

2015 Bow River Brown Trout Redd Survey



(Photo: Marc Fossi, 2015)

Trout Unlimited Canada - Bow River Chapter

October 2016



ACKNOWLEDGEMENTS

Trout Unlimited Bow River Chapter would like to thank all of our volunteers for their time and effort during the volunteer driven data collection and reporting phase of the Bow River Brown Trout Redd Survey, particularly during the chilly mornings on the Bow. We'd also like to thank everyone who donated equipment, provided shuttles, or a warm vehicle at the start and end of each day. BRC would particularly like to thank Wallace La, of Trout Unlimited Canada, who provided us with endless amounts of patience and time in developing the redd mapping.

2015/2016 Project Committee Members: Alicia Morin, Brent Piche, Caitlin Gifford, Erin Humeny, Riley Swendseid, Teague Urquhart, Will Ratliffe, Sarah Aftergood



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1.0 Introduction

In November 2015, the Bow River Chapter (BRC) of Trout Unlimited Canada conducted its first annual Brown Trout Redd Survey of the Bow River. The project was initiated to acquire baseline and trend through time data, as well as to supplement data from similar surveys completed on the Elbow and Bow Rivers by other organizations including Calgary River Valleys.

2.0 Study Area

The Bow River originates in Banff National Park near the Wapta Icefields and flows in a general southeasterly direction until it reaches the South Saskatchewan River west of Medicine Hat, Alberta. A number of dams exist on the Bow River, and most notable to this survey is the Bearspaw Dam located in the northwest quadrant of the City of Calgary. For the purposes of this survey, the lower portions of the Bow River downstream of Bearspaw Dam, between Graves Bridge on Glenmore Trail and Policeman's Flats southeast of the Deerfoot Trail Bridge, were chosen for primarily logistical and ease of access reasons.

Known species present in the Bow River within the study area include Brown Trout (*Salmo trutta*), Rainbow Trout (*Oncorhynchus mykiss*), Mountain (*Prosopium williamsoni*) and Lake Whitefish (*Coregonus clupeaformis*), Northern Pike (*Esox lucius*) and Burbot (*Lota lota*) among many coarse and forage fish species (i.e., sucker and minnow species). Bull Trout (*Salvelinus confluentus*), a Threatened species under the Alberta Wildlife Act, and Westslope Cutthroat Trout (*Oncorhynchus clarkii lewisi*), a *Species at Risk Act* Listed species, were once found in the lower Bow River region but are now listed as being Extirpated (ASRD and the Alberta Conservation Association, 2006, 2009). Of the coarse and forage fish species, Spoonhead Sculpin (*Cottus ricei*) are found within the study area and are considered as "May Be at Risk" in Alberta, with data lacking to inform on status. Of the species documented, Brown and Rainbow Trout are non-native.

3.0 Methods

On November 7th and 8th of 2015 a group of three Crew Leads and up to five volunteers per crew surveyed 21.2 km of the Bow River, between Graves Bridge on Glenmore Trail to Policeman's Flats. Crew Leads were considered based on Fisheries and Redd Survey related experience. Volunteer experience ranged from Fisheries Biologists to local anglers and lay persons. Prior to the start of the survey, an overview was given of survey methods and Brown Trout redd identification, as well as safety considerations for the day. The group as a whole stopped several times and at several locations throughout the survey where redds were observed to confirm and educate volunteers on redd observations.

Survey methods included physical observations for redds either from three rafts, floating along river left, mid and right in tandem, or by foot with travel limited to on top of the banks. Communal versus individual redds were not differentiated during this survey, however estimates on redd numbers within communal areas were made. Ingress and egress locations were chosen based on ease of access and thus

determined the extent of the survey. Redds were counted and locations waypointed using Garmin 62s GPSs. All observations were given a redd class designation as per the following:

- Definite – pit and tail spill recognizable with clean substrate noted
- Probable – pit and tail spill recognizable with dirty substrate noted
- Possible – pit and tail not recognizable

In addition, at representative sites, habitat information was taken and included the redd length and width, as well as water depth, cover, substrate and habitat type. Photos were also taken for some observations.

3.1 Description of Reaches

Post-survey, the entire survey area was split into defined reaches for comparative purposes among the whole area surveyed as well as over time. These reaches were determined based on the ingress/egress locations and definable landmarks, as well as perceived overall habitat differences. The reaches are described below along with their approximate lengths. In addition, reach extents are depicted in Appendix A.

Reach 1 – 2.7 km; Graves Bridge on Glenmore Trail to the Eric Harvie Bridge in Sue Higgins Park. This section of the Bow River marked the start of the survey and contained numerous backwater areas and side channels, which are often associated with Brown Trout spawning habitat. In addition, the presence of suitable depths, velocities, and substrates, primarily located within side channels contributed to overall high quality spawning habitat within this reach.

Reach 2 – 3.6 km; Eric Harvie Bridge to Sue Higgins Pedestrian Bridge. This section of the Bow River is considered sinuous, with relatively uniform instream habitat. The reach was dominated by moderately deep run habitat, with few islands or side channels. Long stretches of bank have been recently armoured with riprap, decreasing the presence of overhanging vegetation cover and limiting the availability of suitable spawning conditions within proximity to the banks. Spawning suitability in this reach was considered moderate for Brown Trout, facilitated by small patches of highly suitable habitat located in the two short side channels and along non-armoured banks, limited by larger substrate particle size, armoured banks, and deeper run habitat.

Reach 3 – 4.5 km; Sue Higgins Pedestrian Bridge to the Bow River Pathway Bridge. This section of the Bow River consisted of one large meander bend with multiple side channels and a wider floodplain than observed elsewhere in the survey area. The Mallard Point side channel is located within this reach, which has been historically known to provide quality spawning habitat for Brown Trout. This reach was characterized as having a high suitability for Brown Trout spawning, attributed to the presence of adequate depths, velocities, and substrates, primarily located within the side channels.

Reach 4 – 2.8 km; Bow River Pathway Bridge to Stoney Trail (Hwy 22X). This section of the Bow River consisted of several, tighter meander bends, and is considered the end-point of survey day 1. No side channels are present within this reach. Velocities were generally higher in this short reach, with a long,

shallow riffle and high velocity deep run heading into the final bend and the egress location. A greater portion of the banks within this reach were stabilized with hard armouring, primarily associated with the higher velocity flows. This reach was characterized as having a moderate suitability for spawning, attributed mostly to a small amount of highly suitable spawning habitat along the margins of the first kilometer of the reach. Spawning was limited by mid channel depth greater than 0.6 m, predominance of cobble substrate, and long stretches of high velocity.

Reach 5 – 3.0 km; Stoney Trail (Hwy. 22X) to the Cranston Subdivision, prior to the side channel starting on river right (UTM 12 U 289537 5639968). This section of the Bow River is the start of survey day 2 and, similar to Reach 2, is considered sinuous and relatively uniform. This reach is dominated by moderately deep to deep run habitat with limited cover along stream margins and within the lone side channel. Reach 5 is characterized as having moderate suitability for spawning, attributed to a small amount of higher quality spawning habitat within the first 500 m of the reach. The short side channel present within this reach, downstream of the high left bank located near the Cranston Subdivision, is characterized by depths greater than 1 m, boulder substrates and moderate to high flows, offering limited suitable spawning habitat relative to other side channels in the study area.

