Methodology and Data Sources for Agriculture and Irrigation's Interpolated Data (1901-Current)

Disclaimer:

This data is provided as-is with no warranties neither expressed nor implied. As a user of the data, you assume full responsibility for any and all uses that are connected to and/or based on this data set.

The data for each township center was estimated using an inverse distance weighted interpolation procedure employing a pre-defined search radius (see below). If no stations within the search radius were found, the nearest neighboring station was used regardless of distance from the township center. As a result for many locations, the user is strongly discouraged from using this prior to 1961, due to low station density in many areas of the province (Figure 1). ACIS currently uses a data flagging scheme that provides data only if there was a single station operating on a given day within 30 km of the township center, or if there are two or more stations within a 60 km radius. This is intended to prevent unreliable estimates for weather variables that were derived from station(s) that were simply too far away to provide a reasonable estimate. When selecting elements of interest for the *daily* option, there is an additional checkbox titled "***Include Interpolation Flags (Table/CSV)***". Checking this will provide the interpolation flags that are available for each estimated observation, describing the station neighborhood used on that day.

An example of a single data flag is as follows:

N=8, C = 14.81, F=83.49

Where:

N = number of stations (8)
C = closest station distance (14.81 km)
F = farthest station distance (83.49 km)

Note: the interpolation process tends to degrade in those areas, and/or during times where sharp spatial gradients exist for the element in question. Typically, errors are greatest in and around the mountains and foothills, or through other areas where there are large elevation changes. In addition, many areas in the province have poor station coverage, particularly during the winter. In these areas the interpolation is also degraded. Users are encouraged to take the time analyze the data flags and cross reference the interpolation estimates with nearby stations for each target area they are using the data for, in order to "get a feel" for its suitability for the intended application.

Input Data Sources

Raw data was provided by Alberta Agriculture and Irrigation, Environment and Protected Areas (EPA), Forestry and Parks (FP) and the Meteorological Service of Canada (MSC). Preliminary, but not exhaustive data quality control procedures have been applied to the data from EPS, FP and MSC, prior to 2005. From April 2005 all ACIS data is used along with a relatively small number of stations provided by EPA, FP and MSC. Since early 2005 ACIS data has undergone extensive quality control and fewer errors are likely. Note that for the entire period of record (1901-current) any raw input observations deemed as suspect were removed from the analysis.

Precipitation

- Utilized the Hybrid Inverse Distance cubed weighing (IDW) process using a daily search radius out to 60 km, or a maximum of eight closest stations, whichever was satisfied first.
- If there were no stations within 60 km of the township center, the nearest neighbor was used regardless of its distance from the township center.

Temperature, Humidity and Solar Radiation

- Utilized a linear IDW procedure with a radius of 200 km or 8 closest stations whichever is satisfied first.
- If there were no stations within 200 km the nearest neighbor is used regardless of its distance to the township center.
- ***Note***: Due to lack of stations that measure solar radiation, often **Solar Radiation** reverts to nearest neighbor.
- ***Input data sources:***
  - ***Temperature:*** daily maximum and minimum temperatures
  - ***Humidity:*** computed using the daily average of hourly humidity observations. Note that no conditions were imposed for completeness of the hourly record. For example, if only five observations (hours) were present for a given station on a particular day then, the daily average was computed using the average of five hourly values.
  - ***Solar Radiation Source:*** Daily total of all hourly values. Conditions were imposed for completeness, such that all 24-hours needed to be present to yield a daily total.

Caution

Figures are included here that depict historical data density and station completeness for precipitation measurements only. Other elements (temperature, humidity, solar radiation often have far less density). Data density beyond 1961 is typically deemed insufficient for a regional analysis of the province as a whole.

Figures

Each figure provides a summary of yearly station density along with a station completeness index. Station completeness was expressed as a percentage of actual observations relative to possible total number of observations. For example, if the station had 100 days of observations in a given year and a possible 365 days of observation, that stations completeness would be 27%.

