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# YUOK TRIBE ENVIRONMENTAL PROGRAM



Source Water Assessment and Protection Program  
FISCAL YEAR 2013

Susceptibility Analysis  
October 1, 2013 through December 31, 2014

Prepared by the Yurok Tribe Environmental Program  
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## **INTRODUCTION**

The Yurok Tribe is pleased to submit the Susceptibility Analysis for the FY 2013 Yurok Tribe Direct Implantation Tribal Cooperative Agreement, Source Water Protection and Assessment Program. This report will describe the delineation of the source water protection zones that may impact any of the six Community Service Districts (CSD) located within the boundaries of the Yurok Tribe Reservation, inventories done within the McBeth Acres CSD, and an assessment of those inventories.

### **Source Water Assessment Program**

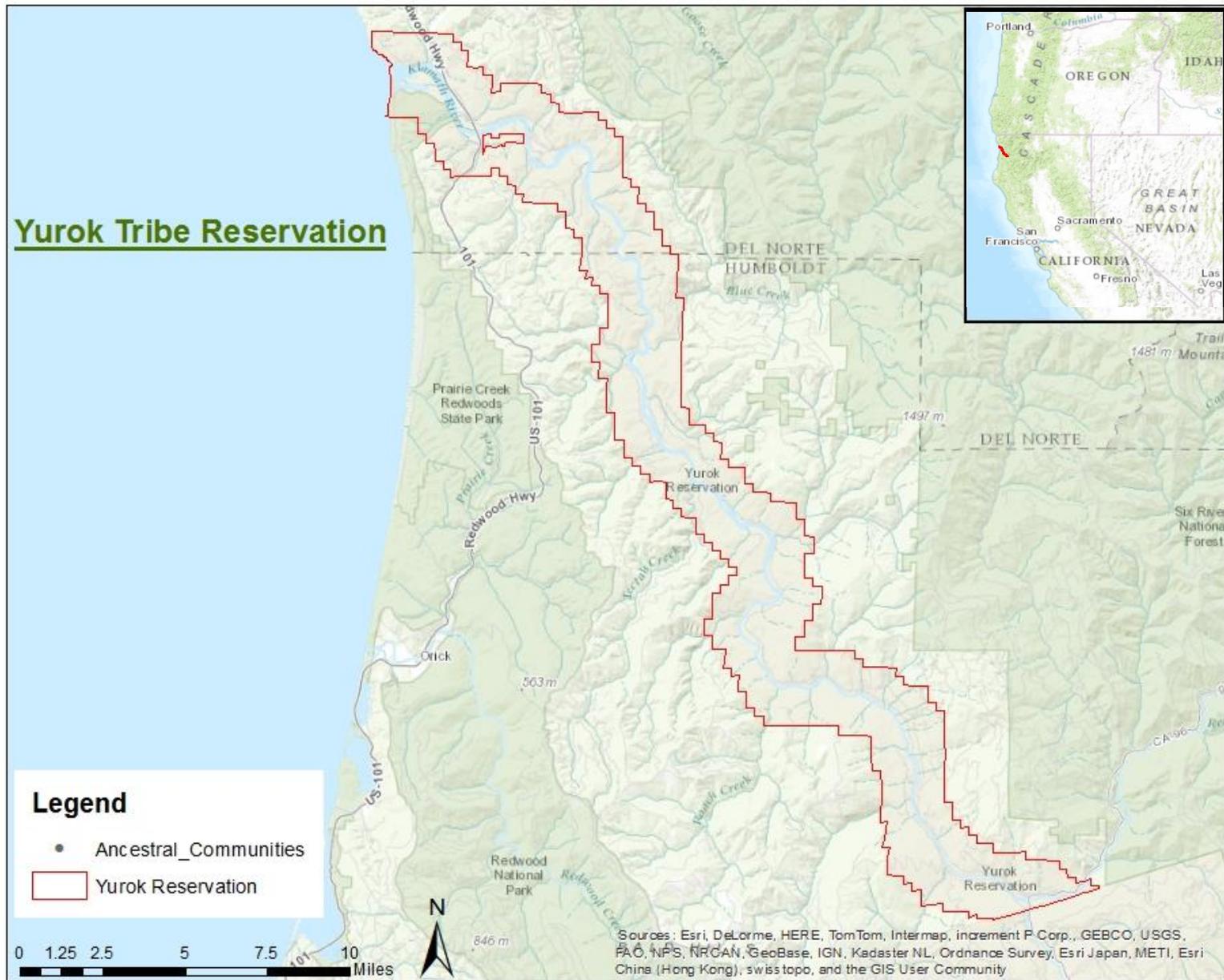
A Source Water Assessment and Protection (SWAP) program is intended to meet the requirements of the United States Environmental Protection Agency (USEPA) Safe Drinking Water Act (SDWA), and the Yurok Tribe Source Water Assessment and Protection Program (SWAPP).

