Creating Maps in SAS 9.4

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Outline

- Comparison of old vs. new SAS maps
- Install/Update map data
- Create map using PROC GMAP
  - Project maps – PROC GPROJECT
  - Map with legend and annotation
  - Map with data layers
  - Change color scheme
  - Map with shape files

Old SAS Maps

- In the past, various sources of map data were used
- Data inconsistencies due to different data sources
- Huge amount of time on data processing
- Lack of inexpensive sources
- No technical support
- No updates on old SAS maps - eventually phase out

The New SAS Gfk Maps

- Partner with a third-party vendor - GfK GeoMarketing
- The map datasets are updated annually
- Perform updates manually – NOT automatically updated
- Need a current license for a SAS product that includes SAS/GRAPH

Install/Update Map Data Set

- Download GFK Maps
- Need to register with SAS
- Need admin privilege
- Run **PROC CIMPORT**

```
LIBNAME SASFILES 'C:\Program Files\SASHome\
      SASFoundation\9.4\Mapsgfk';

PROC CIMPORT INFILE='C:\Mydownloads\Canada.cpt'
      LIBRARY=SASFILES;
RUN;
```

PROC GMAP

```
PROC GMAP MAP=map-data-set
          DATA=response-data-set;
     ID XX;
     CHORO XX;
RUN;
```

ID: define map area

CHORO: determine midpoints and assign patterns

Data at a Glance

	Census Divisions code	Province code	ID segment number	Projected Longitude: Albers	Projected Latitude: Albers	Unprojected degrees longitude (East)	Unprojecte degrees latitude	Map detail level based on output resolution	Greduce density values	Lake Flag:
1	CA-1001	CA-10	1	0.478462	-0.08423	-52.937996	48.171	8	5	0
2	CA-1001	CA-10	1	0.478501	-0.08421	-52.934159	48.1707	2	2	0
3	CA-1001	CA-10	1	0.478506	-0.08422	-52.934425	48.1699	8	6	0
4	CA-1001	CA-10	1	0.47849	-0.08425	-52.936998	48.1693	8	5	0
5	CA-1001	CA-10	1	0.4785	-0.08425	-52.936182	48.169	8	6	0
6	CA-1001	CA-10	1	0.478506	-0.08426	-52.936478	48.1682	8	5	0
7	CA-1001	CA-10	1	0.478504	-0.08429	-52.938254	48.1669	5	4	0
8	CA-1001	CA-10	1	0.478512	-0.08429	-52.937754	48.1665	8	6	0
9	CA-1001	CA-10	1	0.478513	-0.0843	-52.938461	48.1658	8	6	0
10	CA-1001	CA-10	1	0.478527	-0.08431	-52.937744	48.1652	8	6	0
11	CA-1001	CA-10	1	0.478529	-0.08432	-52.938196	48.1645	8	5	0
12	CA-1001	CA-10	1	0.47855	-0.08432	-52.936779	48.1638	2	2	0
13	CA-1001	CA-10	1	0.478581	-0.08428	-52.932545	48.1646	8	5	0
14	CA-1001	CA-10	1	0.478582	-0.08426	-52.931594	48.1653	8	6	0
15	CA-1001	CA-10	1	0.478572	-0.08426	-52.931975	48.1659	6	4	0

