AWWA Presentation - City of Lacey

Seeing the Future:
Enhanced Planning and Forecasting of Well Maintenance and Lifecycle Costs

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Outline

- City of Lacey Water System Overview
  - Current challenges
  - Goals
  - Streams of information
- Solution: The Well Program
  - Defining the Well Program
  - It all starts with data
  - Demo of Pilot Well Program and next steps

City of Lacey Overview

Aging Infrastructure and Growing Population

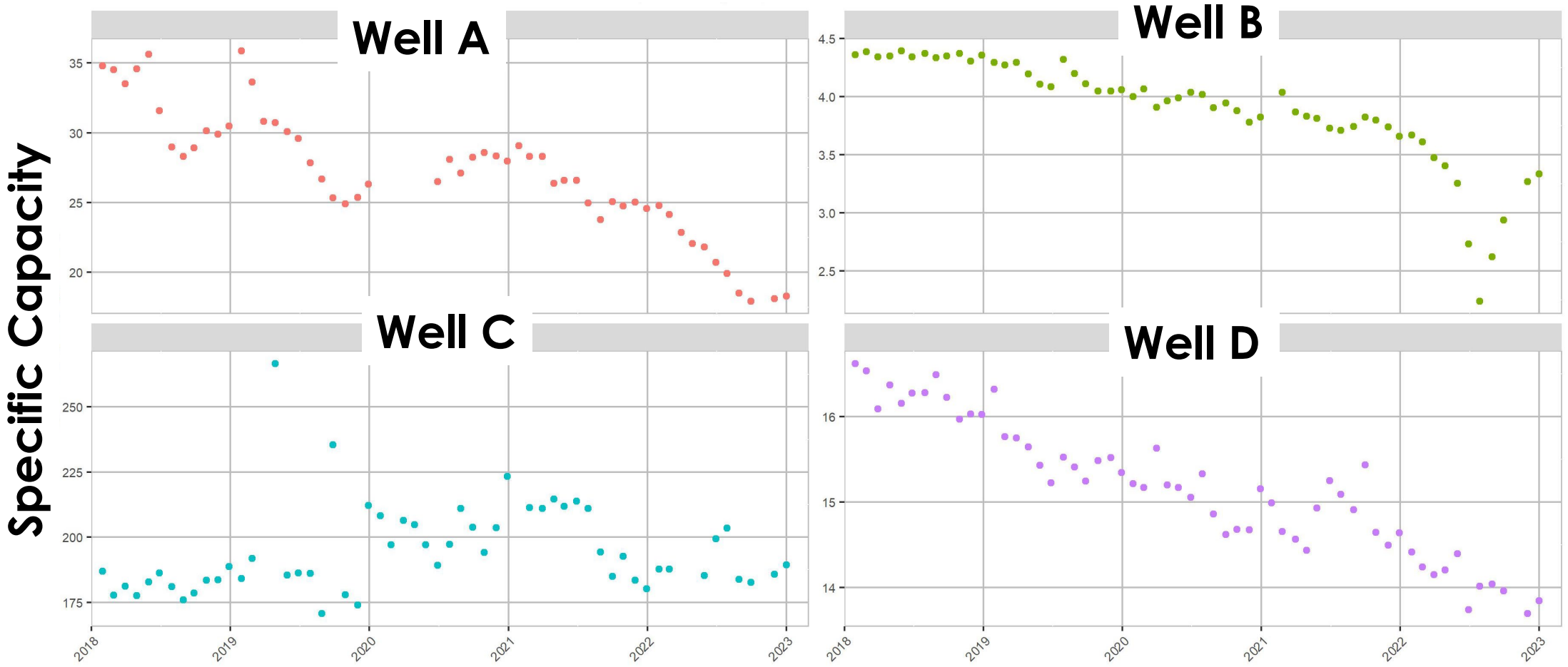
- Average age of wells: 36.5 years
- 5 wells older than 50 years
- Want to have a more pro-active approach for well maintenance

