Chapter 4
Methods of Analysis

Ward Ling
AgriLife Extension

Review

- Geronimo Creek first listed on the 2006 303(d) list for not supporting the contact recreation use
  - Listed again in 2008 and 2010
- Geronimo Creek first identified in 2000 for concern for nutrient enrichment
  - 2008 assessment, all 60 samples exceeded 1.95 mg/L nitrate-nitrogen

Our Goal

- Reduce loading of bacteria to meet the water quality standard for contact recreation
  - 126 cfu/100 mL *E. coli*
- Reduce loading of nitrate-nitrogen to meet the water quality screening criterion for nitrate-nitrogen
  - 1.95 mg/L nitrate-nitrogen

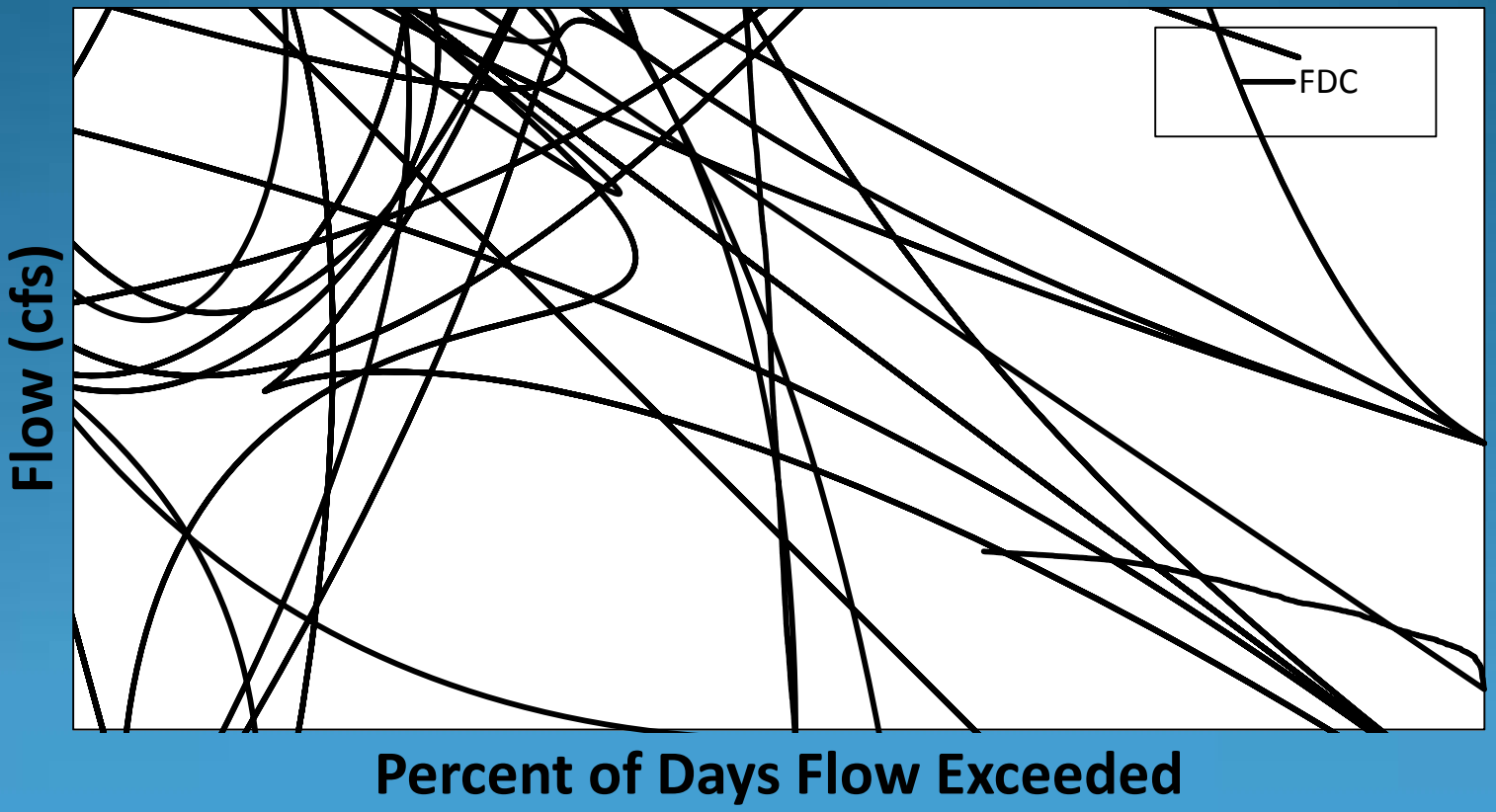
Draft WPP