Reach 6 – 2.6 km; Cranston Subdivision at UTM 12 U 289537 5639968 to Deerfoot Trail Bridge. This section of the Bow River contains braided channeling and side channels around Christmas Tree Island, resulting in a variety of short riffle to long run sections and associating velocities and substrates. Directly upstream of the Deerfoot Trail Bridge, the right bank has been extensively armoured for approximately 800 m at the Pine Creek Wastewater Treatment Facility. A large, shallow, gravel bed/deposit exists on river left, across from this bank armouring, and extends to below the Deerfoot Trail Bridge.

Reach 7 – 2.0 km; Deerfoot Trail Bridge to Policeman's Flats. This section of the Bow River contains several gravel bars and riffle sections as well as a few backwater areas among predominantly moderately deep run habitat over mostly cobble substrates. Spawning habitat was limited to short, narrow areas of suitable substrates directly adjacent to the exposed sections of gravel bars within the reach. Pine Creek flows into the Bow River on right bank approximately 1.25 km downstream of the Deerfoot Trail Bridge. The right bank directly upstream of Policeman's Flats was stabilized using angular riprap following the 2005 flood, but flood damage in 2013 resulted in riprap being washed downstream and the creation numerous snye-like features. The long side channel located on river left was not surveyed due to logistical constraints.

4.0 Results and Discussion

A total of 833 potential, probable and definite redds were observed within the 21.2 km study area. Of these, 716 were confirmed 'definite', while 56 and 61 were determined to be 'probable' or 'potential', respectively.

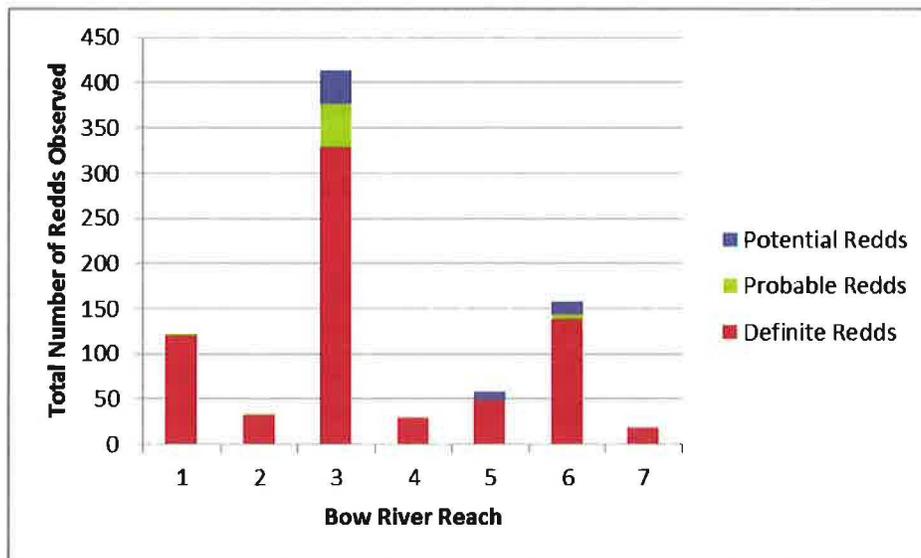


Figure 1: Redd observations during the 2015 Brown Trout Redd Survey of the Bow River, by reach.

Reach 3 contained the highest number of redds with 329 ‘definite’ redds observed. Optimal spawning habitat was noted within the Mallard Point (also known as Poplar Island) side channel on river right. Redds within this location were difficult to quantify due to expansive communal redd areas throughout. In addition, the mainstem also provided for excellent spawning habitat.

Reaches 1 and 6 contained moderate numbers of redds relative to the rest of survey, with 120 and 139 ‘definite’ redds observed respectively. Both reaches contained side and braided channels with riffle-pool and riffle-run sequences and largely gravel substrates. Of note in Reach 6, however, was the large number of ‘definite’ redds (40) observed along less than 100 m of shallow run habitat. This spawning area was directly adjacent to a grass-only covered gravel bar on river left of the mainstem, upstream from the Deerfoot Trail Bridge, downstream of Christmas Island and across from approximately 800 m of hard armoured, class 3 riprap bank stabilization. No suitable cover in any form existed along this spawning area, however, low to moderate velocities and depths in addition to mostly large and small gravels may have contributed to this location’s extensive use when compared to other specific locations of high redd densities.

Reaches 2, 4, 5 and 7 contained the lowest number of redds relative to the rest of the survey, with less than 50 ‘definite’ redds within each reach. These reaches were characterized as having moderate spawning potential throughout and limited by predominantly deeper run habitat, larger substrate components and limited cover.

A commonality observed throughout the survey was that redds were typically found within shallow runs or riffles between 0.3 and 0.5 meters deep containing low to moderately embedded gravel substrates. However in some areas, depths were as low as 0.2 meters and as high as 0.7 meters. Lack of direct cover via undercut banks or overhanging vegetation and woody debris did not appear to deter Brown

Trout from spawning if suitable substrates, velocities and depths were present. In some instances cover could be found within 2.0 meters of redds while in other areas, cover was over 5.0 meters away to entirely absent to adjacent redds. While velocities were not directly measured during the survey, given time of year and the prevalent drought conditions in the summer of 2015, velocities were considered low to moderate overall, with moderate flows typically observed over redds, although in some instances, relatively low velocities were observed.

The highest density of redds by area were observed mostly within side and braided channels containing the conditions described above. Presumably this is due to greater variability in riffle-run sequences, subsequent velocities and depths as well as more cover options within these typically smaller channels. However, mainstem areas were also utilized to a degree, with focus seemingly around bridges and bank margins where suitable substrate, velocities and depths existed. These areas were presumably utilized as they provide adult fish with cover and refuge, potentially from predators during spawning.

5.0 Multi-year Comparison

In 1999, EnviroConsult Inc (2002) conducted Brown Trout redd surveys of the Bow River. Survey methods differed from those used in 2015 by the BRC and were considered more rigorous. The biggest difference was that communal redds were recorded separately and considered to have “more than one spawning pair per redd” within the single area. In addition, multiple surveys of the reaches were completed over the course of a month to determine spawning onset and peak counts, as well as marking confirmed redds and recording specific redd measurements and habitat details. Known or potential spawning was also outlined prior to the survey and focused on with a single jet boat containing three crew members moving upstream to complete observations. Due to the differences in survey methodologies, direct comparisons cannot be made between the 2015 BRC survey and the 1999 EnviroConsult Inc survey, however some inferences and interpretations can still be considered. For the purposes of this comparison, only ‘definite’ redds were compared in 2015 with the minimum number of possible redds from 1999 which constituted 1 redd for individual counts and 2 for communal counts.

