Background

One of the fastest growing metropolitan areas in the United States is the Phoenix metro area [1]. Following a boom in the 1990s, the area has seen its landscape transform from farmlands to gated suburban communities. The area however does not have much access to fresh water.

Canal systems provide water access to areas like this in order to keep farms and lawns well kept. The Gilbert and Roosevelt Water Conservation District (RWCD) that serves Gilbert and Chandler, AZ of metropolitan Phoenix, comprises of an area that is no exception to the others [2]. The population has grown substantially in the past 30 years and has changed demographics to majority of people being in families [Figure 1]. The quality of water in these canals has become more important than ever [3][4].

Methods

- First batch of samples taken on November 0, 2018 and second batch on November 6, 2019
- Samples analyzed with the following:
  - The proposed particle sensor
  - pH measurements.
  - Turbidity measurements.
  - Conductivity measurements.
  - Particle size distribution.
  - EPA method 1605 for detecting E. coli.

Sensor Process

The particle sensor uses a method called Digital In-line Holographic Microscopy (DIHM) [6].

Light hits suspended particles in volume and raw data gets collected by a CMOS sensor.

Conclusions

- Water quality can differ year to year [Figure 4]. Differences could be caused by change in rainfall and changes to the urban landscape.
- Busy transportation intersections may be driving up pH in the canal water [Figure 4].
- Although there is little correlation between the sensor and other data measurements, there is potential for more data is acquired.

Future applications

Potential for an IoT style network of these sensors paired with other sensors.

Different bodies of water: Ex. City harbors.

Use in detecting particles in medical IVs.

Literature cited