



# New Millennium Dive Expeditions

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## **Project Report July 12, 2013:**

Phase 1 of 2 (Phase 2: August 26<sup>th</sup> – 30<sup>th</sup>, 2013)

Supporting the UNR Chara Bed Research and Exploration

Camp Richardson and South Shore Mound (The NUB)

Principal Scientists (UNR) - Sudeep Chandra and Annie Caries

### **Initial Notes**

- After a meeting prompted by the staff of the Tahoe Regional Planning Agency (TRPA), initial work was funded through a last minute, generous contribution from the League to Save Lake Tahoe
- New Millennium Dive Expeditions (NMDE) would like to acknowledge the efforts of its members; Michael Soldwisch, Marc Briseno, Jimi Quinn, Wendy Wangberg, Dr. Steven Parker, James Novaes and Martin McClellan; along with Global Underwater Explorers' Project Baseline members, Todd Kincaid and Vanessa Belz. Without their commitment and dedication, along with all their personal hours volunteered (see below), the success of this project would not have been possible.
- We believe the initial work generated from this project will yield significant information related to key hot spots in the lake that support much of Lake Tahoe's plant and invertebrate diversity. These hot spot patches in turn have been shown to be very important areas for Lake Tahoe's fishery (lake trout, *Salvelinus namaycush*). While we have received initial support to jump start the collaborations between New Millennium Dive Expeditions and scientific researchers from the University of Nevada, Reno, we are in need of continued support to complete this project. The information collected can directly assist the TRPA in the management of the nearshore aspects of Lake Tahoe, biodiversity of the lake bottom, and could be of general interest to the fishing community. We hope this agency will consider nominal support to New Millennium Dive Expeditions and its work with Project Baseline: Tahoe to continue beyond October 2013.

## **Project Goals**

### Phase 1:

- Map the extent of the Chara plant beds lying on the South Shore Mounds (Nub) [38- 57' 52.3N / 119- 59' 31.9W] and within the Camp Richardson Chara Bed (CRCB) [38- 57' 4.7N / 120- 02' 22.1W] to document the current baseline condition of the beds since they are thought to support a large amount of native and endemic biodiversity for Lake Tahoe and are active rearing areas for the game fish lake trout.
- Establish 400 foot transects through the beds to determine plant composition and the amount of coverage along the lake bottom.
- Take initial height measurements of the Chara to determine a baseline condition before the summer season progresses during which time the plants are thought to grow.
- Place potted Chara samples on the bottom for growth evaluation during the summer Season
- Take "biomass" samples along the transects to understand the initial mass prior to start of the growing season and determine the spatial variability of plants in the plant patch.

## **Dives**

### *Recon Dives June 1, 2013*

Our project began with a pair of reconnaissance dives held on June 1, 2013. These initial dives allowed the divers and researchers to gain an initial evaluation of the plant beds and determine the underwater working conditions in this part of the lake to accomplish the project goals.

### Dive One

On 6/1/2013 we conducted 2 dives; one on the Nub and one on the CRCB. This dive was conducted by a team of two divers to a depth of 173 feet for 64 minutes (including decompression time) on the Nub: We discovered a very small area of Chara. The top of the Nub is 158 feet and contained sparse Chara plants that extended down to a depth of approximately 163 feet but no deeper. The estimated area of this site was no more than 150 feet in diameter. What was very predominant was a thick (1-3 feet) layer of moss, highly compacted, creating a layered ledge structure along the northern edge of the Nub. We documented the entire dive with digital video.

### Dive Two

This dive was conducted by a team of two divers to a depth of 119 feet for 53 minutes (including decompression time) at the CRCB. As we descended upon the CRCB we were immediately amazed as to its immensity. We dropped to our maximum depth of 119 feet and began a westward (270 degrees) traverse, aided by underwater scooters (rate: ~150 feet per minute), that lasted for approximately 12 minutes. The Chara beds were continuous at the 119 foot depth and we did not encounter the western extent of the beds during the 12-minute traverse.

