Air Quality and the Demand for Health Services in New Hampshire

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Outline

- Goals and Objectives
- Previous Studies
- Data and Methodology
- Findings
- Future Work

Objectives

- GOAL: Investigate the link between hospital respiratory and cardiovascular services and air quality indicators in New Hampshire.

- Specific Objectives:
  - Identify magnitude and timing of seasonal patterns in seacoast hospital asthma services.
  - Link seasonal patterns with variations in air quality.
  - Develop a regional prediction model for the demand for health services based on air quality.

Previous Studies: Fall Peak in Maryland

Blaisdell et al (2002)

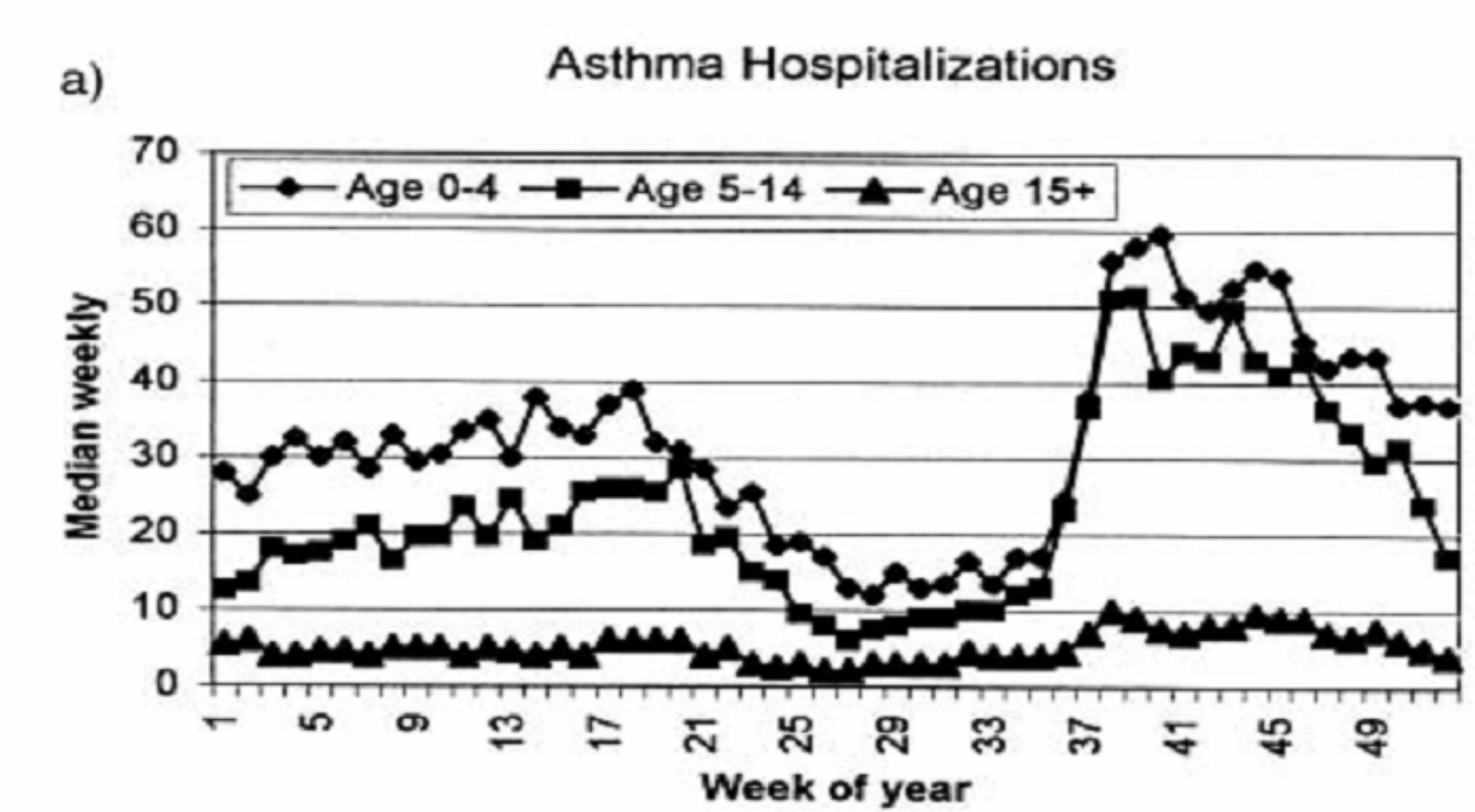
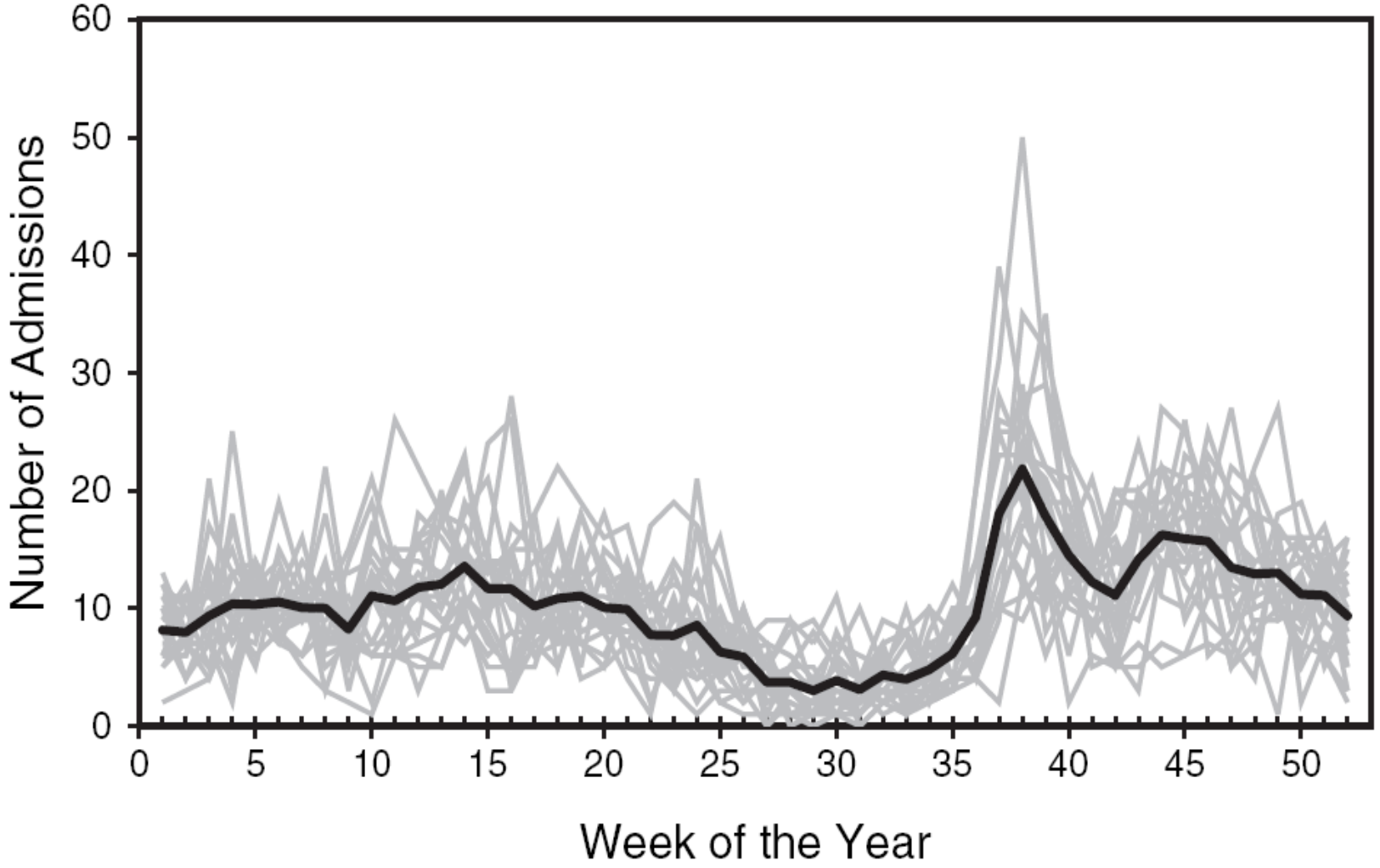