The Yurok SWAPP is not a definitive program of actions designed to enhance water quality, but instead it is a practical approach to protecting Tribal public drinking water supplies from actual or potential contaminate sources.

## **BACKGROUND**

### **Yurok Indian Reservation**

The Yurok Tribe is currently the largest federally recognized Native American Tribe in the state of California. It is located in the northwestern portion of California. The Yurok Indian Reservation (YIR) boundaries consist of a one mile wide corridor which extends 46 miles from the mouth of the Klamath River to the Pacific Ocean upriver to the town of Weitchpec (Fig.1). Throughout the YIR are numerous Class V Underground Injection Wells private septic systems that are improperly maintained, failing, and/or poorly located. As such, these systems pose a potential health risk to the surrounding community, and to tribal drinking water resources. To address this concern, the Yurok Tribe has been working under a Cooperative Agreement under the Safe Drinking Water Act and Source Water Assessment and Protection Program (SWAPP).



**Figure1: Map of Yurok Indian Reservation Boundaries.**

## **SUSCEPTIBILITY ANALYSIS**

### **Community Service Districts (CSD) Information**

On the YIR there are a total of six 'in use' Community Service District (CSD) wells. These include the 'down river systems': Klamath CSD, McBeth Acres CSD, Requa CSD, and the 'up-river systems': Cappell CSD, Weitchpec CSD, and Wautec CSD (Table 1 and Fig 2). In the reporting year FY12 the Klamath and Requa CSDs were inventoried and assessed. For FY13, the Yurok Tribe has completed the inventory and assessment for the remaining 'down-river' system McBeth Acres CSD. 'Up-river' systems will be inventoried and assessed in the reporting year FY14.

Having the ability to recognize and correct potential health risks could prevent a devastating outbreak on the YIR. Major components of the Yurok Tribe SWAPP are delineation, inventory and assessment. The emphasis of the delineation, inventory and assessment report is to identify significant potential contaminant threats to tribal drinking water sources, and assessing susceptibility to those threats in order to provide the basis needed to develop a source water protection plan for public water systems.

### **MCBETH COMMUNITY SERVICE DISTRICT**

The McBeth Acres CSD is located in the Klamath Glen, and is approximately 3 miles upriver from Klamath. The end users are residential, commercial and recreational. There is currently one well that serves the Klamath Glen, the Maple Street Well and Pumphouse. The first well that was in use, the Cedar Tree Well and Remote Terminal Unit (RTU) has been abandoned due to fecal coliform contamination. Both wells in the CSD are at a depth of 60 feet. There are 160 homes that are connected to the distribution system, and all of the residents in the CSD use on-site septic for their domestic waste disposal. High groundwater, septic failure, and large amounts of livestock may have led to the contamination of the Cedar Tree Well, and could pose future risks to human health of those residents living in the Klamath Glen community. The CSD is owned, operated, and maintained by the Yurok Tribe Public Utilities Department (YTPUD).

