Data on the Surficial Deposits of the Great Salt Lake Desert, Bonneville Salt Flats and East Part of the Wendover 30' x 60' Quadrangles, Tooele County, Utah

by

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Disclaimer

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INTRODUCTION

The Utah Geological Survey (UGS) is conducting intermediate-scale geologic mapping of the Bonneville Salt Flats 30' x 60' quadrangle and the Utah part of the Wendover 30' x 60' quadrangle (figure 1). Year 3 of this multi-year mapping project covers an area encompassing nearly 20 7.5' quadrangles (about 1,200 square miles) over part of the Great Salt Lake Desert along the Interstate 80 corridor between Wendover and Knolls. This area also includes the Bonneville Salt Flats located northeast of Wendover. Much of the map area includes Quaternary surficial deposits in mudflats and salt flats, and locally the low-relief mudflats are covered with eolian sand or silt deposits in dunes and sheets. At places where all stratigraphic units are present, near-surface sediments typically consist of (in descending order) Holocene to late Pleistocene (post-Bonneville) mud deposited in playa environments, carbonate mud ("marl") deposited offshore in Pleistocene Lake Bonneville, and carbonate mud deposited in pre-Bonneville (Pleistocene-Pliocene) shallow-lake and mudflat environments. In some areas, sediments of Lake Bonneville and post-Bonneville time are not present and pre-Bonneville mud is at the surface of the mudflats. Bedrock of Tertiary through Cambrian age is locally exposed in adjacent mountains and hills.

Although some prior work on surface and subsurface sediments and associated background geology has been conducted (see Nolan, 1927; Eardley and Stringham, 1952; Jones, 1953; Bissell and Chilingar, 1962; Eardley, 1962; Turk, 1973; Dean, 1978; Lines, 1979; Williams, 1994; White and Terrazas, 2006; Boden, 2016), updated data were needed and will mesh with recent and ongoing investigations of the Bonneville Salt Flats by B.B. Bowen and students at the University of Utah (Bowen and others, 2017, 2018; Bernau and Bowen, 2018a, 2018b; Bowen, 2018; Kipnis and Bowen, 2018).

We report here new data on sediments exposed in landfill pit walls, hand-dug pits, natural exposures, and sediment cores from this study area (figure 2; see table 1 for more precise depths). Oviatt viewed landfill pit walls (C5-5 and C29-5 at Energy Solutions Clive landfill) in 2014 that had total depths of 3.5 and 10 meters (m) (12 and 33 feet [ft]), respectively. Oviatt and Clark dug six pits (CH1, CH2, Kn1, NUTTR1, NUTTR2, FI1) in 2017–18 at depths from 0.3 to 1.2 m (1–4 ft). In 2019, three cores (BC1, BC2, BC3) were collected that had a maximum depth of 6 m (20 ft), using a geoprobe (push)-type drill rig mounted to a FORD 1715 tractor operated by Push Drilling, LLC. Oviatt and Clark collected six other cores (BC4, BC5, BC6, BC7, BC8, BC9) by hand driving 3.8-centimeter [cm] (1.5-inch [in]) diameter PVC plastic tubing into the subsurface to depths of 0.5 to 1 m (1.6-3.4 ft). Clark dug one pit (SI1) to 7 cm (3 in) depth.

Photographs of selected sediment sample sites are in appendix A. Descriptions of the sediment encountered, and identification of ostracode genera and species, led to the interpretations of depositional environments given in the following sections. Oviatt and Clark attempted to view Intrepid Potash trenches near Bonneville Salt Flats in late September 2019 but were unable to enter the trenches due to the muddy conditions caused by wet weather.

PIT, CORE, AND TRENCH SEDIMENTS

Oviatt, Clark, and Bernau described the sediments exposed in the pits, cores, and trenches, and Bernau prepared the sediment logs using PSICAT software. Clark and Oviatt photographed selected pits, while Taylor Boden (UGS), Clark and Bernau photographed the cores. Sediment logs are presented in appendix B. All measurements are in meters (m). We noted that some compression of sediment in the cores occurred during collection, but due to several unquantifiable assumptions we did not recalculate core depths for the purposes of this report—depths reported here were measured directly from the cores.

No reevaluation of the Wendover and Knolls cores (figure 2, table 1) was conducted for this study. These two cores were obtained by A.J. Eardley (University of Utah) in 1960. The results from those cores have never been published completely, but some information is available in Williams (1994). In 1995 the Knolls and Wendover cores, or what remained of them in cardboard boxes at the University of Utah, were logged by R.S. Thompson (U.S. Geological Survey) and C.G. Oviatt, but the logs have not been published. Both cores are now archived at the UGS Core Research Center in Salt Lake City.

OSTRACODE IDENTIFICATIONS AND INTERPRETATIONS

Selected samples were collected from the pit walls and cores by Oviatt and Bernau for ostracode evaluation (table 2; appendix B). Oviatt and Bernau prepared the samples. Oviatt identified ostracode genera and species using a binocular microscope (table 2). Ostracodes are useful indicators of environmental conditions and can be used for stratigraphic correlations in deposits of Lake Bonneville (see, for example, Forester, 1987; Oviatt and others, 1999; Oviatt, 2017).

INTERPRETATION OF DEPOSITIONAL ENVIRONMENTS

Using the results from the sediment descriptions and ostracode identifications, Oviatt and Bernau interpreted the depositional environments of the sediments exposed in the pits, cores, and trenches. Results are presented in table 2 and the sediment logs are in appendix B. Times of deposition were assigned to different units as pre-Lake Bonneville, Lake Bonneville, and post-Lake Bonneville. Figure 3 shows a general chronology and hydrograph spanning the three time-units of deposition. Pre-Bonneville environments include mudflat, eolian and shallow-lacustrine conditions. Lake Bonneville environments include a transgressing and regressing deep-lake system. Post-Bonneville depositional environments include those in salt flat, mudflat, eolian, wetland, and shallow-saline-lacustrine settings (including the Gilbert-episode lake). For further context, refer to Oviatt (2014) for information on the Gilbert episode, Oviatt and Shroder (2016) for a scientific update on Lake Bonneville, Williams (1994) for tephrochronologic data from the Wendover and Knolls cores, and the geologic map of the area by Clark and Oviatt (2019) and Clark and others (in preparation).

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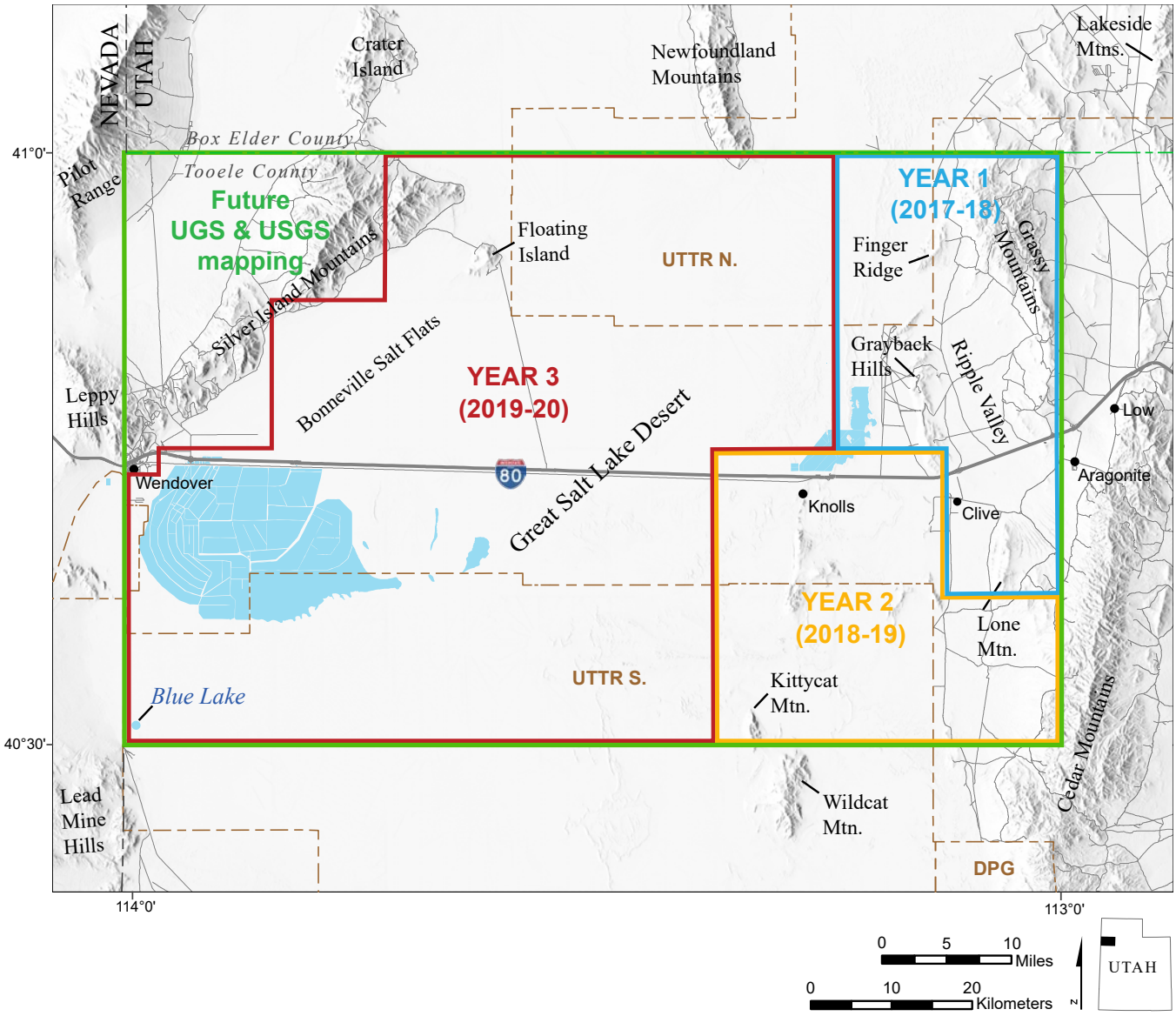


Figure 1. *Primary geographic features and progress of geologic mapping in the Bonneville Salt Flats and east part of Wendover 30' x 60' quadrangles (green rectangle). UTTR is Utah Test and Training Range (U.S. Air Force) and DPG is Dugway Proving Ground (U.S. Army).*

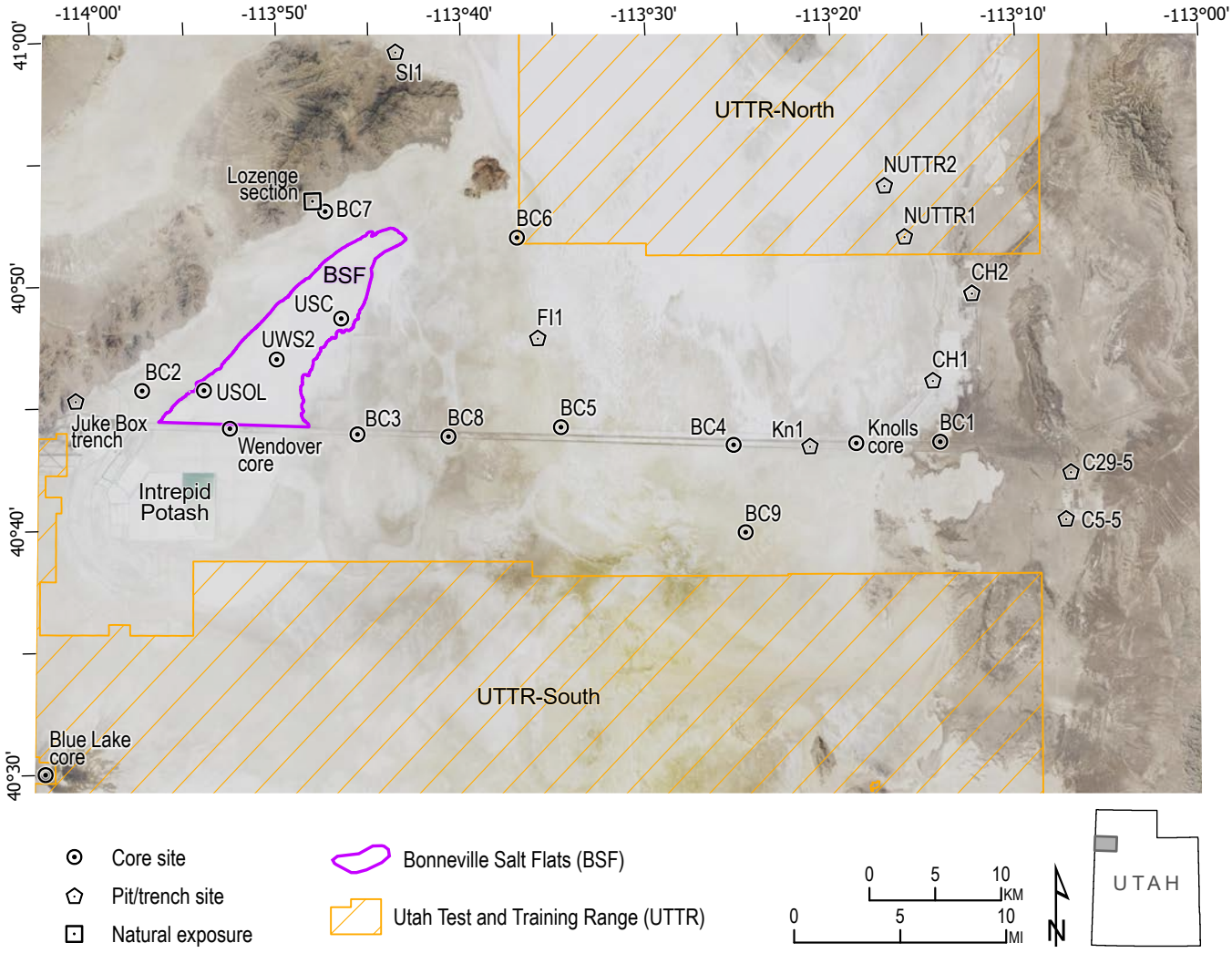


Figure 2. *Locations of UGS shallow sediment pits and cores, and other selected sediment data sites from the map area.*

