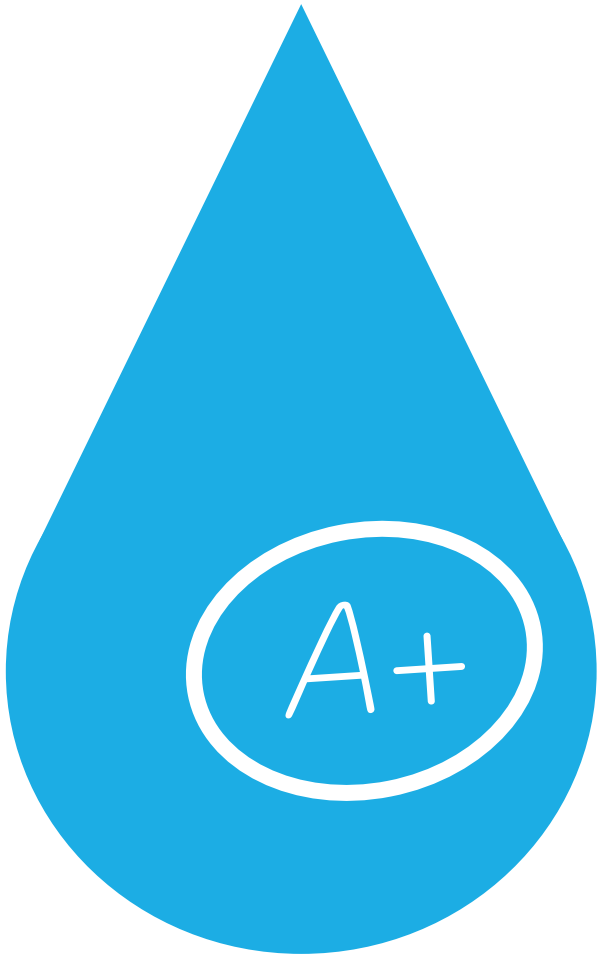
WATER QUALITY REPORT CARDS

Part of *Approaches to Clean Water Communication*



Report Cards

Water quality programs and other stakeholders have used a report card format to convey the results of their assessments or track achievement of program goals in a format that is intuitive to the public.

This document includes examples from the following locations, in order:

- Chesapeake Bay
- Commonwealth of the Northern Mariana Islands
- Kentucky
- Minnesota

The examples that follow are not intended to be comprehensive; rather, their collection is meant to facilitate the sharing of ideas among water quality programs, especially CWA 303(d) programs, and generate new ideas about how to use this format for different purposes.

Chesapeake Bay Report Cards

The University of Maryland Center for Environmental Science's Chesapeake Bay Report Card is published as both a short report and an interactive online tool. The report includes a narrative overview as well as an assessment of the Chesapeake Bay Watershed, and the interactive tool allows users to explore the Bay's water quality currently and over time, and in certain locations and in terms of certain indicators.

Report

Chesapeake Bay and watershed results

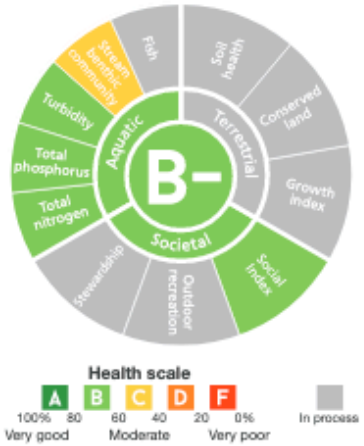
Moderate and poor scores in 2019 were mainly due to above-average temperatures almost every month of the year. The intense heat hurt aquatic grasses and benthic macroinvertebrates, and lowered dissolved oxygen levels. Precipitation was not above normal for the region as a whole, but extreme and severe periods of rain caused pollution from run-off. There were also possibly lingering effects from the record rainfalls in 2018 that stressed the bay and watershed.

Chesapeake Bay Watershed scored for the first time

This is the first year the watershed has been scored. Three categories were chosen to represent watershed health—aquatic, terrestrial, and societal. Within each category, indicators were assessed against thresholds or goals for each of the 23 regions.

Overall, the Chesapeake Watershed scored 60%, a B-. There were four aquatic indicators and one societal indicator. Watershed-wide, total nitrogen scored 79%. Total phosphorus scored 61% and turbidity scored 68%. Stream benthic community scored 46%. One social indicator was included, the Social Index, which scored 60%. See the indicator descriptions section for more details about what these new indicators measure.

The highest scoring region was the Upper James (72%), with the Lower Potomac and Lower Western Shore just slightly behind (both 71%) (see map next page). The lowest scoring region was the Lower Eastern Shore (42%), followed by the Choptank (47%) and the Elizabeth (52%). Overall, 10 regions had poor scores and 13 had moderate scores. More forested regions tended to have better scores.