A historical overview of station counts and data completeness is given in Figure 1. Throughout the 1950's station density began to improve dramatically. By about 1961 a quasi-steady-state was achieved that generally persists to this day. For a complete historical overview Figure 2, shows a glimpse into each decade showing the locations of stations used in the interpolation. Following that, each year, up to 2005 is represented in a similar fashion allowing users further insight into yearly data availability. Of interest is the relatively low completeness of stations in the forested areas. Many of these stations were seasonal and as such, generally only operated May through to September, thus giving a completeness index of around 40%. The dot maps are very useful for identifying those areas that had relatively low station density. However a systematic analysis of the data flags will yield better results and allow the

user to customize their own methodology for evaluating the integrity of the data as it applies to their particular use.

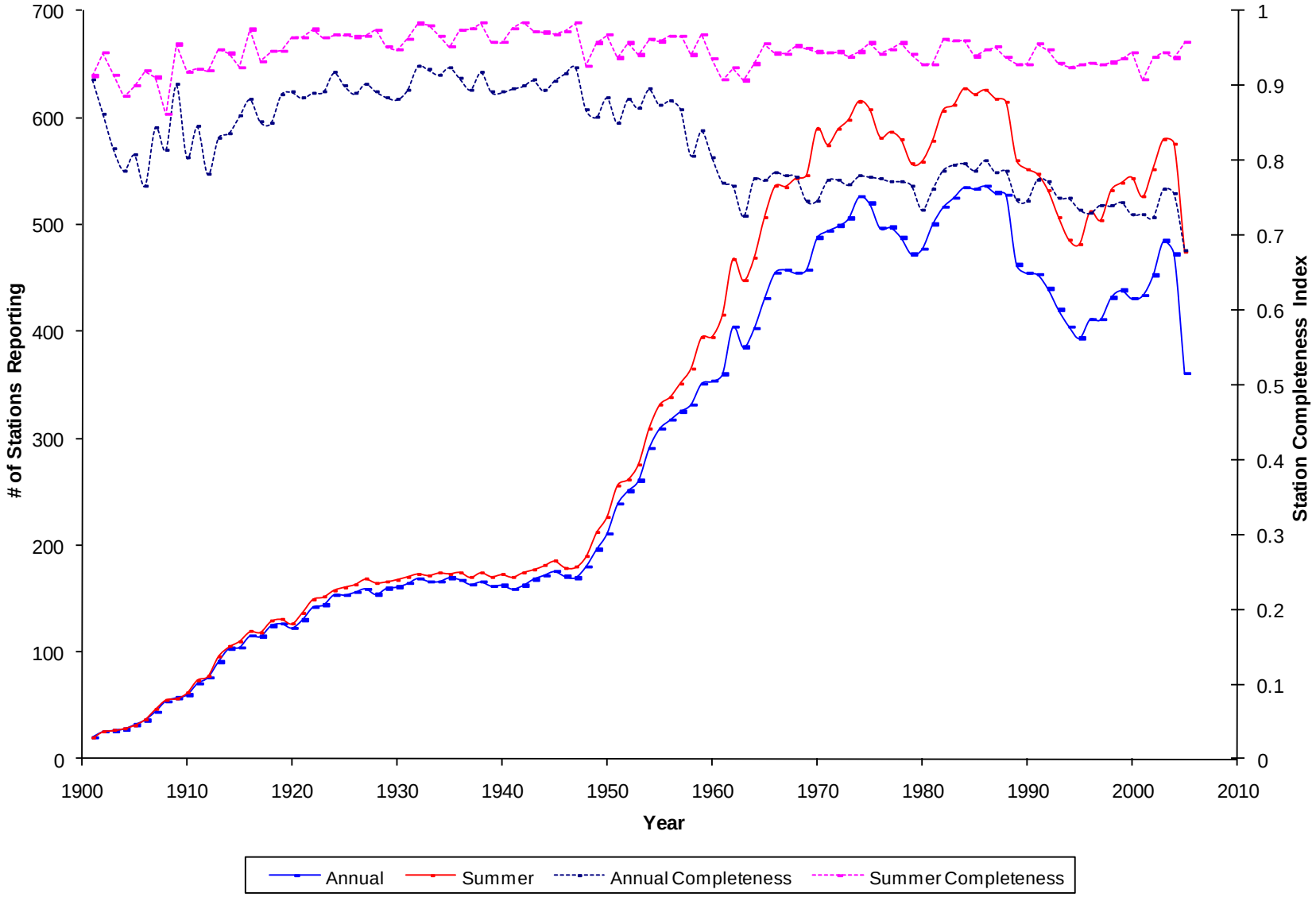

Figure 1. Number of stations used in the interpolation scheme counted by total stations per year, along with a station data completeness index

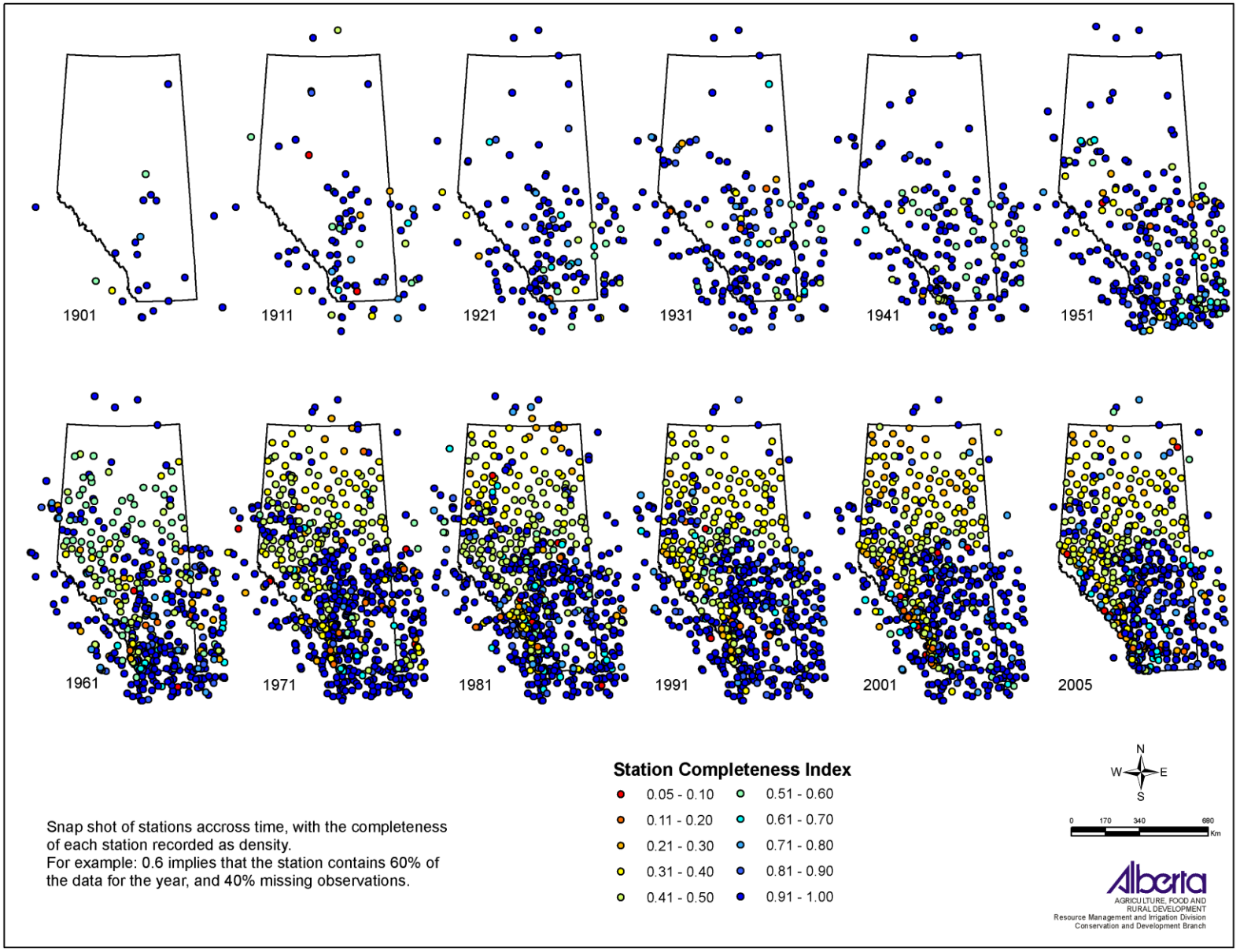

Figure 2 Station density and completeness Index for the period 1901 to 2005.