At the 12 minute mark we altered our direction and traversed south (180 degrees) for 5 minutes and moved from approximately 119 feet to a depth of approximately 90-95 feet where the Chara ended. We then travelled east (090 degrees) for another 15 minutes along the 90-95 foot contour and noted no Chara shallower than 90-95 feet but thick and continuous Chara beds along the deeper side of the transect. We did not encounter the eastern extent of the Chara bed during the 15 minute traverse. We documented the entire dive with digital video.

During the debrief of these dives, we determined that our focus should be entirely upon the CRCB as the size was larger in surface area than expected. The Nub, albeit a definite area for future study, would not provide the information and opportunity of that within the CRCB. Also, it was recommended that due to the Nub's depth our limited funds would be best spent at the CRCB site. Our report was submitted to the researchers from the University of Nevada (Dr. Sudeep Chandra and Annie Caires) so we could work together to create a plan for meeting the goals and objectives related to the deep-water sensitive habitat project currently funded through the Southern Nevada Public Lands Management Act. After a discussion between divers and scientists, we decided to concentrate and modify our mission plan to focus solely upon the CRCB during our project dives set for 10 and 12 June. With help of additional funding sources, NMDE, Project Baseline: Tahoe and UNR representatives may be able to complete a study of the Nub in an efficient and cost effective manner.

### *Project Dives June 10, 2013*

Mission Plan: 2 Dives

Goals:

- Dive 1 to GPS mark utilizing surface marker buoys sent up from below the deep extent and the eastern extents of the CRCB.
- Dive 2 to GPS mark utilizing surface marker buoys sent up from below the western and shallow extents of the CRCB

### Dive One

This dive was conducted by a team of two divers to a maximum depth of 155 feet for a total of 86 minutes (including decompression time). We entered the water at approximately the same location as the start of the June 1 CRCB dive, which we approximated to be near the center of the CRCB and descended to 115 feet. Upon arrival at the bottom (115 feet) we then travelled north (00 degrees) down the depth contour and upon hitting 150 feet observed a distinct absence of Chara plants below a depth of 150 – 155 feet. To ensure this we travelled out further north but not going below 155 feet to observe that the bottom in fact was clear of Chara at depths deeper than 155 feet and it was. Then we followed the 150 – 155 foot contour in an easterly direction for approximately 5 minutes, scooter aided (rate: ~150 feet per minute) and again confirmed the absence of Chara below 150-155 feet. We then sent a surface marker buoy to the surface for GPS marking to establish the northern extent (deep side of the sloping lake bottom) of the Chara bed.

Upon seeing that the surface marker buoy was retrieved from above, we then began a traverse in an easterly direction moving our depth up to that of 125 feet and continued on this path, scooter aided (rate: ~150 feet per minute) for approximately 26 minutes. At the end of this traverse, we encountered a cliff structure measuring 8-10 feet tall along the top of a slope that dropped off at one point from 125 feet immediately down to well over 200 feet. We did not observe any Chara east of this structure but to make sure, we continued our traverse east (090 degrees) at a shallower depth of 110 feet for approximately 5 minutes again to ensure that we had located the eastern extent. At this point, we returned in a westerly direction to the edge of the Chara bed and sent another marker buoy to the surface to be marked by GPS as the Eastern Extent of the CRCB. Upon its obvious retrieval from above, we continued in a west (270 degrees) direction along a shallow contour of 100 – 105 feet observing no Chara shallower than this depth. We documented this entire set of traverses with digital video.

Based on these observations and those made on the June 1 dive, we conclude that at some point the Chara moves from 100 – 105 feet near the eastern extent of the CRCB to that of a shallower depth of 90 – 95 feet.

Upon ascending from decompression, the surface weather conditions had deteriorated to that of unsafe so we exited the water, aborted Dive Two and exited the lake.