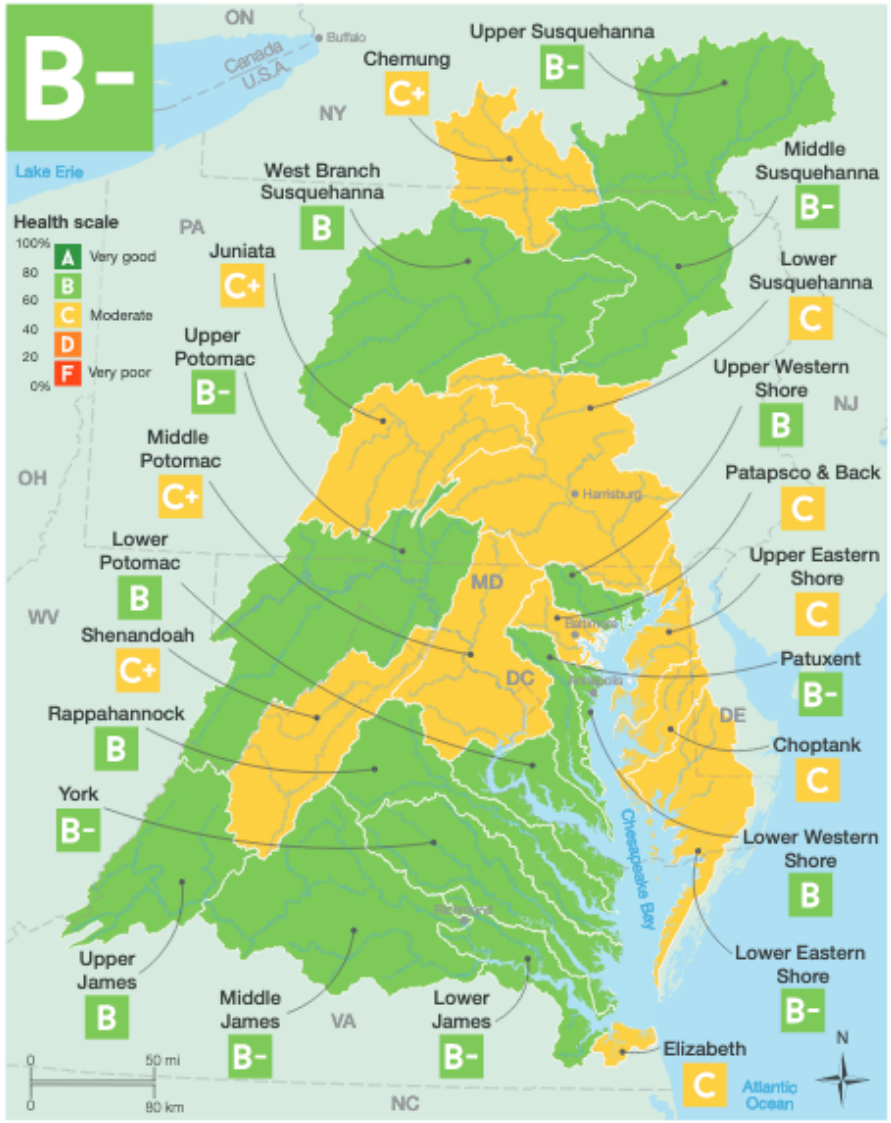


Chesapeake Bay health remained moderate in 2019

Overall, Chesapeake Bay scored 44% in 2019. This is the lowest score and first C- since 2011. Although several indicators of bay health improved in 2019, they did not offset those that declined. Bay-wide, dissolved oxygen scored 83% in 2019, a decrease from 2018. Water clarity scored 10%, a slight decrease from last year's 7%. The benthic community score sharply decreased from a 59% to a 38%. Total nitrogen scored 39%, a decline from last year's 44%. Total phosphorus scored 76%, a slight increase from 2018. Chlorophyll a scored 26%, an increase from 22% in 2018. Aquatic grasses scored 35%, a decline from last year's 39%.

The highest scoring region was the Upper Western Shore (58%). The lowest scoring region was the Patuxent River (22%). This is the first year there was no "B" grade for a region since 2011. However, no region had an "F" grade either. Despite low scores in 2019, long-term trends are still showing improvement. Six regions are showing significant positive trends over time, and the overall bay is showing a slightly improving trend. No regions are showing significantly declining trends over time (see map on far page).