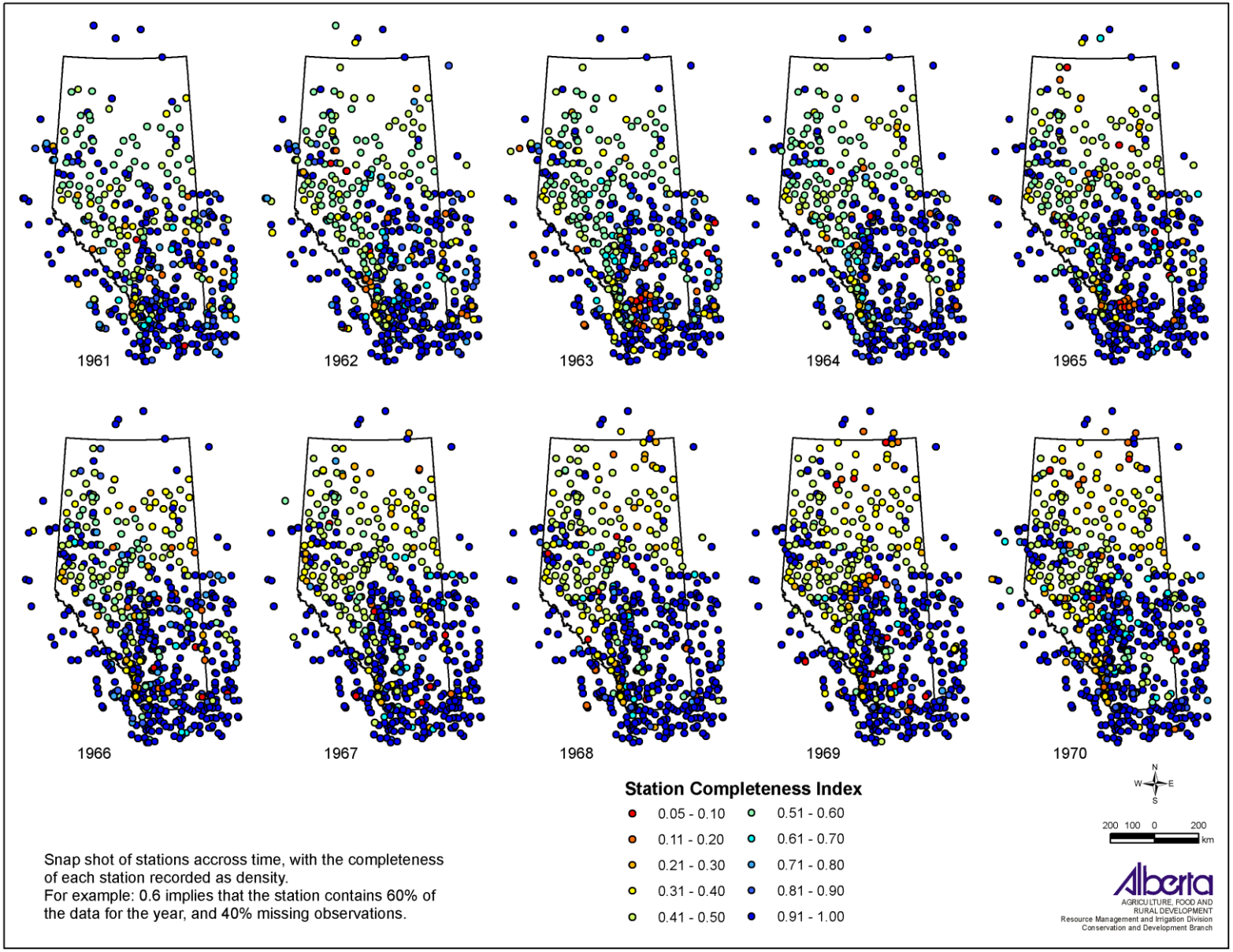

Figure 3. Station density and data completeness for the period 1961 to 1970

