What's Good for the Tap is Good for the Creek!

Reading Area Water Authority
marks five years of
Source Water Protection

SSM

RAWA

Reading Area Water Authority

- Provides water to 125,000 residents in and around the City of Reading
- Source water supply is Lake Ontelaunee, located north of Reading
- Completed a Source Water Protection Plan in 2007
- Lake Ontelaunee included on Pennsylvania's 303(d) list of impaired water bodies
- Lake Ontelaunee Total Maximum Daily Load (TMDL) completed in 2004

SSM

RAWA
READING AREA WATER AUTHORITY

AWWA EXEMPLARY SWP AWARD

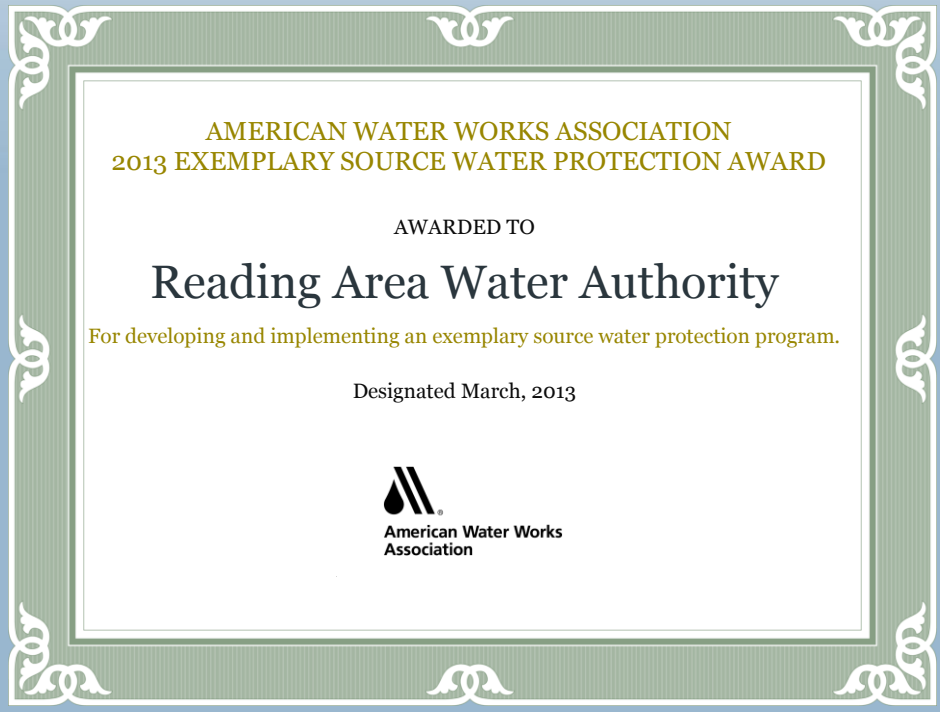
RAWA recently awarded the 2013 **American Water Works Association Exemplary Source Water Protection Award** for **large water systems**

Previous award winners:

- Boston, MA (2010)
- Wilmington, DE (2011)
- Portland, ME (2012)

Award Criteria:

- Vision
- Source water characterization
- Goals
- Action plan
- Implementation
- Evaluation and revision



SSM

RAWA

RAWA's Vision

- Importance of Source Water Protection
- Steering committee will help with development of formal Vision
- Implementation of Management Strategies
- Connection between watershed residents and service area
- Team approach to Source Water Protection

SSM

RAWA

RAWA Management Strategies

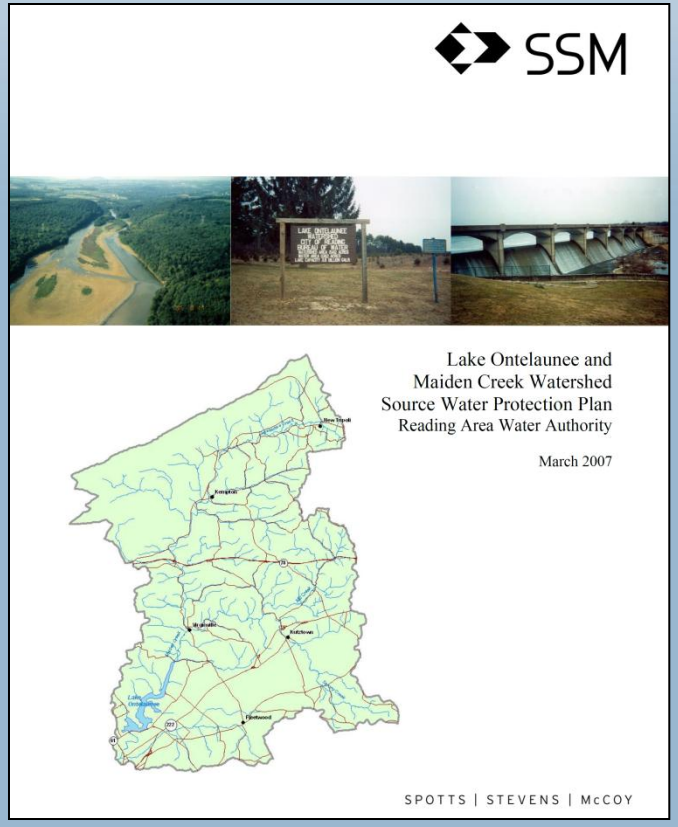
SOURCE WATER PROTECTION PLAN

Plan Development

- Received $190,000+ grant from the PA DEP in May 2004
- Approved by PA DEP in September 2007

5-Year Plan Update

- Review of management options
- New steering committee
- Revise key components of plan
- Develop a formal SWP vision



SSM

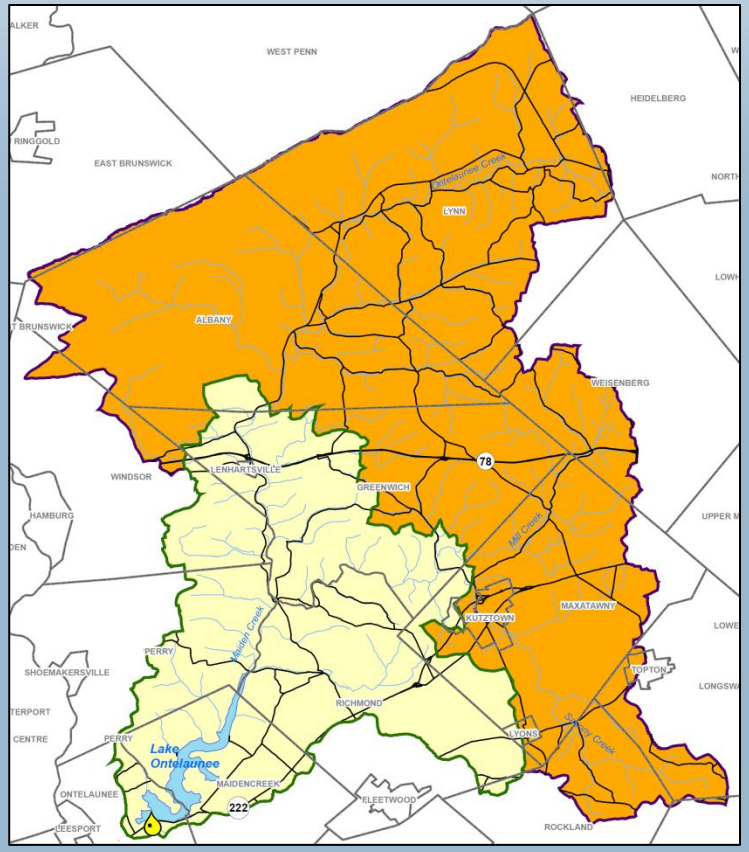
RAWA
READING AREA WATER AUTHORITY

Watershed Delineation Process

TIME-OF-TRAVEL STUDY

Surface Water Sources
- Lake Ontelaunee intake
- Emergency Intake

Protection Zones
- Zone A
  - 5 hour time-of-travel
  - 63 square miles
- Zone B
  - 25 hour time-of-travel
  - 153 square miles