Watershed health is good in first evaluation



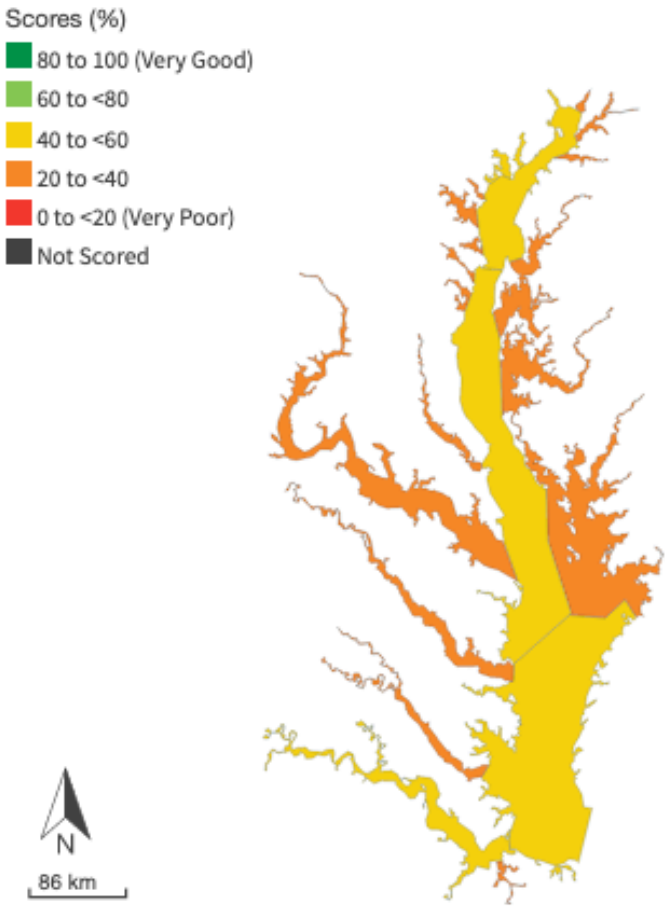
Online Tool

1986 — 2019

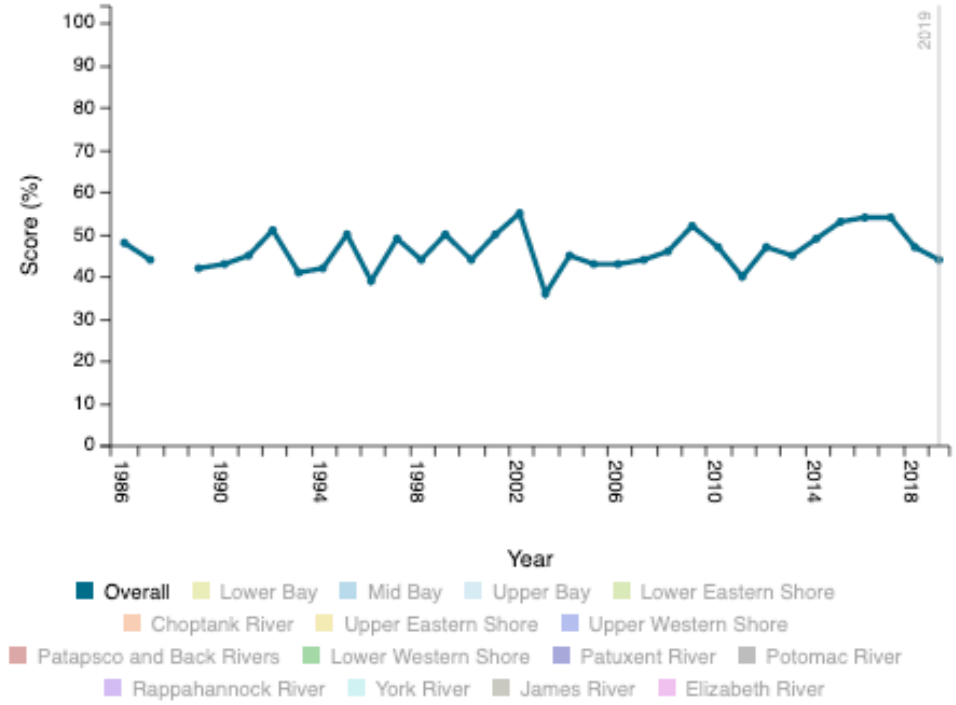
BY INDICATOR |

Overall Health Index | Dissolved Oxygen | Nitrogen | Phosphorus | Chlorophyll a | Water Clarity | Aquatic Grasses | Benthic Community | Blue Crab | Bay Anchovy | Striped Bass

BY REGION | Overall



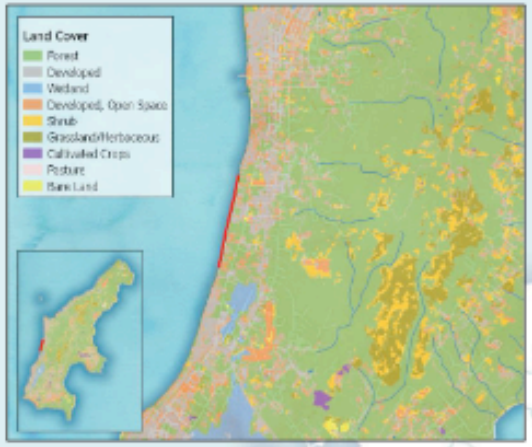
TRENDS | Overall



Commonwealth of the Northern Mariana Islands: TMDL Watershed Report Cards

These one-page cards provide, for various watersheds in the Northern Mariana Islands, a snapshot of local land cover, uses, water quality trends, bacteria sources, and planned or ongoing restoration and protection actions. The full suite of report cards can be found on BECQ's website here.

Segment 19C: West Takpochao South

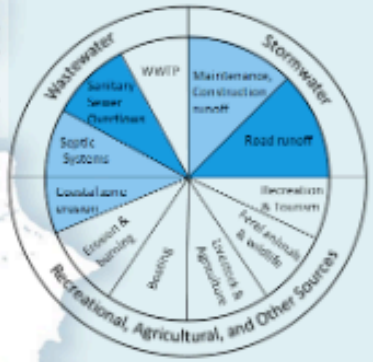



Wetland restoration located on NPS lands


Downstream extent of Garapan stormwater canal where construction BMPs failed

West Takpochao is the most urbanized watershed in CNMI, and is dynamic and complex. West Takpochao South contains two beaches: Chalan LauLau and Garapan Beach. The Saipan Beach Pathway runs from the base of the segment north through Garapan and into American Memorial Park (Segment 19B). The beach path is enjoyed by residents and tourists who bike, walk, and enjoy the ocean breeze along the walkway. Seagrass lines the coast line and no homes or hotels are located along the coast. This segment is included on the Clean Water Act 303(d) list of impaired waters for Enterococcus bacteria, and greatest potential sources of pollution are from failing wastewater systems and stormwater runoff that drains the large, paved, populated area into the lagoon.

Bacteria Sources



Water Quality Trends

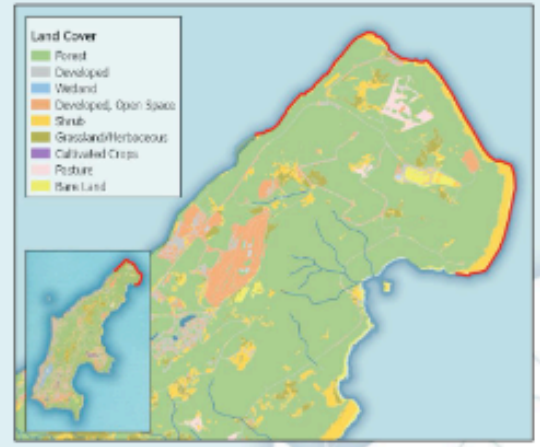
The STV (Statistical Threshold Value) approximates the 90th percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from a sanitary sewer overflow, as well as road runoff & construction runoff during rain events. Over the past 5 years, exceedances of water quality standards were highest in 2014, reaching up to 10%, and no samples exceeded the STV in 2016. There was an average exceedance of 4% and highest exceedances were observed in July.