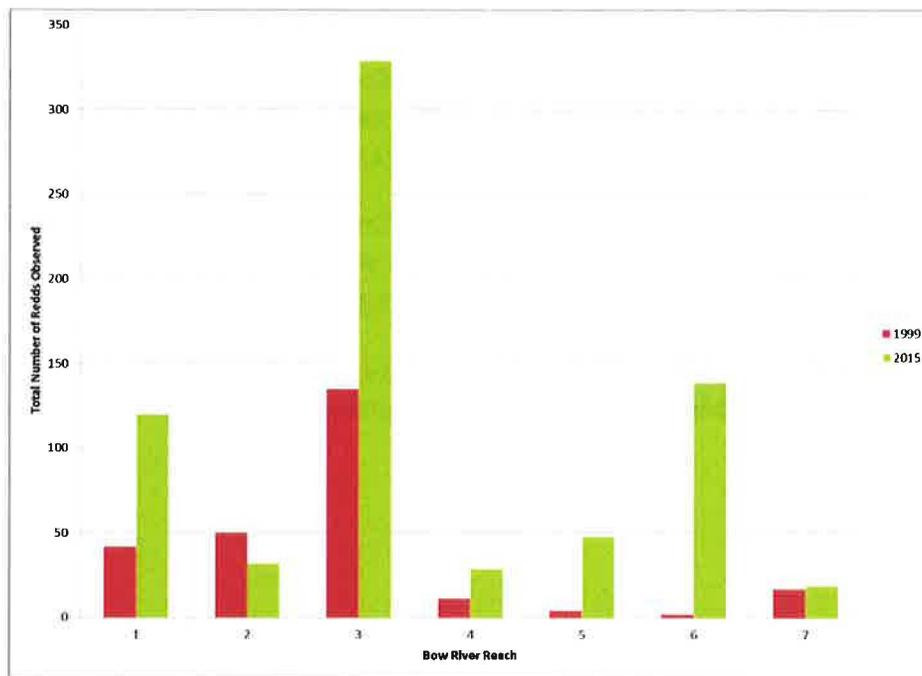


Figure 2: Comparison of ‘definite’ redd observations as per the 2015 BRC Brown Trout Redd Survey with the minimum number of redds observed during the 1999 survey conducted by EnvironConsult Inc.

Of note, all reaches have increased in the number of redds observed, with the exception of Reach 2. Habitat in this reach in 1999 was mostly deep run with redds limited to nearshore gravel bars. Similar conditions existed in 2015 with the reach considered to be sinuous with uniform habitat throughout. It is therefore unlikely that the differences seen between the surveys are significant.

The largest increases in redd numbers were observed in 2015 in Reach 3, as well as more notably in Reach 6. In 1999, redds in Reach 3 were observed scattered in small congregations in both the mainstem and side channel. However, in 2015 the overall numbers increased with some expansion observed in the mainstem but more notably redds found throughout the entirety of the side channel, as opposed to select locations. In Reach 6, numerous redds were observed throughout with a high concentration upstream of the Deerfoot Trail Bridge in 2015 while few redds were found at a single location in 1999.

Since 1999, the Bow River has seen two significant flood events in 2005 and more recently in 2013 which could account for re-distribution of gravels throughout the reaches assessed. In addition, areas around Poplar Island in Reach 3 have included fish habitat enhancements including bank stabilization efforts utilizing bioengineering (i.e., wattle fencing).

Overall, it appears that redd counts on the Bow River within the City of Calgary have increased from previous surveys, indicating either more suitable habitat within the study area, a larger population of spawning Brown Trout, potential issues around survey design and design differences, and/or a combination of the above mentioned factors. Subsequent annual surveys are planned by the BRC to continue to collect trend through time data of Brown Trout use of spawning areas in the Bow River within the City of Calgary.

6.0 Works Cited

Alberta Sustainable Resource Development and the Alberta Conservation Association. 2006. Status of Westslope Cutthroat Trout (*Oncorhynchus clarkia lewisii*) in Alberta: Alberta Sustainable Resource Development. Wildlife Status Report No. 61. Edmonton, AB. 47 pp.

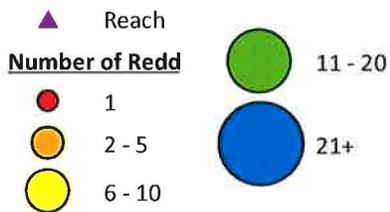
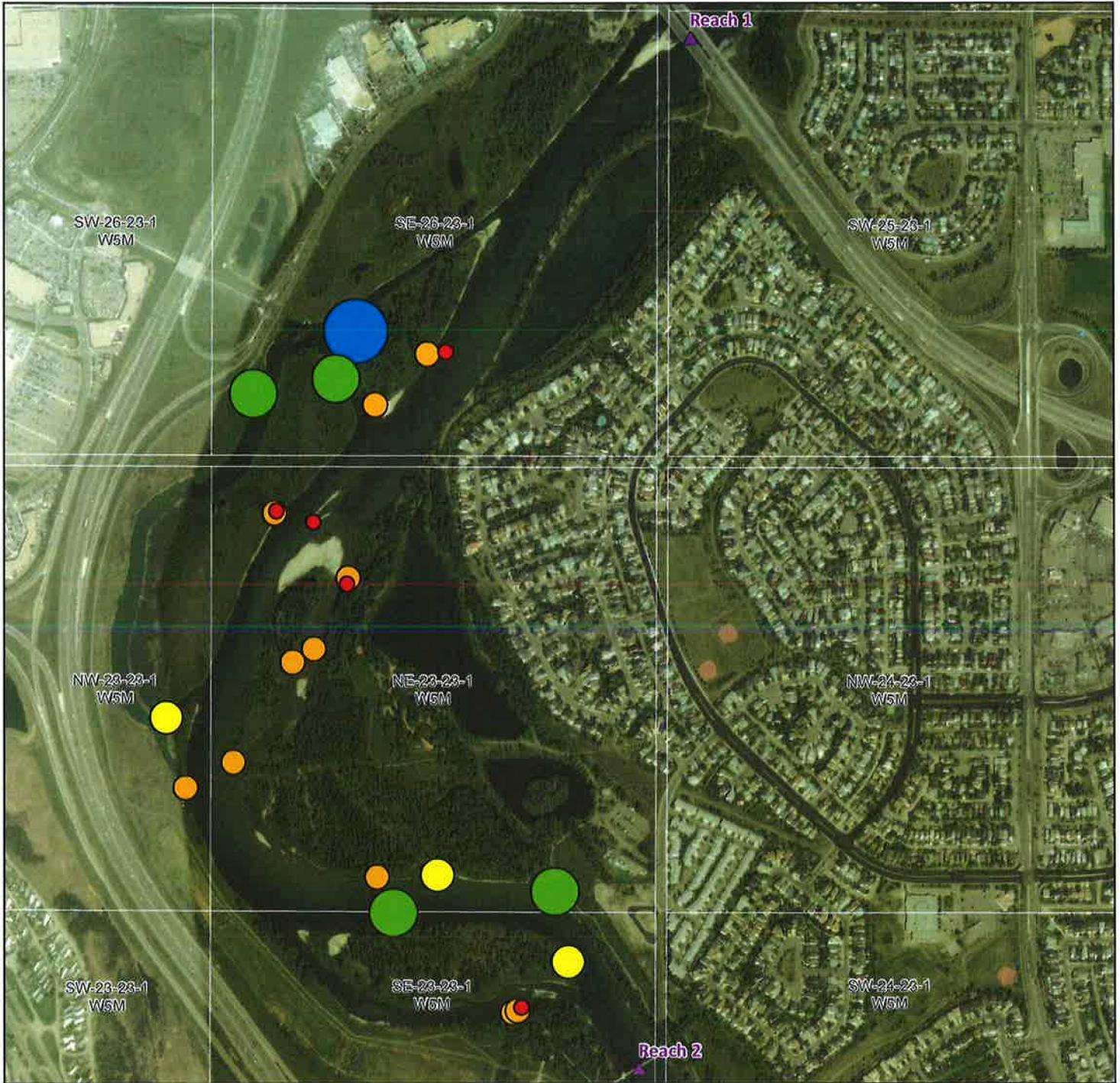
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APPENDIX A: Brown Trout Redd Locations by Reach