- Population increase of 27% expected in the next 20 years

City Goals

- Want to have a more pro-active approach for well maintenance
- Want to better use data the City already collects

Declining Well Performance



Lifecycle Management of Well Infrastructure

Benefits to Forecasting Well Life Cycles

- Increase value of dollars spent on maintenance
- Provide early warning of problems
- Help allocate funds and plan for costs

Key Performance Indicators:

- Pumping rates/hours of operation
- Static and pumping water levels
- Specific capacity
- Knowledge of historic well rehabilitation events

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- Pumping rates/hours of operation
- Static and pumping water levels
- **Specific capacity -> ratio of pumping rate to drawdown**
- Knowledge of historic well rehabilitation events

Streams of Information

Structured

- GIS data (well and infrastructure locations)
- SCADA data
- Monthly field readings

Unstructured

- Reports
- Construction Documents
- Well attributes
- Well events
- Well videos/photos

Information is currently stored in separate locations with various access limitations and organization schemes.

Using Data Better – Enter, the "Well Program"

- Making information accessible and organized
- Use the information for
  - Planning
  - Decision making
  - Streamlined reporting of water efficiency
  - Utility risk analyses
  - Water right permitting and reporting requirements

Current priority of City of Lacey is well infrastructure planning

Stakeholder Survey

- How do we get from A to B?
  - Step 1: Define A and B
  - A = Where we're at
  - B = Where we want to be

- City stakeholder survey
  - Established the direction and scope of the Well Program

Survey Results

Well Program should:

- Be maintained internally
- Have minimal reliance on new programs or subscriptions
- Provide both analytical and reporting features
- Strong agreement:
  - Power in comparative analyses of data
- Greatest uncertainty:
  - Frequency of use (day to day or just reporting)
  - Who will or should use it?
  - Who will maintain it?

What is the Well Program

- **High level -> Dashboard** for viewing and interacting with well-related information
- **An internal "program" not just a computer-based tool**
  - **Establishing and documenting data collection and management protocols (SOP)**
  - **Compiling data in a centralized and accessible location**
  - **Understanding the limitations of the data**
  - **Using information to forecast well lifecycles and develop well performance metrics**
  - **Increasing use of data in current City workflows**

It All Starts With The Data

- Development of Data Standard Operating Procedures (SOP)
- Organized document file structure
- Establish table of well events and well attributes
- Protocols for retrieving and interpreting SCADA data
- Discussions around where information “lives”
- New protocols for field data collection
  - Paper form to Survey123