Figure 3. Median weekly asthma admissions by age group, 1986–1999, in Maryland. Plot of weekly admissions for 0–4, 5–14, and 15–18 year olds. Asthma admissions increase four- to eightfold in the fall compared to the summer (weeks 26–38).
From Blaisdell, C. J., S. R. Weiss, et al. (2002). "Using seasonal variations in asthma hospitalizations in children to predict hospitalization frequency." J Asthma **39**(7): 567-75.

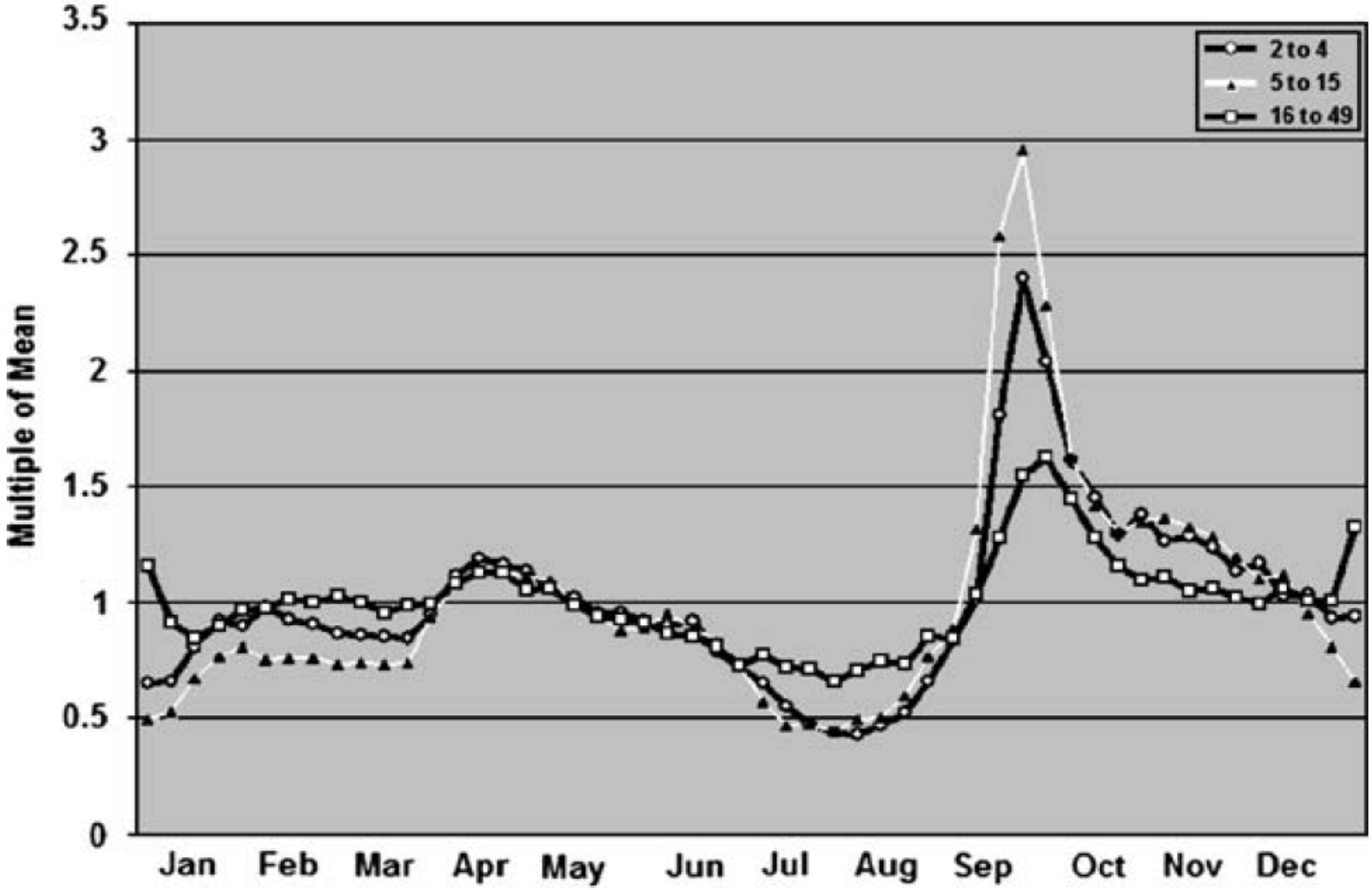
Previous Studies: Fall Peak in Maine

Langley-Turnbaugh et al. (2004)



