

VOPA 2012: Cara Blanca Pool 1

Report submitted to the Institute of Archaeology National Institute of Culture and History, Belize

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The Valley of Peace Archaeology (VOPA) project was granted permission by the Belize Institute of Archaeology to continue diving Cara Blanca Pool 1 May 7-10, 2012 (Figures 1 and 2). Given their importance in Maya belief systems as portals to the underworld, the project goals were to explore this watery realm.

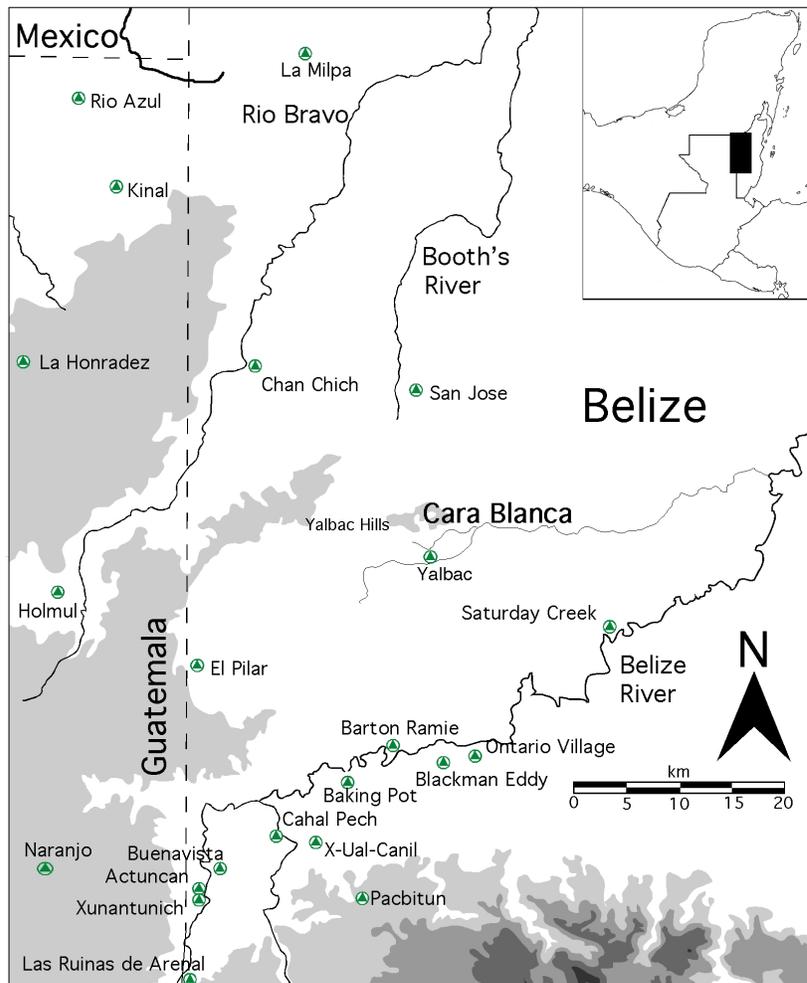


Figure 1 Research area with location of Cara Blanca

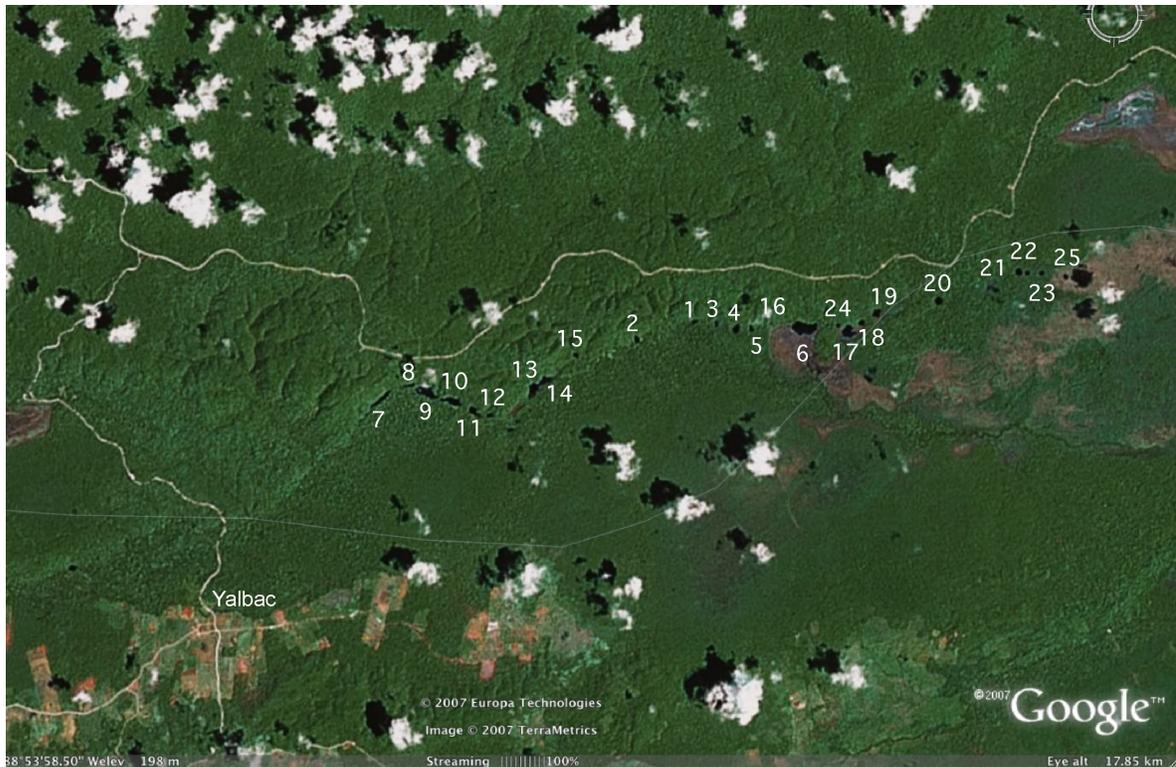


Figure 2 Numbered Cara Blanca pools

The dive team included Marty O’Farrell, who also did the underwater filming (<http://www.seofarrell.com/>), Chip Peterson, owner of Belize Diving Services on Caye Caulker (www.belizedivingservices.net), and underwater archaeologist Andrew Kinkella (Moorpark College), who was recently certified for Nitrox diving. The landowners of Cara Blanca, Forestland Group, have provided permission for this expedition. Field assistants included Cleofo Choc, Jose Ernesto Vasquez, Stanley Choc, and Juan Antonio López (Figure 3).



