

# Inaugural Mixed-taxa Marine Environment in the San Diego Zoo's Africa Rocks Exhibit

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*speaker notes in italics*

Thanks Deb!

*I'm here to discuss collaboration amongst all the key players and what it took to make a unique exhibit a success.*

*This involved:*

*Architects, Aquarists, Aviculturists, Water Quality, Construction teams, Curatorial dept, Development, Membership, Education and a host of others.*

*Any aquarists in the house?*

*Apologize ahead of time.*

*Aviculturist talking about aquariums.*

*Show of hands: anyone NOT familiar with SDZ's marine aquariums??*

*This is a first for us, but we had capable and knowledgeable staff on board.*

*Typical example of  
mixed taxa exhibits:*

*Long-legged, hardy  
birds, like Maribou  
storks in with  
hoofstock.*

*Look for compatibility.*

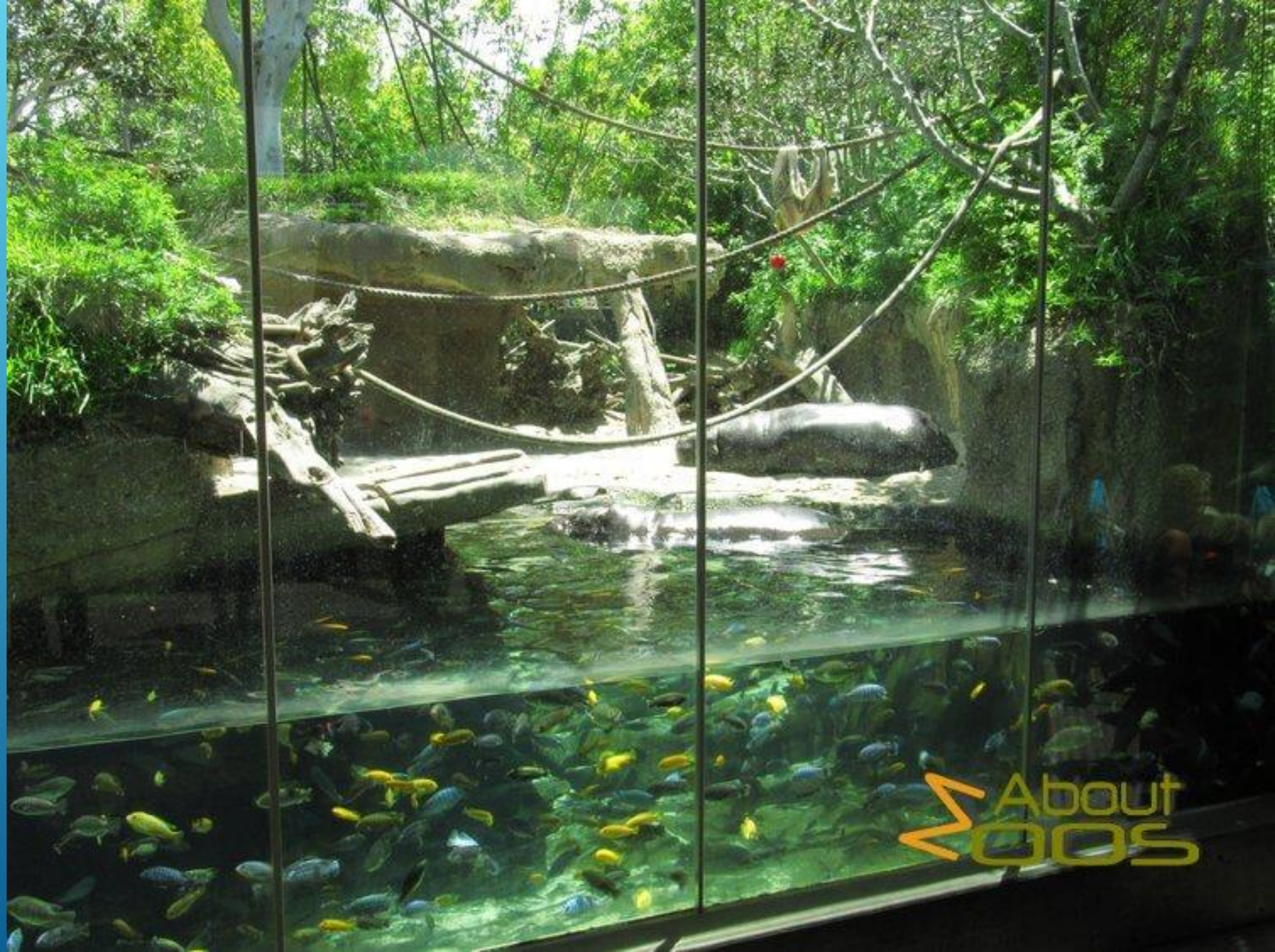




*Or Wattled crane in with Addra Gazelles like at the Saint Louis Zoo.*

*Or Ostrich with Rhinos and giraffes, like at the SDZ Safari Park.*

*Or Pygmy Hippos  
with Cichlids.*



*Try to avoid any incompatibility or potential hybridization if possible.*



*But what do you do  
when your President  
comes up with an  
idea?*



*Not YOUR President...*

*Our President.*

*Doug Myers, CEO and President  
of the San Diego Zoo*

*Well, you walk right up to him  
and say..." how many sharks  
would you like, sir?"*



**President/CEO: San Diego Zoo Global**

**Mr. Douglas Myers**



*Of course  
this is what  
most people  
think of  
when you  
say  
penguins  
and sharks.*



I don't know about you, but the last time I saw penguins and sharks together it was the 2016 Stanley Cup.

And BTW the Penguins won the series 4-2 (Just sayin).

So the next thing to do was research what types of sharks and fish are around African Penguins.



Well, it just so happens there is someone in Cape Town SA, PhD candidate Lauren de Vos, that uses BRUVs (Baited, Remote, Underwater Video Systems) to document fish populations in False Bay.

