Figure S8. Photographs and descriptions of smear slides from colluvial sequence (depth 65-140 cm) in middle part of core BO-1 sampled with "Russian" medium-diameter (5 cm) corer.

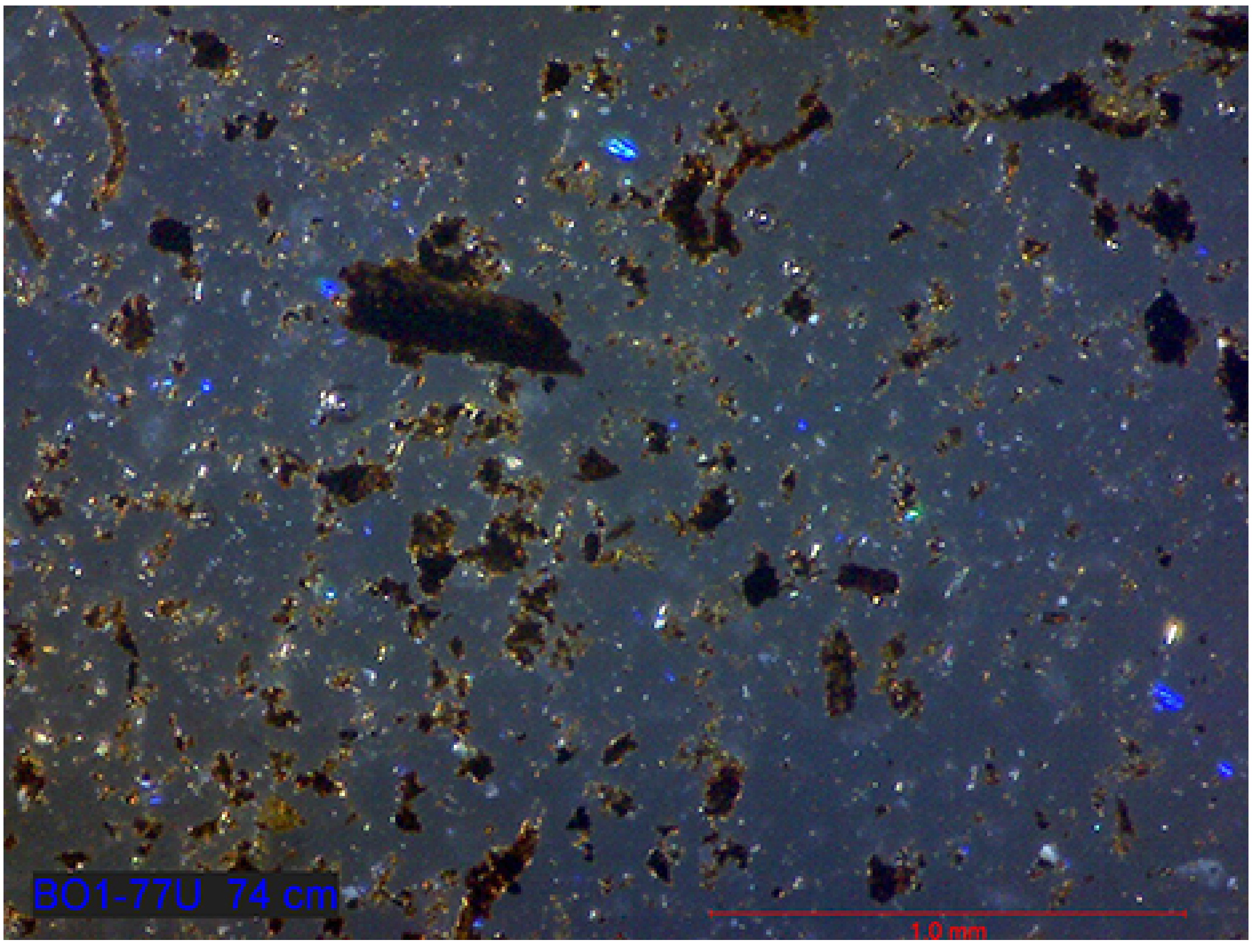

Photo BO1-74—Slide 77-U (74 cm). Organic-rich layer at base of upper peat layer (unit 6). Other components: sponge spicules (rare), chrysophyte cysts, phytoliths; organics abundant. Diatoms: fairly abundant; ~20% planktonic (*Aulacoseira*, *Tabellaria*), remainder are benthic (*Eunotia*, etc.). The genus *Eunotia* is generally indicative of peaty, acid waters. Dissolution is minimal, minor valve breakage. Return to peat stratigraphy indicates shallower water than below.

Figure S8. (continued)

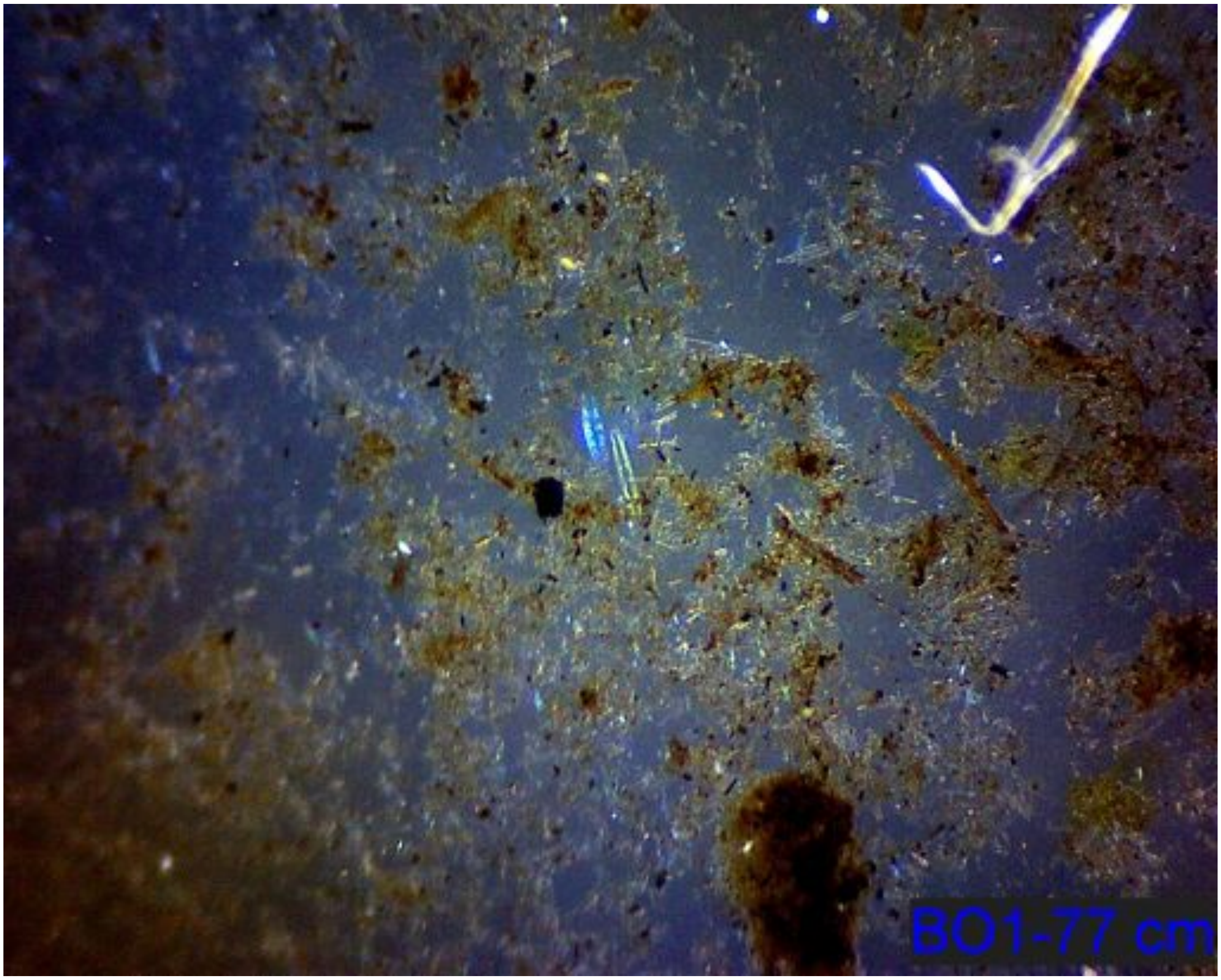

Photo BO1-77—Slide 78.5-U (77 cm). Silt bed at top of silt interval (unit 5). Other components: sponge spicules (rare), decomposed plant organics. Diatoms: fewer than below; mostly benthic, (*Eunotia*) present but not abundant, planktonic (*Aulacoseira*) rare. Dissolution is minimal, fair amount of valve breakage. Diatom assemblage suggests shallower water than below.