- Draft of Chapters 1 through 3 were posted on the project webpage for review and comment in January
  - Chapters 4 and 5 were recently posted
- Chapter 4 of the draft WPP contains Load Duration Curve Analysis of Geronimo and Alligator Creeks
- Chapter 4 contains material that has been presented at previous work group and Partnership meetings, except for a minor change to the LDC for Haberle Road

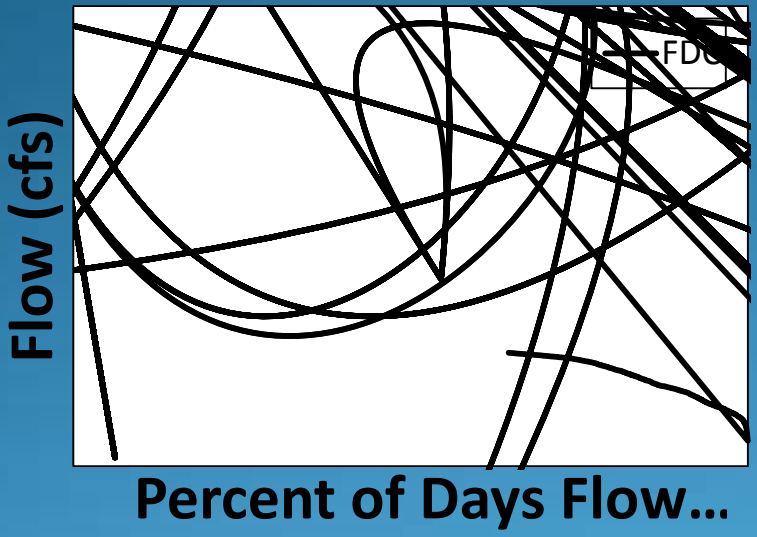
Load Duration Curve Review

- Begin with constructing a Flow Duration Curve
  - The curved line demonstrates the frequency of flows in a stream over time
    - Highest volume flows are on the left
    - Lowest volume flows are on the right
    - Frequency of the flows is given along the X axis