Key Actions

1. Assess wastewater systems, including septic
2. Support BECQ & NRCS watershed planning, including outreach in rural areas to take advantage of wastewater solutions for livestock
3. Support planning along Middle Road for wastewater treatment
4. Identify road-derived sediment sources to create mitigation to trap sediment during high flow events
5. Work with NOAA Fisheries and others to improve land-derived pollution sources affecting Lighthouse Reef Reserve

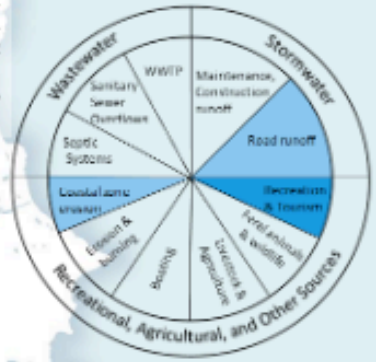
Segment 22: Banaderu



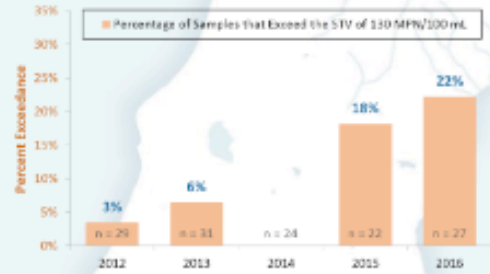

View of Saipan looking north toward Banaderu

Banaderu, the northernmost watershed on Saipan, is known for its excellent snorkeling, cliff diving, and scuba diving opportunities. Grotto Cave, a naturally formed clear-water grotto contains deep clear waters and is a popular destination for recreation. In fiscal year 2015, public advisories for Grotto Cave increased significantly due to Enterococci bacteria exceedances, and therefore, Banaderu was added to the Clean Water Act 303(d) list of impaired waters. The greatest potential sources of pollution are from recreation and use of public restrooms, which are designed with a septic holding tank and maintained with regular pump out practices.

Bacteria Sources



Water Quality Trends



The STV (Statistical Threshold Value) approximates the 90th percentile of the WQ distribution and should not be exceeded by more than **10 percent** of the samples

Water quality measurements indicate elevated levels of Enterococcus bacteria, likely from recreation and tourism at Grotto Cave. Other sources include road runoff during rain events. Over the past 5 years, exceedances of water quality standards were highest in 2016, and range from 0 – 22%, with an average exceedance of 10%. Highest exceedances were observed in November, but are also high throughout the rainy season, especially between August and October.

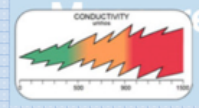
Key Actions

1. Upgrade restrooms at the Grotto, closing the park when the bathroom is not available (i.e. outside of regular business hours), and install an entrance gate.
2. Establish user fees which will be used to increase Ranger presence and provide maintenance and enforcement in the Grotto
3. Begin mandatory Tour Operator Certification Course for tour operators and install visitor friendly images about proper use of facilities.

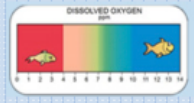
Kentucky: Basin Report Cards

Beginning in 2018, the Kentucky Division of Water assisted Watershed Watch in Kentucky (WWKY) with producing Basin Report Cards designed to use WWKY data to inform current and future volunteers about water quality in their Basin and the sampling that is being done. In addition to the following examples, the report cards can be accessed here.

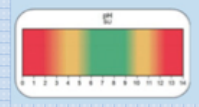
What We



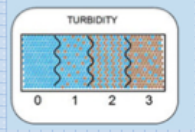
Conductivity is a measure of the dissolved solids in the water.



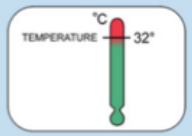
Aquatic animals need DO levels above 4ppm to survive.



Normal pH is between 6-9. Low pH means conditions are acidic, which can be harmful.



Turbidity is a measure of water clarity. High turbidity can be harmful to aquatic life.



Temperatures above 32 degrees C are stressful for aquatic life.

E.coli levels above 240 MPL/100 may cause health issues in humans.

Basin Health Scores

This Report Card looks at Volunteer Data and breaks it into two scores.

***E.coli* Score:** Looks at bacteria (*E.coli*) in the stream and indicates how safe the levels are relative to swimming safety standards.

Field Chemistry Score: Looks at the water chemistry data and tells you how many times a problem was found during sampling for the year.

Next Steps

In general, *E. coli* and field chemistry scores were good in the Four Rivers Basin. There are always things communities and individuals can do to help water quality, though!

Communities can do a lot to influence water quality by using Best Management Practices (BMPs) that help to minimize Runoff Pollution entering the streams.

Rain Gardens: Rain gardens add beauty to your yard and the native plants soak up rain water, filtering pollutants like bacteria, sediment, and chemicals

Permeable Pavers/Concrete: This type of green infrastructure allows water to soak into the ground, preventing it from running across a parking lot where it can pick up pollutants.

Rain Barrels: Capture rain water from your roof to prevent runoff pollution and get a cheap source of water for your yard.

Riparian Buffers: Riparian Buffers are an area of plants along a creek side that help filter pollutants out of storm water runoff.

FOUR RIVERS BASIN Report Card 2019

WATERSHED WATCH IN KENTUCKY

Explore. Connect. Protect.

What's Your Basin Score?

The Four Rivers

Located in far western Kentucky, this region is identified by the four major rivers that flow through or adjacent to this region, the Cumberland, Tennessee, Ohio and Mississippi Rivers. This region drains approximately 4,700 square miles across parts of 17 counties. Water is abundant in this area, with more than 10,000 miles of stream and plentiful groundwater resources.

Measuring Your Watershed

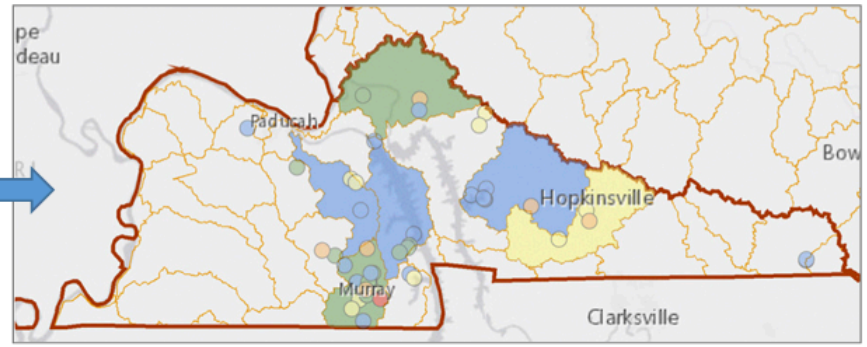
Watershed Watch in Kentucky (WWKY) is a state-wide citizen science program. It's mission is to teach volunteers to measure water health indicators that tell us how well a given stream meets state water quality standards for human health and safety, as well as for supporting healthy ecosystems. In this report we present the basic sampling results from your WWKY basin team, and talk about where the program has detected issues.

