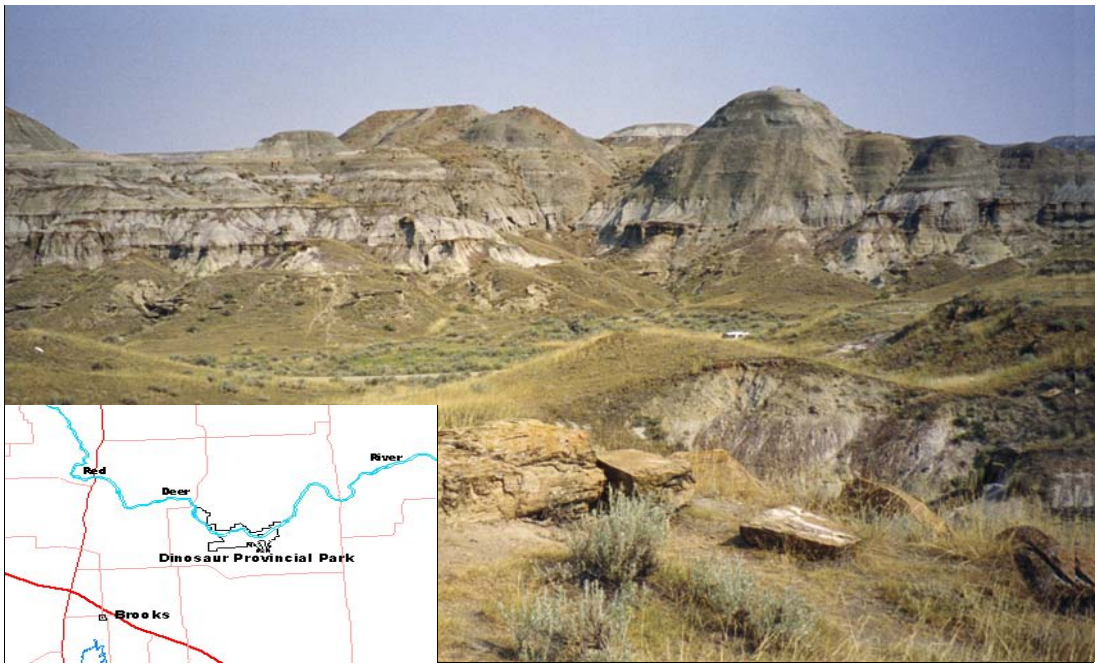
PILOT INVENTORY OF INVASIVE PLANT SPECIES IN DINOSAUR PROVINCIAL PARK




Hordeum jubatum (Foxtail barley)


Salsola kali (Russian thistle)

September 2004

Resource Information Management Branch
Strategic Corporate Services
Alberta Sustainable Resource Development

PILOT INVENTORY OF INVASIVE PLANT SPECIES IN SELECTED PROTECTED AREAS IN ALBERTA

DINOSAUR PROVINCIAL PARK

September 2004

Resource Information Management Branch
Strategic Corporate Services Division
Alberta Sustainable Resource Development

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ACKNOWLEGEMENTS

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1.0 INTRODUCTION

Invasive plant species are of widening concern in the parks and protected areas of Alberta, especially where they encroach on sites with rare species or threaten to reduce the natural diversity of certain native plant communities. Protected areas and sites in other regions are also recognized as being threatened by invasive plant species. As a result, Resource Data Branch (RDB) has accepted a request from Alberta Parks and Protected Areas (PPA) to continue the pilot inventories for at least another field season. Beyond this, further inventory may have to await a general review of the overall invasive species situation before proceeding further.

Previous pilot invasive plant inventories have been done for two Alberta protected areas. These inventories were completed in Police Outpost and Beauvais Lake Provincial Parks in 2002. While these two pilot inventories are fairly typical of the Foothills Parkland and Rocky Mountains Montane Natural Subregions, they probably cannot be applied in other climatic regions. Differing climatic, geomorphic, hydrologic, soil and disturbance conditions occur in protected areas in different natural subregions across the province. As a result, Parks and Protected Areas have chosen to extend the pilot inventory series to Dinosaur Provincial Park (DPP) situated in the Dry Mixedgrass Natural Subregion.

There is also a continuing problem of which invasive plant species to inventory. As pointed out by Carpenter and others (2002), many natural areas have more invasive species than can be inventoried with the available resources. Any such inventory obviously needs to adopt a strategy that maximizes the effectiveness of generally scarce resources for such inventories.

Experience gained from the two previous study areas has led to the conclusion that it is probably most effective to concentrate efforts on invasive plants, either dominant and widely occurring or observed to be a threat to survival of rare plant species in the park. Care was taken in those two inventories as far as possible to include less dominant invasive plants that could be a future threat depending however, on whether or not they could be readily identified given their particular growth stage at the time of field survey.

2.0 PURPOSE OF THE INVENTORY

The purpose of this project is to locate, document and map the occurrences of invasive plants in Dinosaur Provincial Park. This protected area was selected to extend the pilot inventory to a protected area with climate, landform and disturbance conditions widely different from those affecting areas previously studied, namely Police Outpost and Beauvais Lake parks. Target invasive plant species to be inventoried will include those threatening rare plants and those commonly associated with human caused disturbances. As before, local site managers may indicate additional target species of special concern for park management. The project will serve to test and possibly modify or improve methodology developed for the two previously inventoried areas.

3.0 LOCATION AND DESCRIPTION OF STUDY AREA

Dinosaur Provincial Park (DPP) is found within the Dry Mixedgrass Natural Region in southeastern Alberta along a portion the Red Deer River. The park is located in Townships 20 and 21, Ranges 10 to 12, west of the Fourth Meridian. It occupies an area of 7 331.7 hectares (18 116.4 acres). The park is characterized by having an extensive area of deeply incised and eroded 'badlands' terrain of over 150 km^2. Badland formation is associated with river downcutting and rapid erosion of the underlying, soft Cretaceous bedrock following Wisconsin deglaciation (Bryan *et al. 1987*).

The area is renowned for its importance of its dinosaur fossils and is designated as a World Heritage Site. The Royal Tyrrell Museum conducts field studies and fossil excavations from the field station located within the park. Visitor facilities include picnic and trailer parking areas near park administrative centres. Conducted tours, both walking and by bus are available to visitors as part of the Park educational outreach program.

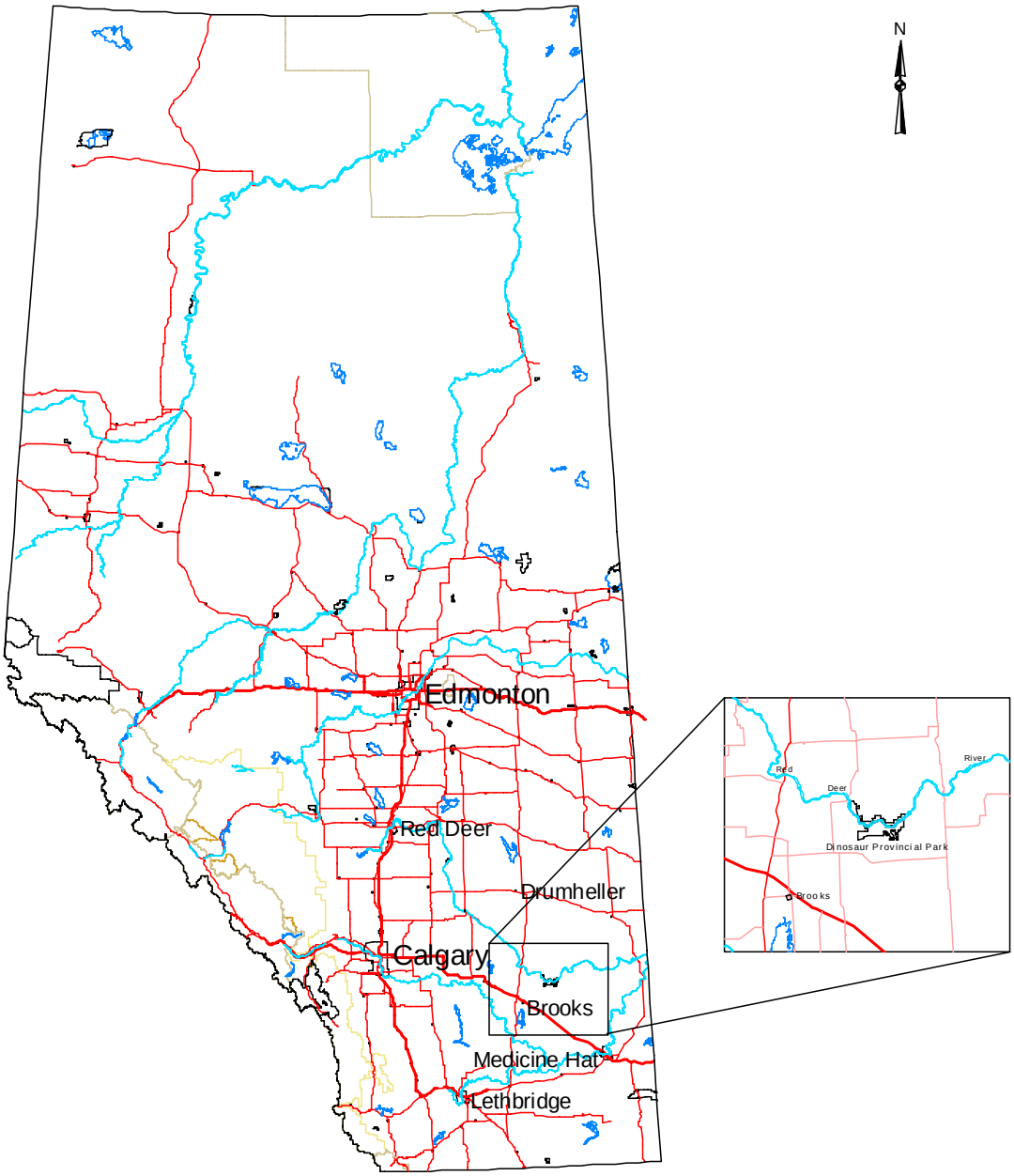

Figure 1. Location of Dinosaur Provincial Park Study Area.