Flow Duration Curve

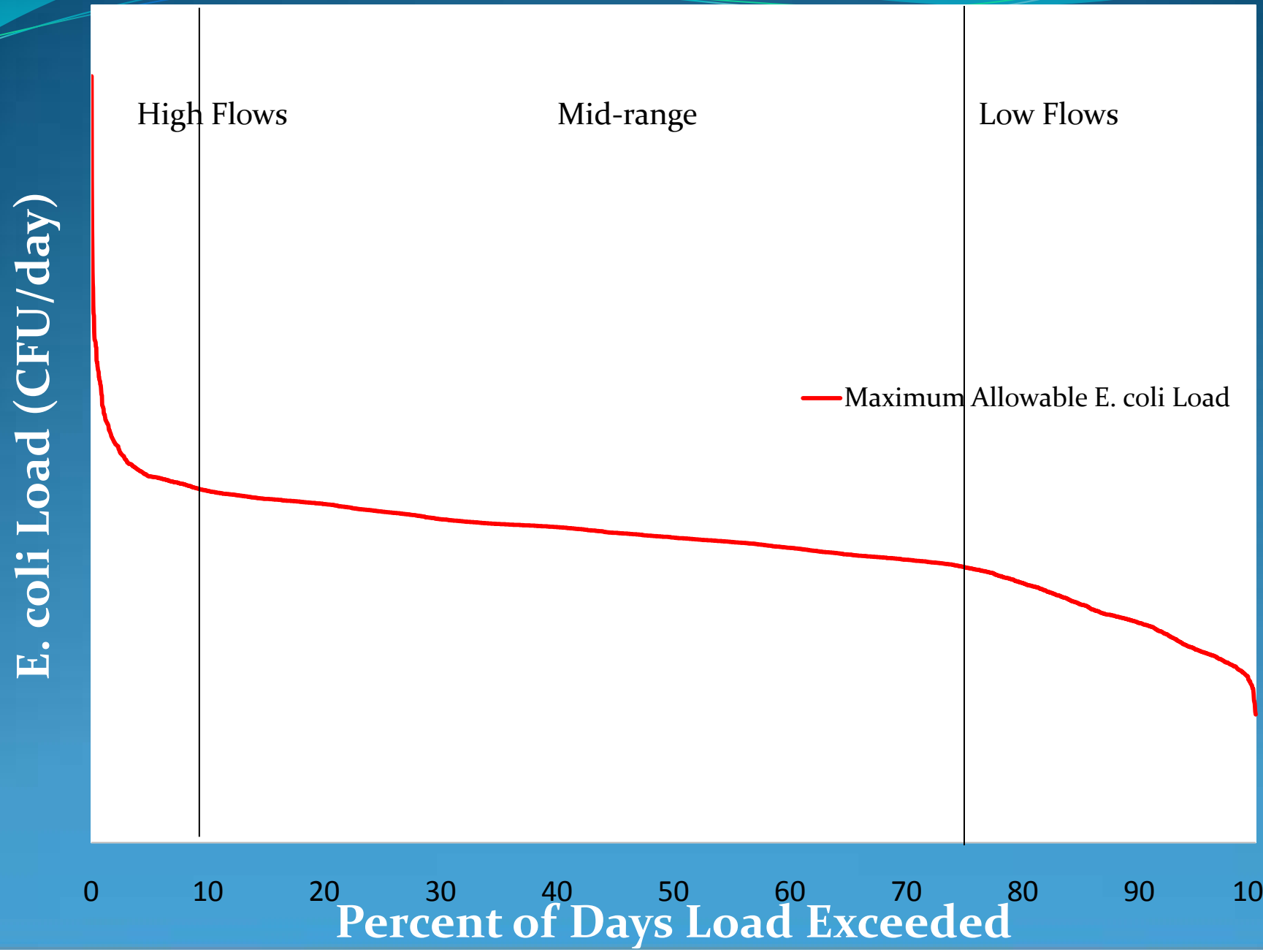


Creating LDCs from FDCs



X **Contact Recreation Standard**

Geronimo Creek at Haberle Road Load Duration



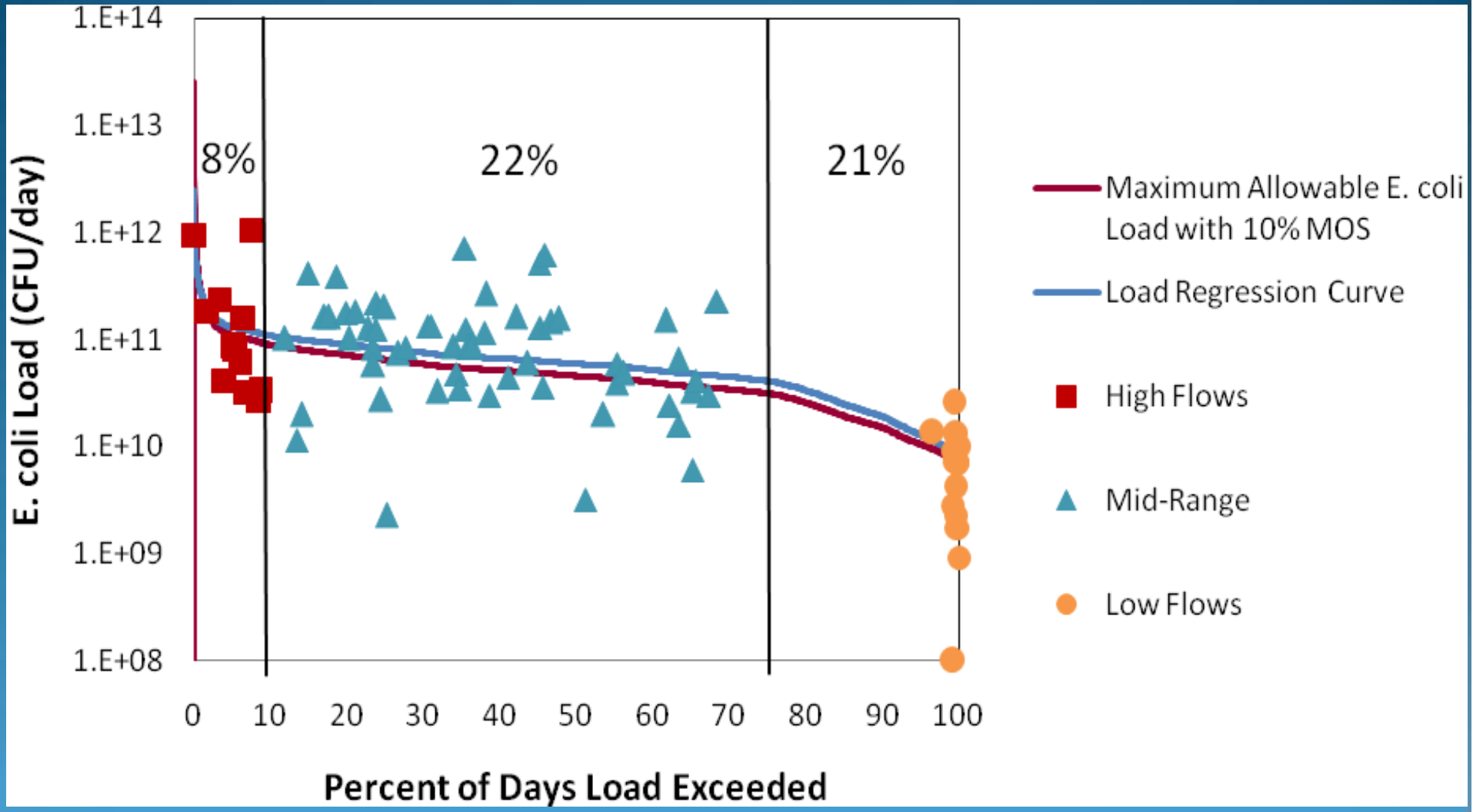
Next…

- Plot the data collected from the creek
- These individual data points will be scattered on the graph
- A “best fit” line will be on the graph to demonstrate the trend of the collected data

How do you read a LDC?

- Data points above the red line (Maximum allowable load) are above the standard
- Data points below the line are below the water quality standard
  - The “best fit” blue line demonstrates where our data are falling