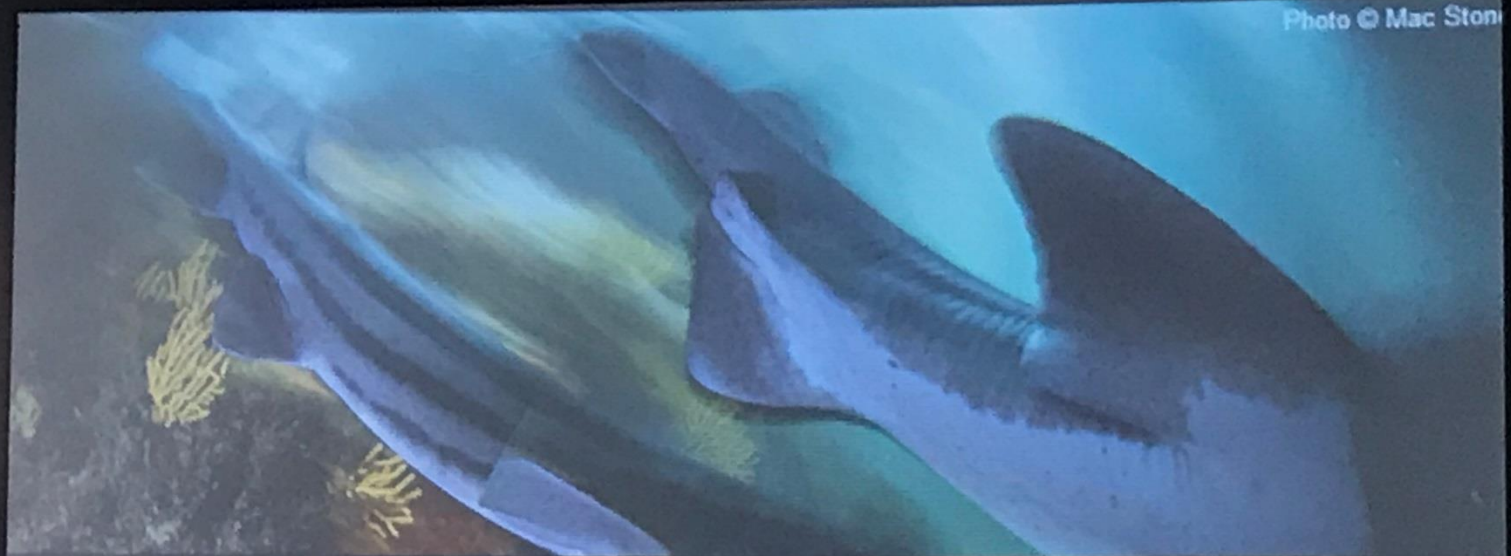


Photo © Mac Stone

**CAMERAS FOR CONSERVATION:  
A first remote imagery survey of the  
diversity and distribution in marine biodiversity of  
False Bay, South Africa**

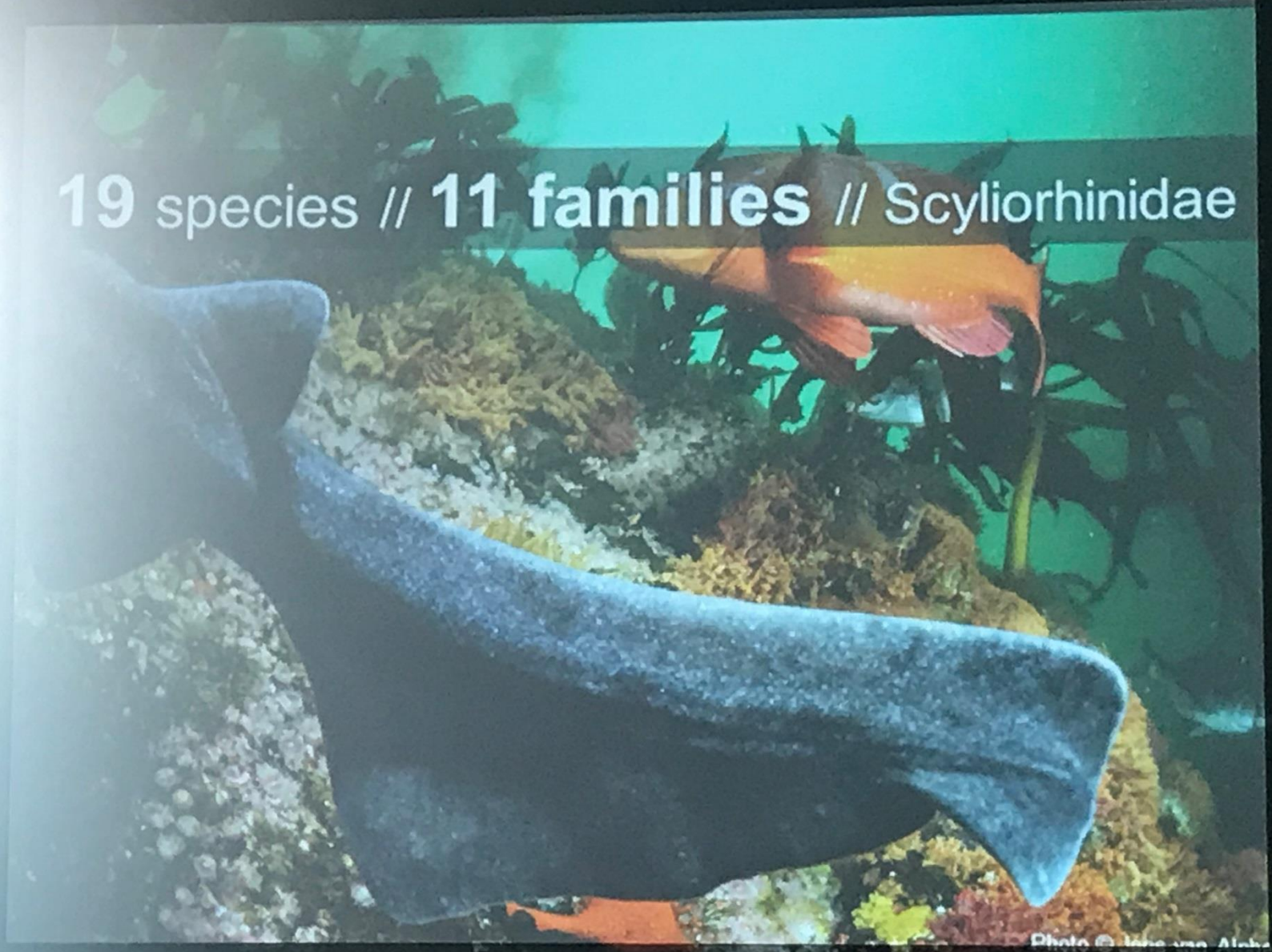
Lauren De Vos // PhD Candidate // University of Cape Town



