Kiefer Creek Septic Feasibility Study Results

Fall 2022

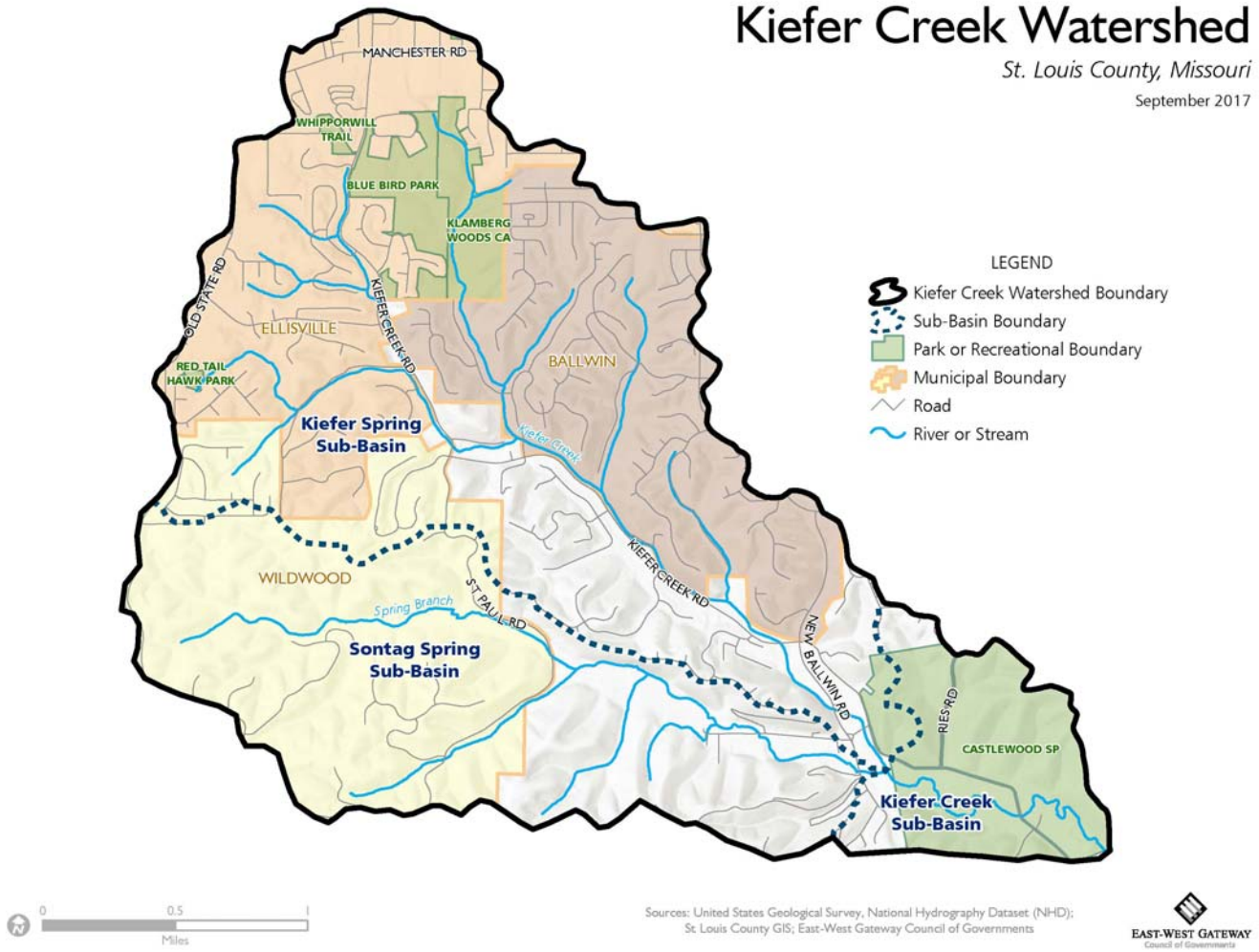
The Lower Meramec, Kiefer Creek, & Castlewood State Park

Lincoln Beach, in what is now Castlewood State Park started as a local swimming hole and heat respite from the City

As a railroad spur made it more accessible to more people, it transitioned from informal swimming hole, to resort and 'summer camp' homes

The neighborhoods around the park are now year-round homes with a mix of septic systems and sewer connections

The watershed is mostly residential, with some agricultural/vacant land and a small amount of commercial development