4.0 METHODOLOGY

The field survey and data compilation methods applied for this inventory is essentially the same as those used for the Police Outpost and Beauvais Lake protected areas. The mapping legend for Dinosaur Park has, however, been updated to be more adaptable for application in other protected areas across the province. Because fairly consistent combinations of dominate invasive plants were again found to reoccur across particular landscape segments, the invasive plants of DPP are mapped within an existing ecological land classification framework (Romuld 1993). Again, although several example areas of invasive plants were delineated with GPS equipment, limited time available for the survey prohibited wider coverage possible with a more detailed inventory.

4.1 Field Survey

Inspections were done at 113 selected field sites. Existing roads and trails both within and from outside DPP provided overall access and allowed a fairly detailed assessment of invasive plants associated with these disturbances on specific landforms. Further access inside the park was by foot along established trails and along transects across main river terraces, steep tributary coulees, and different erosion surfaces in badland sections.

Data collected at these field observation sites includes location, site, and relevant vegetation information as follows:

Location - Plot number, aerial photo number, GPS lat/long readings in decimal degrees, 35mm site photographs, and ecosite polygon number and label (if ecological land survey coverage is available).

Vegetation/site - dominant general vegetation cover or physiognomy, land use history, nature of disturbance (if any), major invasive or noxious species, inclusions of less abundant invasive or nuisance plants, presence of rare or endangered plant species, percentage cover of invasive species, and distribution pattern of invasive plants.

These field data were compiled and grouped to bring out any similarities or differences in the occurrence and distribution of invasive plants on dominant portions, i.e., landform segments

representative of ecosite used by Romuld (1993). In addition to characterizing invasive plant occurrence on representative sites, these data were used to build the current mapping legend and to extend invasive species map units across the study area.

4.2 Mapping Legend

The map legend used for the invasive plant inventory of DPP is modified from that of the first version used for Police Outpost and Beauvais Parks. Field survey methodology is very similar and consideration of direct disturbance is still an integral part of the inventory. This version however, uses a controlled, descriptive mapping legend in place of the more open, connotative legend used for the Police Outpost and Beauvais Lake surveys (Wells and Benner 2004). The change was seen to be necessary, first because the former legend could not easily be adapted to the different terrain and vegetation conditions present in DPP. Second, although there is an existing detailed ecological land classification of DPP (Romuld 1993), actual Ecological Land Classification (ELC) map coverage of the park is negligible. As a result, the existing descriptive ELC classification was used as a basis to delineate invasive plant distribution primarily in terms of their landform and erosional or depositional characteristics, and secondarily on their dominant vegetation cover together with presence or absence of disturbance or other features significant to the occurrence of invasive plants. Landform characteristics together with dominant vegetation cover in the form of physiognomic groupings as provided by the Romuld ELC (*op. cit.*) are used to describe the invasive plant map units. These map units are essentially ecological land units at the ecosite category level although their included, dominant plant community groupings are necessarily generalized because project objectives and time constraints precluded further detailed field survey.

The invasive plant map units developed for DPP represent ecologically unique land units defined in terms of their dominant landform, vegetation cover and characteristic invasive plant distribution. Many of the ecological classification units described for DPP by Romuld (1993) are too small in area to be separately delineated at the 1:10 000 mapping scale of this inventory. In such cases, these smaller elements are grouped and delineated as integral components of broader but ecologically unique land units appropriate to the working scale of the inventory. In this way, the invasive plant inventory of Dinosaur Park builds on and is nested within the holistic,

landscape classification framework provided by the existing ecological land classification. Because this version uses a legend structure and based on existing ELC methodology that applies across different natural regions and subregions, it should be adaptable for use in protected areas across the whole province.

Also, with this revised map legend structure, although such information is exceedingly useful, an existing ELC inventory may not be a necessary prerequisite. Some Alberta protected areas do not have ELC inventories. Many however, do have soil inventories. The AGRSID Soil Inventory Database (Alberta Soil Information Centre 2001) covers protected areas within the White Area and provides reasonably detailed soil and landform information at 1:100 000 scale. Many other provincial parks located either in the White or Green Areas have detailed soil surveys completed as part of the former soil survey program by the Alberta Research Council (Greenlee 1981). Other protected areas are at least likely to have at least some geomorphic and/or vegetation information useful for invasive plant mapping. AGRASID, for example, did provide soil and landform information helpful to corroborate ecosite delineations needed for the invasive plant survey of Dinosaur Park.

4.2.1 Map Legend Components

The invasive inventory plant legend has four major components:

1. Map unit name and number denoting dominant landform and vegetation characteristics;
2. Invasive plant cover class (L, M, H),);
3 Dominant invasive/nuisance plant group(1, 2, or 3; and
4. Local modifying features, e.g., bw, cu, etc.

Each of these four components are combined to designate unique, repeating landscape units with particular invasive plant distributions at 1:10 000 scale.

Example map symbols:

BD1.L1 FT4.H2 BD2.M3/rd

Map symbols show the ELC map unit name and number designators separated by a dot from cover class and invasive plant group while any relevant modifying features, if present, are separated by a forward slash.

4.2.1.1 Map Unit Names and Symbols

Map units are usually named after dominant ELC ecosections and ecosite units described by Romuld (1993). Many of these were grouped because this survey could not accommodate the greater detail in the ELC breakdown. Map unit names and their corresponding symbols are shown in Table1.

Table 1. Map Unit Name Codes.

Code	Name Description
BD	Badlands - Active or Stabilized
FF	Fluvial Fans and Aprons
FT	Fluvial Terraces
TV	Tributary Valleys
UP	Uplands

4.2.1.2 Map Unit Numbers

The map unit numbers shown immediately after the name symbol, e.g., BD1, BD2 are ordinal numbers that denote significant changes in dominant landform, vegetation cover or disturbance features significant to occurrence and distribution of invasive plants within named map units.

4.2.1.3 Invasive Plant Percent Cover Classes

Cover classes employed here are those used by the Montana Weed Survey. These cover classes have received wide usage in other jurisdictions and appear to more closely reflect invasive plant distributions in terms of considerations for their management and control. Fieldwork in the park indicated that it is unlikely that any area with trace occurrence, i.e., less than one percent invasive plant coverage, and large enough to delineate at 1:10 000 can be mapped with any degree of confidence. Therefore, only three of the four classes listed in Table 2 below: L, M, and H, are used for this inventory.

Table 2. Invasive Plant Percent Cover Class Codes[1]

Code	Cover	Cover Percent
T	Trace	< 1
L	Low	1 to 5
M	Moderate	5 to 25
H	High	25 to 100

[1]*Montana Noxious Weed Survey and Mapping System*

4.2.1.4 Dominant Invasive/Nuisance Plant Groups

Invasive and nuisance plants predominant across the park are placed in three major groups as shown in Table 3. The three plant groups correspond broadly to 1) those plants found under xeric on or near actively eroding, e.g., active badlands or sediment accumulating sites, e.g., active fluvial fans, aprons and terraces; 2) those present on moist sites along tributary streams or on river terraces with a fluctuating water table within a meter of the surface; and 3) those present on disturbed sites, usually roadways or reclaimed pipeline routes. Users should note that not all of the plants listed for each group necessarily occur at a given site within particular map polygons but on average, most of them are present as dominant components. Users should also note that that member species of these groups shown in Table 3 are not exclusive to any one group and may be found as minor components of other groups at some field locations.