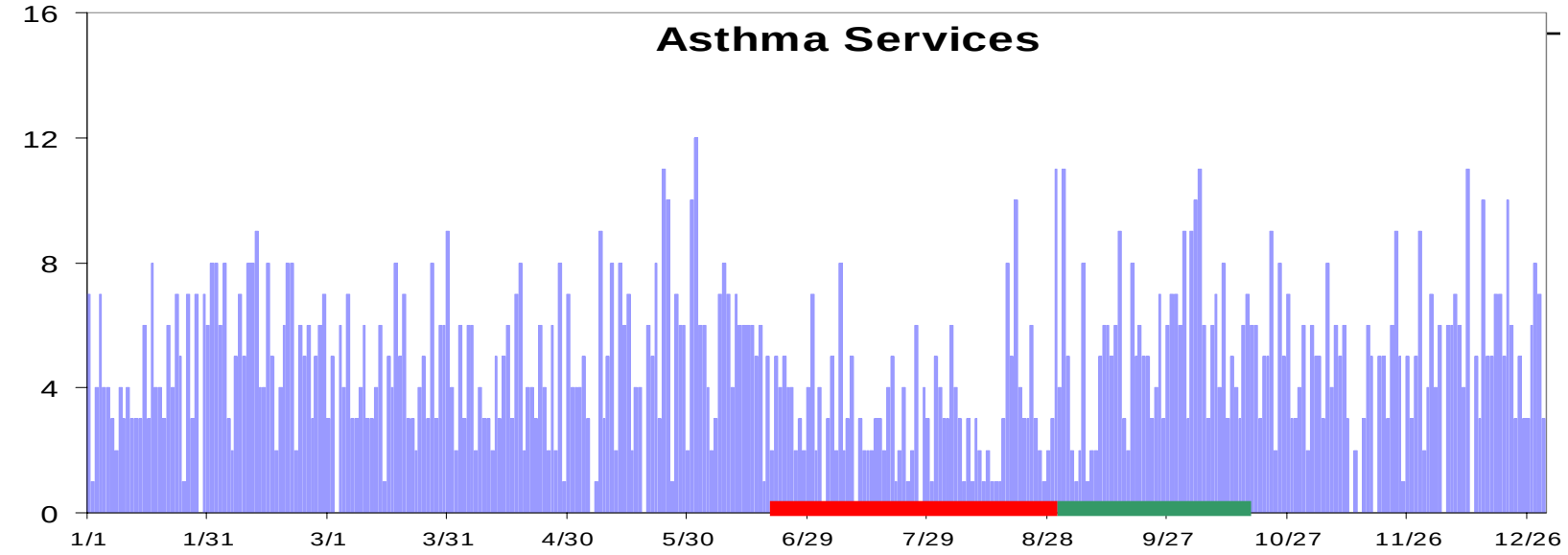
Previous Studies: Fall Peak in Canada

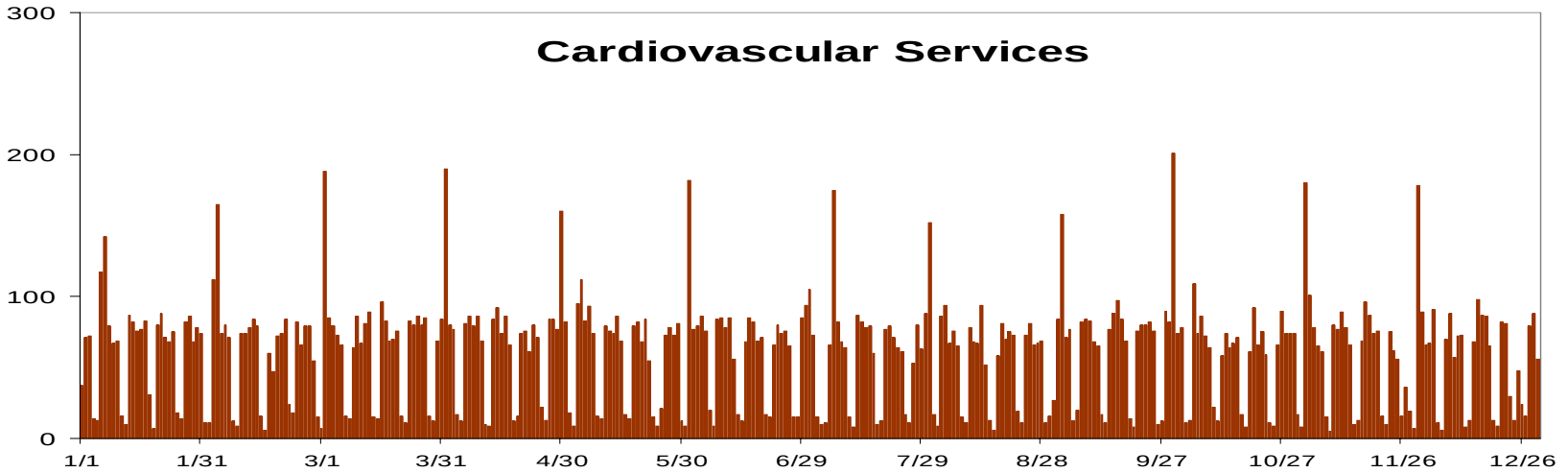
Johnston et al. (2005)