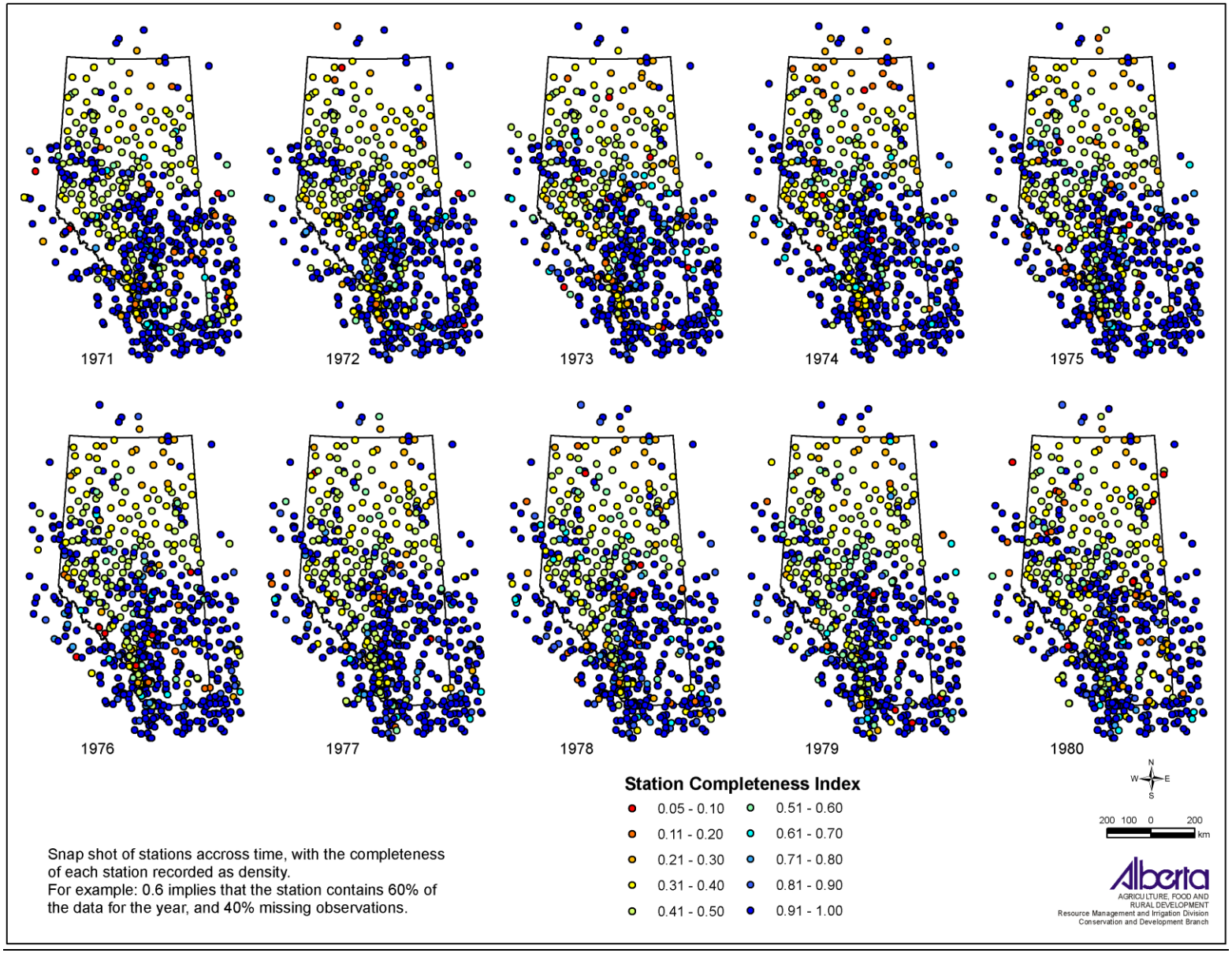

Figure 4. Station density and data completeness for the period 1971 to 1980

