Amphibian Inventory for Kootenay and Yoho National Parks, British Columbia, Canada. 2004.

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Table of Contents

Introduction

The 2004 Amphibian inventory for Yoho and Kootenay National Parks (YNP and KNP respectively) was conducted with a focus on determining Boreal Toad (*Bufo boreas*, BOTO) presence in the wetlands surveyed during the inventory. This focus was due, in large part, to the national listing of the BOTO as a species of Special Concern under the Species at Risk Act (SARA) in 2002 (Wind and Dupuis 2002). This designation is a result of loss of habitat and declines in populations based mostly in the U.S.A. (Wind and Dupuis 2002). The populations of BOTO in both B.C. and Alberta are listed provincially as stable (Wind and Dupuis 2002).

The inventory strategy for this project was to survey as many sites as possible from May to September. The primary focus was to inventory breeding sites, previously known sites, and new sites for all species of amphibians in KNP and YNP. Several locations were visited two or more times in order to ensure any amphibians present were detected. Many sites that are used by amphibians for breeding are ephemeral and dry up in the later summer. These ephemeral sites are not necessarily viable as breeding areas, depending on how long is necessary for tadpoles to metamorphose. Multiple site visits are useful to determine whether certain locations are viable breeding areas and whether they would be useful as possible long term monitoring sites.

Another goal of the inventory was to recommend several sites in both YNP and KNP as potential long-term monitoring sites. The purpose of the long term monitoring would be to set a baseline for the amphibian populations in YNP and KNP. There is little data on numbers of amphibians, or breeding success, for amphibian populations occurring in the mountain parks. Accurate population information would be useful in determining the status of amphibian populations in the mountain parks. This will be increasingly important for all the amphibian species in the parks as global warming, habitat loss, disease, and other threats to amphibian populations around the world become increasingly disruptive.

Methods

Surveys of sites were conducted from May 1, 2004 to September 1, 2004. There were 48 sites surveyed in KNP (Figure 1), and 31 sites were surveyed in YNP (Figure 2). In KNP 32 sites were surveyed more than once, and in YNP 7 sites were visited more than once. Sites were chosen using historical surveys or information such as the Ecological Land Classification (ELC) of KNP (Poll et al. 1984) or the ELC of YNP (Wallis et al. 1996), or air photos and 1:20,000 trim maps. Sites were chosen for survey based on size and accessibility, as well as probability of finding BOTO or other amphibians.

The surveys conducted were visual and auditory surveys. There was some active searching such as lifting of rocks and logs, but because there was limited time to conduct exhaustive searches, active survey was kept to a minimum. The surveys were conducted following the shoreline, approximately one meter from shore in the water, or along the shore within three meters of the water. Several surveys were conducted with two

surveyors present. One person would survey on shore, the other in the water approximately one meter. The surveyors would then proceed slowly along the shoreline, with the surveyor in the water about one meter ahead to frighten adult and juvenile amphibians onto shore, into the path of the other surveyor.

Access directions and site descriptions were recorded for each site visited, in a narrative designed to aid in relocating the site for future surveys. The UTM easting and northing was recorded using a handheld GPS unit, as well as the elevation in meters, and the estimated precision of the GPS unit in meters. The drainage in which the site was located was also recorded.

Habitat information was recorded for each survey site for each visit. Sites were categorized by their general characteristics into several types such as: lake, pond, roadside ditch, marsh or bog, gravel pit, river or creek, seep or spring, and terrestrial. These categories were decided upon in the field based upon very generalized guidelines, for example: a pond was categorized as a body of water that was smaller than a lake. The maximum depth of the wetland was estimated in meters, and recorded as one of three categories: less than one meter, one to two meters, and greater than two meters deep. The pH of the water was taken using a handheld digital pH meter, when available. The presence of fish was recorded when detected, and when not detected.

Environmental information was recorded for each site at each visit, including the temperature of the water and air, the sky conditions and the wind speed based on the Beaufort scale. There were nine categories for the sky conditions: clear, partly cloudy (scattered) or variable sky, cloudy (broken) or overcast, fog or smoke present, drizzle, snow and showers. The wind speed was recorded into six different categories: calm, light air, light breeze, gentle breeze, moderate breeze, and fresh breeze. These categories were based on the Beaufort scale, and indicate a range of wind speeds in kilometers per hour from 1.6 to 38.6. The speed and Beaufort number were determined using several indicators listed below in Table 1.

Table 1: Beaufort scale used to estimate wind speed for survey, recorded at each site on each visit.

Beaufort Number	**Wind Speed km/h**	**Indicators of Wind Speed**
0 – Calm	1.6	Smoke rises vertically
1 – Light air	1.6 – 4.8	Wind direction shown by smoke drift
2 – Light breeze	6.4 – 11.3	Wind felt on face; leaves rustle
3 – Gentle breeze	12.9 – 19.3	Leaves, small twigs in constant motion; light flag extended
4 – Moderate breeze	20.9 – 29.0	Raises dust and loose paper; small branches are moved
5 – Fresh breeze	30.6 – 38.6	Small trees will sway; crested wavelets on inland waters

The search effort was categorized as either a time constrained, or systematic survey. Surveys of sites were conducted for a total of one-person hour, and labeled systematic if the entire perimeter of the site was surveyed within the one-hour time limit. Any site that was too large to survey entirely in one hour was labeled as a time constrained survey. The start time was recorded, as well as the finish time and total time searched. The distance searched, in meters, was estimated and recorded.

The amount of human disturbance evident at each survey site was estimated and placed into three categories: high, moderate, and low. Sites that had low human disturbance were characterized by being remote, had no roads or trails nearby and saw little or no human traffic. Highly disturbed sites were those that were near or adjacent to roads or highly used trails, had garbage or buildings on site, or had been created by humans such as parking lots or gravel pits. Moderate sites fell in between the two extremes.

The species of each sighting was recorded using the species code: boreal toad (BOTO), wood frog (*Rana sylvatica*, WOFR), Columbia spotted frog (*Rana luteiventris*, SPFR), and the long-toed salamander (*Ambystoma macrodactylum*, LTSA). The life stage of each sighting was identified as either an egg mass, larvae, juvenile, or adult. The microsite description of the area directly near the sighted individuals was recorded, including the position in the water column and the presence of vegetation. The numbers of individuals at each sighting were estimated and recorded.

These data were recorded on datasheets in the field, and then input into the Herpwatch database to ensure easy retrieval of data. The Herpwatch database was obtained from Banff National Park, and contains data from the Bow Valley, Jasper, Banff, and other areas in the Rocky Mountains. The Herpwatch database is useful for coordination of the management of BOTO and other amphibian populations throughout their range, instead of within each park separately.

The data for sites where BOTO were observed were also input into a database for the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Because of the designation of BOTO as a species of Special Concern, occurrence data for this species were input into this COSEWIC database, to aid in determination of the species status in the future, and to determine the status of the populations in the species entire range. The status of this population as either declining, stable, or growing will aid in determining whether BOTO warrants a new designation under the species at risk act.

Survey Results

Table 2: Sites surveyed in Kootenay National Park during the 2004 Amphibian Inventory, and the species detected during survey.