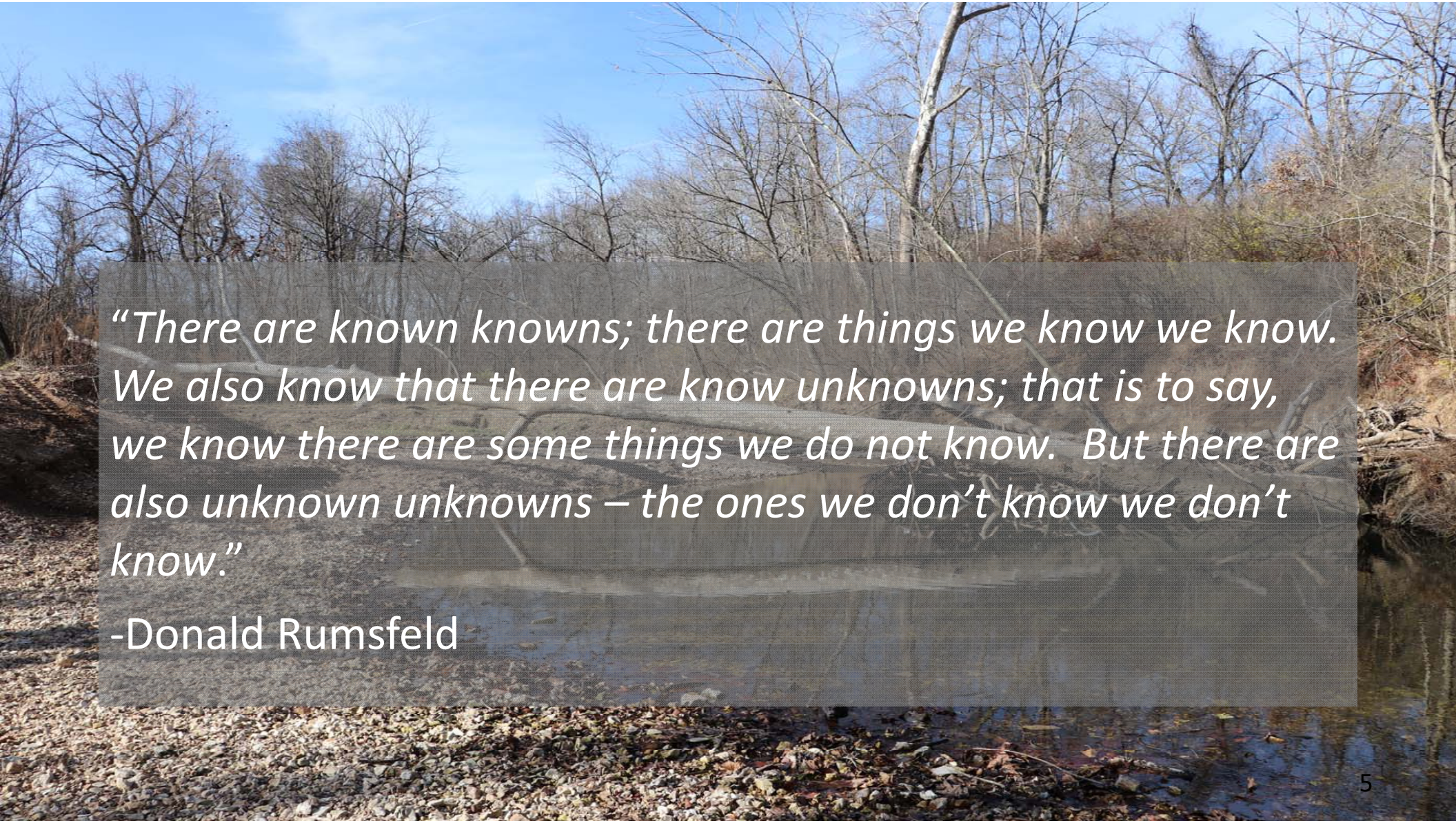

Kiefer Creek Watershed
St. Louis County, Missouri
September 2017
MANCHESTER RD
WHIPPORWILL TRAIL
BLUE BIRD PARK
KLAMBERG WOODS CA
OLD STATE RD
KIEFER CREEK RD
ELLISVILLE
RED TAIL HAWK PARK
BALLWIN
Kiefer Spring Sub-Basin
Kiefer Creek
WILDWOOD
Spring Branch
ST PAUL RD
Sontag Spring Sub-Basin
NEW BALLWIN RD
RIES RD
CASTLEWOOD SP
Kiefer Creek Sub-Basin
LEGEND
Kiefer Creek Watershed Boundary
Sub-Basin Boundary
Park or Recreational Boundary
Municipal Boundary
Road
River or Stream
0
0.5
1
Miles
Sources: United States Geological Survey, National Hydrography Dataset (NHD); St. Louis County GIS; East-West Gateway Council of Governments
EAST-WEST GATEWAY
Council of Governments

Project Background

- Kiefer Creek has been 303(d) listed for *E. coli* since 2012, but concerns about bacteria and septic systems date back to the early 1970's
- The *2014 Missouri Coalition for the Environment, Draft Kiefer Creek Watershed Restoration Plan*, called out septic systems in the watershed as the primary contributor to high *E. coli* levels
- A potential project for septic systems was outlined in Chapter 3 of the *2017 Lower Meramec Watershed Management Plan – Kiefer Creek Nine Element Plan for Bacteria*
- In late 2020, EWQ received a 604b grant from MoDNR to study the feasibility of a Repair, Replace, Connect program in the watershed