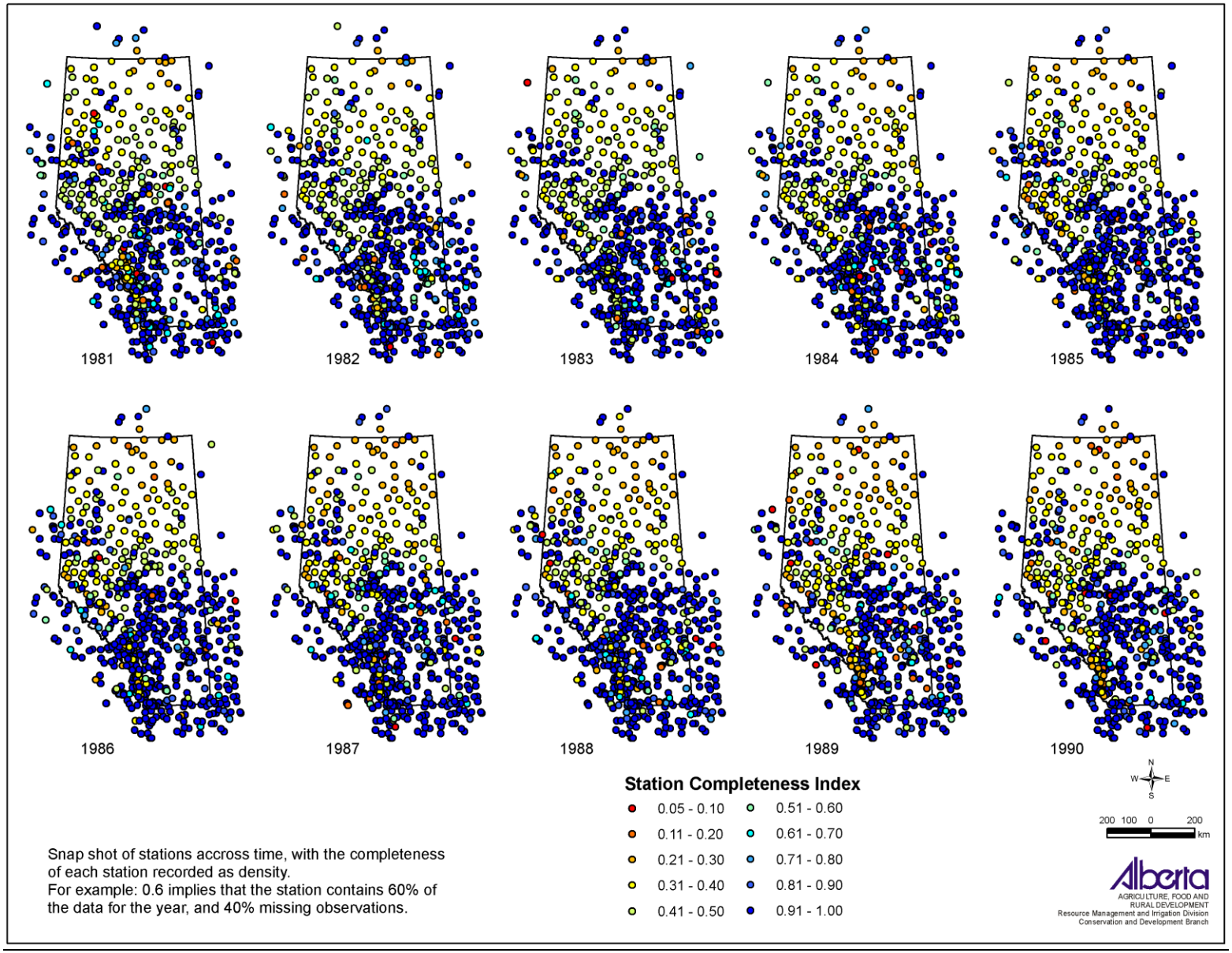

Figure 5. Station density and data completeness for the period 1981 to 1990