Figure S8. (continued)

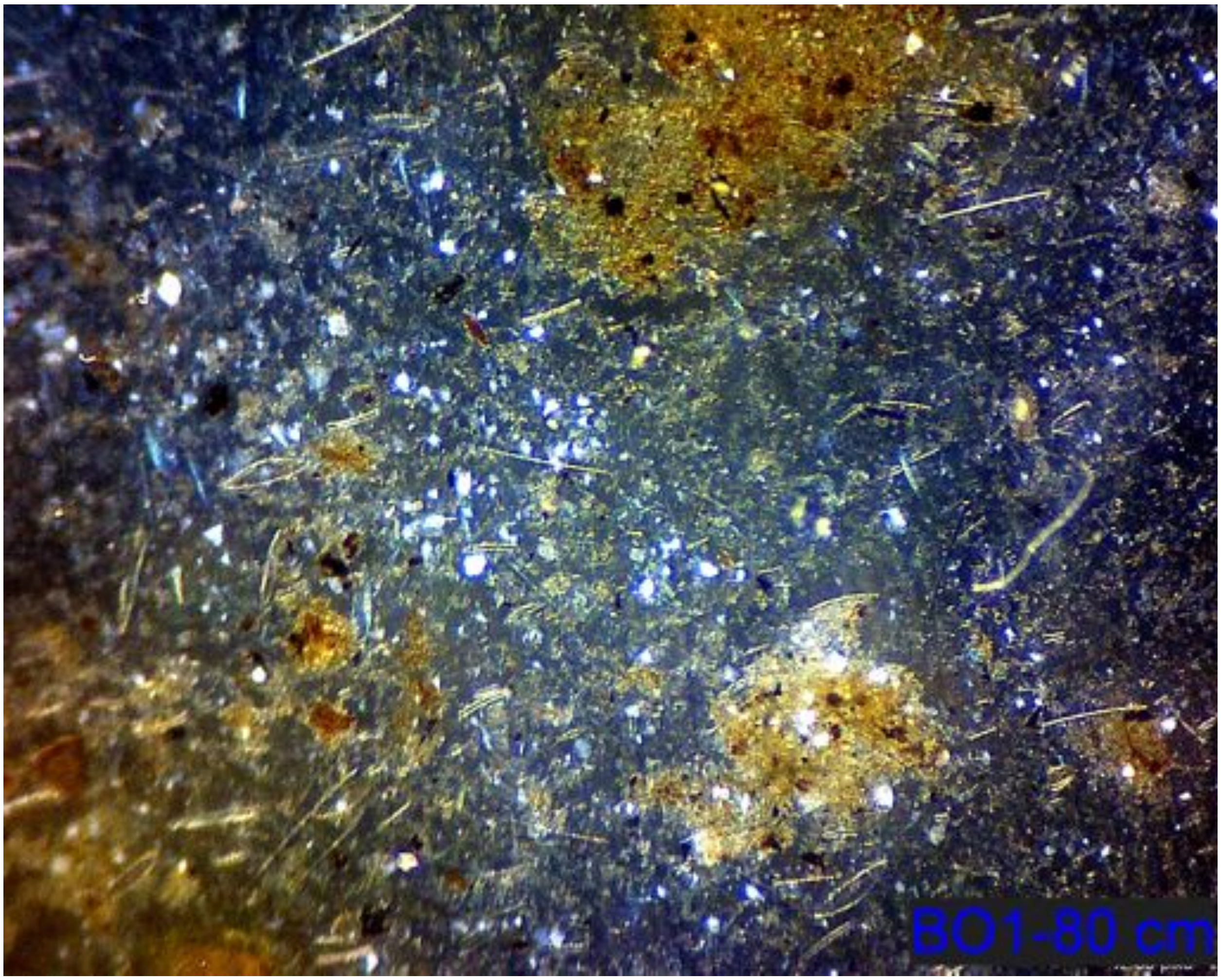

Photo BO1-80—Slide 81-U (80 cm). Thin diatomite bed at bottom of silt interval (unit 5). Other components: sponge spicules. Diatoms: Abundant; ~30-40% planktonic (*Aulacoseira, Tabellaria*), remainder are benthic (*Eunotia*, etc.). A few *Rhopalodia* and *Epithemia* (nitrogen-fixing) suggests reduced nitrogen input (less surface water input and more direct rainfall. Dissolution is minimal, minor valve breakage. Diatom assemblage suggests deeper water than above or below (increased planktonic fraction).

Figure S8. (continued)

