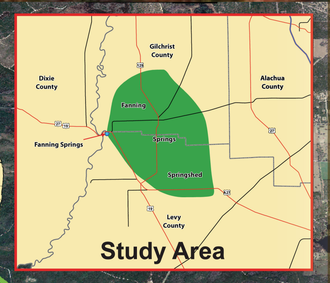
Sources of Nitrate Contamination in Fanning Springs, Florida

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Florida Geological Survey
Poster #15, 2010

Springshed Delineation

The springshed outlined in green on the 2004 aerial imagery below was delineated using potentiometric surface maps. The eastern extent of the springshed was determined utilizing a potentiometric map for the Floridan aquifer system produced by the U.S. Geological Survey in 2000. The remainder of the springshed was delineated using more recent higher resolution potentiometric surface maps produced for the Suwannee River Water Management District.

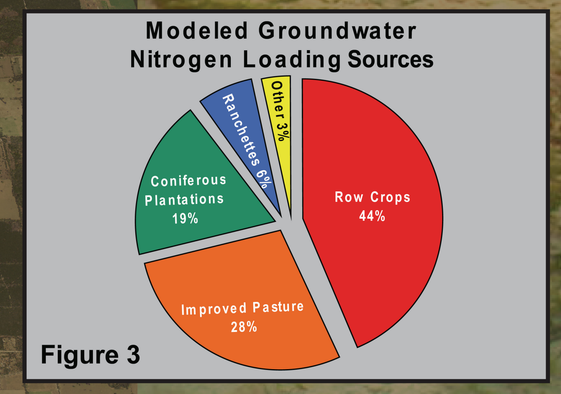


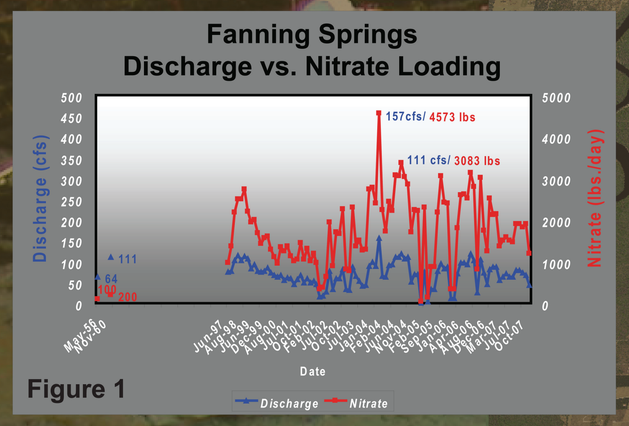
Nitrate Sources (Figure 3)

The Watershed Assessment Model (WAM) was used to estimate nitrogen loading to groundwater from the various land uses within the springshed in 1995. The spatial distribution of the WAM nitrogen loads to the groundwater is shown on the imagery to the left. The model indicates more than 90% of the groundwater nitrogen loading is from agricultural land use (see Table 2 and Figure 3 pie chart to the right). Synthetic fertilizer is the main source of the applied nitrogen for these land uses.

Table 2. Land Use and Nitrogen Loading

Land Use	Acreage	% Land Use	% N Load
Row Crops	14,145	12	44
Improved Pasture	33,111	28	28
Coniferous Plantations	35,711	31	19
Ranchettes	5,581	5	6
Other	28,136	24	3





Nitrate Load (Figure 1)

Fanning Springs discharges the highest concentration of nitrate of Florida's first magnitude springs exceeding 6 mg/l. Nitrate loading routinely exceeds more than a ton of nitrate per day to the Suwannee River which is an order of magnitude greater than fifty years ago.