Basin Report Card: Four Rivers

E.coli Score

Each site receives a score based on the amount of bacteria (MPN/100mL) detected.

When there are at least 3 sites in a subwatershed, they receive a score based on the geomean of bacteria concentrations measured throughout the year.



***E.coli*:** Graded Sites (Geomean per year)

F (>2400) D (700.1-2400) C (240.01-700) B (130.01-240) A (0-130)

***E.coli*:** Graded Local Basins/HUC10 (Geomean)

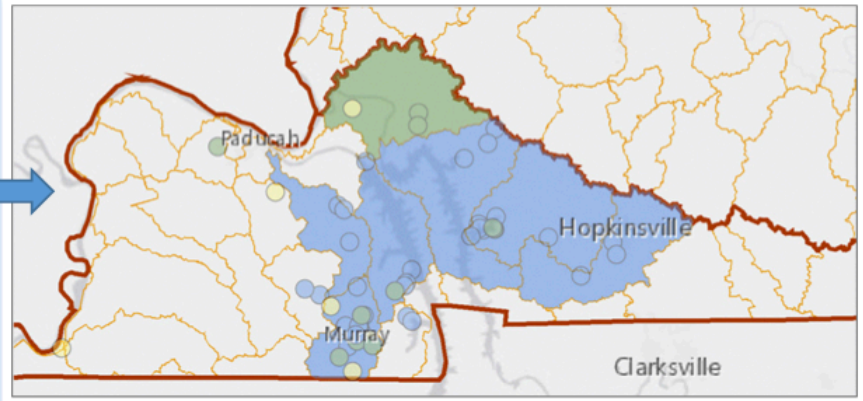
F (>2400) D (700.1-2400) C (240.01-700) B (130.01-240) A (0-130) Not Graded (less than 3 sites for analyses)

Field Chemistry Score

The Field Chemistry Score tells us how healthy the water is for the fish and bugs in the stream. When we find that a parameter is out of the healthy range, the site receives a "flag". The icons on the map show the number of flags that each site received for the year.

When a sub-watershed has 3 or more sampling sites, we are able to calculate a Field Chemistry Score for that area.

$$\frac{\text{Total \# Flags in the Watershed}}{\text{Total \# Sample Events in Watershed}} \times 100\% = \text{FC \%}$$



Field Chem: Sites (# of Water Quality Exceedances per year)

5+ Exceedances 4 Exceedances 3 Exceedances 2 Exceedances 1 Exceedance 0 Exceedances

Field Chem: Graded Local Basins/HUC10 (% Exceedances)

F (>60% Exceedance) D (41-60% Exceedance) C (26-40% Exceedance) Not Graded (less than 3 sites for analyses) B (11-25% Exceedance) A (<10% Exceedance)

But wait, there's more...

These scores only take into account the basic WWKY water chemistry and bacteria samples that were collected. Check out the WWKY Data Portal to download all the data from this area at: http://kgs.uky.edu/wwky/main.htm

How do we calculate the scores?

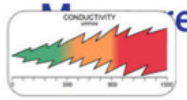
Volunteers collect water samples 3 times a year, in Spring, Summer and Fall. In order to generate a score for a subwatershed, there must be at least 3 sampling sites in that area. Where there is not enough data to generate a score, the map icons show individual site results.

How Healthy is My Basin?

Six of the thirty four subwatersheds in the Four Rivers Basin had enough sampling sites to generate *E. coli* and seven had enough sampling sites to generate field chemistry scores. In general, *E. coli* observations were lower than in years past, resulting in all five of the six subwatersheds receiving As or Bs, indicating these regions are probably safe for human recreation. One subwatershed received a C, indicating that there could some issues with bacterial pollution in this area. Field chemistry scores were also good, with all seven of the subwatersheds receiving As or Bs, indicating that streams in these regions should support healthy aquatic communities.

Additional sampling sites and volunteers are needed throughout the region to give a better picture of water quality.

What We



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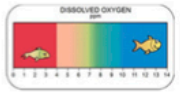

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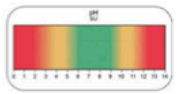

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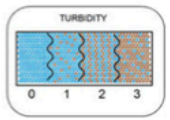

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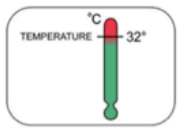

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Next Steps

What can you to to protect streams and rivers in the Salt River Watershed?

- **Pick up after pets** - dog waste on yards and in parks can pollute waterways with bacteria
- **Don't litter** - litter looks ugly & attracts nuisance animals
- **Fix vehicle fluid leaks -** a small amount of antifreeze or oil can pollute a lot of water!
- **Wash cars on the grass** - grass filters dirt and detergents
- **Compost leaves and yard waste** - great for a garden, don't dump in streams or storm drains!
- **Limit or eliminate artificial fertilizers and pesticides** - these chemicals can be harmful to streams and wildlife
- **Keep storm drains clean -** remove leaves and trash to keep stormwater flowing and streams clean
- **Regularly pump & service septic systems** - protects groundwater & streams from pollution
- **Plant trees** - trees absorb water, hold stream banks together, provide shade and shelter to wildlife
- **Volunteer with Salt River Watershed Watch** - you'll learn how to test a waterway, understand & use the results!

For more information or to contact the Salt River Watershed Watch, visit our website at www.srww.org.

SALT RIVER BASIN Report Card 2019

WATERSHED WATCH IN KENTUCKY

Explore. Connect. Protect.

What's Your Basin Score?