Table 3. Dominant Invasive/Nuisance Plant Group Codes

Code	Dominant Invasive/Nuisance Plants	Major Occurrence
1	Russian thistle, bluebur, goat's-beard, common peppergrass, foxtail barley, common burdock, Canada fleabane, cocklebur.	Present in areas with active erosion or deposition, e.g., active badland, active portions of fans and terraces.
2	Awnless brome, Canada thistle, crested wheat grass, sweet clover, perennial sow thistle. foxtail barley is dominant in saline areas.	Present in moist sites on terraces along the Red Deer River, and also along tributary valleys with permanent streams, irrigation water drainage, or saline seepage,.
3	Crested wheat grass, Russian thistle, flixweed, sweet clover, kochia.	Present along roadways, reclaimed pipeline rights of way, and sometimes as invading patches from adjacent cultivated upland.

4.2.1.5 Local Modifying Features

Local modifying features found to preferentially influence invasive plant distribution within the park are listed in Table 4. Many of these are disturbances that result from human activity but others, such as permanent streams or surface soil salinity, are natural features.

Table 4. Local Modifying Feature Codes.

Code	Description
bw	Berms, borrow pits, irrigation pumping sites.
cu	Past cultivation: tame or non-native species.
fi	Fire disturbed.
ir	Tributary stream receiving irrigation drainage water.
pf	Public park facilities: campgrounds, picnic areas, playgrounds, and maintenance depots.
pl	Reclaimed pipeline rights-of –way.
ps	Permanent stream.
rd	Roadway margins, grades with culverts.
sa	Surface soil salinity: saline flats, seepage areas.
tr	Park walking trails, footpaths.
un	Cattle grazing: active or past intensive.
wt	Invasive plants occur with wetland species.

4.3 Map Compilation

Invasive plant map compilation for Dinosaur Park differed from that done for Police Outpost and Beauvais Lake parks in that the Leica Softcopy Photogrammetric Suite program was used for digital stereo interpretation instead of manual examination of stereo air photo pairs. The procedure involved preparation of diapositives from existing black and white, 1:30 000 scale air photo coverage obtained in 2001. These diapositives were then scanned at 15 micron resolution to produce digital imagery required for use with the Softcopy program. Photo interpretation with simultaneous digitizing of polygon boundaries was then done using the stereo Softcopy 3D imaging facility now available here with Resource Data Branch (RDB).

An orthophoto mosaic was also prepared for use as a base map at 1: 10K from the same 1:30K scanned diapositives. The polygon boundaries produced with Softcopy were then placed on the ortho mosaic base and labeled using RDB Geographic Information System facilities.

The main advantage of using Softcopy was to speed up the photo interpretation, digitizing and transfer of polygon lines to the base map by eliminating intermediate steps and introduction of errors associated with routine manual map preparation. Stereo viewing also seemed easier with Softcopy than with manual stereoscopic interpretation. Softcopy interpretation is also aided by having image enhancement in terms of magnification and contrast, both of which with judicious use can help with accurate identification and map boundary placement.

A possible disadvantage with Softcopy digital interpretation is the relatively high cost of photo scanning and preparation of ortho mosaic base maps which may not be completely offset by faster map compilation. In this project there was still a significant amount of work needed to remove line breaks and close polygons before the final map product could be considered clean. Given that both the interpreter and the map compiler were on a learning curve, some of this probably could have been avoided with more experienced operators. However, some of the digitizing errors do seem to be inherent with the Softcopy process. The operational requirements of this inventory project did not allow evaluation of various error factors involved.

5.0 INVENTORY RESULTS

Five map portions at 1:10 000 scale accompany this report and serve to document the distribution and extent of invasive plant species in Dinosaur Provincial Park. The polygon labels designate the terrain (badlands, fluvial terraces, etc.), the dominant vegetation cover, the level of infestation, the dominant invasive species and their relative abundance, and, if present, the type of disturbance affecting this distribution. Even though the final map scale is relatively large, the inventory should still be considered a reconnaissance study, an overview of invasive plant occurrence and distribution across the park area. Precise locations of invasive plants cannot be shown, even at this relatively large map scale. The 1:10 000 scale was chosen partly for legibility but mainly to provide fairly detailed, ecological divisions of terrain as a framework for later, more detailed studies of different kinds of invasive species. The maps are provided as a limited number of hardcopies and in digital format on CDROM. The CD contains individual plot files for easier reproduction of the separate hardcopy portions and a seamless overall coverage in ArcView GIS Version 3.2a.

5.1 Distribution of Invasive Plant Map Units

Map units distribution is shown in terms of hectares and percent of the study area occupied in Table 5.1 below. Actively eroding badlands cover the largest portion of the park at 43 percent. Badlands including active, stabilized, and partially stabilized occupy just over two-thirds of the park area, in total 67.5 percent. The next largest portion, 14.5 percent, includes the upland units. Units situated within the main or tributary valleys including fans, terraces and tributary valley bottoms, account for most of the remaining area at 17.6 percent. The remaining 0.4 percent is comprises miscellaneous land units: areas disturbed by human development, private land easements, and vegetated but more or less ephemeral islands and sand bars in the Red Deer River.

Table 5. Distribution of Invasive Plant Map Units for Dinosaur Provincial Park.

Map Unit	Count	Area	MU %
Badlands, Active			
BD1.L1	44	3183.92	43.0
Badlands, Stabilized			
BD2.L1	40	230.57	
BD2.M2/rd	1	103.56	
BD2.M3/rd	4	562.92	
BD2.M3/tr	2	15.77	12.3
Badlands, Partially Stabilized			
BD3.L1	42	555.48	
BD3.L2/ps	1	3.05	
BD3.M2/ir	1	9.94	
BD4.L1	8	188.07	
BD5.L1	6	39.52	
BD6.L1	5	112.64	12.2
Fluvial Fans & Aprons			
FF1.M1	4	69.07	
FF2.L1	2	45.90	
FF3.L1	9	99.93	
FF3.M3/rd	1	12.64	3.1
Fluvial Terraces			
FT1.M2	7	39.19	
FT2.H2/cu	1	19.84	
FT2.H2/fi	1	6.70	
FT2.L1	6	109.48	
FT2.L2/un	1	7.43	
FT2.M2/pf	2	9.27	
FT2.M3/tr	1	6.75	
FT3.L2/wt	1	3.13	
FT3.L3	7	115.09	
FT4.H2	17	376.66	
FT4.M2/pf	1	9.00	9.5
Tributary Valley Bottoms			
TV1.M1	2	18.85	
TV1.M2/rd	1	1.09	
TV2.L1	3	3.70	
TV2.M2/ps	1	2.38	
TV2.M2/sa.ir	1	4.29	
TV3.L1	3	4.22	
TV4.M2	1	105.74	
TV3.M3/rd	1	39.56	
TV5.L1	17	129.63	
TV5.L1/sa	1	20.37	
TV5.M2/sa.ir	1	38.16	5.0

Table 5. Continued

Map Unit	Count	Area	MU %
Uplands			
UP1.H3/pl	2	131.51	
UP1.L1	43	670.09	
UP1.M2/ir	1	15.71	
UP1.M3/rd	1	4.74	
UP1.M3/rd.tr	1	11.19	
UP1.M3/tr	1	199.56	
UP2.L1	41	39.37	14.5
Miscellaneous Land Units			
DL1	5	8.86	
LE1.M3	2	2.21	
PB1.L2	9	15.27	0.4
Grand Total	354	7402.00	100.0

6.0 SUMMARY AND CONCLUSIONS

The invasive plant inventory conducted in Dinosaur Provincial Park provides a medium intensity overview of the kind and distribution of major invasive and nuisance plant species common within the park. Survey results show that even in this dry mixed grass region, most invasive plants become established at sites with some human disturbance, e.g., roads, trails interpretive sites, parking areas and picnic sites. Invasive plants, such as awnless brome, Canada thistle, and perennial sow thistle that are major problems across other parks with moister climates, are able to predominate here only on the moist portions of the main Red Deer River terraces and next to permanent streams in some tributary valleys. Elsewhere, they barely occur under the generally dry conditions over most of the park. Because of this moisture limitation, cattle grazing seems to have little or no effect on the spread of these weed species in this protected area.

Crested wheat grass, well adapted to dry conditions, has in some locations invaded from cultivated forage fields on uplands outside the park boundary. At other locations crested wheat grass has been seeded as a reclamation species and remains dominant with other weed species, especially along gas pipeline routes and sites along power transmission corridors.

Invasive plant control across this protected area may be a moot question. Most of the invasive species are abundant and confined to moist sites largely away from the main tourist attraction of

the park, the badlands. Sporadic occurrence of invasive plants in the badlands are generally along roads, trails and interpretive sites and perhaps future detailed inventory for control purposes, possibly using Geographic Positioning System (GPS) technology, should be concentrated on these prime tourist and educational feature areas.

A number of highly weed-infested areas encountered during the fieldwork were delineated using GPS equipment. Invasive/nuisance species mapped include: Awnless brome grass, Foxtail barley, Crested wheat grass, and Russian thistle. They are included together with a location map as examples in the Appendix of this report. Results from only a few local areas such as these do not give a representative, let alone a complete picture. However, these results were promising and the methodology could probably be selectively applied to priority use areas to accurately outline areas where rare species are under threat by invasive plants or other hazards.