Figure 3 2012 team: Marty, Lisa, Clefo, Chip, Andrew, Juan Antonio, and Stanley. Ernesto took the photo.

Unfortunately, Mr. Scott, who was our first VOPA field assistant in 1997, passed away October 12, 2011. For the last few years, he diligently kept our field equipment in order, which was made easier by the shed we built on his property that we shared. He will be sorely missed, as will his Creole sayings and great stories.



Mr. Scott in 2005

Funding was provided by my department research funds at the University of Illinois. The remaining funds of the National Science Foundation High-Risk Research in Physical Anthropology and Archaeology Grant (#1110005) was used to purchase my airline ticket. Project costs were further offset by Marty and Chip, who donated their time and paid for their own travel costs and diving gases. Andrew paid for his own airfare as well. Total expenses, not including that provided by divers, were \$7885.29. This total includes the cost of the used 20' container (including transportation from Big Creek to Yalbac Sawmill and duty) I purchased to store VOPA artifacts.

I also received permission to submit four blogs to the *New York Times* 'Scientist at Work,' which details the brief field season and includes photos and film clips (<http://scientistatwork.blogs.nytimes.com/author/lisa-j-lucero/>).

On a general note, Yalbac Ranch has added several signposts along the all-weather roads. Pool 6 has been named Blue Water; Pool 20 Muddy Camp; and the Gorgeous Gorge road Rock Cut.

Cara Blanca Pool 1

Cara Blanca ('white face') consists of 25 pools along the base of a limestone escarpment c. 80 to 100 m high. We have visited the 22 of the 25 pools over the years (Nos. 1-21, 24), five of which have associated settlement (1, 7, 8, 9, and 20) (Kinkella 2009, 2011). Unlike at centers where Maya elite built *witz* (lineage mountains or pyramid temples), the Maya at Cara Blanca did not have to build artificial mountains; nor did they have to create portals to the underworld. These sacred features abound at Cara Blanca. In fact, the Maya left this area relatively untouched. The few structures and features found near pools are ceremonial in nature. Its significance seemed to increase at the end of the Late Classic (c. A.D. 800-900) when Maya intensified ritual activities (see Moyes et al. 2009) at the pools in the midst of several multiyear droughts (e.g., Medina-Elizalde et al. 2010). The concentration of so many pools in one area and the relatively small-scale and unique settlement indicate that Cara Blanca likely served as a sacred place to the ancient Maya, likely as a pilgrimage center.

Pool 1 stands out among the pools (Figure 4). It is a steep-sided *cenote* (c. 60 m deep, 100 x 60 m) surrounded by seven mounds. Looters' trenches show that the largest structure (Str. 1, 20 x 10 m, 3.3 m tall) is a vaulted L-shaped building with six rooms, three to a side and radiating out from a central spine wall with a series of four pillar-like walls that run the poolside length of the structure. The structure sits so close to the pool's edge that part of its eastern side has collapsed into the water. The building's architecture is further compromised by long-term looting (see below).