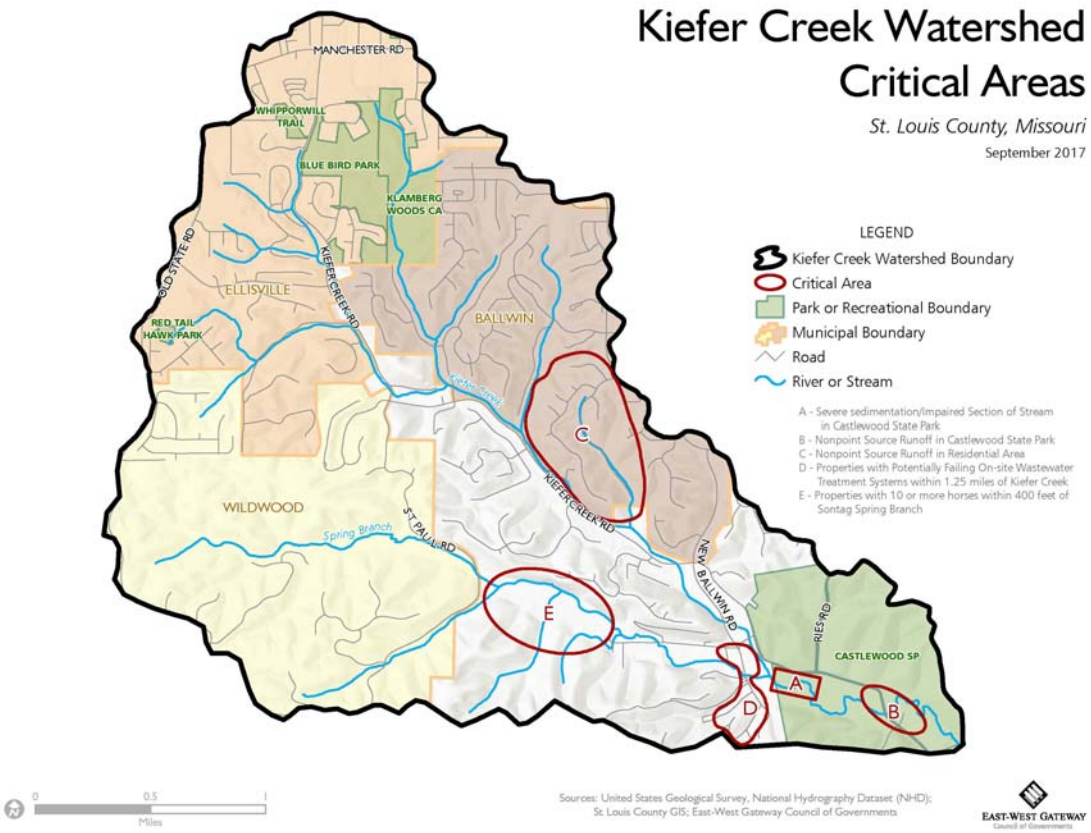
MISSOURI DEPARTMENT OF NATURAL RESOURCES

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



"There are known knowns; there are things we know we know. We also know that there are know unknowns; that is to say, we know there are some things we do not know. But there are also unknown unknowns – the ones we don't know we don't know."