Asthma Seasonality in NH, seacoast area 2003

Daily Services





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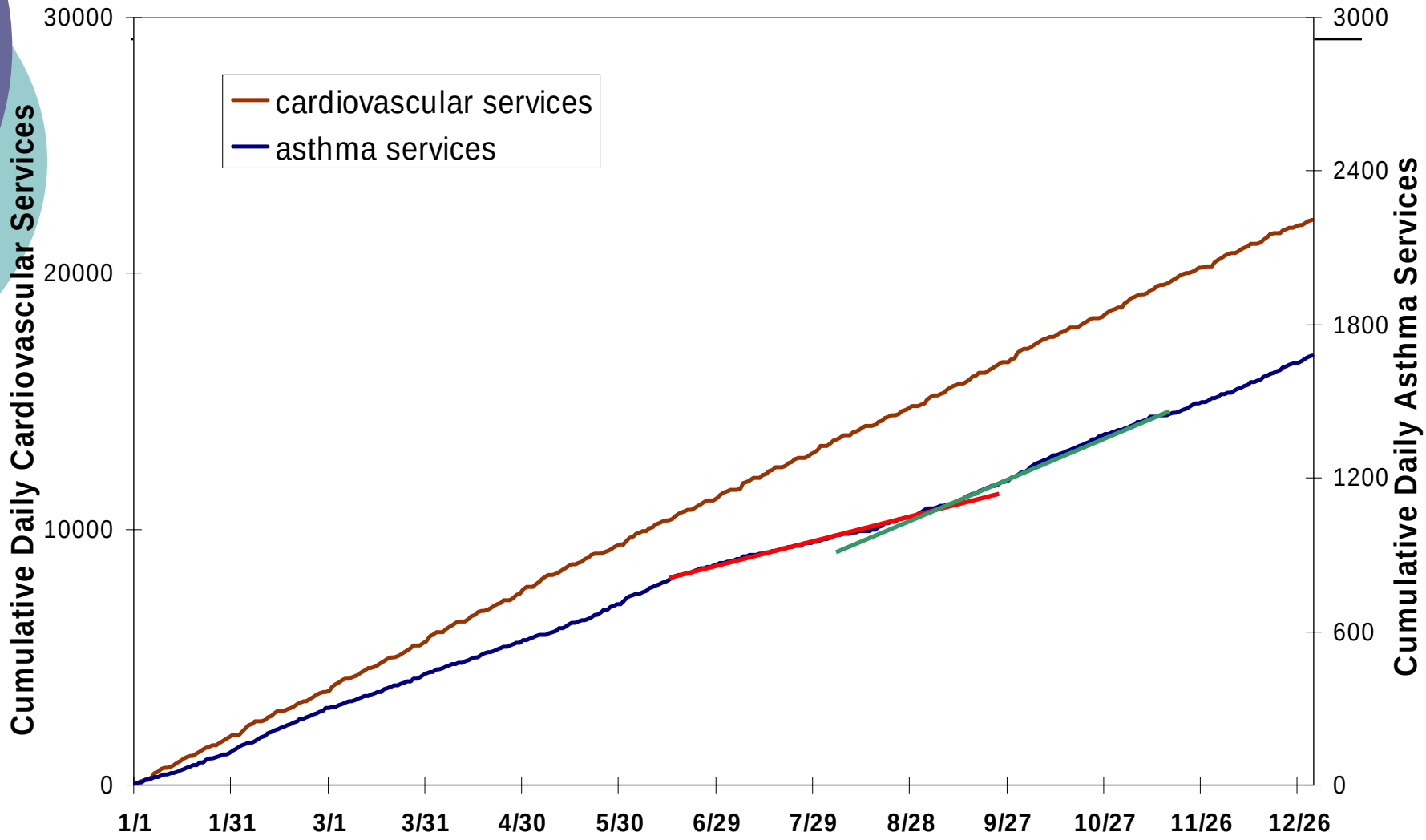
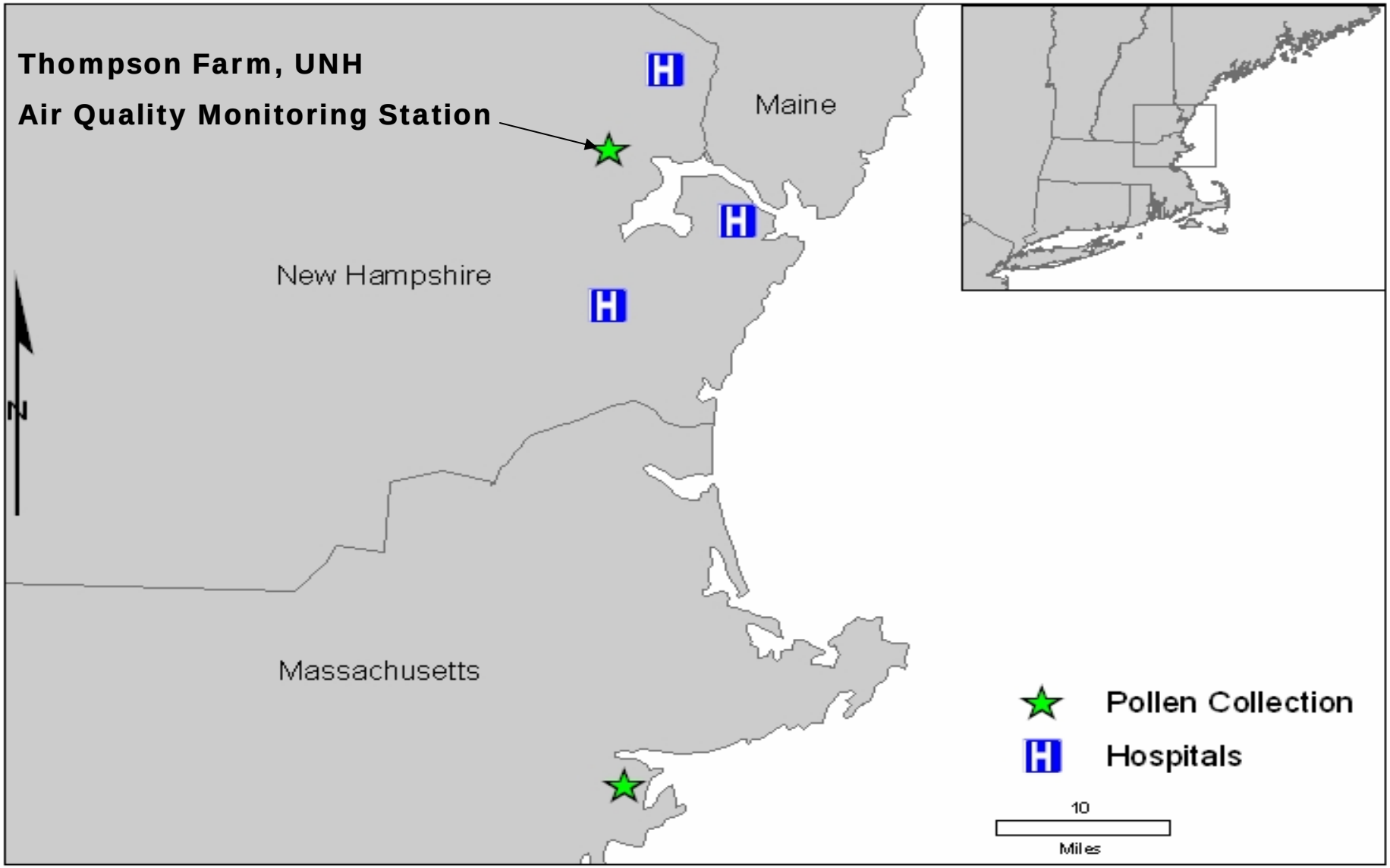


Previous Studies: Air Quality and Asthma

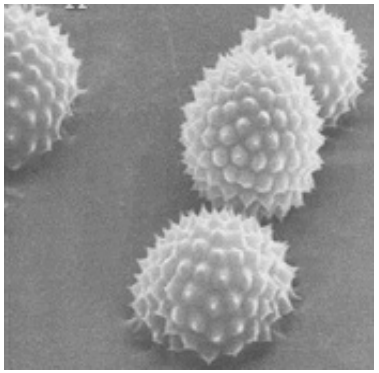
- Various studies have shown a relationship between asthma and criteria pollutants.
- In our analysis CO,SO_2,O_3 did not correlate with the fall kink.
- Ragweed Pollen peaks in September and may explain the fall asthma kink.