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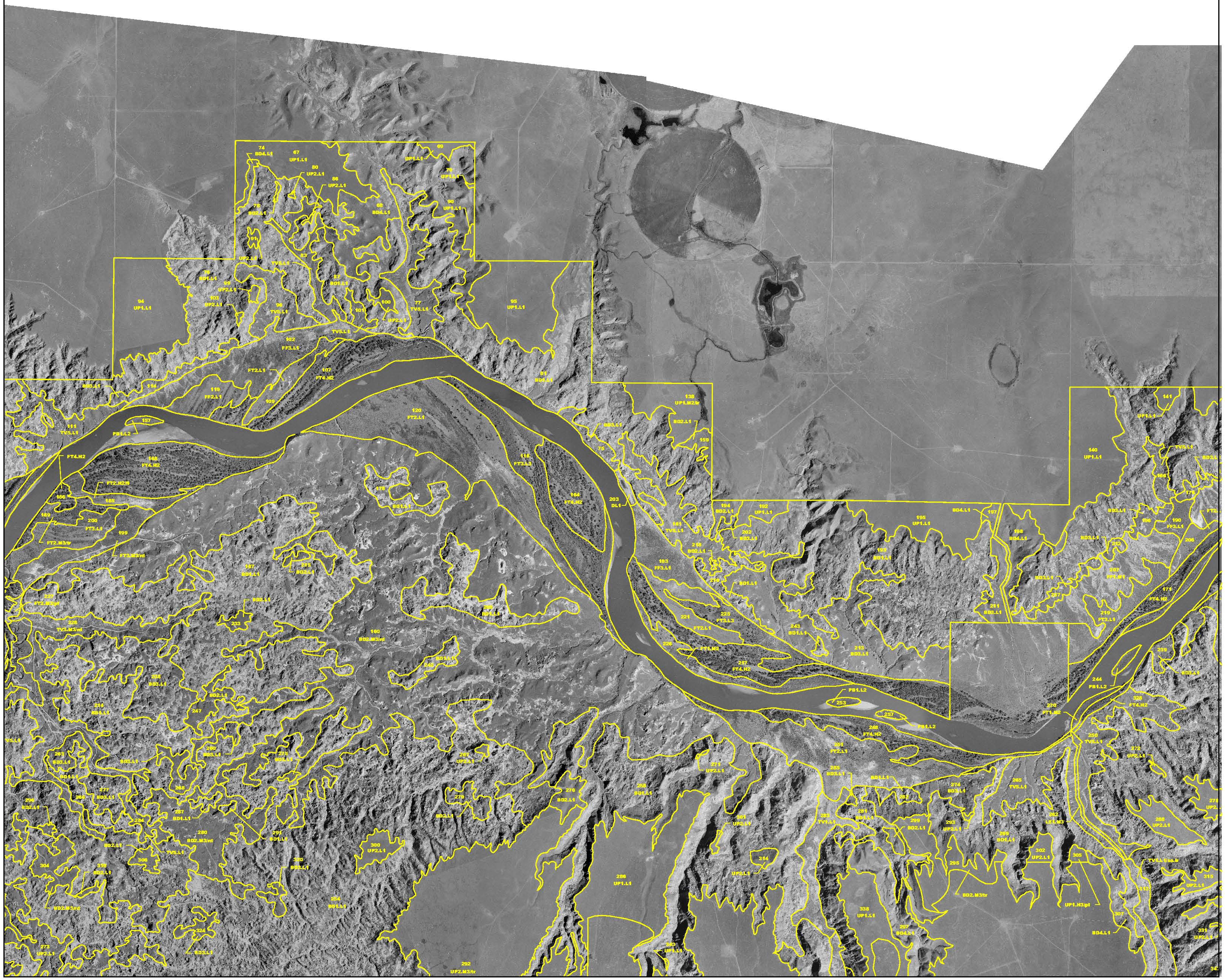
APPENDIX 1

GPS MAPPED INVASIVE PLANT SPECIES



Alberta
COMMUNITY DEVELOPMENT

Invasive Plant Species Inventory
Dinosaur Provincial Park
Central North Portion

0.5 0 0.5 1 Kilometers

1:10,000

MAP LEGEND

Map Unit Name and Number

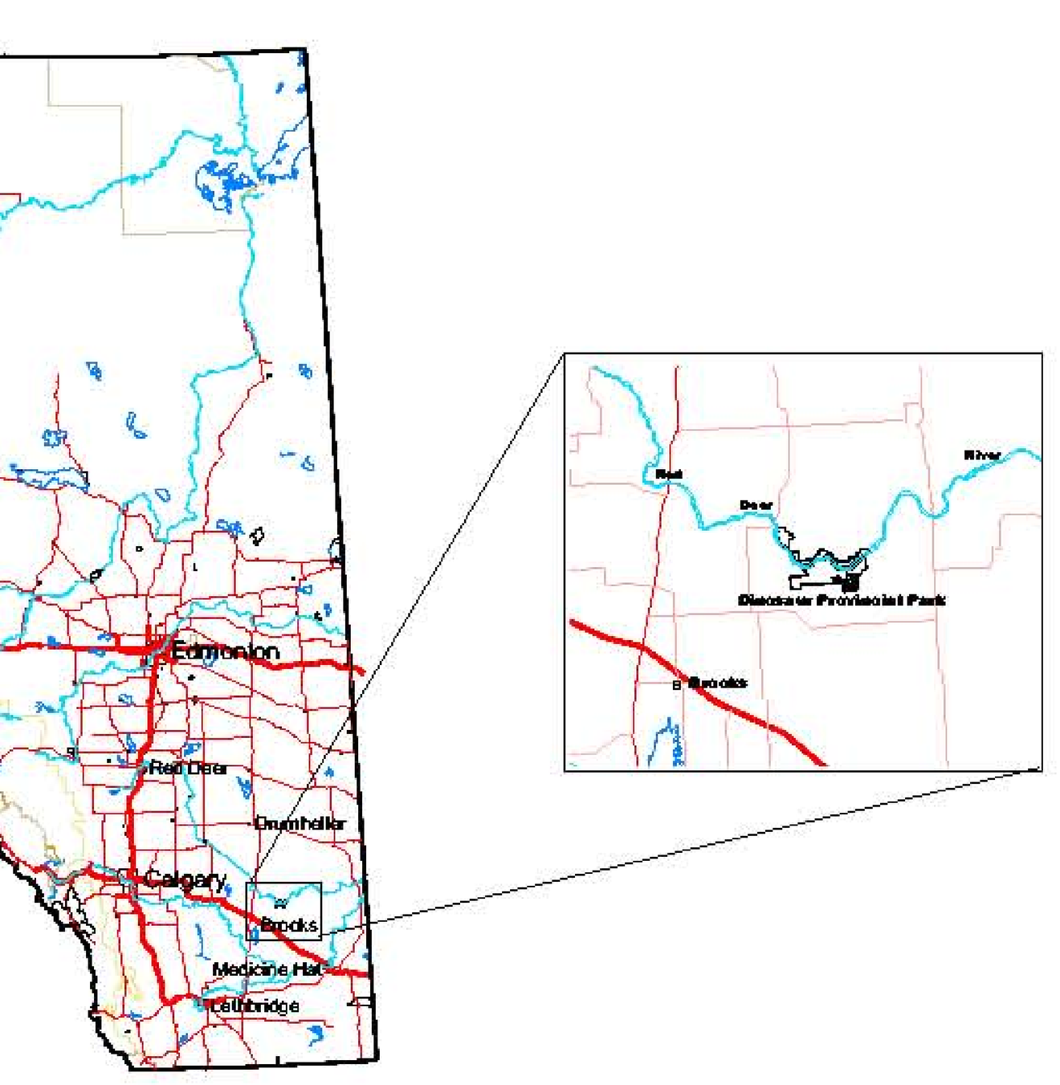
Code*	Dominant Landform/Parent Materials	Dominant Vegetation Cover
Badlands (BD) - Actively Eroding		
Badlands (BD) - Stabilized		
Badlands (BD) - Partially Stabilized		
Fluvial Fans and Aprons (FF) - Active		
Fluvial Fans and Aprons (FF) - Stabilized		
Fluvial Terraces (FT) - Channelled, Active		
Fluvial Terraces (FT) - Channelled, Stabilized		
Tributary Valley Bottoms (TB) - Active		
Tributary Valley Bottoms (TB) - Stabilized		
Uplands (UP)		
Miscellaneous Land Units		