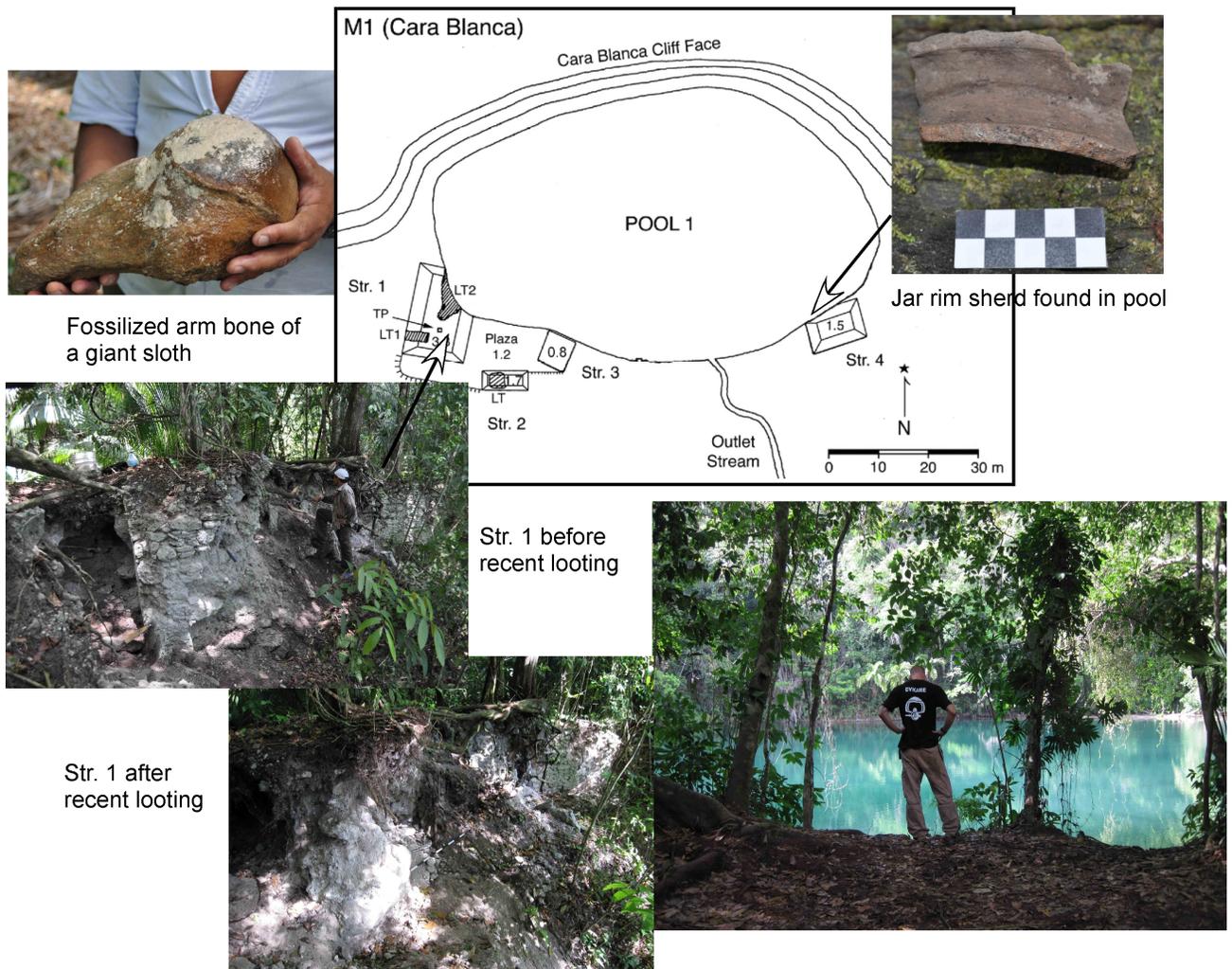


Figure 4 Pool 1 features

Earlier test excavations at several structures at Pool 1 yielded mostly jars (63%) dating to the end of the Late Classic period, or c. A.D. 800-900 (Kinkella 2004), indicating a specialized rather than a residential function (e.g., Lucero 2001:Table 5.2). The Maya may have collected sacred water in jars for special ceremonies that took place either at the pool or at the closest centers. In future, once we have more artifacts from Pool 1, we plan to compare Cara Blanca jars and artifacts with collections from Yalbac (c. 7 km distant), San Jose (c. 11 km distant), Saturday Creek (c. 11 km distant) and others, to determine if people from different areas deposited offerings in pools and collected sacred water.

In 2010 and 2011, divers mapped Pool 1 by attaching knotted nylon line (every 10' or 3.05 m) at various depths (5-6 m, 14-16 m) of the pool perimeter spiraling down to c. 40 m (Lucero 2011a). They discovered a massive cave entrance on the north wall starting at 30 m below the surface of the water, aptly named Actun Ek Nen (Black Mirror Cave); it was a challenge to map because it is pitch black, penetrates over 50 m into the cliff face and bottoms out at over 70 m—the largest of its kind in Belize according to IOA records (Lucero 2011b). They also recovered several sherds, including a jar rim immediately beneath the surface at the pool's edge near Str. 4 (15 x 11 m, 1.65 m tall) dating to c. A.D. 800-900. Finally, divers also discovered geological beds c. 20 m below surface laden with fossilized mega-fauna bones (e.g., possible tusk, long bones, pelvis, vertebra, etc.), the first fossils recorded in Belize according to IOA records. Divers collected three specimens; a rib, vertebra and

arm bone fragments, the latter likely belonging to a giant sloth, *Eremotherium laurillardii* (McDonald 2011). They also noted large crystal veins that begin at c. 13.5 m below the surface and extend to 50 m.

Wood fragments, soil, and gastropods from the same geological bed collected in 2011 were submitted for AMS radiocarbon dating to the Radiocarbon Dating Laboratory, Illinois State Geological Survey (<http://www.isgs.illinois.edu/>). The fossils date anywhere between c. 9000 and 39,000 years BP, the more recent end which would fall in the realm of human occupation, which has interesting implications for addressing the issue of early humans in Belize.

Cara Blanca 2012

Before the divers arrived Ernesto, Cleofo, and I went to Pool 1 to check the status of the roads, which turned out to be quite good, considering the damage caused by the October 2010 Hurricane Richard and subsequent wildfire in April-May, 2011 (Lucero 2011b). Loggers cleared the same road as last year, which ended at the 2011 and 2012 diving platform located on the west side of the pool just north of Str. 1. The water seemed clearer than in 2011, a fact divers later confirmed—for the most part anyway (see below). Interestingly, Cleofo collected some allspice leaves from a tree immediately north of Str. 1; it would be interesting to find out if the Maya used them in the past as they do present (seasoning, e.g., Escabeche soup).

On the way back, we stopped at Yalbac to check its status; we had to turn back after about 20 minutes from Plaza 2 because of the dense secondary growth (post-hurricane, post-fire). We will need to check it out in 2013.

The jungle is greener than last season, but the visible skyline from the lack of large trees destroyed in the hurricane and subsequent wildfire will take some getting used to. Many trees in the more open areas are completely hidden by dense vines.

The first thing the field assistants did on the first day of diving was to build a ladder for divers to access the water about 2 meters below the *cenote* edge. The water level seemed a little higher than last year by c. 30 cm.

Divers used nitrox (oxygen and nitrogen) or trimix gases (oxygen, nitrogen, and helium), which allowed them to safely and effectively explore depths beyond traditional scuba diving.

