

2005-2006 FROST/SNOW MONITORING REPORT

March 2007



Prepared for:

SOUTH WASHINGTON
WATERSHED DISTRICT

Prepared by:



Memorandum

To: Matt Moore —South Washington Watershed District Administrator

From: Erik Anderson, Jessica Arendt, Wendy Griffin, Tim Sundby, and Travis Thiel--
Washington Conservation District

Date: October 17, 2005

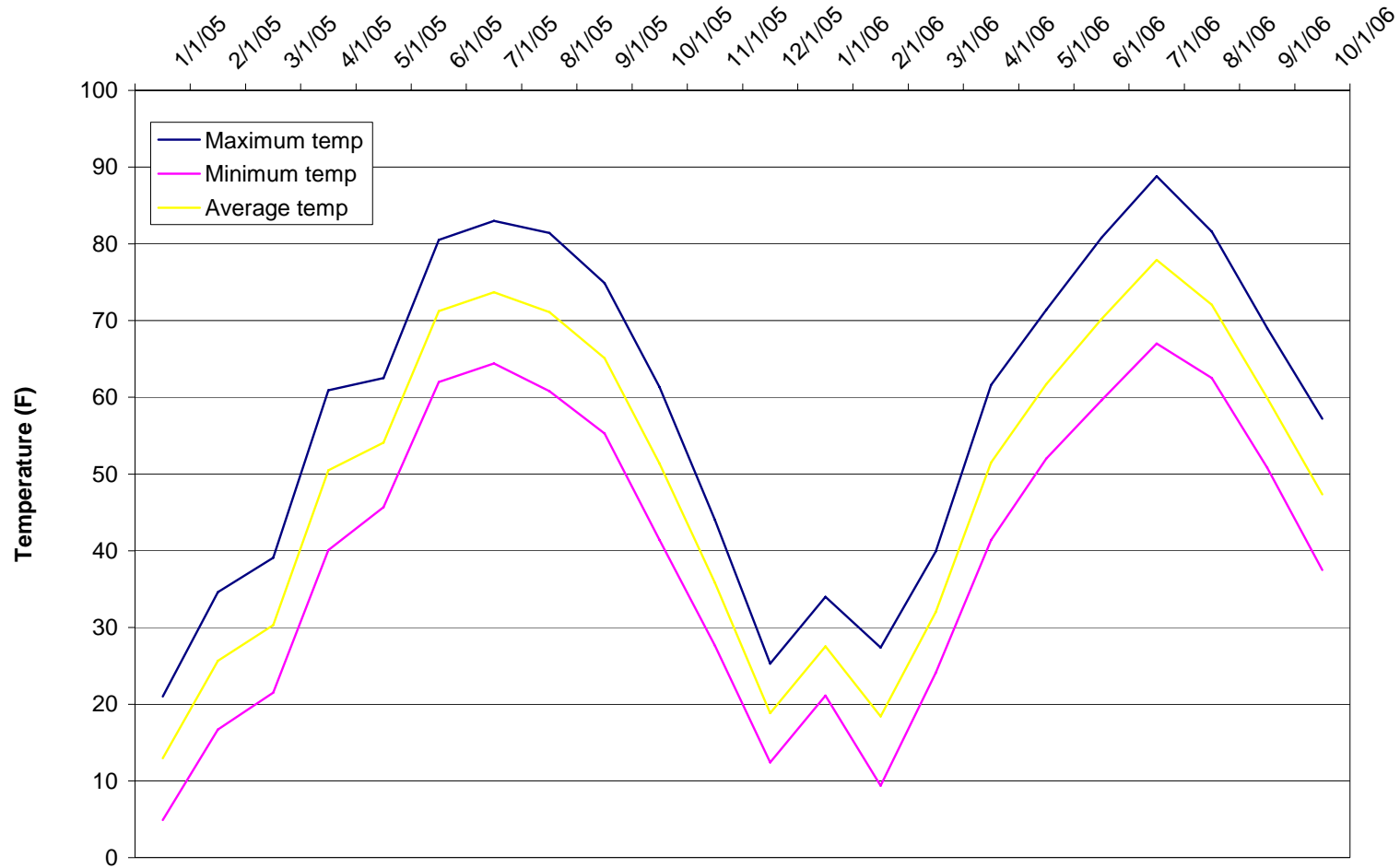
Re: SWWD 2005-2006 Frost/Snow Monitoring: Cottage Grove Ravine Park, CDP 85, CDP 86,
and MS-1

At the request of the South Washington Watershed District (SWWD), the Washington Conservation District (WCD) conducted frost/snow monitoring at fifteen frost monitoring sites (Cottage Grove Ravine Park, CDP-85 locations {NH, NL, SH, SL, EH, EL, WH, WL, SC}, CDP-86 locations {86-1, 86-2, 86-3, 86-4}, and MS-1). The following report summarizes our methods and results for monitoring conducted from December 9, 2005 to March 22, 2006. This report and the accompanying data will also be provided in an electronic format.

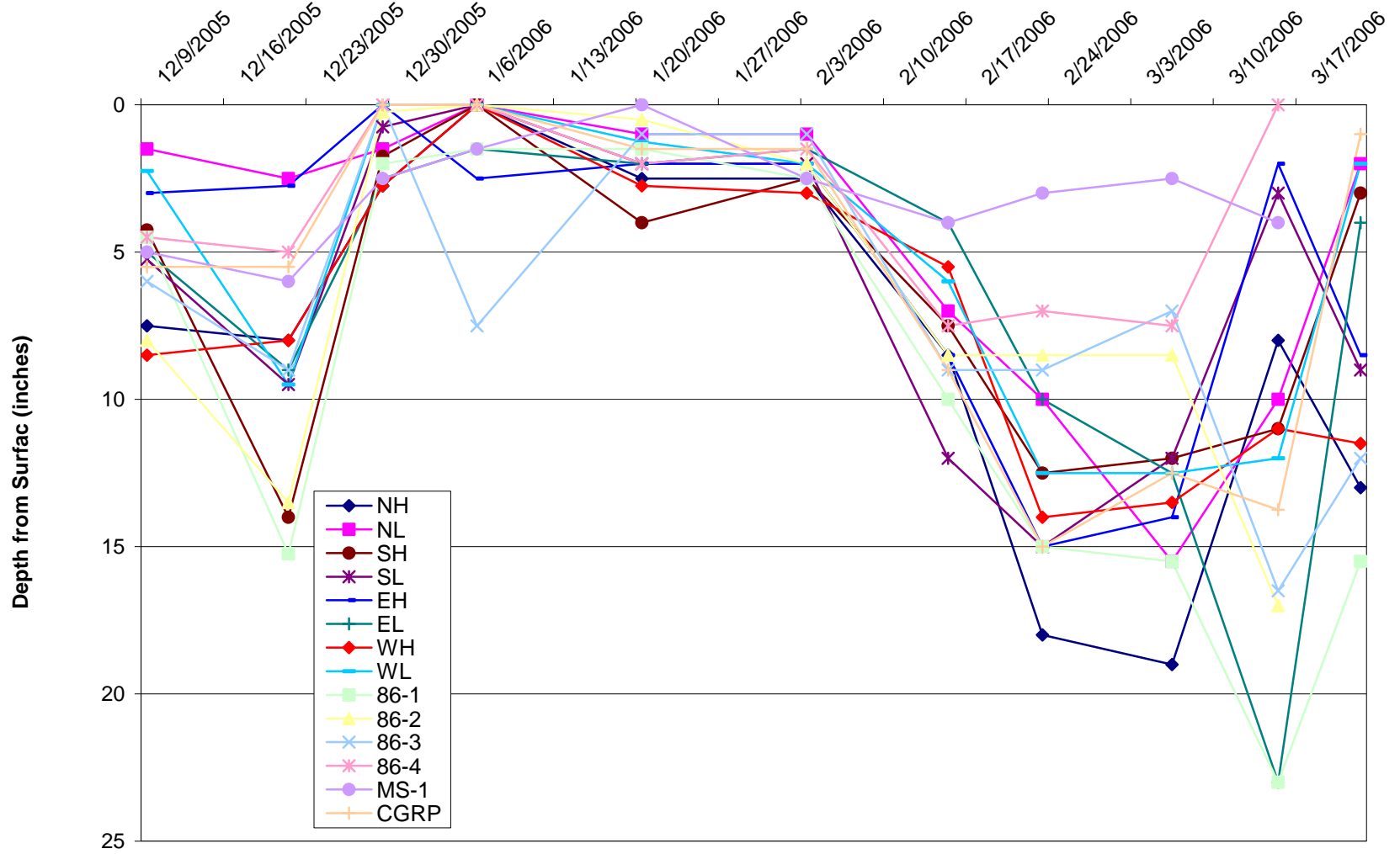
Frost/Snow Monitoring Sites: Cottage Grove Ravine Park, CDP-85 (NH-North side/upper slope, NL-North side/lower slope, SH-South side/upper slope, SL-South side/lower slope, EH-East side/upper slope, EL-East side/lower slope, WH-West side/upper slope, WL-West side/lower slope, SC-Center of south half of basin, CDP-86 (86-1-tilled corn field in upland area, 86-2-tilled corn field between upland and lowland areas, 86-3-grassland ridge adjacent to lowland meadow, 86-4-tilled corn field adjacent to lowland meadow, and MS-1.