Invasive Plant Cover Classes

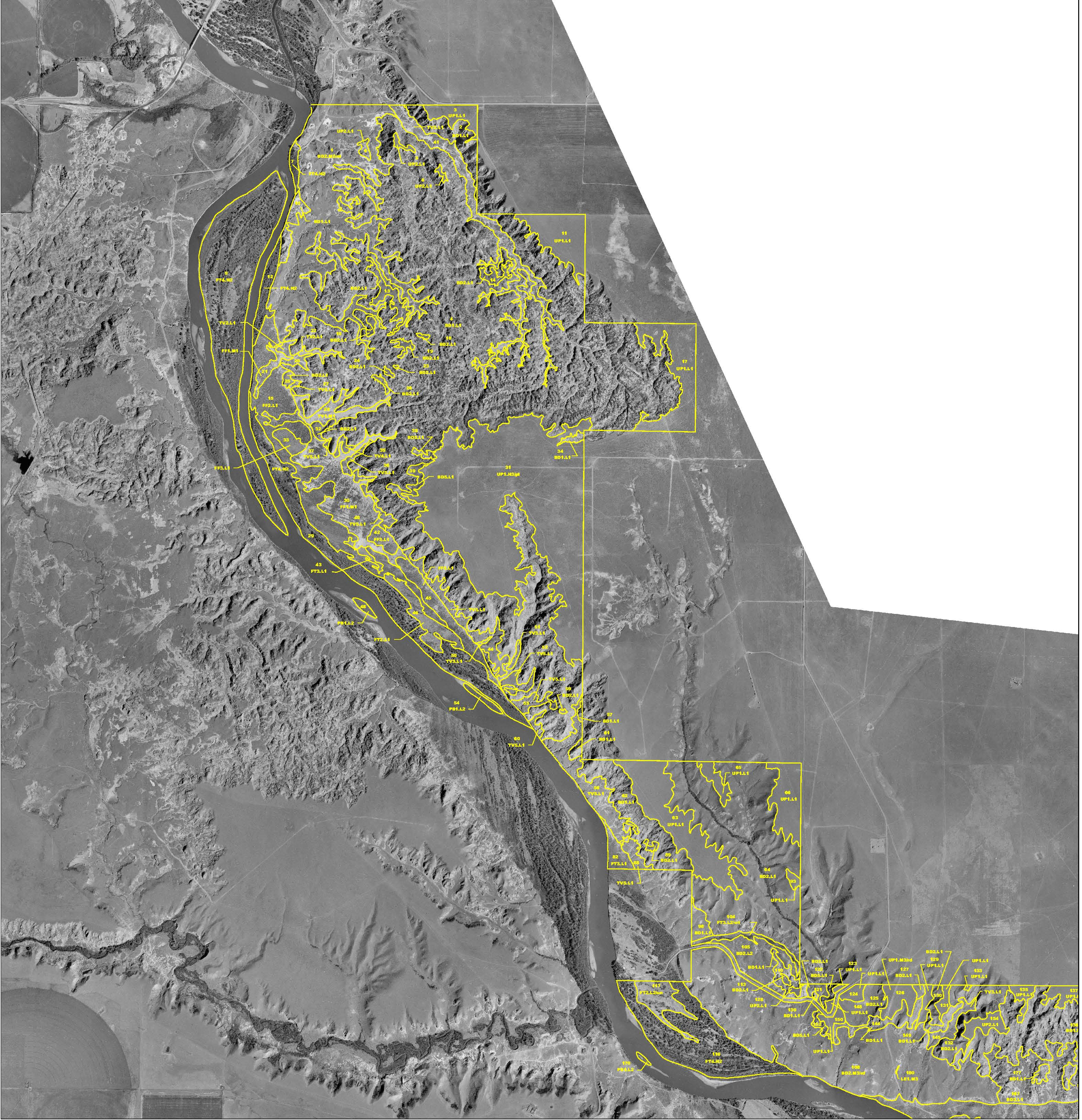
Dominant Invasive Plant Group Codes

Local Modifying Feature Codes

Example Map Unit Label



Base Map Data Provided by Spatial Data Warehouse Ltd.
Air photo image prepared by Alberta Sustainable Resource Development, Forest Protection Division.
Map prepared by Alberta Sustainable Resource Development, Strategic Corporate Services, Resource Information Management Branch, July 2004.



COMMUNITY DEVELOPMENT

Invasive Plant Species Inventory

Dinosaur Provincial Park

Northwest Portion

0.5 0 0.5 1 Kilometers

MAP LEGEND

Map Unit Name and Number

Code* | Dominant Landform/Parent Materials | Dominant Vegetation Cover

Badlands (BD) - Actively Eroding

Badlands (BD) - Stabilized

Badlands (BD) - Partially Stabilized

Fluvial Fans and Aprons (FF) - Active

Fluvial Fans and Aprons (FF) - Stabilized

Fluvial Terraces (FT) - Channelled, Active

Fluvial Terraces (FT) - Channelled, Stabilized

Tributary Valley Bottoms (TV) - Active

Tributary Valley Bottoms (TV) - Stabilized

Uplands (UP)