**Table 1: Community service wells of the Yurok Tribe Reservation**

<b>System Name / PWSS ID Number</b>	<b>Source Name</b>	<b>Population per Source</b>	<b>Population per System</b>	<b>Source Type</b>	<b>Well Depth</b>	<b>In Use</b>	<b>Systems Inventoried</b>
Klamath CSD 0800548	Green Diamond Well	59 connections	59 connections	Groundwater	UNK	Yes	PWS: 1 Septics: 22 Complete as of FY12
Klamath CSD 0800548	Well 01	59 connections	59 connections	Groundwater	60 ft	No	PWS: 1 Septics: N/A
Klamath CSD 0800548	Well 02	59 connections	59 connections	Groundwater	60 ft	No	PWS: 1 Septics: N/A
McBeth Acres CSD 0605014	Maple St. Well & Pumphouse	160 homes	160 homes	Groundwater	60 ft	Yes	PWS: 1 Septics: 88 Complete as of FY13
McBeth Acres CSD 0605014	Cedar Tree Well & RTU	160 homes	160 homes	Groundwater	60 ft	No	PWS: 1 Septics: N/A
Requa CSD 090605014	Ground-water	28 homes 50 served	28 homes 50 served	Groundwater	44 ft	Yes	PWS: 2 Septics: 12 Complete as of FY12
Weitchpec CSD 090605006	Gist Creek	25 connections	25 connections	Surface Water	N/A	Yes	PWS: 2 Septics: 0
Cappell CSD 090605033	Cappell Creek	45 residents	45 residents	Surface Water	N/A	Yes	PWS: 2 Septics: 0
Wautec CSD 090600134	Achelth Creek	21 connections	21 connections	Surface Water	N/A	Yes	PWS: 2 Septics: 0