Frost depth from surface, frost thaw from surface, snow depth, and water content of snow was measured at least every one to two weeks at each of the sites mentioned above within the SWWD depending on weather conditions. Frost depth from surface and frost thaw from surface was measured using a self-designed frost tube. The frost tubes were created using a 5-ft. sealed, rigid outer CPVC pipe and a pliable 4-ft. vinyl tube in the interior of the CPVC pipe. The vinyl tube was filled with a sand/fine gravel mixture and all gaps and holes were filled with a 0.10% fluorescein dye/water solution that was poured into the mixture. The dye/water mixture changes from green to red within the tube to indicate whether frozen or unfrozen soil exists. This slurry was used to mimic the effects that temperature would have on saturated ground. The CPVC pipe was placed in the ground to a depth of 4 ft. and 1 ft. was exposed on the surface for visibility. The inner tube was pulled from the outer tube and the frost/thaw measurements were recorded. Snow depth measurements were assessed by taking the average depth of snow measured at various locations within a 30-ft. radius of the frost tube. Water content was assessed by collecting a column of snow within the area where the average depth of snow was measured with a 4-inch diameter collector. This snow was allowed to melt and the water content was measured by pouring the melt water into a precipitation gage calibrated to measure the 4-inch diameter column collector. All snow depth and water content measurements at CDP-85 and CDP-86 were taken at one site (SC) to represent the snow depth and water content at all locations in this region. Missing data points that are within the following dataset are due to frost tubes either being surrounded by snowmelt water forming a pond and giving false readings or by the ponds around the tubes freezing the tubes under the ice making them inaccessible.

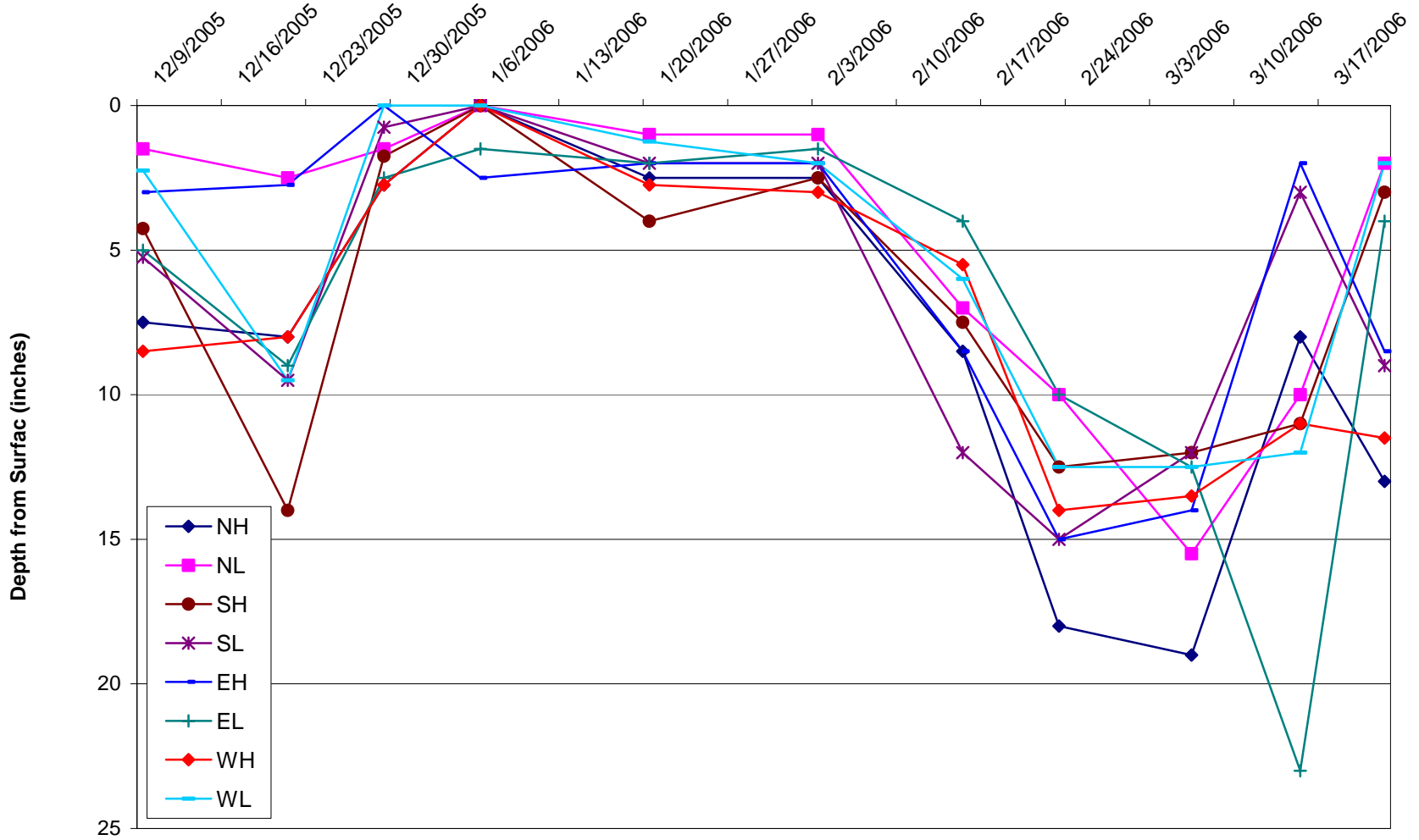
**Monthly Air Temperatures at St. Paul WB Airport
(Township 28, Range 22, Section 9)**