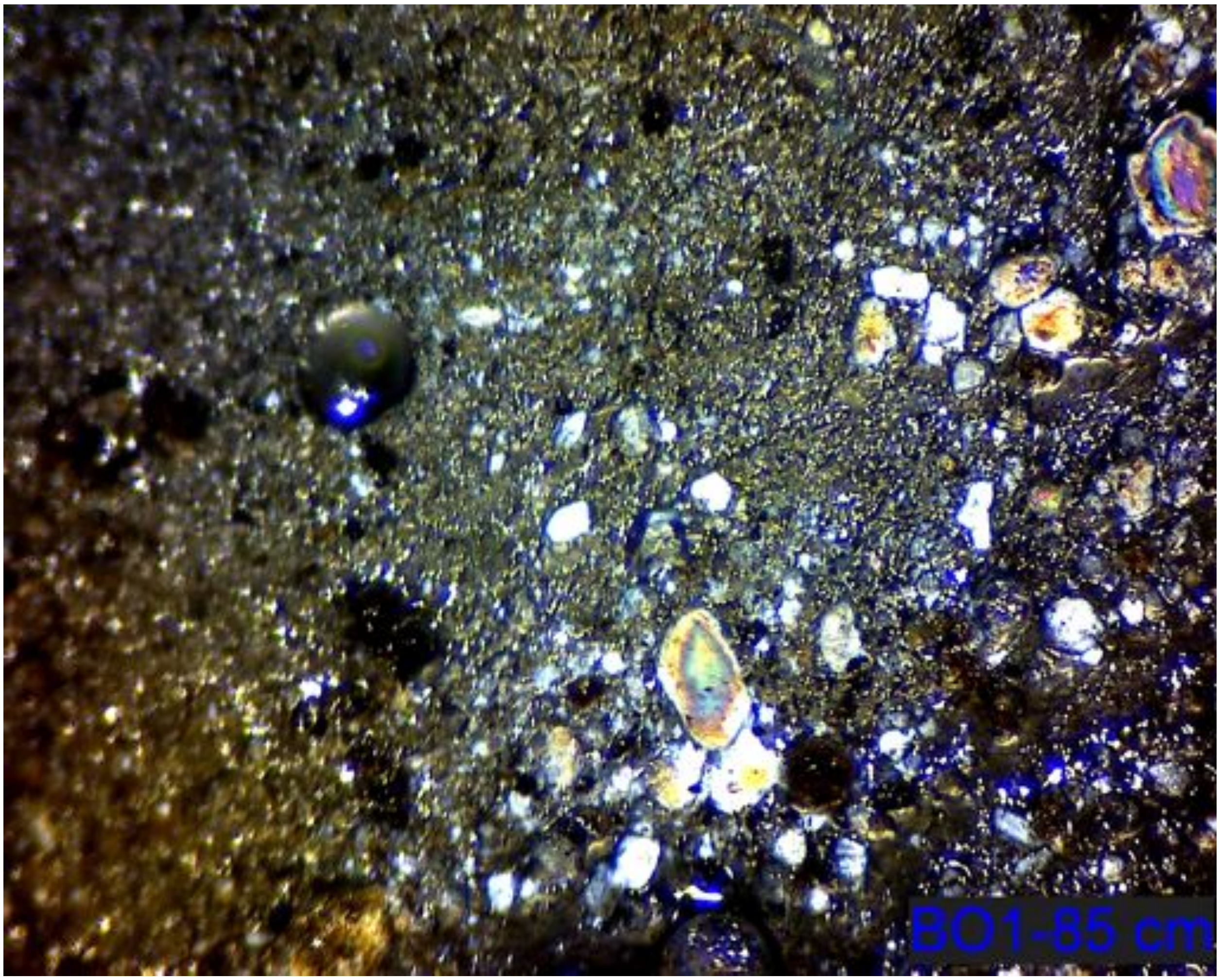

Photo BO1-85—Slide 84-U (84 cm). Sandy silt in upper part of sandy silt/colluvial interval (unit 4). Other components: sponge spicules, phytoliths. Diatoms: fairly abundant; <10% planktonic (*Aulacoseira, Tabellaria*), primarily benthic (*Eunotia*, etc.). Dissolution is common (more than above, less than below), moderate valve breakage. Diatom assemblage suggests shallower water than above or below.

Figure S8. (continued)

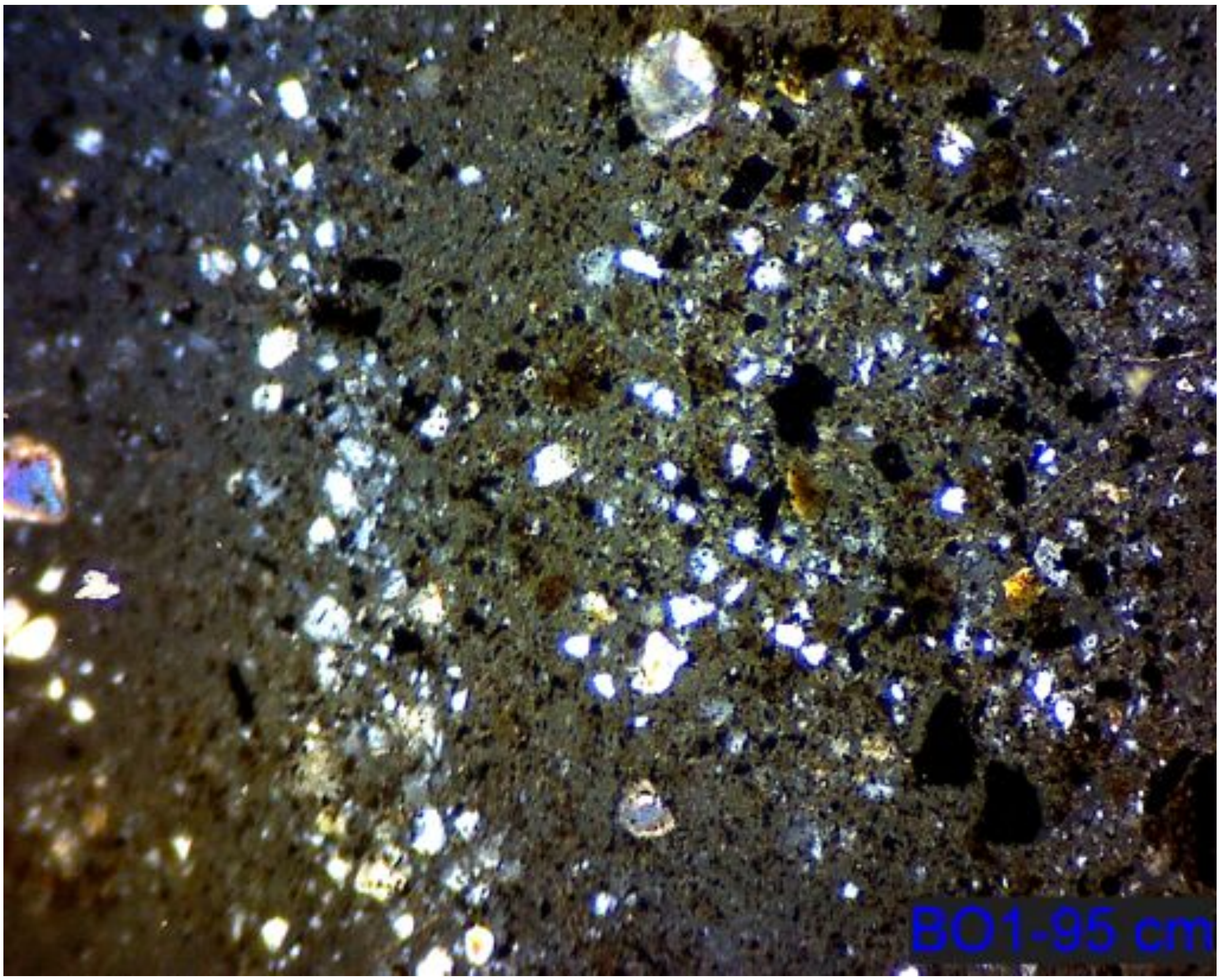

Photo BO1-95—Slide 91-U (91 cm). Sandy silt in upper part of sandy silt/colluvial interval (unit 4). Other components: sponge spicules, phytoliths, ash shards. Diatoms: fairly abundant (but less than below), less diversity than below; ~30-40% planktonic (*Aulacoseira, Tabellaria*), remainder benthic (*Eunotia*, etc.). Dissolution is common, significant valve breakage, but less than below. Diatom assemblage suggests deeper water than above or below.

Figure S8. (continued)