Compiling Data

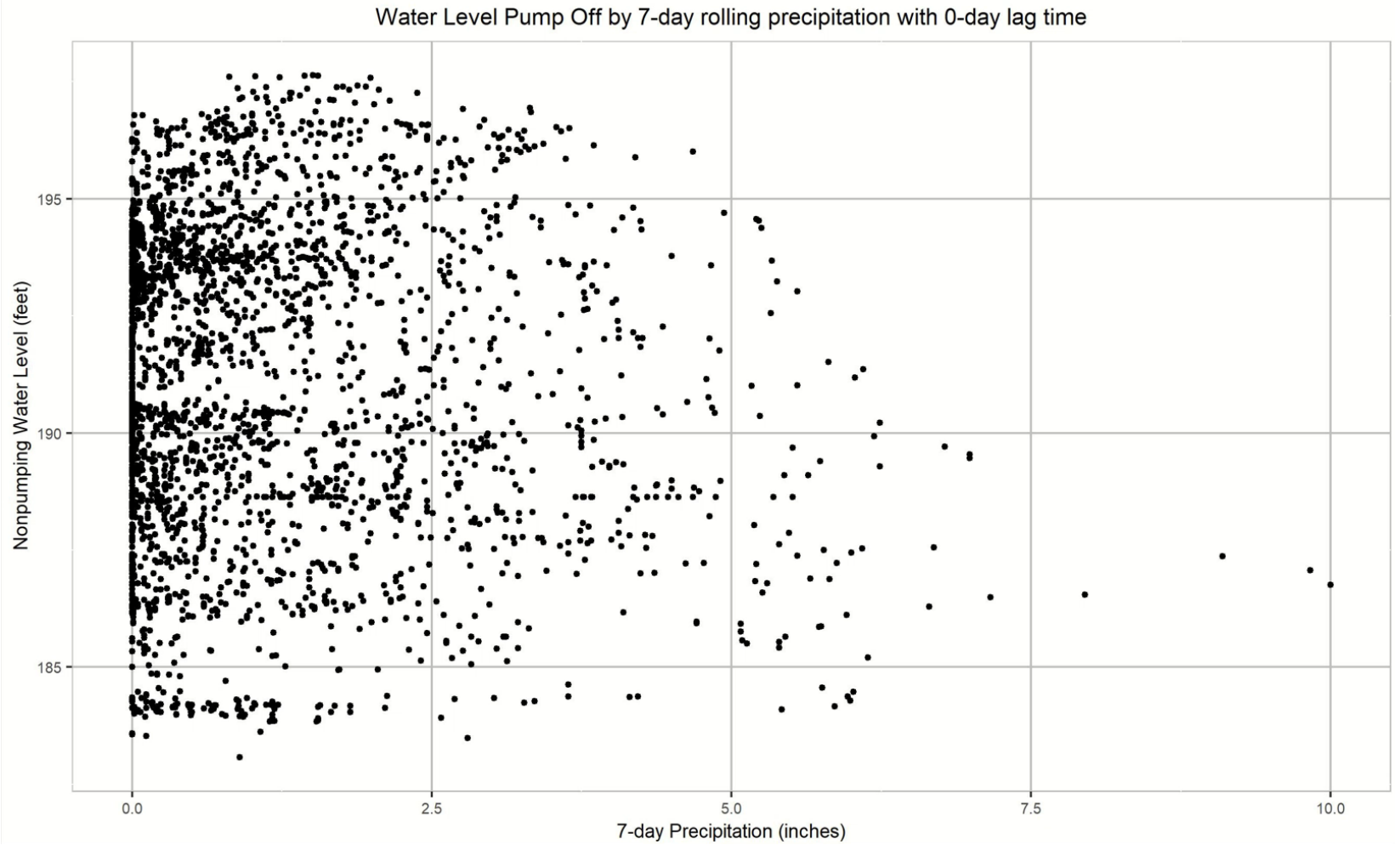
- SCADA data collected and stored differently over time
- Monthly field readings handwritten and transcribed into Access database
- Information about well history and well attributes live in City documents

Data Processing – SCADA and Field Readings

- Scrubbing (R code)
  - Compiling
  - Quality control
  - Understanding limitations
- Analysis (R code/Hydrogeologic Interpretation)
  - Calculations
  - Climate affect
  - Trends/Relationships
  - Key performance indicators
  - Forecasting
- Curate presentation of data and user interaction (ArcGIS Enterprise Online)