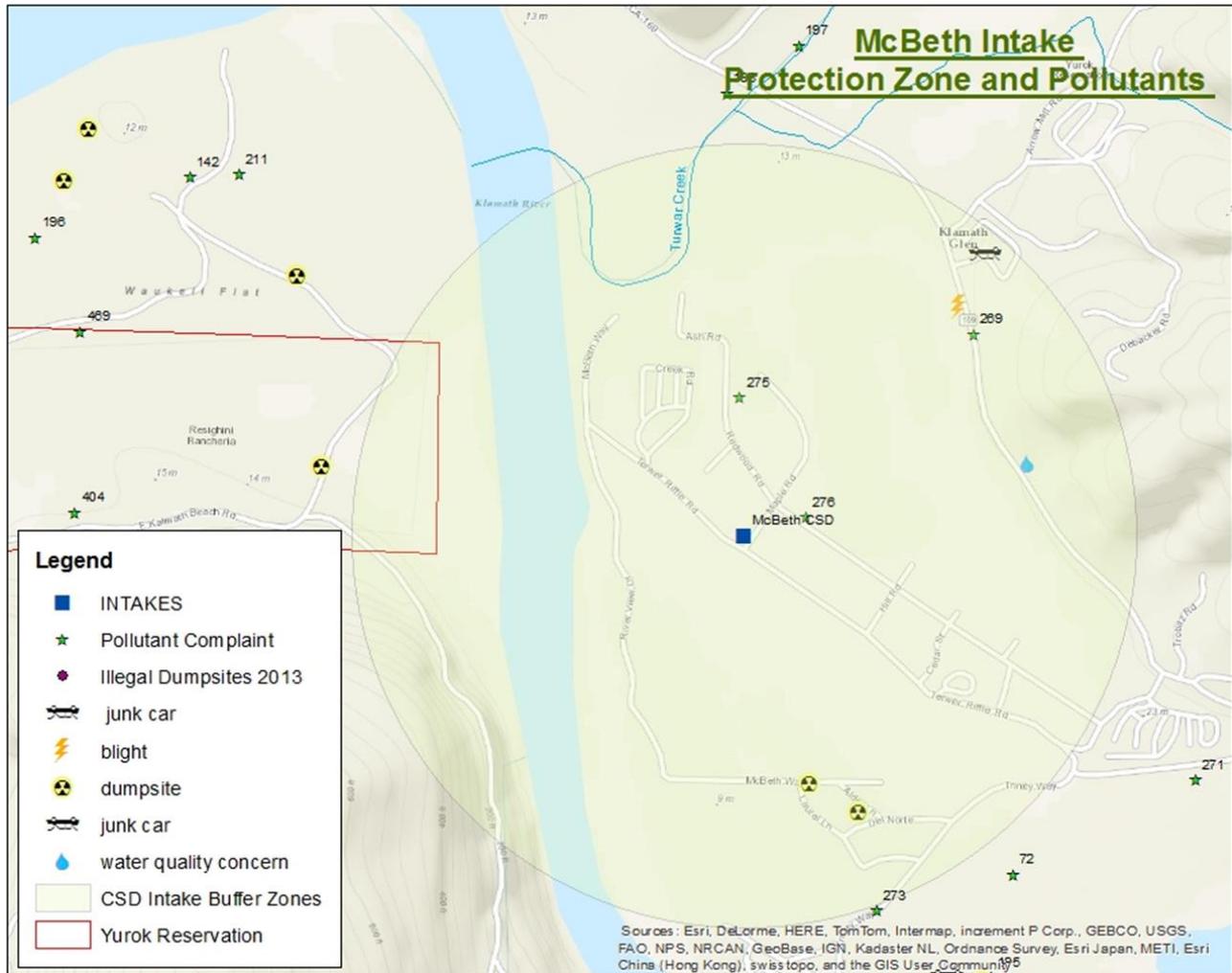


**Figure 2: Locations of the ‘in use’ intakes for the YIR CSD wells**

### Assessment

In FY 2013, GIS was utilized to spatially analyze potential sources of contamination on the YIR and their proximity to drinking water systems. An arbitrary circular protection zone extending approximately 2500 feet in radius from the well head was established based on source water assessment guidelines for groundwater systems. This protection zone serves as the basis for inventory and assessment data collected in this project. Also, maps with the watershed, streams, topography and the protection zone were created. These maps allowed us to identify the residences,

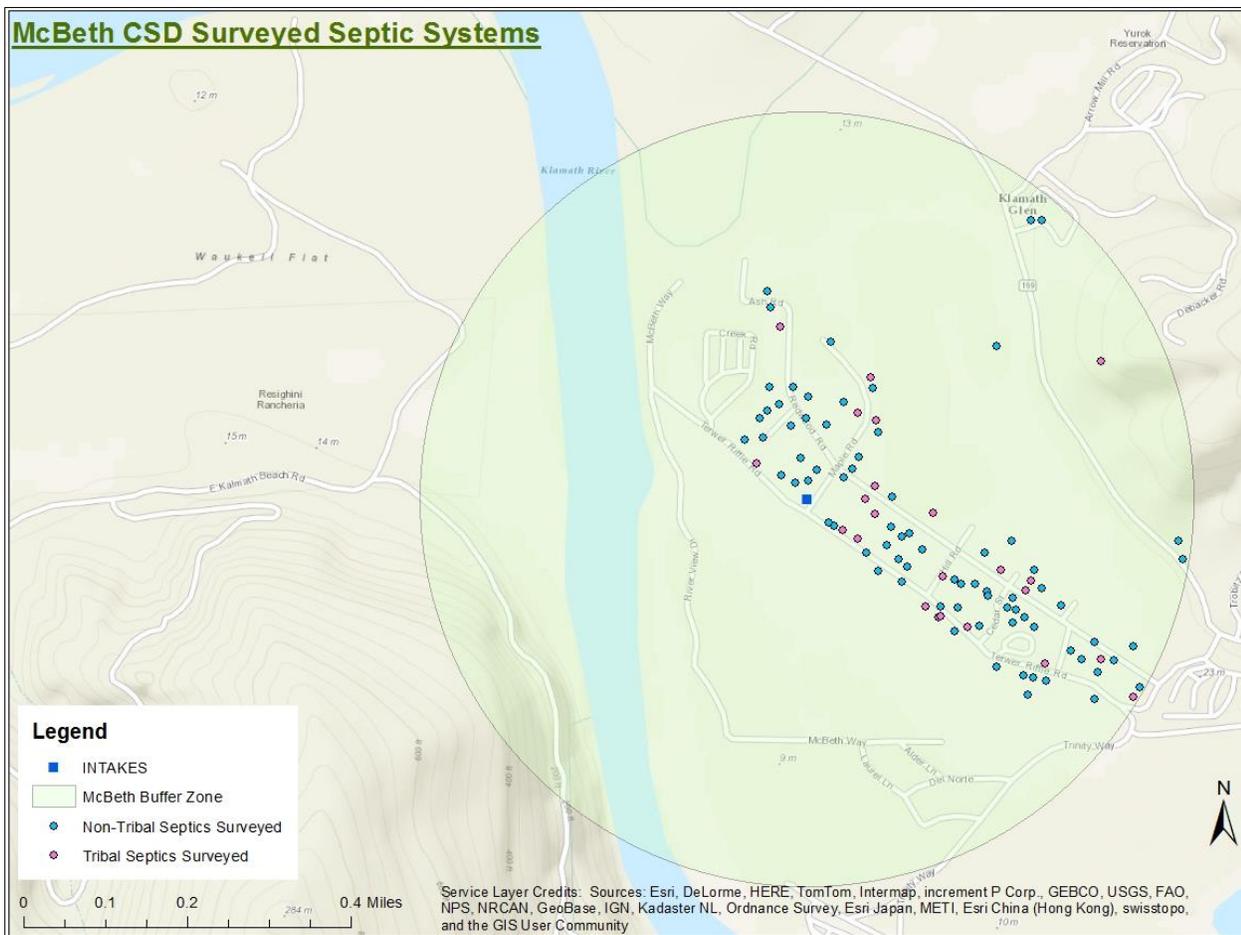
businesses, commercial areas, agricultural practices, potential Brownfield sites, hazardous waste and dumps that were located within the protection zone (Fig.3).