# Catsharks

*Again, my apologies to the Aquarists in the house.*

*She recorded these . . .*



38 species // **17 families** // Sparidae



Photo © Joris van Alphen

Porgies

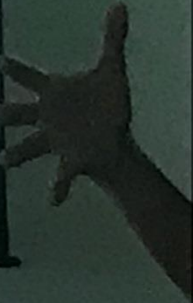
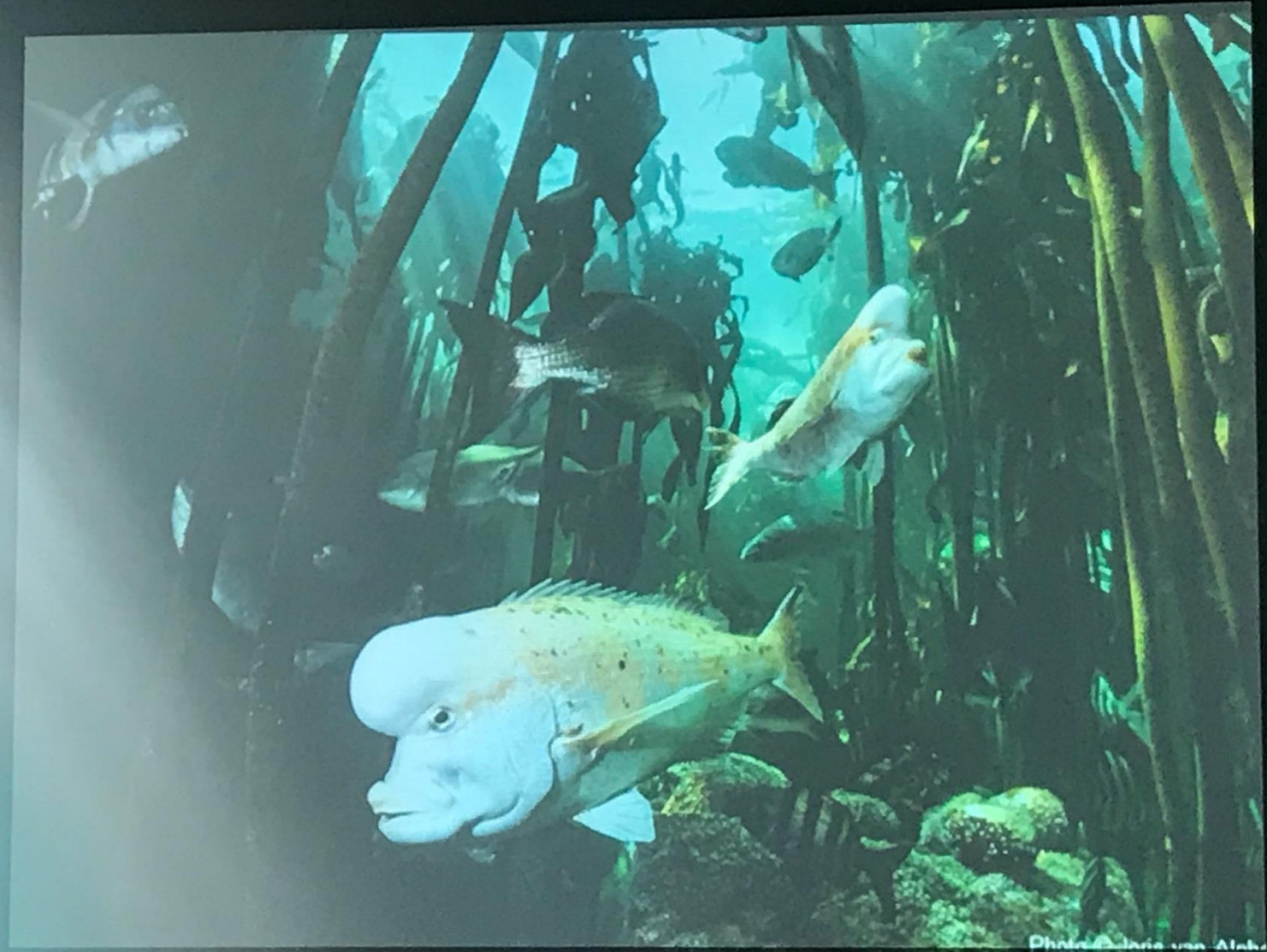
*Beautiful kelp  
forests and other  
marine life . . .*