### *Project Dives June 14, 2013*

Mission Plan: 2 Dives

Goals:

- Dive 1 to GPS mark utilizing surface marker buoys sent up from below the western extent of the CRCB.
- Dive 2 to establish a physical line creating a 400 foot long transect through the CRCB at a depth of 100 – 110 feet.

#### Dive One

This dive was conducted by a team of two divers to a depth of 153 feet for 72 minutes (including decompression time). We descended at the 115 foot marker at the expected center of the CRCB and upon arriving at the bottom, we began a traverse in a due west (270 degrees) direction at a depth of 112 feet. After travelling for well over 20 minutes, again scooter aided (rate: ~150 feet' per minute) we began to experience the bottom dropping away and eventually ended up at a depth of 153 feet where we encountered an obvious end to the CRCB on the western extent. Again to make sure, we travelled out another 3 minutes in the westerly (295 degrees) direction and observed no more Chara. We sent a surface marker buoy to the surface for GPS marking to establish the western extent of the CRCB. Once its obvious retrieval from the boats above was determined, we travelled into shallower water to ascend according to a modified decompression profile. We documented the entire traverse with digital video.

#### Dive Two

This dive was conducted by a team of two divers to a depth of 116 feet for 64 minutes (including decompression time). We established a 400 foot long transect line along the bottom, heading east to west at a depth between 105 and 120 feet. The transect depth

rose from 115 feet on the east end to 110 feet on the west end. The transect was spanned by a 1/8inch braded line secured at either end by rocks naturally occurring on the bottom and marked at each end with a marker buoy sent to the surface that was used by the surface support crew to establish GPS coordinates for the transect endpoints. We placed a 1m measuring stick affixed to a plastic garden stake at each end of the transect and recorded the height of the Chara using these measuring sticks at each point. We then traversed back along the transect line placing marker flags at approximately 30–40 foot intervals. This transect would then be used in future dives as a control line for further study of the CRCB site.

### *Project Dives June 29, 2013*

#### Mission Plan: 1 Dive

##### Goals

- Collect 10 – 15 Chara biomass samples along the transect every 30 – 40 feet.
- Place potted Chara plants for growth evaluation
- Photo and written documentation of all activities

This dive completed our 4 planned dives for Phase 1 of the project. Due to weather, we had to incorporate a fourth trip to Tahoe to complete this dive but because of this delay, the scientists were able to develop a better method for measuring Chara growth; Chara was harvested from the Camp Richardson site and individual plants were weighed, measured, and planted in weighted planting pots for placement on the bottom of the lake. Retrieval of these plants for growth measurements is planned for the Phase 2 dives at the end of August.

This dive was conducted by a team of three divers to a maximum depth of 117 feet for 72min (including decompression time). With our 400 foot transect in place and marked with GPS coordinates we travelled to the eastern end of our transect at the surface and dropped a temporary marker line for our descent. Descending from a surface GPS point is always a bit unknown, but fortunately we arrived at the bottom within 15 feet of the eastern end of the 400 foot transect. At this point, we removed the potted Chara growth samples from the 5 gallon buckets they were transported in (all buckets and lids were successfully removed from the lake) and placed them in a sandy bed amongst the CRCB where no Chara was growing. This sandy bed is estimated to be about 80 – 100 square feet of area (there were many areas within the overall CRCB that had no Chara growing but the areas were generally anywhere from 5 square feet to that of 100+ square feet). Upon successful placement of the growth samples, we continued toward the west end of our 400 foot transect where we were able to take 13 Chara samples, travelling westward along the transect using a 5-Gallon plastic bucket with the bottom cut out as a coring device. This open – ended bucket was placed over an area of Chara, driven into the bottom by hand in a circular motion, thus cutting the Chara inside the bucket free and then scooped by hand from inside the bucket and placed in numbered zip-lock bags. Each bag was notated as to distance from the east end of the transect and along with specific depth. Photos and video of the sampling process as well as of the general condition of the Chara along the transect were collected. At the

western end of the transect, a bag containing all of the samples was sent to the surface with a marker buoy. The team then ascended following a standard decompression profile.

