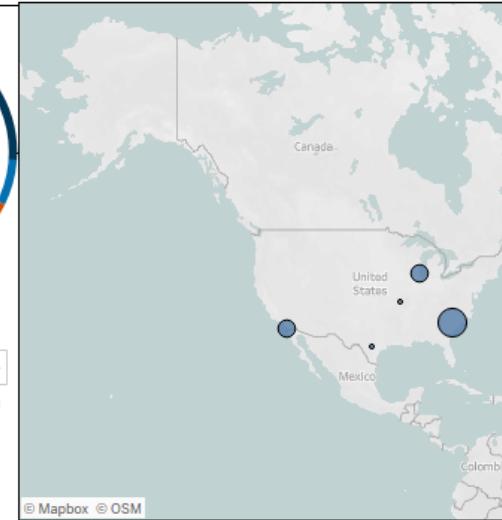


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Months  
 < Septembe... >  
 Show history

Surveillance Site: (All) Study: (All) Start Month: 1/1/1998 End Month: 6/13/2023 Anomaly Detections: (All)

- Military Recruits
- CDC-CDPH-BIDS
- DoD Beneficiaries



Anomaly Detections: Number of Recruits meeting FRI case definition by



# OPEN DISCUSSION