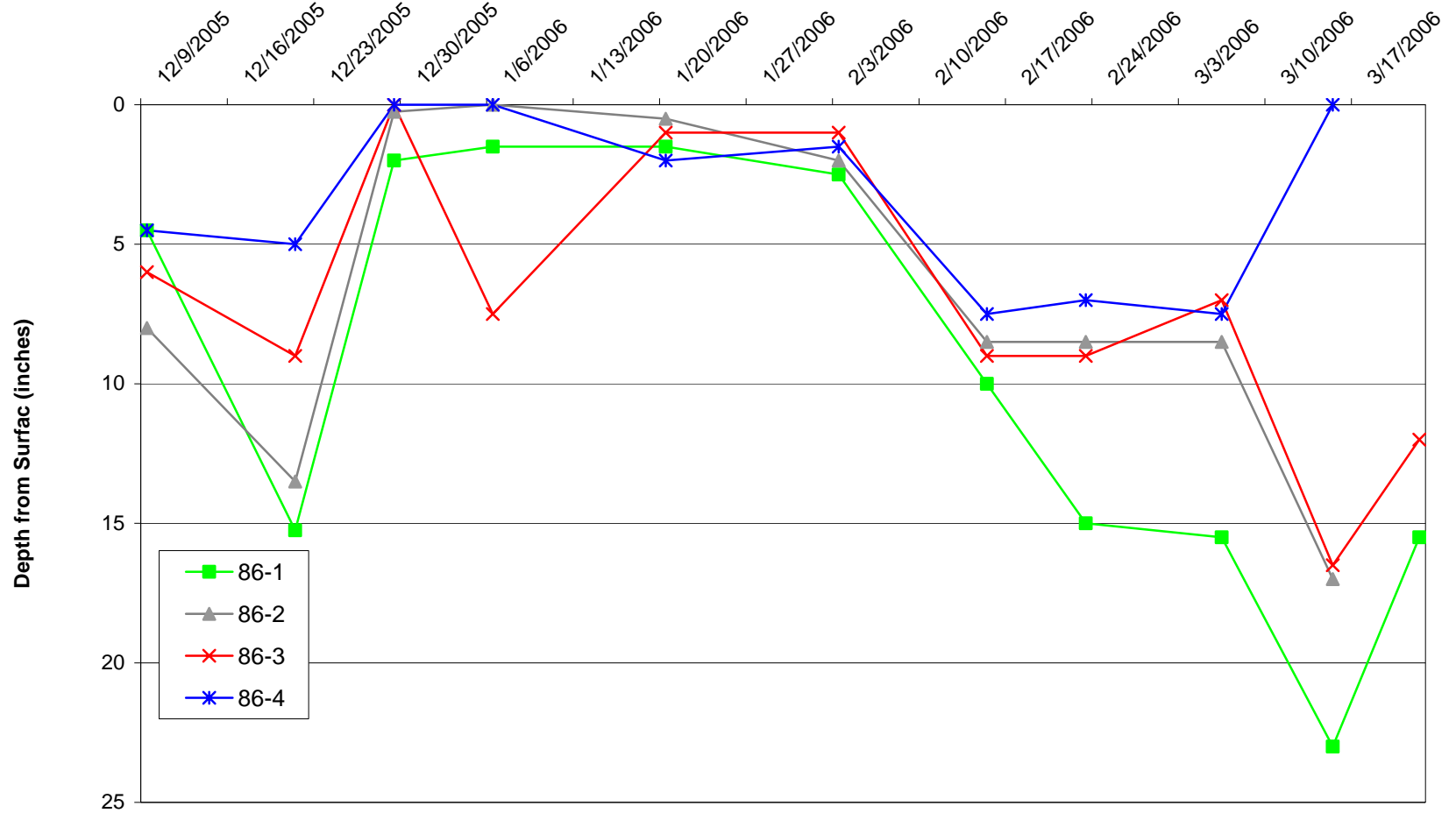
Frost Depths at All Sites



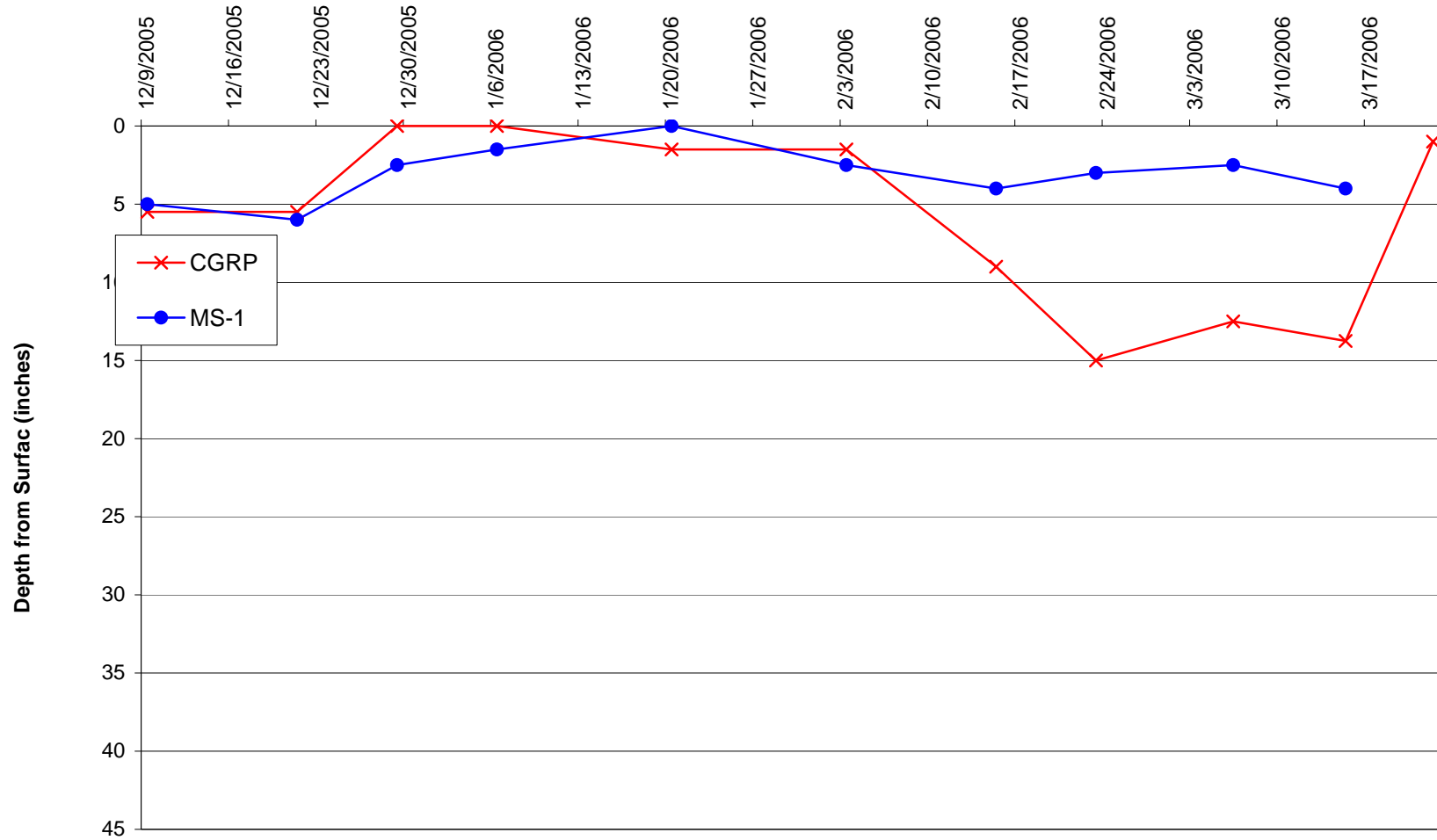
Frost Depths at CDP 85



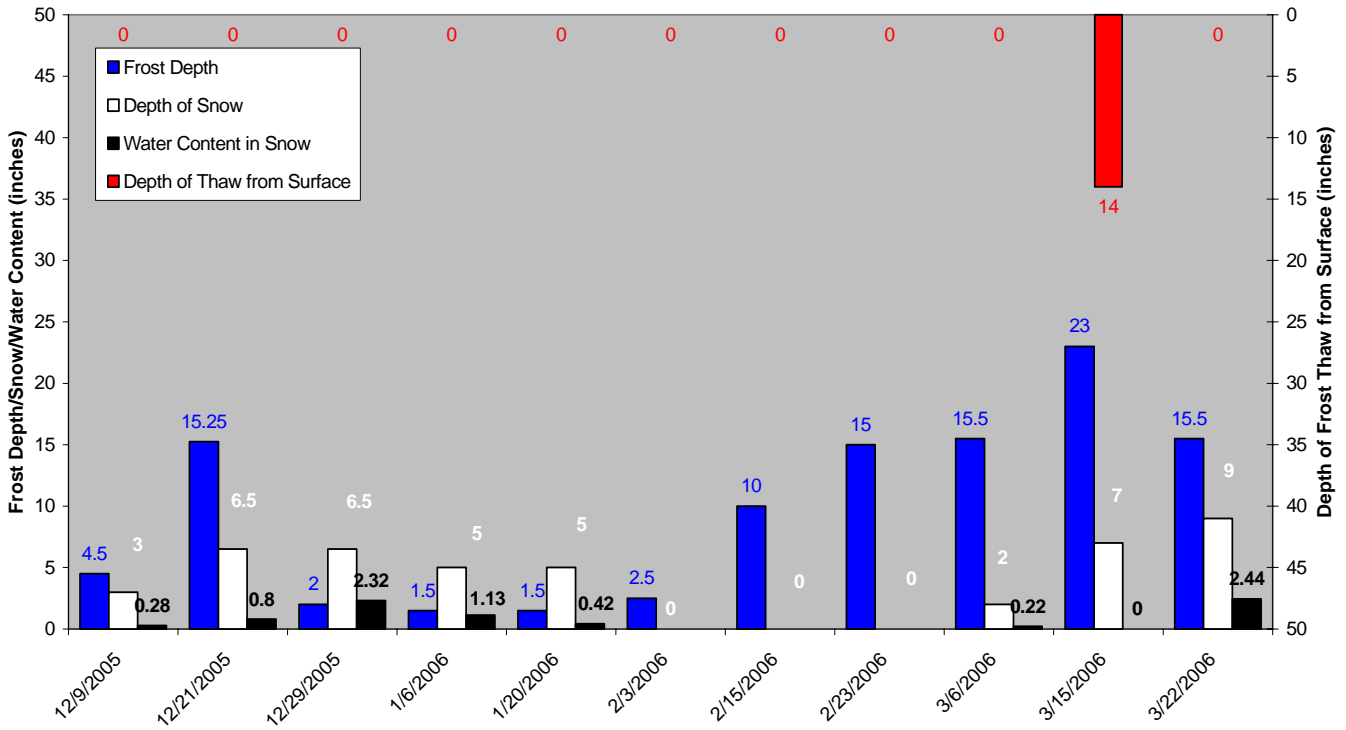
Frost Depths at CDP 86



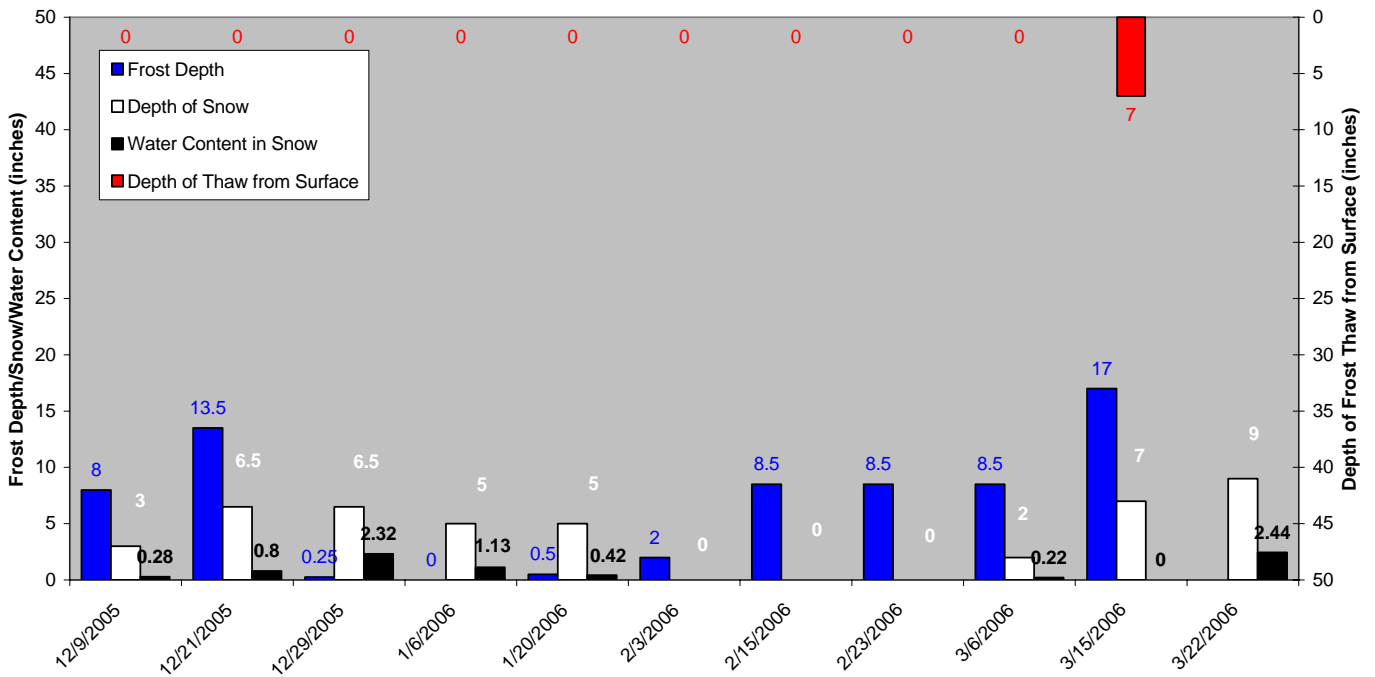