-Donald Rumsfeld



The Assumptions

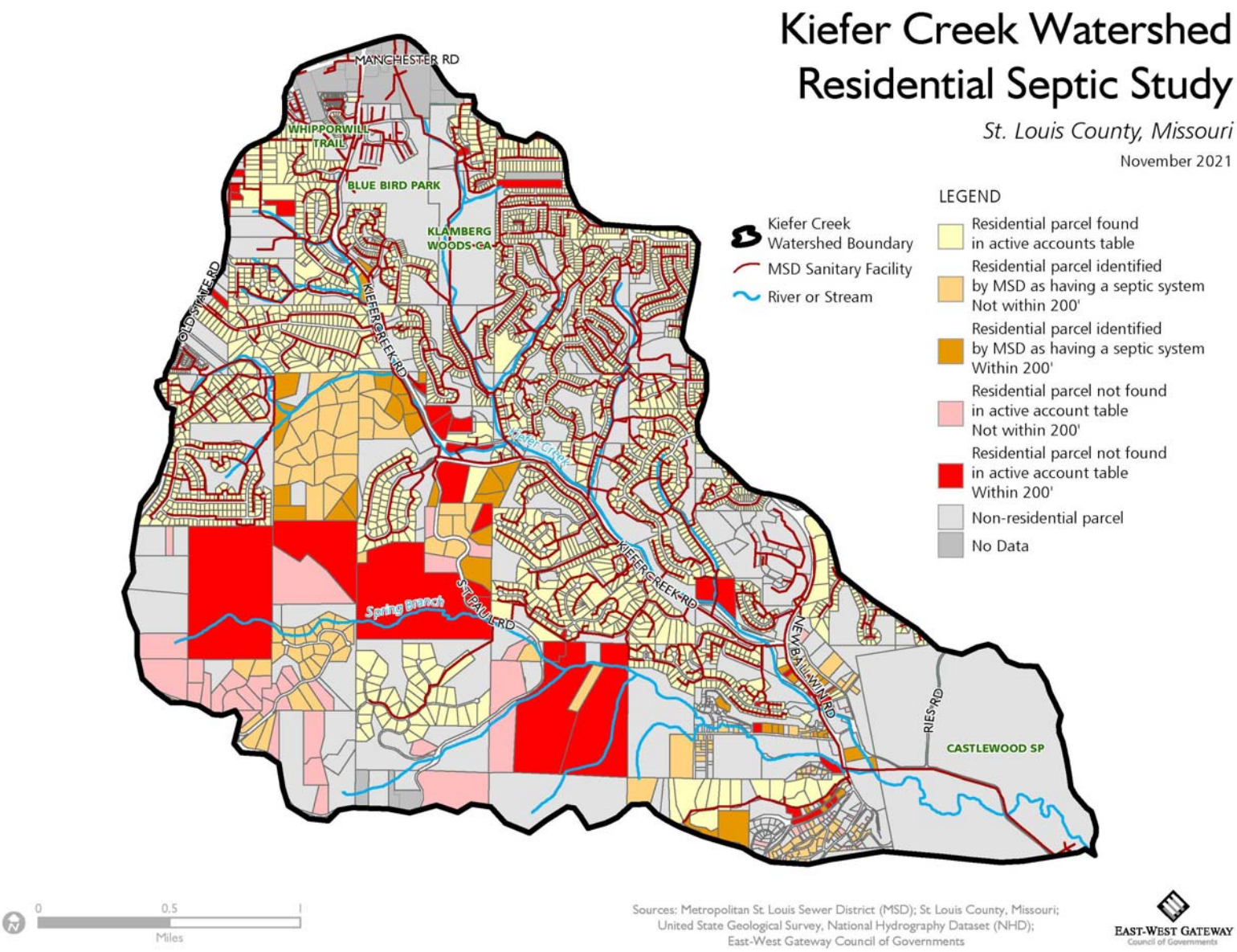
- The Kiefer watershed *E. coli* numbers were due largely to individual septic systems
- The older 'summer camp' homes on small lots were significant contributors, but all homes with septic should be included
- A Repair, Replace, Connect program was needed to provide funding to homeowners who were financially unable to repair their failing septic systems, replace them, or connect to sewer if available

The Sources

- Metropolitan St. Louis Sewer District (MSD)
- Missouri American Water (via MSD)
- St. Louis County – both parcel data and citizen access portal, Acella
- U.S. Census American Community Survey
- U.S. Environmental Protection Agency's EnviroAtlas
- U.S. Geological Survey (USGS)
- Missouri Department of Natural Resources (MoDNR)
- Zillow.com
- responding septic repair and replacement companies
- participating residents in the Kiefer Creek Watershed

Methodology

- MSD provided their own sewer bill data and Missouri American water billing information. These were cross-referenced to determine addresses with a water bill but no sewer bill. MSD also provided *E. coli* testing results.
- Using County parcel data, these addresses were further examined for homes/structures. Multi-family and commercial properties were discarded.
- County Acella data was then used, matching each parcel of the now-refined list for any permit information. The handful of homes with completed permits for sewer connection were removed from the list.
- For American Community Survey / US Census block groups comprising the watershed, data was collected for income, age, college degree, demographics, income, median home value, and social vulnerability index (SOVI) information.
- Septic repair / replacement companies were contacted for prices; a handful responded.
- MoDNR records and USEPA's EnviroAtlas helped confirm no point-source is responsible for *E. coli* levels.
- The internet was scoured for potential sources of funding for a repair, replace, connect program.
- Kiefer residents with septic systems were surveyed about their systems and interest in aspects of a repair, replace, connect program.



- Highlights proximity to sewer lines
- Shows sewered and septic parcels
- 262 homes identified as having septic systems
- 31% of homes on septic are within 200' of a sewer line

Caveat:
St. Louis County Ordinance, "Where a public sanitary sewerage system is legally and economically available to the building to be served, or within two hundred feet (200') of the property line, the Code Official shall require that sanitary sewage be discharged into that system."