RAWA Daily Operations

WATERSHED PROTECTION

- Land preservation
- Reforestation
- Litter control
- Lake eutrophication / algae control
- Invasive plant control on project farms
- Goose population control

SSM

RAWA

Management Strategies

WATER SUPPLY AREA SIGNS

- 13 signs placed on state roads entering the watershed
- 6 signs placed on township roads
- Partially funded by a grant from the Water Resources Education Network

SSM

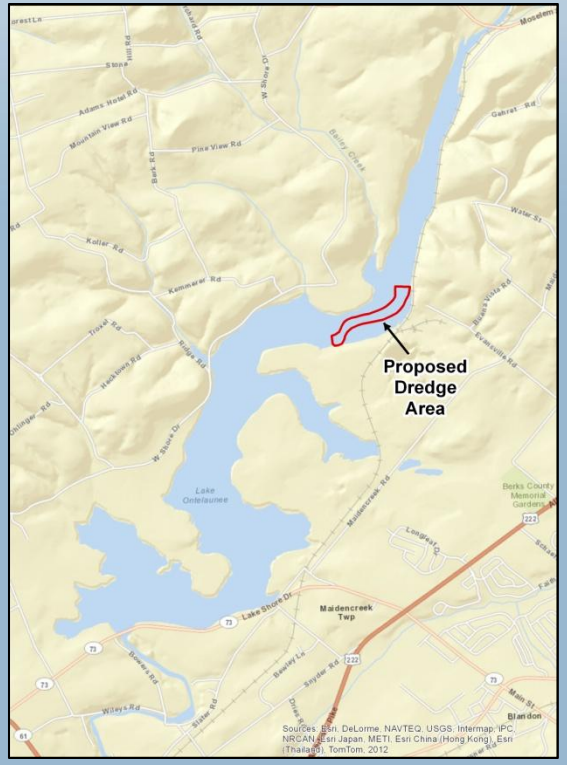
RAWA

Management Strategies

LAKE ONTELAUNEE DREDGING PLANNING

- Remove sediment from upper neck of lake
- Increase lake capacity and reduce flood possibility
- Estimated project cost = $2,000,000
- Dredged material may qualify for beneficial reuse
- Preliminary engineering evaluation for sediment diversion structures

Photo courtesy of Dredge America



SSM

RAWA

Management Strategies

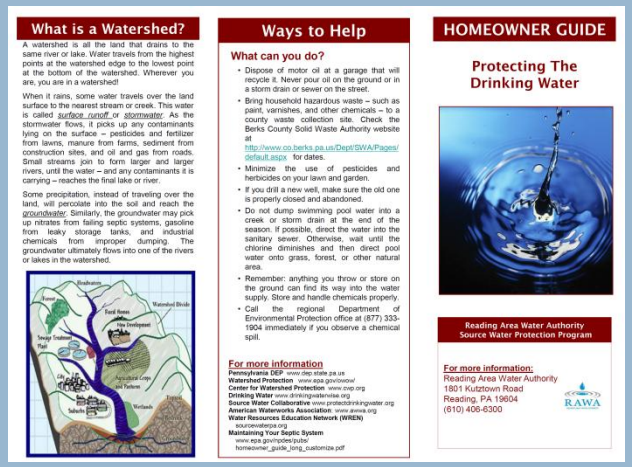
EDUCATION

Educational Brochures

- Stream buffer brochure
- SWP brochures

In Progress

- Public Education
  - Reading Area High School
  - Reading School District I-Lead Charter School
- Kutztown University
  - Biology Department student volunteers
- SWP page on RAWA website … coming soon!



SSM

RAWA
READING AREA WATER AUTHORITY

Management Strategies

EMERGENCY MANAGEMENT

Cooperation with Emergency Management

- Berks County Emergency Services
- Lehigh County Emergency Services
- Local Emergency Planning Committee

Berks County LEPC
Local Emergency Planning Committee
"Partners in Preparedness"

Participation in the Delaware Valley Early Warning System

- DVEWS administered by the Philadelphia Water Department
- Water utilities share information and emergency event notifications in the Schuylkill River Watershed

SSM

RAWA

Management Strategies

WATERSHED MONITORING PROGRAM GOALS

- Consistent, comprehensive program
- Establish baseline water quality and macroinvertebrate conditions
- Identify improving, deteriorating, or static conditions
- Indicate potential emergency issues
- Identify locations for watershed conservation projects
- Improve stream water quality and get streams delisted

SSM

RAWA

Management Strategies

WATER QUALITY MONITORING PROGRAM

- RAWA staff / RAWA onsite lab / MJ Reider lab
- Data collection from June 2008 – present
- Ten (10) watershed monitoring locations
- Two (2) intake monitoring locations
- Chemical parameters monitored weekly or monthly

SSM

RAWA

Management Strategies

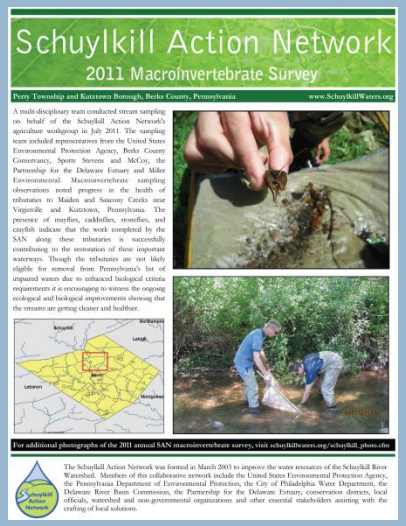
MACROINVERTEBRATE MONITORING

Schuylkill Action Network (SAN)

- Five (5) agriculture project sites from 2005 – 2010 to monitor improvements in watershed