Photo © Joris van Alphen

# Humphead

*And some crazy looking fish.*



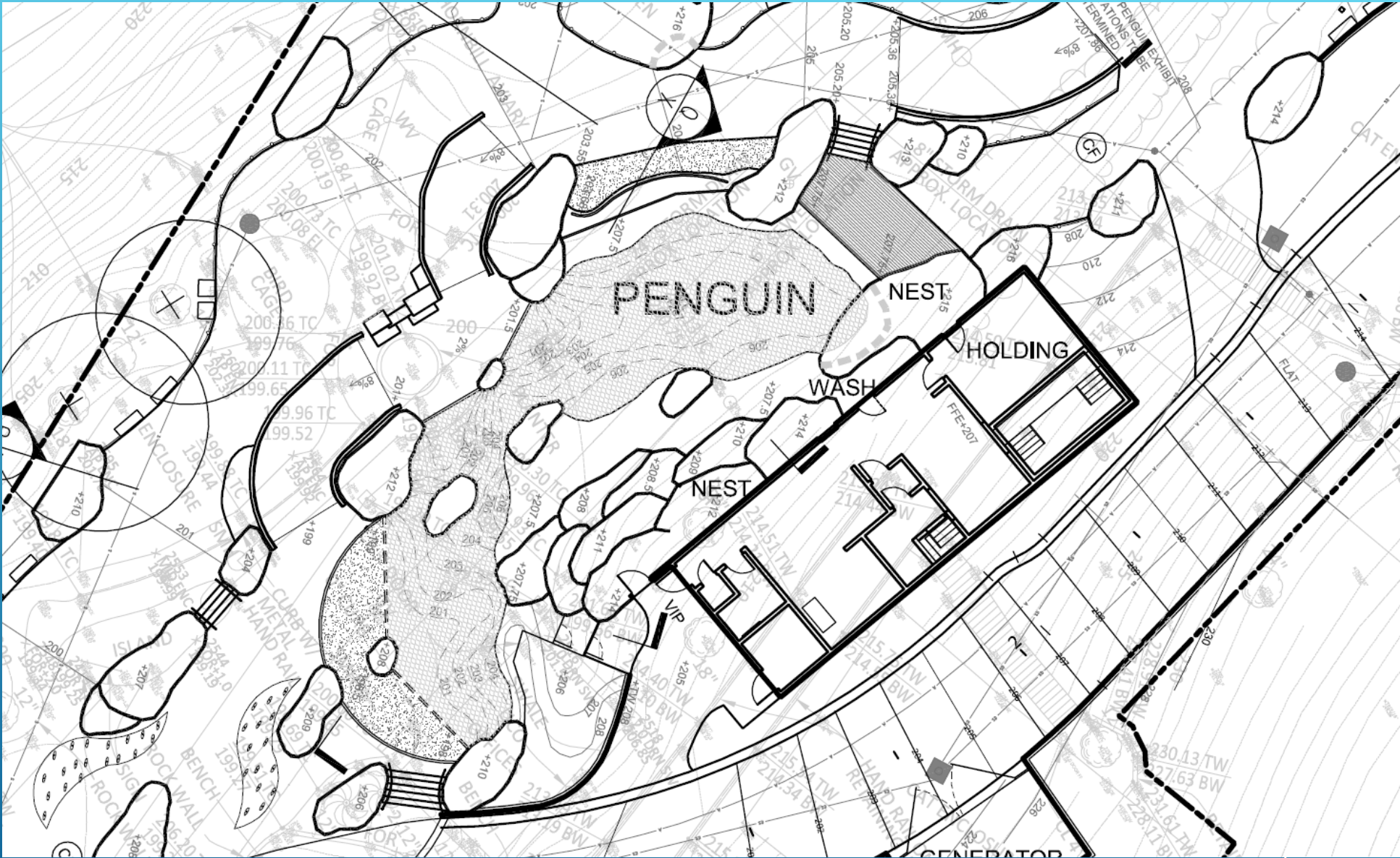
It is well known  
there are Great  
White sharks in  
False Bay.





As well as Bronze  
Whalers.





*So what do you do with the original plans you had for the African Penguin habitat?*

*A fresh water, 50,000 gallon pool with filtration and chiller, designed to accommodate 20 breeding pairs of African Penguins plus 10 offspring.*

*With the new parameters needed for a marine environment, you collaborate with all the Departments involved and design a new exhibit...*

*This required input from the*

- Aquarium Dept, (run by the Reptile Dept), (who knew sharks needed a “glide path and suitable turning radius”?)*
- The Bird Dept,*
- Architects,*
- Water Quality,*
- Construction and Maintenance,*
- Curatorial Liaisons*
- And Development (who Needs to raise more money now)*

*To name a few*

And what did we get???

A pool over 180 ft long

13 feet deep

70 ft of under water viewing

Once an hour turnover rate





## EXHIBIT INFO

- 200,000 gallons
- Ocean saltwater
- 55-60 degrees Fahrenheit
- Penguins, sharks, and a variety of fishes
- Replica similar to Cape Fynbos habitat

And what  
did we put  
in there?

Six species  
of fish  
including  
...



Blacksmith, *Chromis punctipinnis* (12)



Pacific Halfmoon, *Medialuna californiensis* (67)