(Photo: Marc Fossi, 2015)



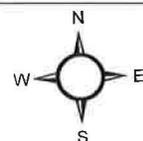
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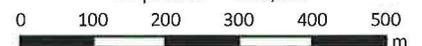
Reach 1

Bow River, Calgary, Alberta

Bow River Chapter



Map Scale: 1:10,000

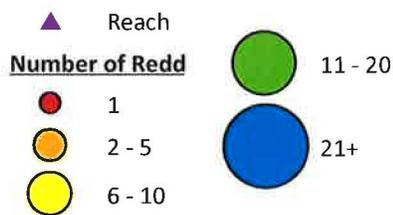
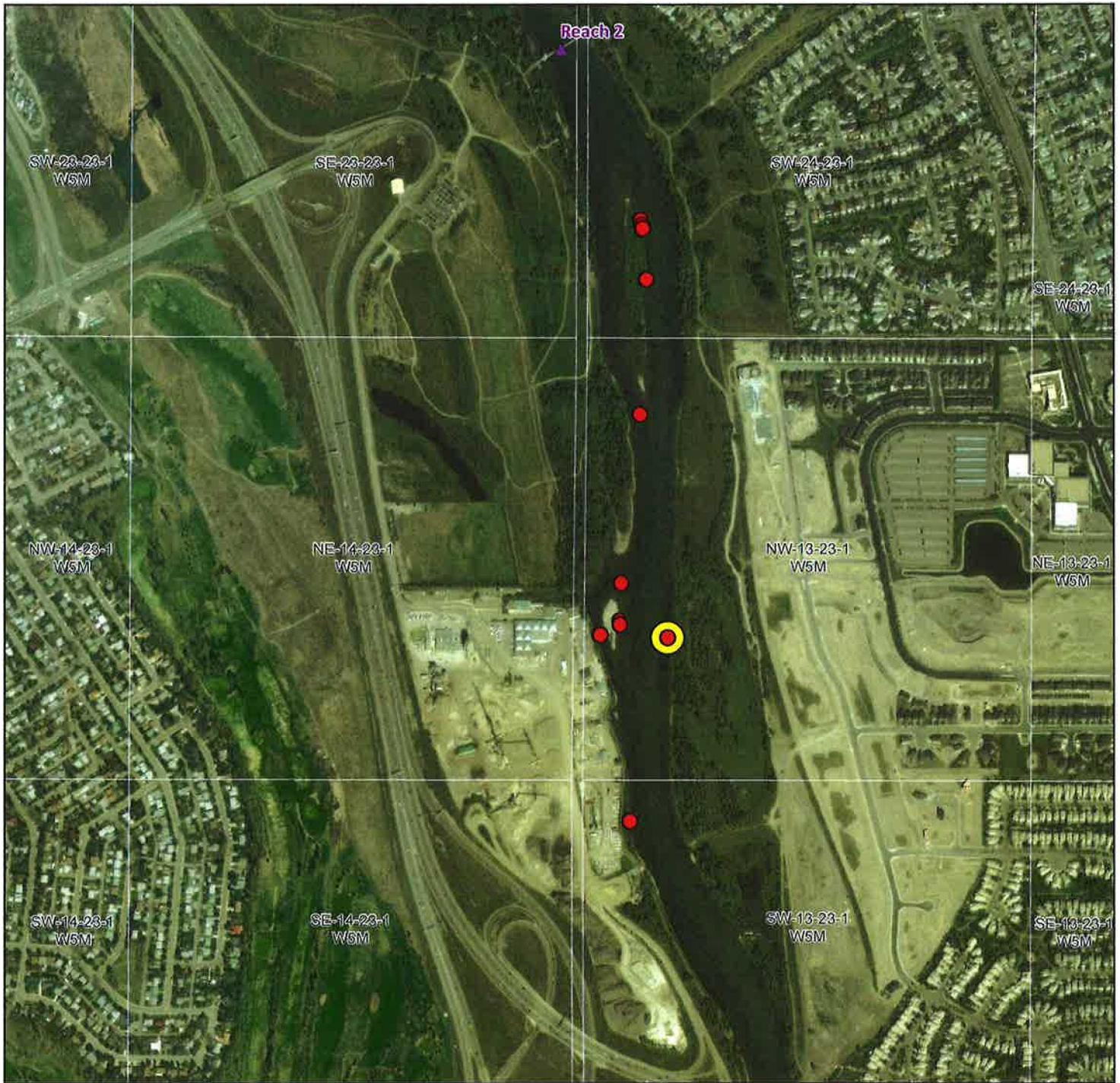


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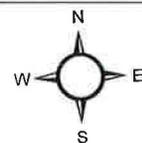
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Reach 2