Frost Depths at Cottage Grove Ravine Park and MS-1



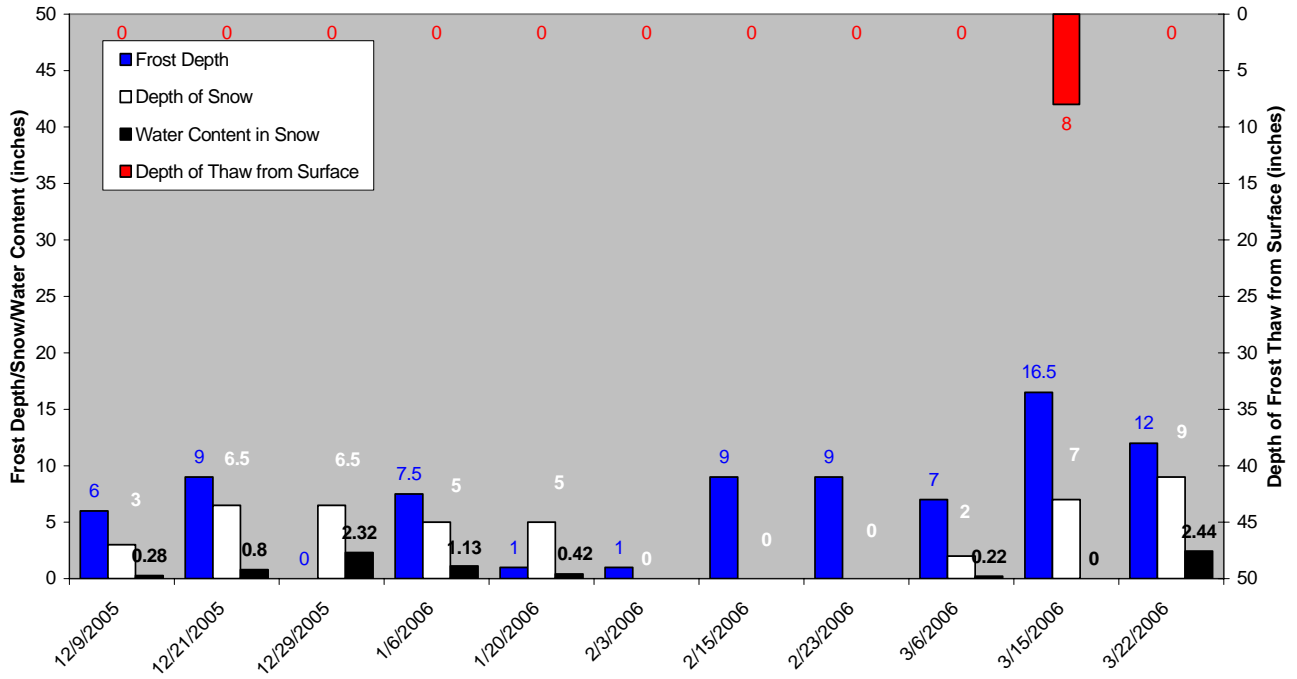
CDP 86-1 Tilled Upland Soybean Field



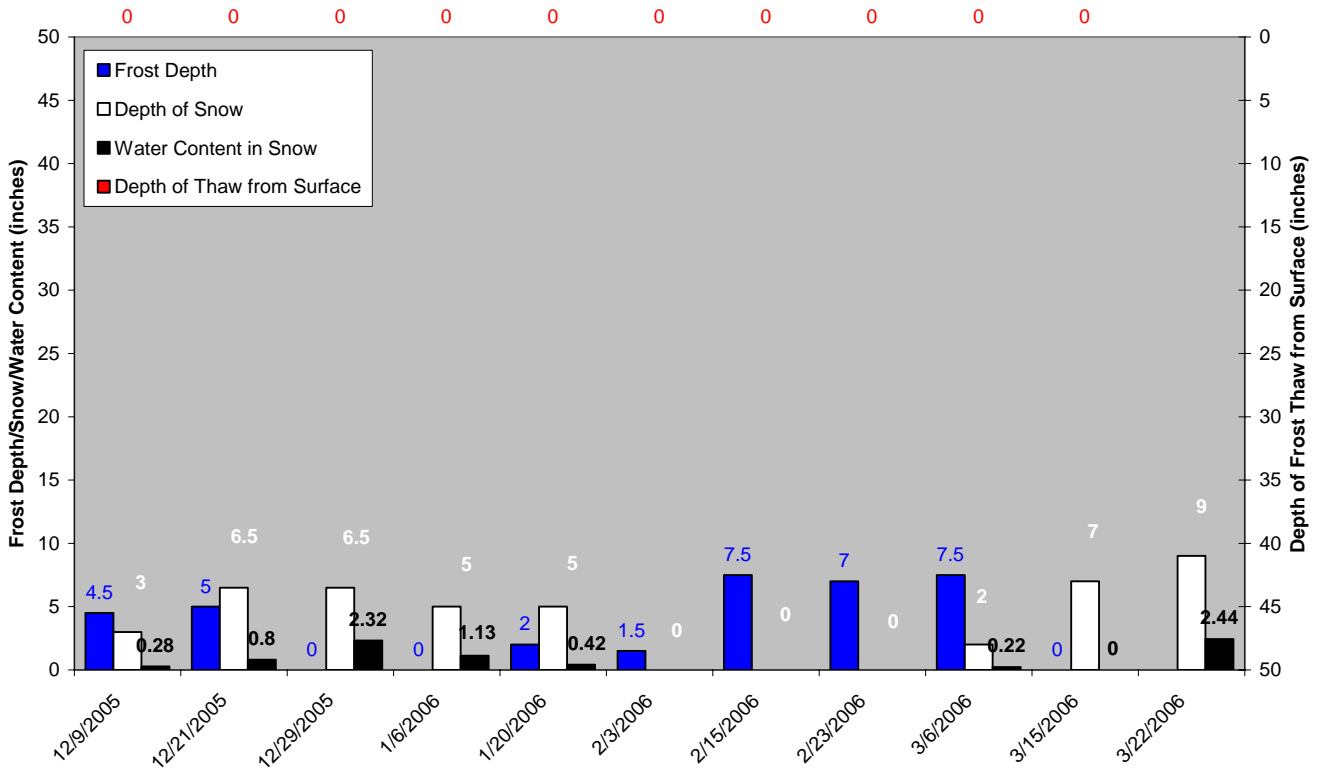
CDP 86-2 Tilled Soybean Field Between Upland and Lowland