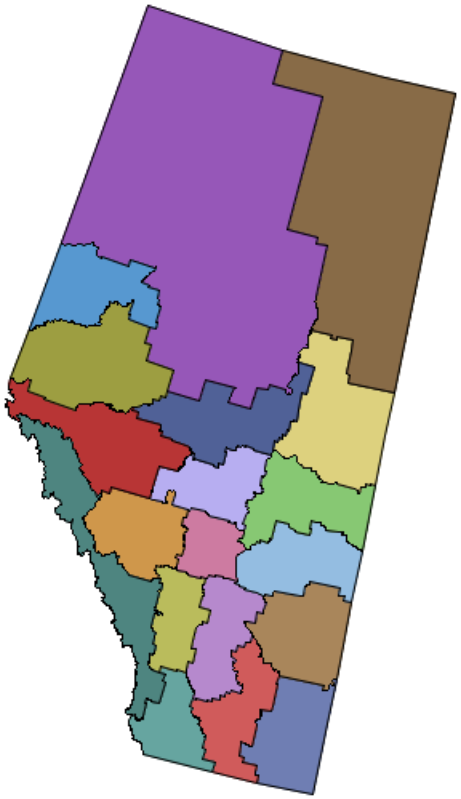
Mapsgfk.Canada

Data at a Glance – Cont.

	Provinces code	ISO Country code	Census Divisions name	Provinces name	ISO Country name	Alternate IDname	Census Divisions name in Unicode	Provinces name in Unicode	Alternate Provinces name in	Alternate ID1name
1	CA-10	124	Division No. 1	Newfoundland and Labrador	CANAD		Division No. 1	Newfoundland and Labrador	Terre-Neuve	Terre-Neuv
2	CA-10	124	Division No. 2	Newfoundland and Labrador	CANAD		Division No. 2	Newfoundland and Labrador		Terre-Neuv
3	CA-10	124	Division No. 3	Newfoundland and Labrador	CANAD		Division No. 3	Newfoundland and Labrador		Terre-Neuv
4	CA-10	124	Division No. 4	Newfoundland and Labrador	CANAD		Division No. 4	Newfoundland and Labrador		Terre-Neuv
5	CA-10	124	Division No. 5	Newfoundland and Labrador	CANAD		Division No. 5	Newfoundland and Labrador		Terre-Neuv
6	CA-10	124	Division No. 6	Newfoundland and Labrador	CANAD		Division No. 6	Newfoundland and Labrador		Terre-Neuv
7	CA-10	124	Division No. 7	Newfoundland and Labrador	CANAD		Division No. 7	Newfoundland and Labrador		Terre-Neuv
8	CA-10	124	Division No. 8	Newfoundland and Labrador	CANAD		Division No. 8	Newfoundland and Labrador		Terre-Neuv
9	CA-10	124	Division No. 9	Newfoundland and Labrador	CANAD		Division No. 9	Newfoundland and Labrador		Terre-Neuv
10	CA-10	124	Division No. 10	Newfoundland and Labrador	CANAD		Division No. 10	Newfoundland and Labrador		Terre-Neuv