The underwater topography (bathymetry) determined where divers began their search for offerings. Marty O'Farrell had noticed last season that the pool bottom is roughly half the size of its surface because of the slope beginning on the south side down towards the cave entrance. If the Maya proffered offerings from Structure 1, they likely either would have landed on a shelf 5 m below, or rolled all the way down below 50 m down to 60+ m. This is where divers focused their efforts (and which we will continue to do in future dives). The deeper one goes north towards the cliff face, the less silt there likely is. In fact, when Marty went over his 2011 film clips, he realized that he had stood on a hard surface near the cave entrance—perhaps even bedrock.

In addition to depth, another challenge had to do with visibility issues; hydrogen sulfide clouds were the worst the divers had seen (see film clip at <http://scientistatwork.blogs.nytimes.com/2012/05/11/diving-for-underwater-offerings/>). Clouds were more noticeable in the upper regions of the pool; below was crystal clear. It was so thick in the northeast section of the pool that Marty felt his skin burn; he got out of there pretty quick, especially since he could barely see in front of him; he also noted that the water temperature was noticeably hot—at least in the mid-to-high 90s. Hydrogen sulfide is emitted from decomposing vegetation in the absence of oxygen and can be toxic at high doses.

Worse than the clouds for visibility, however, is the fine silt, any slight movement of which results in thick clouds. There is also the challenge of negotiating through the numerous trees that have collapsed into the *cenote* for who knows how many centuries. It just so happens that the highest density of trees is found immediately under Structure 1. Lines from 2010 and 2011 have been jumbled (e.g., due to landslides/slumping); some are also covered with growth.

In general, once divers got below the hydrogen sulfide clouds, the water was pretty clear—and warm—87° at top to 83° at c. 60 m deep. In fact, visibility was over 24 m. Also, the sidewalls are about 50% limestone (shelf) and 50% clay/pebble conglomerate found in rivulets (i.e., mixed soft and hard materials).

The plan was to begin excavations down slope from the ceremonial building on the southwest edge of Pool 1, where we think anything the Maya threw in from Str. 1 would roll down. Thus, divers excavated at various depths in roughly the same line below Str. 1.

Chip, who was exploring the sidewall by fanning the silt c. 5 m below Str. 1, found a jar neck sherd that either dates to c. A.D. 800-900 on the first day (Figure 5) (Table 1)!! Before they started to use buckets, they brought up anything of interest in mesh bags.



Figure 5 Chip with jar neck

Archaeologists all over the world rely on 5-gallon plastic pigtail buckets and shovels. The same goes for underwater archaeology, in this case anyway.

For the first bucket attempt at over 54 m deep, Chip used a shovel to excavate a small area; he filled about half the bucket with dirt. He then used a lift bag filled with air from his tank to help raise the bucket, full of bottom debris and water (see film clip at <http://scientistatwork.blogs.nytimes.com/2012/05/15/the-tools-for-uncovering-underwater-remains/>). When the lift bag hit surface, Andrew swam out to get a GPS reading (0300987E 1926989N, c. 6 m south of north-center edge of pool), so we know exactly the location Chip excavated relative to Str. 1. It was still a challenge to get the bucket out of the water; the line got caught on some trees, and it was not removed until the following day.

Underwater excavations using 5-gallon plastic buckets and shovels continued to prove quite useful. At 5 m below Str. 1, Chip Petersen, one bucket at a time, brought up four in less than an hour from a 2 x 2 m area. Each bucket was dumped onto a tarp and gone through thoroughly by hand. The first bucket (surface slump) was quite clayey, while the rest mostly consisted of gravel and limestone conglomerate cobbles and small boulders (and little or no clay) (Figure 6). He also released a plastic jug on some line from the location of his excavation area, from which he obtained a GPS reading (see Table 1) (he swam back once he brought up the bucket). He also took bearings to the plastic jug from water surface at the diving ladder (127°), and from the water surface at northeast

edge of Str. 1 (50°). It took about 30 minutes for Chip to re-enter the water and collect another bucket of material from 20+ m.



Figure 6 Bucket material

For the items collected from 54.3 m depths, I exported the three fish bones and one possible seed fragment for identification (Figure 7a). Dr. Lynne R. Parenti, Curator of Fishes and Research Scientist in the Department of Vertebrate Zoology in the National Museum of Natural History at Smithsonian Institution provided a tentative identification based on Figure 7b: “The second object from the left is a subopercle bone and the third object a fin spine. These are likely from some percomorph fish, but which one is almost impossible to tell. If you need a more positive ID, DNA sequence data may narrow it down” (email correspondence, 2 August 2012).



Figure 7a Items from 54.3 m below surface; note bone fragment near center



Figure 7b Close up of from the left, possible see, two fish bones, and one small bone fragment

According to Wiley and Johnson (2007) as part of the Tree of Life Web Project (<http://tolweb.org/Percomorpha/52146>), “Percomorphs (more than 14,450 species in about 250 families) are the crown group of the spiny-rayed fishes, and best represent what Nelson (1989) called the “bush at the top.” Percomorpha, sensu Johnson and Patterson (1993) comprise a group of orders forming the Smegmamorpha and five additional groups, traditionally treated as orders: Perciformes, Scorpaeniformes, Pleuronectiformes, Dactylopteriformes, and Tetraodontiformes” (accessed 2 August 2012). Perciforms include perches, which are still found in the cenotes at present.

Field assistants devised an inventive pulley system to bring up buckets once divers brought them to the surface using rope and a fallen tree overhanging Structure 1 (Figure 8). While we did not find any obvious offerings from the small area Chip excavated at over 54 m deep, divers had better luck halfway up the slope towards the water shrine at c. 21 m where they found several more water jar sherds (Figure 9). The same goes for 5 m and 1.5 m up slope towards the building (Figure 10).