Site Name	Species Present				
	BOTO	LTSA	SPFR	WOFR	NONE
Dog Lake			X	X	
Daer Pond		X	X	X	
Dolly Varden Mud Puddle	X				
Ochre Creek Trail	X				
Continental Divide Borrow Pit	X				
Simpson Mineral Lick Ponds	X	X	X		
Vermillion Crossing Borrow Pit North	X		X		
Vermillion Crossing Borrow Pit South	X		X		
Kootenay Pond		X		X	
Settler's Road Beaver Ponds Northwest			X	X	
Crook's Pond		X	X		
Settler's Road Borrow Pit		X	X		
Simpson Monument Ditch		X			
South Dog Lake Pond			X	X	
Cobb Lake			X		
North Kootenay Pond		X			
Sundew Pond				X	
Long Pond			X		
West Kootenay Fire Road		X		X	
North Simpson Ditch	X	X			
Sora Pond	X	X			
Aspen Quarter Pond	X	X		X	
Kootenay Valley Viewpoint Ditch	X	X			
South Dolly Varden		X	X		
Prescribed Burn Pond		X	X	X	
Nixon Lake		X	X	X	
South Simpson Pond	X	X	X		
Simpson Monument Horseshoe Pond		X	X		
Productive Pond		X	X	X	
Meadow Creek Beaver Pond					X
Conservation Corps Pond					X
Olive Lake					X
Dolly Varden South					X
Wardle Creek Picnic Pond					X

Wardle Creek Ditch					X
Wardle Marsh					X
South Simpson Monument Ditch					X
Numa Creek Picnic Ponds					X
Numa Creek East					X
Burned Pond					X
Paint Pot Parking Lot Ponds					X
Settler's Road Beaver Ponds Small Pond					X
Settler's Road Beaver Ponds Southeast Pond					X
Overlooked Pond					X
Wardle Creek East Ditch					X
Wardle Creek Highway Pull-out					X

Table 3: Table of sites visited in Yoho National Park during the 2004 Amphibian Inventory, and occurrence data for all four species found in the park. Question marks (?) denote uncertain identification of species.

Site Name	**Species Present**				
	BOTO	**LTSA**	**SPFR**	**WOFR**	**NONE**
Black Bridge Small Pond	X				
Emerald Lake Marsh	X			X	
Emerald Lake NW Corner	X				
Emerald Lake NE Corner	X				
Deerlodge Pond	X				
Black Bridge Second East Ponds			X		
Ranch Horseshoe Pond			X		
Narao Lakes			X?		
North Ottertail Ditch		X	X	X	
Westgate Train/Beaver Pond				X	
Salamander Blowdown Ditch		X			
Westgate Ditch	X?	X			
Chancellor Cliff Ponds		X			
South Ranch Pond		X			
Chancellor Camp Pond		X			
Amiskwi/Kicking Horse 1st Pond					X
Amiskwi/Kicking Horse 2nd Pond					X
Chancellor/Kicking Horse Pond					X
Black Bridge First West Pond					X
Peaceful Pond					X
Chancellor TCH Pond					X
Black Bridge West Last Ponds					X
Faeder Lake					X

Ross Lake					X
Sink Lake					X
Summit Lake					X
Leanchoil Marsh	X				
Kicking Horse/Field Flats Pond					X
West Kicking Horse/Field Flats Ponds					X
Field Access Pond					X
Natural Bridge Turnoff Ponds					X

Of the 48 sites visited in KNP, there were 31 sites that had amphibians present in at least one of the surveys conducted at each site during 2004, including those that had two visits (Table 2). Thus, of all sites visited in KNP, 65% had amphibians present. In YNP, out of 31 sites visited, there were 16 sites where amphibians were detected, or 52% of all sites (Table 3).

Of the 48 sites surveyed in KNP, there were BOTO found in 13 sites (Figure 3, Table 2). In KNP, 27% of all the sites surveyed were used by BOTO for breeding except for the Ochre Creek trail location, which was a terrestrial sighting of adults only. In YNP, BOTO were the most common amphibian species found, in 23% of the sites surveyed, or a total of 7 sites out of 31 (Figure 4, Table 3). Most of the sites in KNP that had BOTO present were roadside ditches, or gravel pits; while in YNP, the majority of sites were ponds or lakes, in particular, Emerald Lake (Figure 4). In YNP, BOTO co-occurred in sites with fish 71% of the time, while in KNP, BOTO preferred ponds with no fish 81% of the time. In both parks, BOTO were found in water that was less than one meter in depth, 57% in YNP, and 76% in KNP.

LTSA were the most common species of amphibians found in KNP. There were 18 sites in KNP that were found to contain LTSA, 38% of all sites surveyed (Figure 5, Table 2). In YNP there were LTSA found in 6 of 31 sites, or 19% (Figure 6, Table 3). These amphibians were rarely found to co-occur with fish, only 17% of the time in KNP, and never in YNP. LTSA preferred ponds or roadway sites most, in both parks, and were also located most often in sites with water less than one meter deep, 61% of sites in KNP, and 83% in YNP.

SPFR were the next most commonly seen species in KNP, occurring in 35% of the sites surveyed, or a total of 17 sites (Figure 7, Table 2). These large amphibians were found in only 3 sites surveyed in YNP (Figure 8, Table 3), and were only observed in locations that were seemingly empty of fish. The SPFR in KNP also preferred sites with no fish 65% of the time. In KNP, 70% of the sites surveyed were ponds or lakes, 76% of which had water depths greater than one meter. In YNP out of the three sites found to contain SPFR, two of them were ponds, while the other site surveyed was a roadside ditch.

WOFR were the least common amphibians found in KNP, found in only 25% of the sites surveyed (Figure 9, Table 2), and in YNP, found in only 3 sites (Figure 10, Table 2). In

KNP these amphibians were found exclusively in lakes or ponds, most often with water depths between one and two meters. These amphibians appear to prefer sites that had low human disturbance, 66% of the sites in KNP that contained WOFR were rated as low human disturbance. In YNP however, WOFR occurred in two high disturbance rated sites out of three. Two of the three sites in YNP where WOFR were found, were ponds, the other was a marsh or bog, and 100% of these locations had water depths that were less than one meter. Both populations of WOFR, in YNP and KNP, were found in sites where fish were not detected, 75% of the sites in KNP, and two of the three sites in YNP.

There were 19 sites in KNP where two or more species co-occurred in a single site together, 8 of them were sites where BOTO could be found (Table 2). In YNP, there were only three sites surveyed that had more than one species present, though, in two of those sites BOTO could be found (Table 3). This information may be useful in determining the location of future surveys as sites that are, or have been, used by more than one species would make intensive monitoring more efficient.

Of the 8 sites in KNP that contained other species alongside BOTO, three of them had two more species present (Table 2). There were 5 sites that contained LTSA, and all three of the sites that contained two more species along with BOTO contained LTSA as well (Table 2). WOFR were found with BOTO in one site along with LTSA, while SPFR were found in four sites with BOTO, two of which contained LTSA as well (Table 2). No sites contained all four species, though in the Ecological Land Classification for Kootenay National Park (Poll, *et al*. 1984) there were all four species present at both Nixon Lake and the Kootenay ponds.