Mapsgfk.Canada_attr

Default Map



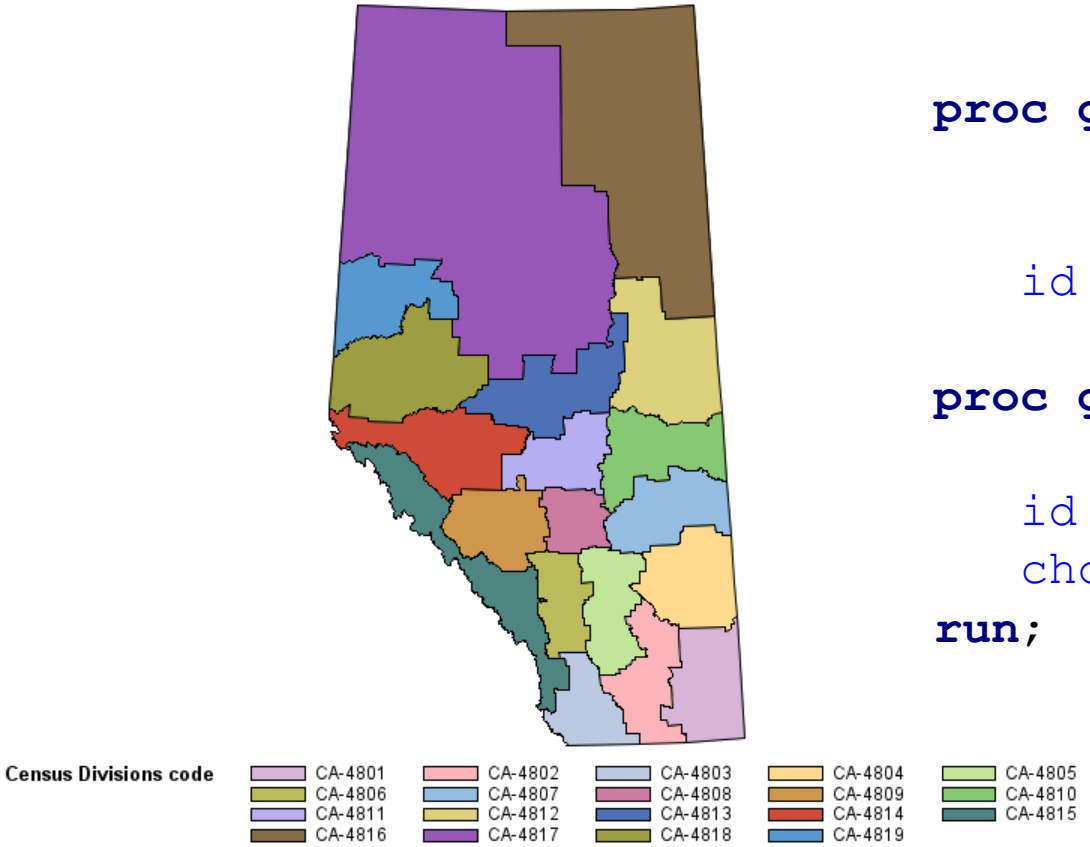
Census Divisions code
CA-4801 CA-4802 CA-4803 CA-4804 CA-4805
CA-4806 CA-4807 CA-4808 CA-4809 CA-4810
CA-4811 CA-4812 CA-4813 CA-4814 CA-4815
CA-4816 CA-4817 CA-4818 CA-4819

```
data alberta_map;
    set mapsgfk.canada;
    where ID1='CA-48';
run;

goptions transparency;

proc gmap data=alberta_map
          map=alberta_map;
    id id;
    choro id / statistic=first;
run;
```

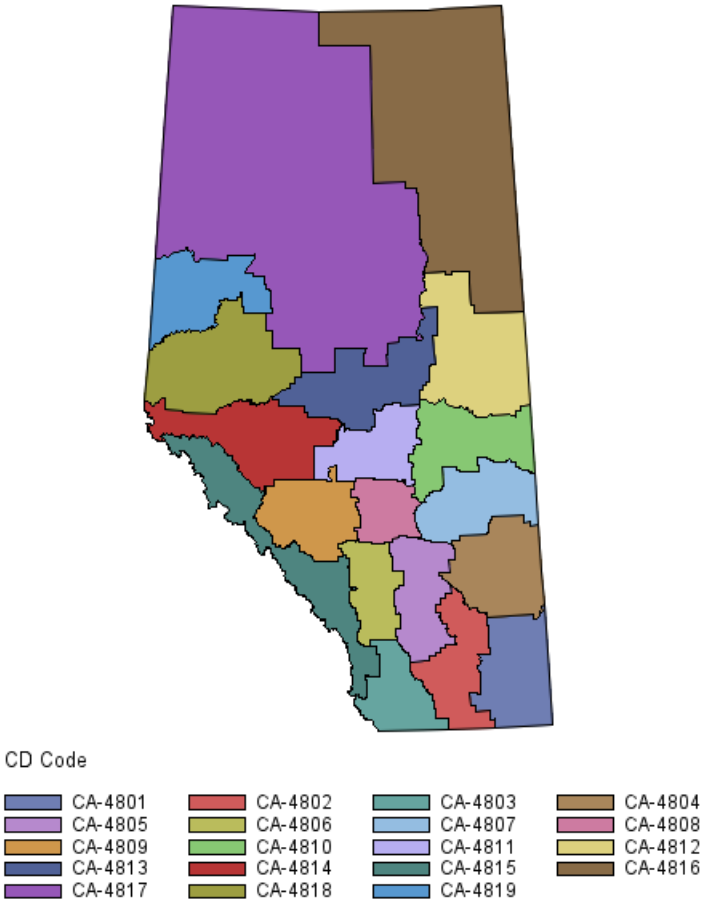
Projected Map




```
proc gproject data=alberta_map
        out=alberta_map
        latlong eastlong degrees;
    id id;

proc gmap data=alberta_map
             map=alberta_map;
    id id;
    choro id / statistic=first;
run;
```