## **Summary**

The project to date shows the positive collaboration that has developed between New Millennium Dive Expeditions' Project Baseline: Tahoe, as well as scientists trying to determine the ecology of the critical habitat for endemic invertebrates and game fish at the bottom of Lake Tahoe. We are very happy with the cooperative team effort that has been developed and believe that additional resources are needed to accomplish the goals established in our project. While we received initial support from the League to Save Lake Tahoe to jump start this project, we require additional funding that we hope will be supported by agencies that have a direct need for this information.

Our scientific and dive teams have developed a working mission plan for both phases of the Chara bed project (Note that the Phase 2 dives of this project will now be under revision based upon what was learned and accomplished from Phase 1). Knowing that all things underwater never go as planned, we opted to conduct reconnaissance dives that gave us the ability to plan in a more precise manner. With the consistent and direct participation of the UNR scientists in all phases of this project, guiding us with their needs and our ability to transfer those needs to successful underwater activities, we completed all project goals and returned with information far beyond expectations. For example, the delineation of the extent of the Chara beds may have been impossible without diver-assistance. If this type of delineation was attempted by collecting samples along transects with a benthic dredge, the results would have been less reliable and definitive. Additionally, diver-delineation is a non-destructive method, much preferred to traditional dredging techniques in such a unique, endemic benthic community such as the Camp Richardson Chara beds. The placement of potted plants on the bottom for growth rate determination also would not have been possible without these dives. The growth rate and other life history characteristics of Chara have not been investigated in Lake Tahoe due to the difficulty of studying these unique deep-water communities. Overall, these dives have made possible the seemingly-impossible and hold valuable potential for future scientific discoveries in deep parts of Lake Tahoe that are biologically-rich, yet extremely difficult to study.

We completed 6 dives over 4 days and, in the case of Camp Richardson, discovered a Chara bed of magnitude that still needs to be more accurately defined. We hope that, with the use of underwater transceiver and receiver technology, we will be asked to return and travel the entire perimeter of the CRCB to accurately map its true size. We also look forward to exploring further the south end of the lake looking for the existence of more Chara beds, as the fishing captains of the lake have informed us that there are many more than what lies off Camp Richardson. Finally, we feel that funded exploration of the Nub should be a priority along with the exploration of the Tahoe City lake area since its underwater environment is similar to that of Camp Richardson and extensive plant beds were discovered in this area in the 1960s.

If provided with funding sufficient to continue this work, New Millennium Dive Expeditions, along with Project Baseline: Tahoe, looks forward to being involved in more research activities within the Lake Tahoe research community. Our divers possess the underwater training, skills and experience required to safely and efficiently execute dives for this and similar projects.

Respectfully Submitted,

*Martin M McClellan*

Martin McClellan  
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#### **NMDE Volunteer Hours: Phase 1 - UNR Chara Bed Research Project**

• Boat Prep	11.50
• Equipment Prep	5.50
• Gas Filling	22.75
• Transportation (One team diver traveled from Sacramento)	32.00
• Dives 6/1 (Time from dock departure to return – 3 Divers) *	32.00
• Dive 6/10 (Time from dock departure to return – 3 Divers)	30.00
• Dives 6/14 (Time from dock departure to return – 3 Divers)	27.00
• Dives 6/29 (Time from dock departure to return – 4 Divers)	20.00
• Report Preparation	8.00
<b>TOTAL</b>	<b>188.75</b>

\* Total physical average dive time (underwater) per diver = 5.5hours

- Dive Volunteers:
  - Michael Soldwisch
  - Todd Kincaid – GUE Vice President
  - Vanessa Belz – GUE Director, Project Baseline
  - Martin McClellan - President, NMDE  
Project Manager Project Baseline: Tahoe
- Non – Diving Support Volunteers
  - Marc Briseno
  - Jimi Quinn – NMDE VP
  - Dr. Stephen Parker
  - Wendy Wangberg – NMDE Secretary
  - James Novaes – Board Member