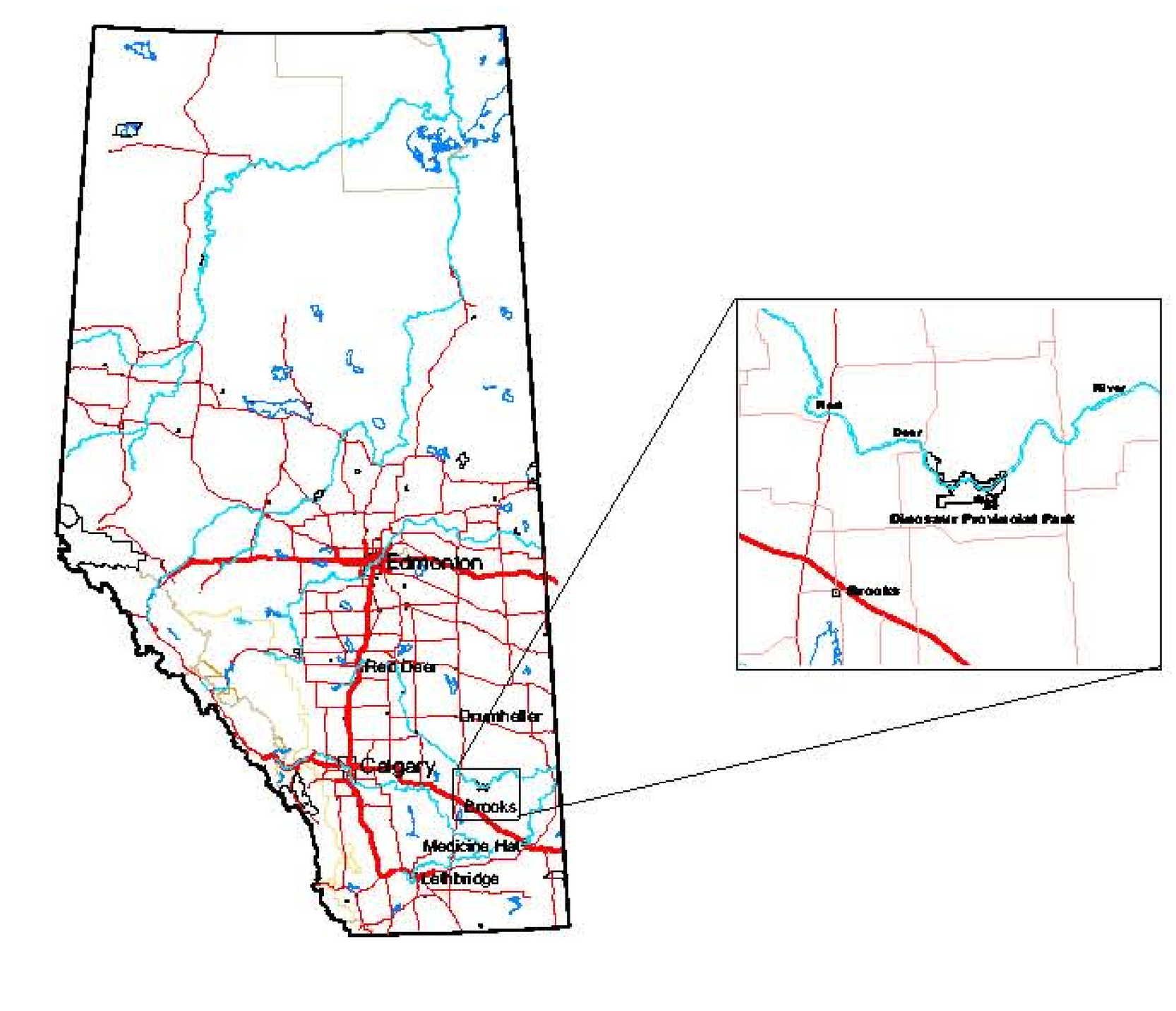
Miscellaneous Land Units

Invasive Plant Cover Classes*

Dominant Invasive Plant Group Codes

Local Modifying Feature Codes

Example Map Unit Label



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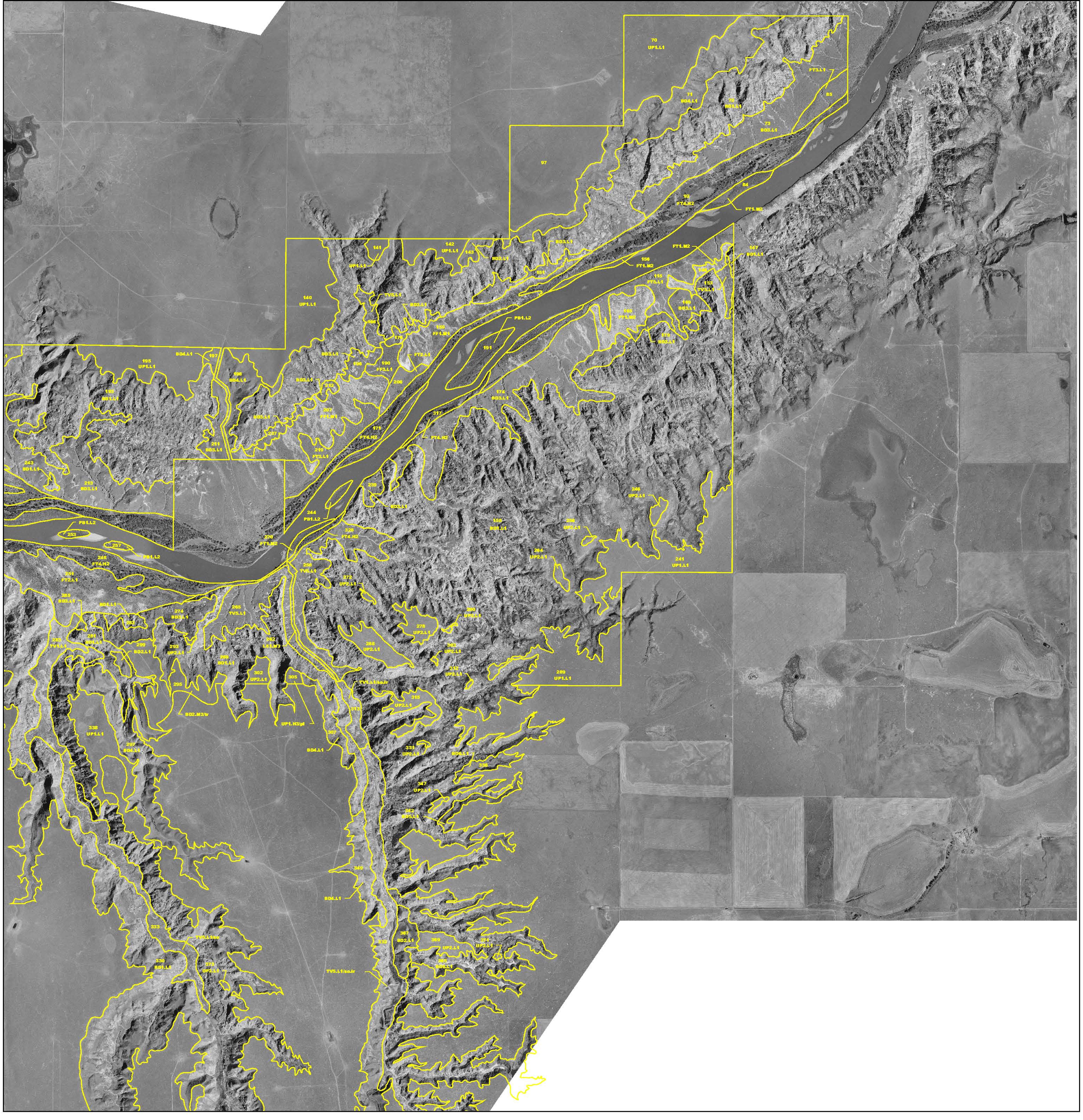


Alberta

COMMUNITY DEVELOPMENT

Invasive Plant Species Inventory

Dinosaur Provincial Park

East Portion

0.4 0 0.4 0.8 Kilometers

1:10,000

MAP LEGEND

Map Unit Name and Number

Code*	Dominant Landform/Parent Materials	Dominant Vegetation Cover

Badlands (BD) - Actively Eroding

Badlands (BD) - Stabilized

Badlands (BD) - Partially Stabilized

Fluvial Fans and Aprons (FF) - Active

Fluvial Fans and Aprons (FF) - Stabilized

Fluvial Terraces (FT) - Channelled, Active

Fluvial Terraces (FT) - Channelled, Stabilized

Tributary Valley Bottoms (TB) - Active

Tributary Valley Bottoms (TB) - Stabilized

Uplands (UP)

Miscellaneous Land Units

Invasive Plant Cover Classes^

Code	Cover	Cover Percent
T	Trace	<1
L	Low	1 to 5
M	Moderate	5 to 25
H	High	25 to 100

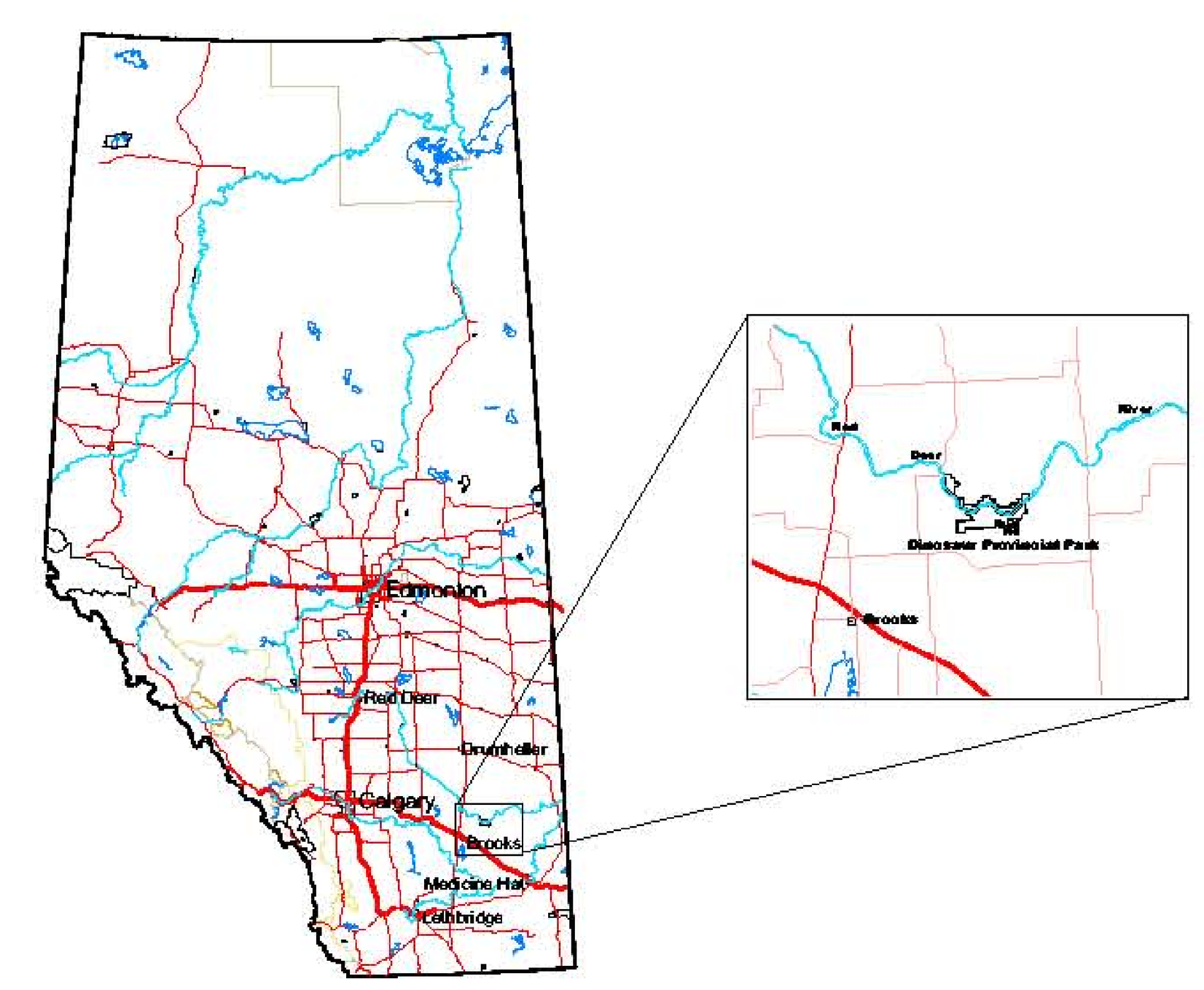
Dominant Invasive Plant Group Codes

Code	Dominant Invasive/ Nuisance Plants	Major Occurrence
1	[illegible]	[illegible]
2	[illegible]	[illegible]
3	[illegible]	[illegible]