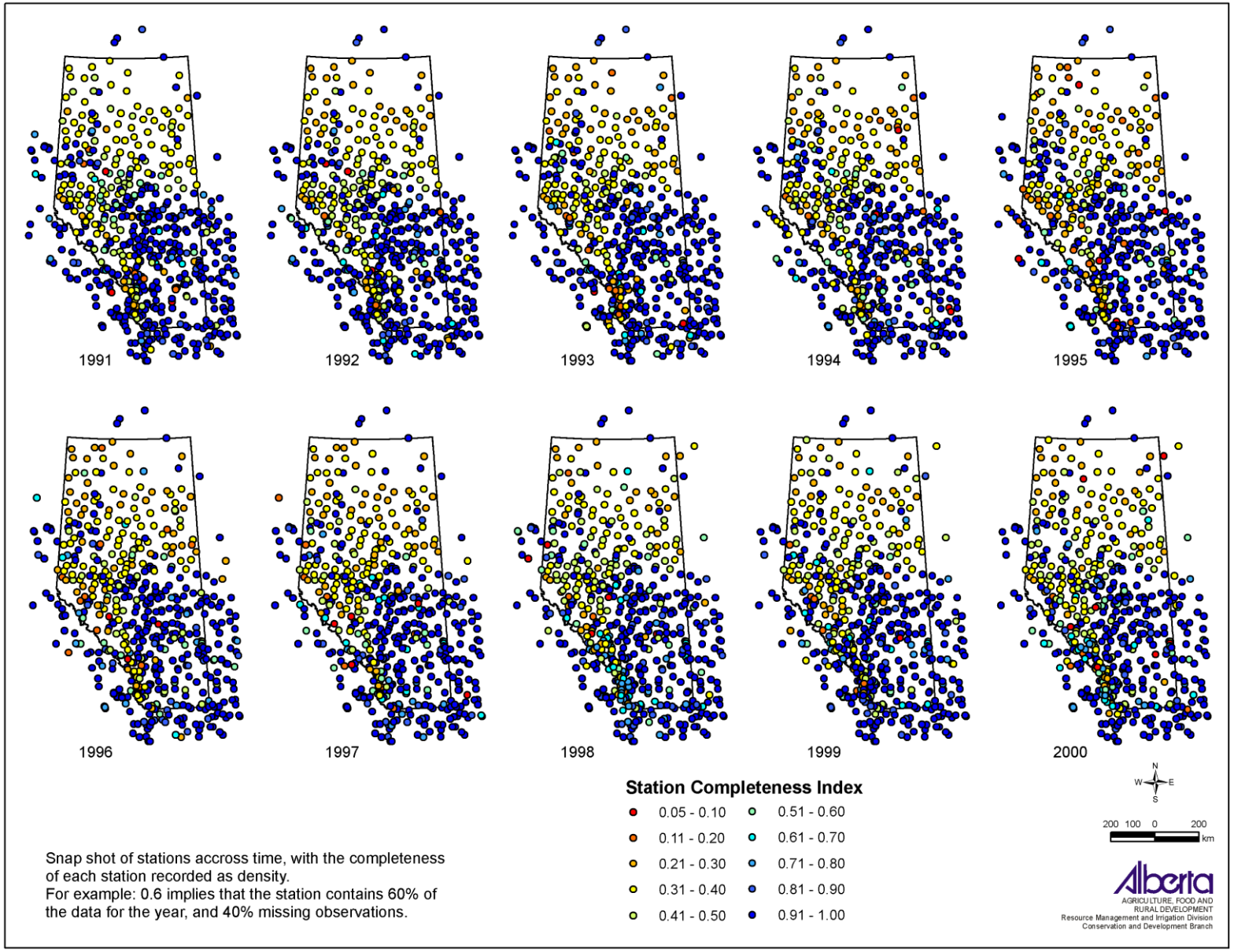

Figure 6. Station density and data completeness for the period 1991 to 2000