In YNP there were two sites that contained more than two species as well as BOTO. One had WOFR, and the other LTSA (Table 3). There was only one site that contained three of the four species present in the park, North Ottertail Ditch, where LTSA, WOFR and SPFR were all found to be breeding (Table 3).

Recommendations

The primary goal of this inventory was to assess the presence or absence of amphibian species at several ponds and other wetlands throughout KNP and YNP in 2004. A secondary goal was to provide recommendations for sites that might be suitable for more intensive, long term monitoring of populations. Primarily, BOTO was the target species for this project, though the three other species of amphibians present in the parks were also of great concern to Parks Canada. Sites that may be suitable for long term monitoring could be chosen due to their diversity of habitat, species, locations, disturbance, and several other factors.

The best sites for monitoring of populations of amphibians would be those that had more than one species present, include BOTO, were not ephemeral and were viable as breeding sites. If these criteria were used, the following sites would be excellent candidates for long term monitoring in KNP:

Dog Lake
Daer pond
Simpson Mineral Lick ponds
The Vermillion Crossing Borrow Pit ponds
Kootenay Ponds
South and North Simpson ponds
Nixon Lake
Sora pond
Thee Dolly Varden area

These sites contain a wide variety of different wetland types, disturbance regimes, species present, and accessibility.

In YNP, there are several sites that would be excellent for long term monitoring such as:

The Emerald Lake area
The Black Bridge area
Leanchoil Marsh
North Ottertail ditch
The Westgate ditch

The Black Bridge and Emerald lake areas, are excellent because within the larger area, are several locations that are good habitat for a variety of species of amphibians, there is easy access, there is a variety of disturbance, and the sites are not ephemeral. Westgate and North Ottertail ditches would be good for long term monitoring because they are easy to access, and have more than one species of amphibians present.

In both YNP and KNP, there were several sites that seemed to be good habitat for amphibians, but none were located during survey. There were also many areas that were not surveyed for many reasons including lack of time, and their poor accessibility. These sites such as the Ice River and Lake O'Hara areas in YNP, or the Northwest Dolly Varden area in KNP might be excellent candidates for long term monitoring plots, once they have been surveyed. Thus, many more surveys could be done across the parks to better determine amphibian distribution throughout both YNP and KNP.

In conclusion, wherever long term monitoring plots may be placed in the future, care should be taken to ensure adequate representation of all the species of amphibians in both parks. In order to best determine the status of amphibian populations in YNP and KNP, a wide variety of likely sites should be chosen.

Acknowledgements

I would like to thank Joanne Williams, the aquatics specialist for the LLYK field unit, Parks Canada, for her patience, advice, and aid in surveying. I would like to thank Dave Gilbride for his aid in creating the several maps and air photos used for both surveying and this report. I would also like to thank Sybilla Helms, Omar McDadi, and Andrew

Grieg for their aid in completing the surveying for this project. A special thanks goes to Diane and Mike McIvor, David Poll and Larry Halverson for their training and advice in locating and identifying both amphibians and amphibian habitat. Finally I would like to acknowledge Charlie Pacas, for the use of the Herpwatch database.

Appendix

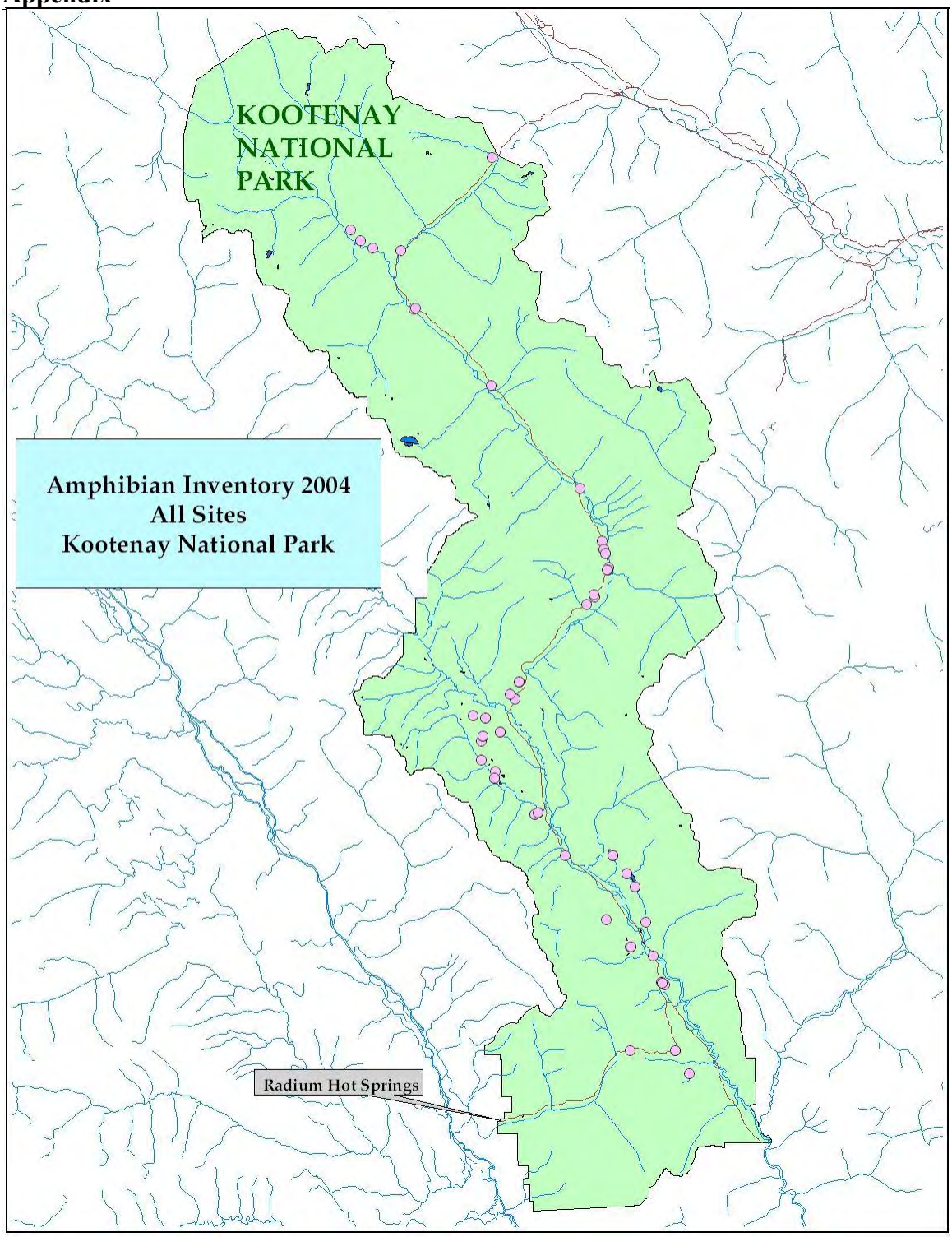

Figure 1: Map showing all sites surveyed in Kootenay National Park in 2004, for the Amphibian Inventory. A total of 48 sites were surveyed.