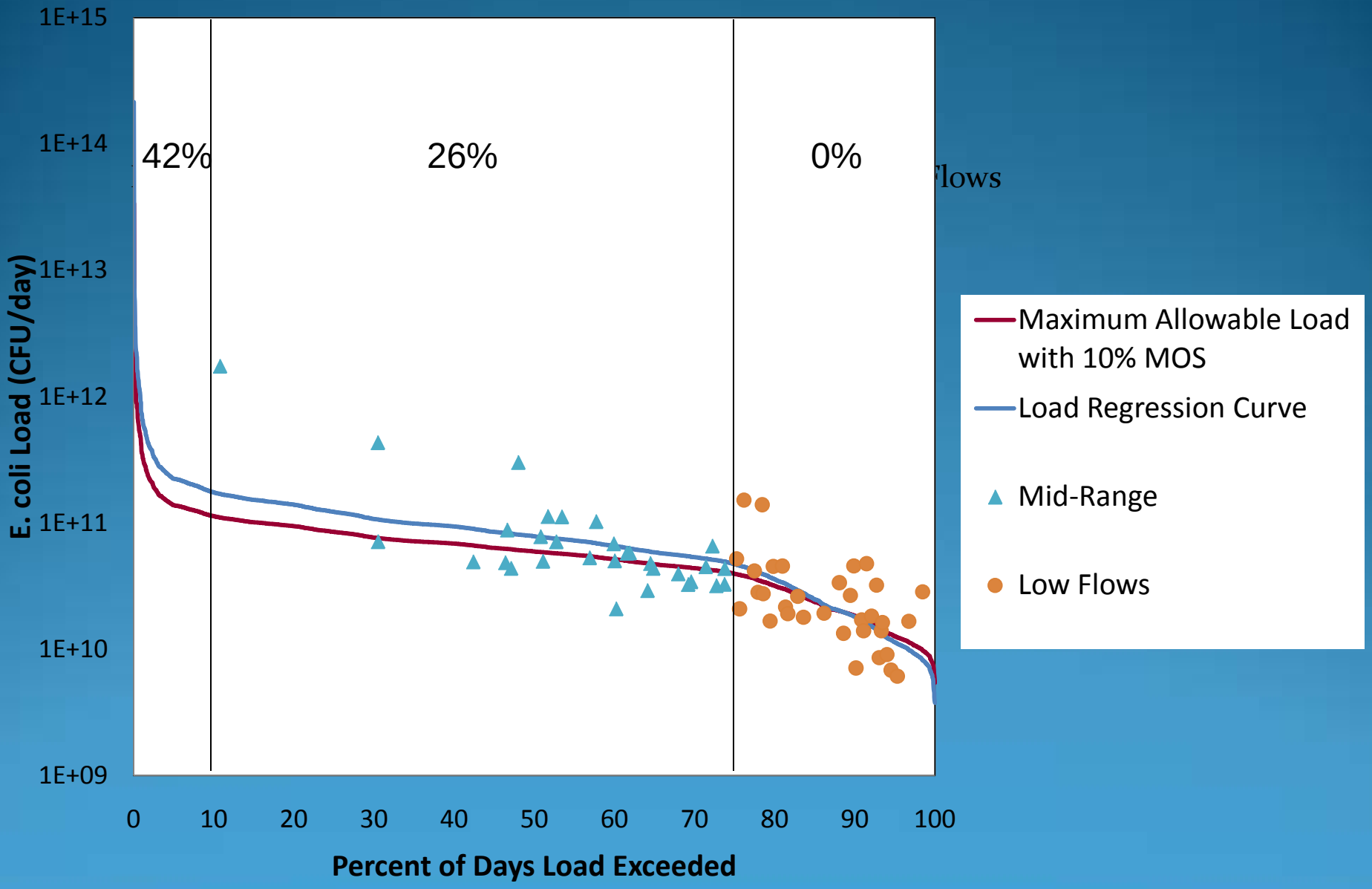
LDC for Bacteria for Geronimo Creek at SH 123