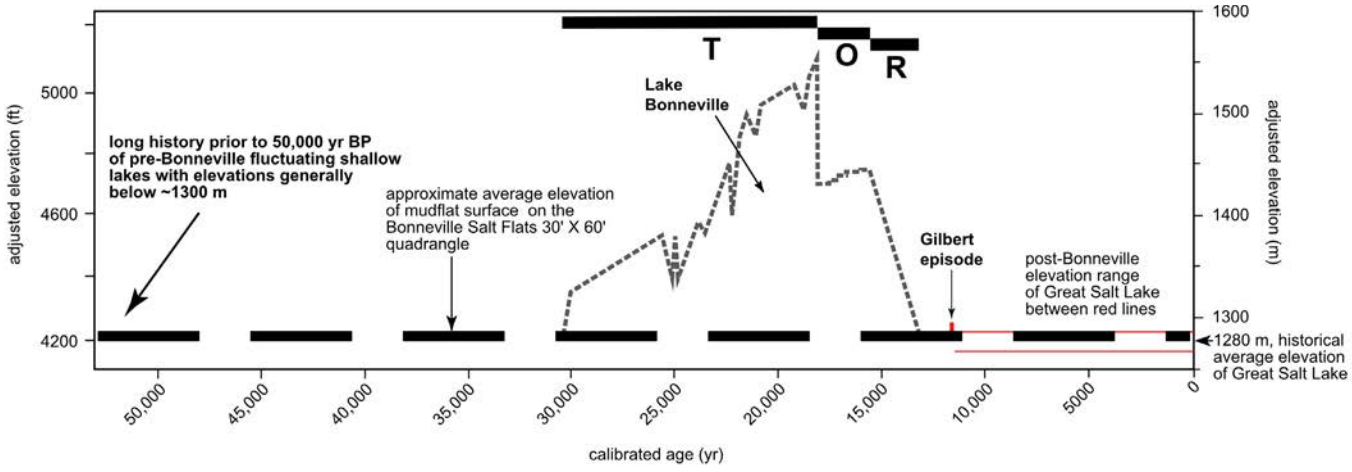


Figure 3. *Schematic diagram showing the chronology of three primary lacustrine events (pre-Lake Bonneville, Lake Bonneville, and post-Lake Bonneville) in the area of the Bonneville Salt Flats 30' x 60' quadrangle. Lake Bonneville rose to elevations much higher than the average mudflat elevation during the period from about 30,000 to 13,000 yr BP, but for most of the past million years, except for a few deep-lake cycles (Oviatt and others, 1999), lake levels remained low, probably below about 1300 m (4300 ft). The details of the pre-Bonneville lacustrine history have not yet been deciphered. Elevations are adjusted for the differential effects of isostatic rebound in the basin resulting from the removal of the Lake Bonneville water load (Oviatt, 2015); this adjustment only applies to elevations of shorelines above about 1300 m (4300 ft). The phases of Lake Bonneville are marked: T = transgressive phase; O = overflowing phase; R = regressive phase.*

Table 1. *Summary of UGS shallow pits and cores and other selected sediment data sites from the Bonneville Salt Flats and east part of the Wendover 30' x 60' quadrangles, Utah.*

Site ID	Type	Collection Year	7.5' Quadrangle	Latitude (°N) WGS84	Longitude (°W) WGS84	UTM easting NAD83-12	UTM northing NAD83-12	Ground Elevation (m)	Ground Elevation (ft)	Total Depth (m)	Total Depth (ft)	Samples for Ostracode Evaluation	Collector/Reference
C29-5	landfill pit wall N	2014	Aragonite	40.70608	113.11609	321240	4508283	1305	4283	10	33		Oviatt, 2017
C5-5	landfill pit wall S	2014	Aragonite	40.67403	113.12063	320771	4504734	1302	4272	3.5	12		Oviatt, 2017
CH1	pit	2017	Grayback Hills	40.76902	113.23968	310977	4515529	1288	4226	0.55	1.8		Oviatt and Clark; this study
CH2	wall of excavation	2017	Grayback Hills	40.82862	113.20423	314135	4522072	1292	4240	1.5	4.9		Oviatt and Clark; this study
Kn1	pit	2017	Knolls	40.72439	113.35040	301499	4510819	1286	4220	1.15	3.8	yes	Oviatt and Clark; this study
NUTTR1	pit	2018	Knolls 2 SE	40.86745	113.26466	309151	4526511	1287	4223	0.32	1.1		Oviatt and Clark; this study
NUTTR2	pit	2018	Knolls 2 NE	40.90242	113.28255	307745	4530432	1285	4217	0.55	1.8		Oviatt and Clark; this study
FI1	pit	2018	Floating Island SE	40.79875	113.59486	281096	4519656	1285	4216	1.15	3.8	yes	Oviatt and Clark; this study
SI1	pit	2019	Floating Island	40.99435	113.72300	270944	4541701	1291	4234	0.07	0.23	yes	Clark; this study
BC1	core	2019	Aragonite NW	40.72753	113.23363	311371	4510910	1294	4247	6	20	yes	Oviatt and Clark; this study
BC2	core	2019	Tetzlaff Peak	40.76275	113.95078	250932	4516610	1286	4218	6	20	yes	Oviatt and Clark; this study
BC3	core	2019	Salduro	40.73342	113.75719	267172	4512821	1286	4220	6	20	yes	Oviatt and Clark; this study
BC4	core	2019	Knolls	40.72598	113.41927	295687	4511153	1286	4220	0.55	1.8	yes	Oviatt and Clark; this study
BC5	core	2019	Arinosa NE	40.73829	113.57438	282627	4512893	1286	4218	0.63	2.1	yes	Oviatt and Clark; this study
BC6	core	2019	Floating Island SE	40.86785	113.61382	279725	4527375	1285	4216	0.61	2	yes	Oviatt and Clark; this study
BC7	core	2019	Graham Peak	40.88566	113.78649	265235	4529802	1286	4218	0.49	1.6	yes	Oviatt and Clark; this study
BC8	core	2019	Arinosa	40.73190	113.67546	274069	4512439	1285	4215	1.03	3.4	yes	Oviatt and Clark; this study
BC9	core	2019	Barro	40.66622	113.40869	296399	4504494	1285	4217	0.51	1.7	yes	Oviatt and Clark; this study
USOL (BSF Solstice core)	core	2017	Bonneville Racetrack	40.76316	113.89519	255626	4516499	~1284	~4212	3.20	10.5		Bernau and others, unpublished
UWS2 (BSF Weather Station 2 core)	core	2019	Bonneville Racetrack	40.78451	113.82990	261214	4518689	~1284	~4212	2.905	9.5		Bernau and others, unpublished
USC (BSF Short Course 1 core)	core	2019	Bonneville Racetrack	40.81252	113.77194	266204	4521643	~1284	~4212	3.90	12.8		Bernau and others, unpublished
Juke Box trench, section 1	trench	1986, 2009	Leppy Peak	40.75491	114.01021	245885	4515909	1297	4254	4.5	14.8	yes	Oviatt and others, 2018
Lozenge section	outcrop	NA	Graham Peak	40.89261	113.79781	264306	4530604	1294	4245	4	13		Green, unpublished; Munroe and others, 2015
Blue Lake core (BL04-4)	core	2004	Ferguson Flat	40.49997	114.03614	242717	4487681	1298	4257	8.03	26.3	yes	Benson and others, 2011
Wendover core	core	1960	Salduro	40.73712	113.87185	257501	4513544	1285	4217	171	560		Williams, 1994
Knolls core	core	1960	Knolls	40.72685	113.30903	305000	4511000	1291	4234	152	500		Williams, 1994

Notes:

Landfill pit walls (for sections C29-5 and C5-5) were at the Energy Solutions landfill at Clive, Utah; CH2 was a pit-wall exposure in an excavation at Clean Harbors Grassy Mountain landfill.

Shallow pits were dug using a shovel.

Cores BC1, BC2, BC3 were collected by Push Drilling, LLC.

Remaining UGS sediment cores were collected by hand-driving a PVC pipe into the mud.

Ground elevation determined from 7.5' topographic maps.

Blue Lake core (BL04-4) core length is 8.03 m (total depth is 8.58 m below ground surface). Oviatt examined the core in 2005 and evaluated ostracode samples in 2013 (see sediment log).

The Wendover and Knolls cores were taken by A. Eardley (Univ. of Utah), core locations are approximate; detailed logs of the cores have never been published. These cores are archived at the Utah Core Research Center (Salt Lake City, Utah).

No reevaluation of the Wendover and Knolls cores was conducted for this study.

Samples for ostracode evaluation are reported in table 2, except for the Blue Lake core (see sediment log).

"Green, unpublished": Sue Green was a graduate student of D.R. Currey (University of Utah) in the 1980s; this "lozenge" section was part of her Master's thesis, which was not completed.

It is anticipated that the 2017-2019 cores will be archived at the Utah Core Research Center.

Table 2. *Ostracode results from selected new sediment pits and cores in the Bonneville Salt Flats and east part of the Wendover 30′ x 60′ quadrangles, Utah.*

Sample Site ID - Depth (m)	Ostracodes/Comments	Interpretation
Kn1-0.15	*Fabaeformiscandona* sp.; *Limnocythere ceriotuberosa*; *Limnocythere staplini*; abundant carbonate lumps; FeOx- and MnOx-lumps	early transgressive-phase Bonneville
Kn1-0.25	*Fabaeformiscandona* sp.; *Limnocythere ceriotuberosa*; *Limnocythere staplini*; abundant carbonate lumps;	early transgressive-phase Bonneville
Kn1-0.45	*Fabaeformiscandona* sp.; *Limnocythere staplini*	early transgressive-phase Bonneville
Kn1-0.60	*Limnocythere staplini*; *Fabaeformiscandona* sp.	early transgressive-phase Bonneville
Kn1-0.75	*Limnocythere staplini*	early transgressive-phase Bonneville
FI1-0.12	white carbonate mud lumps; no ostracodes	post-Bonneville mud
FI1-0.37	white carbonate mud lumps; broken ostracodes (*Fabaeformiscandona* sp.); carbonate-mud-filled *Fabaeformiscandona* sp.; juvenile *Limnocythere* sp. (carbonate-mud coated); *L. ceriotuberosa* fragment	regressive-phase Bonneville marl
FI1-0.70	*Candona adunca*; *Limnocythere ceriotuberosa*; *Fabaeformiscandona* sp.	transgressive-phase Bonneville marl
FI1-0.90	*Limnocythere ceriotuberosa*; *Fabaeformiscandona* sp.; *Limnocythere staplini*	transgressive-phase Bonneville marl
FI1-1.08	*Limnocythere staplini*; *L. ceriotuberosa*; *Fabaeformiscandona* sp.	transgressive-phase Bonneville marl
SI1	*Limnocythere staplini*, *L. ceriotuberosa*, *Fabaeformiscandona* sp., unidentified valves (possibly *Cyprinotus* sp.), *Candona decora*	transgressive-phase Bonneville marl
BC1B-0.15	sand; no ostracodes	pre-Bonneville(?)
BC1C-0.20	rods; spherical ooids; quarts sand; carbonate lumps	pre-Bonneville(?)
BC1C-0.90	quartz sand; rods; carbonate mud lumps; one female *L. staplini*	pre-Bonneville(?)
BC2A-0.15	a few rods; no ostracodes	pre-Bonneville
BC2A-0.60	carbonate mud lumps	pre-Bonneville
BC2A-0.90	carbonate mud lumps	pre-Bonneville
BC2B-0.13	rods; carbonate mud lumps	pre-Bonneville
BC2B-0.54	very clean *L. staplini* (100% *L. staplini*)	pre-Bonneville
BC2B-1.10	carbonate mud lumps	pre-Bonneville
BC2C-0.15	rods	pre-Bonneville
BC2C-0.60	rods; carbonate mud lumps	pre-Bonneville
BC2C-1.10	*L. staplini*	pre-Bonneville
BC2D-0.10	rods; carbonate mud lumps	pre-Bonneville
BC2D-0.75	*L. staplini*; carbonate mud lumps	pre-Bonneville
BC2D-1.10	*L. staplini*; ostracode fragments visible in mud lumps	pre-Bonneville
BC2E-0.20	carbonate mud lumps; fragments of *L. staplini*	pre-Bonneville
BC2E-0.60	carbonate mud lumps	pre-Bonneville
BC2E-1.15	carbonate mud lumps	pre-Bonneville
BC3A-0.15	rods; pellets; quartz sand	pre-Bonneville
BC3A-0.50	abundant rods	pre-Bonneville
BC3B-0.20	very clean *L. staplini* (100% *L. staplini*; males, females, juveniles)	pre-Bonneville
BC3B-0.53	carbonate mud lumps; juvenile *L. staplini*; ostracode fragments; *L. staplini* visible in mud lumps	pre-Bonneville
BC3B-1.17	ostracode fragments; one juvenile *L. staplini*	pre-Bonneville
BC3C-0.20	*L. staplini*; ostracode fragments visible in mud lumps	pre-Bonneville
BC3C-0.70	abundant rods	pre-Bonneville
BC3C-1.10	carbonate mud lumps; *L. staplini*	pre-Bonneville
BC3D-0.12	*L. staplini* 100%	pre-Bonneville
BC3D-0.50	L. *staplini*; ostracodes visible in carbonate lumps	pre-Bonneville
BC3E-0.12	carbonate mud lumps	pre-Bonneville
BC3E-0.56	carbonate mud lumps; ostracode fragments	pre-Bonneville
BC3E-1.00	abundant rods; carbonate-mud filled ostracode	pre-Bonneville

Table 2. *Continued.*

Sample Site ID - Depth (m)	Ostracodes/Comments	Interpretation
BC4-0.15	*Fabaeformiscandona* sp.; ostracode fragments	Bonneville
BC4-0.45	carbonate mud lumps; ostracode fragments	pre-Bonneville
BC5-0.15	*L. staplini* (appears reworked — frosted, cloudy, many broken valves); possible *Cytherissa lacustris* (frosted, cloudy); broken F. sp.	Bonneville (regressive phase)
BC5-0.35	carbonate mud lumps; organic "flecks"?	Bonneville?
BC5-0.55	Candona adunca; *Limnocythere ceriotuberosa*; *F*. sp.	Bonneville (post-Stansbury; middle transgressive phase)
BC6-0.15	*F*. sp.; *C. adunca*; *L. ceriotuberosa*	Bonneville (post-Stansbury; middle transgressive phase)
BC6-0.33	spheroidal ooids, pellets; carbonate-coated ostracodes; *F*. sp.; *L. staplini*; *L. ceriotuberosa*	Bonneville (Stansbury-age)?
BC6-0.48	carbonate mud lumps; ostracode fragments; rods	pre-Bonneville
BC7-0.25	sand-size carbonate lumps; rods	pre-Bonneville
BC8-0.45	rods; pellets; mica grains; broken ostracodes	pre-Bonneville
BC9-0.12	*L. sappaensis* (one valve!); ostracode fragments (probably *L. staplini* . . . reworked?); sand-size carbonate lumps	Gilbert episode?
BC9-0.31	spherical ooids; rods; quartz sand; Fe-oxide-cemented sand; no ostracodes	Gilbert episode?

Notes:
See table 1 for Site ID and location. Depth is measured from ground surface.

Ostracode identification and interpretation by C.G. Oviatt.

"rods" are rod-shaped ooids

"*Fabaeformiscandona* sp." is probably *Fabaeformiscandona caudata*, in most cases. "The most common *Fabaeformiscandona* species is one Forester referred to as *Candona caudata*. Forester identified several species of what he called *Candona*, but because the shapes of the valves are similar and it is difficult to consistently identify them, they are lumped . . . as *Fabaeformiscandona* spp." ("sp." here) (Oviatt, 2017, p. 130). Oviatt, C.G., 2017, Ostracodes in Pleistocene Lake Bonneville, eastern Great Basin, North America: Hydrobiologia, v. 786, no. 1, p. 125-135.

Appendix A – Photographs of Selected Sediment Sample Sites

View south of coring work at BC1.

View north of coring work at BC2.

View southwest of coring work at BC2.

View south of coring work at BC3.

View east of coring work at BC3.

View of coring site BC4. Oviatt for scale.

View west of coring site BC5 and sediment core tube.

View north of coring site BC5 and sediment core tube.