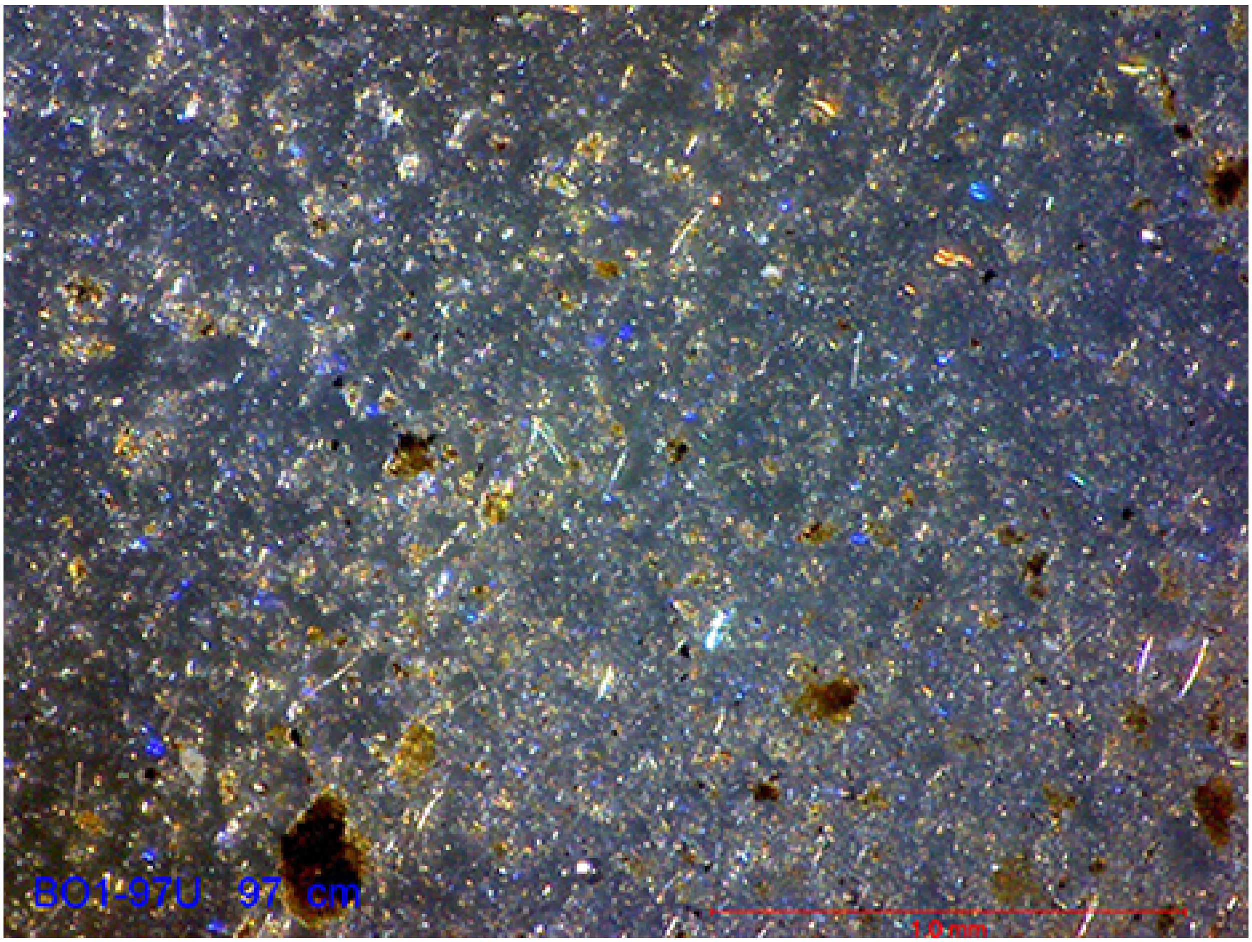

Photo BO1-97—Slide 97-U (97 cm). Sandy silt in lower part of sandy silt/colluvial interval (unit 4). Other components: sponge spicules (more abundant than below), phytoliths, abundant decomposed plant organics, ash shards. Diatoms: fairly abundant (but less than below); ~fewer planktonic (*Aulacoseira, Tabellaria*), than below, remainder benthic (*Eunotia*, etc.). Dissolution is common, very significant valve breakage (most in core). Diatom assemblage suggests shallower water than above or below.

Figure S8. (continued)

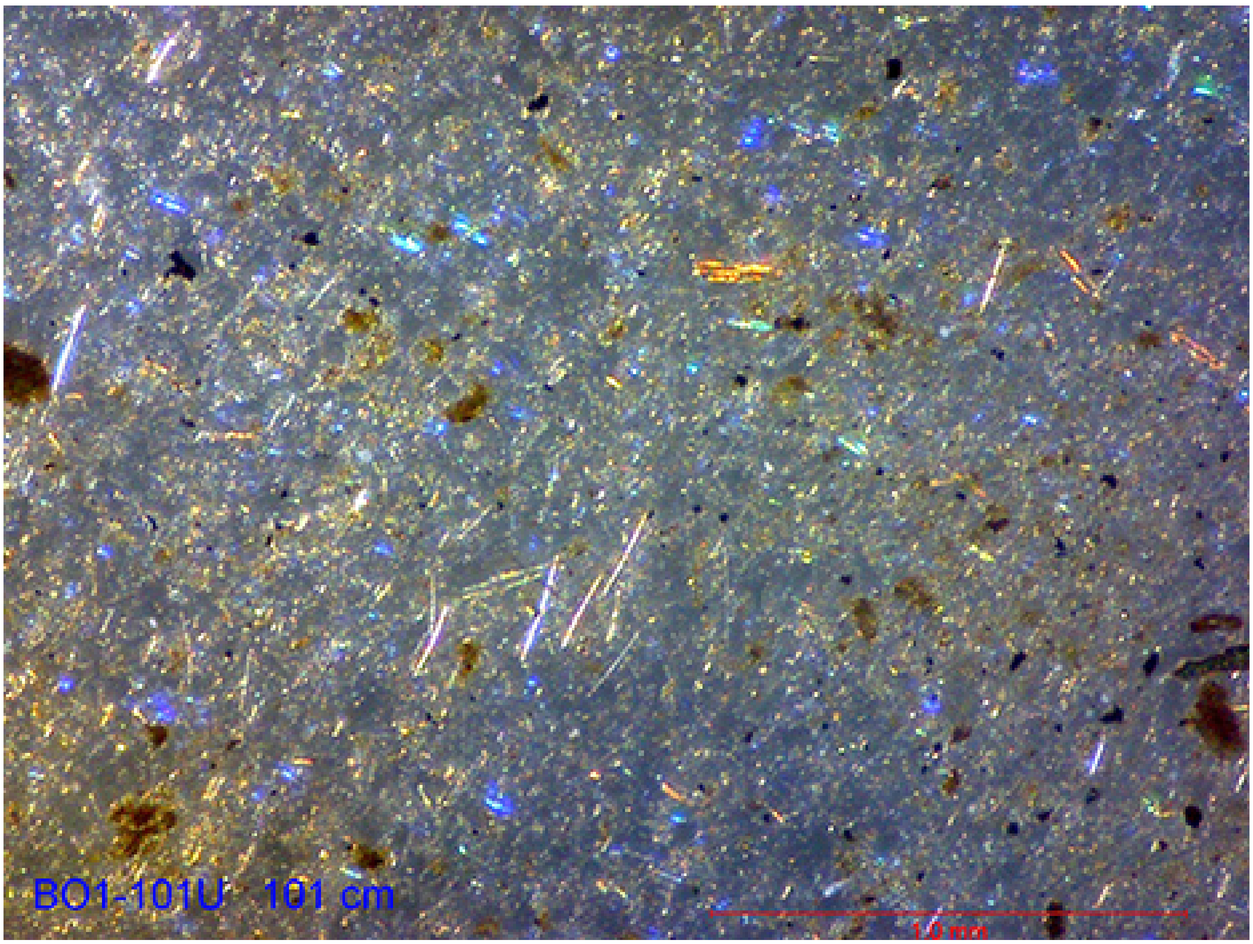

Photo BO1-101—Slide 101-U (101 cm). Silt bed at top of silt interval (unit 3). Other components: sponge spicules, chrysophyte cysts, phytoliths. Diatoms: Abundant; diverse mix of planktonic (*Aulacoseira, Tabellaria*), and benthic (*Eunotia*, etc.). Dissolution is common, no obvious skeleton breakage. Diatom assemblage suggests deeper water than above or below (increased planktonic fraction).