Additional RAWA sites on impaired streams

- Partner groups assisting with information

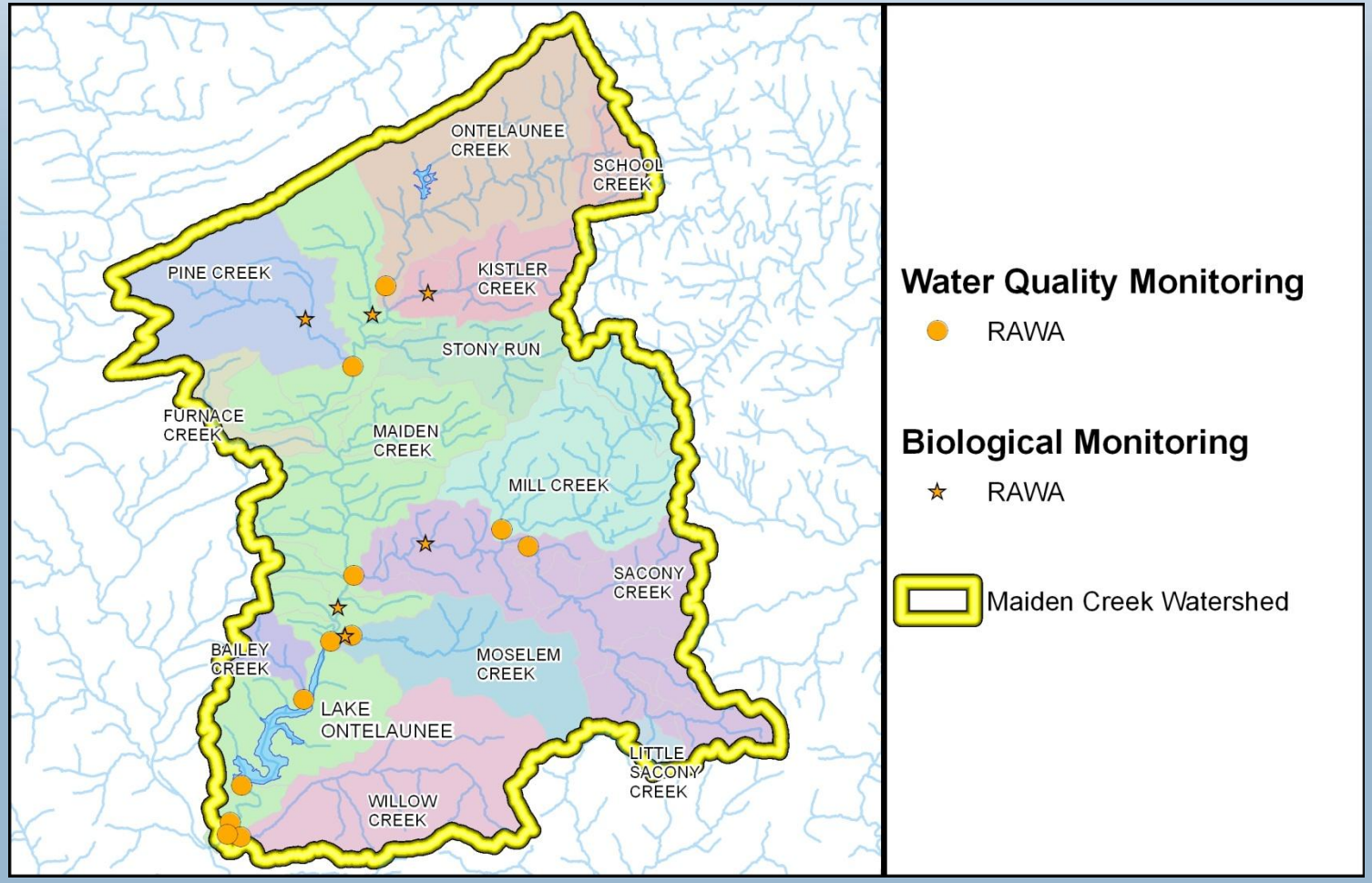

Schuylkill Action Network
2011 Macroinvertebrate Survey
Perry Township and Kutztown Borough, Berks County, Pennsylvania
www.SchuylkillWaters.org
A multi-disciplinary team conducted stream sampling on behalf of the Schuylkill Action Network's agriculture workgroup in July 2011. The sampling team included representatives from the United States Environmental Protection Agency, Berks County Conservancy, Sports Stewards and McCoy, the Partnership for the Delaware Estuary and Miller Environmental. Macroinvertebrate sampling observations noted progress in the health of tributaries to Maiden and Saucony Creeks near Virginville and Kutztown, Pennsylvania. The presence of mayflies, caddisflies, stoneflies, and crayfish indicate that the work completed by the SAN along these tributaries is successfully contributing to the restoration of these important waterways. Though the tributaries are not likely eligible for removal from Pennsylvania's list of impaired waters due to enhanced biological criteria requirements it is encouraging to witness the ongoing ecological and biological improvements showing that the streams are getting cleaner and healthier.
Schuylkill
Northampton
Lehigh
Berks
Lebanon
Montgomery
For additional photographs of the 2011 annual SAN macroinvertebrate survey, visit schuylkillwaters.org/schuylkill_photo.cfm
The Schuylkill Action Network was formed in March 2003 to improve the water resources of the Schuylkill River Watershed. Members of this collaborative network include the United States Environmental Protection Agency, the Pennsylvania Department of Environmental Protection, the City of Philadelphia Water Department, the Delaware River Basin Commission, the Partnership for the Delaware Estuary, conservation districts, local officials, watershed and non-governmental organizations and other essential stakeholders assisting with the crafting of local solutions.