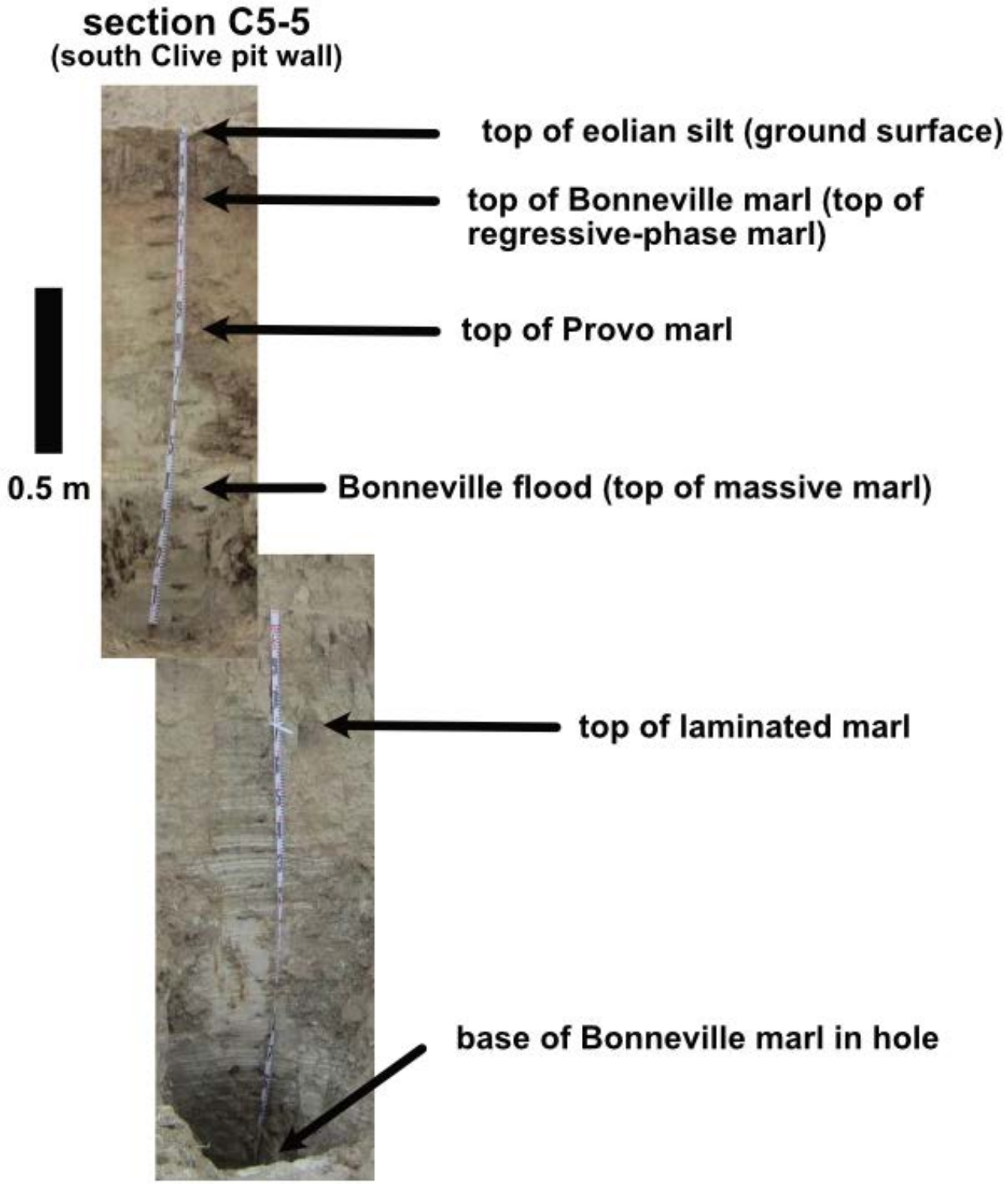
View north of coring site BC6 and sediment core tube.

View north of coring site BC7 and sediment core tube. Oviatt for scale.

View west of coring site BC8 and sediment core tube.

View northwest of coring site BC9 and sediment core tube.

View east of coring site BC9 and sediment core tube.



Photomosaic of Clive landfill pit wall site C5-5. Tape in centimeters (numbered increments = 0.1 m).

View north of sediment pit FI1. Tape in centimeters (numbered increments = 0.1 m).

Close-up view of sediment pit FI1. Tape in centimeters (numbered increments = 0.1 m).

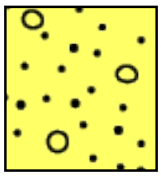
View west of sediment pit Kn1. Tape in centimeters (numbered increments = 0.1 m).

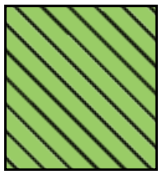
Close-up view of sediment pit Kn1. Tape in centimeters (numbered increments = 0.1 m).

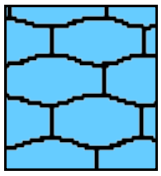
View northwest of Lozenge site natural exposure in the Graham Peak 7.5' quadrangle. Image is modified from figure 1.6 in Munroe and others (2015).

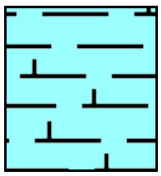
Appendix B – Pit, Core, and Trench Sediment Logs

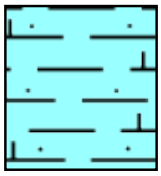
Sediment and Symbol Key

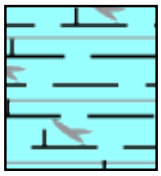

Gravel, sandy

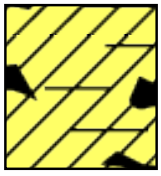

Gypsum

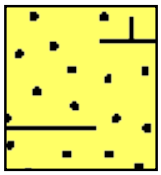

Clumpy carbonate

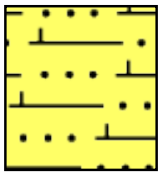

Mud, calcareous


Mud, calcareous sandy


Mud, laminated, calcareous


Peat


Sand, calcareous


Silt, calcareous

Bedded, thinly


Carbonate clumps

Contact, distinct


Deformed

Drilling artifact

Fault

Laminated, finely


Ooids


Ostracodes


Redox gradient


Sandy interval

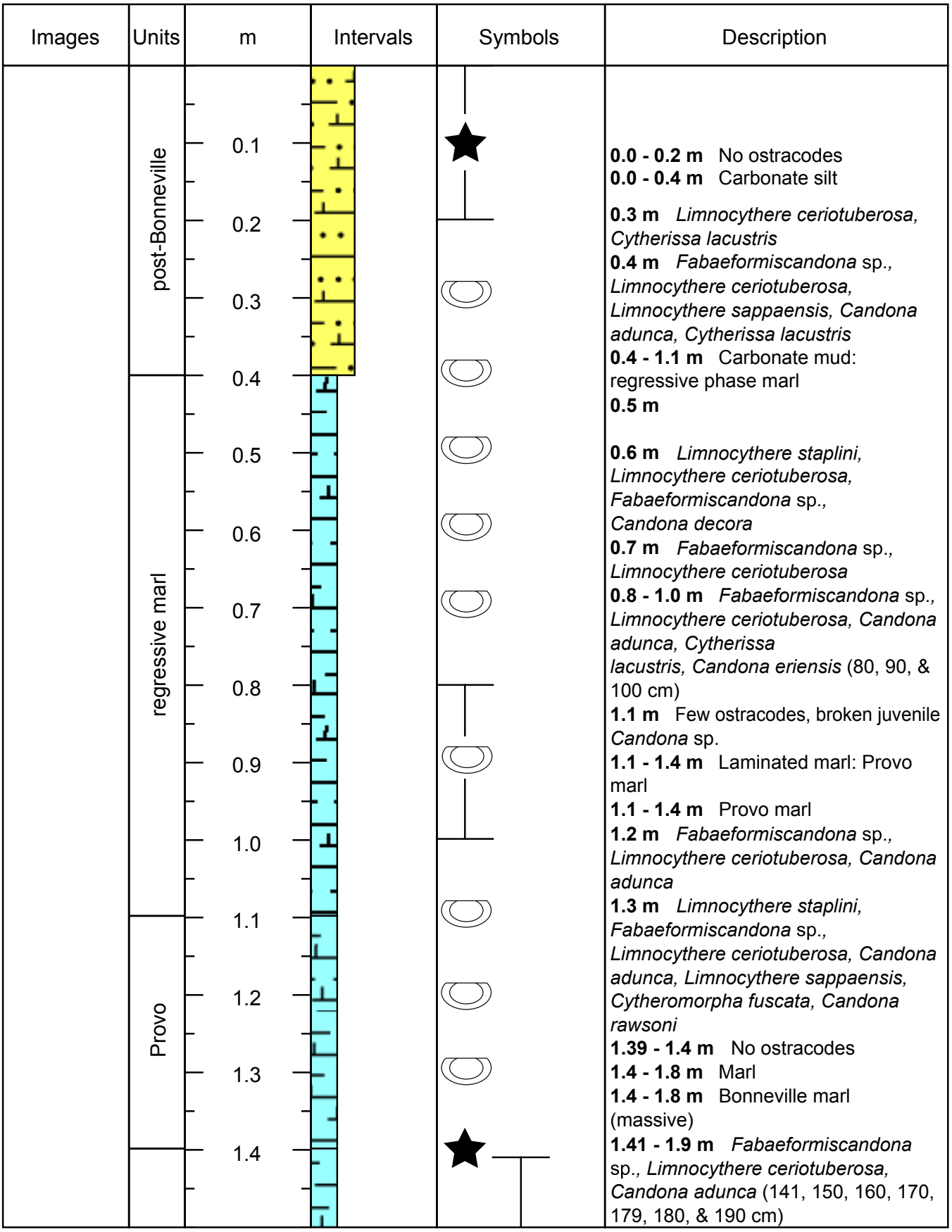

Sediment sample, other


Soft sediment deformation

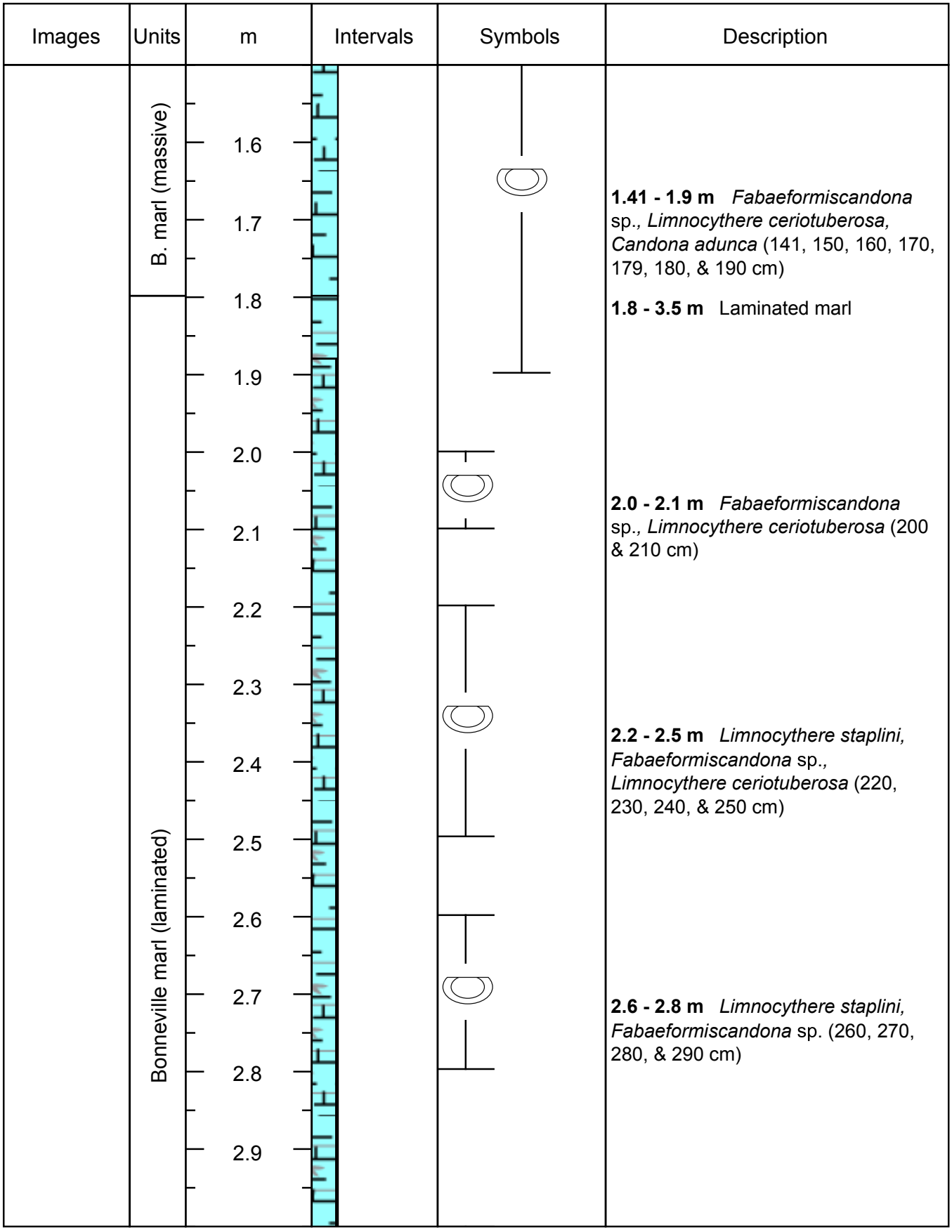
C29-5

Images	Units	m	Intervals	Symbols	Description
	post-Bonn.	1			**0.0 - 1.1 m** Silt (eolian)
	Bonneville marl	2			**1.1 - 3.3 m** Marl
		3			*Limnocythere staplini, Limnocythere ceriotuberosa*
	pre-Bonneville	4			**3.3 - 6.3 m** Volcanic pebbles in sand matrix **3.3 - 10.0 m** Pre-Bonneville shallow lakes and subaerial deposits, buried soils
		5			
		6			**6.3 - 6.5 m** Carbonate mud **6.5 - 10.0 m** Poorly sorted sand and carbonate mud; reddened mud; thin mud; sand with soil development
		7			
		8			
		9			