**Figure 3: Known Pollutants in McBeth Acres CSD**

Field work was conducted to inventory and assess septic systems within the established protection zone. Previous investigations under the SWAPP project identified septic systems as the main potential source of contamination. Due to the extensive layout of the reservation and remoteness of many individual sites, the downriver coastal communities were surveyed first (upriver sites will be surveyed at a later date). The Requa Community Service District and The Klamath Community Service District were inventoried and assessed in FY12. Potential contaminate sources within the protection zone were surveyed, documented and reported.

In FY13 McBeth Acers CSD, located in the downriver community of Klamath Glen, was completed. The Mcbeth Acres CSD is by far the largest populated CSD with 160 connections. This is well over twice the amount of connections than all other CSD's on the YIR. Because of the high number of connections, out of the 160 septics a goal of 75 was set to be inventoried. The Yurok Land Management (YLM) assessed 23 Yurok Tribal septic systems in 2012, these septics were included in the analysis. Building off YLM's inventory, YTEP was able to assess a total of 76 septic systems in FY13. In total 99 septic systems were assessed and are included in this susceptibility analysis. These septic systems include both tribal and non-tribal residences (Figure 4).



**Figure 4: Septic Systems that were assessed and inventoried**

Data collection methods were altered slightly from previous inventory that was collected due to improving efficiency and what was deemed necessary for a complete assessment. For the McBeth CSD septic system assessments a handheld Trimble XH Geographic Positioning System (GPS) unit was utilized to collect detailed information. A data dictionary was created which

included a field labeled Septic System Point. Within this attribute were several sub-fields which further identified the conditions present. These points were then uploaded into ArcGIS and used to generate maps which can aid in visualizing and analyzing potential threats to source water.

Parameters listed under the data field *Septic System Point* include: *Address, Name of Resident, Water System Name, Community Water, Type, Condition of Tank, Buffer Area, Smells, Clean-Out Cap, Access Cover, Location of Tank, and Comments*. These parameters were then divided into more specific subfields which will be discussed in the Rankings section.



