

SCUBA Diving Operations

North Carolina Zoological Park

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What we will Cover:

- Why we dive/tasks performed
- Where we dive
- Staff training
- Equipment overview
- Policies and Guidelines
- Safety and Best Practices

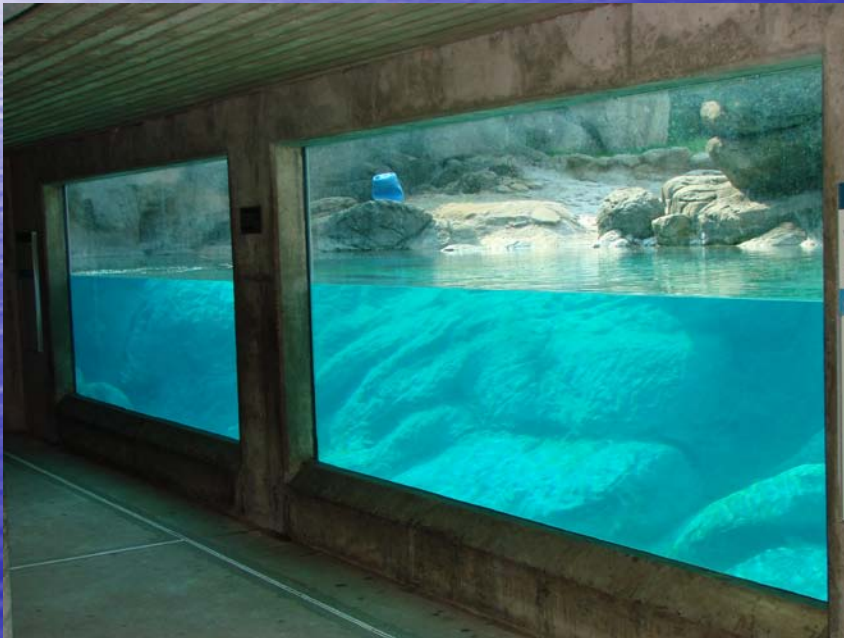


Diving Locations

- Polar Bear Exhibit Pool
- Pinniped Exhibit Pool
- Seabird Exhibit Pool
- Gamefish Tank
- Other



Polar Bear



Pinniped: Harbor Seals and California Sea Lions



Seabirds



Gamefish Tank



Benefits of Diving Exhibit Pools



- Important for animal health by helping to maintain good water quality for animal health.
- Ensures that pools look as good as possible for visitor viewing.
- Address various maintenance issues.
- Animal Enrichment

Diving Tasks: Vacuuming



- Removing Animal Waste
 - Improves the pool's appearance.
 - Reduces the growth rate of algae.
 - Helps keep coliform levels at a safe and healthy level.

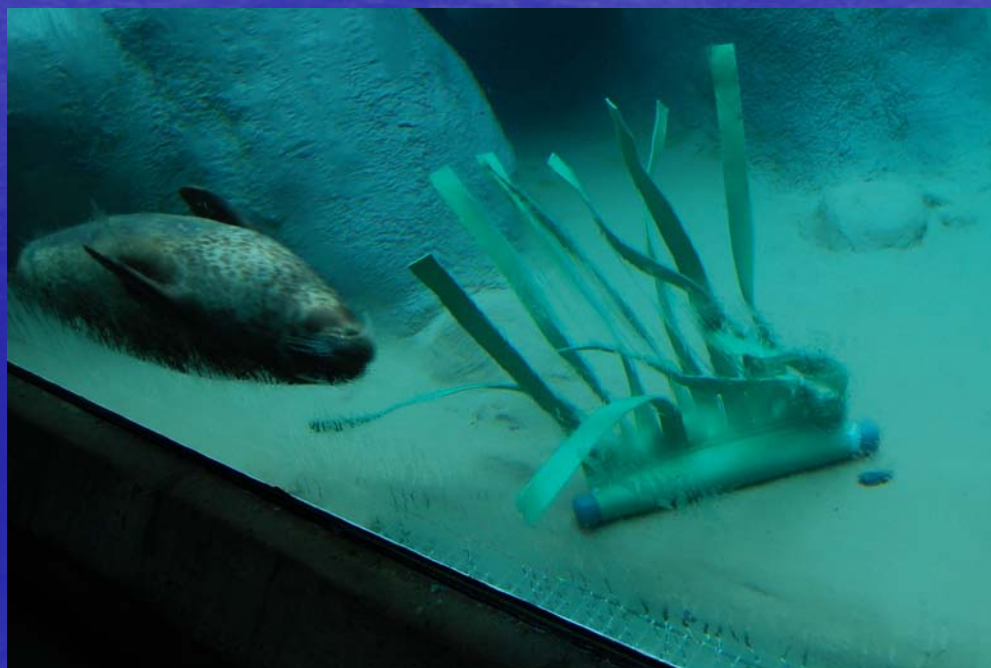
Diving Tasks: Scrubbing Algae

- Improves the pool's appearance.
- Is more of a challenge during the hot season.
- Very time consuming