Bow River, Calgary, Alberta

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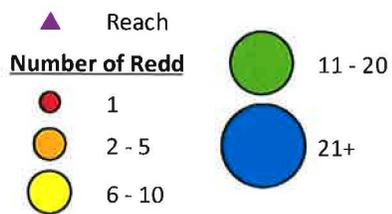
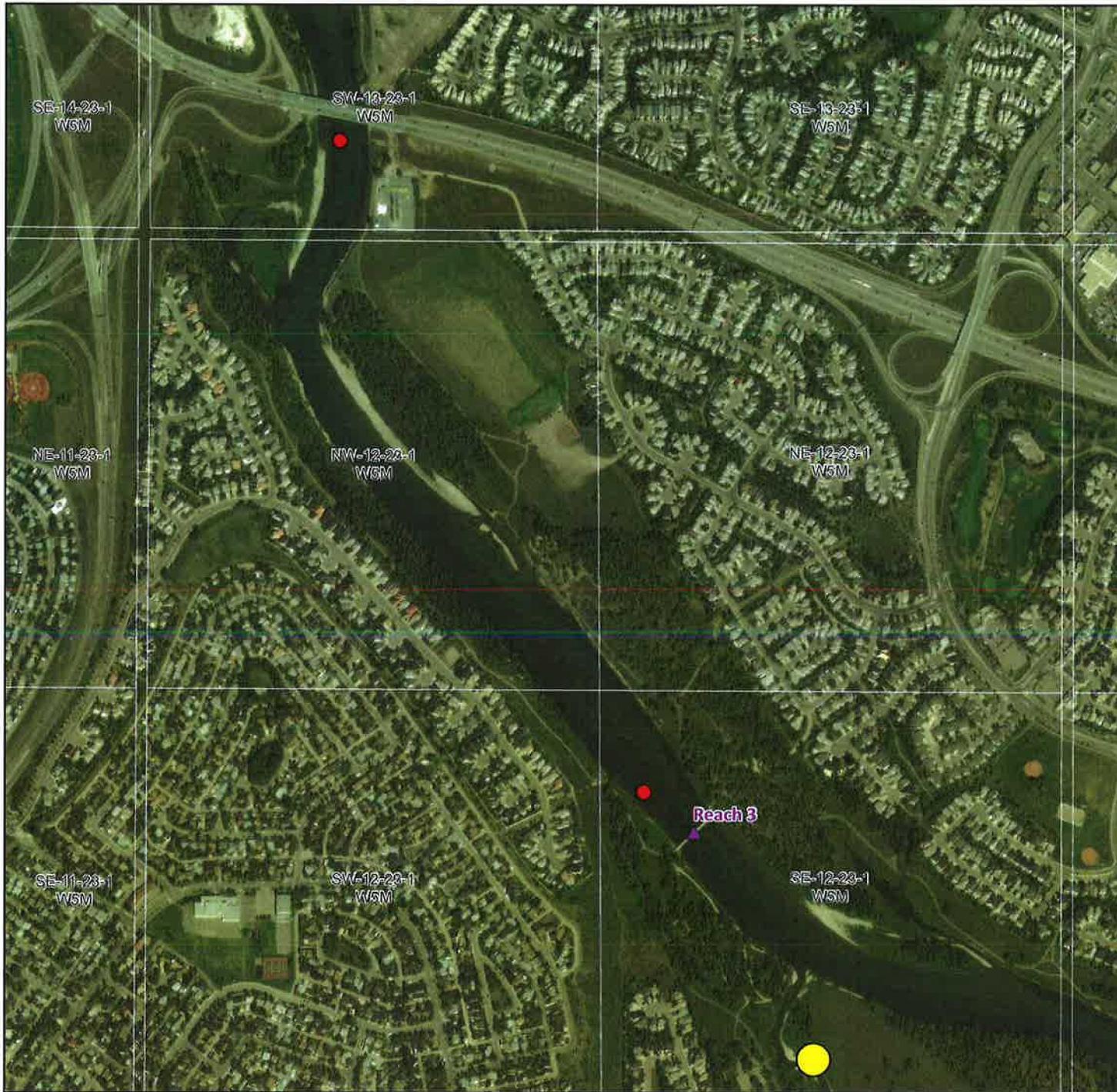


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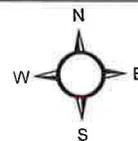
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Reach 2/3

Bow River, Calgary, Alberta

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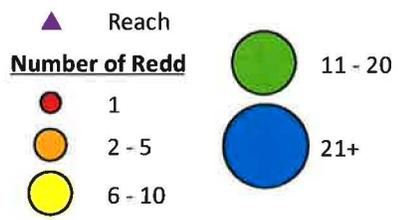
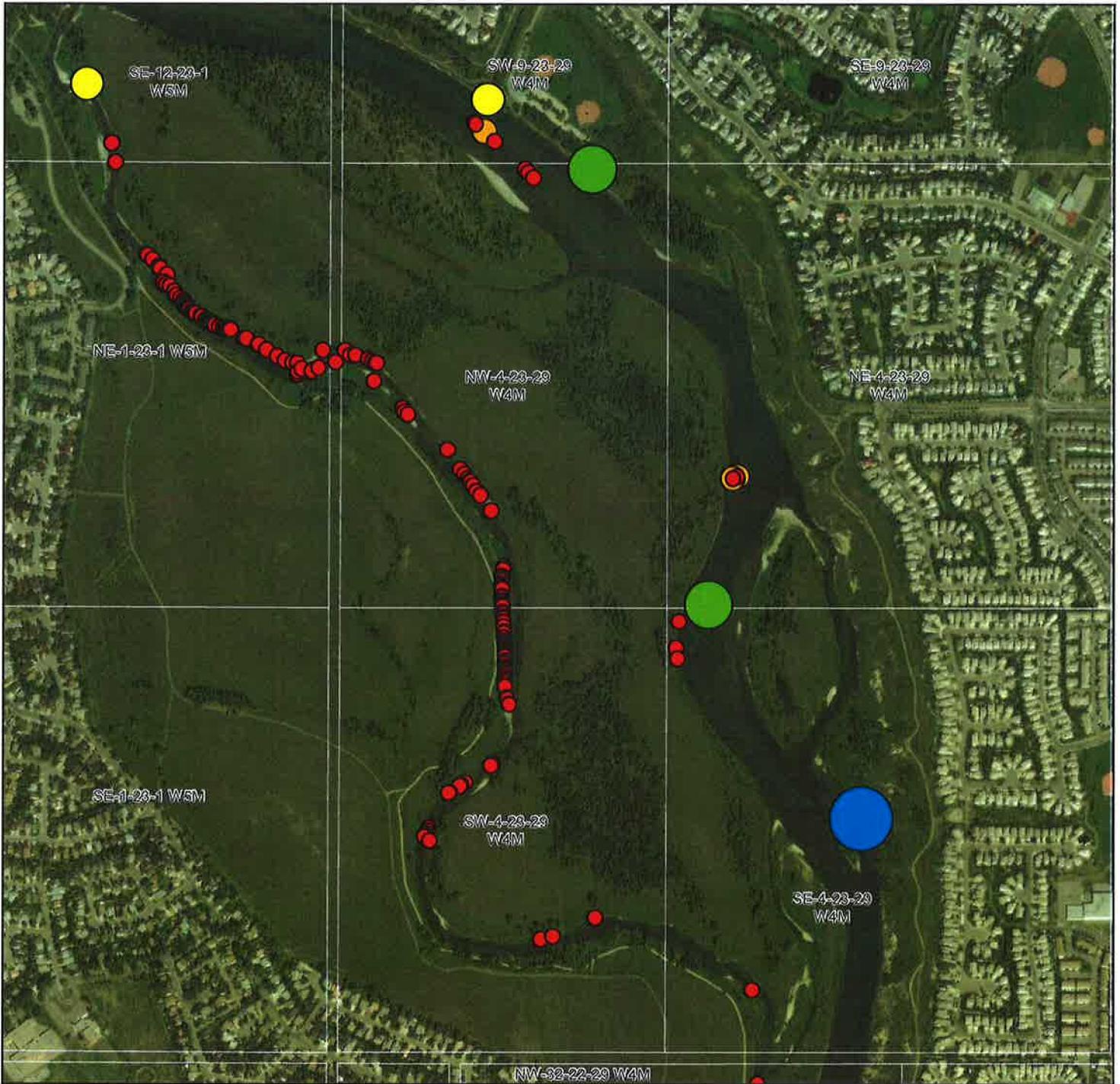


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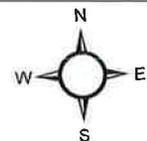