Figure 8 Pulley system



Figure 9 Jar rim from 20.4 m below surface under Str. 1



Figure 10 Jar necks from 1.5 m (left) and 4.8 m (right) below surface under Str. 1

On the last dive, Marty showed Chip the fossil bed; they ended up collecting a limb and ball joint fossils (Figure 11) that were about to fall out of the sidewall 21.3 m underwater (see Lucero 2011a: Figure 2.5 for a profile from where the fossils came; the ball joint was the one Robbie Schmittner originally thought was the bottom of a pot in 2010 recorded at 20 m; in other words, the pot and surrounding matrix had slumped a bit). I exported the large limb fragment (Figure 12) for possible AMS dating since it may not have completely fossilized (which will have to wait until

further funding). I sent photos of the limb to senior curator of the U. S. Park Service, H. Greg McDonald; he emailed (Sept. 4, 2012) that, “The general appearance of the bone is of a tibia of *Eremotherium* and it appears it is missing its epiphysis.” This is not surprising since it was recovered from the same area the other giant sloth bones were.



Figure 11 Marty with limb and ball joint fossils



Figure 12 Ernesto with limb fragment fossil

Table 1. Underwater Pool 1 artifacts arranged by depth

Catalog #	Depth below Str. 1 in same line	GPS coordinates	Artifacts*	Features
1054	1.5 m		Large jar neck sherd c. 1 cm thick & c. 45 cm diameter, 4 small body sherds, 2 body sherds, 1 body broke into 4 fragments in washing tub (all body sherds unslipped), 1 bone fragment, 18 shells of various species, 1~fossilized bone fragment, 2 chunks, 2 small flakes, 3 biface chips	TuTu Camp or Cayo Unslipped (A.D. 800-900)? Or Preclassic? A little clay mixed with gravel and rocks.
1053	4.8 m	16 Q 0300948 UTM 1927155	Jar neck sherd, rectangular chunk, 1 chunk, flat ls piece. Photos only (discarded): multi-layered clay/gravel (looks like varves), conglomerate	TuTu Camp or Cayo Unslipped (A.D. 800-900)? Or Preclassic?
1055	20.4 m	16 Q 0300960 UTM 1927160	Jar rim sherd with some volcanic ash, 5 different body sherds (4 quite thin and flat=> large vessels, including ~jar sherd), 2 biface chips, 1 smooth ovoid ls, 5 small flakes, 2 haft tips, 1 haft mid-section, 12 chunks (5 of which look like part of eroded exhausted chert cores), 18 complete shells of various species, c. 6 shell fragments, 1 bone fragment	TuTu Camp Striated (A.D. 800-900)? Or Preclassic (Achiote; see Adam 1971; comparable to Jocote Orange-brown or Jenny Creek, 1000-300 B.C.)?
1050	21.3 m		Fossil ball joint, one large fossil limb fragment (<u>exported</u>), several other fragments (3 large, c. 20 small) from same limb	
1052	33.5 m		Twig (c. 10 cm long, 1 cm diameter)	Collected from silt c. 40 cm deep
1051	54.3 m		Conglomerate rock w/ embedded shell, ~chert cobbles, 3 fish bone (<u>exported</u>), 1 bone fragment, 1 vascular ls, 1 ~seed (though quite hard) (<u>exported</u>), 3 small crystals, 1 crystalline fragment, 23 complete shells of various species, c. 15 shell frags, 3 tiny blade fragments, 2 flakes (1 crystalline chert), 4 small chunks, 3 small ~unworked lithics	Lots of gravel, some silt

*all items stored in VOPA container at Yalbac Sawmill unless otherwise noted.

Several shelves ring the entire pool, which are still visible despite the transformation of some parts by slumping or landslides and tree fall. The slope (Figure 13) clearly impacted the trajectory of objects fallen or thrown in. As Table 1 shows, divers recovered most artifacts from immediately below Str. 1 at 1.5 m and 4.8 m (Figure 14). That said, most of the bucket excavations took place closer to the building. Further, an unknown number of the artifacts likely came from looters' debris and building collapse.