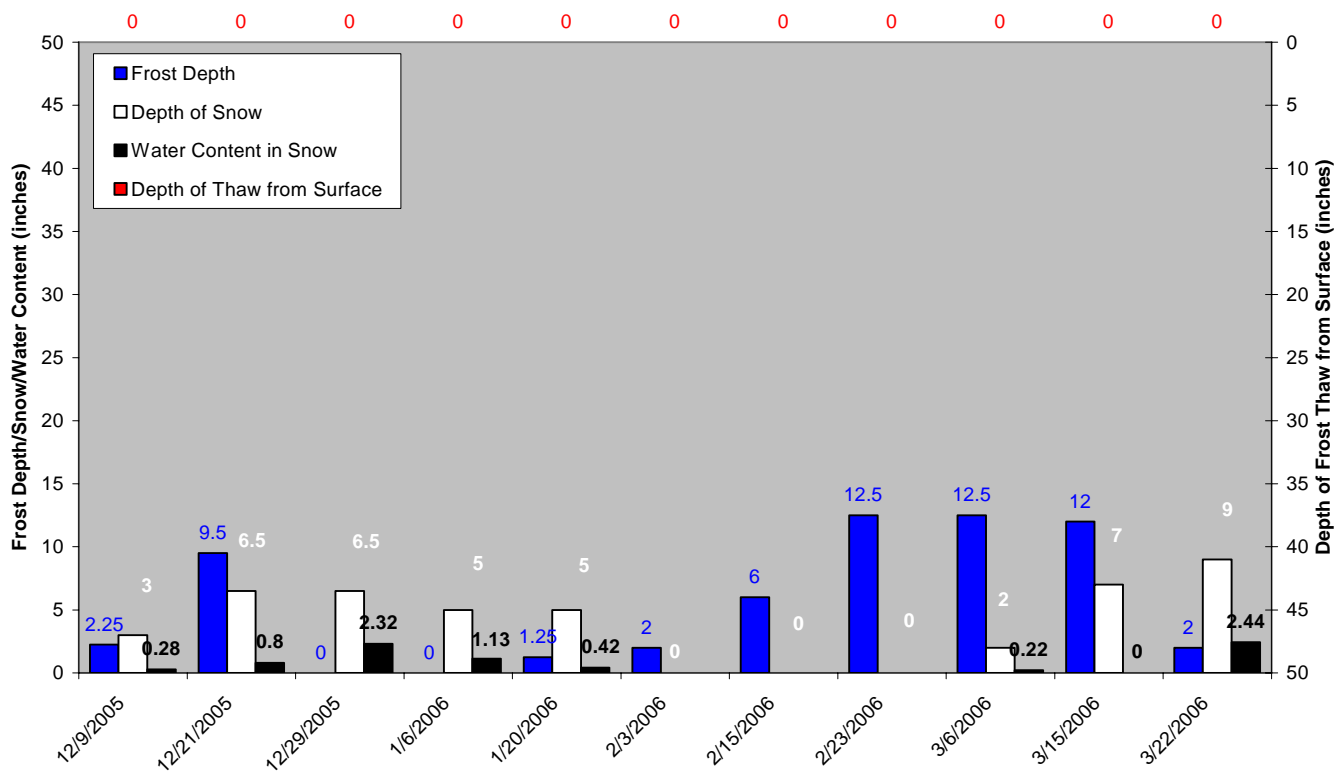
CDP 86-3 Lowland Grassy Ridge



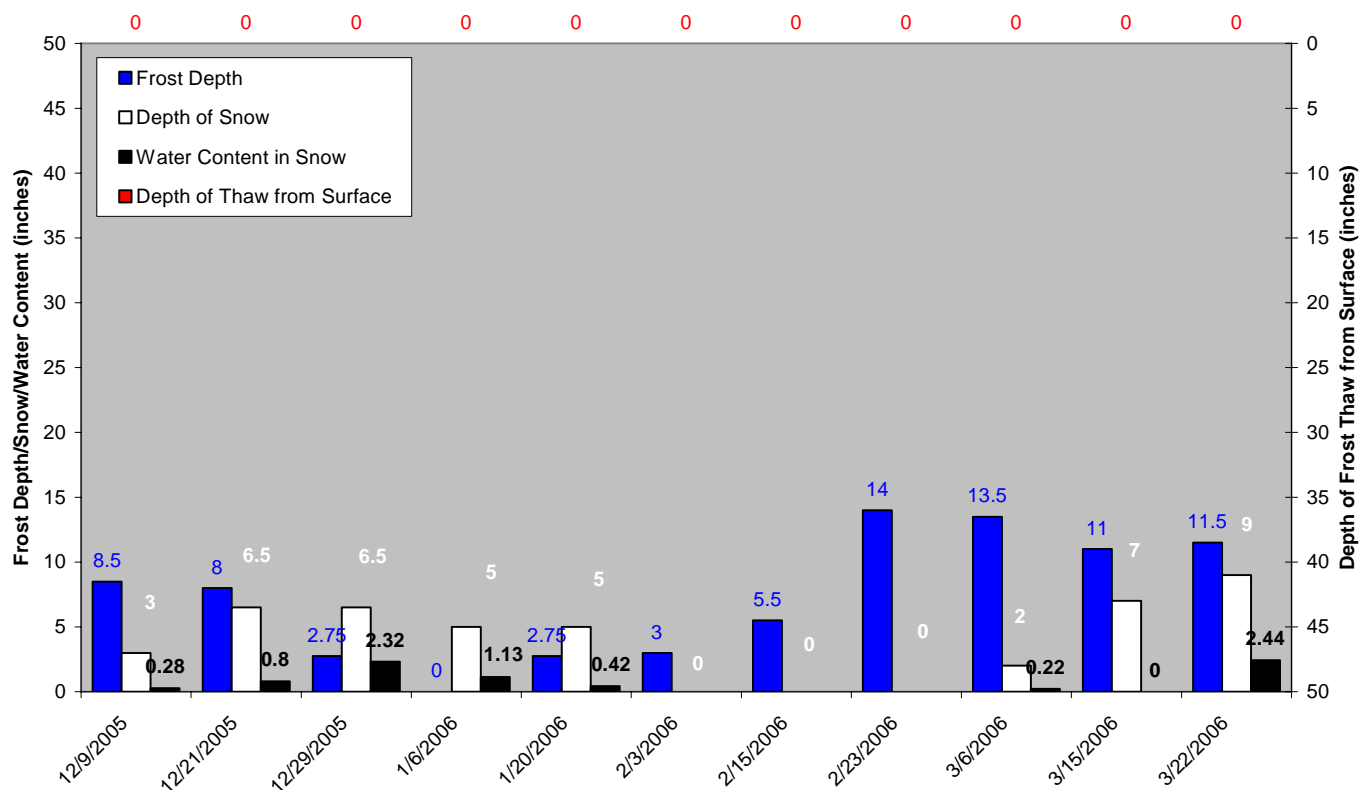
CDP 86-4 Tilled Lowland Soybean Field



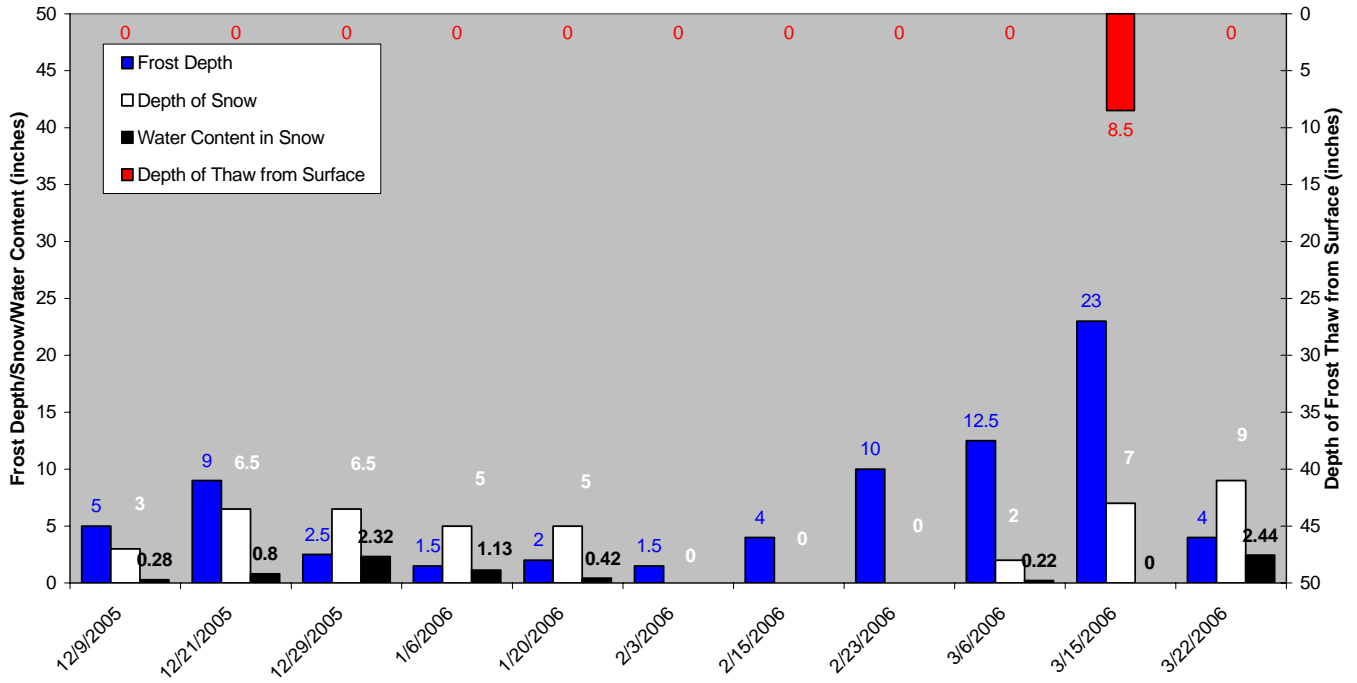