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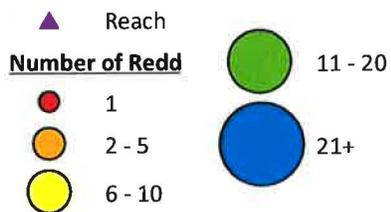
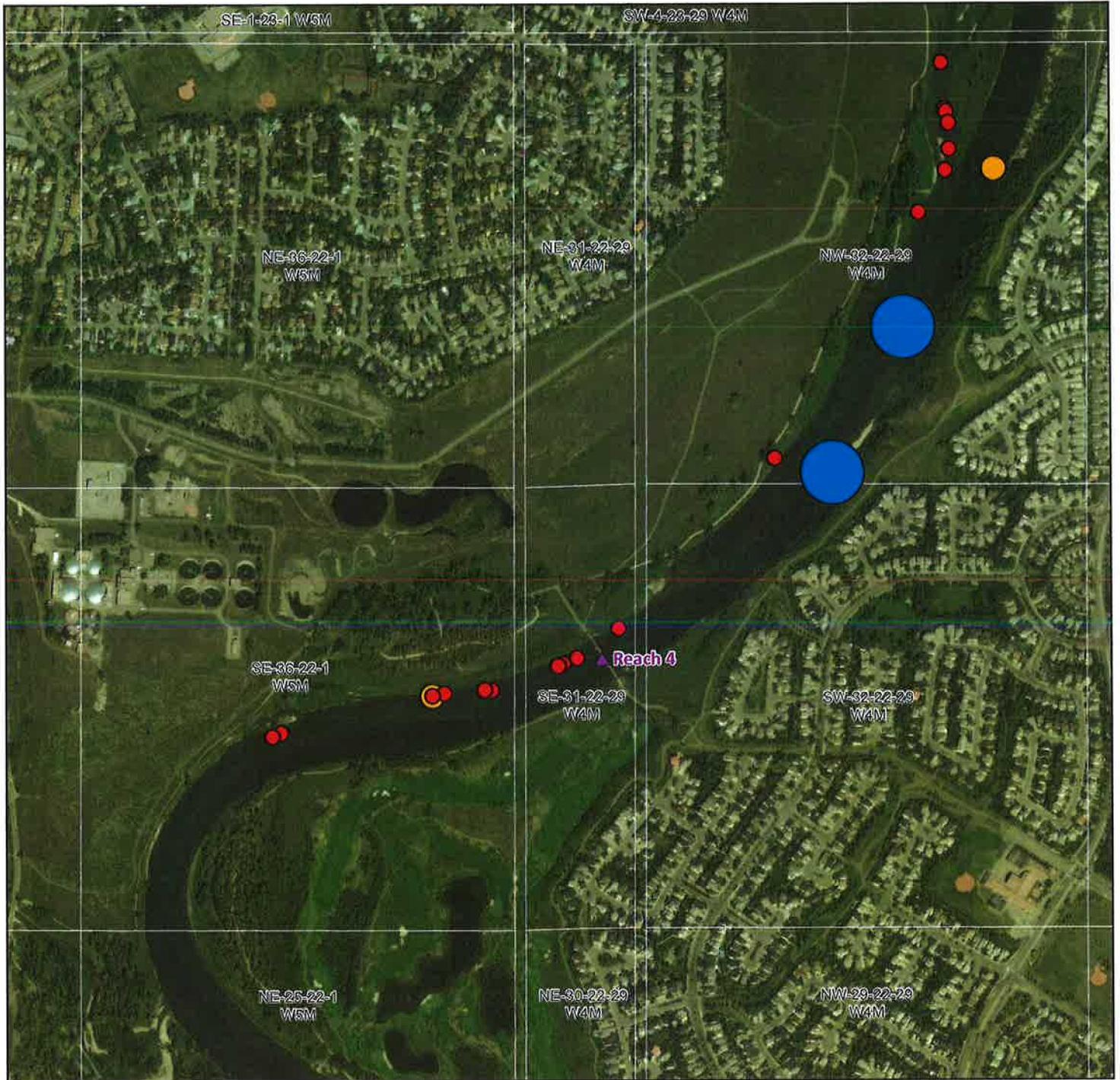


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Reach 3
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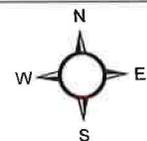
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Reach 3/4

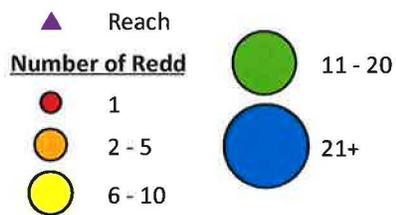
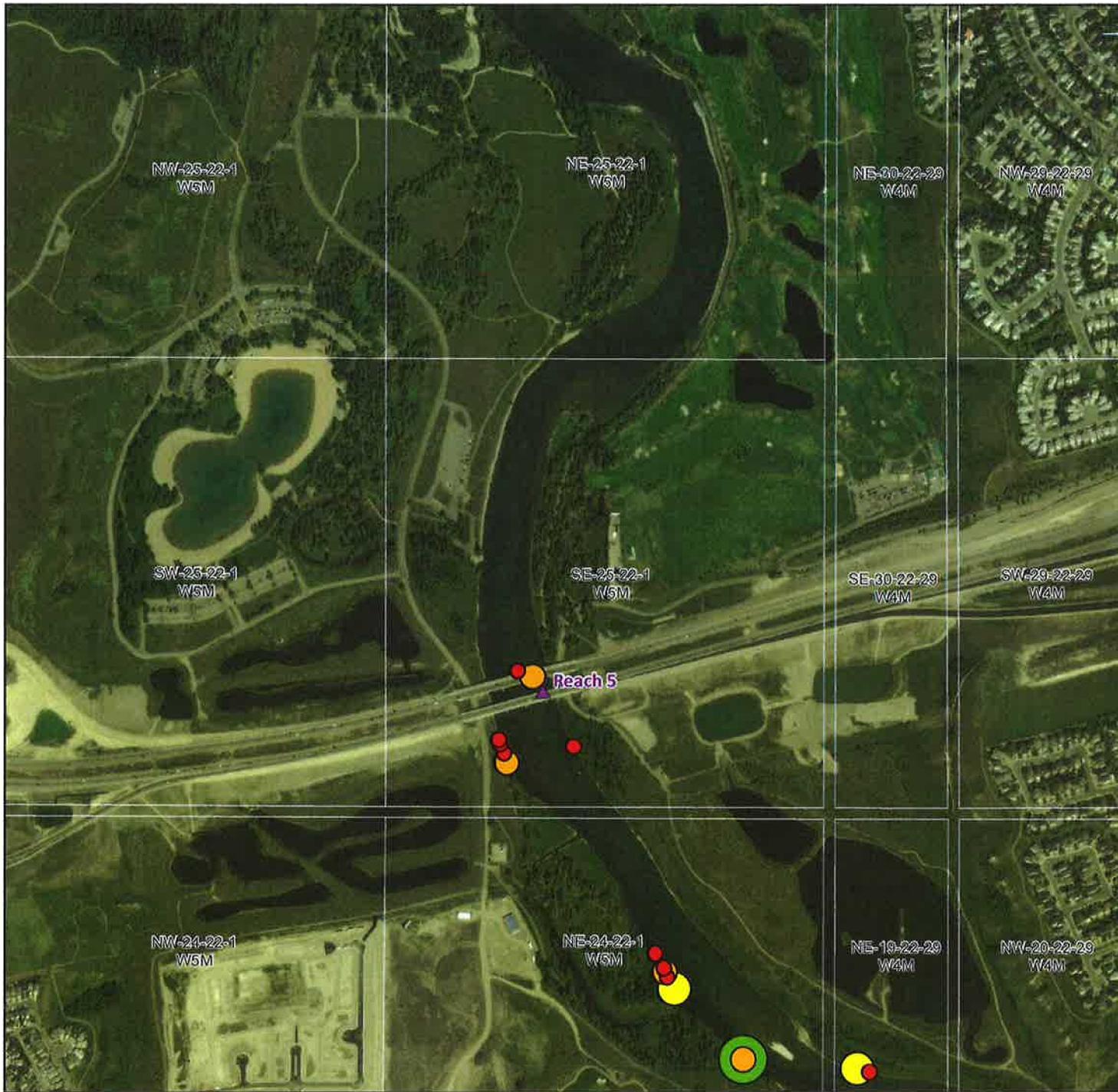
Bow River, Calgary, Alberta