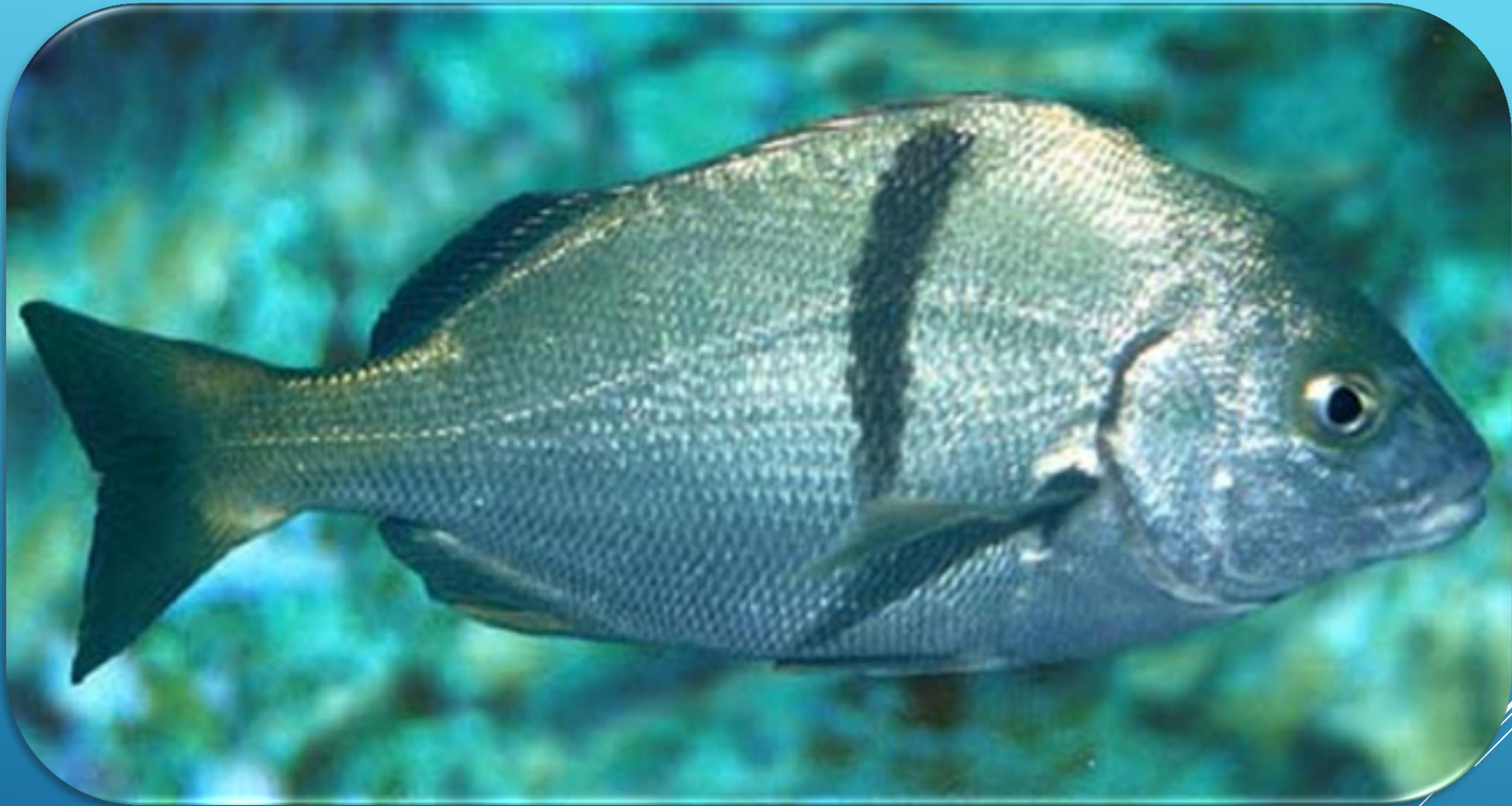


Ocean Whitefish, *Caulolatilus princeps* (8)





Opaleye, *Girella nigricans* (44)

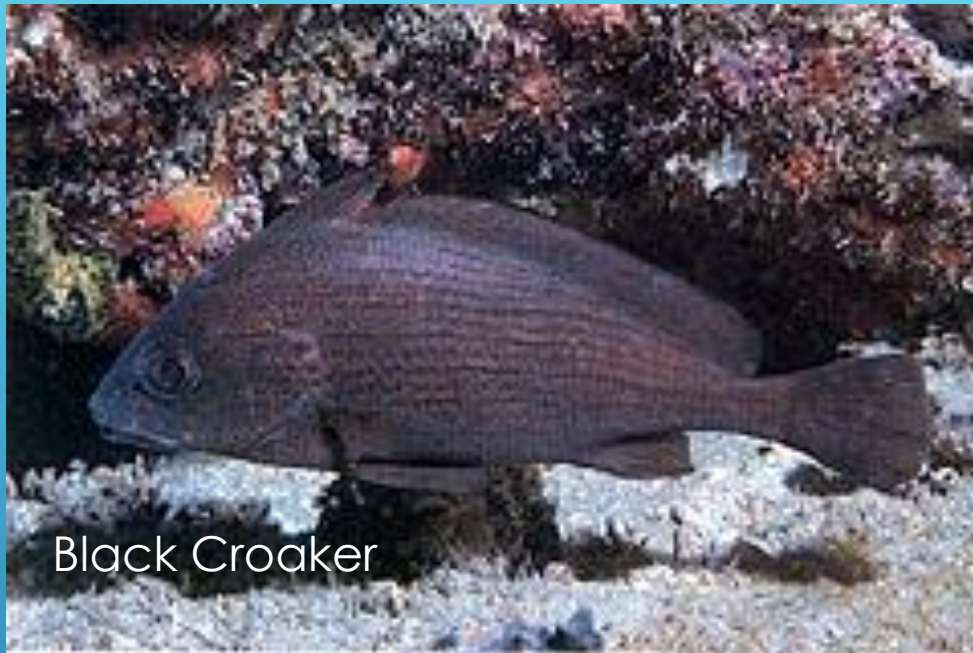


Sargo (grunt), *Anisotremus davidsonii* (5)



Leopard Shark, *Triakis semifasciata* (11 males)

*All of these are close cousins of fish found off the coast of South Africa*



Black Croaker



Painted Greenling



Giant Kelp fish



Kelp Bass

*Some species we had challenges with were...*





*Our Aquarists developed some strategies for success.*



Strategies for success:

Moved the shark feeding area from shallow end, where penguins are fed, to deep end where they are not.

Coordinated times of shark and penguin feedings so as not to overlap.



*Sharks are fed 3 times a week.*

*Other fish are fed daily.*

- Herring
- Capelin
- Squid

*And of course,  
the penguins are  
fed twice a day.*



*Chopped food items for sharks*

*Soft gel and pellet diet for the fish*

*Soft gel diet before being cubed*



Two types of vitamin diet:

A) A formulated pellet

B) A formulated soft gel-based diet

*It all looks fine and dandy until...*

*And so it  
begins...*



**“You've got your chocolate in my peanut butter!”**

**“No, Your penguins are chasing my sharks!”**

Now, you can clearly see that our sweet penguin is not chasing this shark at all, it looks quite the opposite.

So, what do you do when people see animal interactions but don't have the data to support it? Collect the data for evidence-based animal welfare.