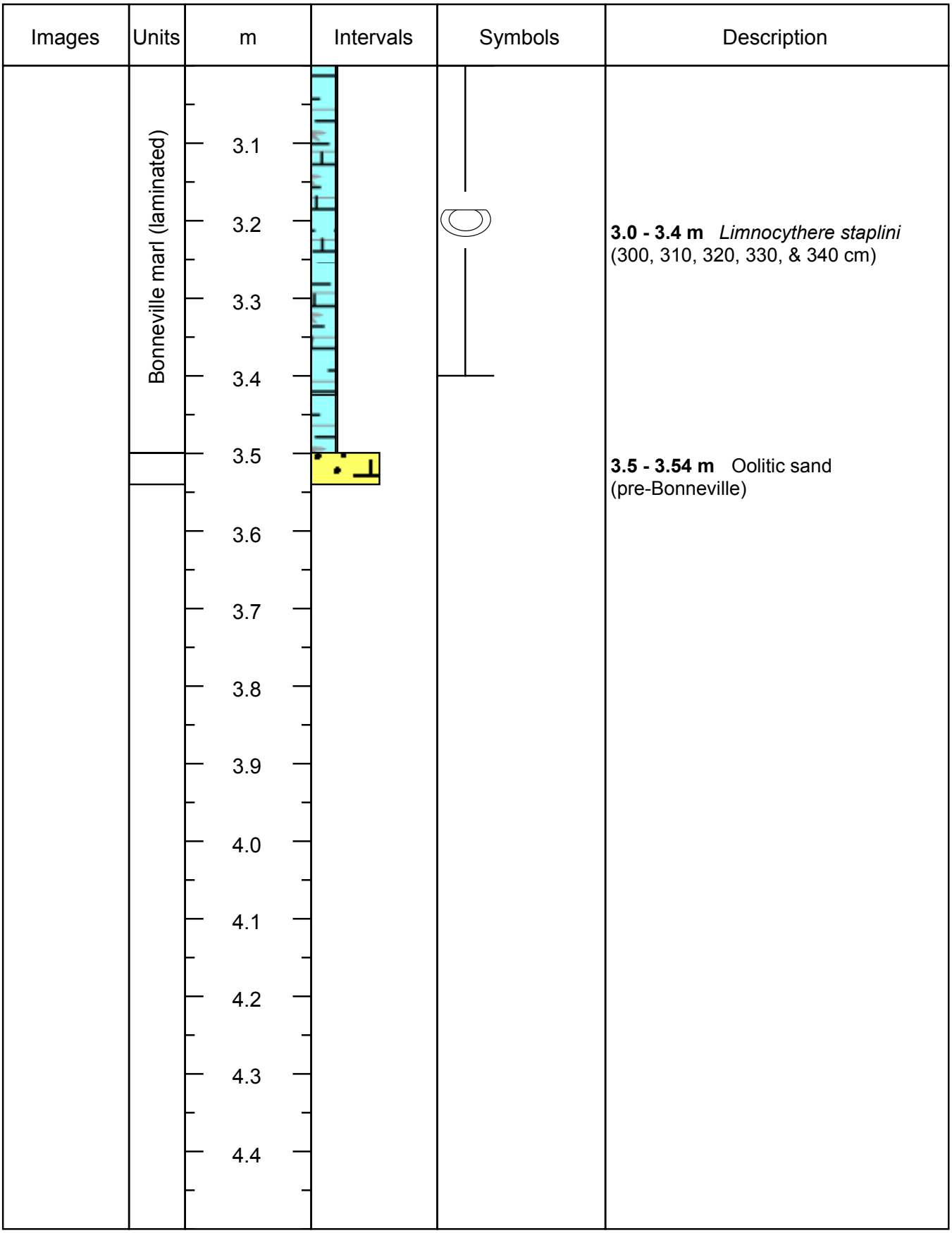
C5-5


Images
Units
m
Intervals
Symbols
Description
post-Bonneville
regressive marl
Provo
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
0.0 - 0.2 m No ostracodes
0.0 - 0.4 m Carbonate silt
0.3 m *Limnocythere ceriotuberosa, Cytherissa lacustris*
0.4 m *Fabaeformiscandona* sp., *Limnocythere ceriotuberosa, Limnocythere sappaensis, Candona adunca, Cytherissa lacustris*
0.4 - 1.1 m Carbonate mud: regressive phase marl
0.5 m
0.6 m *Limnocythere staplini, Limnocythere ceriotuberosa, Fabaeformiscandona* sp., *Candona decora*
0.7 m *Fabaeformiscandona* sp., *Limnocythere ceriotuberosa*
0.8 - 1.0 m *Fabaeformiscandona* sp., *Limnocythere ceriotuberosa, Candona adunca, Cytherissa lacustris, Candona eriensis* (80, 90, & 100 cm)
1.1 m Few ostracodes, broken juvenile *Candona* sp.
1.1 - 1.4 m Laminated marl: Provo marl
1.1 - 1.4 m Provo marl
1.2 m *Fabaeformiscandona* sp., *Limnocythere ceriotuberosa, Candona adunca*
1.3 m *Limnocythere staplini, Fabaeformiscandona* sp., *Limnocythere ceriotuberosa, Candona adunca, Limnocythere sappaensis, Cytheromorpha fuscata, Candona rawsoni*
1.39 - 1.4 m No ostracodes
1.4 - 1.8 m Marl
1.4 - 1.8 m Bonneville marl (massive)
1.41 - 1.9 m *Fabaeformiscandona* sp., *Limnocythere ceriotuberosa, Candona adunca* (141, 150, 160, 170, 179, 180, & 190 cm)

C5-5


Images
Units
m
Intervals
Symbols
Description
B. marl (massive)
Bonneville marl (laminated)
1.6
1.7
1.8
1.9
2.0
2.1
2.2
2.3
2.4
2.5
2.6
2.7
2.8
2.9
1.41 - 1.9 m *Fabaeformiscandona* sp.*, Limnocythere ceriotuberosa, Candona adunca* (141, 150, 160, 170, 179, 180, & 190 cm)
1.8 - 3.5 m Laminated marl
2.0 - 2.1 m *Fabaeformiscandona* sp.*, Limnocythere ceriotuberosa* (200 & 210 cm)
2.2 - 2.5 m *Limnocythere staplini, Fabaeformiscandona* sp.*, Limnocythere ceriotuberosa* (220, 230, 240, & 250 cm)
2.6 - 2.8 m *Limnocythere staplini, Fabaeformiscandona* sp. (260, 270, 280, & 290 cm)

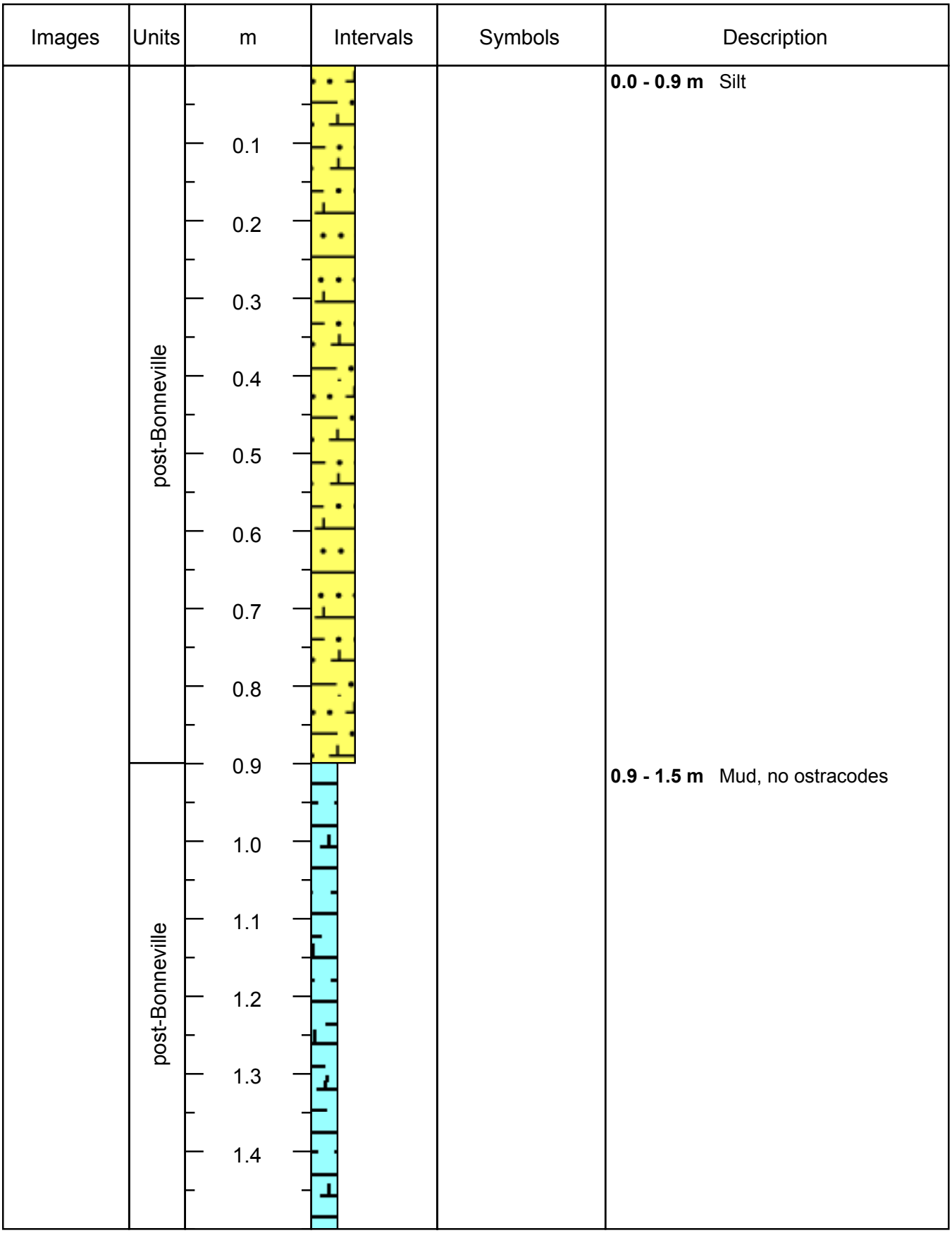
C5-5


Images
Units
m
Intervals
Symbols
Description
Bonneville marl (laminated)
3.1
3.2
3.3
3.4
3.5
3.6
3.7
3.8
3.9
4.0
4.1
4.2
4.3
4.4
3.0 - 3.4 m Limnocythere staplini (300, 310, 320, 330, & 340 cm)
3.5 - 3.54 m Oolitic sand (pre-Bonneville)

CH1

Images	Units	m	Intervals	Symbols	Description
	p-B.				**0.0 - 0.03 m** Mud (post-Bonneville)
	Bonneville marl	0.1			**0.03 - 0.45 m** Carbonate mud
		0.2			
		0.3			
		0.4			
		0.5			
		0.6			
		0.7			
		0.8			
		0.9			

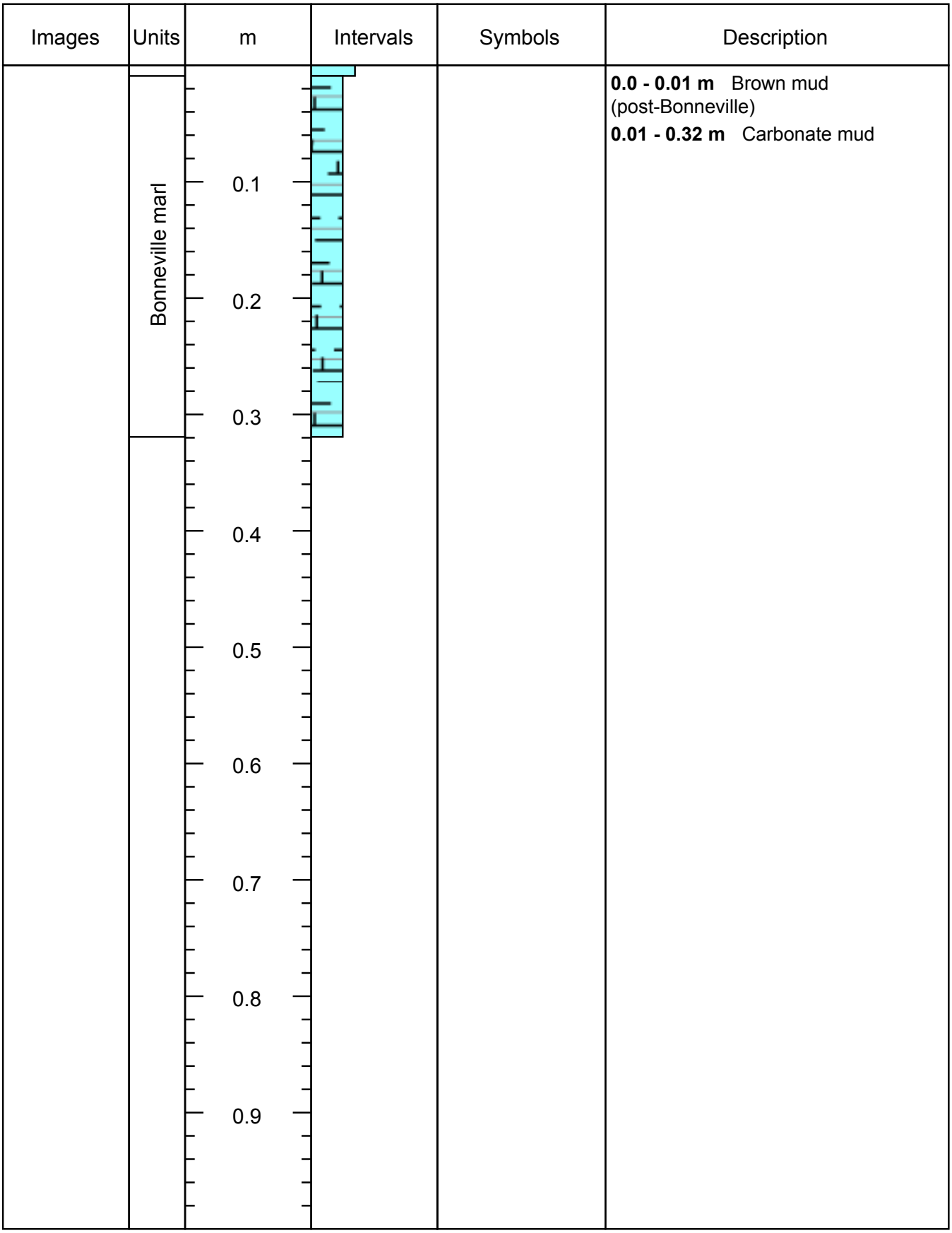
CH2


Images
Units
m
Intervals
Symbols
Description
post-Bonneville
post-Bonneville
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
1.2
1.3
1.4
0.0 - 0.9 m Silt
0.9 - 1.5 m Mud, no ostracodes

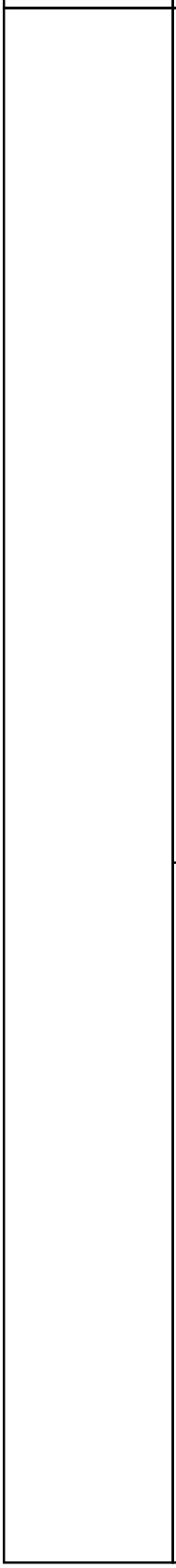
Kn1

Images	Units	m	Intervals	Symbols	Description
	p-B.				**0.0 - 0.03 m** Brown mud (post-Bonneville) **0.03 - 0.82 m** Laminated carbonate mud
	Bonneville marl	0.1			**0.15 m** *Fabaeformiscandona* sp.*; Limnocythere ceriotuberosa; Limnocythere staplini;* abundant carbonate lumps; FeOx- and MnOx-lumps
		0.2			**0.25 m** *Fabaeformiscandona* sp.*; Limnocythere ceriotuberosa; Limnocythere staplini*; abundant carbonate lumps
		0.3			
		0.4			**0.45 m** *Fabaeformiscandona* sp.*; Limnocythere staplini*
		0.5			
		0.6			**0.6 m** *Limnocythere staplini; Fabaeformiscandona* sp.
		0.7			**0.75 m** *Limnocythere staplini*
		0.8			**0.82 - 1.15 m** Ooid-rich mud and sand
	pre-Bonneville	0.9			
		1.0			
		1.1			