Bow River Chapter



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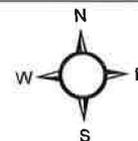
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Reach 4/5

Bow River, Calgary, Alberta

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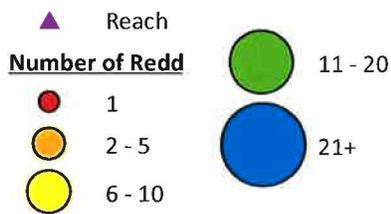
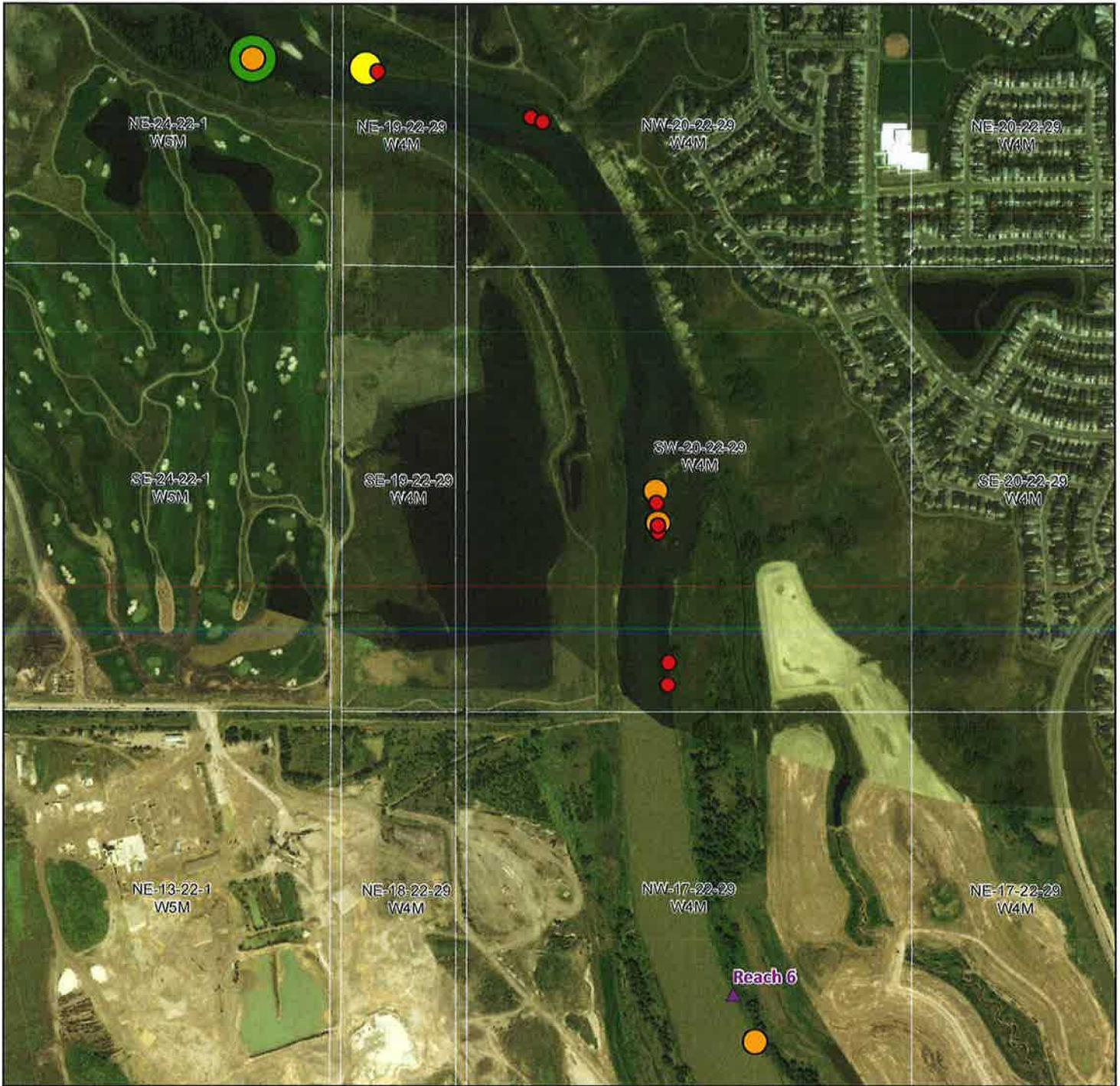
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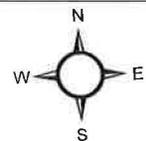
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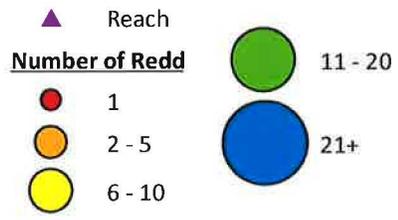
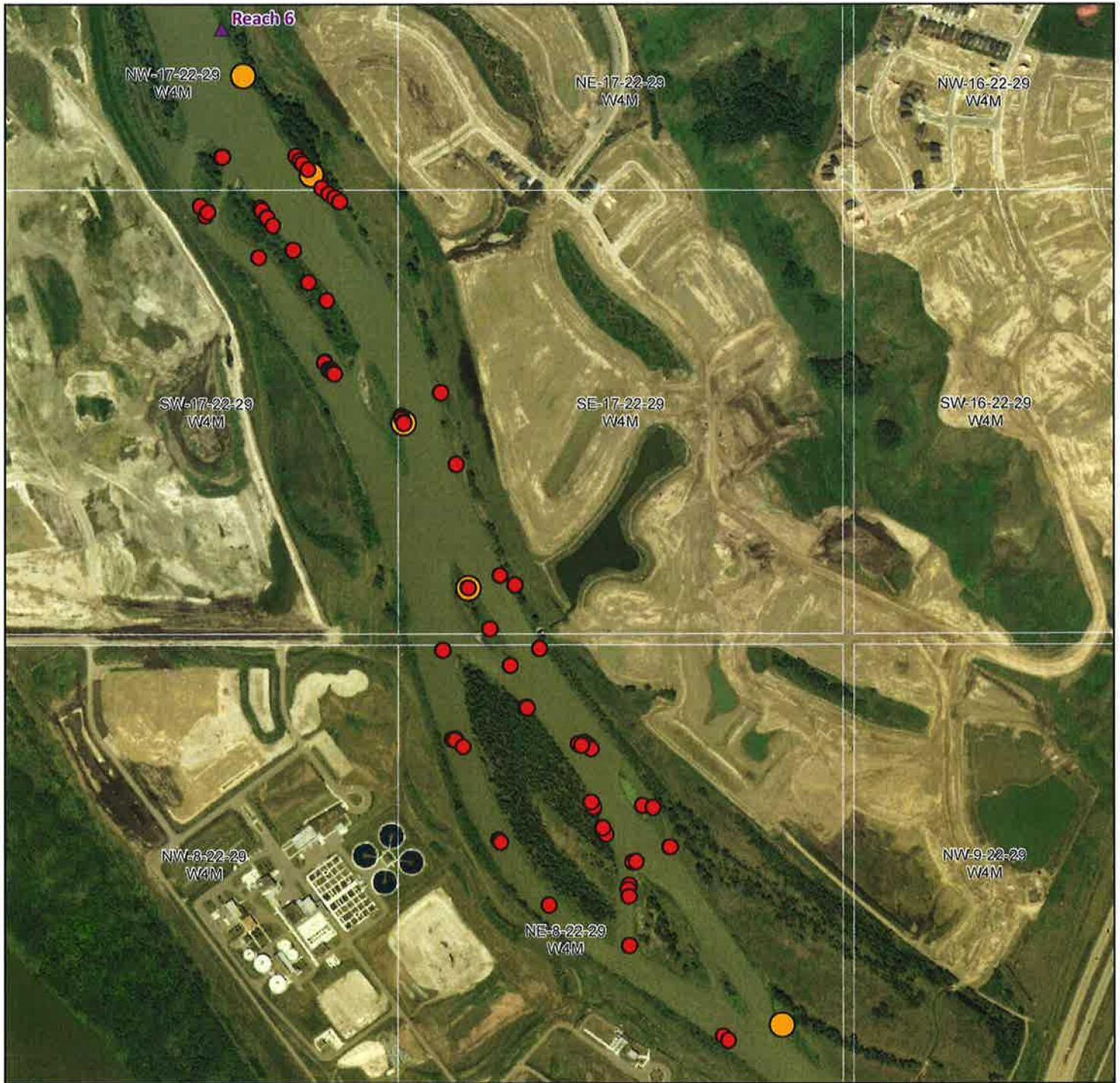