SSM

RAWA
READING AREA WATER AUTHORITY

Management Strategies

MONITORING LOCATIONS

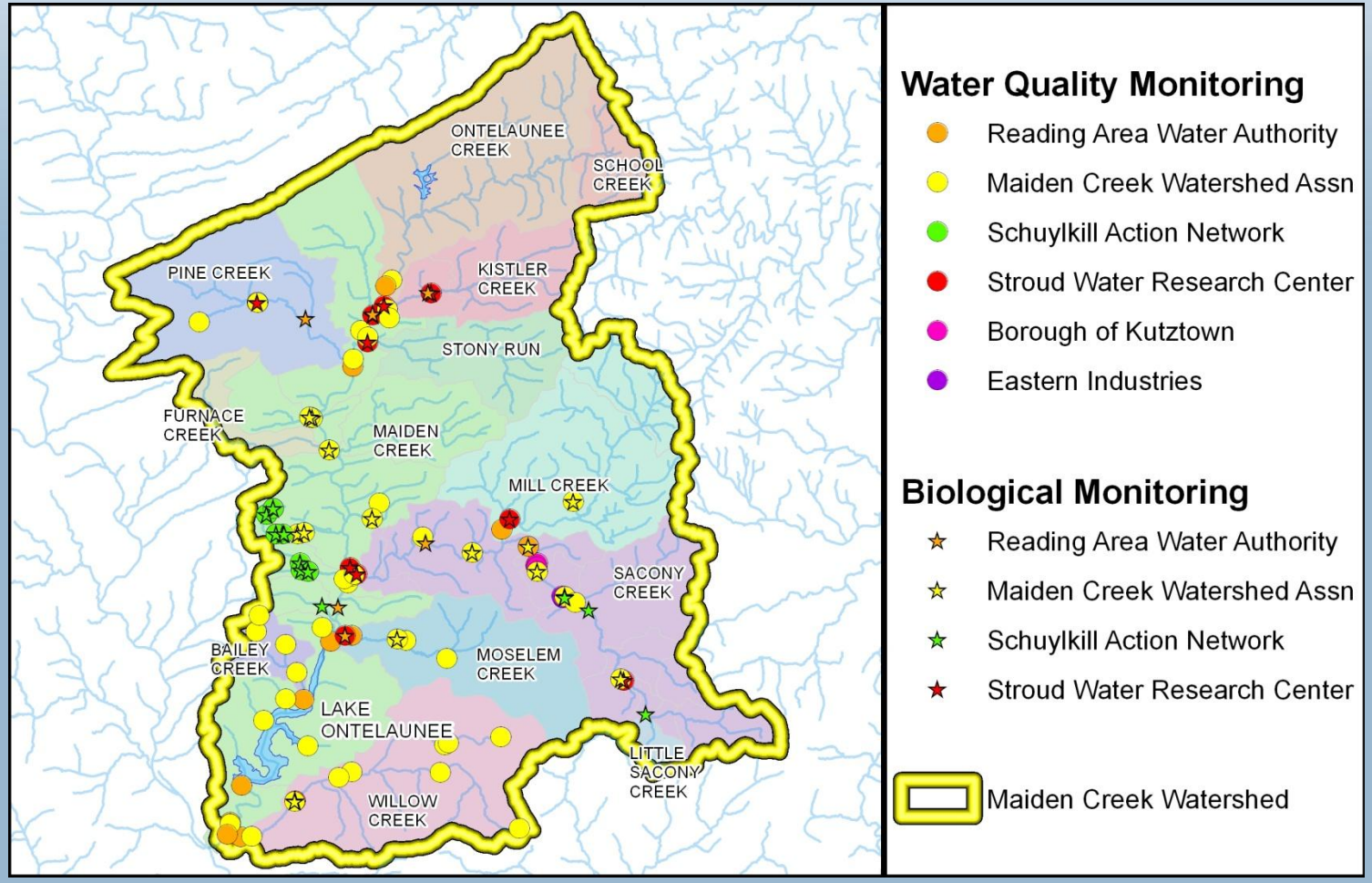


SSM

RAWA

Management Strategies

MONITORING LOCATIONS



SSM

RAWA

Management Strategies

WATER QUALITY DATABASE

- Central database to catalog water quality data
- Easily extract and analyze data
- Partner groups sharing information
  - Maiden Creek Watershed Association and Schuylkill Action Network (ongoing)
  - Borough of Kutztown, Eastern Industries

SSM

RAWA

Management Strategies

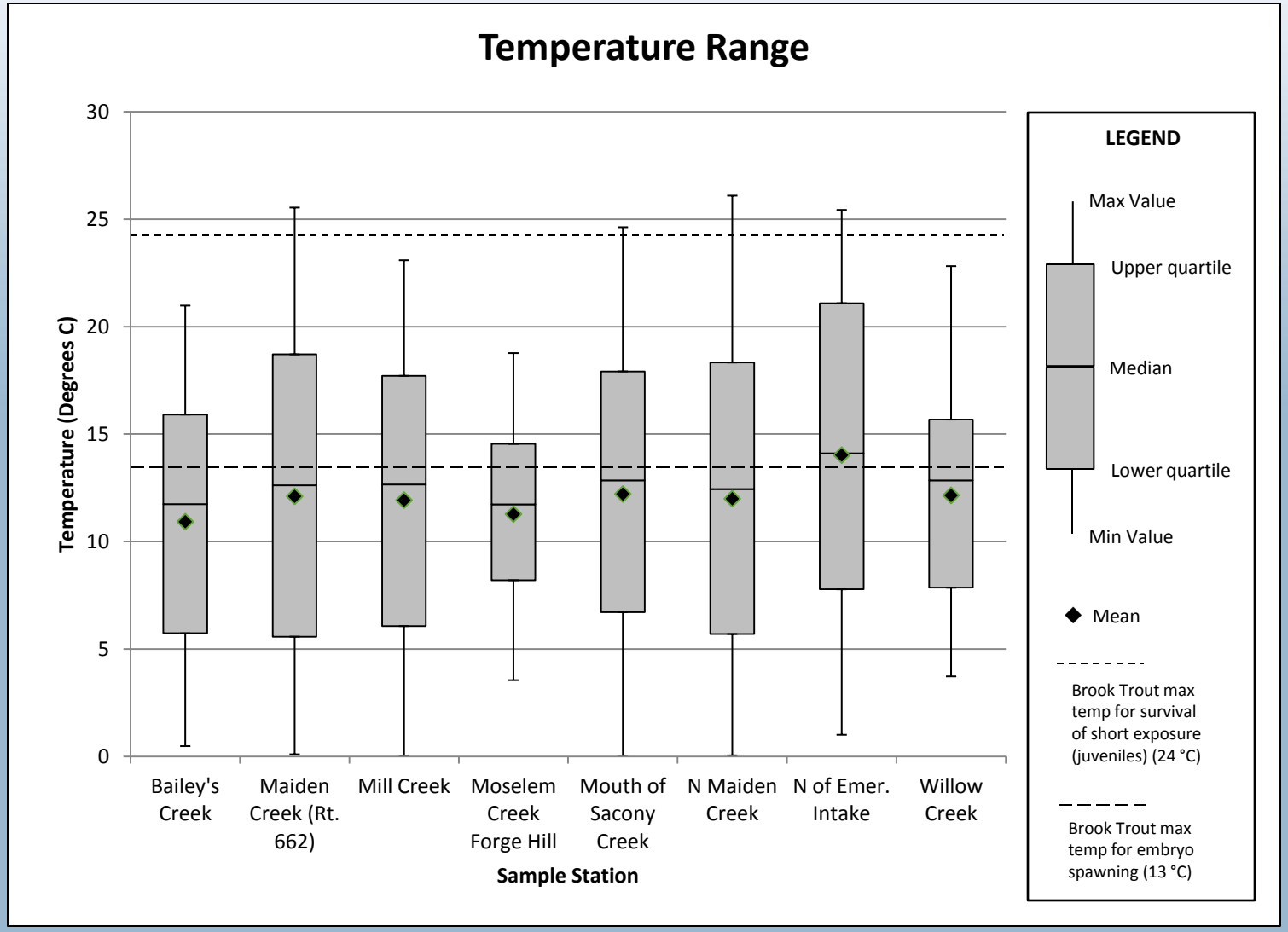
WATERSHED WATER QUALITY MONITORING RESULTS

Temperature

- Typically not elevated throughout watershed
- Seasonal fluctuations and ranges consistent with designated uses of streams

SSM

RAWA


Temperature Range
Temperature (Degrees C)
30
25
20
15
10
5
0
Bailey's Creek
Maiden Creek (Rt. 662)
Mill Creek
Moselem Creek Forge Hill
Mouth of Sacony Creek
N Maiden Creek
N of Emer. Intake
Willow Creek
Sample Station
LEGEND
Max Value
Upper quartile
Median
Lower quartile
Min Value
Mean
Brook Trout max temp for survival of short exposure (juveniles) (24 °C)
Brook Trout max temp for embryo spawning (13 °C)