Location Map



Data

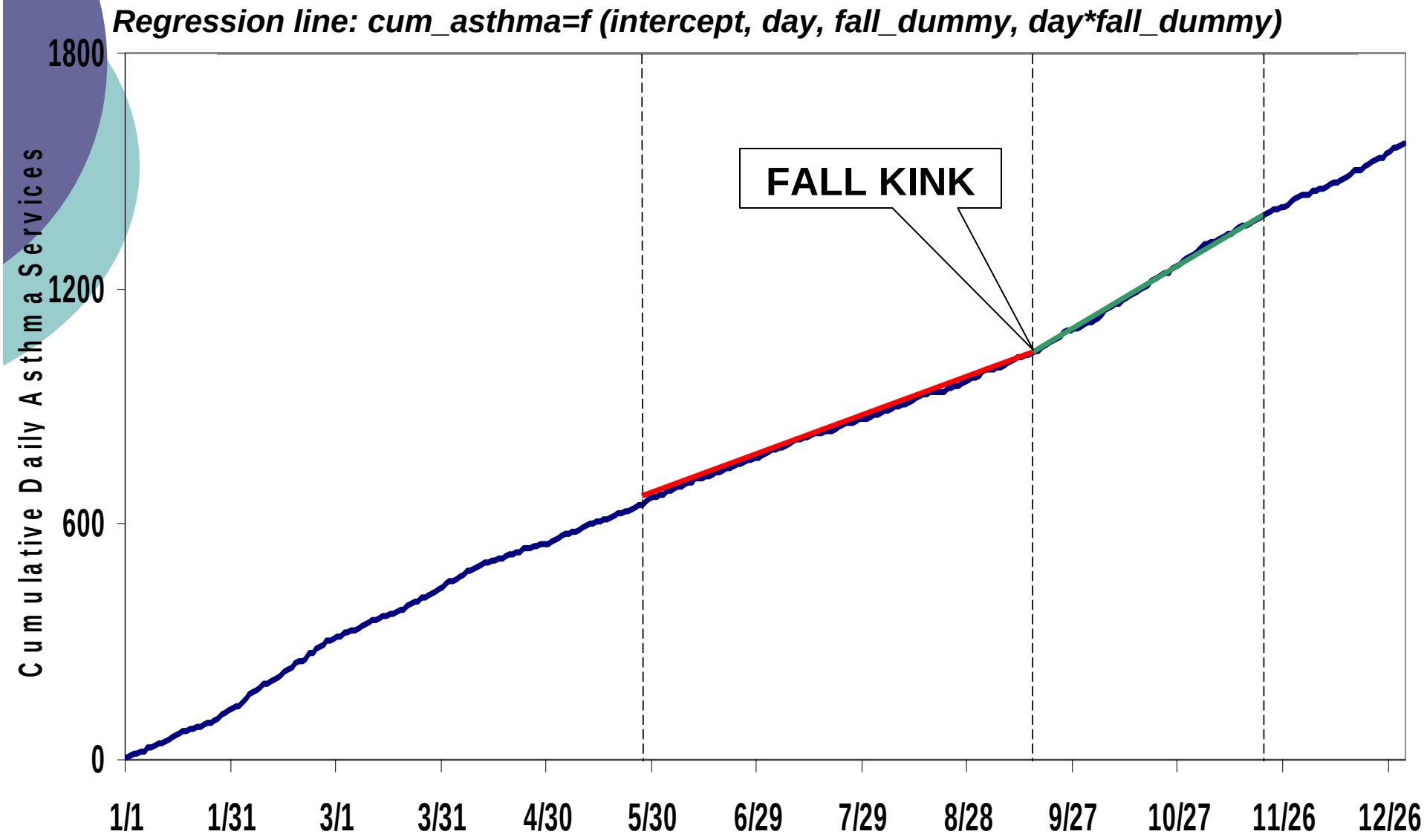
- Three NH Seacoast Hospital Services
  - 2002-2004
  - 4800 asthma services
- Air Pollutants from Thompson Farm, UNH
- Pollen : ragweed



Methodology

- Clearly identify the day of the asthma kink using regression analysis
  - select the day with the highest R-squared
- Compare the timing of the asthma kink with the timing of the peak in ragweed pollen.