**Image 1: Example of a clean out cap for an assessed septic system designated ‘in place’**



**Image 2: Example of a septic system that was too overgrown to assess.**

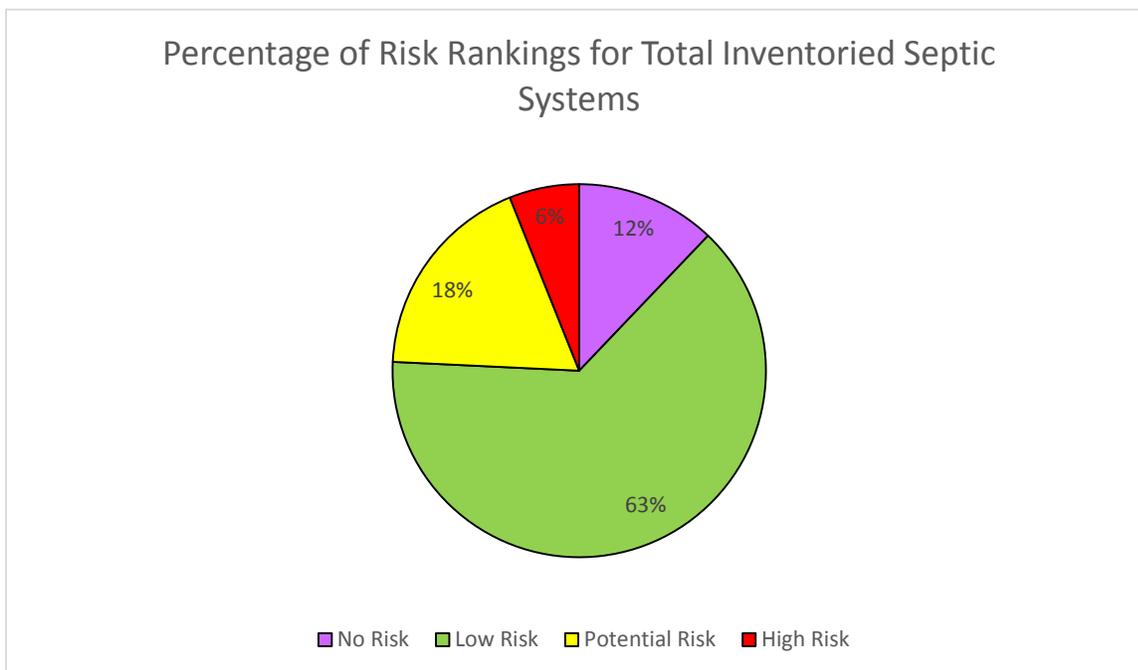
## Rankings

After the assessment for McBeth Acres CSD was completed, all the data was uploaded into ArcGIS to be reviewed and analyzed. YTEP developed a ranking system which correlated overall septic system condition with a numeric value. The GIS attribute table for septic systems was exported into excel in order to assign each septic system a ranking. This ranking was used to determine the level of risk each surveyed septic system posed to the drinking water well. All attributes were examined and certain subfields were assigned a score (Table 2), which were then added up to give a final rank; lowest ranks reflecting low risk; higher ranks reflecting high risk. The data collected and assessed by YLM was from a separate study, therefore these septic systems were ranked based off the system YTEP used for their assessed septic systems.

Attribute	Subfield	Rank
<b>Condition</b>	Satisfactory	0
	Unknown	1
	Poor	2
	N/A	3
	Unusable	4
<b>Buffer Area</b>		
<b>Buffer Area</b>	Clean	0
	Overgrown	1
	Dumping	2
<b>Clean Out</b>		
<b>Clean Out</b>	In Place	0
	Missing	1
	Unknown	2
	N/A	3
<b>Access Cover</b>		
<b>Access Cover</b>	In Place	0
	Missing	1
	Unknown	2
	Broken	3
	N/A	4
<b>Professional Opinion</b>		
<b>Professional Opinion</b>	Satisfactory	0
	Possible Concern	1
	Possible Hazard	2
	Probable Hazard	3
	Eminent Hazard	4