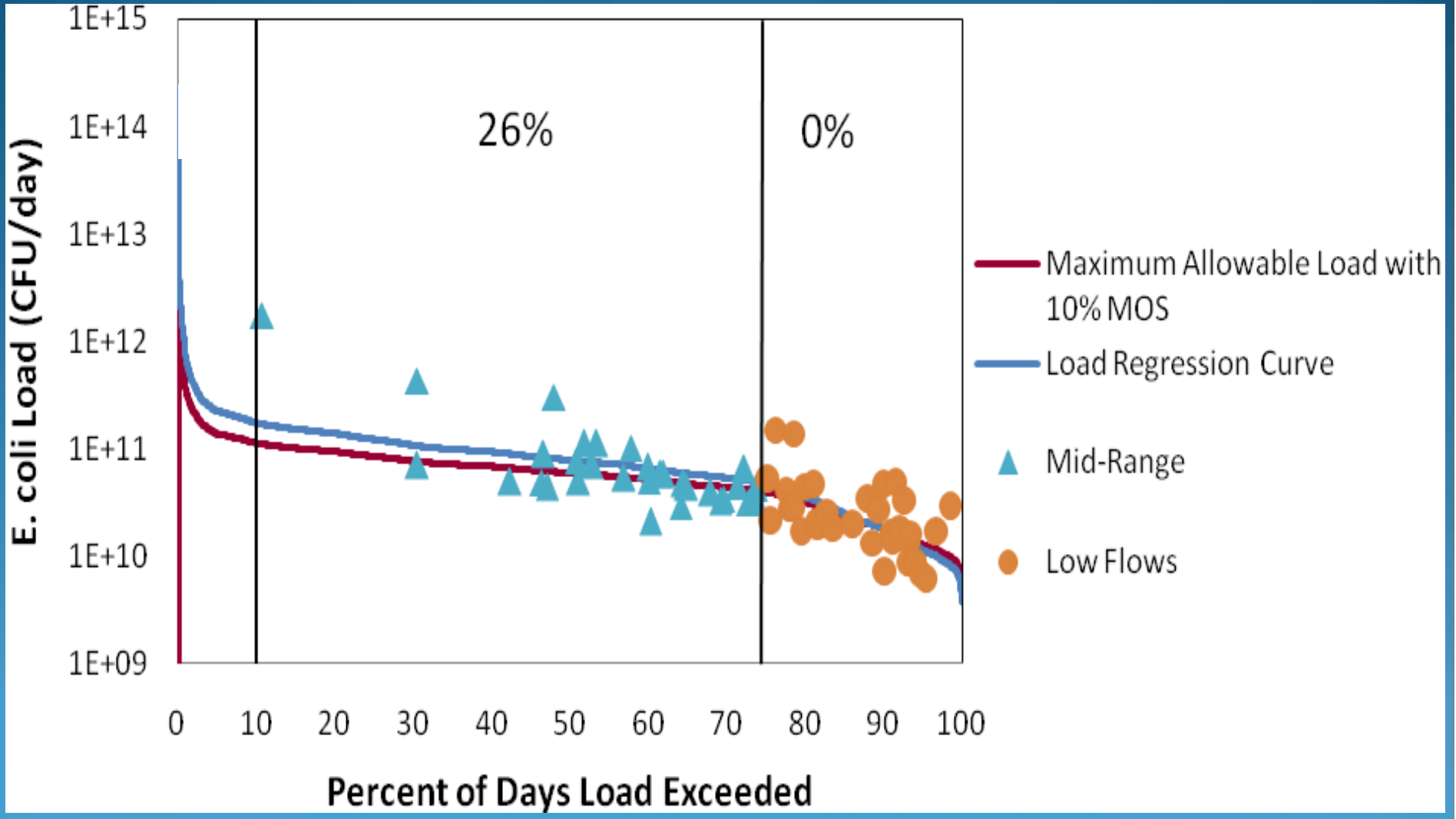
Geronimo Creek at SH 123 Bacteria Reductions