More Methodology

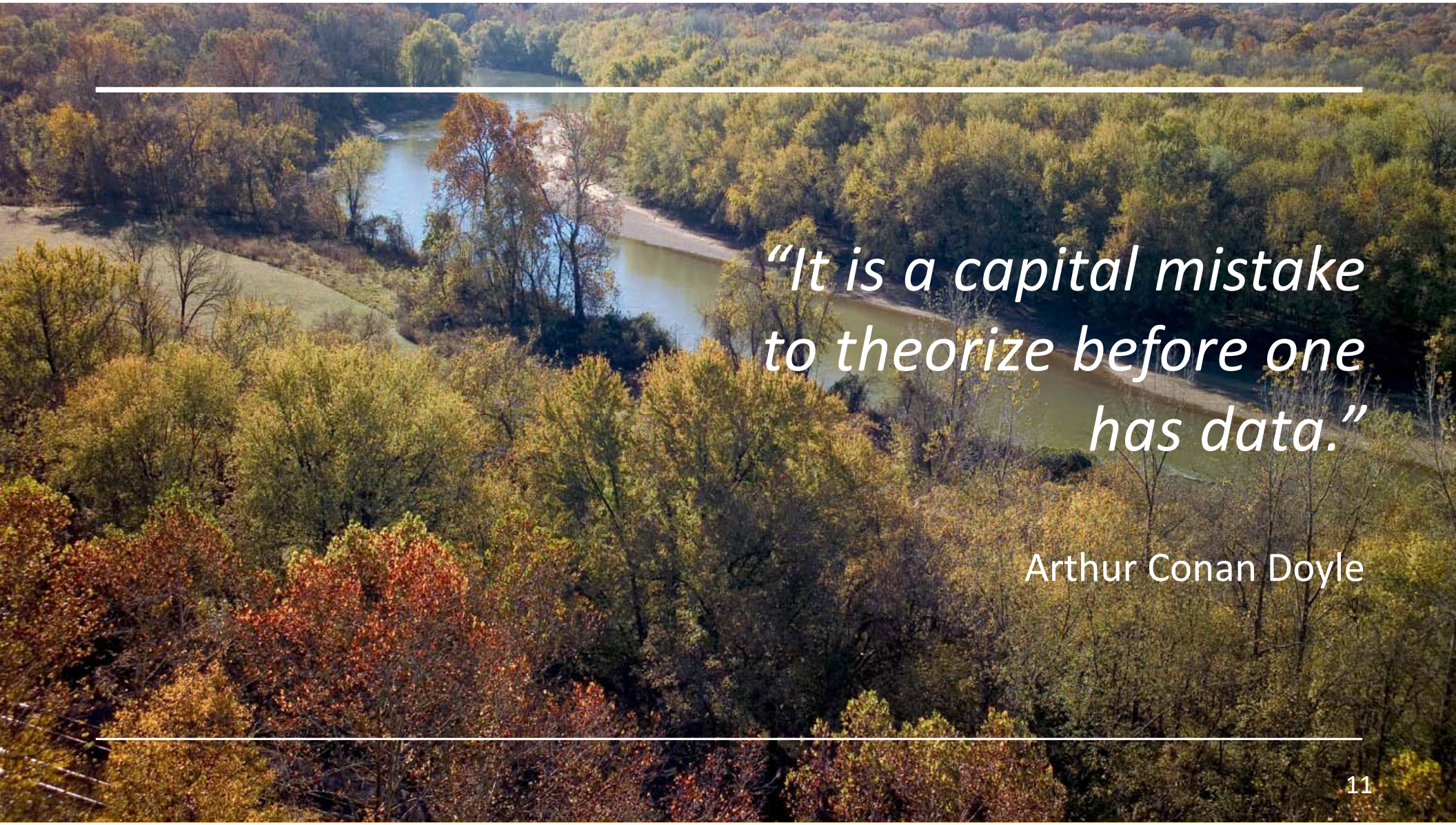
The Unexpected Consequences of Research During Covid

Finding Out What We Didn't Know

- Gaps in county parcel data were researched on Zillow
- Some county records listed 0-size lots, Zillow provided a better lot size estimate
- Calling septic companies from home/personal phones did not help alleviate concerns the questions were competitor research
- None of the original plans for homeowner education or surveying were appropriate in a pandemic
- County Health Department oversees septic systems and was unavailable for septic inquiries

Unexpected Benefits

- The county's Acella portal provided better septic cost numbers for repairs, replacements, and sewer tie-ons, than the septic company surveys
- Double-checking missing lots from MSD data with sewer lines and county property records gave a more accurate septic count
- County parcel data was from 2019, Zillow offered more current sales data
- Developed online survey tools and created a septic information web page which can be used in any future efforts – www.ewgateway.org/septicinfo



"It is a capital mistake to theorize before one has data."