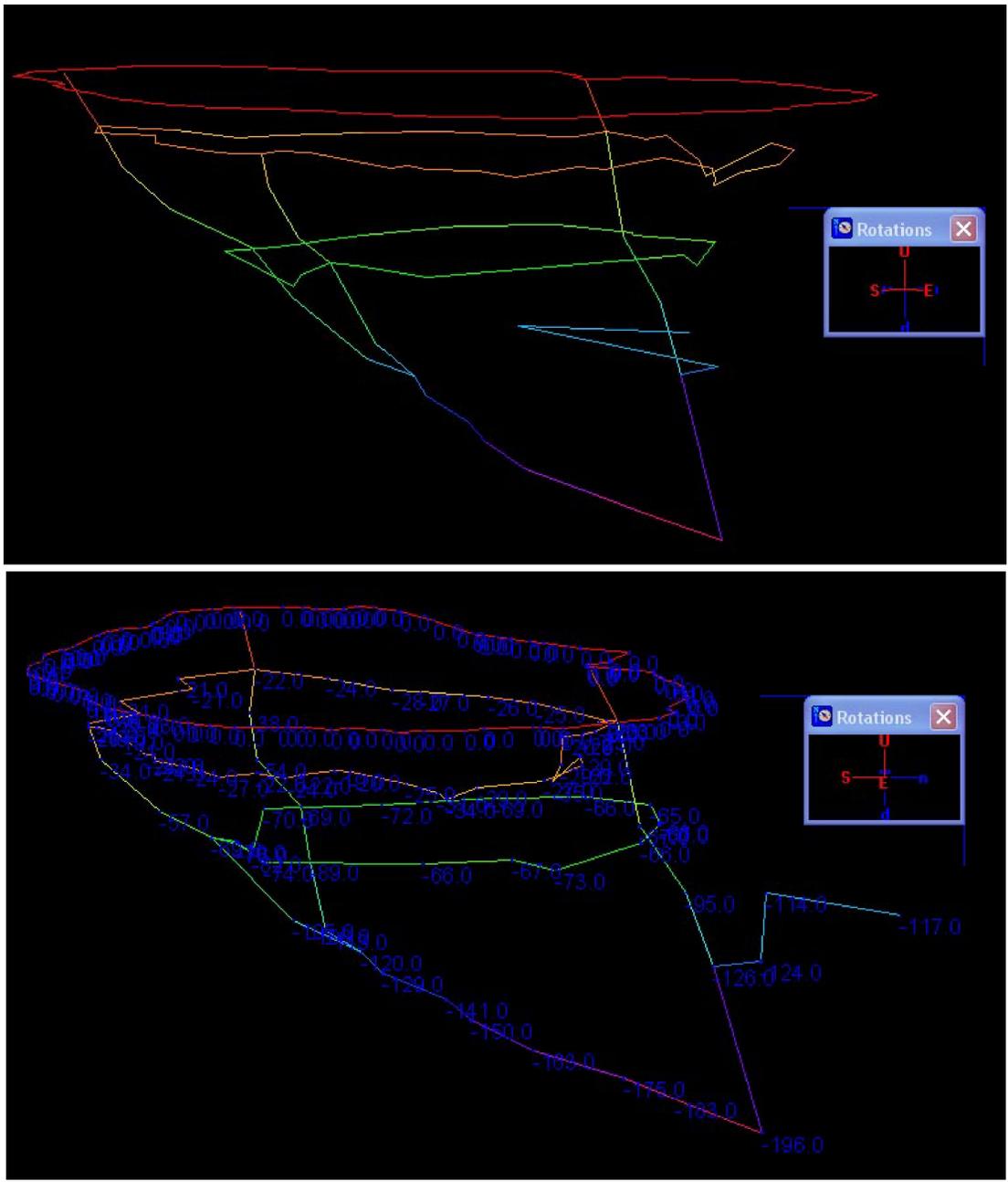


Figure 13 Pool 1 bathymetry (Lucero 2011a:Figure 2.4)

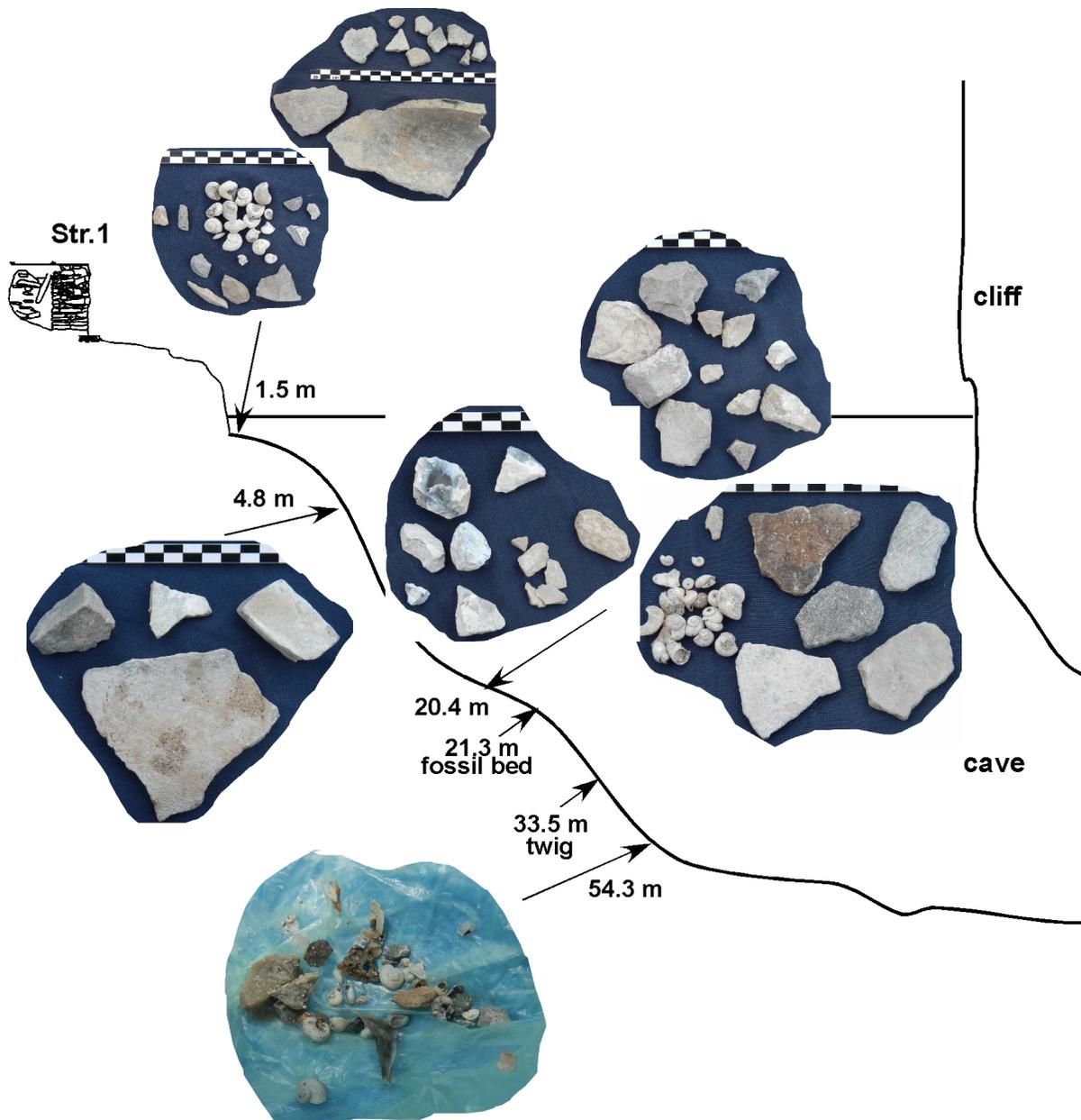


Figure 14 Schematic (not to scale) of Pool 1 cross section looking west. Jar rim from 20.4 m depth not shown (see Figure 9).