CDP 85 West Side/Low Slope



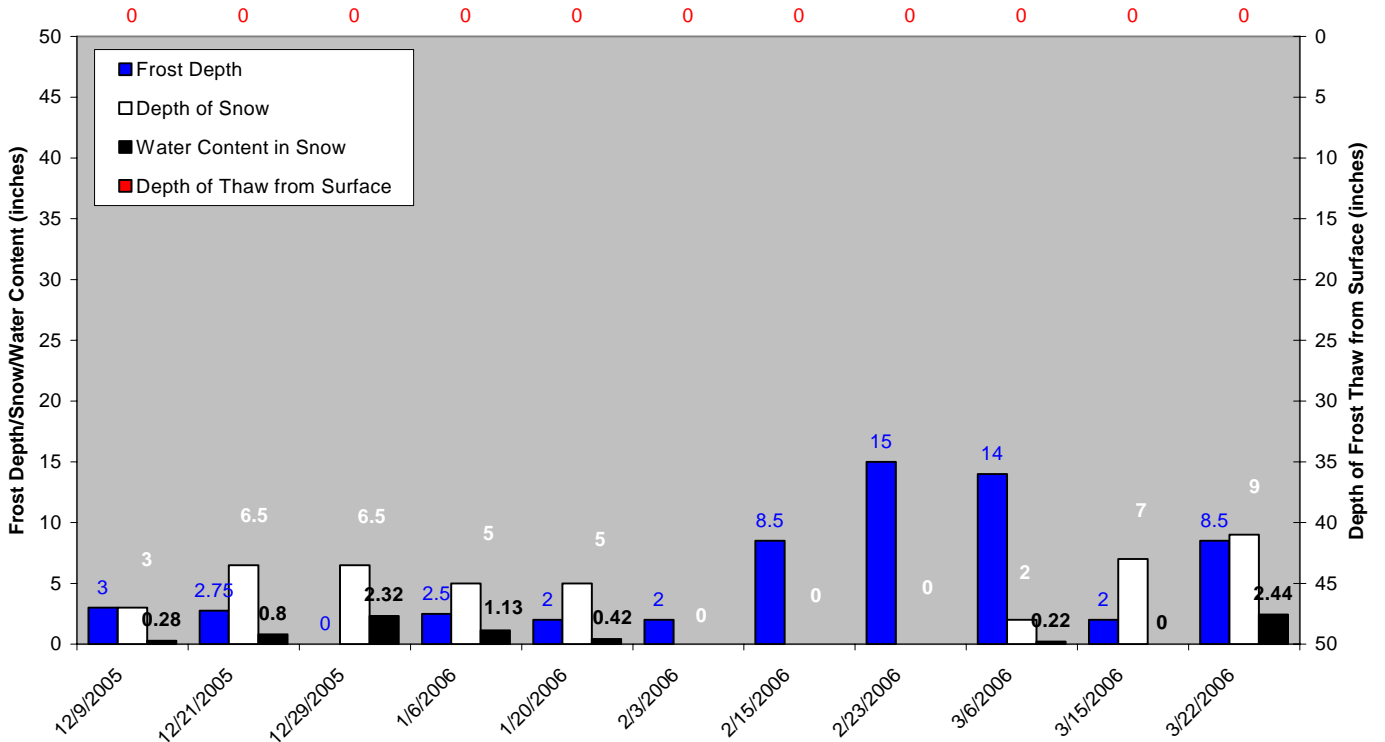
CDP 85 West Side/High Slope



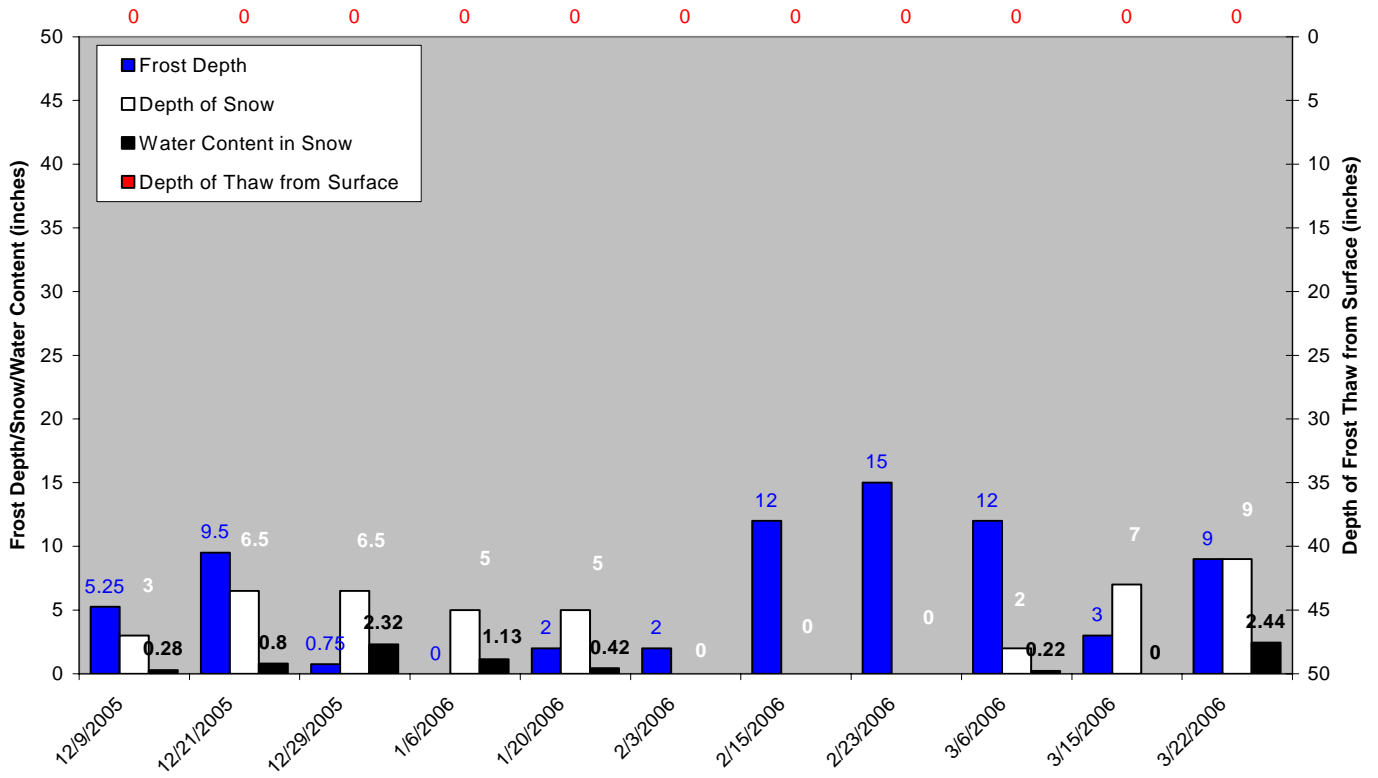
CDP 85 East Side/Low Slope