Figure S8. (continued)

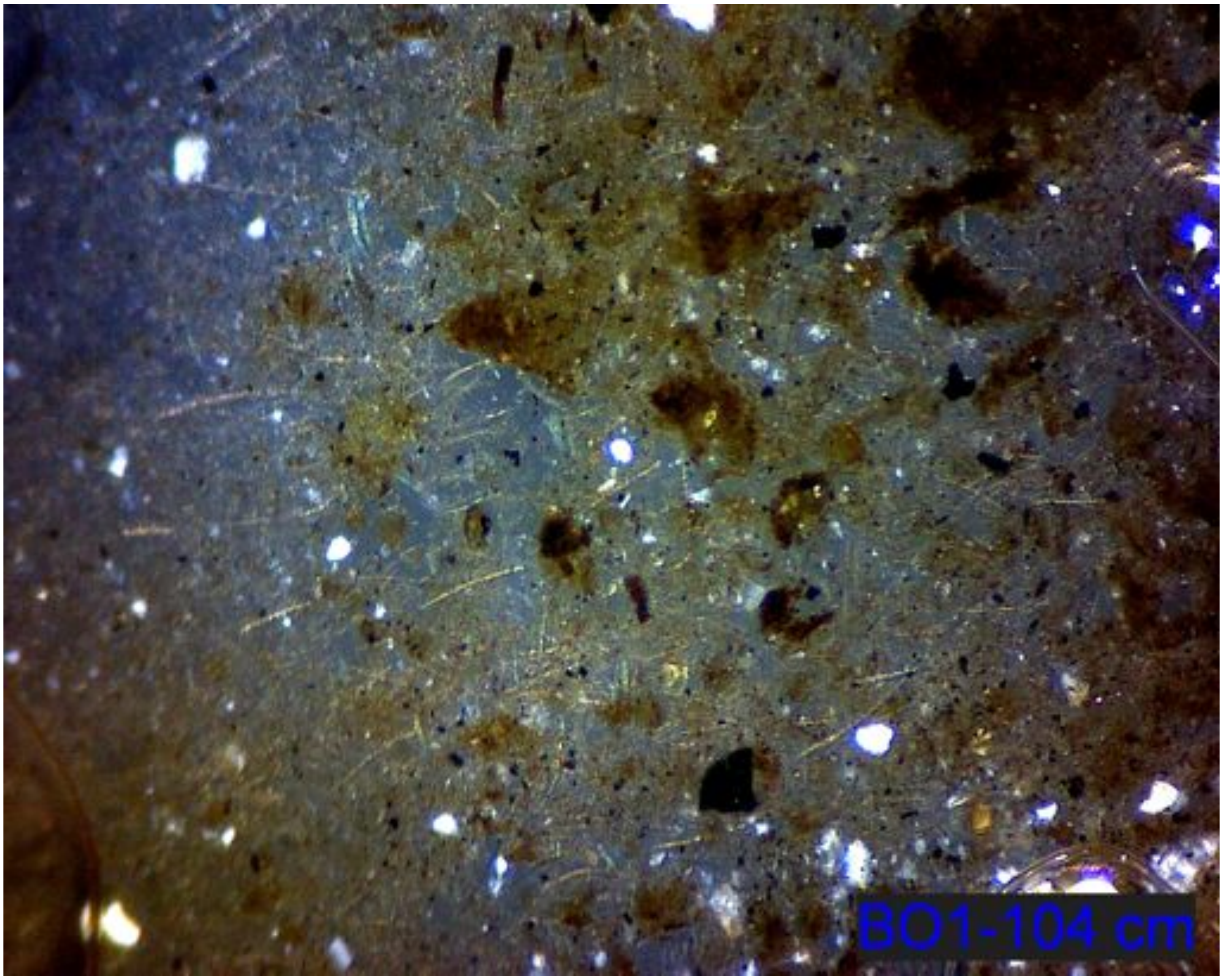

Photo BO1-104—Slide 104-U (104 cm). Silt bed in middle of silt interval (unit 3). Other components: sponge spicules. Diatoms: Abundant; diverse mix of planktonic (*Aulacoseira, Tabellaria*), and benthic (*Eunotia*, etc.). Dissolution is common, no obvious skeleton breakage. Diatom assemblage suggests deeper water than below (increased planktonic fraction).

Figure S8. (continued)

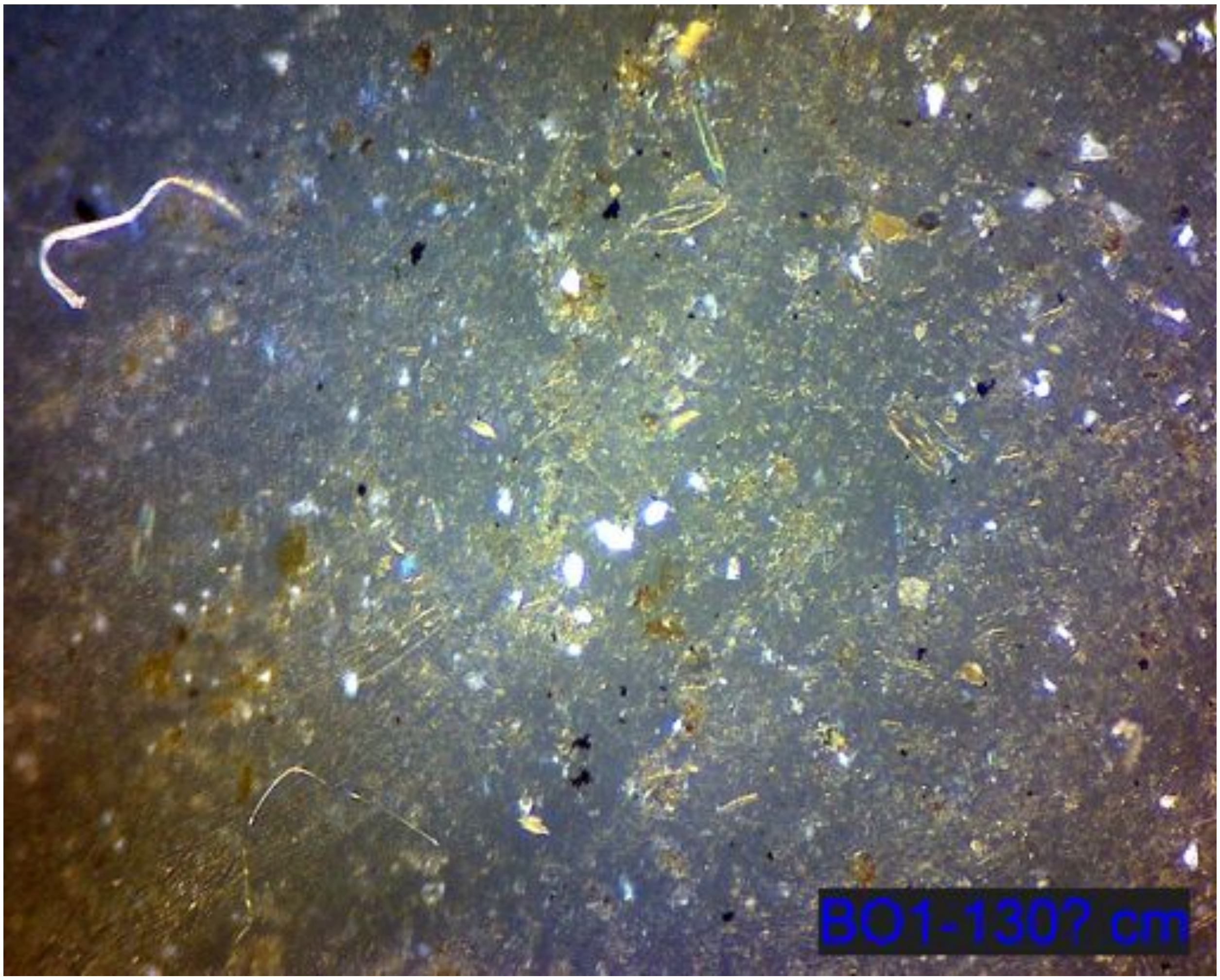

Photo BO1-130 ?—Slide 134-L (106 cm). Silt bed in middle of silt interval (unit 3). Other components: sponge spicules, cryophyte cysts, phytoliths, no pollen. Diatoms: Abundant; mostly (>90 %) benthic (*Eunotia*, *Cymbopleura*), with minor planktonic (*Tabellaria*), little dissolution noted, no obvious valve breakage. Diatom assemblage suggests similar water depth to below and shallower water than above.