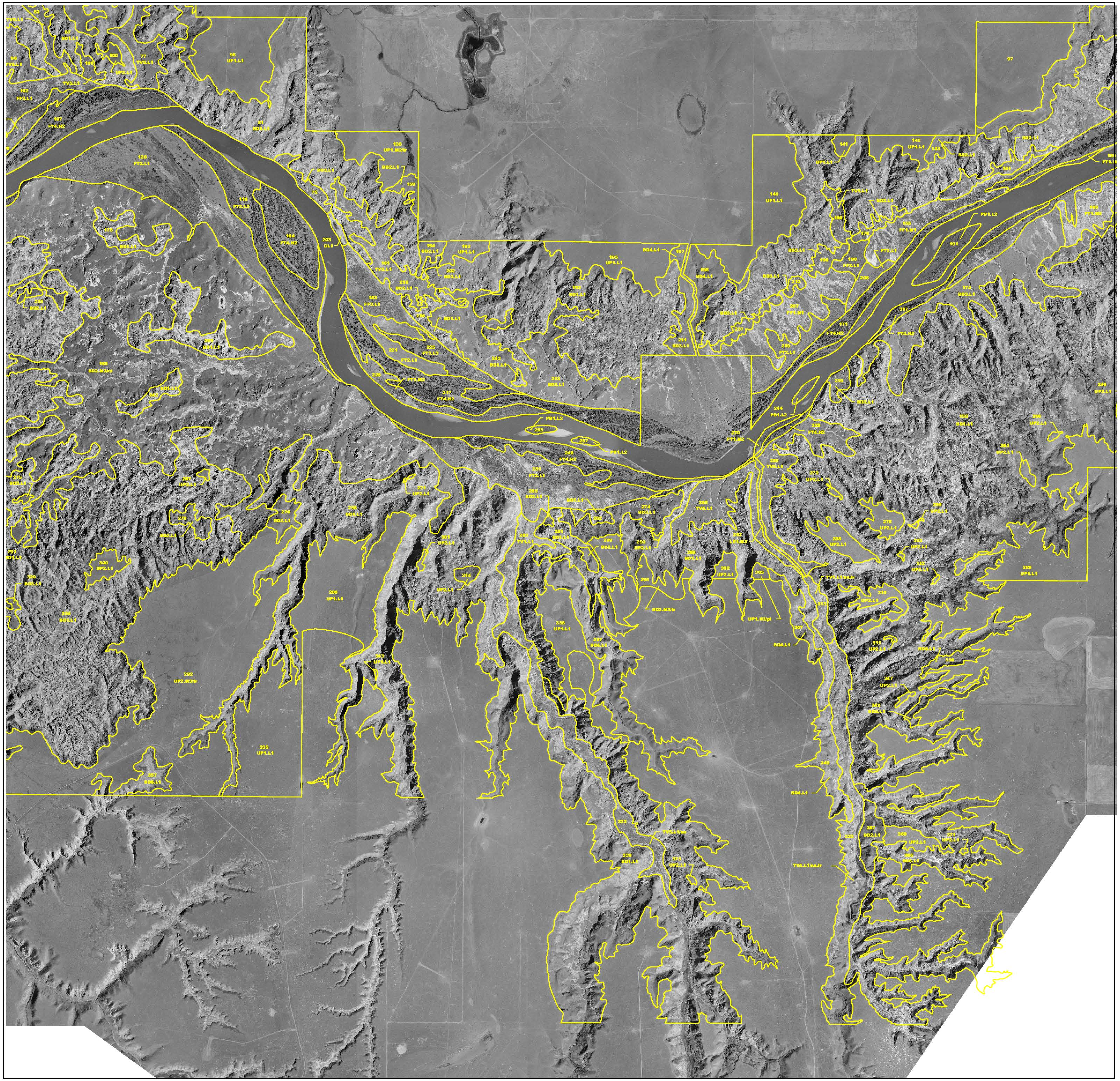
Local Modifying Feature Codes

Code	Description

Example Map Unit Label



Base Map Data Provided by Spatial Data Warehouse Ltd.
Air photo image prepared by Alberta Sustainable Resource Development, Forest Protection Division.
Map prepared by Alberta Sustainable Resource Development, Strategic Corporate Services, Resource Information Management Branch, July 2004.



Alberta

COMMUNITY DEVELOPMENT

Invasive Plant Species Inventory

Dinosaur Provincial Park

Central South Portion

0.5 0 0.5 1 Kilometers

1:10,000

MAP LEGEND

Map Unit Name and Number

Code*	Dominant Landform/Parent Materials	Dominant Vegetation Cover

Badlands (BD) - Actively Eroding

BD1

Badlands (BD) - Stabilized

BD2

Badlands (BD) - Partially Stabilized

BD3

BD4

BD5

BD6

Fluvial Fans and Aprons (FF) - Active

FF1

Fluvial Fans and Aprons (FF) - Stabilized

FF2

FF3

Fluvial Terraces (FT) - Channelled, Active

FT1

Fluvial Terraces (FT) - Channelled, Stabilized

FT2

FT3

FT4

Tributary Valley Bottoms (TB) - Active

TV1

Tributary Valley Bottoms (TB) - Stabilized

TV2

TV3

TV4

TV5

Uplands (UP)

UP1

UP2

Miscellaneous Land Units

DL1

DL2

LE1

PB1

Invasive Plant Cover Classes^

Code	Cover	Cover Percent
T	Trace	<1
L	Low	1 to 5
M	Moderate	5 to 25
H	High	25 to 100