Management Strategies

WATERSHED WATER QUALITY MONITORING RESULTS

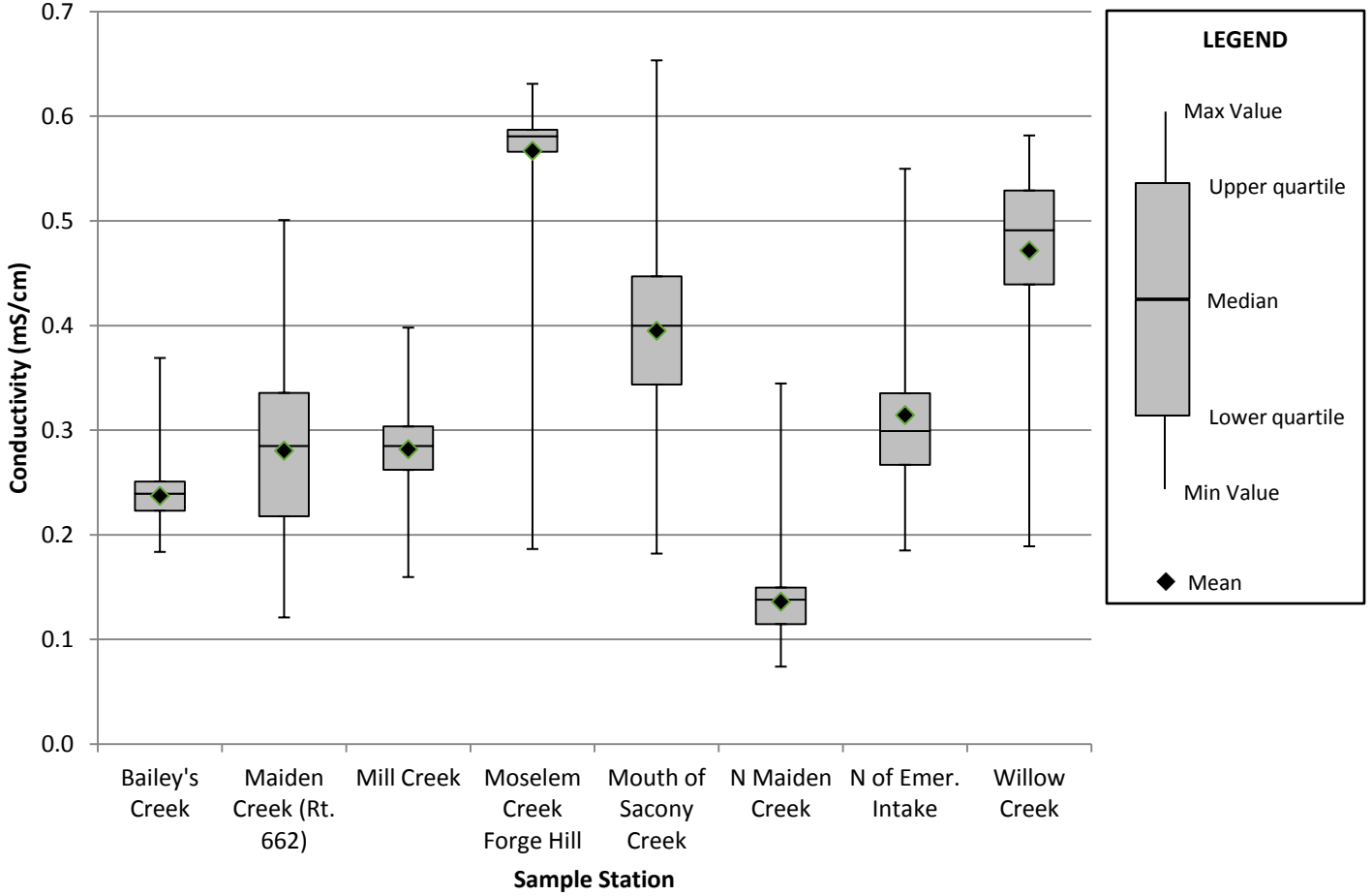
Specific Conductivity

- Highest at Moselem Creek, Sacony Creek and Willow Creek
- These sites also have higher nitrate levels

SSM

RAWA

Specific Conductivity Range



Management Strategies

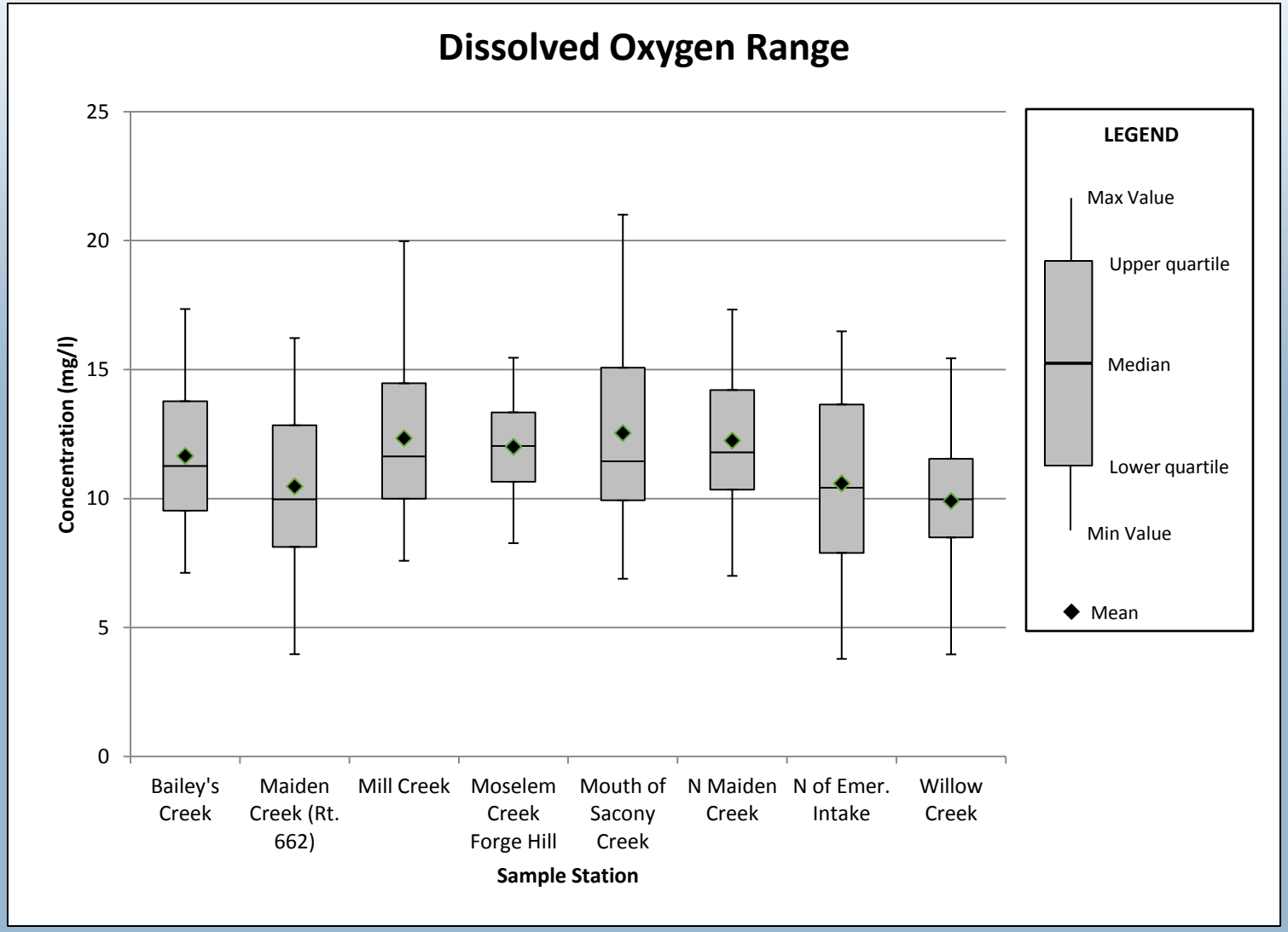
WATERSHED WATER QUALITY MONITORING RESULTS

Dissolved Oxygen (DO)