Salt River Basin Counties

Measuring Your Watershed

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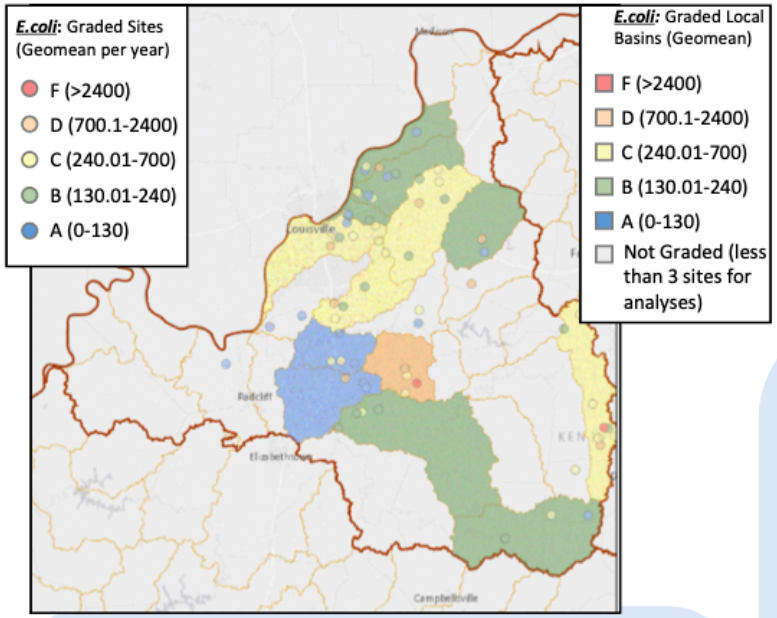
Basin Report Card: Salt River



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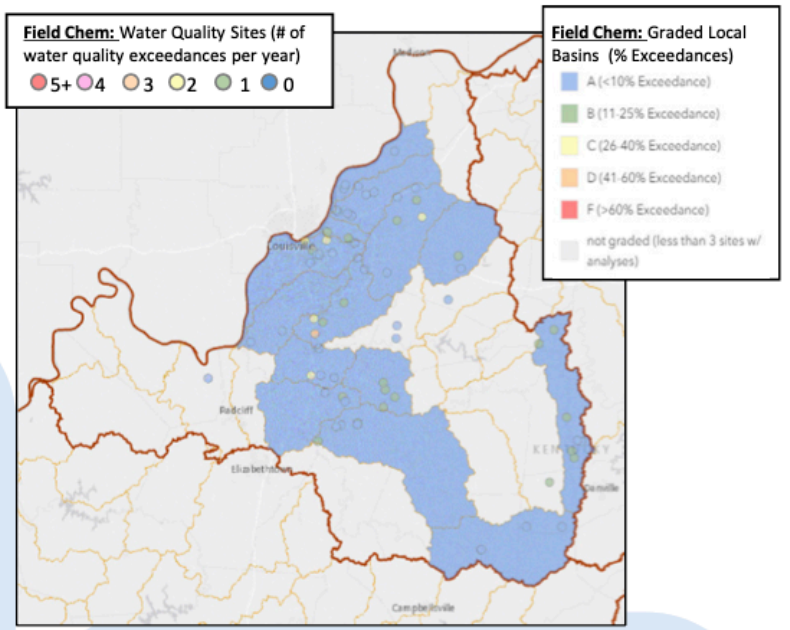

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How Healthy is My Basin?

The Good

All subwatersheds sampled earned an overall grade of A in 2019. This was an improvement from 2018, when three of the basins sampled earned a grade of B (Upper Floyds Fork, Pond Creek and Lower Beech). We also saw improvement in overall *E. Coli* scores across several local basins.

The Bad

We continue to see water quality exceedances and high levels of *E. Coli* at some localized sites. We also note that our data set is limited for a number of subwatersheds across the Basin, leaving those areas ungraded.

Basin Needs

We need more volunteers to participate actively, especially in those subwatersheds that are not graded. If you are interested in volunteering, visit our website at www.srww.org or contact the Salt River Basin Coordinator, Perry Thomas, at perryt@ky.gov.

Field Chemistry Score

Field Chemistry Score tells us how healthy the water is for the fish and bugs in the stream. When we find that a parameter is out of the healthy range, the site receives a "flag". The icons on the map show the number of flags that each site received for the year.

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Minnesota: Clean Water Fund Report Cards

In 2008, Minnesota voters passed the Clean Water, Land and Legacy Amendment to the state constitution, approving a sales tax increase to provide funding for drinking water protection, water quality protection and restoration, and other natural resources and cultural heritage projects.

The Clean Water Fund Report Cards, released every two years since 2016, accompany the full Clean Water Fund Performance Report and provide a qualitative assessment of action implementation and outcomes using a wide range of performance measures.

More information, full reports, and previous years' report cards can be found here.

2020 Clean Water Fund Report Summary

Protecting and restoring Minnesota's waters for generations to come

Minnesotans value clean, safe, and abundant water. In 2008, Minnesota residents voted for the Clean Water Land and Legacy Amendment, increasing their own sales tax and making a strong commitment to clean water in Minnesota. Here are some accomplishments since the amendment passed:

- All major watersheds in Minnesota have been assessed. We now know the clean water challenges we face.
- We have restored water quality in 50 lakes and streams. We are beginning to turn the tide.
- Vulnerable municipal water systems are engaged in protecting their source water.
- Over 30,000 private wells in 50 counties have been tested for nitrate.
- 500,000 acres on almost 800 farms now meet agricultural water quality certification standards.
- The average use of water per person in Minnesota is down by 20% over the last eight years.
- Municipal wastewater treatment upgrades have reduced phosphorus discharges by over 139,000 pounds per year.

Protection and restoration of Minnesota's waters requires a systematic approach. Minnesota is focusing on watersheds as the way to organize water work. This approach inspires and supports local and state partnerships and incorporates a wide range of issues, including water quality and quantity, groundwater, drinking water, habitat and recreation.