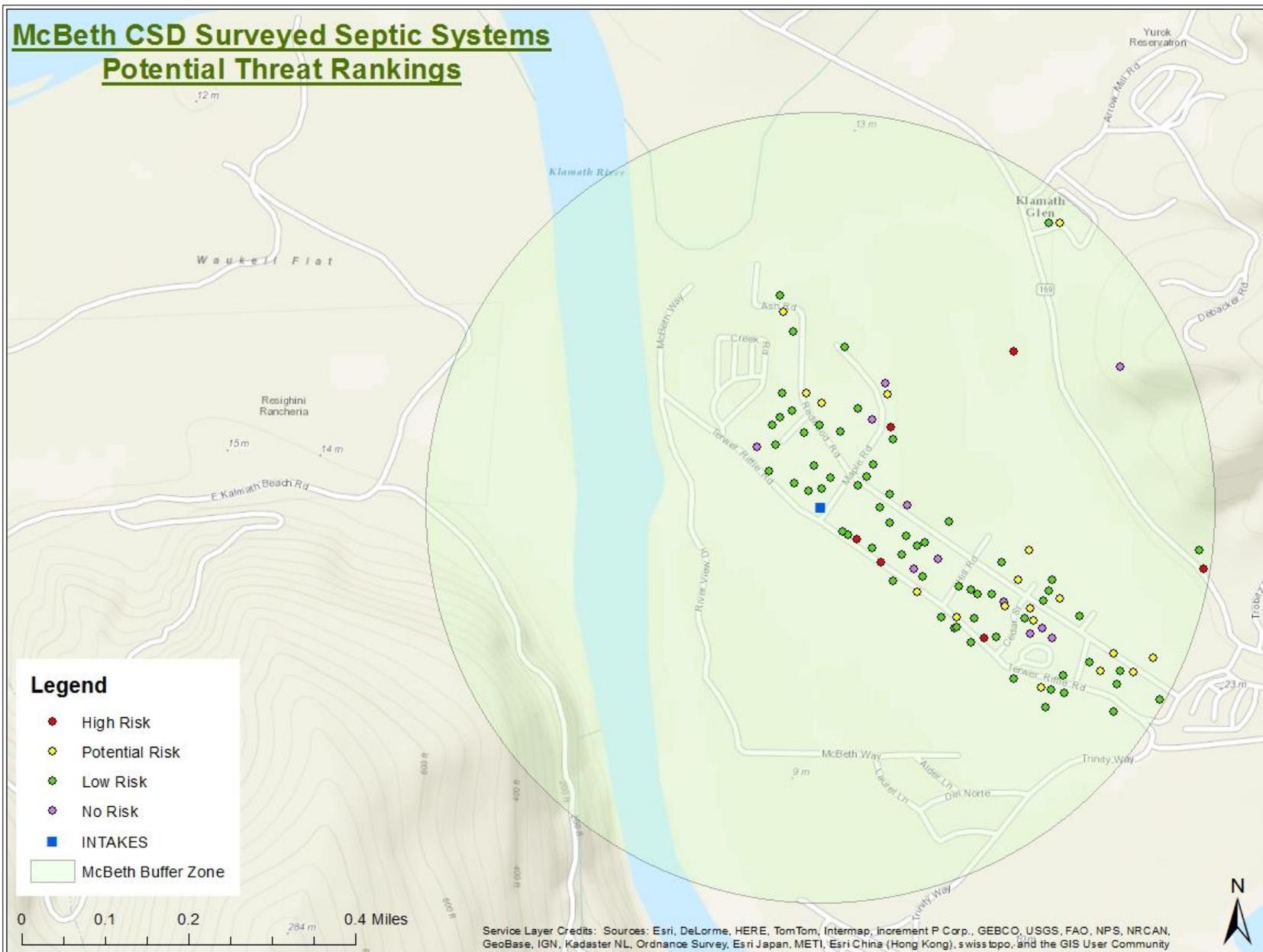
**Table 2: Scores given to designated sub-fields**

To improve visualization, the rankings for each septic system were uploaded into ArcGIS and assigned a color category based on risk levels. Risk categories included no risk (purple), low risk (green), potential risk (yellow), and high risk (red). 12 out of 99 residences (12%) scored zero, posing no risk of contamination to the CSD well. 63 out of 99 residences (63%) scored between 1 and 6, posing little to no risk of contamination. 18 out of 99 residences (18%) scored between 7 and 12, posing a potential risk of contamination. Six out of 99 residences (6%) scored between 13 and 18, posing a high risk of contamination (Graph 1, Figure 5).