Dominant Invasive Plant Group Codes

Code	Dominant Invasive/Nuisance Plants	Major Occurrence
1		
2		
3		

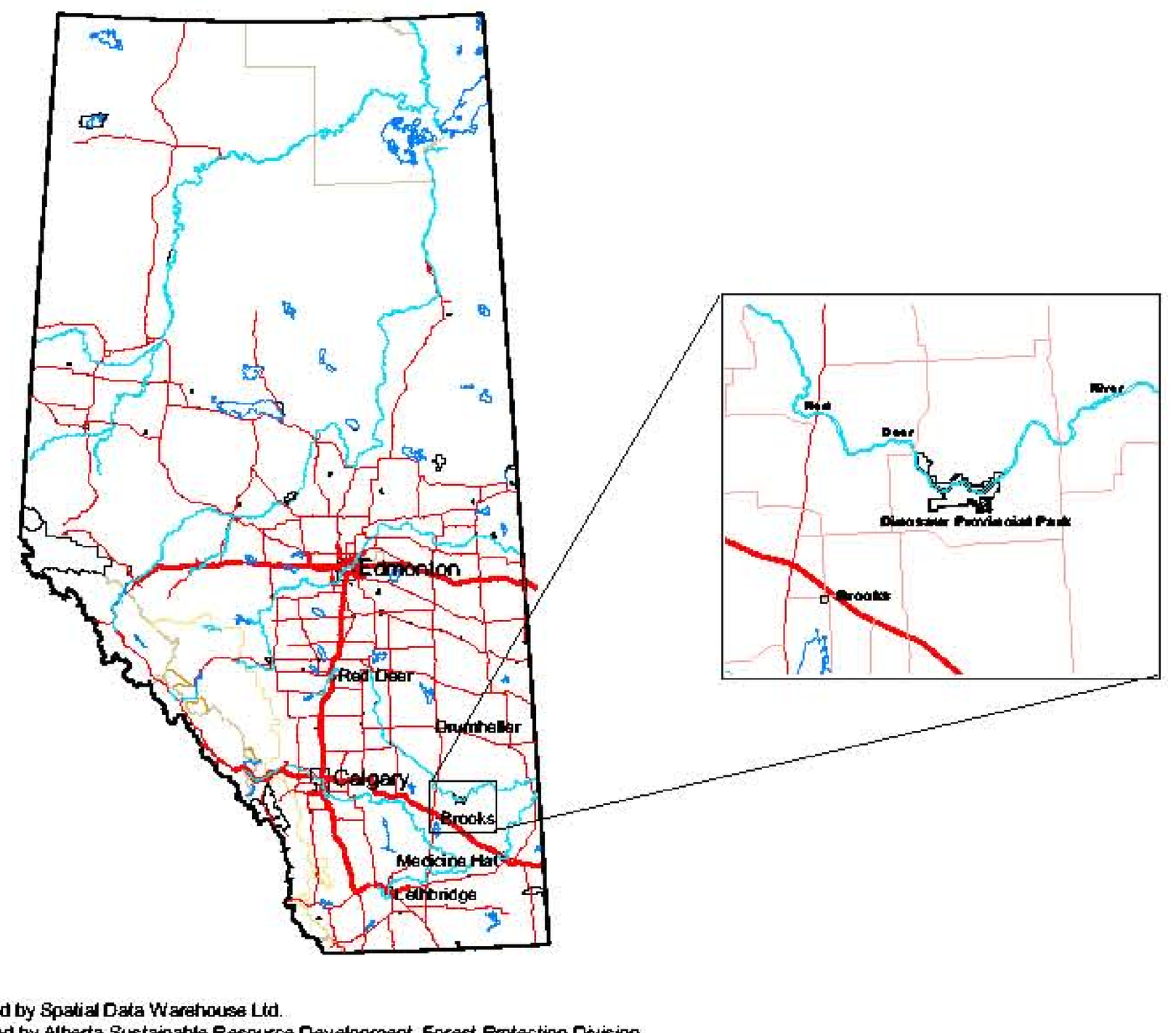
Local Modifying Feature Codes

Code	Description

Example Map Unit Label

294

UP1.M3/rd.tr



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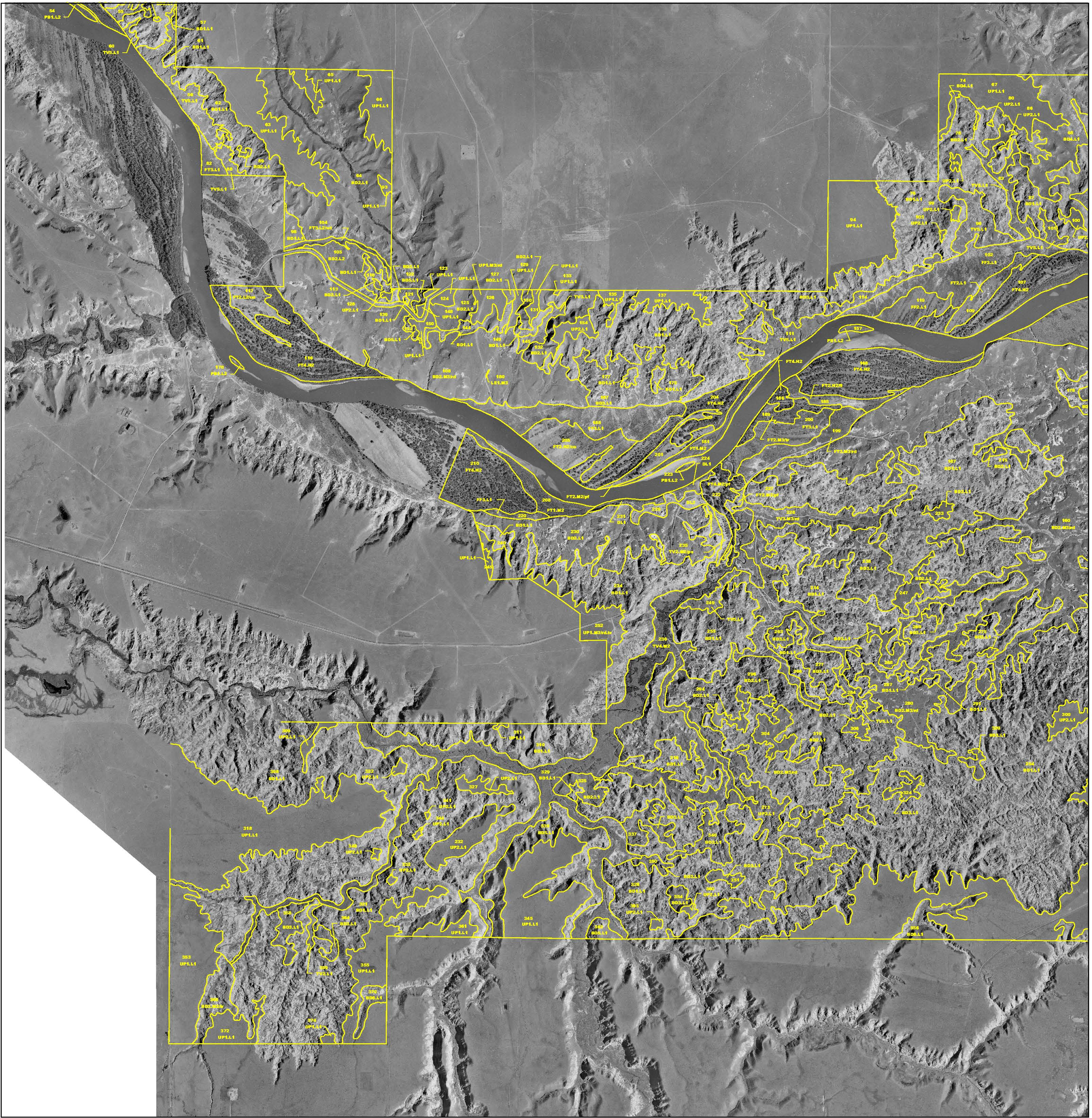

Alberta

COMMUNITY DEVELOPMENT

Invasive Plant Species Inventory

Dinosaur Provincial Park

Southwest Portion

0.5 0 0.5 1 Kilometers

1:10,000

MAP LEGEND

Map Unit Name and Number

Code*	Dominant Landform/Parent Materials	Dominant Vegetation Cover

Badlands (BD) - Actively Eroding

BD1

Badlands (BD) - Stabilized

BD2

Badlands (BD) - Partially Stabilized

BD3

BD4

BD5

BD6

Fluvial Fans and Aprons (FF) - Active

FF1

Fluvial Fans and Aprons (FF) - Stabilized

FF2

FF3

Fluvial Terraces (FT) - Channelled, Active

FT1

Fluvial Terraces (FT) - Channelled, Stabilized

FT2

FT3

FT4

Tributary Valley Bottoms (TB) - Active

TV1

Tributary Valley Bottoms (TB) - Stabilized

TV2

TV3

TV4

TV5

Uplands (UP)

UP1

UP2

Miscellaneous Land Units

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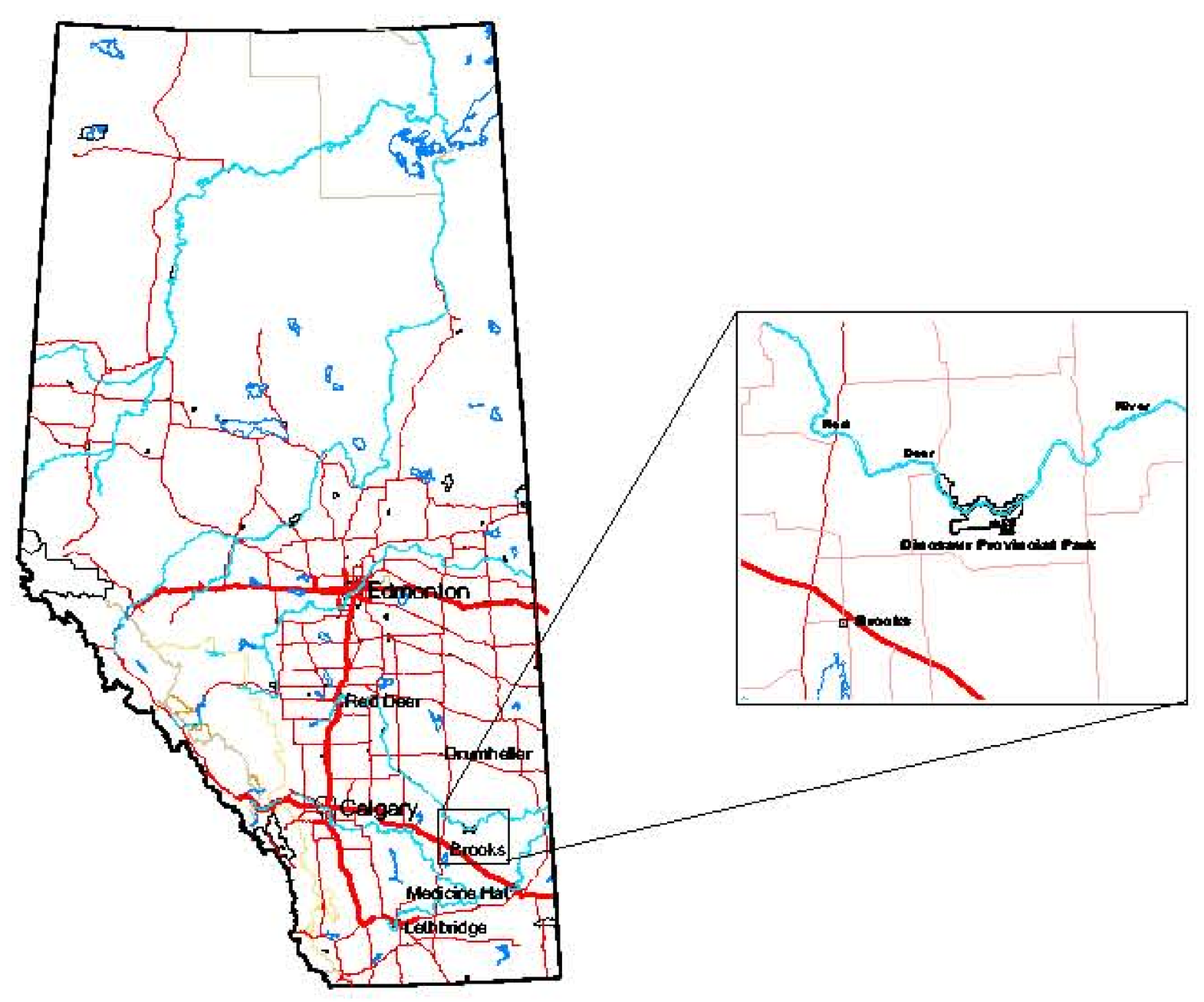
Code	Dominant Invasive/ Nuisance Plants	Major Occurrence

Local Modifying Feature Codes

Example Map Unit Label



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