Figure S8. (continued)

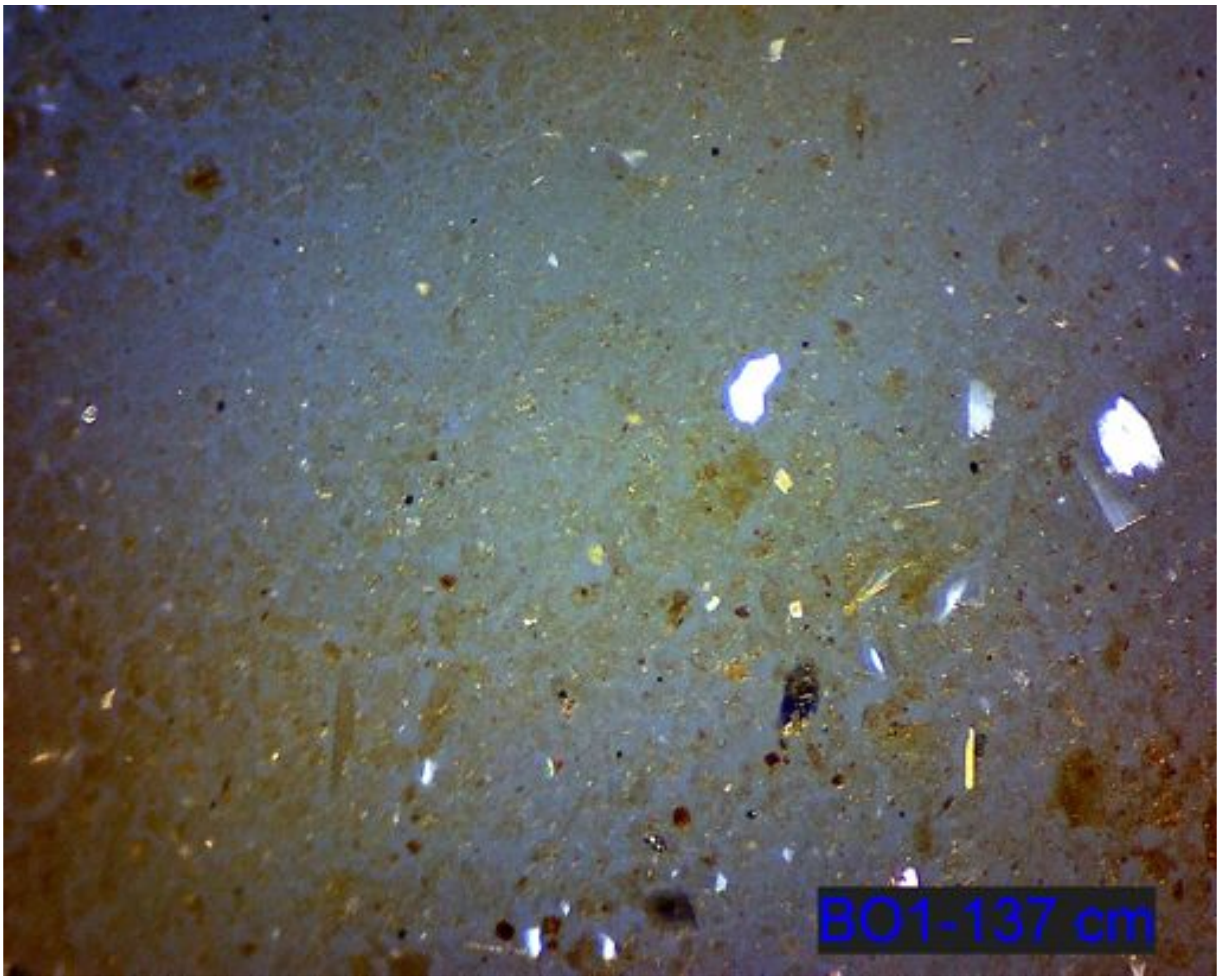

Photo BO1-137—Slide 137-L (108 cm). Mazama ash bed near base of silt interval (unit 3). Other components: Abundant ash shards. Diatoms: Extremely sparse; benthic (*Eunotia*), little dissolution noted, no obvious valve breakage. Diatom assemblage suggests similar water depth to above and below.

Figure S8. (continued)

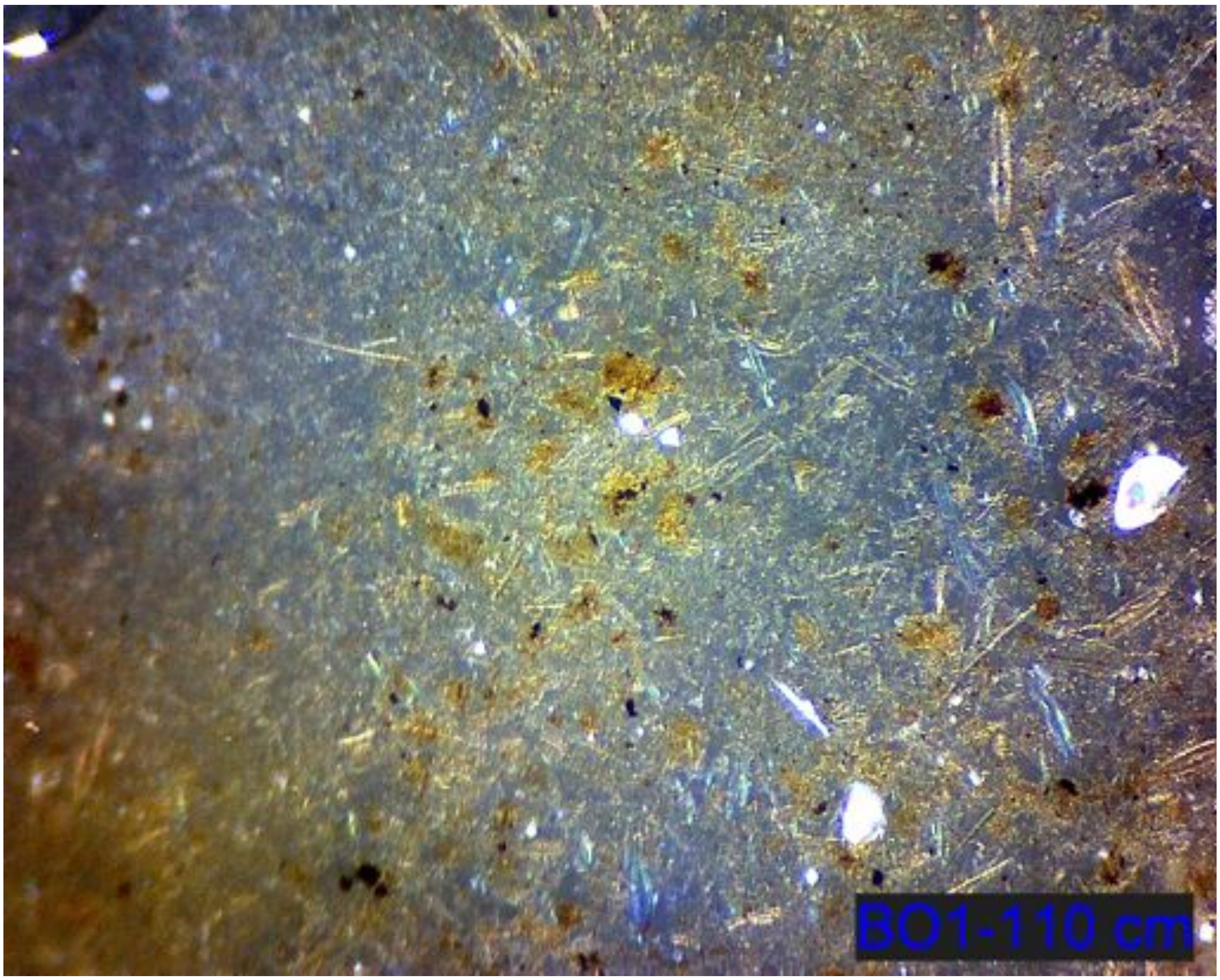

Photo BO1-110—Slide 139-L (111 cm). Silt bed at base of silt interval (unit 3). Other components: sponge spicules, cryophyte cysts, phytoliths, no pollen. Diatoms: Abundant; mostly (>90 %) benthic (*Eunotia, Cymbopleura*), with minor planktonic (*Tabellaria*), little dissolution noted, no obvious valve breakage. Diatom assemblage suggests similar water depth to above and below.