## 5 Opportunities to Thrive

- 1. Opportunity for a well-balanced diet** Fresh water and a suitable, species specific diet will be provided in a way that ensures full health and vigor, both behaviorally and physically.
- 2. Opportunity to self-maintain** An appropriate environment including shelter and species specific substrates that encourage opportunities to self-maintain.
- 3. Opportunity for optimal health** Rapid diagnosis and treatment of injury or disease while providing supportive environments that increase the likelihood of healthy individuals.
- 4. Opportunity to express species-specific behavior** Quality spaces and appropriate social groupings will be provided that encourage species specific behaviors at natural frequencies and of appropriate diversity while meeting social and developmental needs.
- 5. Opportunities for choice and control** Providing conditions in which animals can exercise control and make choices to avoid suffering and distress, and make behavior meaningful.

*Vicino, G.A. and Miller, L.J. (In Prep).  
From prevention of cruelty to optimizing welfare.*

*We collaborated with our institute for conservation researchers to develop an ethogram and collect data. Oh and here are some suggestions...*

*Can you imagine how difficult it is to id a sharking swimming away quickly from a fast swimming penguin?*

1= interaction without contact, i.e, chase no bites

2= contact, interaction, no bites

3= contact with bite

4= multiple bites

2. If it is possible or obvious to notice a single shark is being picked out that would be optimal.

3. Viewing from front for feeding times of sharks and penguins between 815 and 915a

Sharks are fed Wed, Fri, Sun after penguin feeds-feeding times may vary.

4. Feeding times should definitely be included would be optimal for observations, also late afternoon, evening but all times important, would really like to get info late afternoon (noon-evening when Keepers available to watch)

The sharks are individually identified however that is with Trovan PITs so not so easy for volunteers to recognize individuals but perhaps they may see pattern similarities and we can consider photos to help them.

What would be very helpful I think would be a list of the penguin bands as I know they are color coded and although they may not be able to see the detail of the penguins names on the bands they should be able to make out the colors to help identify individual penguins.

Knowing what the sharks do is important but being able to identify perhaps which individual penguins have a tendency to do certain behaviors in regard to the sharks is critical as well.

*Penguin ID's and names (studbook #'s and color coded cable ties)*

Scott/3488

Austin/3523

Cannon/3566

Gayle/3486

Katy/1753

Danny/3487

Molly/2978

Elisabeth/3524

Lori/3560

Tinka/3561

Harlan/2929

DG/2002

Courtney/3481

Malloy/3506

Jack/3585

Dan/3108

McKinney/3109

Vi/1480

Mac/3374

Norinne/3373

Sam/1784

Chaz/2058

Simon/3434

Brecken/2539

Moe/2147

Parker/3501

Prince/8888

Hoover/1960

Rocko/2323

**SHARK EXHIBIT BA08002**

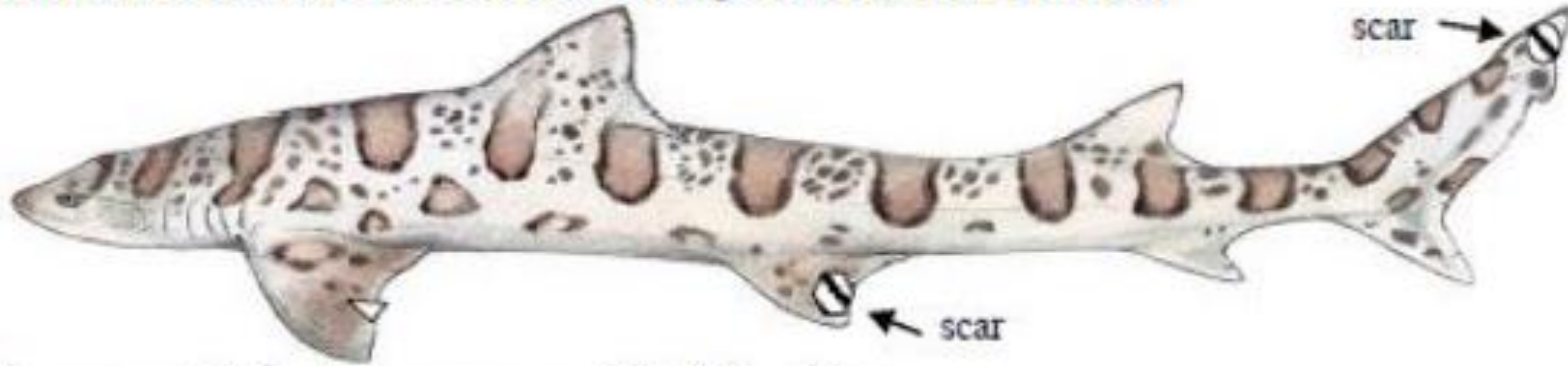
**Leopard Shark ID Chart**  
*Triakis semifasciata*

Shark #6, Local ID: 700017, Transponder # 00783D488



R pec: sm notch; R pelvic: scar; 1<sup>st</sup> dorsal: sm white spot & upside down 6 scar on L dorsal from trovan; caudal tail tip: 2 large white spots

Shark #7, Local ID: 700018, Transponder # 007ABA68F



L pec: sm notch; L pelvic: sm scar; caudal tail tip: white scar

Gotta hand it to the  
aquarists!  
Here's how to ID a shark.  
Good luck!