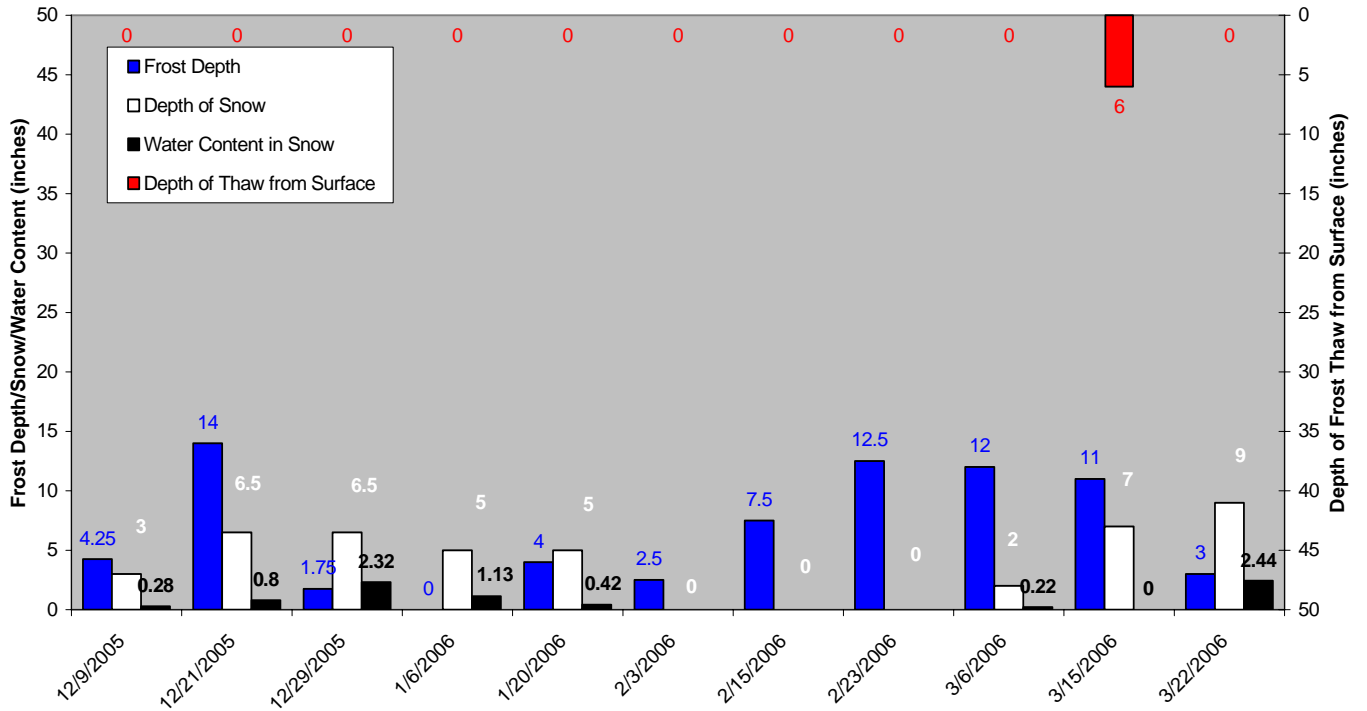
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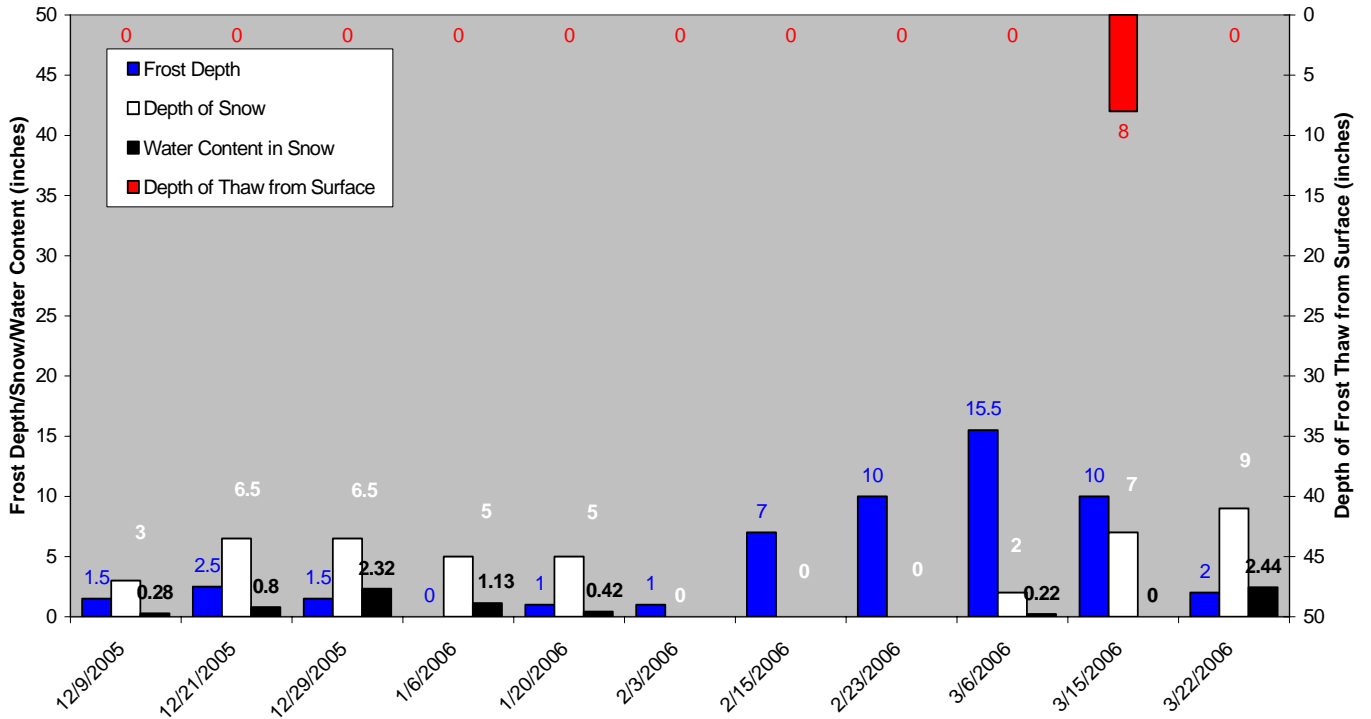
CDP 85 South Side/Low Slope