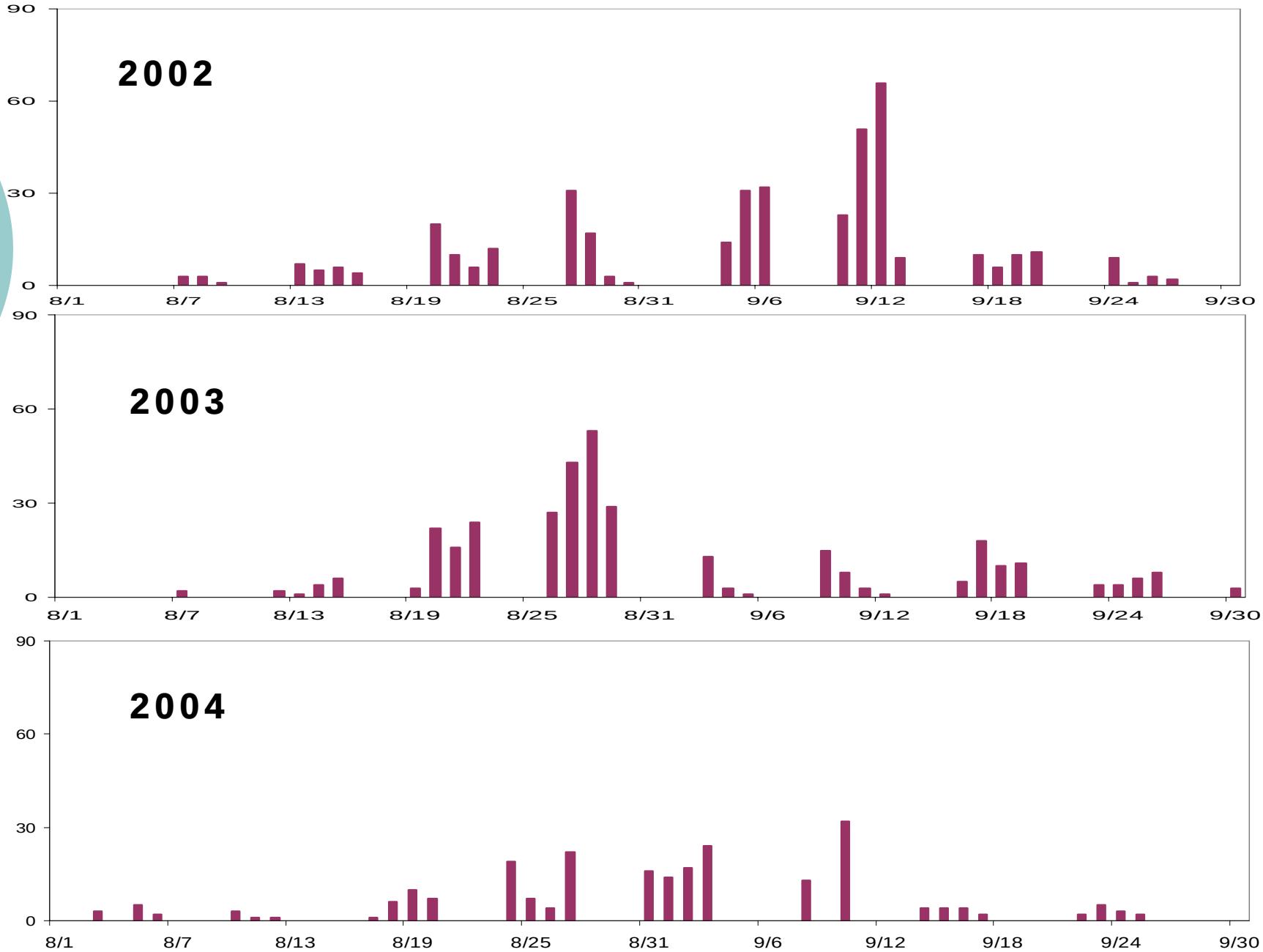
Asthma Seasonality in NH-seacoast, 2002



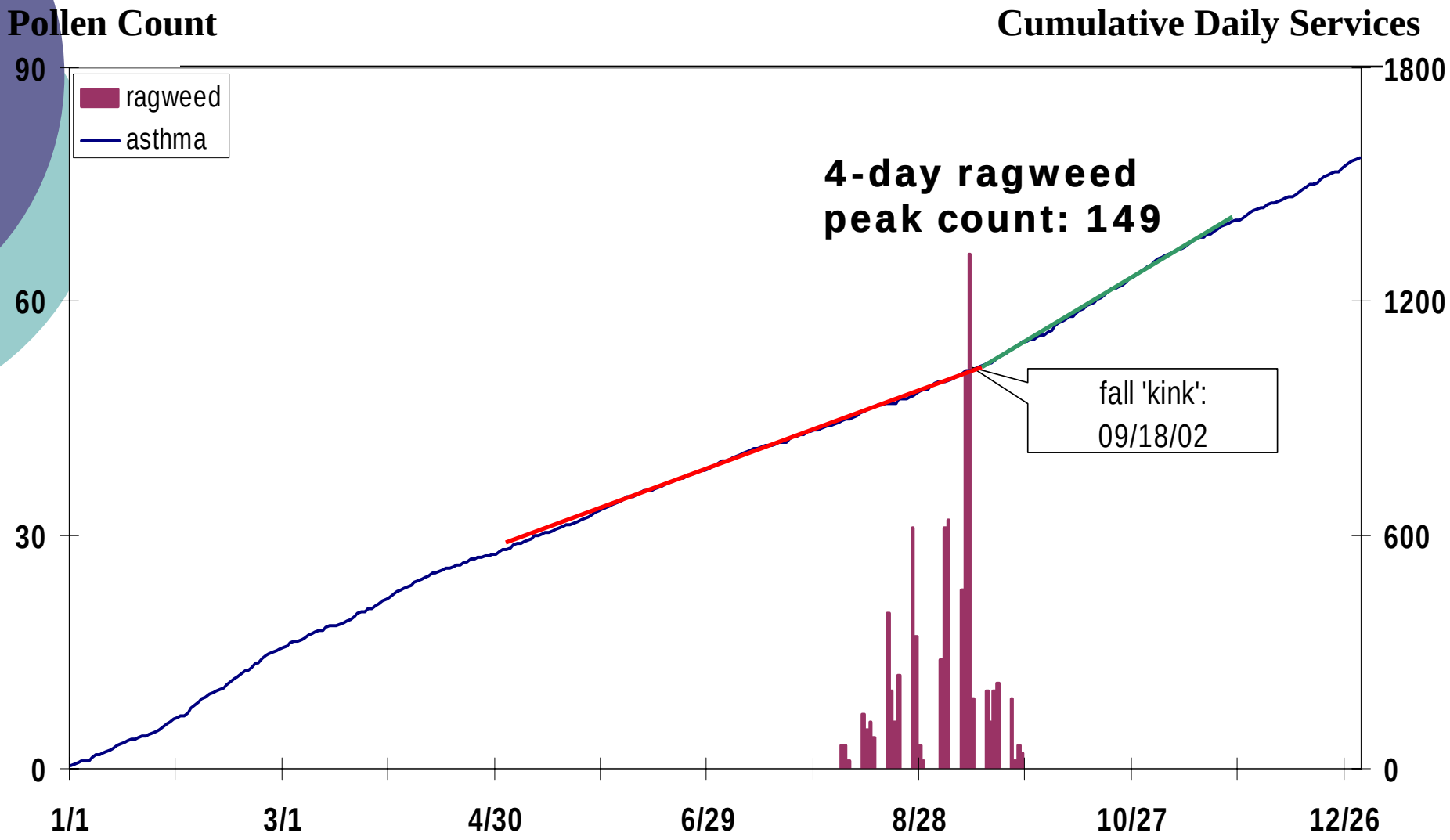
FALL KINK

	2002	2003	2004
All Asthma Services	Sept 18	Sept 2	Sept 14
Outpatient Asthma Services (90% of all services)	Sept 16	Aug 30	Sept 14
Inpatient Asthma Services (10% of all services)	Oct 5	Sept 12	Sept 22