**Graph 1: Percentage of ranking scores based on septic systems assessed.**

Based off the assessment rankings, only 6% of septic systems assessed are considered 'high risk'; the farthest high risk septic systems are more than 1500 feet from the well and the closest being just over 300 feet from the well (Figure 5). The two high risk septic systems that are the closest to the well likely pose a much higher threat than the other four, considering their close proximity (Figure 5). It is recommended that the 18 residences that pose a potential threat be monitored until appropriate mitigation can be achieved. The majority of the residences surveyed, pose little to no risk of contamination, and therefore are not seen as a threat to the CSD well.



**Figure 5. Rankings given to septic systems based on their assessment score and potential risk of contamination**

**Soil Profile**

Soil is an important factor to consider when discussing possible contaminants of concern within a groundwater/well public water system. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils. Within the McBeth Acres CSD we can find this type of soil profile according to what (EDR 2010):

Soil Component Name: BIGRIVER

Soil Surface Texture: sandy loam

Hydrologic Group: Class B- Moderate infiltration rates. Deep and moderately deep, moderately well and well drained soils with moderately coarse textures.

Soil Drainage Class: Well Drained. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydrologic Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential-Uncoated Steel: MODERATE

Depth to Bedrock Min: > 60 inches

Depth to Bedrock Max: > 60 inches

Soil Layer Information							
Layer	Boundary		Soil Texture Class	Classification		Permeability Rate (in/hr)	Soil Reaction (pH)
	Upper	Lower		AASHTO Group	Unified Soil		
1	0 inches	6 inches	sandy loam	Granular materials (35 pct. Or less passing No. 200), Silty, or Clayey Gravel and Sand	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand	Max: 6.00 Min: 2.00	Max: 6.50 Min:5.60
2	6 inches	63 inches	stratified	Granular materials (35 pct. Or less passing No. 200), Silty, or Clayey Gravel and Sand	COARSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand	Max: 6.00 Min: 2.00	Max: 6.50 Min:5.60

Taking this information into consideration, should there be a failing septic that were to overflow sewage within the buffer zone, there is a good chance of the CSD well being at risk of contamination because of the sandy nature and permeability rate of the soil. Another factor to be considered in this situation is the proximity of the contamination to the well.

### **Conclusions**

The McBeth CSD well is located in the former flood plain of the Klamath River, and is now protected by a levee. Its geographic position within the landscape is highly susceptible to fluctuating water table levels primarily controlled by water levels of the Klamath River, but also is influenced by local rainfall. The CSD experiences a range of groundwater levels due to potential flooding from the Klamath River in the winter and low water table levels in summer drought. Effects from nearby septic systems are dynamic and as they interact with seasonal groundwater levels. The sandy loam soil dominating the flood plain significantly increases the risk of contamination from failing septic systems nearby.

This study utilized a representative sample (62%) of all residences within McBeth Acres CSD protection zone to characterize the potential threats to the McBeth Acres CSD. There is a chance that of the 61 septic systems not assessed some are high risk systems. Overall, YTEP considers the project a success and the data collected very useful. Although the number of high risk septic systems encountered in this study were relatively low, the detrimental effect of only a few failing septic systems may have on the McBeth Acres CSD remains unclear. One important piece of information to consider is that a former well in the area was previously abandoned due to the presence of fecal coliform. Results from this study may indicate that the well closure was not likely due to an overabundance of failing or aged septic systems. However, several poor condition septic systems were encountered and their possibility as being a contributing factor should be noted. In any case, this study did show the “in use” McBeth Acres CSD as being vulnerable due to the presence of high risk septic systems encountered in the representative sample.

This study helped reveal data gaps that were beyond the scope of this project, but will be useful in establishing future research investigations. Quantifying contamination permeability in the soil, the distance traveled by contamination, and how fluctuating water levels influence each of these will lead to a better understanding of the potential threats to the McBeth Acres CSD, more

importantly it may provide insight into how much a single failing septic system can impact drinking water for an entire community. This understanding can lead to better management planning and implementation for water system managers and community developers. As inventories of the remaining CSD's are completed, YTEP will begin to organize a contingency plan to ensure the safety of public drinking water within the YIR.

### **References**

Environmental Data Research (EDR). January 8<sup>th</sup>, 2010. Environmental LienSearch Report.  
Inquiry Number: 2687969.7