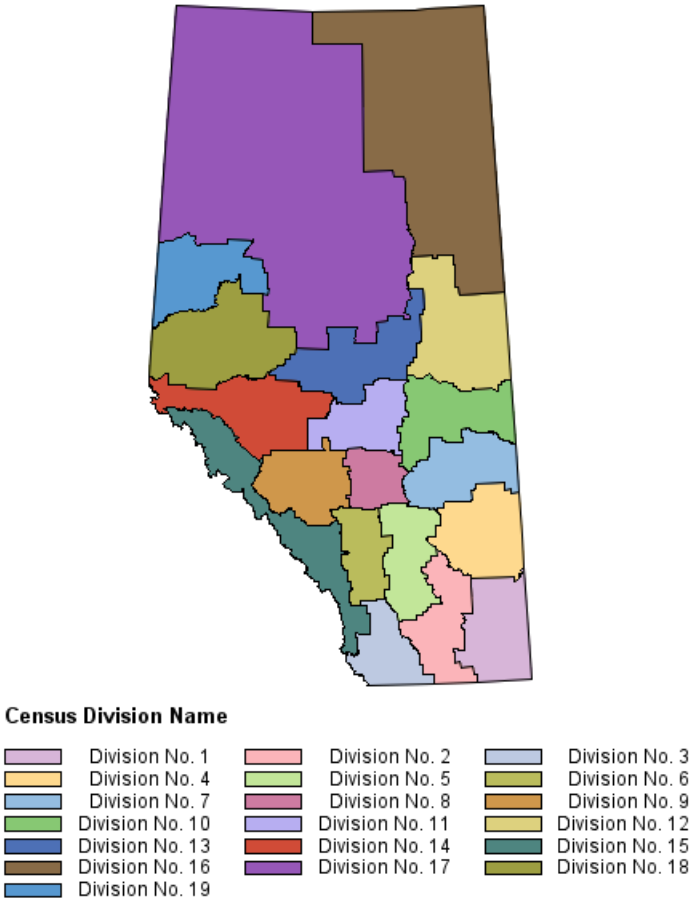
Map with Legend – Legend Statement




```
legend1 across=4
   label=(position=top 'CD Code')
   position=(bottom center);

proc gmap data=alberta_map
          map=alberta_map;
   id id;
   choro id / statistic=first
              legend=legend1;
run;
```

Map with Legend – Choro Statement

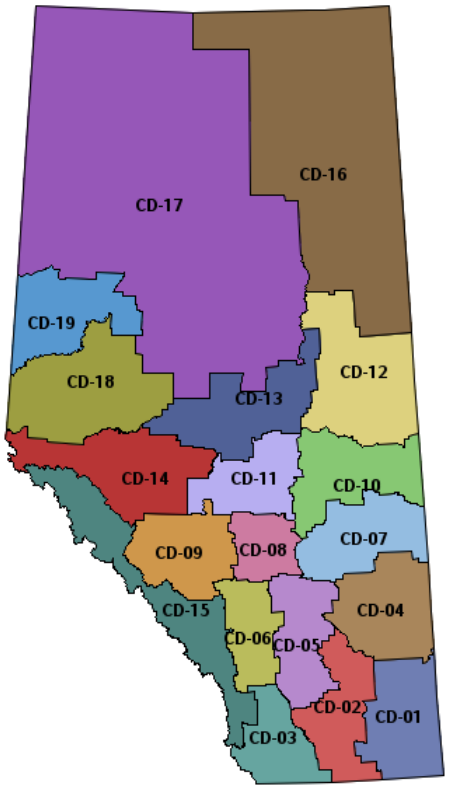



```
data alberta;
   merge alberta_map
         mapsgfk.canada_attr
         (keep=id id1 idname
         where=(id1='CA-48'));
   by id;
run;

proc gmap data=alberta
          map=alberta;
   id id;
   choro idname/ statistic=first
                 legend=legend2
                 discrete;

run;
```