Figure S8. (continued)

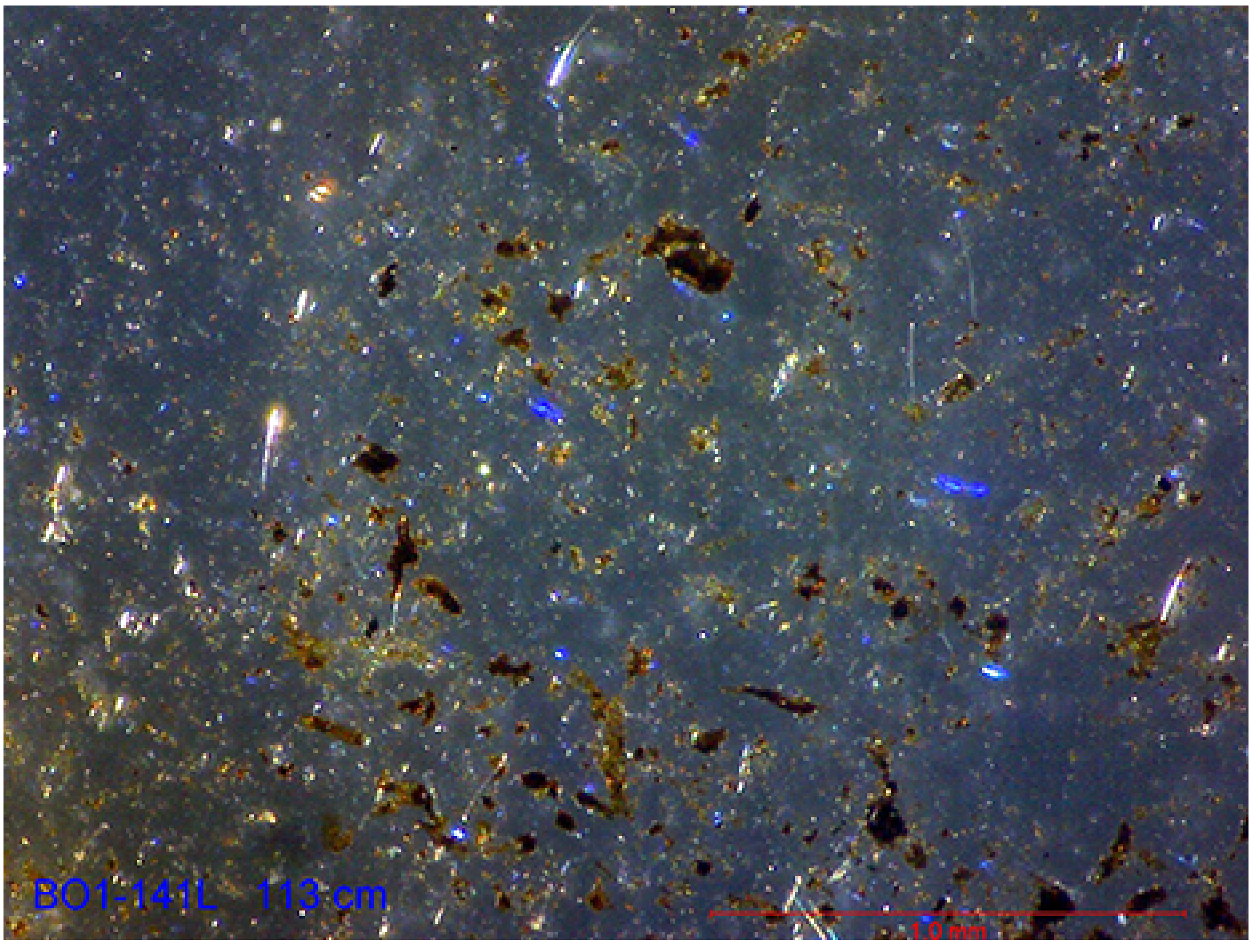

Photo BO1-113—Slide 141-L (113 cm). Sandy-silt bed at top of sandy-silt/colluvial interval (unit 2). Other components: sponge spicules, phytoliths. Diatoms: fairly abundant; mostly benthic (*Eunotia*), extensive dissolution increasing with depth, no obvious valve breakage. Diatom assemblage suggests similar water depth to above and below.

Figure S8. (continued)