- Lowest DO concentrations:
  - Maiden Creek (@ Rt. 662)
  - Maiden Creek (North of Emergency Intake)
  - Willow Creek
- Saturated DO acceptable or better at most monitoring locations
- Saturated DO low in Willow Creek and Maiden Creek (at Route 662) during summer and early fall

SSM

RAWA


Dissolved Oxygen Range
25
20
15
10
5
0
Concentration (mg/l)
Bailey's Creek
Maiden Creek (Rt. 662)
Mill Creek
Moselem Creek Forge Hill
Mouth of Sacony Creek
N Maiden Creek
N of Emer. Intake
Willow Creek
Sample Station
LEGEND
Max Value
Upper quartile
Median
Lower quartile
Min Value
Mean

Management Strategies

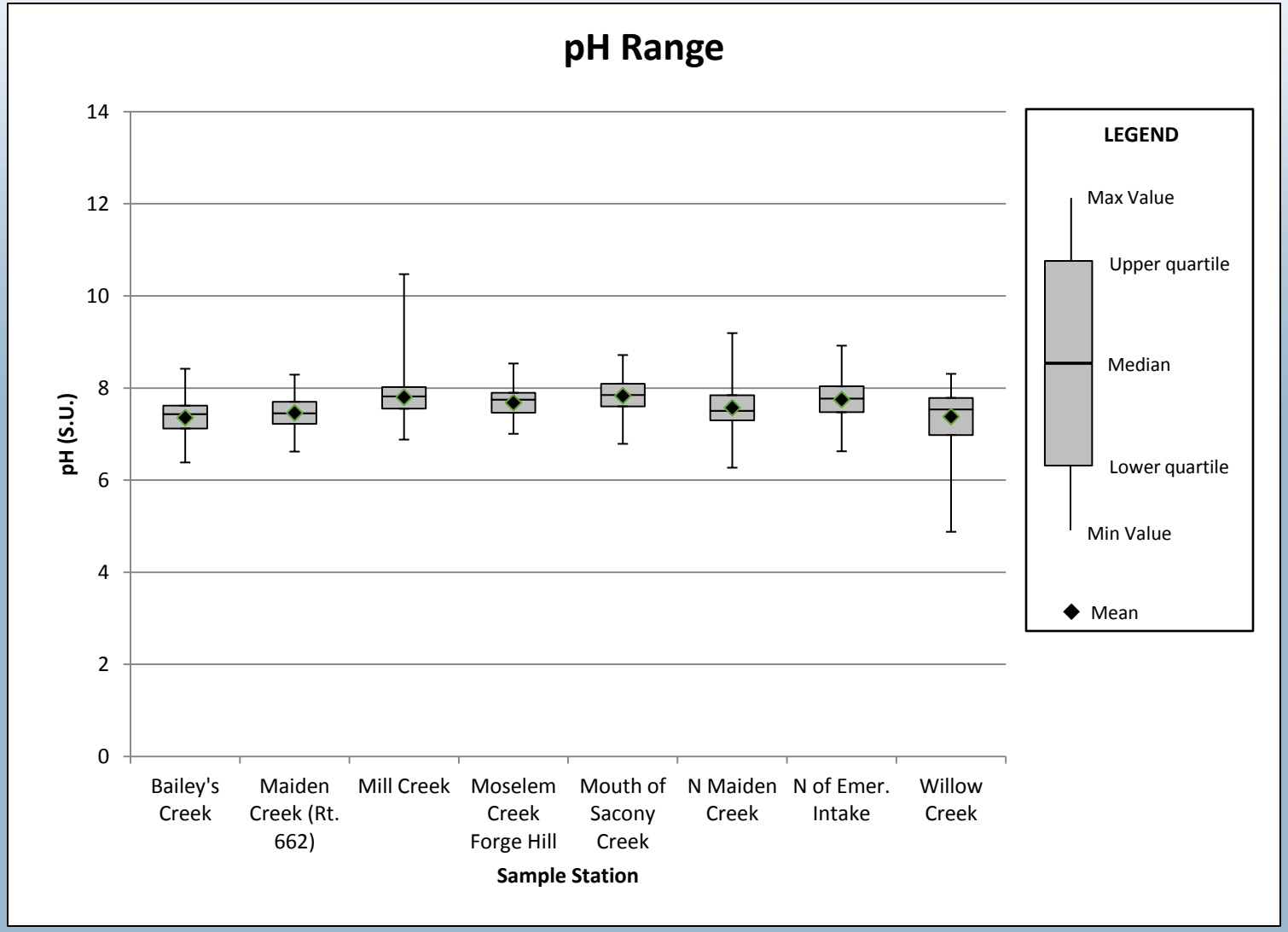
WATERSHED WATER QUALITY MONITORING RESULTS

pH

- Relatively consistent at each site and between sites
- Low pH (<5) observed in Willow Creek in March 2011
- High pH (>10) in Mill Creek attributed to meter malfunction

SSM

RAWA


pH Range
14
12
10
8
6
4
2
0
pH (S.U.)
Bailey's Creek
Maiden Creek (Rt. 662)
Mill Creek
Moselem Creek Forge Hill
Mouth of Sacony Creek
N Maiden Creek
N of Emer. Intake
Willow Creek
Sample Station
LEGEND
Max Value
Upper quartile
Median
Lower quartile
Min Value
Mean

Management Strategies

WATERSHED WATER QUALITY MONITORING RESULTS

Total Coliform (TC) and E. coli bacteria

- Presence/absence testing
- TC and E. coli always present
- Monitoring discontinued in 2013
- May consider bacteria DNA testing in future to determine sources of fecal pollution