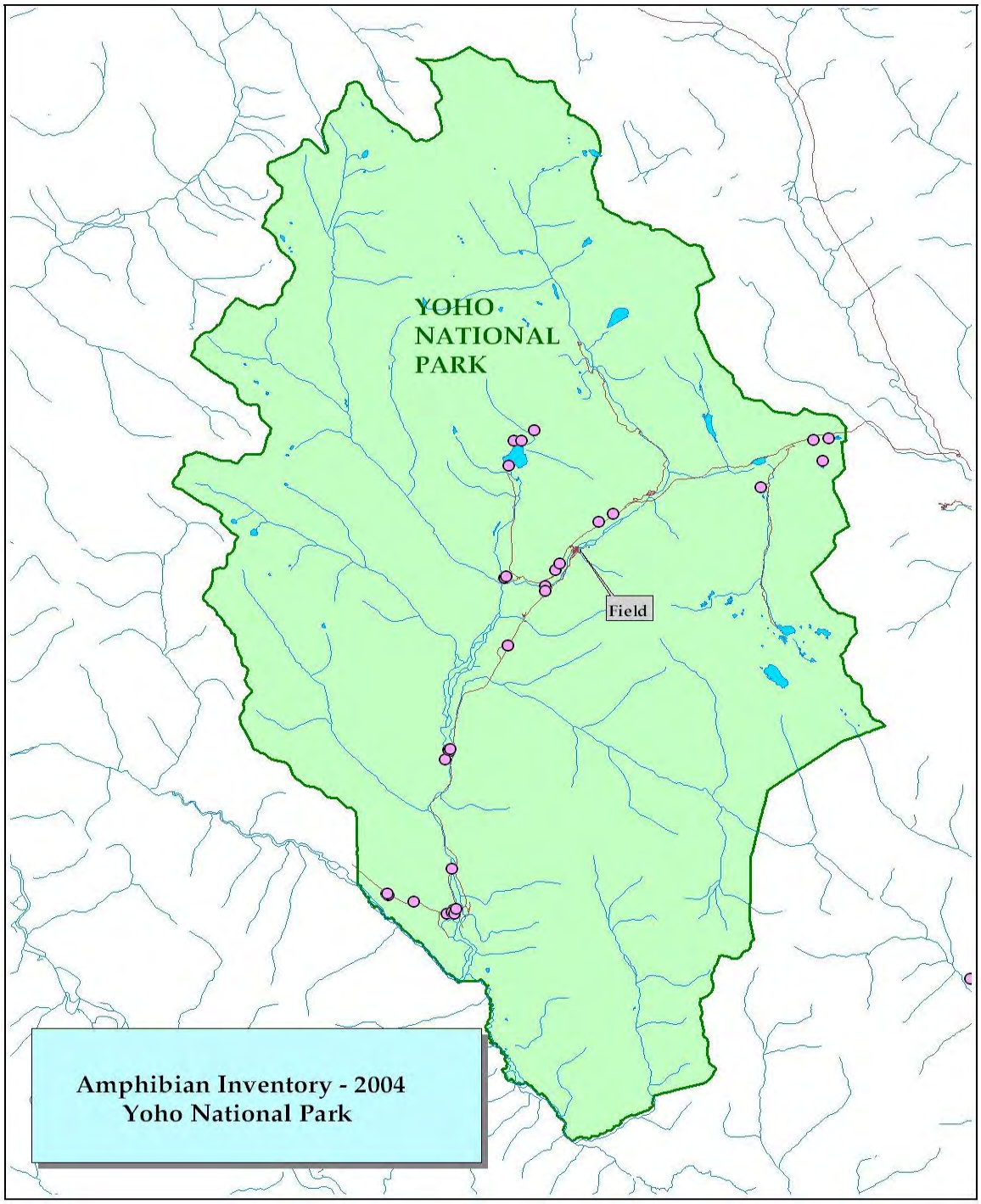

Figure 2: Map showing all sites surveyed during the 2004 Amphibian Inventory, in Yoho National Park. A total of 31 sites were surveyed.

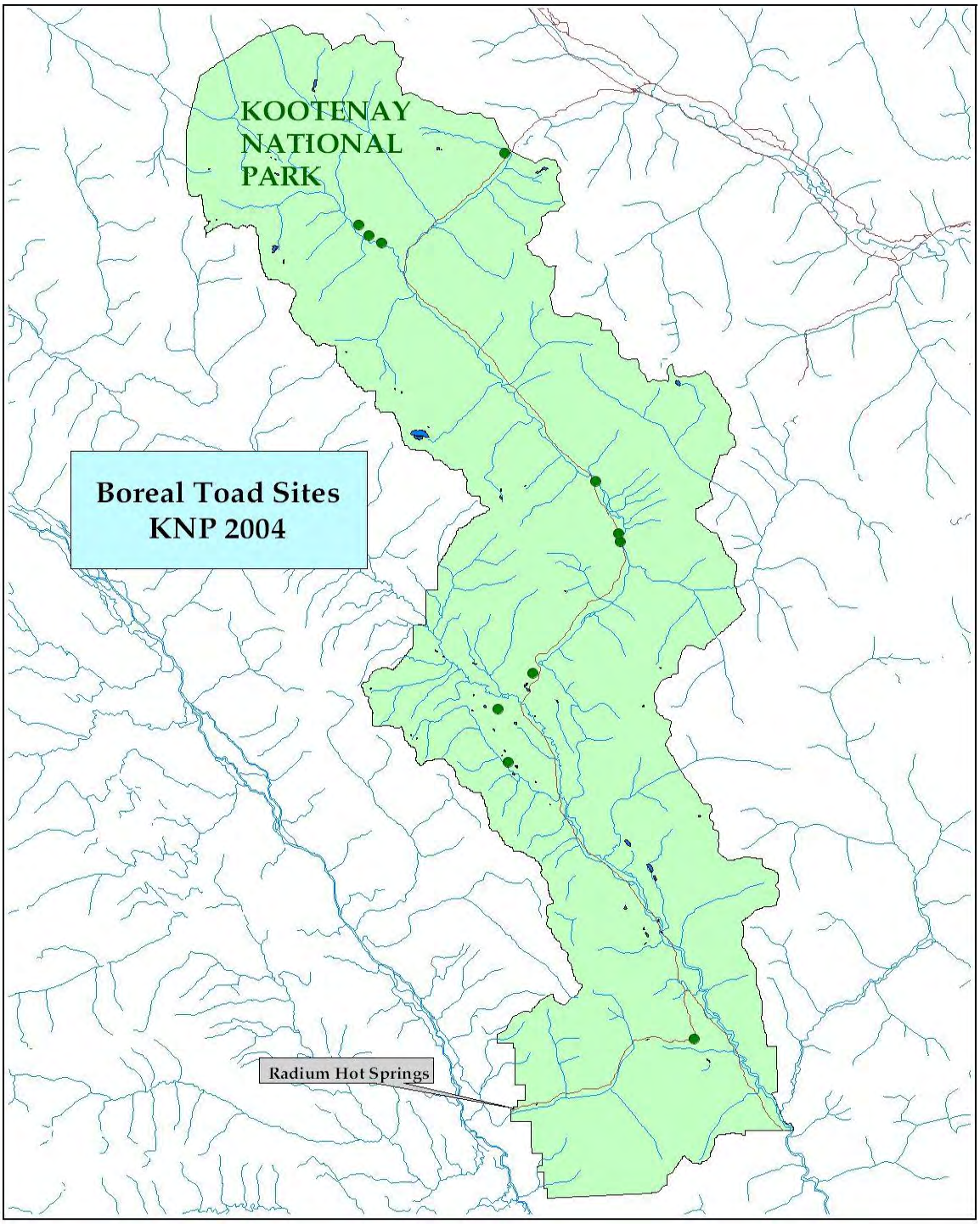

Figure 3: A map showing all sites in KNP that contained BOTO during the 2004 Amphibian Inventory. There were 13 sites found to contain BOTO in KNP.