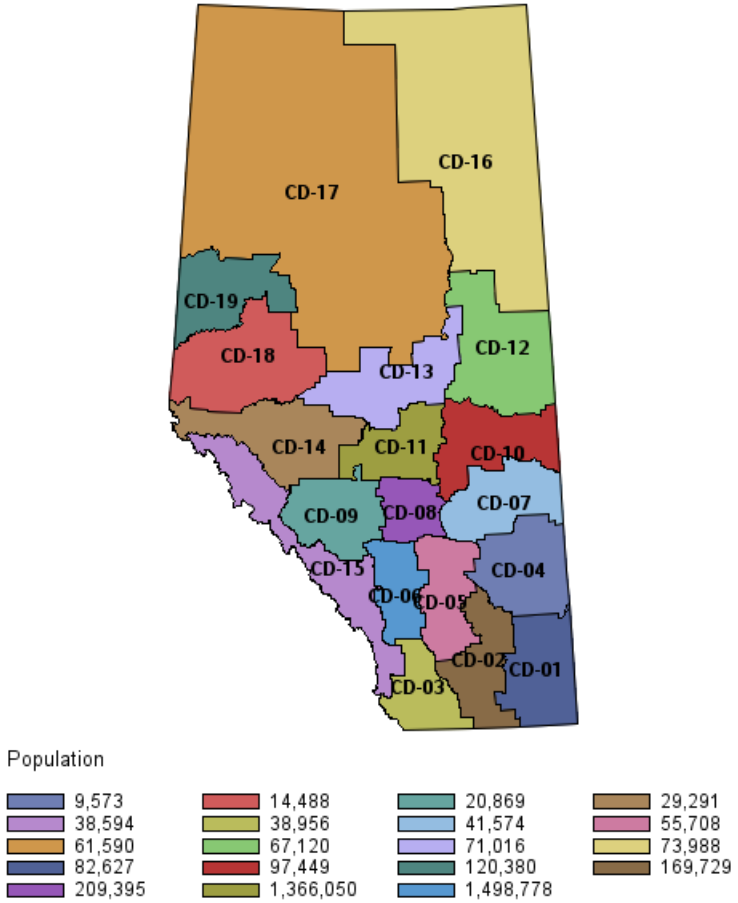
Map with Annotation and No Legend




```
%ANNOMAC;
%MAPLABEL (map-dataset,attr-dataset,
output-dataset,label-var,id-list,
font=font_name,color=n,size=n,hsys=n);

proc gmap data=alberta map=alberta;
    id id;
    choro id / statistic=first nolegend
                anno=myanno;
run;
```