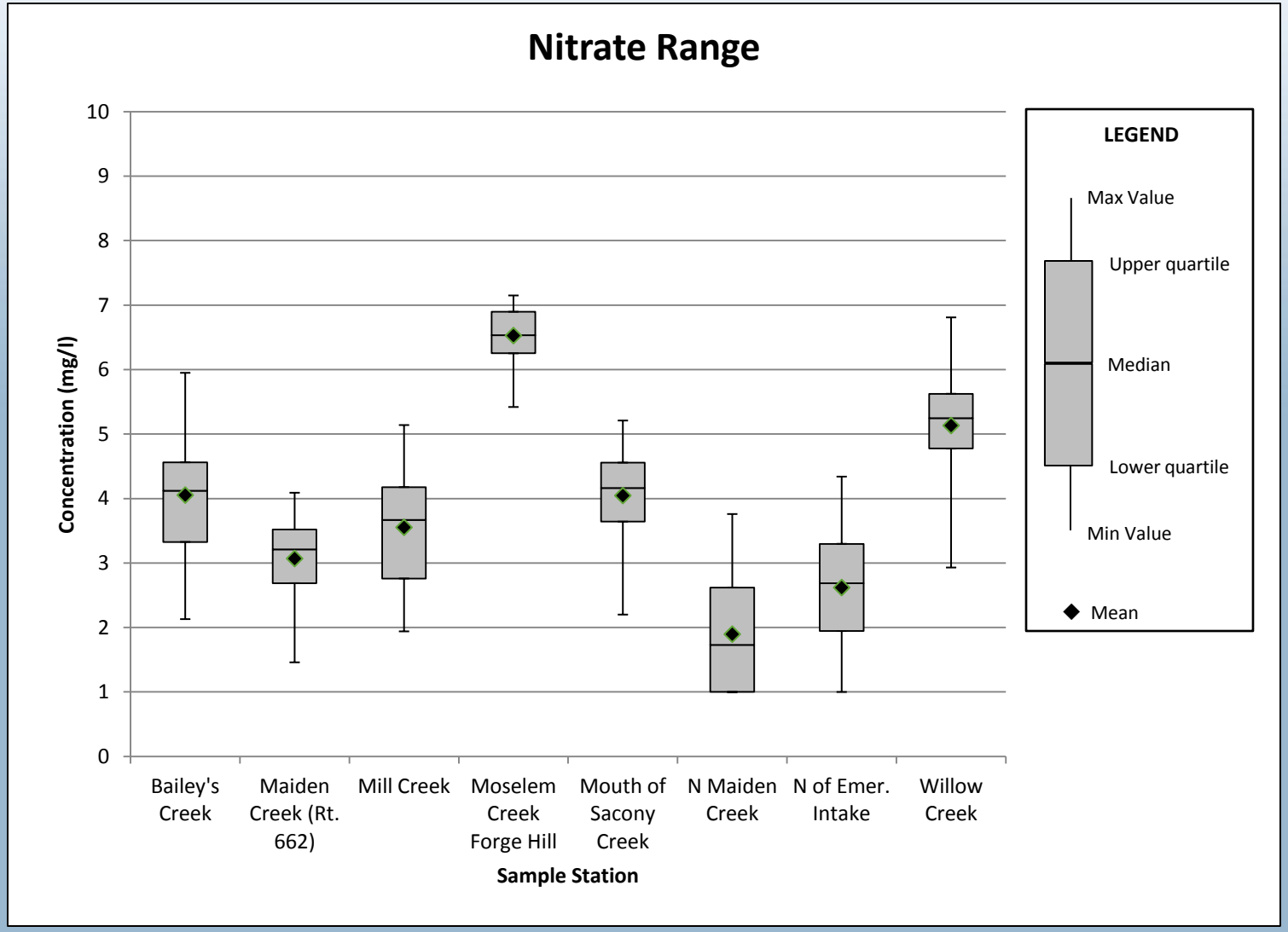
Nitrate

- All monitoring < 10 mg/L*
- Highest in Moselem Creek and Willow Creek

* PA DEP drinking water standard = 10 mg/L

SSM

RAWA


Nitrate Range
Concentration (mg/l)
10
9
8
7
6
5
4
3
2
1
0
Bailey's Creek
Maiden Creek (Rt. 662)
Mill Creek
Moselem Creek Forge Hill
Mouth of Sacony Creek
N Maiden Creek
N of Emer. Intake
Willow Creek
Sample Station
LEGEND
Max Value
Upper quartile
Median
Lower quartile
Min Value
Mean

Management Strategies

WATERSHED WATER QUALITY MONITORING RESULTS

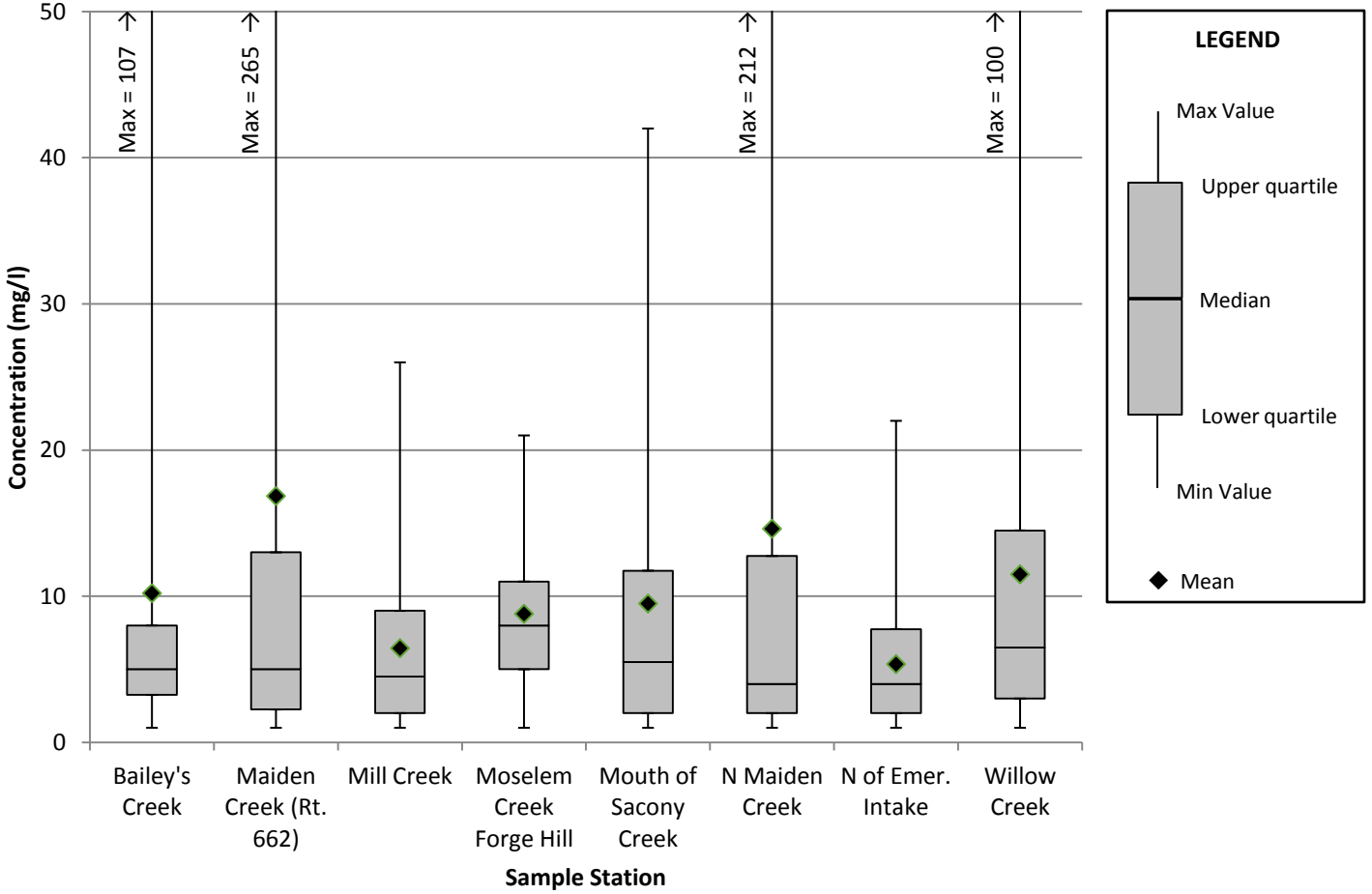
Total Suspended Solids (TSS)