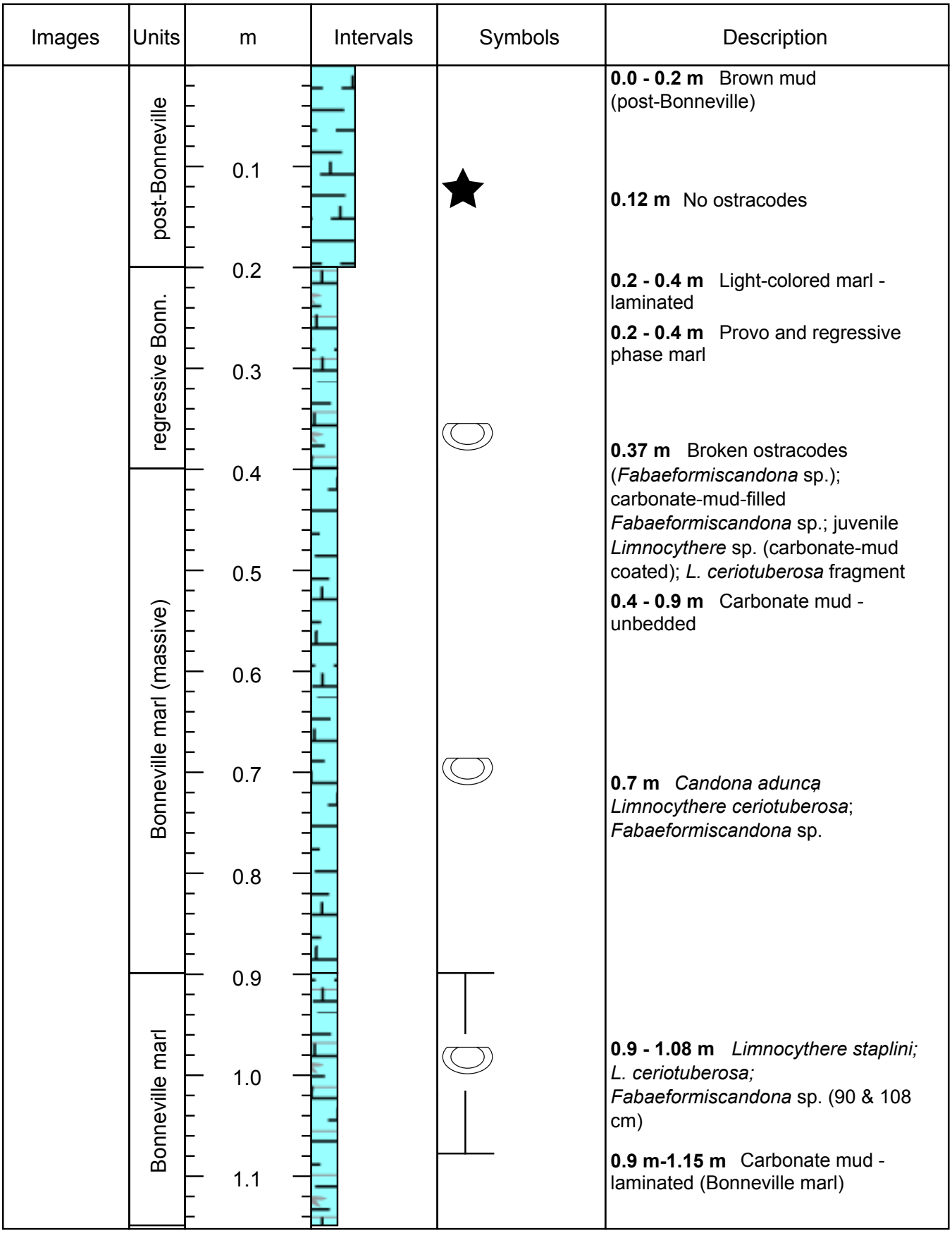
NUTTR1


Images
Units
m
Intervals
Symbols
Description
Bonneville marl
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
0.0 - 0.01 m Brown mud (post-Bonneville)
0.01 - 0.32 m Carbonate mud

NUTTR2

Images	Units	m	Intervals	Symbols	Description
	post-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9			**0.0 - 0.55 m** Brown mud

FI1


Images
Units
m
Intervals
Symbols
Description
post-Bonneville
regressive Bonn.
Bonneville marl (massive)
Bonneville marl
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
1.1
0.0 - 0.2 m Brown mud (post-Bonneville)
0.12 m No ostracodes
0.2 - 0.4 m Light-colored marl - laminated
0.2 - 0.4 m Provo and regressive phase marl
0.37 m Broken ostracodes (Fabaeformiscandona sp.); carbonate-mud-filled Fabaeformiscandona sp.; juvenile Limnocythere sp. (carbonate-mud coated); L. ceriotuberosa fragment
0.4 - 0.9 m Carbonate mud - unbedded
0.7 m Candona aduncą Limnocythere ceriotuberosa; Fabaeformiscandona sp.
0.9 - 1.08 m Limnocythere staplini; L. ceriotuberosa; Fabaeformiscandona sp. (90 & 108 cm)
0.9 m-1.15 m Carbonate mud - laminated (Bonneville marl)

SI1

Images	Units	m	Intervals	Symbols	Description
	B. marl	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9			**0.0 - 0.07 m** Carbonate mud (transgressive Bonneville marl) **0.07 m** *Limnocythere staplini; L. ceriotuberosa; Fabaeformiscandona* sp.

BC1A

Images	Units	m	Intervals	Symbols	Description
	post-Bonneville pre or post-Bonneville (?)	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9			**0.0 - 0.12 m** Light tan, unconsolidated loose crumbly silt aggregates, cemented with carbonate and clay **0.0 - 0.6 m** Eolian silt and sand **0.12 - 0.34 m** Light brown, consolidated, hard carbonate aggregate sand **0.38 - 0.88 m** Light brown, consolidated, carbonate aggregate sand **0.6 - 0.88 m** Eolian sand and mud

BC1B

Images	Units	m	Intervals	Symbols	Description
	pre or post-Bonneville (?) pre-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9		★	**0.0 - 0.04 m** Light tan, unbedded, hard sandy carbonate mud **0.0 - 0.275 m** Eolian sand and mud **0.04 - 0.23 m** Light tan, weakly bedded, hard sandy carbonate mud, ooids (?) **0.15 m** Sediment sample: sand, no ostracodes **0.23 - 0.275 m** Tan, weakly laminated, hard carbonate sandy mud **0.275 - 0.29 m** Brown-red, weakly bedded, sand **0.275 - 0.9 m** Lacustrine sediment (sandy, muddy) **0.3 - 0.36 m** Brown-red, weakly bedded, sand **0.36 - 0.44 m** Diffuse transition to light brown, unbedded, sand **0.44 - 0.54 m** Light tan, thinly bedded, sand **0.54 m-0.75 m** Light brown, weakly thinly bedded, sand **0.75 - 0.83 m** Light brown-red, weakly thinly bedded, sand **0.83 - 0.86 m** Light tan, carbonate-rich sand **0.86 - 0.9 m** Burnt-orange-tan, sand

BC1C

Units	m	Intervals	Symbols	Description
pre-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2		★ 3-10 mm	**0.0 - 0.23 m** Light tan-gray, weak thin bedded, sandy carbonate mud with ooids, localized burnt-orange iron staining **0.0 - 1.2 m** Lacustrine sediment (sandy, muddy) **0.2 m** Sediment sample: rods and spherical ooids; quartz sand; carbonate lumps **0.23 - 0.36 m** Light tan gray, interbedded sand and carbonate mud **0.36 - 0.45 m** Off-white to light gray tan, laminated, mud **0.45 - 0.57 m** Light tan-gray, thinly bedded, sand and mud with localized burnt-red spots **0.57 - 0.64 m** Light tan-gray, no clear bedding, carbonate mud with burnt red spots **0.64 - 0.82 m** Light red-tan-gray, thinly bedded, sand with some mud **0.82 - 0.94 m** Gradational transition from red tan gray at top to light tan at base, carbonate mud at top to sandy at base **0.9 m** Sediment sample: quartz sand; rods; carbonate mud lumps; one female *L. staplini* ostracode **0.94 - 1.2 m** Light tan-red-gray, thinly bedded, sand, with burnt-orange spots and layers

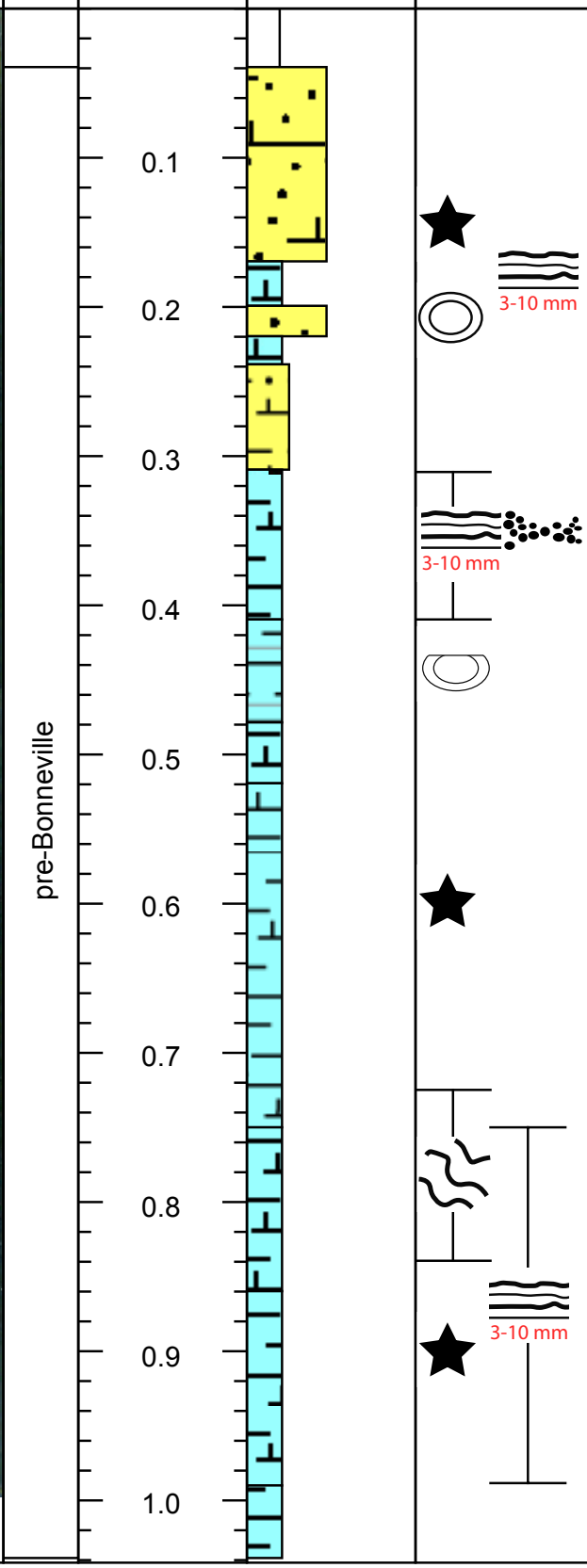
BC1D

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2			**0.03 - 0.12 m** Brown-red, muddy sand **0.13 - 0.26 m** Brown-red, muddy sand, ooid-rich, upper part of interval has red staining **0.27 - 0.38 m** Brown-red, muddy sand **0.38 - 0.5 m** Brown-red, sand, saturated base is gradational contact with lower interval **0.5 - 0.89 m** Brown-gray, sand, saturated **0.89 - 1.2 m** Brown-gray, sand, unsaturated

BC1E

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2			**0.0 - 0.25 m** Dark gray-tan, bedded to unbedded, quartz sand with some ooids and rods **0.25 - 0.34 m** Dark gray-tan with slight pink undertone, sand, some dark grains **0.34 - 0.54 m** Dark gray-tan, weakly bedded to unbedded, quartz sand, some ooids and rods **0.54 - 0.63 m** Dark tan-gray with slight pink undertone, sand, some dark grains **0.63 - 1.21 m** Dark gray-tan, weakly bedded to unbedded, quartz sand, some ooids and rods

BC2A

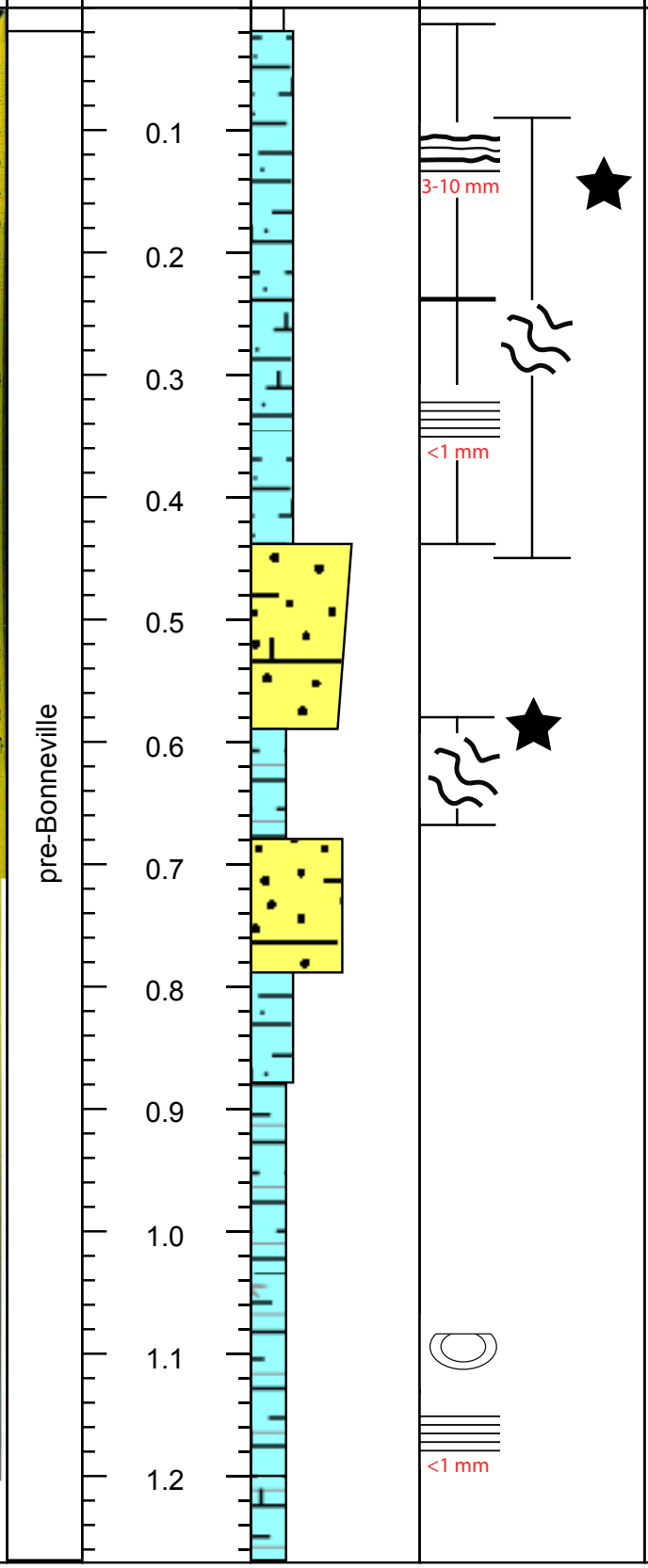


Description
0.04 - 0.17 m Medium brown, sand, with ooids and gypsum(?)
0.145 m Sediment Sample: few rods, no ostracodes
0.17 - 0.2 m Medium brown, weakly thinly bedded, carbonate mud
0.2 - 0.22 m Brown, thinly bedded, ooid sand
0.22 - 0.24 m Medium tan, carbonate mud, small black spots
0.24 - 0.31 m Medium brown, no clear structure, silt, with dark specs
0.31 - 0.41 m Light tan-gray, weakly bedded, carbonate mud
0.345 - 0.355 m Sandy bed of ooids, rods, clumpy carbonates
0.41 - 0.48 m Light tan with light to dark intervals, laminated, carbonate mud
0.44 m Sediment sample: ostracodes present
0.48 - 0.52 m Light brown, unbedded to thinly bedded, mud with iron staining
0.52 - 0.75 m Light tan, weakly bedded, carbonate mud with some sandy intervals
0.6 m Sediment sample: carbonate mud lumps
0.725 - 0.84 m Soft sediment deformation, dark brown material injected into layer, some concurrent offset
0.75 - 0.86 m Medium brown, thinly bedded, mud
0.86 - 0.99 m Light tan, weakly thinly bedded, carbonate mud
0.9 m Sediment sample: carbonate mud lumps
0.99 - 1.04 m Bottom part of core section in Ziplock bag: light tan, weakly thinly bedded, carbonate mud