Divers also found several artifacts at 20.4 m, including a jar rim, body sherds, lithics, shell, and a bone fragment. While they did not recover any sherds at 54.3 m, they did find several lithics. With more time, divers will find more at all depths.

Eleanor Harrison-Buck and Astrid Runggaldier, who briefly evaluated the three jar neck sherds, think they might be Preclassic, based on them having relatively small and shallow striations and fine paste (vs. Cayo Unslipped, which typically has a coarser paste). That said, Laura Kosakowsky, who looked at the Cara Blanca ceramics at the BAS ceramic workshop in 2007, stated that the ceramic collection is more similar to the Petén and northern Belize than the Belize valley ceramics. For example, we do not see much Mt. Maloney (black slip) bowls—I have yet to see one come out of Cara Blanca or Yalbac (center c. 11 km distant). Also, there are more striated jars than one finds in

the Belize valley. Further, Yalbac ceramics tend to have calcite/ash paste, even in Preclassic, clearly a local variation.

We need to collect more sherds to determine an accurate chronology. Finding the jar sherds is quite interesting since previous test excavations, as mentioned, yielded predominantly wide mouth jars—that is, water jars. And if do date to the later time period, it likely relates to rituals performed to appease the gods during a period with several multi-year droughts.

While divers were in the water on the last day of diving, Clefo and I checked out the status of Structure 1, the ceremonial building and possible water shrine. Looting over the years has left it structurally compromised. As Figures 15 and 16 show, looting continues to be a problem. Three of the six rooms have been destroyed and emptied of their contents. The untouched rooms we plan to excavate in the near future will reveal another side to the ceremonial story and tie into what we will find in the *cenote*.

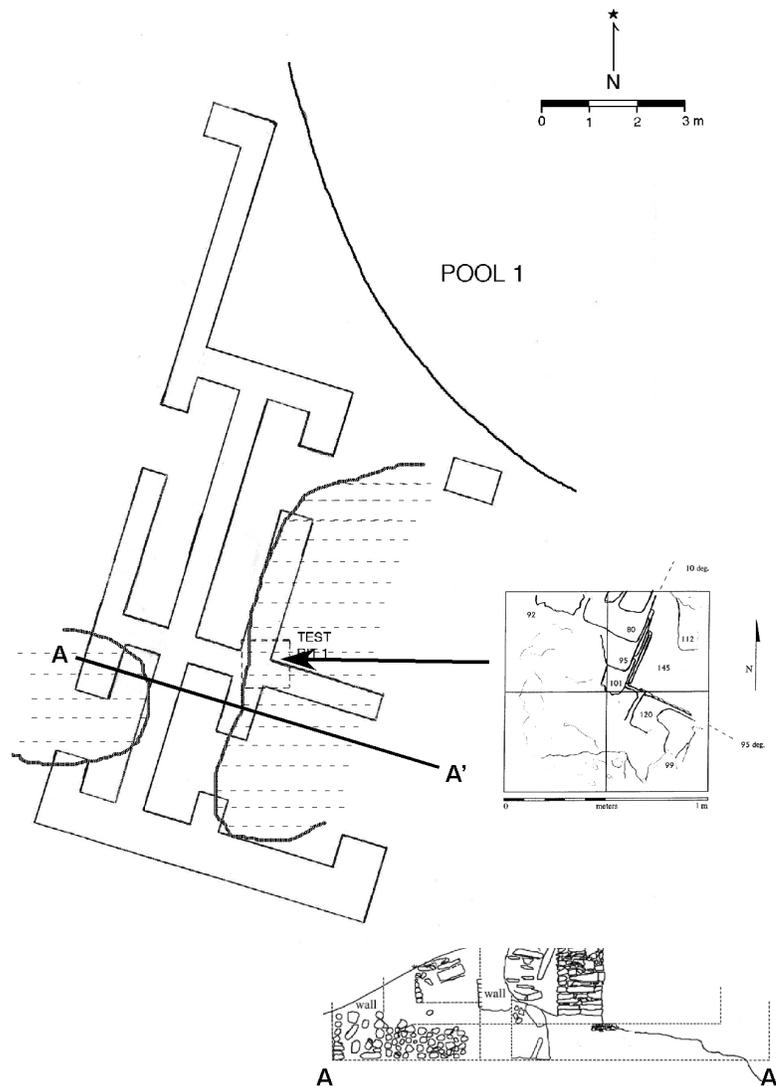


Figure 15 Str. 1 showing looting (and collapse on the east side) (adapted from Kinkella 2011:Figure 5.7)



Figure 16 Top photo looking north post-2010 looting; bottom 2012 status (wall nearly gone)

VOPA Artifact Storage

One final plan was to arrange a storage facility for VOPA artifacts, something I was asked to do by the Institute of Archaeology. Forestland Group has provided space at Yalbac Sawmill, which is

ideal since it is guarded 24/7. A cement slab serves as the foundation for a 20-foot container that I purchased (Figure 17), over which Cleofo and Stanley built a tin roof. We moved all VOPA artifacts from the Dungeon at the old archaeology building, as well as the 2001 non-diagnostic artifacts from Banana Bank Lodge, to the container after the diving program. We only have a few boxes to move from the IOA in Belmopan, which we plan to do in 2013.



Figure 17 20' VOPA storage container at Yalbac Sawmill

Concluding Remarks

There are 25 pools at Cara Blanca, and we have only begun to plumb their depths. In 2010, divers explored eight pools and in addition to gauging their size and depth, extracted 10-foot long sediment cores using 4" diameter PVC pipe from two pools: Pool 2 (4-5 m deep) and Pool 6 (18 m deep). The history of changing climate and landscape is slowly emerging from the cores via pollen and soil analyses. Radiocarbon dating shows that the Pool 6 core covers a period before and after the Classic period (c. A.D. 550-850), the time when Maya population was the highest and kings their most powerful.