A foundational set of tools, reports and plans now support the systematic targeting of Clean Water Fund activities. Watershed Restoration and Protection Strategies (WRAPS) provide details on water quality issues and identify what needs to be done to clean up and protect our surface waters. Groundwater Restoration and Protection Strategies (GRAPS) outline groundwater issues and strategies to prevent overuse and contamination of groundwater and protect private and municipal wells that provide drinking water. Local comprehensive watershed plans, known as "One Watershed One Plan," use the WRAPS and GRAPS reports to create an action plan that will make positive changes in local watersheds that will lead to a better clean water world.

As we enter the second decade of the amendment, we continue to innovate and enhance our efforts. A decade of experience is paying off as we put new science into practice and shift more dollars into implementation. We should remember that it took us 150 years of land and water alterations to get us into our present situation. It will take a concerted effort over many years to significantly improve our water resources across the state. The Clean Water Fund alone will not be sufficient to address all the water challenges in the state. We need to continue to innovate, collaborate and leverage other resources to make a significant difference. Along the way, we will also enhance economic opportunity, recreational enjoyment, wild habitats and the quality of life of all Minnesotans.

New measures in the 2020 report

- Tracking the percent of land in Drinking Water Supply Management Areas that have protective uses that benefit water quality.
- Tracking the success of new water quality monitoring design to better meet local and other state monitoring needs.

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2020 Clean Water Fund Report Card

Minnesotans care deeply about the state's natural resources and cultural heritage. In 2008, we voted to increase our sales tax and pass the Clean Water, Land and Legacy Amendment, providing 25 years of constitutionally-dedicated funding for clean water, habitat, parks and trails, and the arts.

The following report card highlights work done using Clean Water Land and Legacy Amendment dollars for Minnesota's many water resources. The Report Card tracks a suite of performance measures that are described in the full report that follows. It provides a qualitative assessment of how well actions are being implemented and what outcomes are being achieved.

The legend shows the symbols used to describe how measures were scored. Measures are scored according to their status as of the end of fiscal year 2019 (FY19) and for their trend over time. Scores were developed using data-informed professional judgment of agency technical staff and managers.

Action status legend

Symbol	Meaning
●	We are making good progress/ meeting the target
▲	We anticipate difficulty; it is too early to assess; or there is too much variability across regions to assess
■	Progress is slow/we are not meeting the target; or the activity or target is not commensurate with the scope of the problems

Outcome status legend

Symbol	Meaning
●	Water quality is high – we are on track to meet long-term water resource needs and citizen expectations
▲	Water quality needs improvement or it is too early to assess – it is unclear if we will meet long-term water resource needs and citizen expectations; and/or water quality varies greatly between regions
■	Water quality is under intense pressure – long-term water resource needs and/or citizen expectations exceed current efforts to meet them

Trend legend

Symbol	Meaning
↗	Improving trend
→	No change
↘	Declining trend
NEI	Not enough information to determine trend at this time

Investment Measures

INVESTMENTS

Measure	Status	Trend	Description
Total Clean Water Fund dollars appropriated by activity	$1.2B has been appropriated to the Clean Water Fund from FY10-21, ranging from $157M in FY 10-11 to $261M in FY 20-21.	FY 14-15: $182.5M FY 16-17: $228.3M FY 18-19: 201.4M FY 20-21:$261.0M	Appropriation levels will vary by biennium and the strength of the economy. FY10-19 funds have been allocated, while FY20-21 allocations are in progress.
Total Clean Water Fund dollars per watershed or statewide by activity	Most watersheds in the state are benefiting from local and statewide projects.		For FY10-19, all 80 watersheds benefited from Clean Water Fund supported activities. Implementation activities comprise the largest portion of spending in watersheds statewide.
Total Clean Water Fund dollars awarded in grants and contracts to non-state agency partners	$491M was awarded in grants and contracts to non-state agency partners in FY10-19.		About 82% of grant and contract awards are for implementation activities; 50% of total FY10-19 appropriations were awarded to non-state agency partners.
Total dollars leveraged by Clean Water Fund	Required Clean Water match funds were met and exceeded. Leveraged funds trended up in FY18-19.		Required Clean Water match funds were met and exceeded.

Surface Water Measures

ACTION

Measure	Status	Trend	Description
Percent of monitoring addressing state and local needs	▲	→	Nearly half of watersheds met goals for addressing state and local needs for monitoring. Ongoing program development is aimed to ensure local needs are identified for monitoring.
Local partner participation in monitoring efforts	●	→	As of 2019, all programs are meeting participatory goals.
Number of nonpoint source best management practices implemented with Clean Water funding and estimated pollutant load reductions	■	↗	Although funding has increased and there is a continued increase in projects, practices and activities being implemented, the total request for projects has remained three times greater than available funds.
Number of municipal point source construction projects implemented with Clean Water Funding and estimated pollutant load reductions	●	→	Pace of awards is linked to permit cycles, compliance schedules and available Clean Water Funds. Applications exceed currently available funds.