BC2B

Units	m	Intervals	Symbols	Description
pre-Bonneville	0.1			**0.02 - 0.11 m** Soft sediment deformation **0.02 - 0.26 m** Light tan, weakly thinly bedded, mud with sandy ooid intervals **0.13 m** Sediment sample: rods, carbonate mud lumps
	0.2			
	0.3			**0.26 - 0.33 m** Off-white, ooid-rich sand with clumpy carbonates at base **0.33 - 0.39 m** Light gray, laminated, mud
	0.4			**0.37 m** Sediment sample: ostracods with some rods
	0.5			**0.39 - 0.63 m** Tan, laminated, mud with dark brown to black laminae and dark sandy bands
	0.6			**0.54 m** Sediment sample: 100% *L. staplini* **0.625 m** Sediment sample: ostracodes and ooids
	0.7		3-10 mm	**0.63 - 0.72 m** Very light tan, thinly bedded, ooid-rich mud **0.72 - 1.18 m** Very light tan, laminated, mud
	0.8			
	0.9			**0.93 m** Sediment sample: ostracodes, ooids, carbonate mud lumps
	1.0			
	1.1			**1.1 m** Sediment sample: carbonate mud lumps
				1.18 m-1.2 m Light tan, ooid sand

BC2C



0.02 - 0.24 m Light tan, weakly bedded, mud with ooids and rods

0.09 - 0.45 m Medium brown, soft sediment deformation features
0.15 m Sediment sample: rods
0.24 - 0.44 m Light tan, laminated, mud with ooids

0.44 - 0.59 m Very light tan, carbonate sand, with ooids and rods, clumpy carbonates at top

0.58 - 0.67 m Brown injected sediment
0.59 - 0.68 m Very light tan top to light tan at base, very weakly laminated, mud
0.6 m Sediment sample: rods, carbonate mud lumps
0.68 - 0.79 m Very light tan, clumpy carbonates with ooids

0.79 - 0.88 m Light tan, unbedded, mud with ooids
0.88 - 1.2 m Light tan, laminated, mud

1.1 m Sediment sample: *L. staplini*

1.16 - 1.17 m Very light colored, very finely laminated, mud
1.2 - 1.27 m Light tan, laminated, mud (in Ziplock bag from bottom of core section)

BC2D

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1			**0.0 - 0.1 m** Very light tan, weakly thinly bedded, carbonate mud **0.1 m** Sediment sample: rods; carbonate mud lumps **0.1 - 0.11 m** Slightly darker tan, finely laminated, mud **0.11 - 0.13 m** Very light tan, unbedded, mud **0.13 - 0.22 m** Light tan, thinly bedded, mud **0.22 - 0.38 m** Olive-green staining with burn orange (oxidized) clumpy carbonates (uppermost 4 cm), ooid-rich base **0.22 m** Light green staining with burnt orange (oxidized) clumpy carbonates **0.38 - 0.71 m** Light green-tan, laminated, mud, with some 0.5-1 cm-thick ooid-rich beds **0.53 m** Sediment sample: ostracodes, carbonate mud lumps **0.675 - 1.16 m** Soft sediment deformation, localized oxidation around offset **0.71 - 0.79 m** Dark gray-green, thinly bedded, mud **0.75 m** Sediment sample: *L. staplini*; carbonate mud lumps **0.79 - 1.16 m** Light gray-green thinly bedded mud, with minor(?) component of ooids **0.9 m** Sediment sample: ostracodes **1.1 m** Sediment sample: *L. staplini*; ostracode fragments visible in mud lumps

BC2E

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1			**0.01 - 0.1 m** Light green-gray, weakly thinly bedded carbonate mud **0.1 - 0.69 m** Darker light green-gray, laminated to thinly bedded, mud with soft sediment deformation and zones of oxidation **0.2 m** Sediment sample: carbonate mud lumps; fragments of *L. staplini* **0.45 m** Sediment sample: ostracodes and ooids **0.6 m** Sediment sample: carbonate mud lumps **0.69 - 0.91 m** Light gray, laminated, carbonate mud, some soft sediment deformation offset **0.91 - 0.98 m** Dark green-gray, laminated, mud **0.98 - 1.17 m** Alternating layers of light green-gray ooid-rich sandy mud to thin mud beds, some bed deformation **1.15 m** Sediment sample: carbonate mud lumps **1.17 - 1.19 m** Plug from bottom of core section in Ziplock bag: light gray-green, carbonate mud

BC3A

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9			**0.04 - 0.1 m** Medium-dark brown, gypsum and ooid-rich sand **0.1 - 0.21 m** Medium brown, gypsum and ooids with carbonate mud, gradational base **0.15 m** Sediment sample: carbonate mud lumps **0.21 - 0.28 m** Brown, unbedded, gypsum sand with ooids and rods **0.28 - 0.34 m** Brown-tan, clumpy carbonate, with ooids and gypsum? **0.34 - 0.39 m** Brown, carbonate mud with ooids **0.39 - 0.92 m** Pale tan-gray, ooid sand with rods **0.5 m** Sediment sample: abundant rods **0.51 - 0.53 m** Carbonate mud, slight iron staining at top

BC3B

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1			**0.01 - 0.22 m** Pale tan, carbonate mud with ooid and rods **0.2 m** Sediment sample: very clean L. staplini (100% *L. staplini;* males, females, juveniles) **0.22 - 0.32 m** Light tan, laminated (very weak), carbonate mud with ooids **0.32 - 0.49 m** Tan, laminated, carbonate mud **0.33 - 0.41 m** Small fault, soft sediment deformation **0.49 - 0.56 m** Abrupt change to darker, laminated, mud with gradually more oolitic-rich to 56 cm **0.53 m** Sediment sample: carbonate mud lumps; juvenile *L. staplini*; ostracode fragments **0.56 - 0.63 m** Tan ooid bed **0.63 - 0.83 m** Light tan, laminated, carbonate mud with increasing amounts of ooids at base **0.83 - 1.16 m** Pale white, clumpy carbonates, water saturated, abundant ooids **0.87 m** Oxidized iron-rich zone **1.16 - 1.19 m** Light tan, weakly thinly bedded, carbonate mud **1.17 m** Sediment sample: ostracode fragments; one juvenile *L. staplini*

BC3C

Units	m	Intervals	Symbols	Description
pre-Bonneville	0.1			**0.02 - 0.09 m** Light tan, clumpy carbonate
				0.09 - 0.17 m Light gray, unbedded, tan mud
	0.2			**0.17 - 0.34 m** Light gray top to darker light gray at bottom, laminated carbonate mud
				0.2 m Sediment sample: *L. staplini*; ostracode fragments visible in mud lumps
	0.3			**0.24 m** Sediment sample: ooids, some ostracodes
				0.29 - 0.33 m Iron-stained, carbonate laminae - 29, 31, 33 cm
	0.4			**0.34 - 0.53 m** Light tan, ooid sand
				0.42 - 0.445 m Clumpy carbonates
	0.5			**0.53 - 0.9 m** Carbonate sand, ooids and rods
	0.6			
	0.7			**0.7 m** Sediment sample: abundant rods
	0.8			
	0.9			**0.9 - 0.94 m** Light gray, weakly thinly bedded, carbonate mud
				0.95 - 1.01 m Light gray, weakly thinly bedded, carbonate mud
	1.0			**1.01 - 1.07 m** Medium gray, hard mud nodules
				1.07 - 1.1 m Light gray mud
	1.1			**1.1 m** Sediment sample: carbonate mud lumps; *L. staplini*
				1.1 - 1.18 m Light gray, weakly thinly bedded, mud
				1.15 m Sediment sample: ostracodes

BC3D

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9			**0.01 - 0.09 m** Light gray with slight green tinge, weakly thinly bedded, carbonate mud **0.09 - 0.7 m** Light gray with green tinge, laminated, carbonate mud **0.12 m** Sediment sample: 100% *L. staplini* **0.17 - 0.34 m** Soft sediment deformation, maximum offset ~1 cm **0.5 m** Sediment sample: *L. staplini*; ostracodes visible in carbonate lumps **0.535 - 0.65 m** Soft sediment deformation, deformed beds, inclined laminations

BC3E

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1			**0.0 - 0.14 m** Medium gray, weakly laminated to thinly bedded, carbonate mud **0.08 - 0.1 m** Soft sediment deformation **0.12 m** Sediment sample: carbonate mud lumps **0.14 - 0.53 m** Dark gray, laminated, carbonate mud, darker laminae at base **0.53 - 0.6 m** Light gray, unbedded to weakly laminated, carbonate mud **0.56 m** Sediment sample: carbonate mud lumps, ostracode fragments **0.562 m** Thin sandy interval **0.598 m** Thin sandy interval **0.6 - 0.71 m** Dark gray, laminated mud **0.71 - 0.77 m** Lighter gray, thinly bedded, carbonate mud **0.77 - 0.87 m** Darker gray, laminated, silty carbonate mud **0.87 - 1.03 m** Gray, weak thin beds, carbonate mud, ooids **0.93 - 0.94 m** Dark gray interval **1.0 m** Sediment sample: abundant rods, carbonate-mud filled ostracodes **1.03 - 1.1 m** Ooids and rods, sandy, gradational base **1.1 - 1.17 m** Gray, laminated, carbonate mud with ooids **1.14 - 1.15 m** Dark interval **1.17 - 1.2 m** Ooids and rods

BC4

Units	m	Intervals	Symbols	Description
post-B.				**0.01 - 0.09 m** Light gray, weakly bedded, muddy gypsum sand (post-Bonneville?)
lower Bonneville marl	0.1			**0.09 - 0.16 m** Light gray carbonate mud
				0.15 m Sediment sample: *Fabaeformiscandona* sp.; ostracode fragments
	0.2			**0.16 - 0.17 m** Slightly dark-tan light-gray carbonate mud
				0.17 - 0.24 m Slightly tan light-gray carbonate mud
	0.3			**0.24 - 0.37 m** Light gray, thinly bedded, carbonate mud
pre-Bonneville?				**0.37 - 0.52 m** Light gray carbonate mud
	0.4			
				0.45 m Sediment sample: carbonate mud lumps; ostracode fragments
	0.5			**0.52 m-0.55 m** Slightly darker light-gray carbonate mud
	0.6			
	0.7			
	0.8			
	0.9			

BC5

Units	m	Intervals	Symbols	Description
p-B.				**0.03 - 0.08 m** Pale brown mud with gypsum (post-Bonneville?)
				0.08 - 0.28 m Pale gray mud
	0.1			
				0.15 m Sediment sample: *L. staplini* (appears reworked — frosted, cloudy, many broken valves); possible *Cytherissa lacustris* (frosted, cloudy); broken *F.* sp.
	0.2			
				0.28 m-0.43 m Pale gray, finely to vaguely bedded, mud with thin carbonate lump beds
	0.3			
				0.35 m Sediment samples: carbonate mud lump
Bonneville marl	0.4			
				0.43 m-0.63 m Pale brown mud
	0.5			
				0.53 m Color change: darker below and lighter above
	0.6			**0.55 m** Sediment sample: *Candona adunca; Limnocythere ceriotuberosa; F.* sp.
	0.7			
	0.8			
	0.9			

BC6

Units	m	Intervals	Symbols	Description
post B.				
Bonneville marl	0.1			**0.04 - 0.06 m** Very pale-gray mud, irregular basal contact, deformed by coring(?) (post-Bonneville?) **0.06 - 0.29 m** Darker pale-gray mud, mottled oxidation (red-brown) with black lumps **0.15 m** Sediment sample: *F.* sp.; *C. adunca*; *L. ceriotuberosa*
	0.2			
	0.3			**0.29 m** Very pale-gray to white mud, discontinuous layer, injected? **0.29 - 0.36 m** Darker pale-gray mud with mottled oxidation (red-brown) and black lumps
	0.4			**0.33 m** Sediment sample: spheroidal ooids, pellets; carbonate-coated ostracodes; *F.* sp.*; L. staplini; L. ceriotuberosa*
pre-Bonneville	0.5			**0.36 - 0.45 m** Dark pale-gray, laminated, mud **0.45 - 0.46 m** Sand bed **0.46 - 0.62 m** Very pale-gray, laminated, mud with thin ooid-rich sand layers **0.48 m** Sediment sample: carbonate mud lumps; ostracode fragments; rods
	0.6			
	0.7			
	0.8			
	0.9			

BC7

Units	m	Intervals	Symbols	Description
pre-Bonneville	0.1			**0.03 - 0.5 m** Very pale-gray, thinly bedded, carbonate mud, some darker gray fine beds throughout
	0.2			
	0.3			**0.24 m** Muddy sands with ooids **0.25 m** Sediment sample: sand-size carbonate lumps; rods
	0.4			**0.35 m** Muddy sands with ooids
	0.5			**0.48 - 0.49 m** Muddy sands with ooids
	0.6			
	0.7			
	0.8			
	0.9			