Natural features embody the sacred at Cara Blanca. Its isolation, concentration of openings in the earth, and the relatively sparse but unique settlement indicate that it served as a special place to the Maya, likely as a pilgrimage center. The Maya periodically visited Cara Blanca to supplicate gods by performing ceremonies and leaving offerings. Such supplications would have become even more critical at the end of the Late Classic (A.D. 800-900) when several droughts struck the lowlands and the Maya began intensifying their ceremonial activities. It was to no avail, however, and the Maya abandoned Cara Blanca and most southern lowland centers by c. A.D. 900-950. It is clear that Cara Blanca will continue to yield more information about sacred landscapes, underwater offerings, and ritual intensification.

Acknowledgements

I would like to thank the Institute of Archaeology, especially Jaime Awe and John Morris, and Forestland Group, especially Hunter Jenkins, Mike Hinchey, and Jeff Roberson for their support and permission (and road clearing!). As usual, everyone at Banana Bank Lodge (www.bananabank.com) made us feel at home. I also want to thank Nathan Jaeger for all his help in getting my storage container to Yalbac Sawmill from Big Creek, and for arranging my vehicle insurance. Wonderful lunches and coffee for the field were provided by Mrs. Choc—thank you. Invaluable assistance during the diving expedition was provided by field assistants from the Valley of Peace Village—Clefo Choc, Stanley Choc, Ernesto Vasquez, and Juan Antonio López. None of this would have been possible without Marty O’Farrell, Chip Petersen, and Andrew Kinkella. Their donating their time and diving gear is truly appreciated. Finally, I want to thank my friends and colleagues, Ellie Harrison-Buck and Astrid Runggaldier, for taking the time to assess the Pool 1 sherds!

References Cited

- Adams, Richard E. W.
1971 *The Ceramics of Altar de Sacrificios*. Papers of the Peabody Museum of Archaeology and Ethnology, Volume 63 No. 1. Harvard University, Cambridge.
- Johnson, G. David, and E. O. Wiley
2007 Percomorpha. Version 09 January 2007 (under construction).
<http://tolweb.org/Percomorpha/52146/2007.01.09> in The Tree of Life Web Project,
<http://tolweb.org/>
- Johnson, G. D. and C. Patterson
1993 Percomorph Phylogeny: A Survey of Acanthomorphs and a New Proposal. *Bull. Mar. Sci.* 52(1):554-626.
- Kinkella, Andrew
2004 The Pools at Cara Blanca: Archaeology in the Valley of Peace Above and Below the Water. *Research Reports in Belizean Archaeology* 1:93-102.
2009 *Draw of the Sacred Water: An Archaeological Survey of the Ancient Maya Settlement at the Cara Blanca Pools, Belize*. Unpublished Ph.D. dissertation. University of California, Riverside.
2011 Return to Pool 1 and Reconnaissance at Pool 20: The 2010 Cara Blanca Settlement Survey. In *Results of the 2010 Valley of Peace Archaeology Project: Cara Blanca and Yalbac*, edited by L. J. Lucero, pp. 53-68. Report submitted to the Institute of Archaeology, National Institute of Culture and History, Belize.
- Lucero, Lisa J.
2001 *Social Integration in the Ancient Maya Hinterlands: Ceramic Variability in the Belize River Area*. Anthropological Research Paper No. 53. Arizona State University, Tempe.
2011a Exploring the Sacred Pools of Cara Blanca, Belize. In *Results of the 2010 Valley of Peace Archaeology Project: Cara Blanca and Yalbac*, edited by L. J. Lucero, pp. 12-27. Report submitted to the Institute of Archaeology, National Institute of Culture and History, Belize.
2011b *VOPA 2011: Exploring Cara Blanca Pool 1 and Assessing Yalbac*. Report submitted to the Institute of Archaeology, National Institute of Culture and History, Belize.
- Lucero, Lisa J., and Andrew Kinkella.
in press A Place for Pilgrimage: The Ancient Maya Sacred Landscape of Cara Blanca, Belize. In *Drawing on Rocks, Gathering by the Water: Archaeological Fieldwork at Rock Reliefs, Sacred Springs and Other Places*, edited by Ömür Harmansah. Jukowsky Institute for Archaeology and the Ancient World. Brown University, Providence, RI.
- McDonald, H. Gregory
2011 Preliminary Identifications of Pleistocene Mammal Remains from Cara Blanca, Belize. In *Results of the 2010 Valley of Peace Archaeology Project: Cara Blanca and Yalbac*, edited by L. J. Lucero, pp. 46-52. Report submitted to the Institute of Archaeology, National Institute of Culture and History, Belize.
- Medina-Elizalde, Martin, Stephen J. Burns, David W. Lea, Yemane Asmerom, Lucien von Gunten, Victor Polyak, Mathias Vuille, and Ambarish Karmalkar
2010 High Resolution Stalagmite Climate Record from the Yucatán Peninsula Spanning the Maya Terminal Classic Period. *Earth and Planetary Science Letters* 298:255-262.
- Moyes, Holley, Jaime J. Awe, G. A. Brook, and J. W. Webster
2009 The Ancient Maya Drought Cult: Late Classic Cave Use in Belize. *Latin American Antiquity* 20:175-206.
- Nelson, G.
1989 Phylogeny of Major Fish Groups. In *The Hierarchy of Life*, edited by B. Fernholm, K. Bremer, L. Brundin, H. Jornvall, L. Rutberg, and H.-E. Wanntorp, pp. 325-336. Elsevier, Amsterdam.