Ragweed Pollen Count : August and September



Cumulative Asthma Services (In-and Out-patient), 2002



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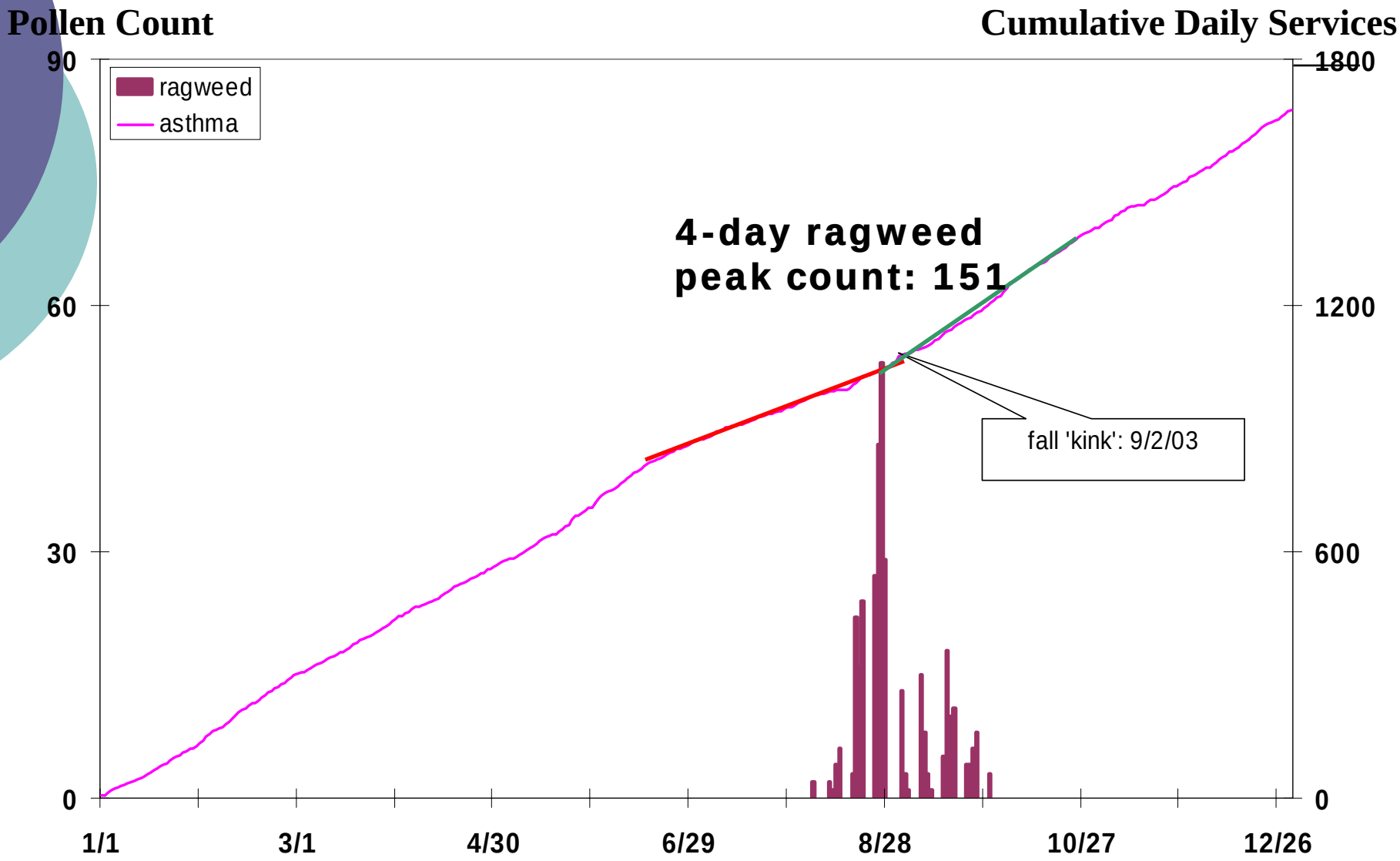
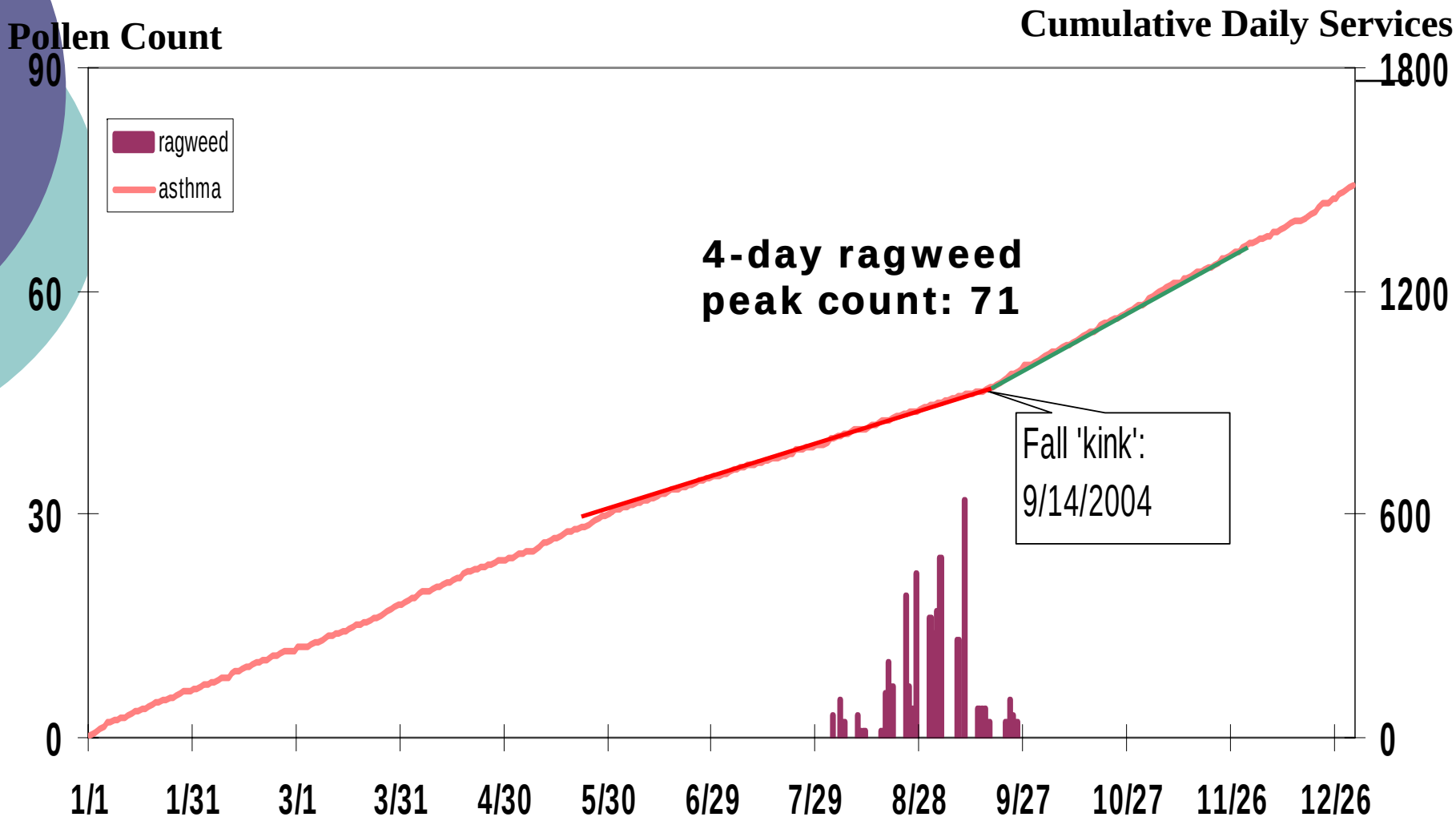
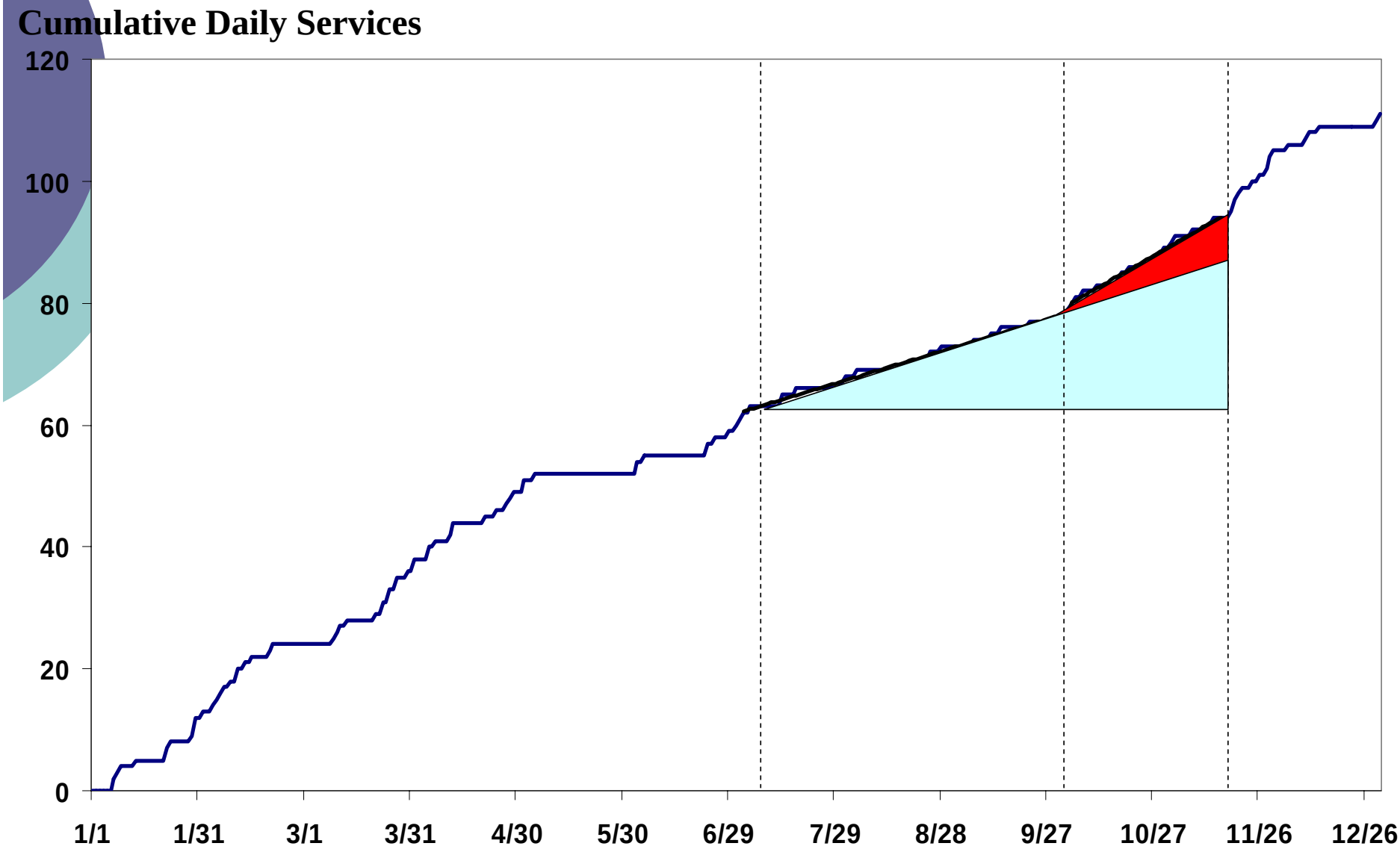