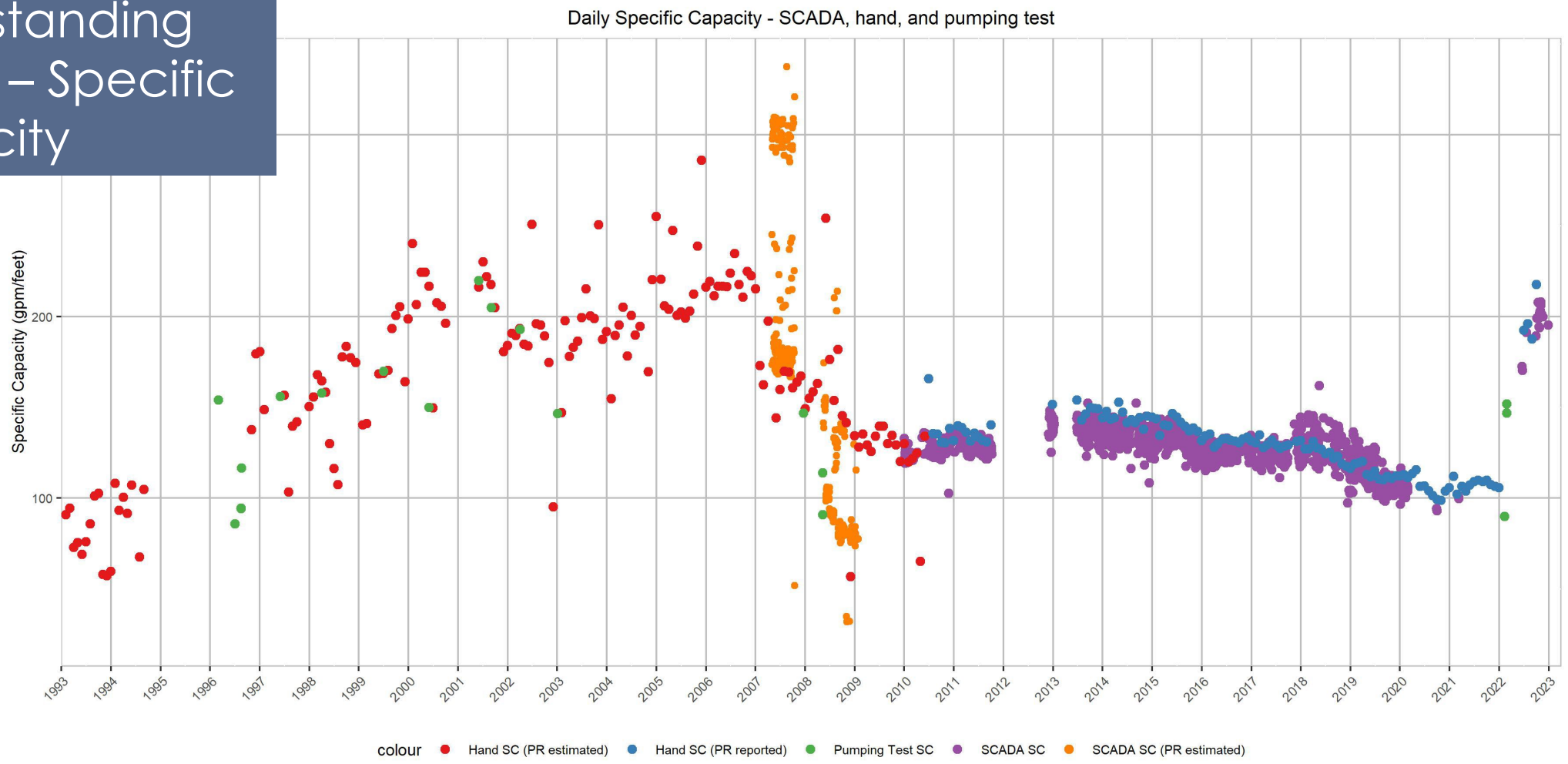
Data Analysis in R

Establishing the relationship between precipitation and water levels



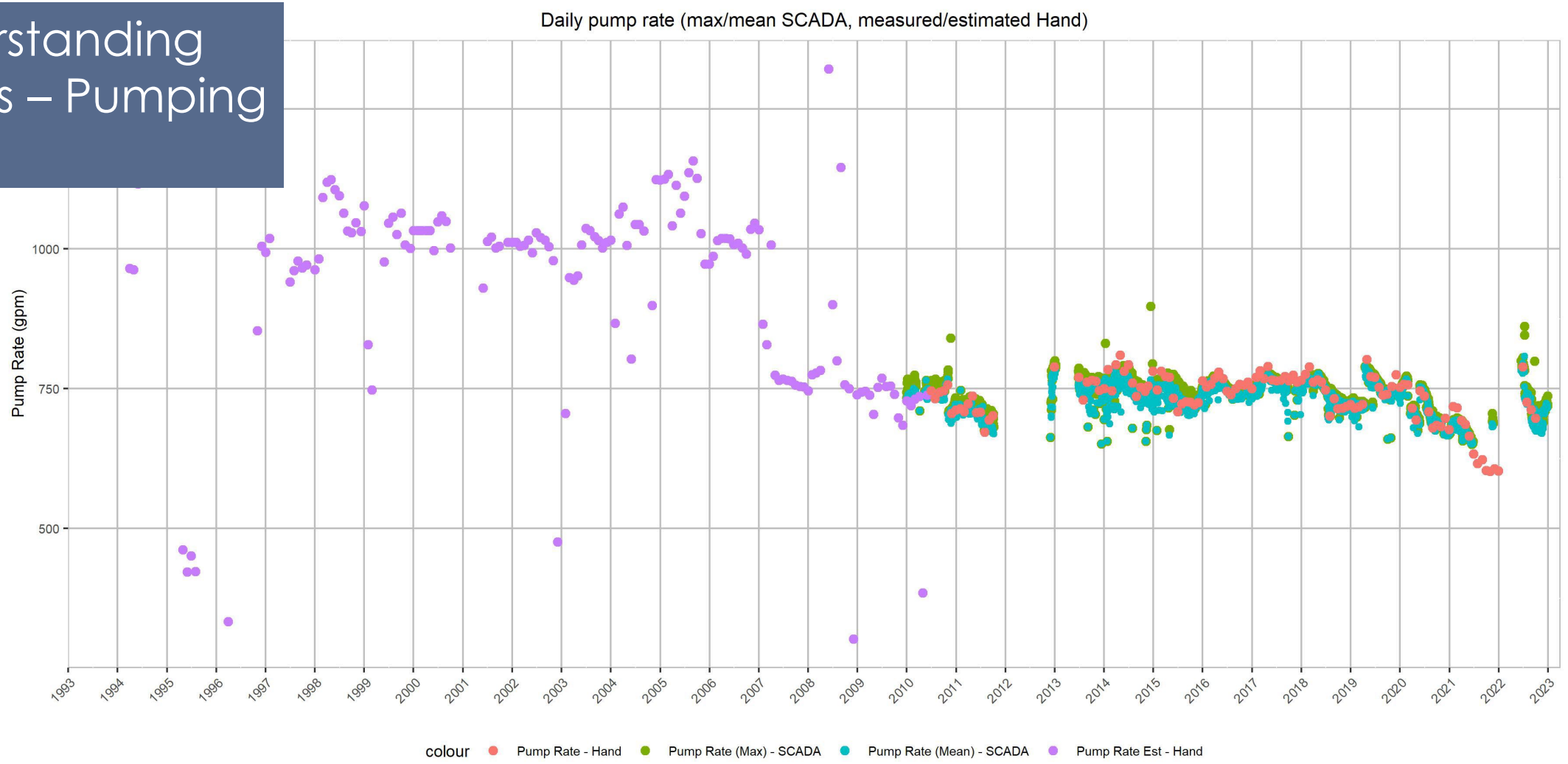
Data Analysis

Understanding Trends – Specific Capacity



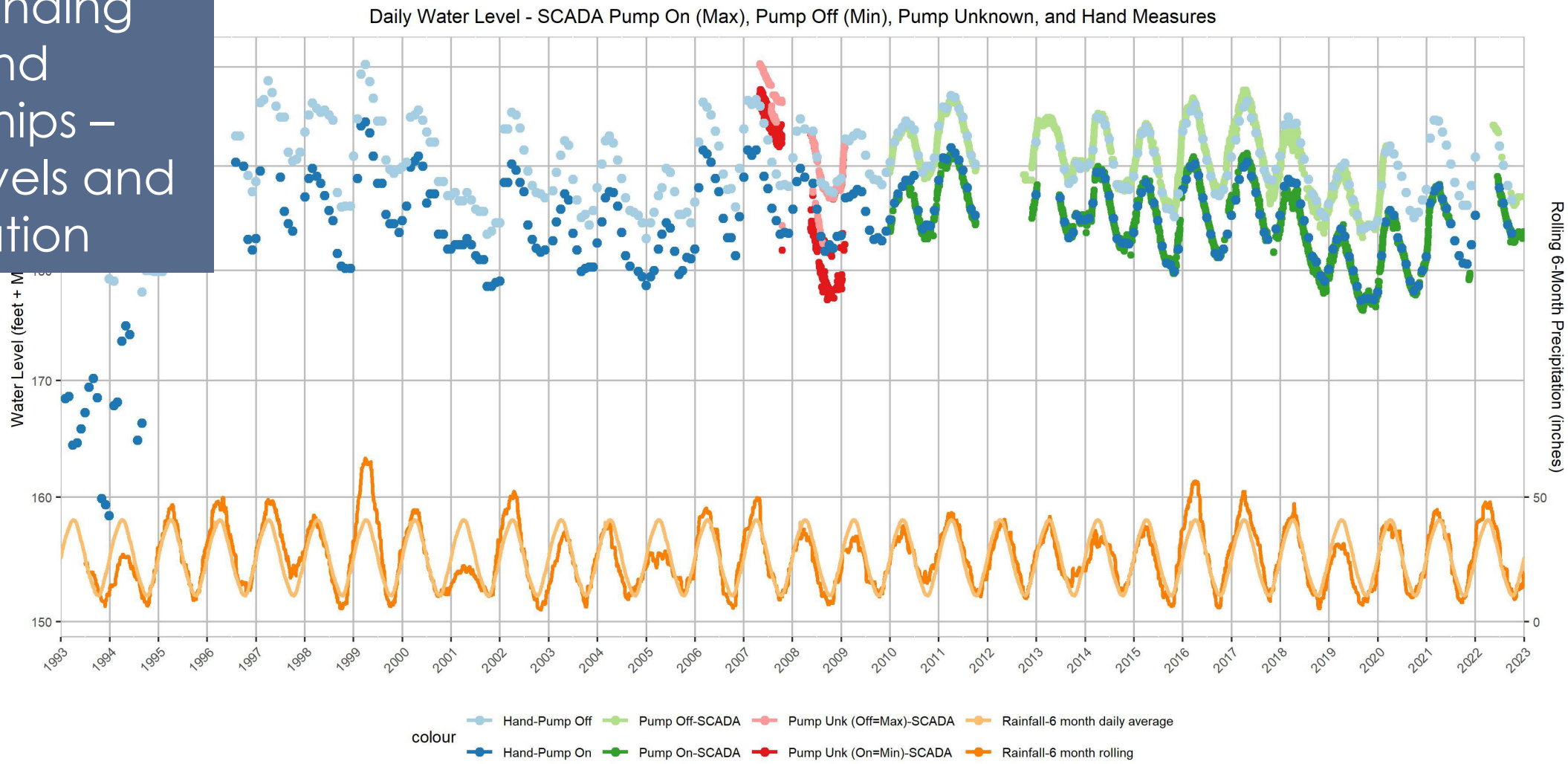
Data Analysis

Understanding Trends – Pumping Rates



Data Analysis

Understanding Trends and relationships – water levels and precipitation



Well Program Dashboard

- **Current Status: Pilot Program (Demo of Features)**
- **Next Steps:**
  - Determine City staff for maintaining the Program
  - Full role out of Program with data from all wells
  - Evaluate long term database options (SQL)
  - Add water rights and water quality data
  - Automate data updates

Thank you!

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