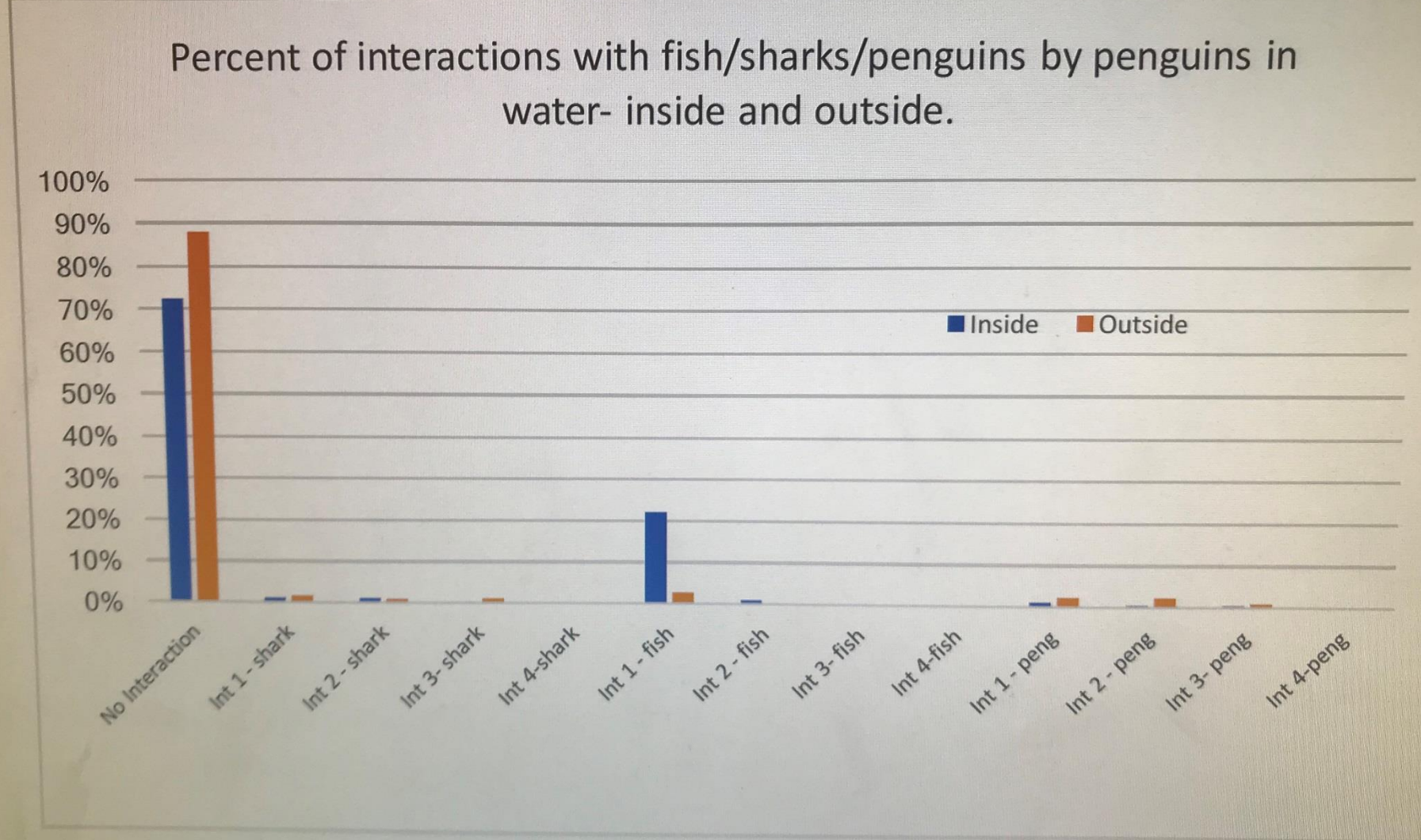
Use of  
transponders to  
verify ID

Left side of first  
dorsal fin

As you can see in the "Outside" category the majority of the time the penguins were in the water there were no interactions (88%) and on the "Inside" was similar (72%).

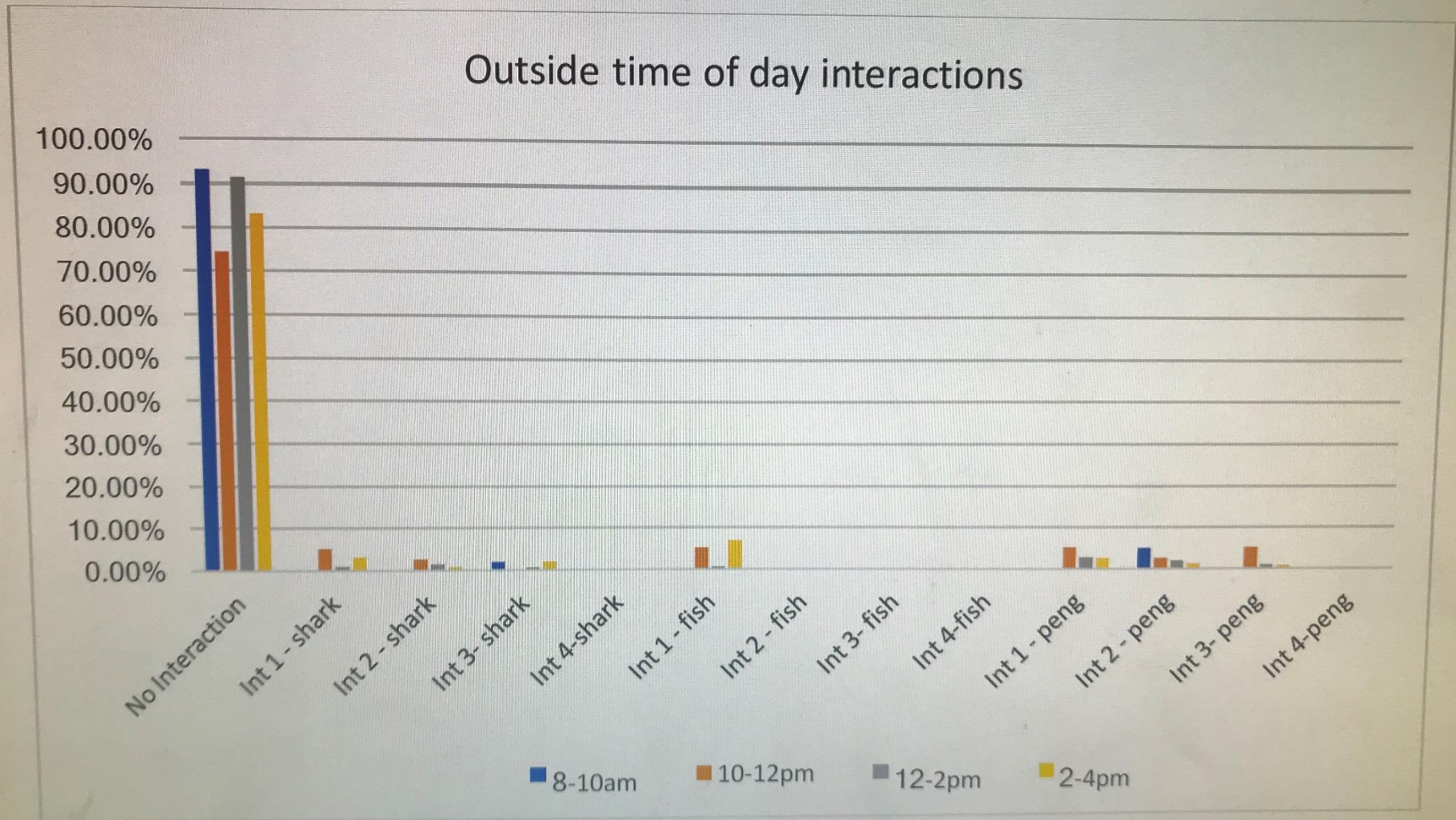
But there was a jump in the amount of times that penguin(s) were seen doing non-contact interactions with fish (22%) which is not surprising given the newness of the fish and that the majority of fish were located in the "Inside" area of the exhibit. (CLANG)