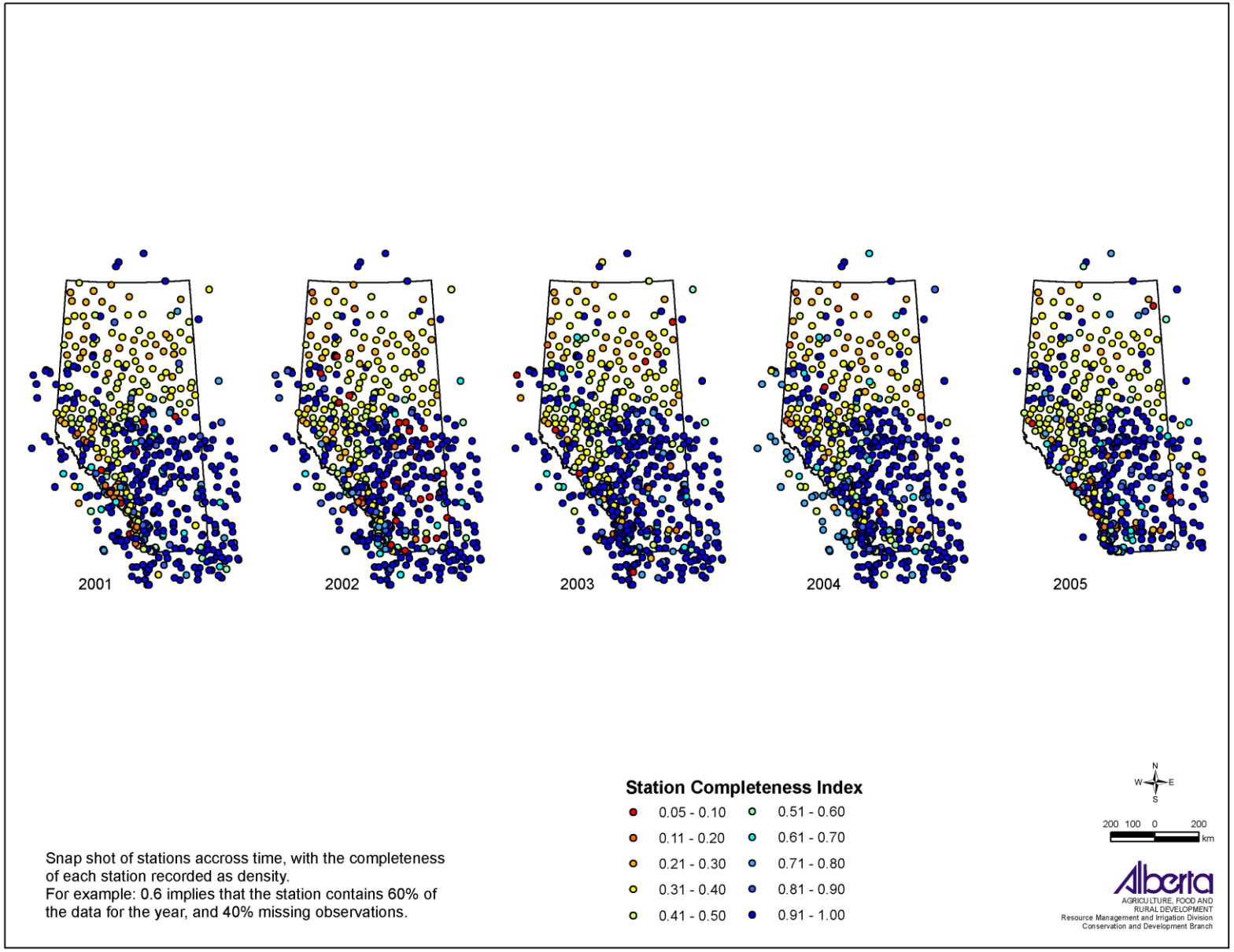

Figure 7. Station density and data completeness for the period 2000 to 2005