OUTCOME

Measure	Status	Trend	Description
Rate of impairment/unimpairment of surface water statewide and by watershed: Stream aquatic life	▲	NEI	Water quality varies greatly by region. In general, better quality is found in the north when land is less disturbed. It is unclear whether long-term goals will be met.
Rate of impairment/unimpairment of surface water statewide and by watershed: Stream swimming	▲	NEI	Water quality varies greatly by region. In general, better quality is found in the north when land is less disturbed. It is unclear whether long-term goals will be met.
Rate of impairment/unimpairment of surface water statewide and by watershed: Lake swimming	▲	NEI	Water quality varies greatly by region. In general, better quality is found in the north where land is less disturbed. It is unclear whether long-term goals will be met.
Changes over time in key water quality parameters for lakes and streams: Lake clarity	●	NEI	There are improving trends in lake water clarity in more lakes than not.
Changes over time in key water quality parameters for lakes and streams: Nutrients and sediment in large rivers	▲	NEI	In general, concentrations in phosphorus and sediment are improving while nitrates are getting worse in surface water.
Changes over time in key water quality parameters for lakes and streams: Pesticides in streams	▲	NEI	Detections in streams vary greatly as a result of hydrologic and agronomic conditions; exceedances of pesticide water quality standards are rare.
Changes over time in key water quality parameters for lakes and streams: Pesticides in lakes	▲	NEI	Detections in lakes vary by region; detections in lakes rarely exceed water quality standards.
Changes over time in key water quality parameters for lakes and streams: Chloride in large rivers	▲	↘	Chloride concentrations continue to increase along all major rivers in the Twin Cities metropolitan area. Trends for chloride are limited to the metropolitan area.
Number of previous impairments now meeting water quality standards due to corrective actions	■	→	Although many projects are making progress in improving water quality, more waterbodies are being listed as impaired relative to the slower rate of waterbodies being restored.
Mercury in fish	▲	→	Mercury in game fish is not yet responding to decreases in local mercury emissions, although these reductions likely have prevented a steeper upward trend. Global emissions have increased. The time lag between emission reductions and response is likely several decades. It is too soon to see a measurable response in fish mercury levels. Long-term and consistent monitoring is necessary to track changes in fish tissue.
Mercury emissions	▲	↗	Significant progress has been made reducing mercury emissions from power plants. To meet Minnesota's 2025 emissions goal, significant reduction of mercury emission from the mining sector and further reduction of mercury use in various prodcuts will be necessary.
Municipal wastewater phosphorus discharge trend	●	↗	Significant phosphorus load reductions have been achieved through regulatory policy, infrastructure investments, improved technology and optimization of operations.

Drinking Water and Groundwater Measures

ACTION

Measure	Status	Trend	Description
Number of community water supplies assisted with developing source water protection plans	●	↗	On track to meet goal of protecting all vulnerable systems under Source Water Protection Plans by 2020.
Number of grants awarded for source water protection	●	↗	Increasing funds accelerate implementation of proven strategies for source water protection.
Number of local government partners participating in groundwater nitrate-nitrogen monitoring and reduction activities	●	↗	New partnerships continue to be established for nitrate-nitrogen monitoring and reduction activities
Number of new health-based guidance values for contaminants of emerging concern	▲	→	Did not meet target for FY 18-19. On track to meet goal of ten guidance values developed next biennium.
Number of counties completing a county geologic atlas for groundwater sustainability	●	↗	County atlases (including the Geologic & Groundwater atlases) are being completed at the planned rate and counties continue to step up to participate. With continued and consistent funding, completion of Geologic Atlases for all counties is expected around 2035, and completion of Groundwater Atlases for all counties around 2040.
Number of long-term groundwater monitoring network wells	■	↗	Many areas of the state still lack important groundwater information. Long-term ramp up in monitoring accelerated by Clean Water Fund investments is filling gaps.
Number of unused groundwater wells sealed	●	→	FY18 funding was awarded to seven public water-suppliers to assist in sealing 17 unused wells. FY 19 funding was awarded to nine local government units to assist in sealing over 300 private unused wells.
Land use in Drinking Water Supply Management Areas	●	↗	There is increasing research, engagement and activity to protect vulnerable areas in DWSMAs.

OUTCOME

Measure	Status	Trend	Description
Changes over time in pesticides, nitrate-nitrogen and other key water quality parameters in groundwater: Pesticides	▲	→	Variable trends for five common pesticides indicate a mixed signal. Low levels are frequently detected in vulnerable groundwater.
Changes over time in pesticides, nitrate-nitrogen and other key water quality parameters in groundwater: Nitrate-nitrogen statewide	▲	NEI	In many agricultural areas, drinking water supplies are not vulnerable to surficial contamination and most wells have low levels of nitrate-nitrogen. However, in vulnerable groundwater areas including the southeast, Central Sands and southwest, nitrate contamination is a significant concern.
Changes over time in pesticides, nitrate-nitrogen and other water quality parameters in groundwater: Nitrate-nitrogen southwest region	■	NEI	In areas where groundwater is vulnerable, nitrate levels can be high. Of the 21 vulnerable townships tested in southwest Minnesota (2013-2018), 100% of them were determined to have 10% or more of the wells over the nitrate-nitrogen 10 mg/L standard.
Changes over time in pesticides, nitrate-nitrogen and other key water quality parameters in groundwater: Nitrate-nitrogen Central Sands	■	→	Trend data from the Central Sands Private Well Network shows a slight downward trend in the 90th percentile . However, Township Testing data show a high level of nitrate in some vulnerable aquifers in the Central Sands.
Changes over time in pesticides, nitrate-nitrogen and other key water quality parameters in groundwater: Nitrate-nitrogen southeast region	■	→	Trend data from the Southeast Minnesota Volunteer Nitrate Monitoring Network shows no change. However, Township Testing data show a high level of nitrate in some vulnerable areas in southeast Minnesota.
Changes over time in source water quality used for community water supplies	●	NEI	Identifying correlations between drinking water contaminants is a significant step in trend analysis of source water quality.
Nitrate concentrations in newly constructed wells	▲	→	Since 1992, there has been a general increase in the percent of new wells that have nitrate levels above the drinking water standard.
Arsenic concentrations in newly constructed wells	▲	→	The percentage of wells with arsenic above the drinking water standard has remained steady over the past 10 years. Evaluation of ways to reduce this percentage is ongoing and may take years before significant progress is made.
Changes over time in groundwater levels	▲	↗	Most observation wells show no signficant change or an upward trend; many areas of the state lack important groundwater information while some areas experience declines.
Changes over time in total and per capita water use	▲	↗	There has been a slight improvement in water efficiency in recent years, although continued tracking is needed to determine the amount of impact from annual difference in weather versus changes in management.

Social Measures and External Drivers

DRIVERS

Measure	Status	Trend	Description
Social measures	▲	NEI	In recent years, state agencies have developed and piloted the Social Measures Monitoring System—integrating social science into Clean Water Fund projects.
External drivers	▲	→	The external drivers identified continue to alter land-water interactions across Minnesota, impacting how Clean Water Funds need to be invested.