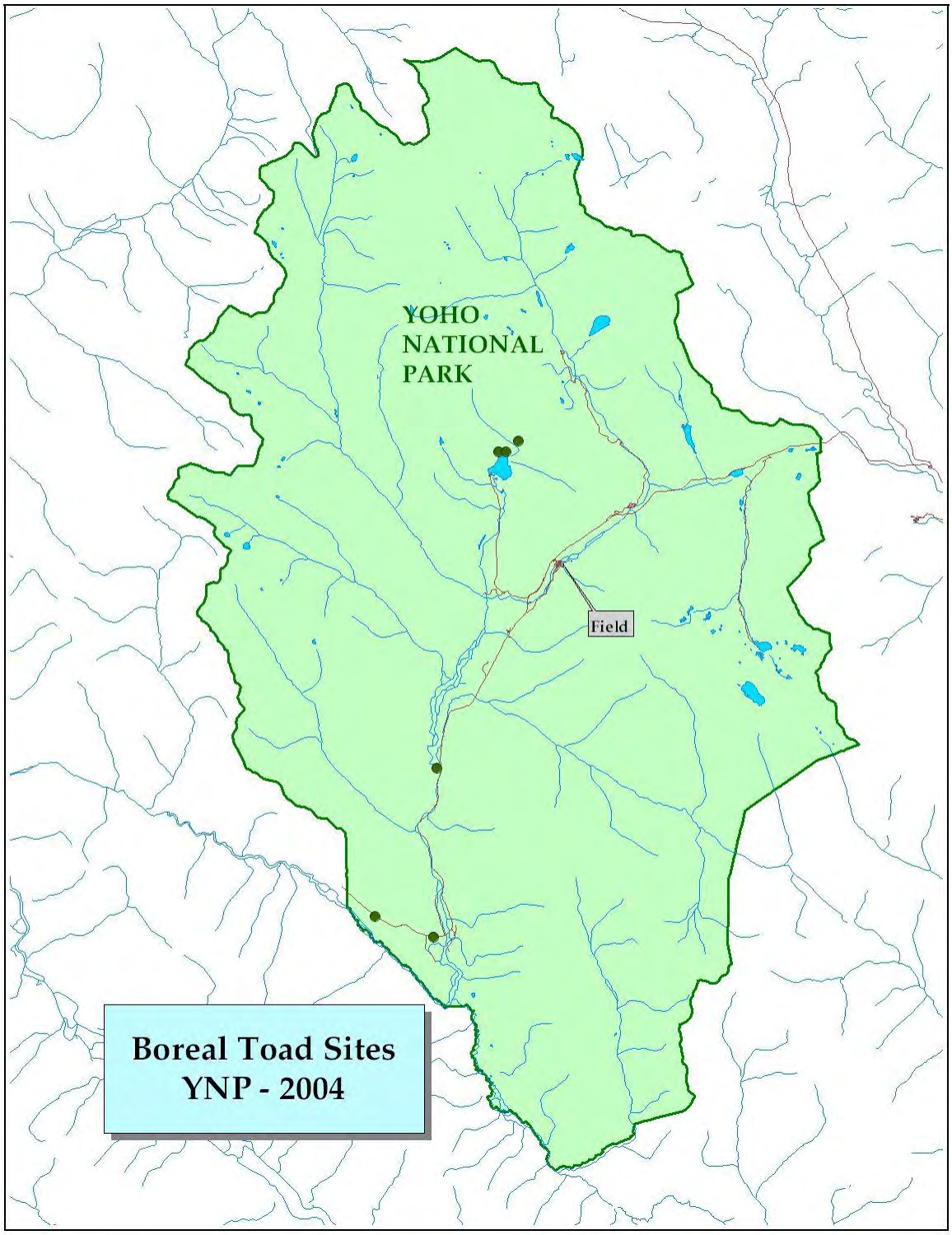

Figure 4: A map showing all sites found to contain BOTO in Yoho National Park, during the 2004 Amphibian Inventory surveys. There were 7 sites found to contain BOTO in YNP.