- Concentration spikes associated with large storm events
  - North Maiden Creek
  - Maiden Creek (@ Rt. 662)
  - Bailey's Creek
  - Sacony Creek
- Northern part of watershed appears to be large source of TSS
- Sampling location added at mouth of Onteleunee Creek

SSM

RAWA

Total Suspended Solids Range



Management Strategies

WATERSHED WATER QUALITY MONITORING RESULTS

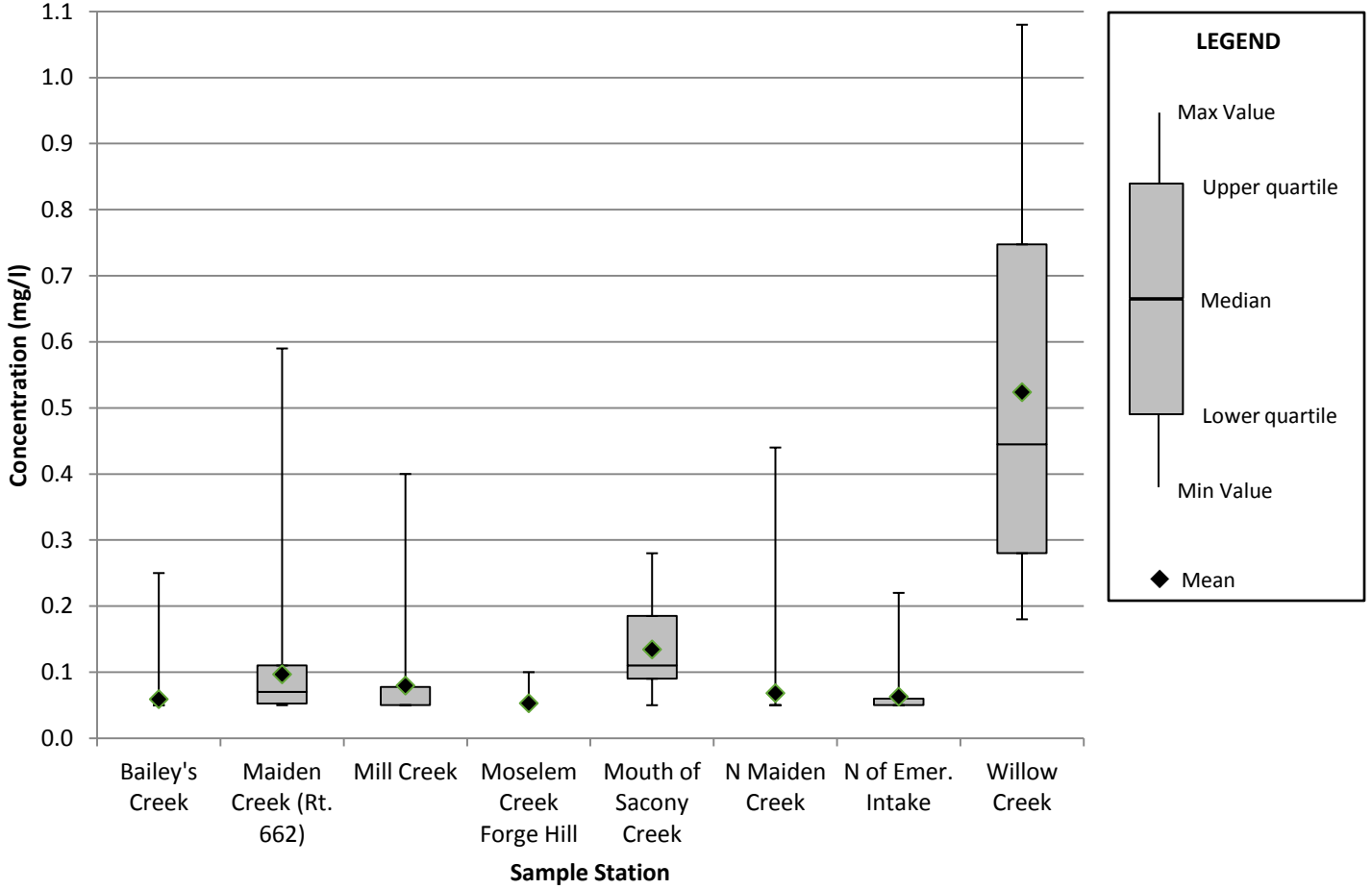
Phosphorus (P)

- Monitoring Total Phosphorus and Orthophosphate
- Low or nondetectable concentrations:
  - North of Maiden Creek
  - Mill Creek
  - Moselem Creek
  - Bailey's Creek
  - Maiden Creek (North of Emergency Intake)
- Moderate concentrations:
  - Sacony Creek
  - Maiden Creek (@ Rt. 662)
- Elevated concentrations in Willow Creek
- Concentration spikes may be related to large storm events
- Sampling location added in Sacony Creek downstream of Kutztown

SSM

RAWA

Total Phosphate Range



Management Strategies

WATERSHED WATER QUALITY MONITORING RESULTS

Oxidation-Reduction Potential (ORP)

- Recently added in 2013
- Will be used to characterize manganese cycling in watershed

Manganese (Mn)

- Recently added in 2013
- Will be used to characterize manganese cycling in watershed

SSM

RAWA

Management Strategies

WATER QUALITY by TARGETTED WATERSHEDS

Total Suspended Solids
- North Maiden Creek and its tributaries
- Bailey's Creek
- Sacony Creek
- Willow Creek

Phosphorus
- Sacony Creek
- Willow Creek

Nitrate
- Moselem Creek
- Bailey's Creek
- Willow Creek

SSM

RAWA

Management Strategies

AGRICULTURAL RESTORATION

Schuylkill Action Network Agricultural Workgroup

Agriculture Restoration Projects

- Exotic species removal on restoration sites
- Contribute funding for development of farm conservation planning and implementation

SSM

RAWA

Management Strategies

AGRICULTURAL RESTORATION

- Sacony Creek
- Farm with swine operations

SSM

RAWA

Questions?

Lori A. Burkert

Graduate Geologist

SSM Group, Inc.
1047 N. Park Road
Reading, PA 19610

610-621-2000
lori.burkert@ssmgroup.com

SSM

RAWA