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Reach 5
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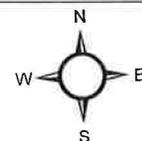
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Reach 6

Bow River, Calgary, Alberta

Bow River Chapter



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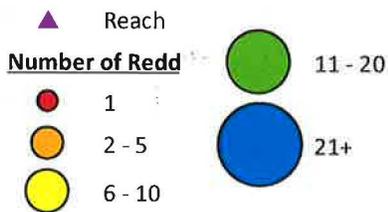
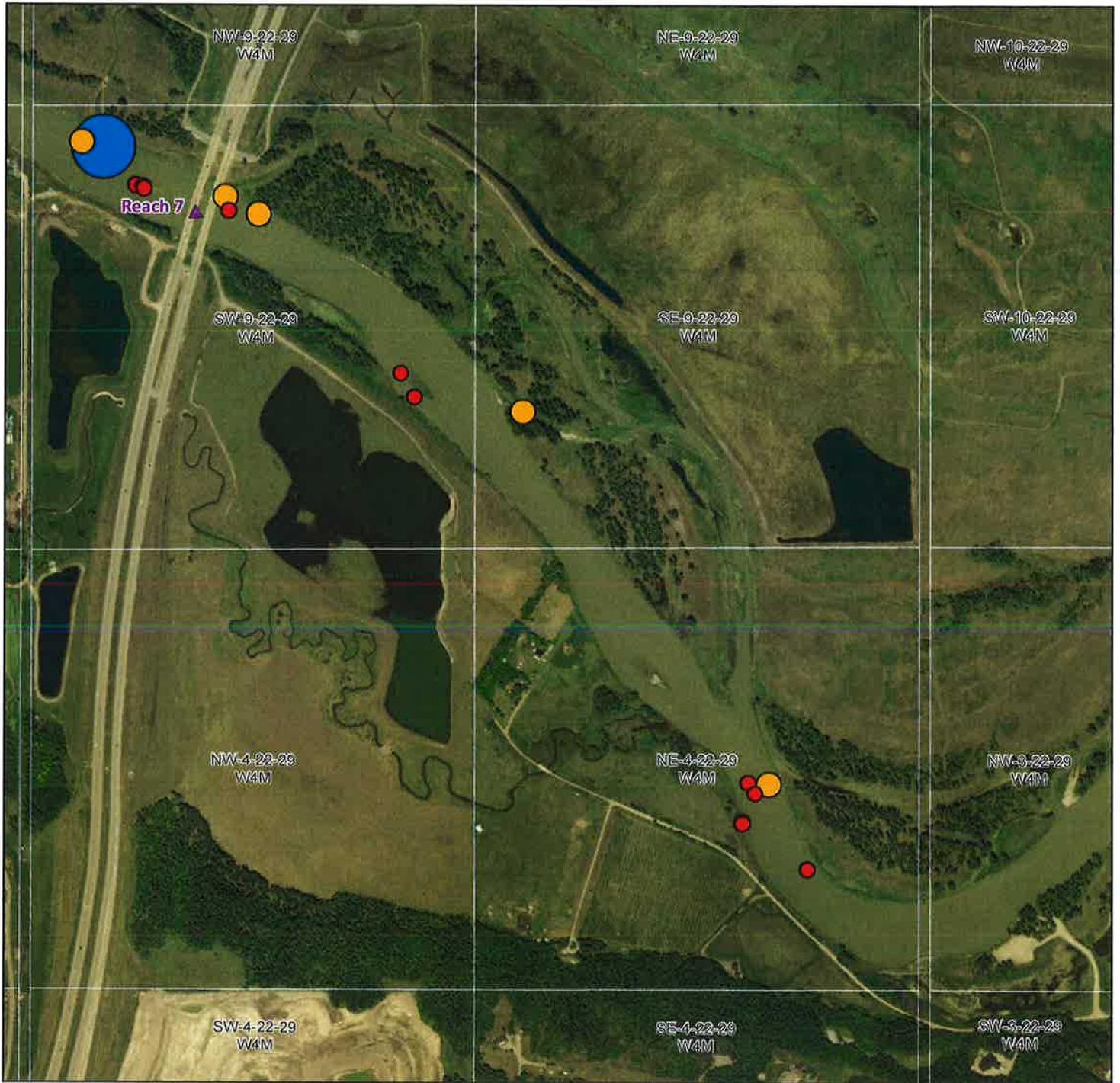


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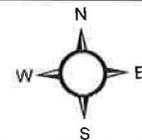
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Reach 7

Bow River, Calgary, Alberta

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