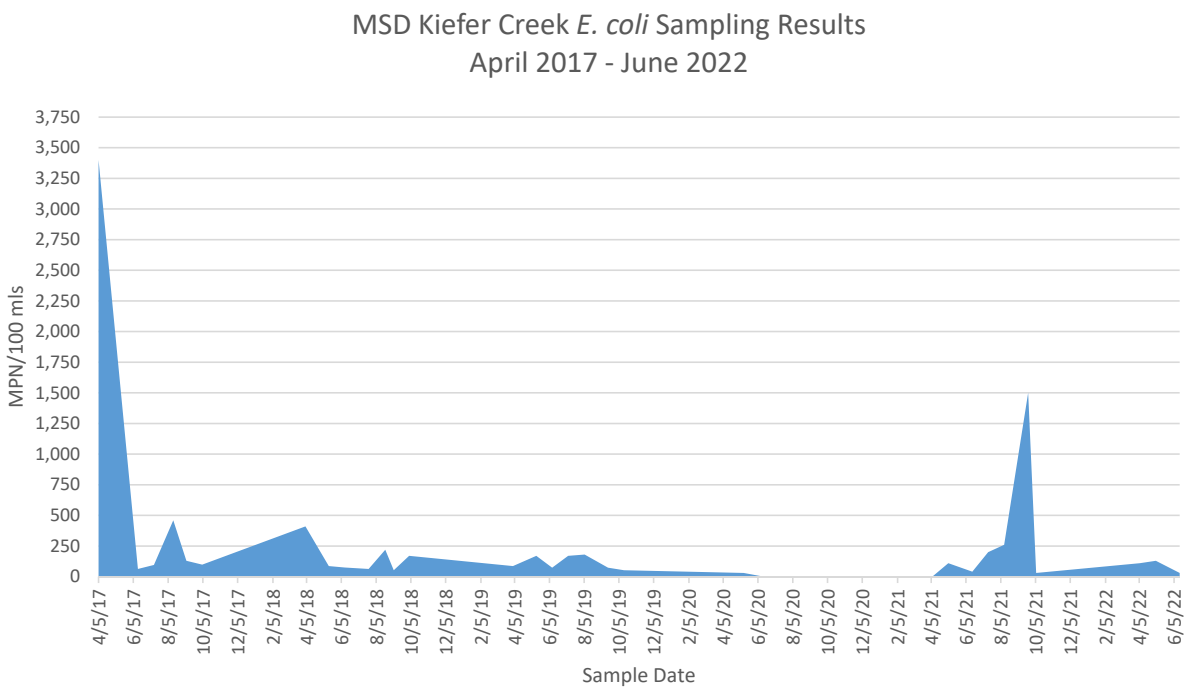
Arthur Conan Doyle

RESULTS

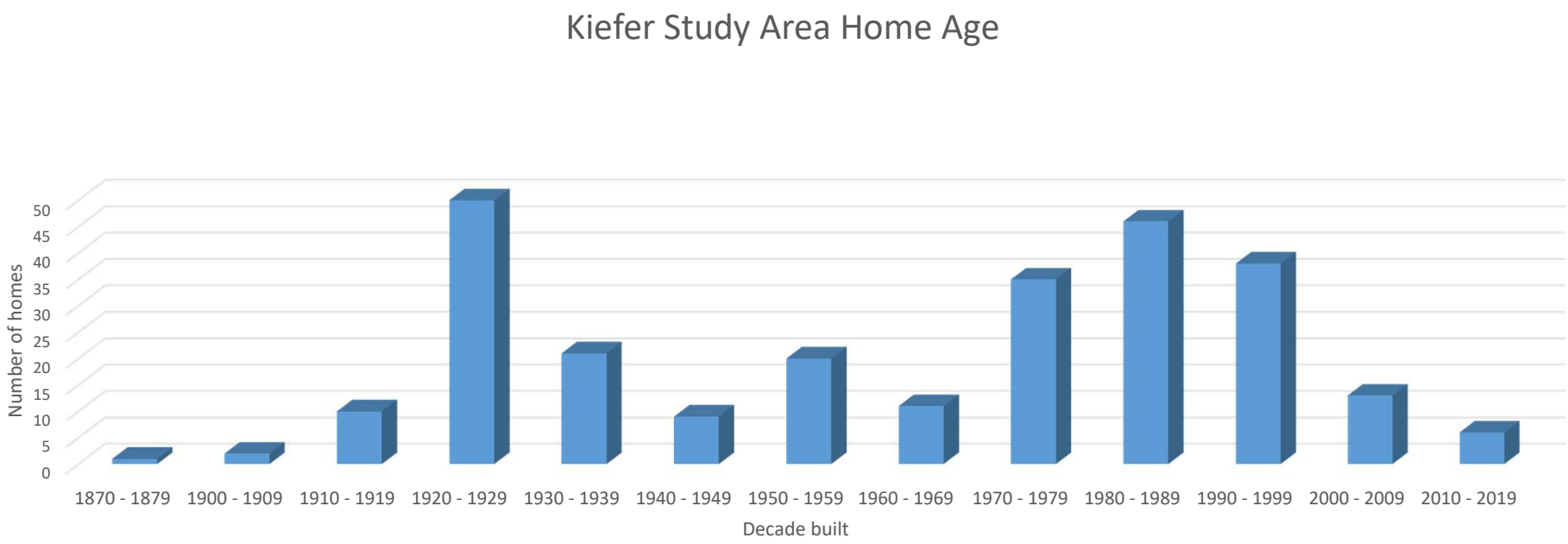
Kiefer Creek does have an *E. coli* problem

It does not appear to be consistent or to be increasing

For the six samples with *E. coli* levels at or above 390 most probable number (MPN), each had a rain event on the day of or within 72 hours prior to the sample collection