Map with Data Layers

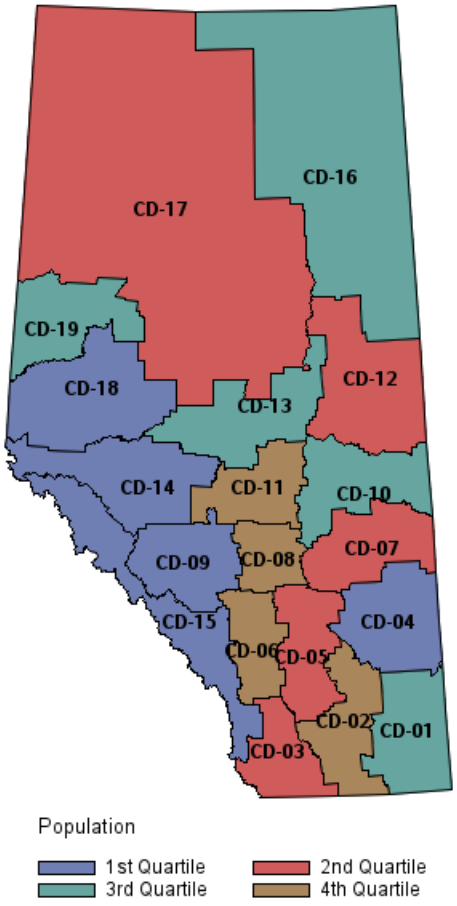


Discrete Display

```
proc gmap data=mymap map=mymap;
    id id;
    choro population /
                discrete
                anno=myanno
                statistic=first;
    format population comma10.;
run;
```

Data from Statistics Canada 2016 Census

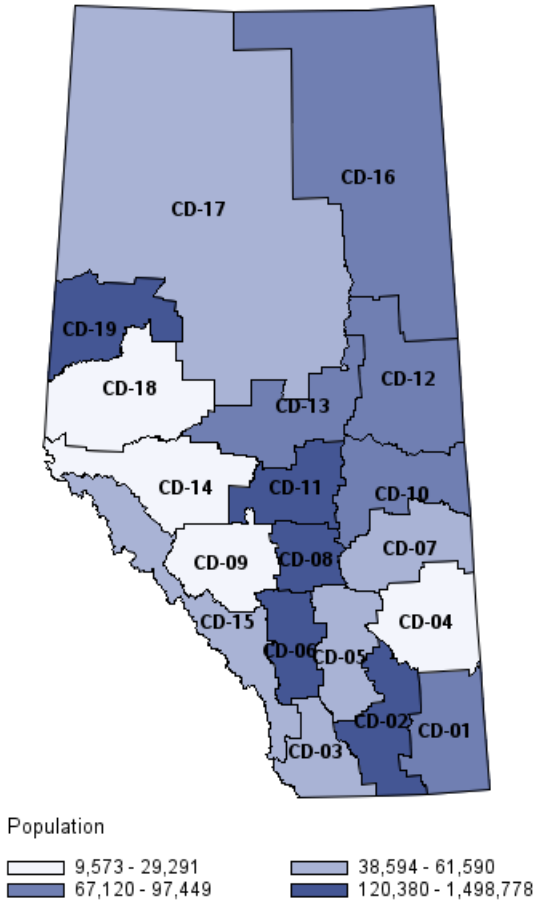
Map with Data Layer – Cont.



User-Defined Display

```
proc gmap data=mymap map=mymap;
    id id;
    choro population /
                discrete
                anno=myanno
                statistic=first;
    format population popf.;
run;
```

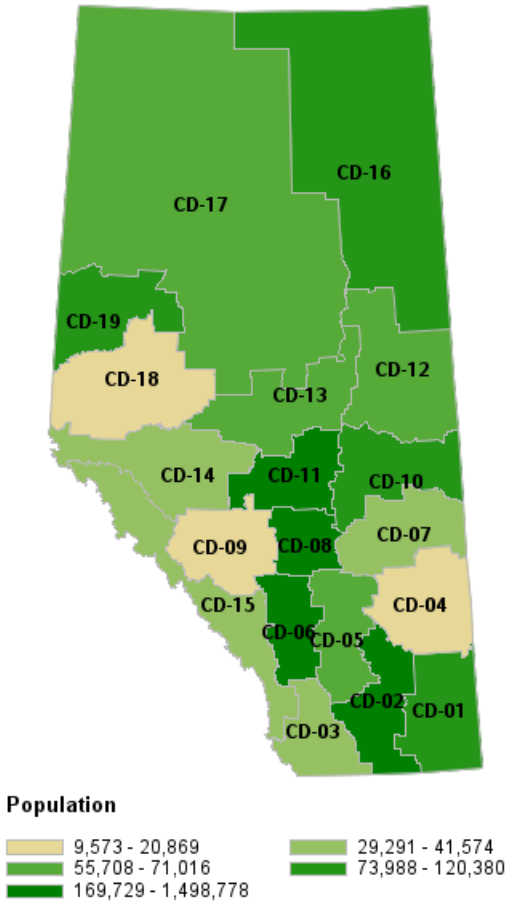
Map with Data Layer – Cont.