BC8

Images	Units	m	Intervals	Symbols	Description
	post-Bonn.	0.1			**0.03 - 0.15 m** Medium gray mud with ooids and gypsum crystals (post-Bonneville)
	pre-Bonneville	0.2			**0.15 - 0.55 m** Pale gray, laminated, carbonate mud with ooids, some oxidation in mottles and along bedding
		0.3			
		0.4			
		0.5			**0.45 m** Sediment sample: rods; pellets; mica grains; broken ostracodes
		0.6			**0.55 - 0.83 m** Pale gray, indistinct bedding, muddy sand with ooids and rods, slightly darker due to oxidation
		0.7			
		0.8			
		0.9			**0.83 - 1.03 m** Pale gray, thinly bedded, carbonate mud with thin oolitic sand beds, weak oxidation along bedding
		1.0			

BC9

Images	Units	m	Intervals	Symbols	Description
	post-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9			**0.0 - 0.1 m** Medium brown, loose, quartz sand **0.0 - 0.51 m** Gilbert episode (?) **0.1 - 0.16 m** Light medium-brown, sandy mud, oxidation along bedding **0.12 m** Sediment sample: *L. sappaensis* (one valve); ostracode fragments (reworked *L. staplini*?); sand-size carbonate lumps **0.16 - 0.26 m** Pale orange oxidized quartz and oolitic sand **0.26 - 0.33 m** Pale gray, carbonate mud with two 0.5-cm sand beds **0.31 m** Sediment sample: spherical ooids; rods; quartz sand; Fe-oxide-cemented sand; no ostracodes **0.33 - 0.41 m** Pale orange, faintly bedded, oolitic sand, with some rods and quartz **0.41 - 0.51 m** Pale gray carbonate mud with thin oolitic sand beds

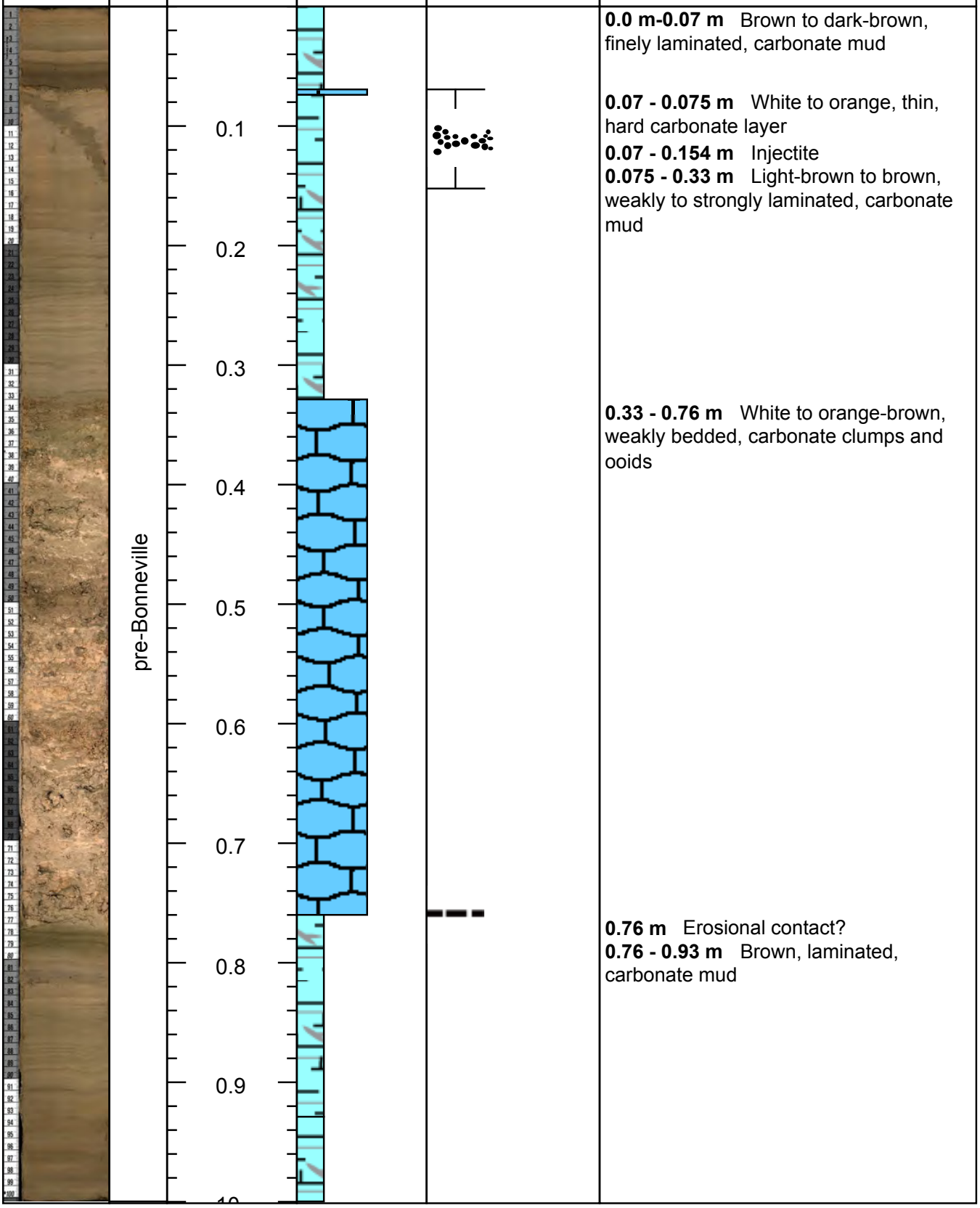
BSF Solstice (0 - 1 m)

Images	Units	m	Intervals	Symbols	Description
	post-Bonneville	0.1			**0.04 - 0.28 m** Brown to dark-brown, thinly weakly bedded, gypsum sand
	pre-Bonneville	0.2			
		0.3			**0.28 - 0.41 m** Light brown, laminated, carbonate mud
		0.4			**0.41 - 0.43 m** Light brown, thin ooid sand bed **0.43 - 0.56 m** Brown, laminated, carbonate mud, trace gypsum
		0.5			
		0.6			**0.56 - 0.59 m** Light brown, thin ooid sand bed **0.59 - 0.67 m** Brown, laminated, carbonate mud
		0.7			**0.67 - 0.68 m** Light brown, thinly bedded, carbonate mud and silt **0.68 - 0.71 m** Brown, laminated, carbonate mud
		0.8			**0.71 - 0.73 m** Brown, thinly bedded, carbonate mud and silt **0.75 - 0.84 m** Tan, unconsolidated, loose carbonate lumps (0.2-3 mm), some flat, no clear shape
		0.9			**0.84 - 0.9 m** Light brown, weakly bedded, carbonate mud **0.895 m** Ostracode fragments **0.9 - 1.04 m** Brown to white, laminated, carbonate mud
		1.0			

BSF Solstice (1 - 2 m)

Units	m	Intervals	Symbols	Description
pre-Bonneville	0.1			**0.0 - 0.04 m** Dark brown, laminated, carbonate mud **0.04 - 0.18 m** Light-gray to orange-tan in upper section, finely laminated, carbonate mud
	0.2			**0.05 - 0.271 m** Injectite **0.18 - 0.25 m** Brown, weakly laminated, carbonate mud
	0.3			**0.25 - 0.26 m** Light brown, thinly bedded, carbonate silt **0.26 - 0.41 m** Very light-to-medium-brown, laminated, carbonate mud
	0.4			**0.354 - 0.443 m** Injectite(?) **0.41 - 0.44 m** Brown, thinly weakly bedded, carbonate silt **0.44 - 0.52 m** Dark brown, unbedded, ooid-rich sand
	0.5			**0.52 - 0.55 m** Brown, unbedded, carbonate clumps
	0.6			**0.526 - 0.667 m** Injectite **0.55 - 0.59 m** Light brown, weakly laminated, carbonate mud **0.59 - 0.67 m** Light-brown to orange-brown, laminated, carbonate mud
	0.7			**0.67 - 0.68 m** Dark brown, weakly thinly bedded, carbonate mud **0.68 - 0.84 m** Brown, well laminated at base to weakly laminated at top, carbonate mud
	0.8		F	**0.69 - 0.90 m** Ostracode fragments: *Limnocythere staplini* **0.84 - 1.0 m** Dark to light-brown, well laminated, carbonate mud
	0.9			

BSF Solstice (2 - 3 m)



BSF Solstice (3 - 3.18 m)

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9			**0.0 - 0.178 m** Orange-brown to light-brown, well laminated, carbonate mud **0.15 - 0.17 m** Ostracodes: *Limnocythere staplini*

BSF EQX Weather Station 2 (0 - 1 m)

Images	Units	m	Intervals	Symbols	Description
	post-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7			**0.0 - 0.79 m** Tan to dark-gray, weakly bedded, gypsum and halite crystals - disturbed by coring
	pre-Bonneville	0.8 0.9		EQ	**0.79 - 0.9 m** Dark tan-gray, unbedded, silty to sandy carbonate mud and gypsum, gradational base **0.86 - 0.925 m** Fragmented ostracodes **0.9 - 1.34 m** Light gray, thinly bedded (upper) to laminated (base), carbonate mud

BSF EQX Weather Station 2 (1 - 2 m)

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9		F	**1.2 m** Ostracodes: *Limnocythere staplini* **1.288 - 1.34 m** Soft sediment deformation **1.335 - 1.36 m** Thin ooid sand layer **1.34 - 1.79 m** Tan-gray with orange tinted layers, laminated to thinly bedded, carbonate mud **1.42 - 1.44 m** Thin ooid sand layer **1.68 - 1.7 m** Small fault **1.79 - 2.22 m** Tan, laminated to thinly bedded, carbonate mud **1.875 m-2.0 m** Small sandy intervals

BSF EQX Weather Station 2 (2 - 2.9 m)

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9			**2.22 - 2.23 m** Dark green, finely laminated, mud **2.23 - 2.29 m** Dark brown, thinly bedded, ooid-rich sand **2.29 - 2.36 m** Pale gray, thinly bedded, carbonate mud **2.295 - 2.565 m** Small seismite with discoloration along it, mm scale displacement **2.36 - 2.42 m** Light gray, finely laminated, carbonate mud **2.4 - 2.87 m** Ostracodes: *Limnocythere staplini* **2.42 - 2.59 m** Pale gray, thinly bedded, carbonate mud **2.59 - 2.9 m** Gray to brown, fine to coarsely laminated, carbonate mud

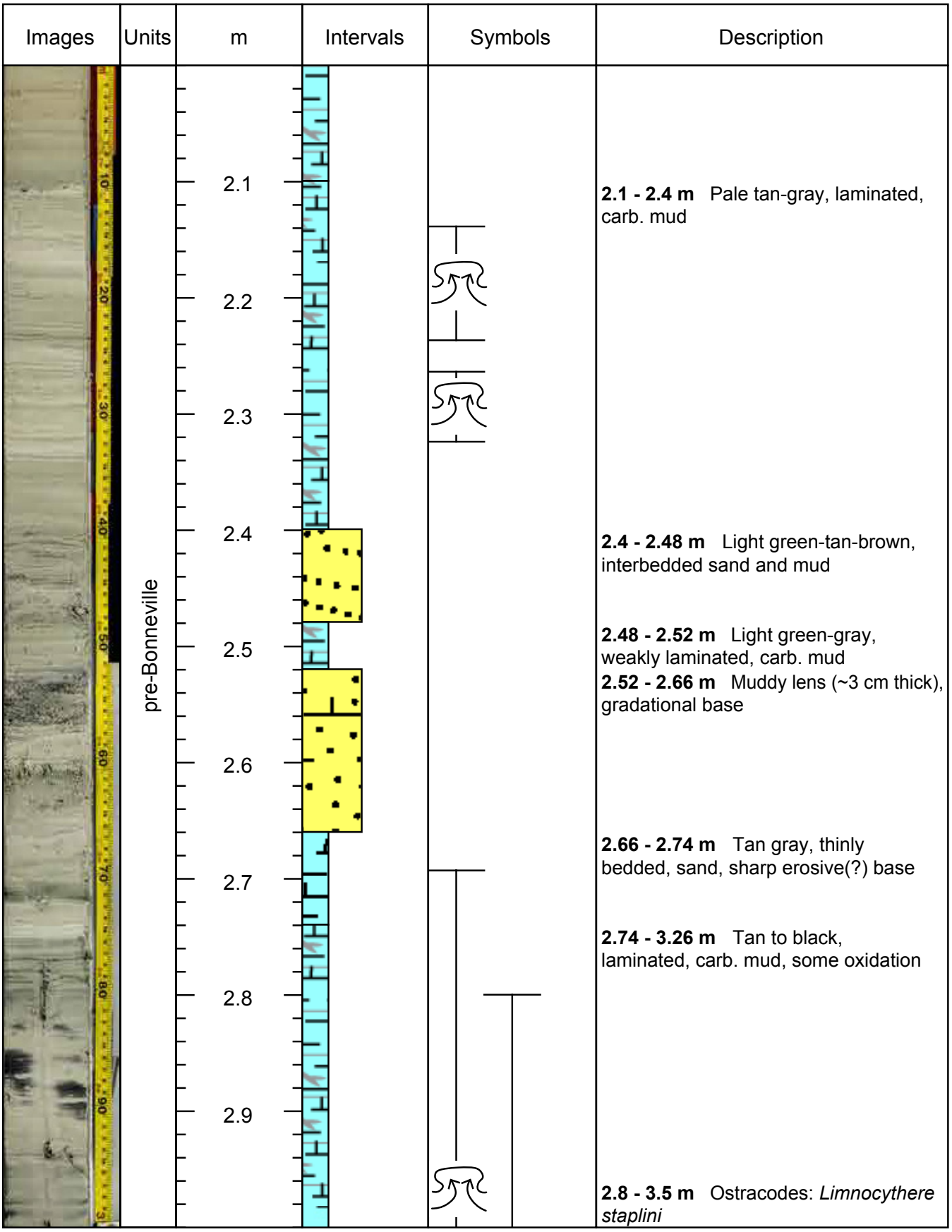
BSF EQX Short Course 1 (0 - 1 m)

Units	m	Intervals	Symbols	Description
post-Bonneville	0.1			**0.0 - 0.23 m** Dark gray-brown, weakly bedded, gypsum sand (post-Bonneville)
	0.2			
	0.3			**0.26 - 0.58 m** Tan, thinly bedded, carb. mud
	0.4		A	**0.27 - 0.588 m** Arching caused by drilling
pre-Bonneville	0.5			
	0.6			**0.58 - 0.65 m** Light red-brown, unbedded, carb. clumps, sharp base
				0.65 - 0.73 m Light tan, unbedded, carb. mud, gradational base
	0.7			**0.73 - 0.81 m** Tan, thinly bedded, carbonate mud
	0.8			**0.81 - 0.83 m** Sand bed
				0.83 - 0.9 m Tan, thinly bedded, mud with sandy intervals
	0.9			**0.9 - 1.02 m** Tan gray, unbedded to weakly bedded, ooid sand

BSF EQX Short Course 1 (1 - 2 m)

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9			**1.015 - 1.535 m** Small faults **1.2 - 1.3 m** Ostracodes: *Limnocythere staplini* **1.3 - 1.337 m** Medium-gray to tan, very thin well-defined beds, carbonate mud **1.337 - 1.46 m** Light-gray to tan, very thin beds, carb. mud with very dark layer at 1.417 m **1.46 - 1.685 m** Tan to burnt-orange, weak thin bedding, carb. mud, iron staining in upper half **1.576 - 1.585 m** Sandy interval: ripples(?) **1.685 - 1.7 m** Tan, thin, carb. sand bed with irregular upper surface **1.698 - 1.93 m** Soft sediment deformation **1.7 - 1.792 m** Light gray-tan, laminated, carb. mud **1.792 - 1.96 m** Pale gray-tan, laminated, carb. mud **1.96 - 2.1 m** Tan to pale-orange, thinly bedded, carb. mud, erosive base(?)