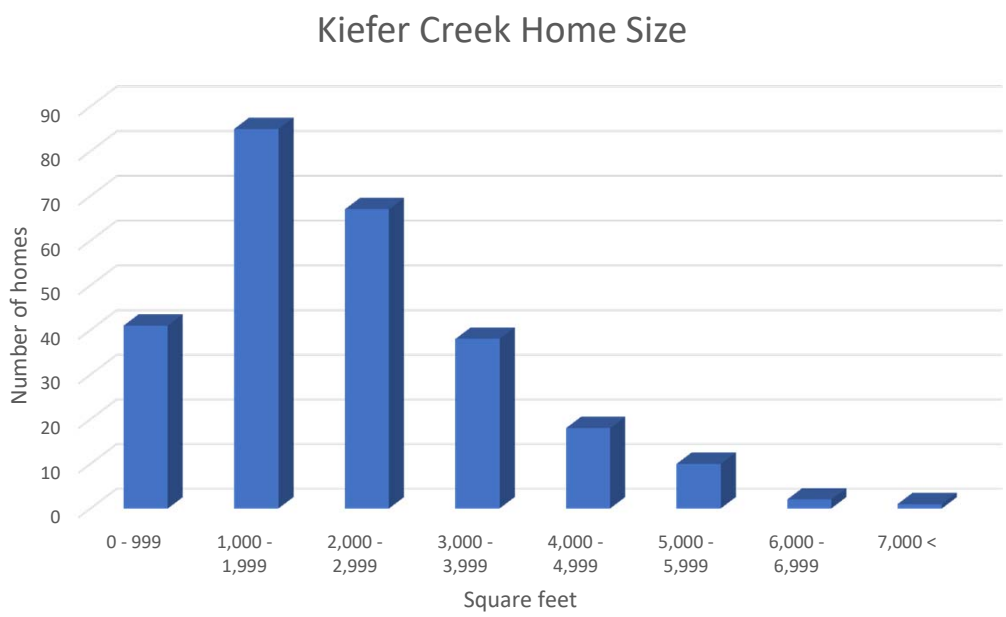


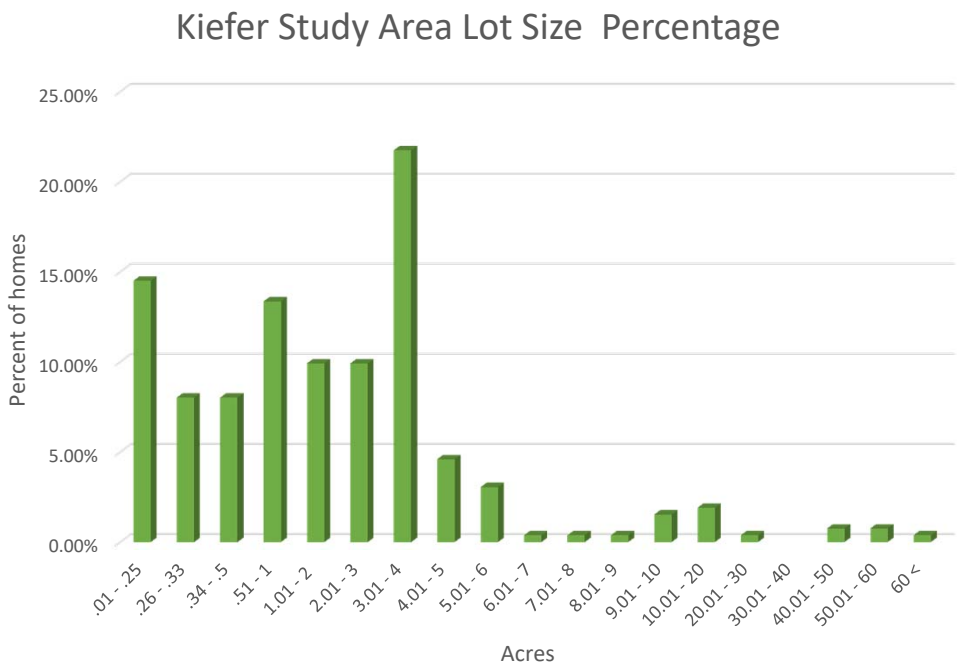
The 262 Homes



13 homes on septic in the Kiefer watershed were built before 1920

How Big?





- 16% of homes on septic in the Kiefer Creek watershed are less than 1,000 square feet
- 85% of homes sit on ¼ acre or more.

Home Sales

Kiefer Study Area Home Sale Dates and Values

Year sold	*Number of homes sold	Percent of total	Current average appraised value	Range
1967 - 1989	9	4%	$351,344	$104,000 - $531,200
1990 - 1999	21	9%	$419,281	$45,000 - $1,211,600
2000 - 2009	44	18%	$262,093	$55,200 - $675,000
2010 - 2022	168	69%	$295,735	$46,300 - $1,105,500

*Number of homes does not equal 262, 20 homes did not have sale data

Sources: St. Louis County parcel data; Zillow.com

The People

Kiefer Creek Watershed Demographics

Region	Total Population	Percent White	Percent Black	Percent Asian	Percent Hispanic	Percent Other
Kiefer*	10,854	83%	1%	8%	3%	5%
STL County	996,179	65%	24%	4%	3%	4%
EWG Region	2,587,799	71%	19%	3%	3%	3%

*Total watershed

Source: American Community Survey 5-Year Estimates (2016-2020)

Kiefer Creek Social Vulnerability Index

Region	Percent 65 and over	Percent of households with no car	Percent of households with limited English proficiency
Kiefer	18.4%	0.0%	1.2%
STL County	18.1%	6.2%	1.3%
EWG Region	16.5%	7.2%	0.9%