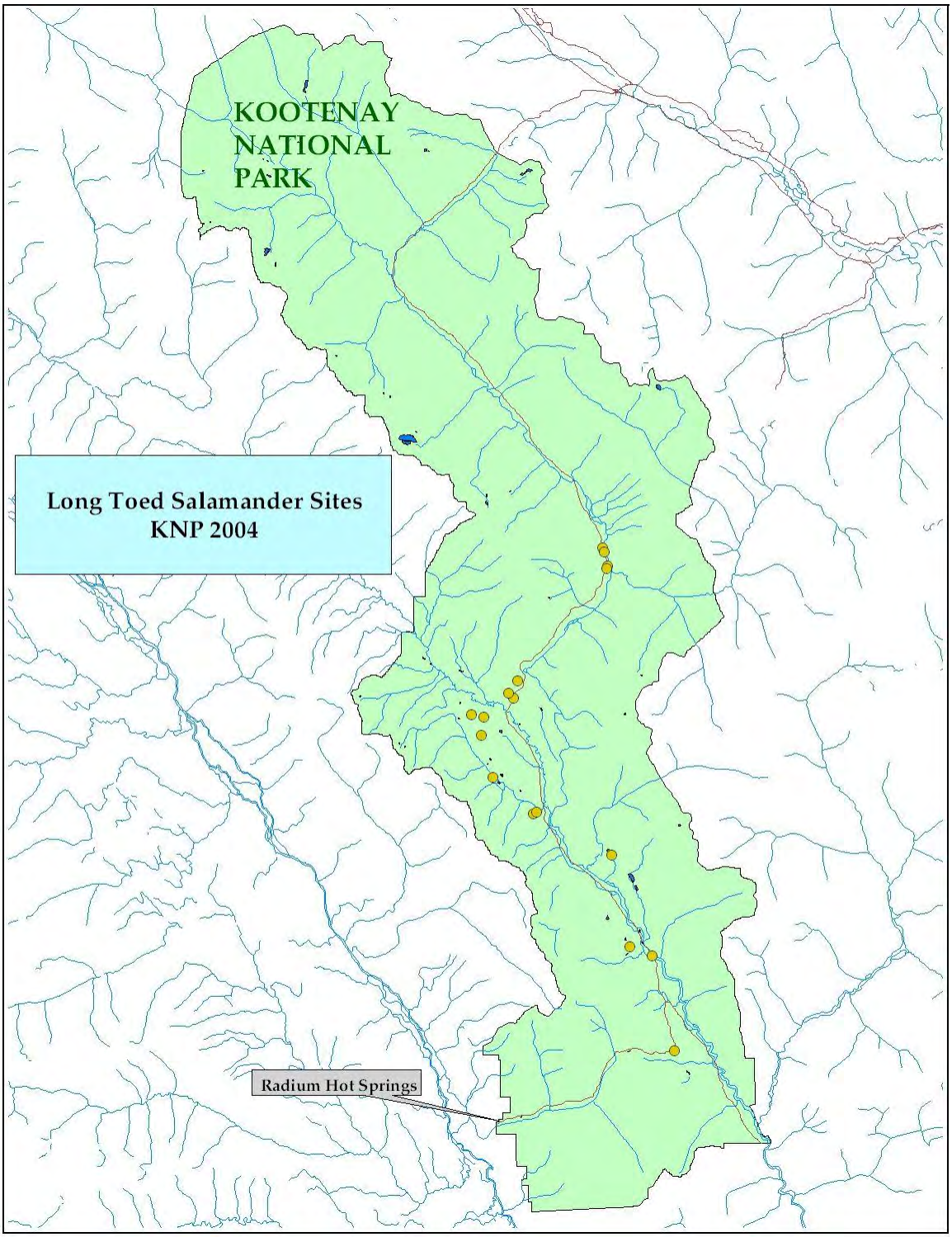

Figure 5: A map showing all sites surveyed in the 2004 Amphibian Inventory, that were found to contain LTSA. There were 18 sites found to contain LTSA in KNP.

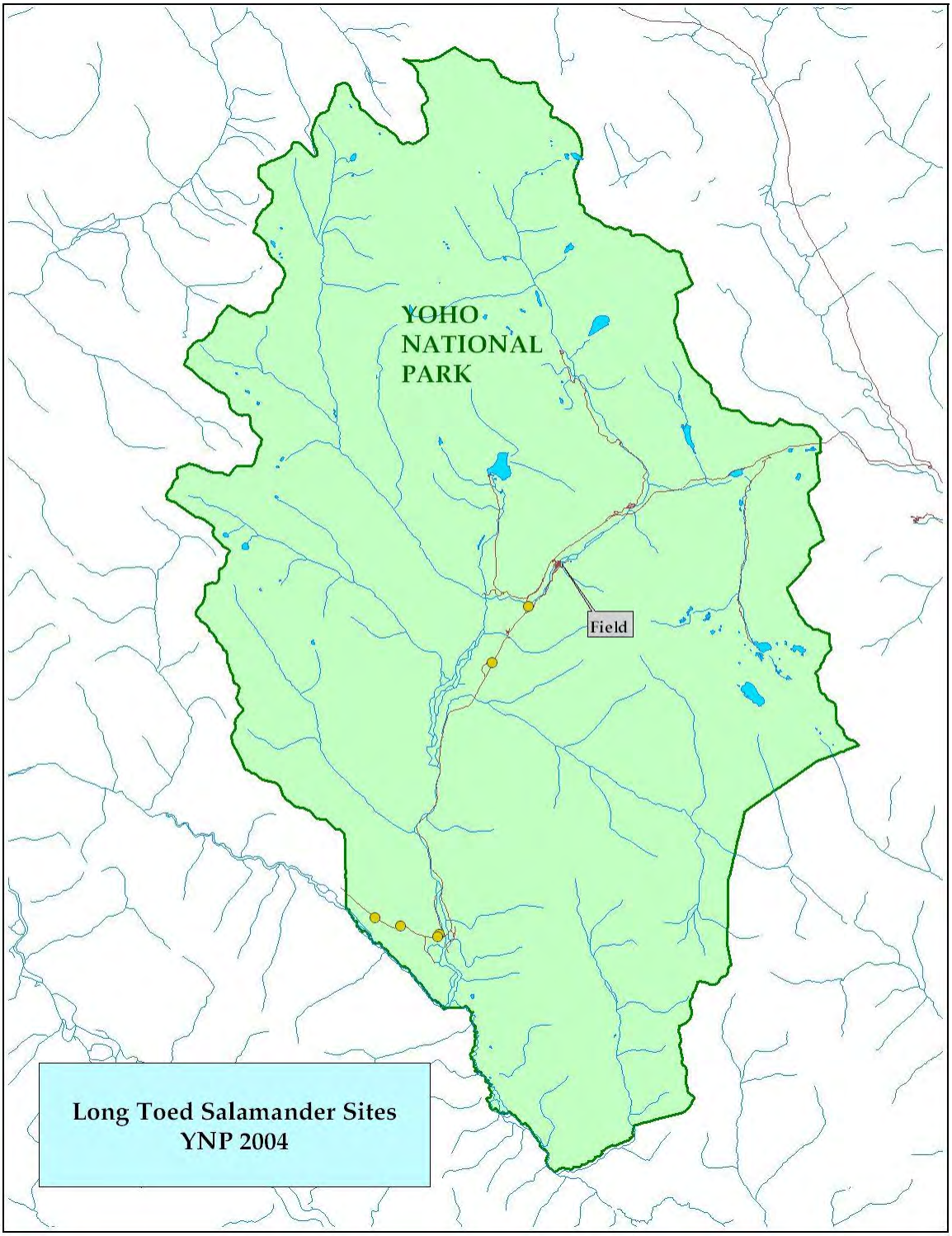

Figure 6: A map showing all sites surveyed in Yoho National Park during the 2004 Amphibian Inventory that were found to contain LTSA. There were 6 sites in YNP with LTSA.