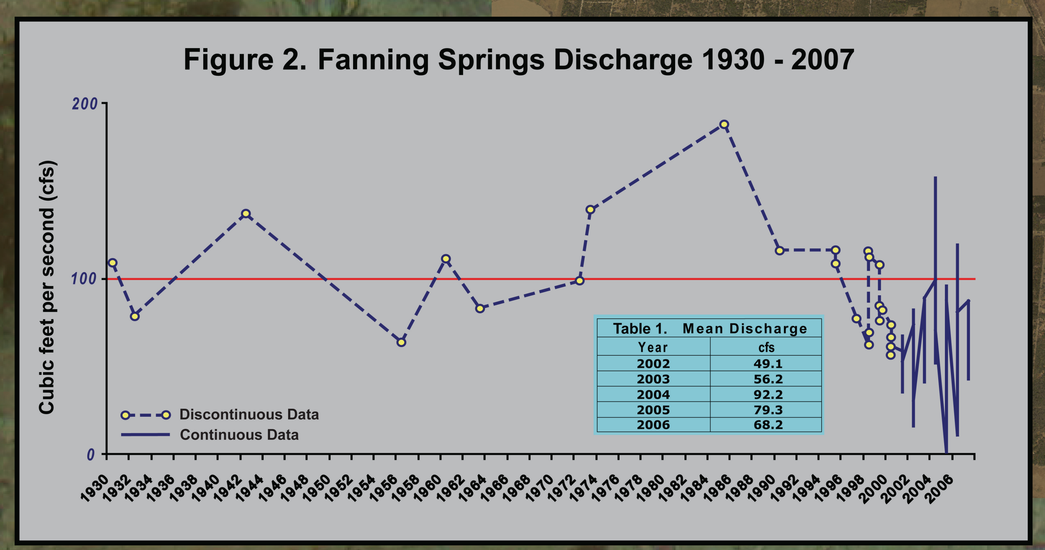


Fanning Springs



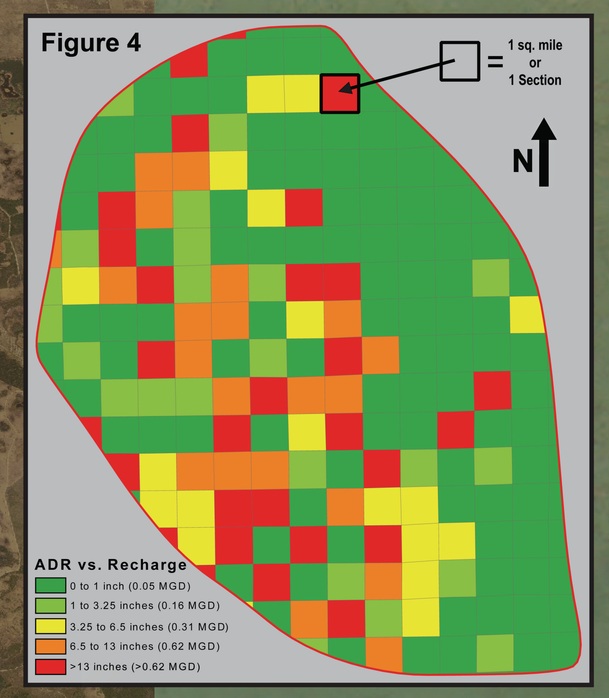
Spring Discharge (Figure 2)

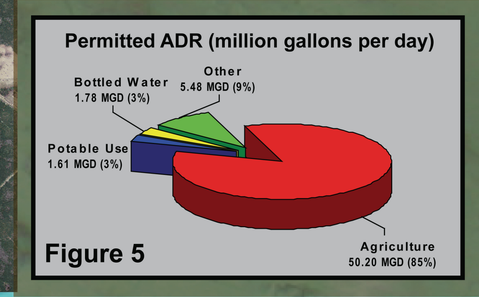
Fanning Springs is now classified as a "historical" first magnitude spring as the median of its discharge measurements is well below the 100 cubic feet per second (cfs) or greater required for a first magnitude classification. The graph of discharge data used in this study clearly shows a decline in discharge since 1997. Since 2001, daily discharge measurements have been obtained from a USGS real-time gauge set in Fanning Springs' run. The mean annual discharges for the year 2002-2006 are presented in Table 1 (inset Figure 2).



Water Consumptive Use in the Springshed (Figures 4 & 5)

Permitted consumptive use data obtained from the Suwannee River Water Management District is provided at the Township, Range and Section level. The permitted Average Daily Rate (ADR) of withdrawal for each section within the springshed was totaled (Figure 4). Sections in which the permitted withdrawals exceed the equivalent of 13 inches of annual recharge are shown in red on the image below. The accompanying pie chart shows the percentage and amount of permitted ADR withdrawals by category (Figure 5).





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