### Inside vs Outside overall:



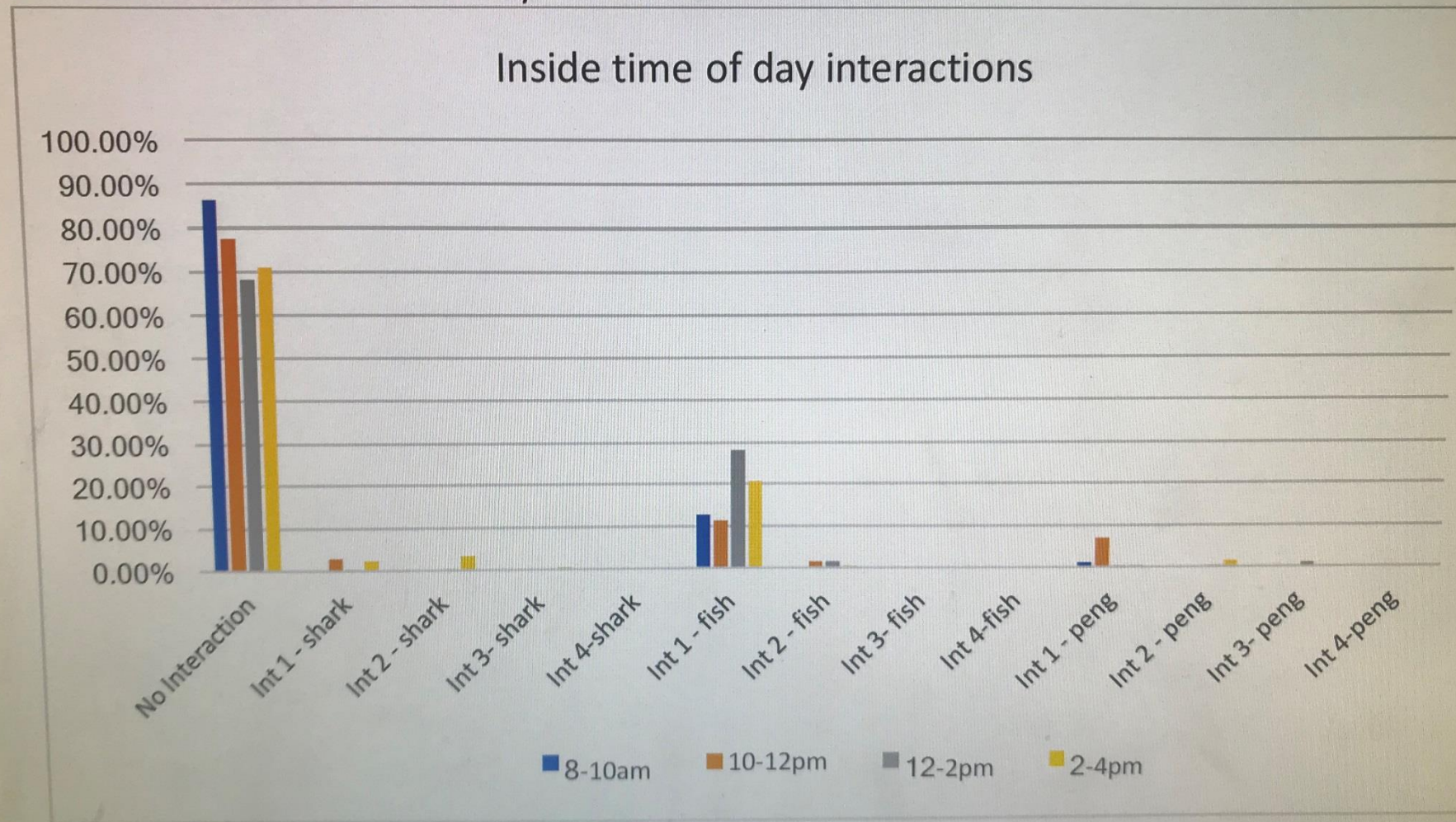


4 different times of the day (outside)



4 different times of the day (inside)

Interactions based on time of day in 2 hour blocks of time:



*And now they  
harmoniously  
swim together...*

*BTW, how about  
that water  
quality?*

*Beautiful isn't it?*



The LSS facility is almost larger than the exhibit itself.

(Mention Water Quality's responsibilities.)



*This is during construction, but you can see the extent of the equipment needed.*



Another example  
of the  
collaboration it  
took.





*And  
here's the  
final result:*

*A healthy fish population, thanks to the Aquarium Dept.  
A healthy penguin population, thanks to the Bird Dept.*

*A beautiful botanical collection thanks to the Horticulture Dept.*

*A well designed exhibit thanks to the Architect Dept.*

*A beautiful exhibit for our guests to appreciate, thanks to the Development Dept.*





*Our president's vision came to fruition and now, almost 2 years since opening, and he was right...*

*It was a great idea.*



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