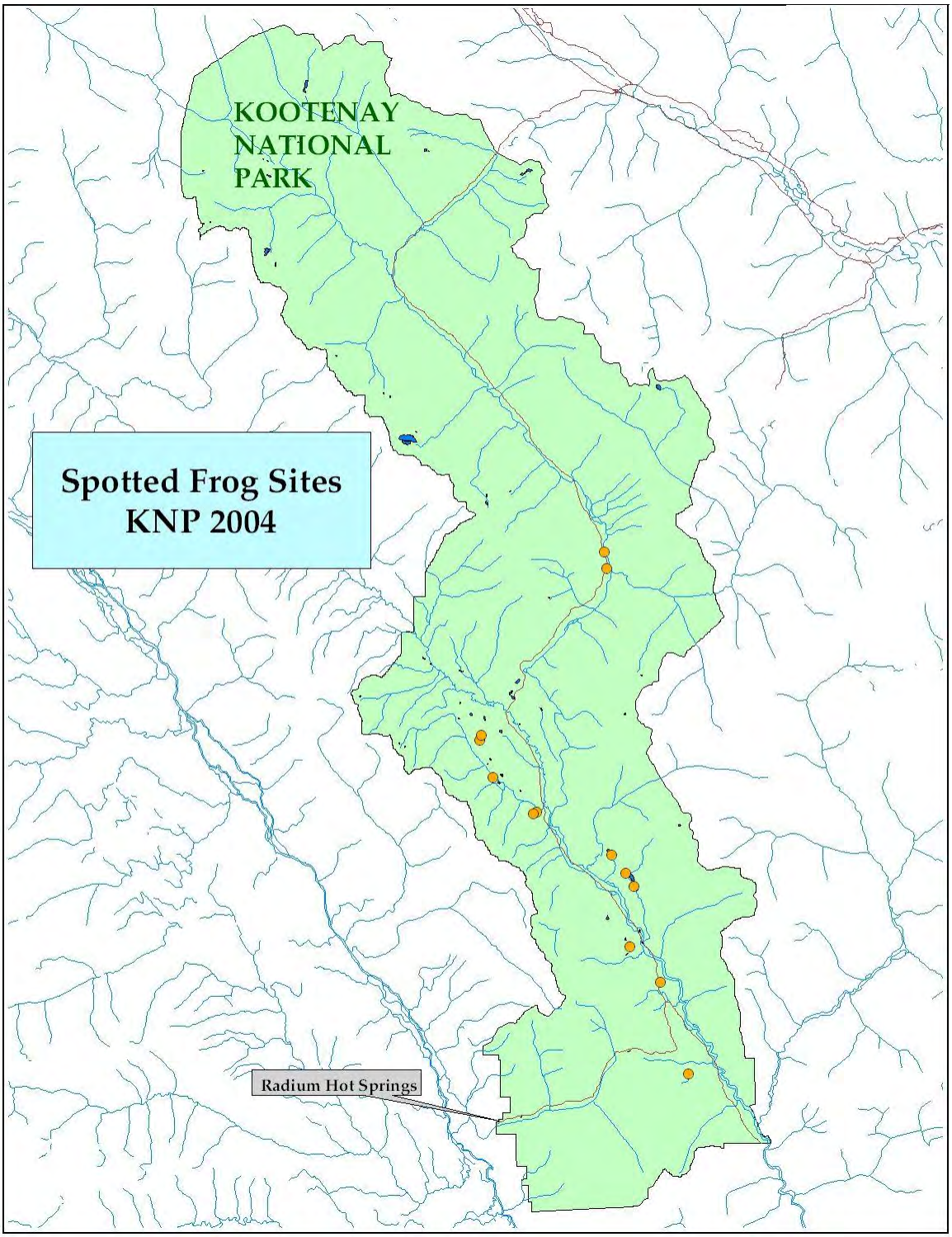

Figure 7: A map showing all the sites (17) surveyed in Kootenay National Park during the 2004 Amphibian Inventory that were found to contain SPFR.

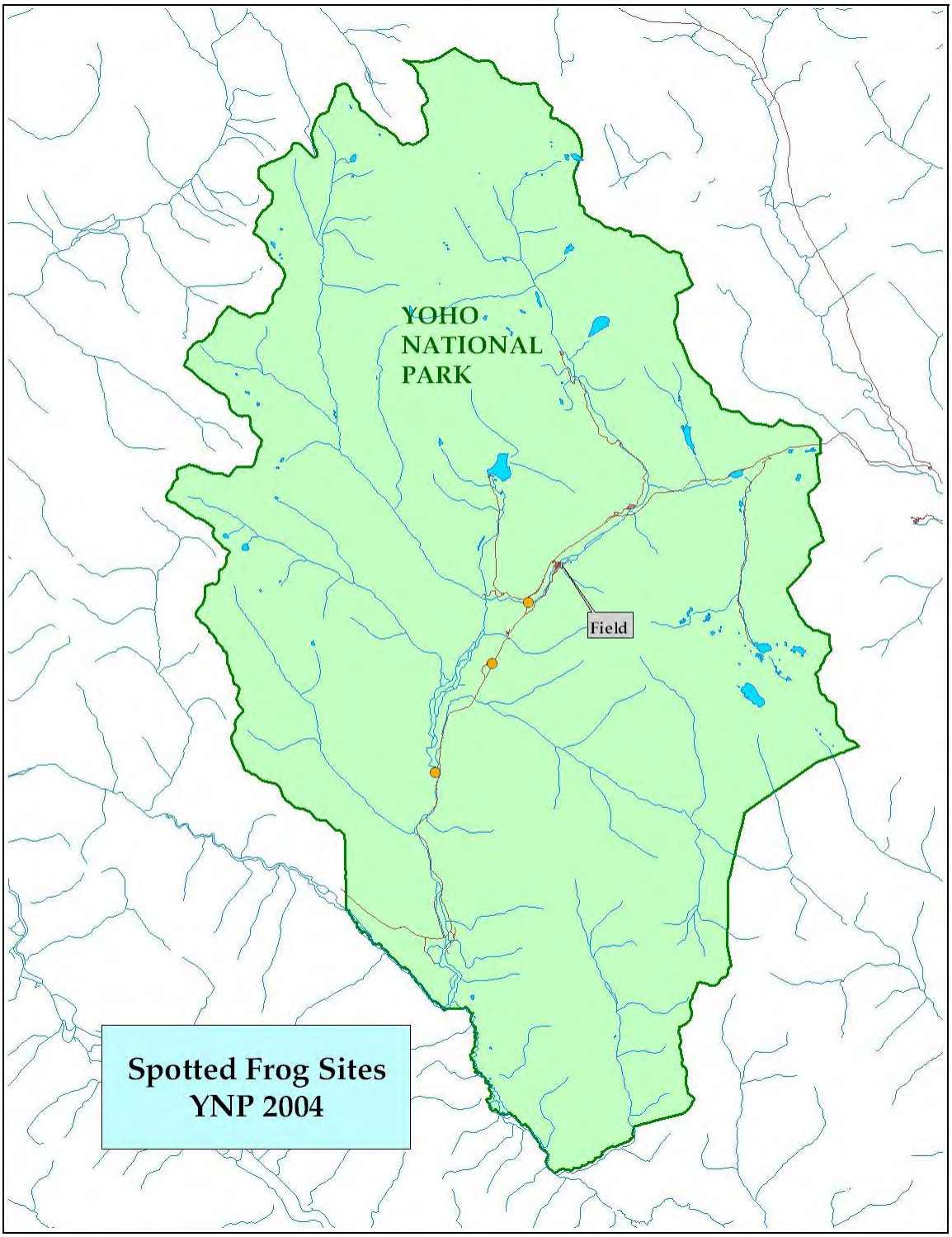

Figure 8: A map showing all the sites surveyed (3) in Yoho National Park during the 2004 Amphibian Inventory that were found to contain SPFR.