Diving Tasks: Enrichment

- Attaching and removing enrichment items to the bottom
- Removing non floating enrichment



Policies and Procedures

- OSHA
- DENR and Zoo Policy
- Area/pool Specific Procedures

OSHA

- 1910.401
- Commercial Diving Operations
- Standards not written specifically in regards to zoo animal exhibit pools, but followed as closely as possible.
- Examples
- Current standards can be found at www.osha.gov

DENR and Zoo SCUBA Policy

- Written to follow OSHA regulations as well as follow DENR and North Carolina Zoo's employee safety program.
- More information specific to North Carolina can found at: www.nclabor.com

Area Specific Procedures

- The 4 primary diving locations at NCZP have differences in their setup, thus some area specific procedures.
- Examples: Indoor vs. Outdoor pools, large and small pools, and type of diver access to the pools.



Staff Training

- All members of the diving team must be "Open Water Diver" certified.
- Open Water Diver is the minimum level of certification. Some staff have more advanced levels



Staff Training (continued)



- Diving staff are required to receive and maintain a current certification in CPR.
- Certified divers must always be able to continue to demonstrate good diving skills to stay active with diving

Diving Equipment

- Tanks
- Regulators
- Spare air canisters
- Buoyancy Control Device (BCD)
- Wetsuits; including hoods and gloves
- Weights
- Masks

Tanks



- Filled to 3000 psi and not depleted past 500 psi.
- Filled onsite at the zoo.
- Inspected and certified on a yearly basis by a local dive shop.

Wetsuits

- Semi-Dry (7mm) wetsuits are used due to cold water diving
- Includes use of hoods, gloves, and boots
- Wetsuits are soaked and rinsed in a detergent specifically made for wetsuits after each use.



Regulators



- Inspected and maintained regularly by zoo staff.
- Inspected and maintained with fresh parts yearly by a local dive shop.
- Mouthpiece disinfected in a mild (1:100) bleach solution after each dive.

Buoyancy Control Device (BCD)



- The nature of much of the diving work performed in zoo exhibit pools requires divers to be in a negative buoyancy condition.
- Therefore BCDs are important to ensure divers can ascend from the bottom readily without having to shed weight.

Diving Equipment Maintenance

- Any equipment not working correctly or in need of repair is taken immediately out of service and tagged.
- The area supervisor will perform repairs or send the equipment into the local dive shop.
- Equipment cannot be put back into service until the appropriate supervisor ensures repairs are complete and removes the tag.



Other Equipment

- Vacuum pumps and hoses
- Window washing
- Scrub brushes for algae
- Misc.



Diving Operations Team

- Diving Safety Officer
- Divers
- Standby Diver
- Monitor
- Dive supervisor
- Support Personnel

Diving Safety Officer

Senior staff who is responsible for managing the diving program

- Ensures that policies and safe practices are kept up to date and followed.
- Reviews operations as needed.
- Investigates problems or accidents.
- Provides necessary diving equipment.

Diver

- Dive team member who fully gears up with SCUBA equipment, enters the water, and performs the work.
- Most dive operations use 1-3 divers depending on the location, nature, and amount of work to be performed.

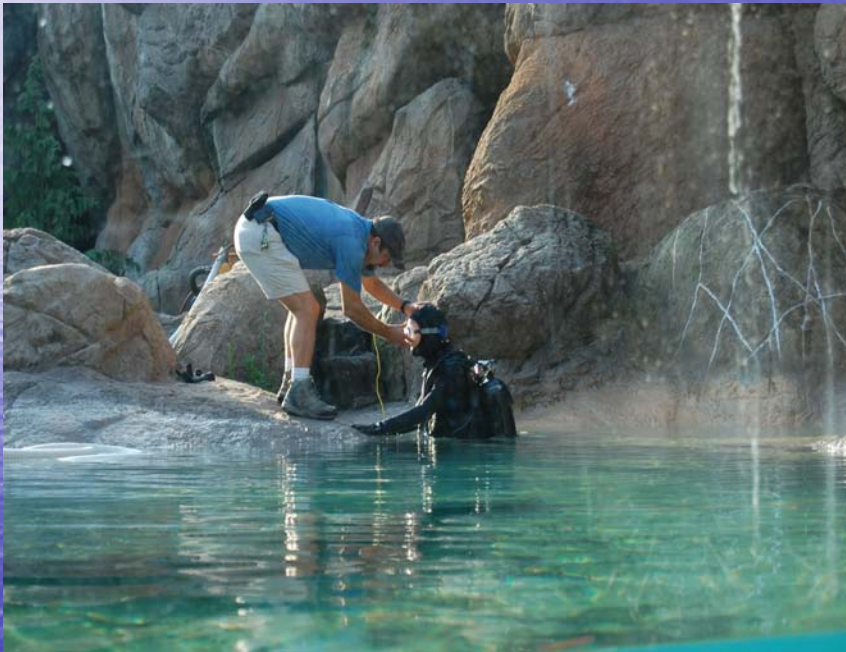


Standby Diver

- Dive team member whose responsibility is to provide any assistance needed by the diver.
- Standby diver is ready at all times to enter the water immediately if needed for a diver in distress.