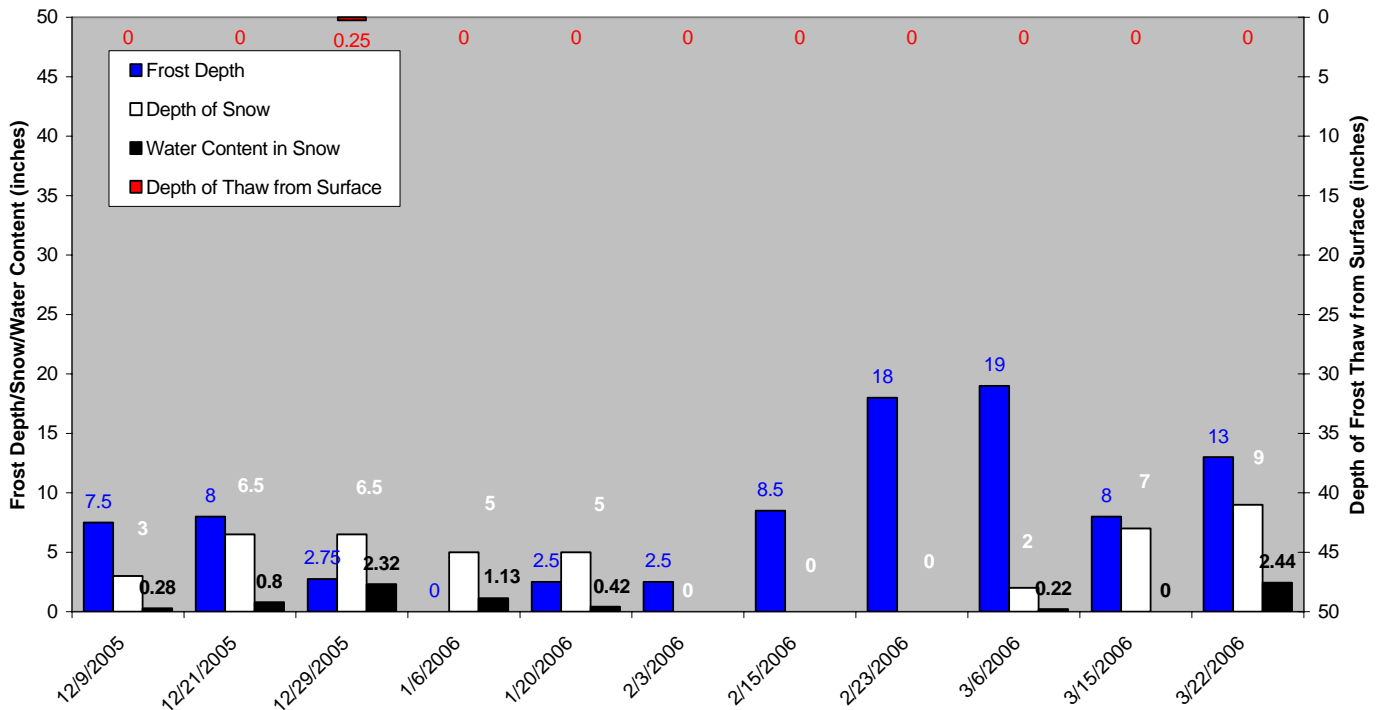
CDP 85 South Side/High Slope



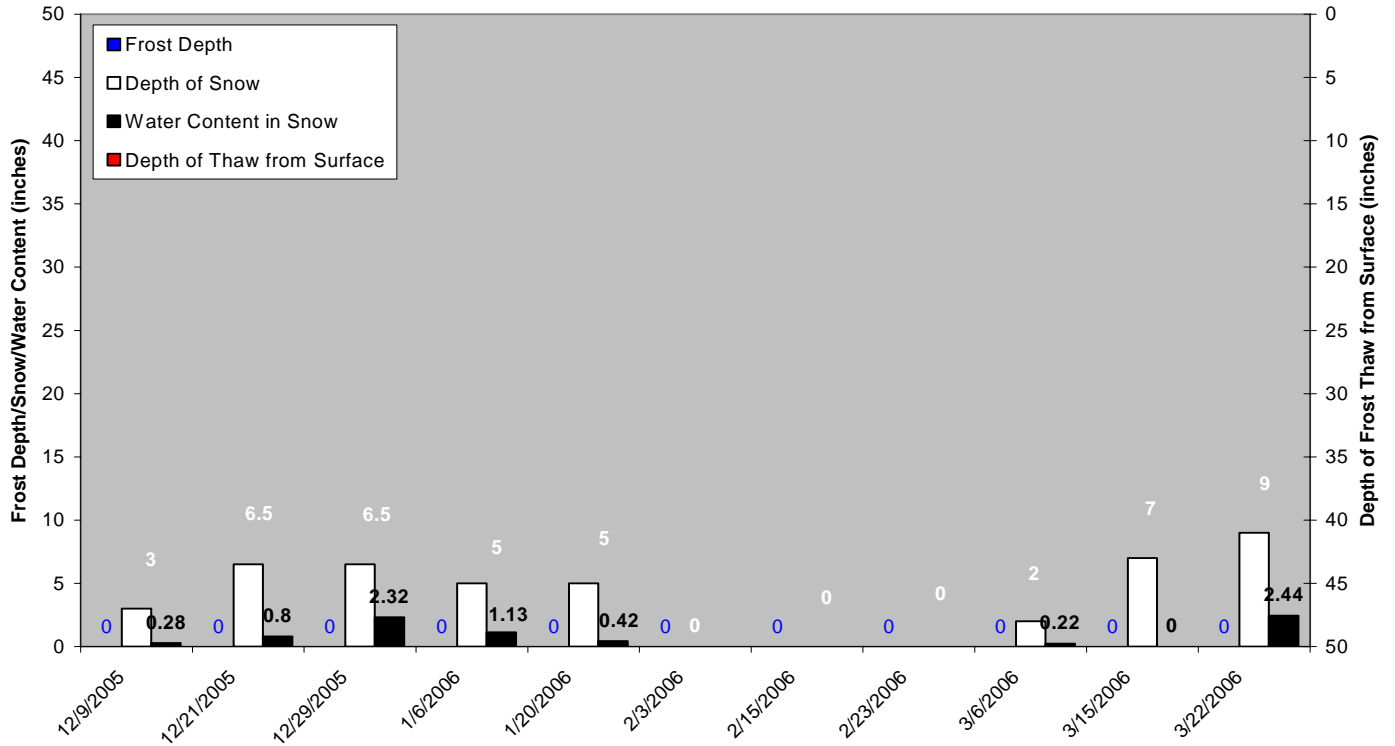
CDP 85 North Side/Low Slope



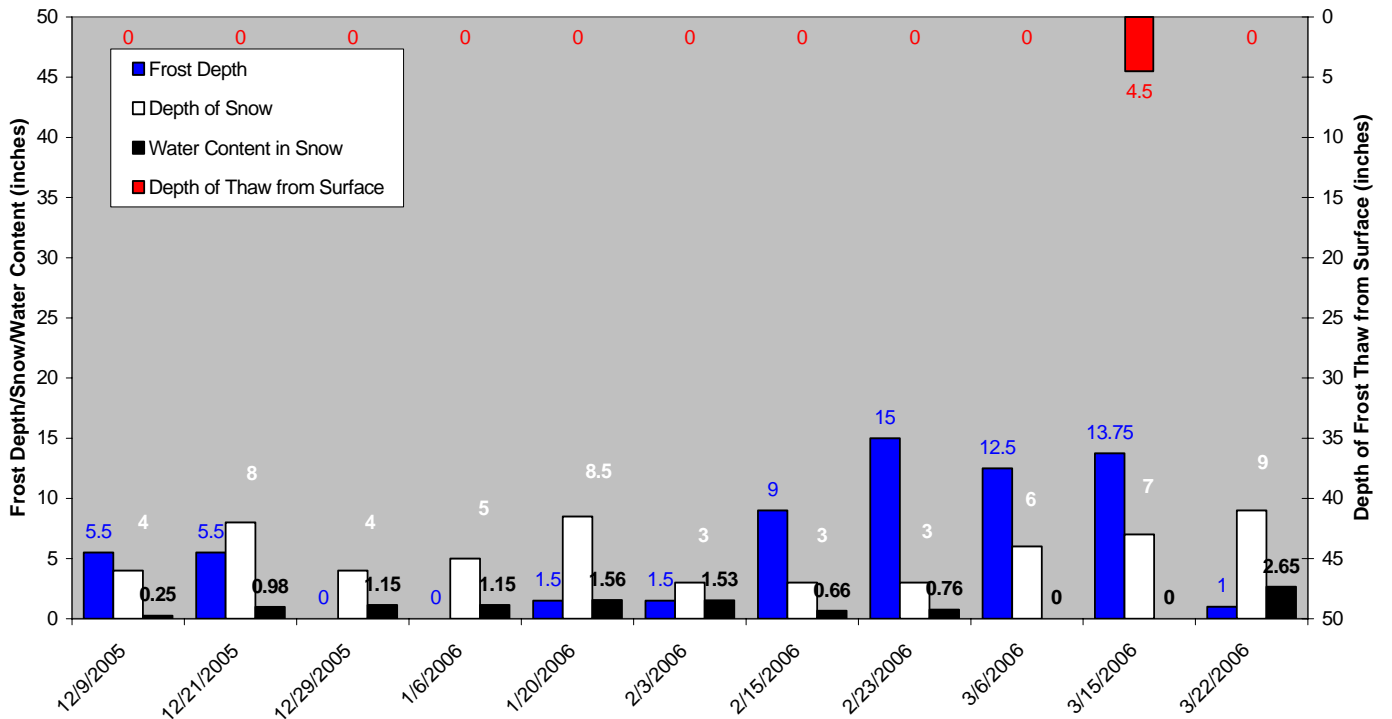
CDP 85 North Side/High Slope



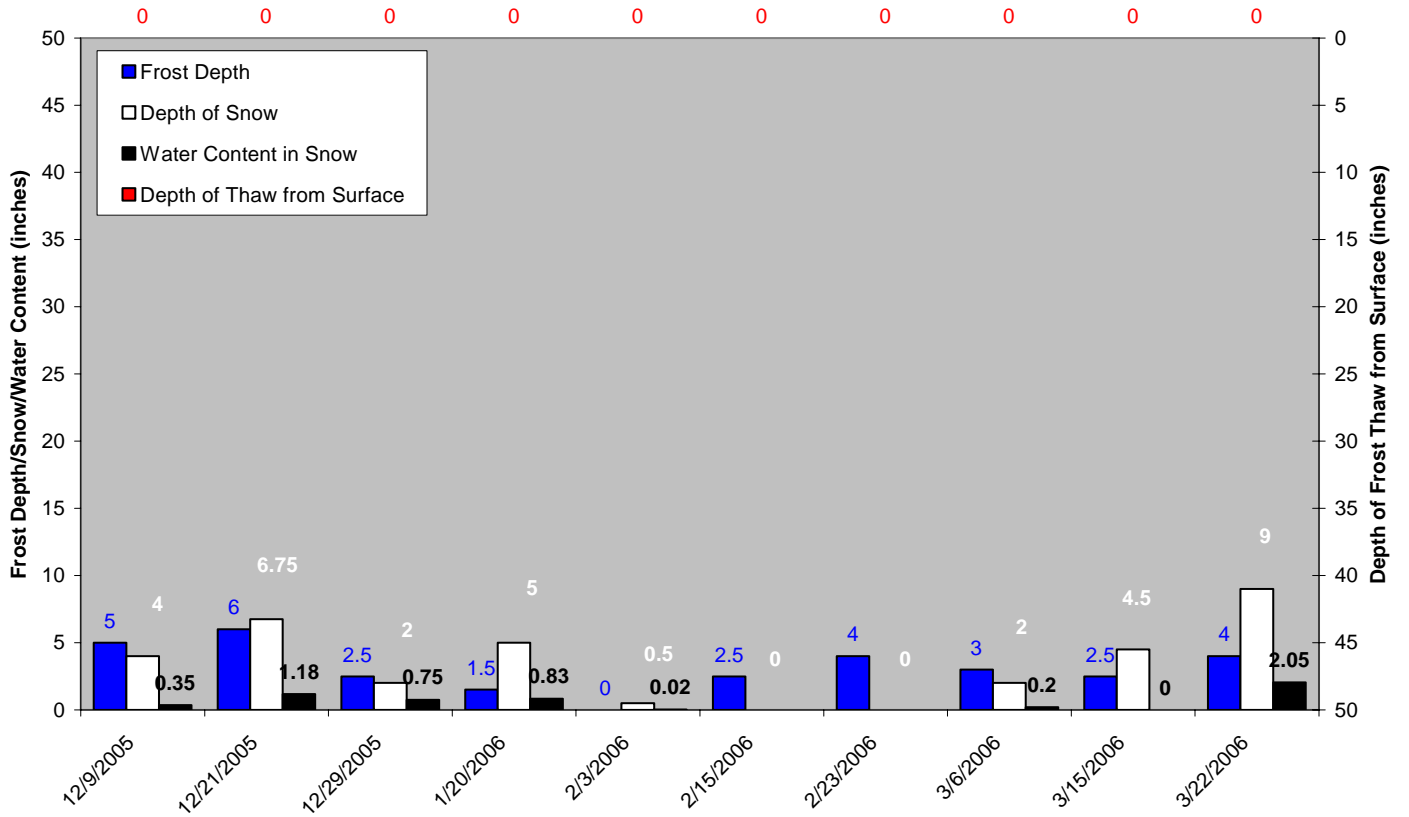
CDP 85 Center of South Half of Basin



Cottage Grove Ravine Park



MS-1



APPENDIX

Frost Depth from Surface, Frost Thaw from Surface, Depth of Snow, and Water Content in Snow.