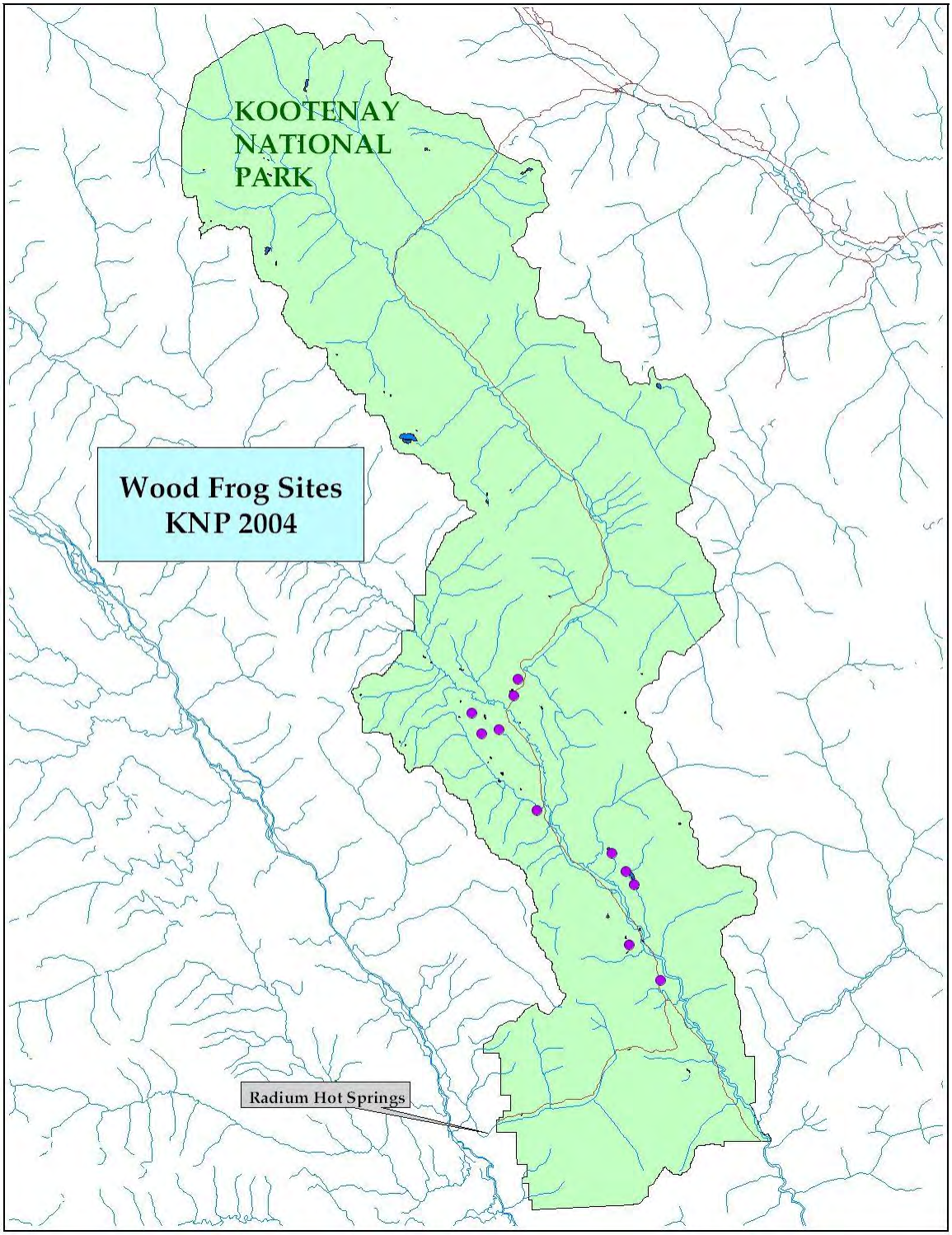

Figure 9: A map showing all the sites surveyed (12) in Kootenay National Park, during the 2004 Amphibian Inventory that were found to contain WOFR.

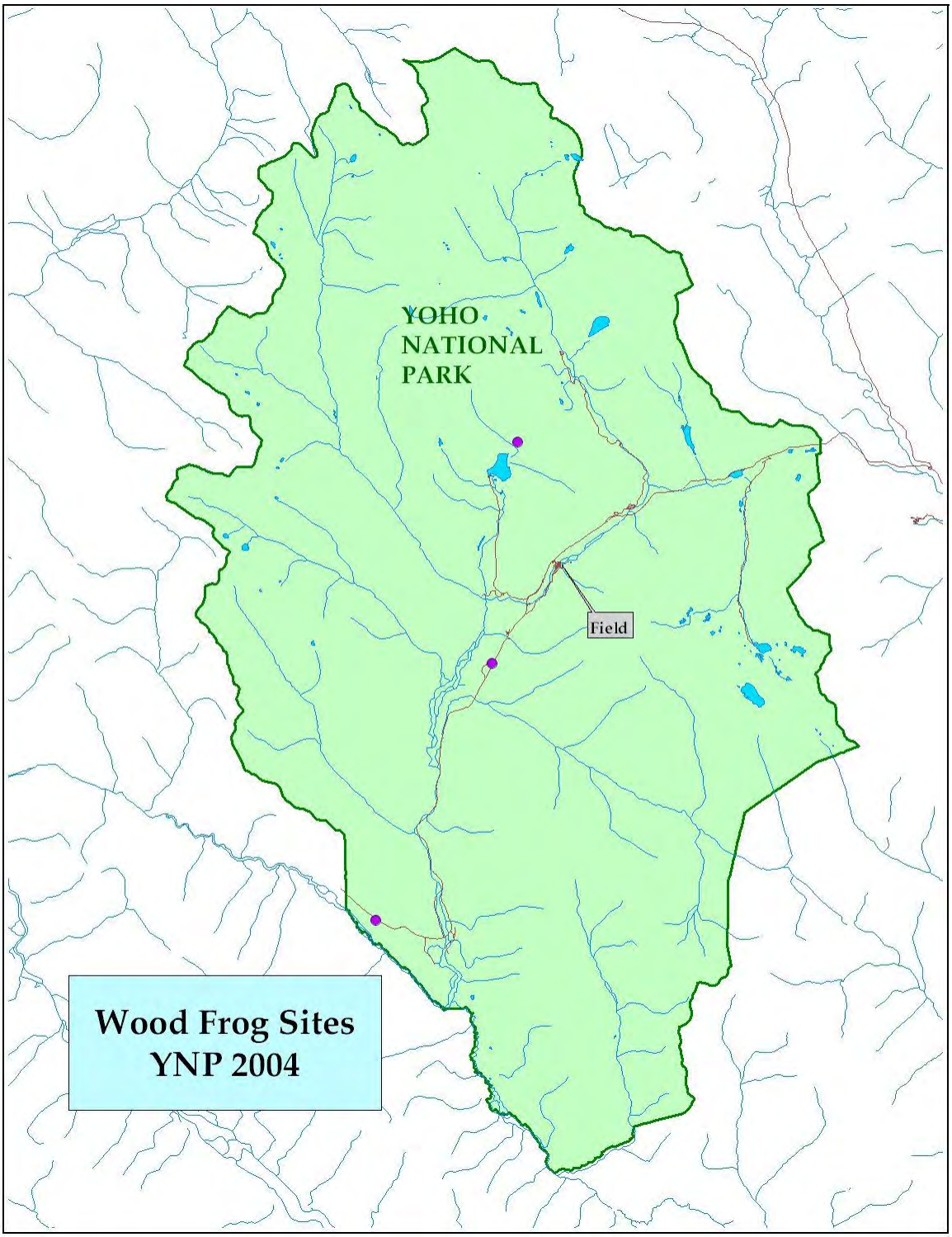

Figure 10: A map showing all the sites surveyed (3) in Yoho National Park, during the 2004 Amphibian Inventory, that were found to contain WOFR.

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