BSF EQX Short Course 1 (2 - 3 m)



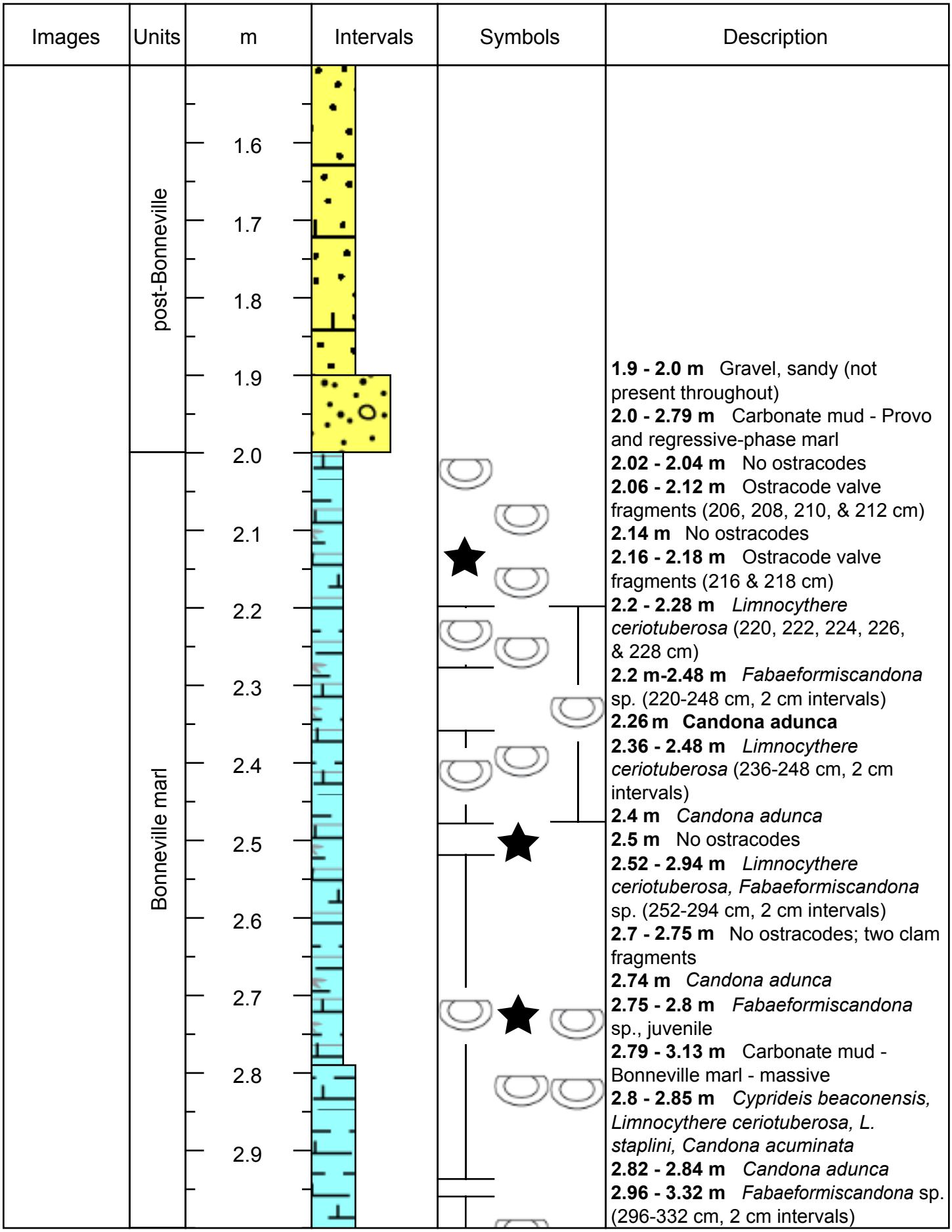
BSF EQX Short Course 1 (3 - 3.9 m)

Images	Units	m	Intervals	Symbols	Description
	pre-Bonneville	3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9			**2.8 - 3.5 m** Ostracodes: *Limnocythere staplini* **3.26 - 3.28 m** Tan, unbedded, ooid sand **3.28 - 3.32 m** Light gray with black streaks, thinly bedded, carbonate mud **3.32 - 3.345 m** Light brown, wavy, thinly bedded ooid-rich sand **3.345 - 3.42 m** Gray with dark-gray streaks, wavy(?) nonplanar thin bedding, carb. mud with sand lamina, sandy base **3.42 - 3.52 m** Gray with black streaks, laminated to thinly bedded, carbonate mud **3.52 - 3.53 m** Gray, thinly bedded, ooid and gypsum sand **3.53 - 3.9 m** Green-gray to tan-brown, poorly developed bedding, sandy to clayey carb. with clumps.

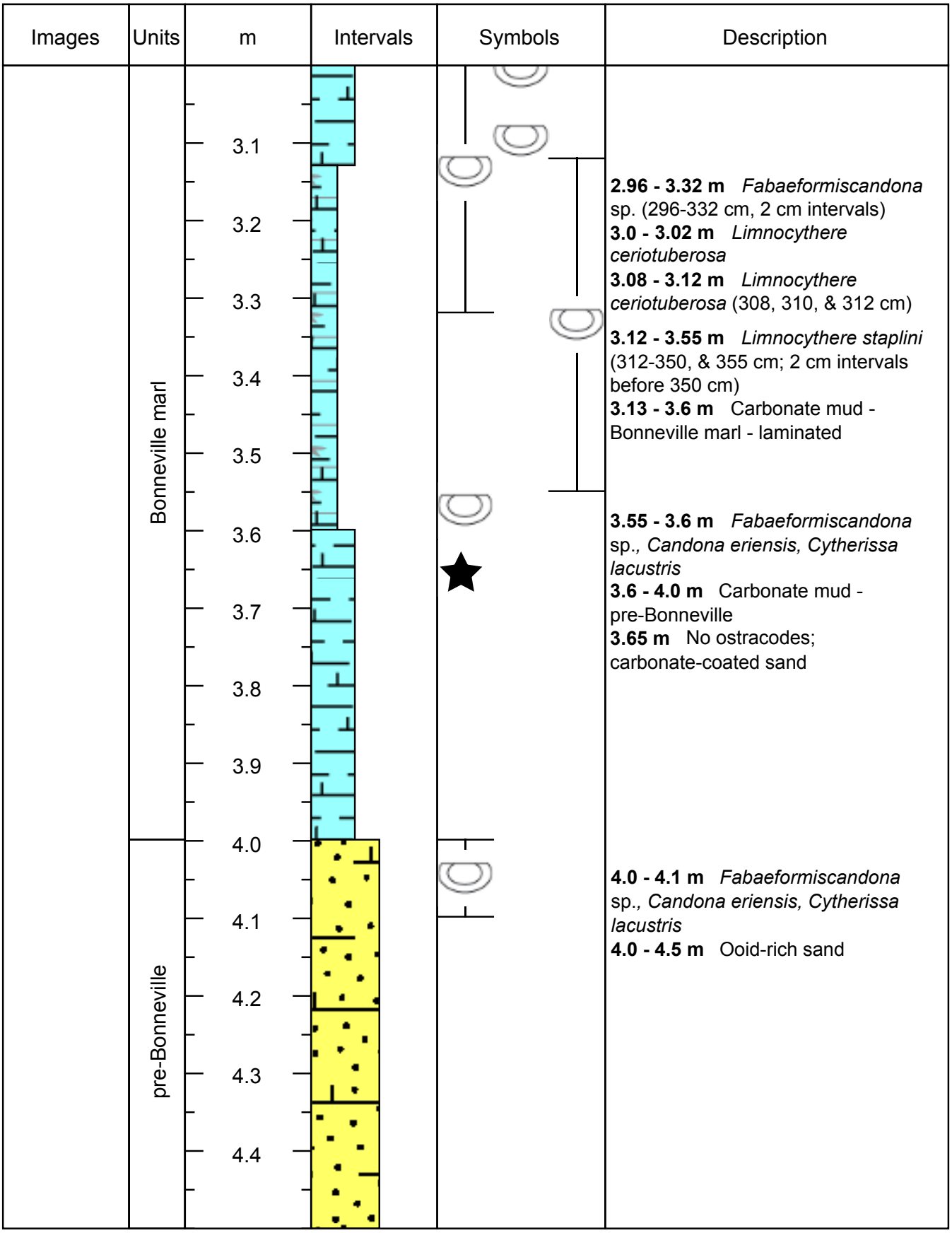
Juke Box trench (0 - 1.5 m)

Images	Units	m	Intervals	Symbols	Description
	post-Bonneville	0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4		★	**0.0 - 1.9 m** Sandy mud (Interval ranges from 0-2 m thickness. In some areas it cuts into B. marl.) **1.0 m** Mazama ash (approximate depth)

Juke Box trench (1.5 - 3 m)

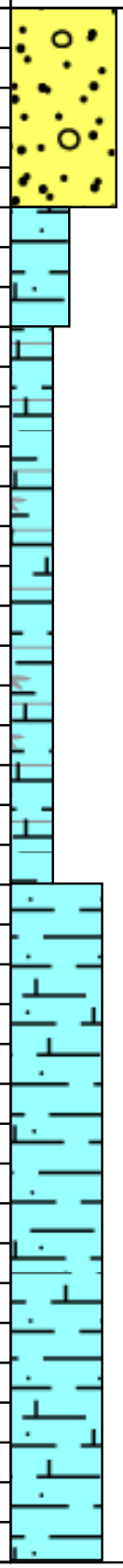


Juke Box trench (3 - 4.5 m)



Lozenge

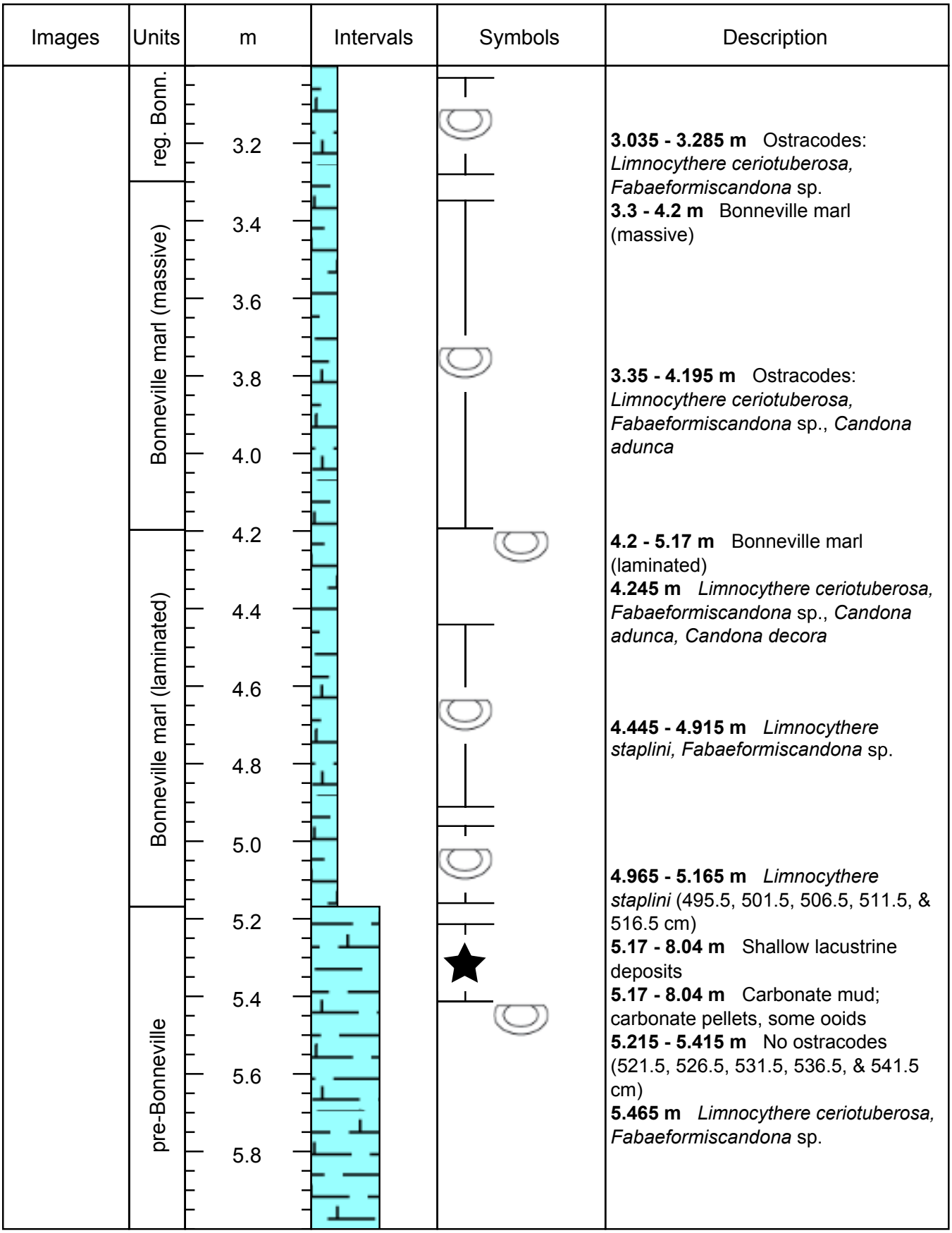
Images	Units	m	Intervals	Symbols	Description
	regressive-B.	0.5			**0.0 - 0.5 m** Well-rounded gravel (late regressive-phase Bonneville shore zone)
	reg.-B.				**0.5 - 0.8 m** Reddish-brown sandy mud (late regressive-phase Bonneville lagoon deposits)
	Bonneville marl	1.0 1.5 2.0			**0.8 - 2.2 m** Laminated to unbedded carbonate mud
	pre-Bonneville	2.5 3.0 3.5			**2.2 - 3.9 m** Ooid-rich sand and carbonate mud (shallow lacustrine)



Blue Lake (1 - 3 m)

Images	Units	m	Intervals	Symbols	Description
	post-Bonneville Gilbert	0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8			**0.0 - 2.74 m** Peat, organic rich mud (wetland deposits) **2.53 - 2.685 m** Ostracodes: *Limnocythere staplini, Limnocythere ceriotuberosa, Fabaeformiscandona* sp.*, Candona rawsoni, Cypridae* sp. **2.735 - 2.885 m** Ostracodes: *Limnocythere staplini, Limnocythere ceriotuberosa, Candona rawsoni, Fabaeformiscandona* sp. **2.74 - 2.87 m** Carbonate mud **2.74 - 2.9 m** Gilbert-episode lacustrine deposits **2.87 - 5.17 m** Carbonate mud **2.9 - 3.3 m** Provo and regressive marl

Blue Lake (3 - 6 m)



Blue Lake Core (6 - 8m)