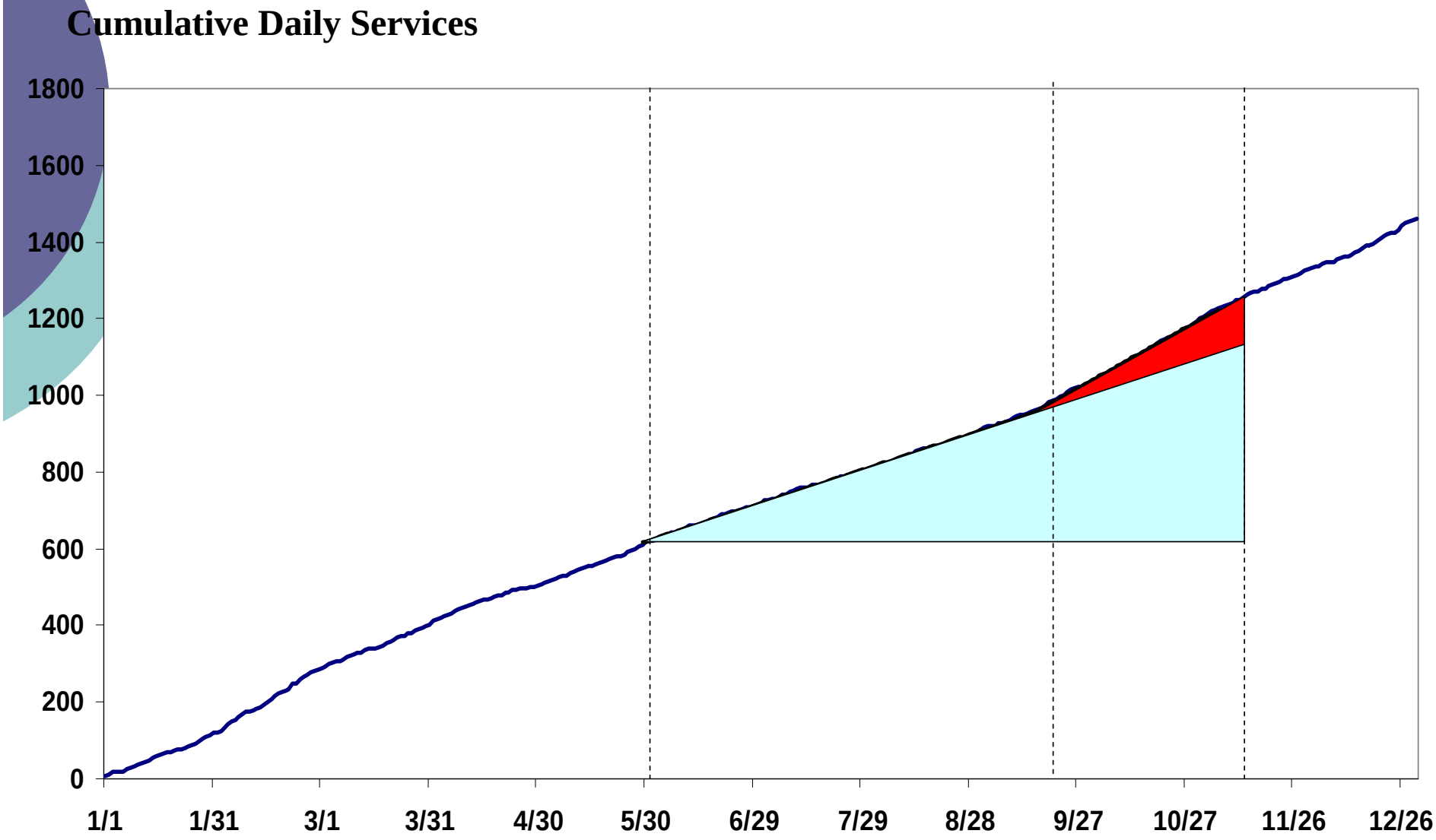
Cumulative Asthma Services (In-and Out-patient), 2004



Three NH Hospital Daily Inpatient Asthma Admissions, 2002



Three NH Hospital Daily Outpatient Asthma Visits, 2002



Fall Asthma Rise and Pollen

	2002	2003	2004
Total Asthma increase per day	1.99	2.37	2.01
Outpatient Asthma increase per day	2.12	2.20	1.90
Inpatient Asthma increase per day	0.16	0.30	0.10

Cost of Hospital Services in NH-seacoast

	2002	2003	2004
Cost per Admission day	$2,906	$2,859	$3,379
Cost per Visit	$520	$535	$585
Average Length of Stay	3.4 days	3.7 days	4.2 days

Cost of Fall Asthma Rise in NH-seacoast

	2002	2003	2004
Additional Inpatient Costs	$67,980	$161,800	$141,920
Additional Outpatient Costs	$68,350	$87,100	$121,150
Total Cost of Fall Peak	$136,330	$248,900	$263,070

Future Work

- Extend the analysis to more years of data
  - Collaboration with local hospital
  - Pollen monitoring Network
- Test different hypothesis for fall increase
  - School start date/Labor day
  - Air pollutants
- Develop a regional prediction model for demand for health services which will help improve public health by:
  - Providing warning to population at risk
  - Assist hospital management teams in anticipated demand for services

The End

- Thank You