Flow Condition	Percent Reduction
High Flows	8%
Mid-Range	22%
Low Flows	21%

Original LDC for Bacteria for Geronimo Creek at Haberle Road



New LDC for Bacteria for Geronimo Creek at Haberle Road



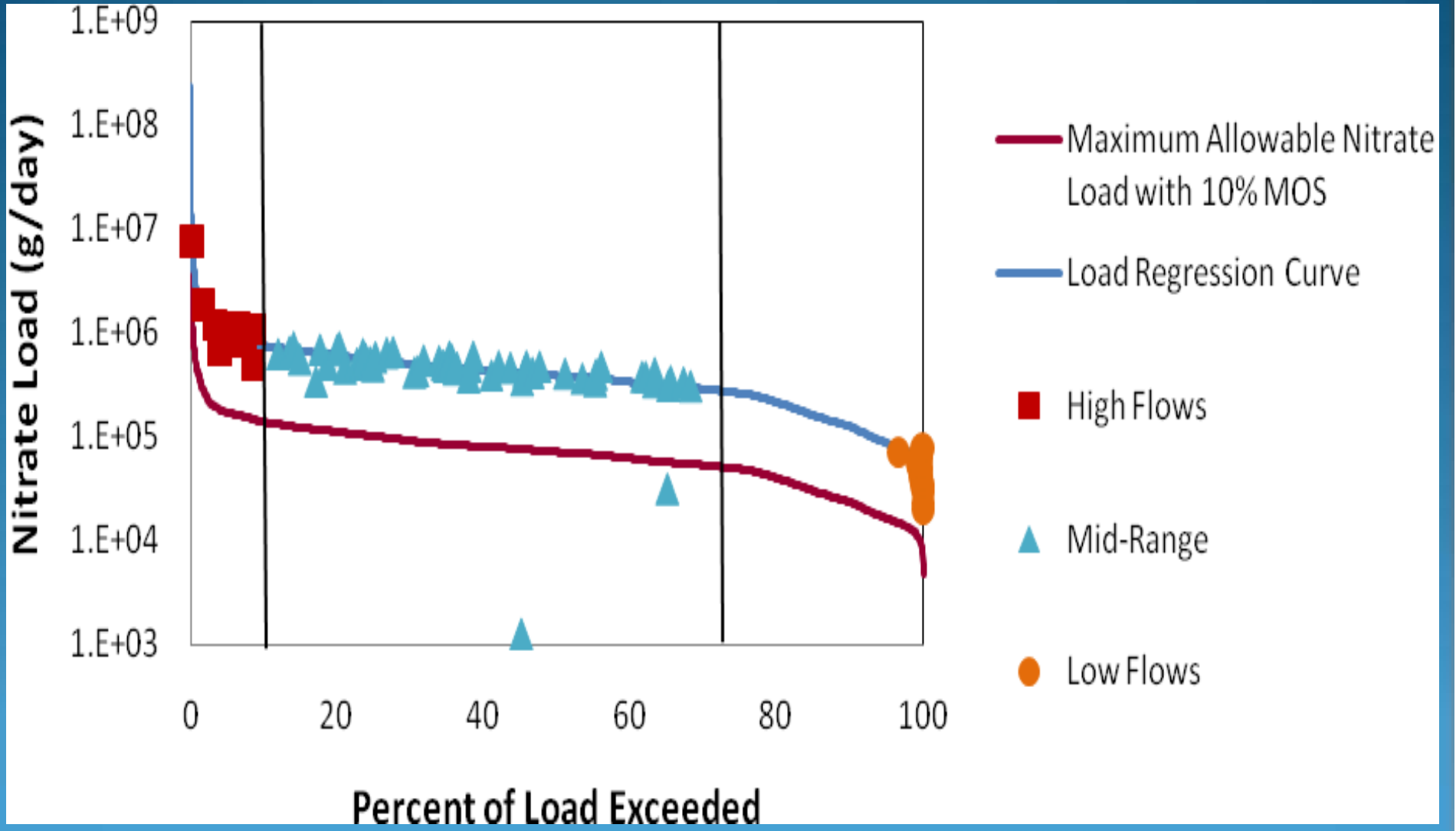
Geronimo Creek at Haberle Road Bacteria Reductions

Flow Condition	Percent Reduction
High Flows	NA
Mid-Range	26%
Low Flows	0%

Nitrate Loadings

- Nitrate levels exceed the screening criterion
- Area water wells tested have demonstrated elevated levels of nitrate-nitrogen in groundwater
- Indication that groundwater concentrations were elevated before the widespread use of inorganic fertilizer