Continuous Display

```
proc gmap data=mymap map=mymap;
    id id;
    choro population /
                anno=myanno
                levels=4
                statistic=first;
    format population comma10.;
run;
```

Change Color Scheme

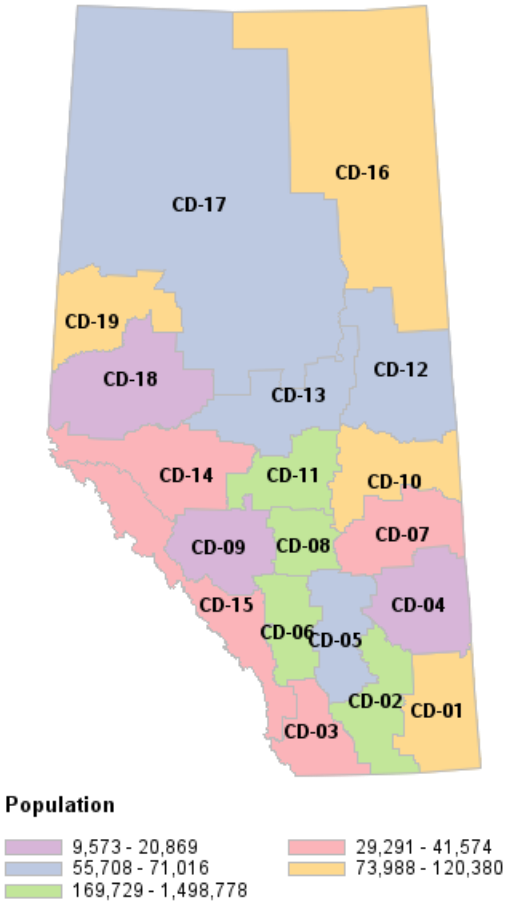


Gradient Shading

```
proc template;
   define style styles.grad_green;
   parent=styles.default;
   style twocolorramp /
              startcolor=cream
              endcolor=green;
end;
run;

ods listing style=styles.grad_green;
ods html style=styles.grad_green;
```

Change Color Scheme – Cont.

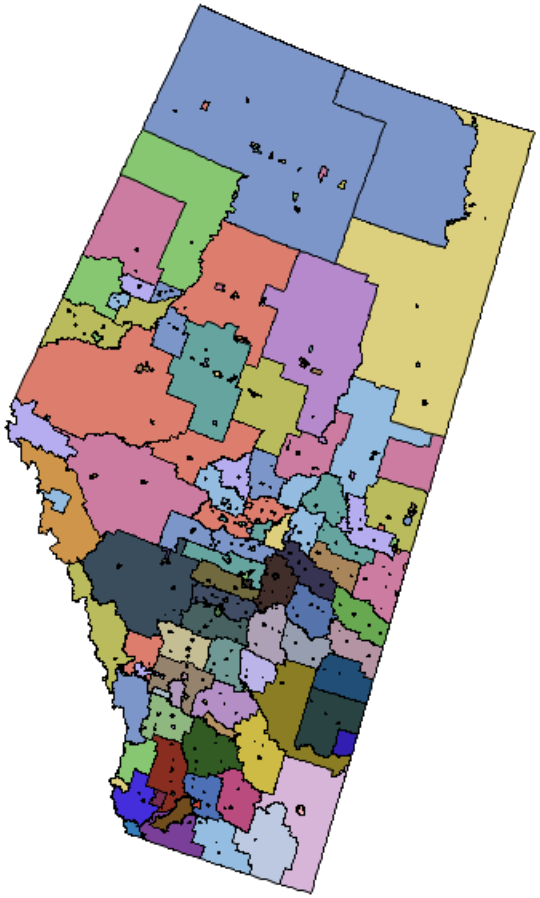


List of Colors

```
pattern1 v=ms c=cxd7b5d8;
pattern2 v=ms c=cxfbb4b9;
pattern3 v=ms c=cxbdc9e1;
pattern4 v=ms c=cxfed98e;
pattern5 v=ms c=cxc2e699;
```