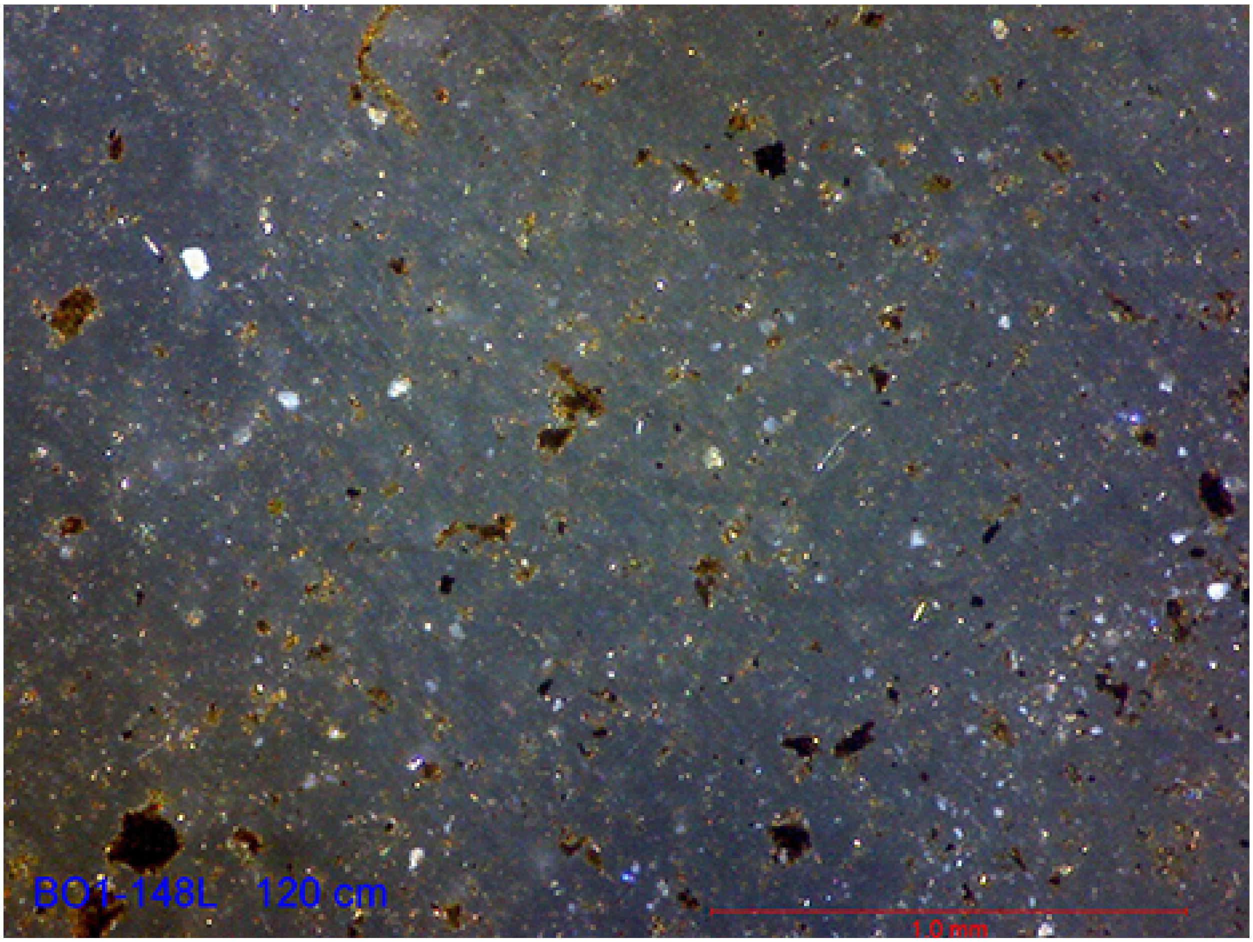

Photo BO1-120—Slide 148-L (120 cm). Sandy-silt bed in middle of sandy-silt/colluvial interval (unit 2). Other components: sponge spicules, phytoliths. Diatoms: fairly abundant; mostly benthic (*Eunotia*), extensive dissolution increasing with depth, no obvious skeleton breakage. Diatom assemblage suggests similar water depth to above.

Figure S8. (continued)

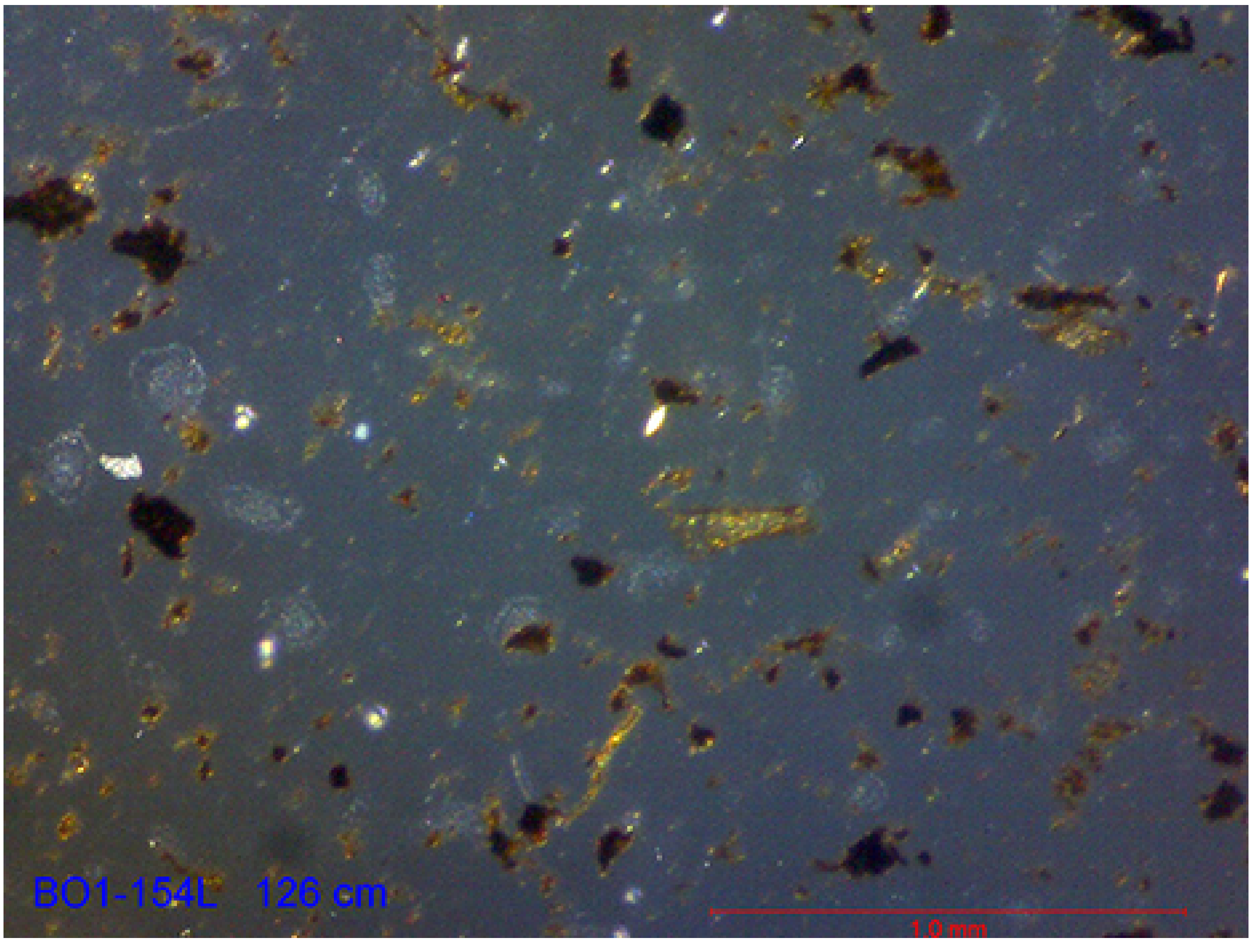

Photo BO1-126—Slide 154-L (126 cm). Sandy, silty peat bed at top of lower peat interval (unit 1). Other components: sponge spicules, abundant organics. Diatoms: very sparse; extensive dissolution.

Figure S8. (continued)

Methods

Diatom smear slides were prepared for 14 sections and examined at 400x using an optical microscope with differential interference contrast (DIC). Diatom silica cell walls, or valves, were evaluated qualitatively and common taxa were identified to the genus level. The condition of valves was noted, for example, whether valves were intact, fractured or the degree of dissolution of silica. Genera were characterized by preference for benthic or planktonic habitats (Spaulding et al. 2010).

Miscellaneous Notes and Interpretations

--Water Depth: Fluctuations in water depth inferred from changes in percentages of benthic vs. planktonic assemblages are consistent with changes in stratigraphy, and likely reflect both tectonic and climate-driven forcing mechanisms.

--Broken Diatoms: Presence of broken diatom skeletons increases dramatically above colluvial event #1 (~98 cm depth), starting with slide 97-U. Cause of breakage is unknown, but is commonly attributed to pretreatment methods, grazing by aquatic invertebrates, or wind-induced turbulence (Ryves et al., 2006; Flower and Ryves, 2009).

--Diatom Dissolution: Dissolution of diatoms valves is present in two zones (82-104 cm and below 112 cm); intervening zone of little or no dissolution contains 3-cm-thick Mazama ash bed that may have locally raised silica content of surrounding waters. Except for ash zone, dissolution generally increases with depth. Dissolution indicates a silica-poor environment, but cause not obvious--waters should be acidic, rather than alkalic.

--Ash Reworking: Reworked ash shards were observed in slides 97-U and 91-U (unit 4), above colluvial event #1 (CE1; ~98 cm depth), but not in samples 101-U, 104-U, and 134-L (unit 5) that lie below the event but above Mazama ash bed. May be evidence of shaking induced erosion and resuspension of ash-bearing wetland sediment from an earthquake associated with CE1.

References Cited

Flower, R.J., and Ryves, D.B., 2009, Diatom preservation: Differential preservation of sedimentary diatoms in two saline lakes: Acta Botanica Croatica, v. 68, no. 2, p. 381–399.

Ryves, D.B., Battarbee, R.W., Juggins, S., Fritz, S.C., and Anderson, N.J., 2006, Physical and chemical predictors of diatom dissolution in freshwater and saline lake sediments in North America and West Greenland: Limnology and Oceanography, v. 51, p. 1355–1368, doi:10.4319/lo.2006.51.3.1355.

Spaulding, S.A., Lubinski, D.J., and Potapova, M., 2010, Diatoms of the United States: http://westerndiatoms.colorado.edu (accessed 14 April 2014).