

# Twin Ports Area SAS Users Group: Doing Great Things on a Great Lake

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## BACKGROUND

The Twin Ports Area SAS Users Group is a newly formed local user group comprised of SAS users from academia, health research, and business in and around the Duluth (MN) Superior (WI) area. Our mission is to promote all things SAS among current users and the SAS-curious, as well as foster teaching, research, and technical development collaborations that take advantage of the many strengths of SAS. We held our first meeting in November 2012, became an officially recognized SAS local user group and launched our website in January.

## TWIN PORTS AREA



## WHO WE ARE, HOW WE USE SAS

- Academic faculty at University of Minnesota-Duluth, University of Wisconsin-Superior
  - SAS in the classroom
  - SAS as a research tool (faculty and students)
    - Analysis, graphics, programming
- Research Scientists, Biostatisticians, Research Informatics Analysts at Essentia Institute of Rural Health
  - SAS Programming
  - SAS Analytics
  - SAS Graphics
  - SAS Visual Analytics
  - All utilized in all phases of broad range of research projects across EIRH and Essentia Health and external collaborations

## SAS IN HEALTH RESEARCH



- ### HMORN Research Consortia
- NCI funded CRN (Cancer Research)
  - HNLBI funded CVRN (Cardiovascular Research)
  - NIMH funded MHRN (Mental Health Research)
  - AHRQ funded DECIDE (Effectiveness Decisions)
  - FDA funded Mini-Sentinel
  - AHRQ funded SUPREME-DM (Diabetes Research)
  - AHRQ funded SPAN (Comparative Effectiveness)
  - CDC funded VSD (Vaccine Safety)

## Virtual Data Warehouse (VDW)

- series of dataset standards and processes
- allow SAS programs written at one HMORN Site to be run against other VDW sites
- 'virtual' because no central database but rather parallel databases set up identically at each HMORN site
- over 40 standard SAS macros developed and shared across network to capture demographics and clinically relevant data from electronic medical records to answer a broad range of research questions

## Defining our VDW enrollment cohort

MACROS Used: %vdw\_mrns, %vdw\_demographics, %vdw\_enrollment, %vdw\_vitals, %vdw\_utilization

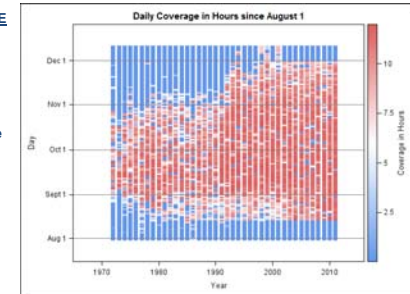
- Get encounters of interest
  - All non-ancillary encounters categorized as primary or secondary care
- Sort by MRN (medical record number) and encounter data
- Set working flags (IF FIRST.mrn THEN DO;)
  - Date1 becomes start date (initialized to adate)
  - Date2 is set to adate at the end of each iteration (initialized to adate)
  - PrimaryCare (PC) initialized to N, change to Y when PC visit or patient had PCP (primary care provider) in secondary care visit
  - Enrollee initialized to N; changed to Y when patient qualifies
- Data step
  - Date1 flag
    - Reset to current adate after 3 yrs w/o encounter
    - Becomes start date if criteria for enrollment met
  - Date2 flag
    - Set to adate at end of iteration
  - PrimaryCare flag
    - Check if a primary care visit or if PCP is assigned
    - If yes set PrimaryCare flag to Y
  - Enrollee flag
    - Compare temporal difference between Date1 (first visit in series) and current adate
      - If  $\geq 90$  days and PrimaryCare flag is Y:
        - enr\_start = Date1, Enrollee flag = Y
    - If three years w/o encounter:
      - set enr\_end to previous adate, output
      - set Enrollee and PrimaryCare flags to N
      - reset enr\_start and enr\_end
      - restart process

## SAS IN OTHER RESEARCH AREAS

### Generalized Linear Mixed Models for Time Trends in Hawk Migrations

Marie Helbach (TPA-SUG member), Ron Regal (Graduate Advisor)

Hawk Ridge Bird Observatory in Duluth, MN, one of the largest raptor migration sites in the US, began formal fall monitoring in 1972 in an effort to track annual population trends in 28 species of raptors. The largest counts are for Broad-winged Hawks. One day in 2003 over 93,000 Broad-winged Hawks were recorded. The extent of the monitoring has increased since 1972 as shown below for Broad-winged Hawks.



### ISSUES TO OVERCOME

- over-dispersion
- high number of zero counts
- lack of independence
- inconsistent survey durations
- SAS can encounter convergence issues

### SOLUTION

- To avoid convergence issues, approach made use of a set of generalized linear and generalized linear mixed models.
  - Use generalized linear models (PROC GENMOD) and cross-validation to develop effective durations of observation for each day of observation.
  - Using daily totals and effective duration of observation, develop effective durations of observation for each year of observation.
  - Test for annual trend – generalized linear mixed model (PROC GLIMMIX) using yearly totals and an offset of effective duration of observation.

### CONCLUSION: Preliminary to more in depth analyses to come.

- Broad-winged hawks did not show a significant decline or increase since 1972

## GREAT PLANS FOR THE ROAD AHEAD

- Continue to expand membership to include broader range of local users from EPA, MN Power, local government, and others
- Joint meetings planned with other SUGs / research partners throughout region
- Share knowledge through training, presentations from SAS and others
- Website enhancements: [www.twinportsug.org](http://www.twinportsug.org)
- Projects to leverage interests/expertise to raise awareness of all things SAS