Abstract
This research was a baseline study of the proportion of influenza A virus (IAV) in urban and rural communities in California. The population was artificial recirculating water ponds in the geographic locations of rural and urban California. Surface water samples were collected from artificial recirculating ponds in California.

Problem
The problem is that public health science professionals have been battling emerging human influenza diseases with tactile and reactionary methods because there was a lack of knowledge and data at the human-animal interface. There are gaps in knowledge about influenza in natural waterfowl wetlands to rural and urban areas. This dissertation study was focused on understanding the proportion of influenza in natural waterfowl wetlands to rural and urban areas. The literature suggests novel influenza viruses originate in the Southern China region where migratory waterfowl become infected (Webster et al., 1992).

Purpose
The purpose of this quantitative study was to extend the previous environmental virology research of influenza in natural waterfowl wetlands to rural and urban areas. The role of the aquatic virus reservoir as a human-animal interface has not been fully understood. This dissertation study was focused on investigating the aquatic virus reservoir.

Relevant Literature
Aquatic virus reservoirs is a human-animal interface. Franklin et al. (2011) suggested aquatic virus reservoirs give rise to indirect transmission, which would alter the transmission dynamics, beyond just direct interactions between infectious and susceptible individuals. The literature suggests novel influenza viruses originate in the Southern China region where migratory waterfowl become infected (Webster et al., 1992).

Procedures
A representative sampling from each of the 21 counties (rural areas), and 37 counties (metropolitan) in California were collected from artificial recirculating ponds. Surface water samples were collected from artificial recirculating ponds. IAV(+) was verified by real-time RT-PCR, MDCK cells for virus infectivity, nucleotide sequencing of the RNA genome, and phylogenetic analysis of IAV H5N1 strains. pH, salinity, and temperature of water samples were analyzed. Pond surface areas were calculated using a laser rangefinder, GARMIN® GPS, or Google Earth.

Data Analysis
Included proportions, bivariate and multivariate logistic regression analysis. The IVs included: geographic community location (rural or urban), GPS location (latitude and longitude), altitude, approximate water pond surface area. The DVs included: IAV detection, IAV infectivity endpoint titer, IAV (H5N1) characterization. Variables evaluated as possible mediators and moderators included: water pH at collection, water salinity at collection, water temperature at collection, and presence or absence of waterfowl (Anseriformes) and shorebirds (Charadriiformes) at collection.

Findings
Showed an association in the burden of influenza A virus to geographical location. The data favored a greater burden of IAV in urban ponds compared to rural ponds. The data analysis—MDCK plaque assays, real time RT-PCR, and nucleotide sequencing—supported the proposal by Franklin et al. (2011) that aquatic systems may serve as reservoirs and sources of infection for both wild birds and mammals. Thus, the aquatic habitats sampled for this study were potential sites of the human-animal interface of IAV. Interestingly, the analysis of the data did not fully support the well-accepted theory of the influenza virus human-animal interface by Webster et al. (1992).

Conclusions
Community water ponds are viable sites of IAV. Data analysis suggest aquatic systems are reservoirs and sources of infection for wild birds and mammals. Infectivity studies show community water ponds to be sites of the human-animal interface for IAV infection. This environmental baseline study validated community water ponds as resource sites for IAV surveillance and monitoring. The commercial preservative RNA Later (Qiagen®) was successfully used as a stabilizing media for IAV research. Real time RT-PCR utilizing the TaqMan® methodology was successful. Field water samples with the MDCK plaque assay showed promise and warrants further investigation. Geochemical properties of pond water was not concluded as contributing to IAV infectivity in water ponds. MDCK plaque assay to geochemical properties of pond water as contributing factors to IAV infectivity warrants further investigation.

Social Change Implications
Impact of this study extends to the international level, the national and state level, the population level, and at the individual level. The results of this study show artificial water ponds in communities can be sources of IAV. Artificial water ponds in communities can be used for IAV surveillance and monitoring, expand and improve upon the IAV strain library for vaccine development, and may bring greater awareness to the individual, and thus, leading to improved vaccination rates.