ColorBrewer

Map with Shape Files

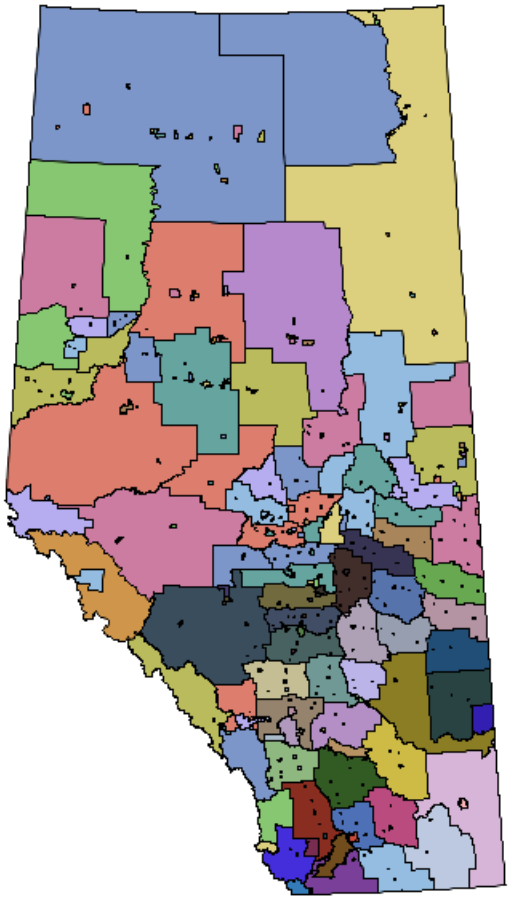


Download Shapefile

```
proc mapimport
    datafile="your_directory\
    your_shapefile_name.shp"
    out=shape_ab;

proc gmap data=shape_ab
          map=shape_ab;
    id CSDUID;
    choro CDNAME / statistic=first;
run;
```

Project the Map



```
proc gproject data=shape_ab
        out=new from="EPSG:3347"
        to="EPSG:4326";
    id csduid;

proc gproject data=new
    out=proj_ab degree eastlong;
    id csduid;

proc gmap data=proj_ab
          map=proj_ab;
    id csduid;
    choro cdname / statistic=first
                   nolegend;
run;
```

SASHELP.Proj4def

Project file (.prj):

PROJCS["PCS_Lambert_Conformal_Conic",GEOGCS["GCS_North_American_1983",DATUM["D_North_American_1983"

	Name	Projection String	Description
1777	EPSG:3347	+proj=lcc +lat_1=49 +lat_2=77 +lat_0=63.390675 +lon_0=-91.86666666666666 +x_0=6200000 +y_0=3000000 +datum=NAD83 +units=m +no_defs	NAD83 / Statistics Canada Lambert
1778	EPSG:3348	+proj=lcc +lat_1=49 +lat_2=77 +lat_0=63.390675 +lon_0=-91.86666666666666 +x_0=6200000 +y_0=3000000 +ellps=GRS80 +towgs84=0,0,0,0,0,0,0 +units=m +no_defs	NAD83(CSRS) / Statistics Canada Lambert
1779	EPSG:3349	+proj=merc +lon_0=-150 +k=1 +x_0=0 +y_0=0 +datum=WGS84 +units=m +no_defs	WGS 84 / PDC Mercator (deprecated)

Thank you

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