Standby Diver (continued)



- Has the appropriate SCUBA gear set up and ready to use if needed during the dive.
- Assists the diver with gearing up, gearing down as well as entering and exiting the water.
- Provides other assistance as needed during the dive operation.

Monitor



- Primary role is observation and communication.
- Serves as second observer of the divers along with the standby diver.
- Communicates via radio with the appropriate parties regarding the start and end of dive as well as problems or emergencies.

Dive Operations Supervisor

- Designated person in charge of a dive operation.
- Usually the area supervisor when present.
- Oversee and ensures a smooth and safe dive operation.
- Makes critical decisions as needed to get the work done and address problems.

Support Personnel

- Animal Supervisor: Notified of start and end of dive, location of dive, and number of divers.
- Usually the supervisor of another diving area when available.
- Responsible for coordinating the response if a dive emergency takes place.

Support Personnel (continued)

- Emergency Medical Technicians (EMT) are part of the zoo's security team.
- There must be an available EMT on grounds before a dive operation can be initiated.
- EMTs monitor radios and stand by to respond in the event of an emergency.
- Appropriate emergency equipment for responding to a dive emergency is kept near diving locations for quick access.



General Dive Procedure

- Dive operations are scheduled in advance to ensure supervisor and EMT availability.
- Dive team members are identified in advance so everybody can prepare for the dive appropriately.
- Gear is set up in advance so any problems can be taken care of before the start of diving.



Dive Procedure (continued)

- Just before diving: the standby diver, monitor and/or supervisor will check all gear.
- Standby diver and/or monitor will assist divers in gearing up as well as entering the water.



Dive Procedure (continued)



- The dive supervisor will call via radio to Zoo communications and the appropriate supervisor that a dive is beginning.
- The number of divers and the location of the dive are clearly communicated.

Dive Procedure (continued)

- When the diving operation is complete: the dive supervisor will call back to the supervisor and zoo communications. This time confirming that all divers are safely out of the water and the dive complete.
- Standby diver and/or monitor assists the divers in exiting the water and gearing down.

Dive Procedure (continued)

- Before the divers leave the area, the dive supervisor will ask the diver for a verbal confirmation that they are feeling ok.
- Divers leave the dive site to finish gearing down and get a shower.
- Other personnel complete equipment breakdown.

Safety and Best Practices

- Diving does not take place in water colder than 45 F.
- 7mm Wetsuits are appropriate for this temperature diving and are used.
- Divers are called out of the water at the first signs of being cold.



Safety and Best Practices



- When tanks empty to 500 psi: divers must either end the dive or change to a fresh tank.
- 'Spare air' canisters are worn by divers in every dive.

Safety and Best Practices



- Dive operations are ended immediately if:
 - Thunderstorm or thunderstorm warning
 - Tornado warning
 - Animal escape or animal escape drill
 - Any other urgent or emergency situation that requires the attention of zoo EMTs preventing them from being available to respond to a diving emergency.

Safety and Best Practices

- Communication During a Dive
 - 2 Way radios
 - International hand signals
 - Underwater pinger or other noise makers
 - Dry erase board (underwater viewing glass)
 - Other



Safety and Best Practices



- For Dives in the polar bear and pinniped pools, the standby diver has the following equipment ready for diver assistance:
 - Pony tank, regulator and mask
 - Long handled extension pole
 - Life ring (buoy)

Safety and Best Practices

- Most dive operations have 2-3 divers.
- This is for safety and in general necessary to accomplish the work.
- Occasionally only one diver is used: in this case the diver is line tendered to the standby diver at the surface. This is per OSHA standards.



Emergency Situations

- "Diver Down" is the designated phrase to communicate that a diver is in distress and needs assistance.
- When communicated, this announcement activates the area supervisor, EMTs, and other appropriate personnel to respond to the dive site.

Emergency Situations

- The standby diver likely will be the first to respond during an emergency, but always communicates the situation to the dive monitor before entering the water.
- The dive supervisor takes the lead in coordinating the emergency response unless this person is the standby diver entering the water.

Diving Emergency Drills

- The North Carolina Zoo has performed several diving emergency drills and plans to continue this practice.
- Emergency drills help all appropriate staff to understand their role in an emergency.
- Communication, response time, diver extraction, and initial first aid can be enhanced by the use of emergency drills.
- Involving local 911 services is recommended if possible.

Recordkeeping

- OSHA standards require that all diving operations be recorded. Information for each dive to record:
 - Date
 - Location
 - Names of divers
 - Nature of work
 - Dive times: in/out and total down time
 - Designated person in charge

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