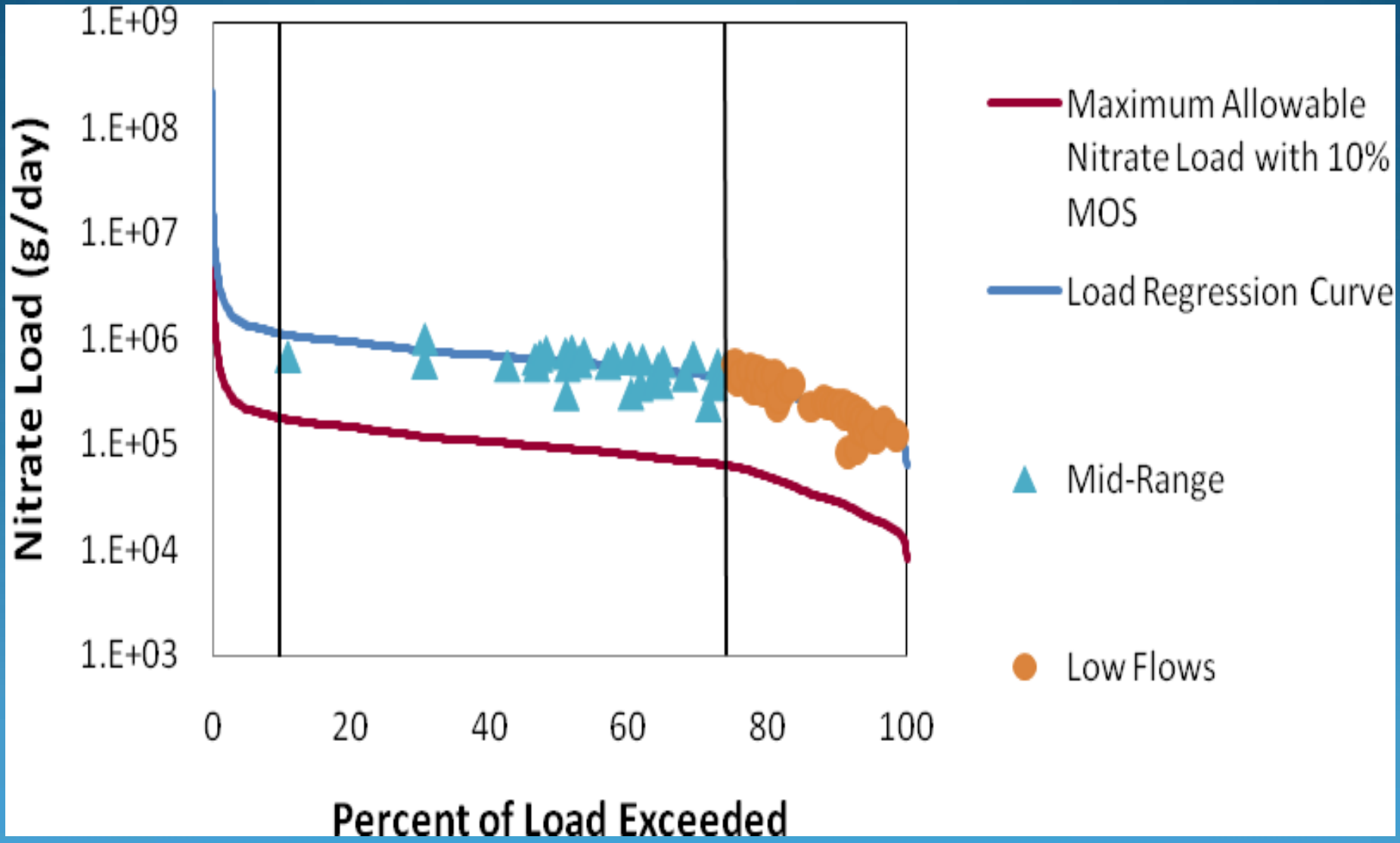
Geronimo Creek at SH 123 Nitrate Concentrations



Geronimo Creek at SH 123 Nitrate Reductions

Flow Condition	Percent Reduction
High Flows	82
Mid-Range	82
Low Flows	81

Geronimo Creek at Haberle Road Nitrate Concentrations



Geronimo Creek at Haberle Rd Nitrate Reductions

Flow Conditions	Percent Reduction
High Flows	NA
Mid-Range	85
Low Flows	86

Bacteria Reduction Goal

- The percent reduction at mid range flows (26%) at the Haberle Road sample station was selected as the load reduction goal for the project area
  - Most current data
  - Represents a larger area
  - Greater flow
  - Demonstrates the need for additional monitoring in the lower watershed

Importance of Reduction Goal

- The reduction determined by LDC analysis is the basis for calculating:
  - Number of livestock
  - Number of feral hogs
  - Magnitude of urban runoff
  - Number of dogs
  - Number of failing septics

That will need to be under improved management to reach the water quality goal, which is addressed in the Management Measures chapter.

Questions and Discussion