Source: American Community Survey 5-Year Estimates (2016-2020); disability data unavailable

More on People

Kiefer Creek Watershed Income & Education

Region	Median Income	Education*	Median Home Value
Kiefer	$129,919	67.10%	$393,550
STL County	$68,661	44.40%	$206,700
EWG Region	$65,666	36.70%	$183,191

*Percent of residents 25 and older who have attained a BA or higher

Hearing from the Homeowners

The Process

- A short, 5 minute survey was developed in Survey Monkey
- A flyer with a QR code, web address, and phone number was created and mailed to the 262 homes identified as having septic systems
- The mailing list was derived from county parcel data and flyers mailed to the home, rather than mailing address to account for renters

The Survey

- Asked for age of septic system
- How often septic was pumped out and cost
- If any repairs had been done and the cost
- Asked about the financial challenges of pump outs and repairs
- Household income
- Whether financial assistance for repairs or a voucher for pump outs would be welcome

The Results

- 12 respondents – 11 had septic systems
- All but one was the homeowner; septic age varied from 6 – 40+ years; and pump outs were most commonly done every 2 – 3 years at a range of costs ($100 - $600)
- 6 of the 11 respondents listed their income as greater than $100,000
- 5 indicated no financial assistance was necessary, the remaining 6 were in favor of vouchers or other assistance
- In an open response opportunity, multiple people indicated a preference to be connected to sewer

Homeowner Education And Outreach …During a pandemic

- In lieu of planned in-person outreach, a web page was developed with links to tools for homeowners and landlords including those from EPA and MSD
- The survey linked to the new web page
- Initial response was better than anticipated

Site Statistics - www.ewgateway.org/septicinfo Time range: 04/07/2022 - 06/22/2022		
Hits		
	Total Hits	161
	Visitor Hits	161
	Spider Hits	0
	Average Hits per Day	2
	Average Hits per Visitor	3.29
	Cached Requests	0
	Failed Requests	0
Page Views		
	Total Page Views	79
	Average Page Views per Day	1
	Average Page Views per Visitor	1.61
Visitors		
	Total Visitors	49
	Average Visitors per Day	0
	Total Unique IPs	45

Source: WebLog Expert

“It’s all about the money.”

Joe Jackson

The Cost$ Of Septic Systems

Estimates derived from:

- County permit information (Acella)
- Responding septic system installation and maintenance companies
- Responding homeowners

- Installation of drip irrigation system (replacement) - $12,000 - $25,000 (this varies because of home size, type of soil, presence of rocks, tree clearance, etc.)
- Cleaning filters - $300/year
- Pump outs - $250 average per pump out
- Repairs - $400 - $800
- Sewer connection - $3,000 - $12,000+ (varies due to proximity to line, elevation, underground geology, etc.)

Funding Search for a Repair, Replace, Connect Program

- A broad search of federal, state, and not-for-profit sources
- Missouri Healthy Watershed Search Tool provided excellent starting point
- No current funding in St. Louis County exists
- There is no current mechanism for sewer line construction
- St. Louis Co. is not rural and the Kiefer watershed is not low income, eliminating USDA and HUD grants
- Economies of scale – 262 homes would require direct outreach, which would be costly – a county-wide septic program makes more sense – although the fragmented nature of septic systems makes those households more difficult to target

Possibilities Identified

319 grant

- A handful of regions in MO use 319 grants to fund a voucher program for pump outs
- Small scale, ~10 – 20, $50 vouchers a year
- Pump outs only, no repair, replace, or connect
- 40% match
- May not allow for a county-wide program

SRLF

- State Revolving Loan Funds could be used by St. Louis County or the cities of Wildwood, Ballwin, or Ellisville to construct sewer lines to unsewered parcels
- Individuals cannot directly access these funds
- Loan, not grant

Conclusions

- Home age and lot size do not appear to correlate to likely bacteria sources from old and/or malfunctioning septic systems
- Only 14.5% of homes in the watershed sit on .25 acres or less
- Almost 70% of homes have been sold in the last 12 years, which would have triggered inspections – and septic awareness on the part of the new homeowner
- The Kiefer watershed is small and not an impoverished area, which makes even a voucher program a challenging argument
- No entity is stepping forward to install sewer lines
- Kiefer is not an ideal location to pilot a repair, replace, connect program

However,

- The foundational knowledge gained through the Kiefer Creek Feasibility Study provides an excellent starting point to address septic issues not just in the Kiefer watershed, but in the EWG region as a whole.
- The methods for determine the presence of septic systems, while not foolproof, were effective and could be used again.
- The web page, links, and actions taken by survey respondents indicate more homeowner education on septic maintenance would be welcome and it seems likely this need extends wherever there are septic systems present in significant numbers.
- *E. coli* source identification research is being conducted by USGS and their results will help determine if septic systems are the real cause of contamination and the contributions from non-human species.
- MSD will be conducting enhanced septic investigations as part of their MS4 permit IDDE measures, with evidence of septic failure turned over to the county for enforcement.

Questions?

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Report available at: www.ewgateway.org/septicinfo