

ARGUS-MARINER

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Preliminary Report on Allman Data

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Dr. Robert N. Lea
California Department of Fish and Game
2201 Garden Road
Monterey, CA 93940

Dear Bob:

While I've been on jury duty, I looked over the photos from the Allman attack (8 March 1992, Winchester Bay, Douglas County, OR). This will be a preliminary assessment of the low magnification examination of the pictures of the surfboard and the wetsuit. There may be some minor revisions later, but I will enclose those with the final report.

The Surfboard

The surfboard was an Al Merrick board of approximately 204 cm (L) x 152 cm (W) x 5 cm (T). This will make the surfboard from the current investigation similar in length and width to previous attacks, but of somewhat less thickness (16%-20% thinner). Both surfaces had a background color of white (uncolored). The lower surface had no other markings save the name of the board maker 0.3 m forward of the rear edge (black). The wood stringer was clearly visible through the fiberglass surface. The upper surface also bore the board maker's name at approximately the same position. In addition, the upper surface contained a black panel of about 40 cm (L) x 50 cm (W) located about 1/3 of the way back from the front edge. Immediately behind the panel was an area of approximately 61 cm (L) x 50 cm (W) consisting of irregular brownish blotching that appear to be wax deposits. I'll ask Mike Allman about that the next time I speak with him. At the extreme rearward edge of the board there are one or more predominantly fluorescent words, but at low magnification they were unreadable. I'll look at these on high magnification later.

The Area of Damage

There is a hemispherical bite mark of approximately 30 cm (W) x 20 cm (D - at symphysis) centered 0.65 m forward of the rear edge on the right side of the board. This would be equal to a shark of about 363 cm predicted length [11.9 ft] (range: 355 cm - 371 cm) using the length regression

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previously derived. The weight would be expected to be about 511 kg (predicted) [1127 lb] (range: 396 kg - 625 kg) using the previously calculated length-weight regressions. The sides of the bite mark at the board's edge appear as wedges with clean margins. The wedges extend about 14-15 cm into the board. At the supposed symphysis are four, perhaps five, individual oval tooth marks, indicating moderately deep penetration of the surface. The upper surface damage most closely matches the pattern of damage to the board from the Douudt attack (27 November 1979, Cannon Beach, Clatsop County, OR). There are some scattered tooth marks extending well beyond the main bite margin on the upper surface of the board. The lower surface of the board is extensively damaged in the area of the main bite mark. There is so much damage, in fact, that it will be difficult to establish the true number of tooth marks due to the fracturing of the fiberglass overlay and the crushing-mangling of the styrofoam core. As with the upper surface, the lower surface has a number of scattered tooth marks well beyond the main bite margin.

Where the damage in this attack departs from what we've seen since 1979 lies in the severing of the board into two pieces. Along the right side of the bite mark the surfboard broke at a 20° backward angle from the transverse axis. The fiberglass overlay is cleanly broken in a sweeping curve in the areas away from the bite mark. The foam core, when viewed in cross-section shows a classical pattern of structural failure from bending, i.e., large irregular, smooth-surfaced cleavage planes. The cross sectional areas in the vicinity of the bite mark, conversely, tend to be very ragged with fairly narrow triangular penetrations at uneven intervals. There is one deep triangular penetration in the upper surface of the board, when viewed in cross section that underlies the area of the most forward tooth marks in the upper surface. This area of penetration shows clearly the relative shape of the shark's upper symphyseal teeth, being far narrower from front-to-back than wide. The cleavage of the board would seem to have occurred from two factors acting in concert: 1) damage to the board from breakdown of the fiberglass overlay and foam core during the bite contact; and 2) tensile failure as a result of the downward force of the shark's head, as it sank deeper in the water column with the board firmly in its mouth, and the upward force of positive buoyancy of the foam core of the board. This appears to have caused the weakened board to cleave along a fulcrum point that approximated the position of the right side of the shark's head. Based on the physical evidence neither event separately would likely have caused the board to break. We have seen previous attacks by much larger sharks, which showed comparatively less damage than in this incident. The shark involved in the current case was the smallest we have so far encountered in a surfer-related attack in Oregon. The data points toward a more forceful and determined attack than any previously investigated by us. A third factor that may have played an undeterminable role in the failure of the board integrity was its comparatively thinner vertical axis.

We have seen isolated tooth marks well in advance of the main bite area in some of the previous attacks. This has always been puzzling. However on further thought there is a scenario in which all of the damage in this attack can be accounted for reasonably: 1) a relatively high-speed impact with an essentially stationary object of 75-90 kg (surfer and board combined) would tend to force the shark's jaws well forward of the main bite area on initial contact thus accounting for the isolated tooth marks outside of the main bite margin; 2) slow motion footage of white shark bite action and the Tricas-McCosker breakout of white shark bite progression indicate the jaw cartilages and teeth thrust forward as they drop down with relation to the tip of the snout; 3) although I have been able to find

no reference to it in the literature almost certainly as the inanimate object (surfboard) wedges back into the shark's mouth there must be some sort of "elastic rebound" as it contacts the soft, thick tissue at the corner of the mouth. This could be analogous to the release of a tensioned slingshot, which propels a rock or marble in the opposite direction. If the sling is not tensioned, the object will not move. As the shark closes its mouth elastic rebound might be expected to move its jaws backward from the point of initial contact. The primary damage from closure would then manifest itself at the main bite margin; 4) the severe crushing in of the lower surface, long thought to be from upward impact, may have a simpler explanation. Again, if you look at the slow motion footage of white shark bite scenarios, you will note that there is a more-or-less rapid series of closures and relaxations of the jaw. This would account for the severe damage to the under surface, if the upper teeth were sufficiently embedded in the board surface to act as a temporary anchoring point while the lower jaw moved up and down. This is given further support when one considers the sheer weight of a white shark's head in a 12 foot specimen and the relatively limited motion of the upper jaw with respect to the cranium; 5) and finally the clean wedges at the edge of the bite area could be due to moderate twisting of the shark's body during the bite sequence if the upper teeth were acting like an anchoring point around which the rest of the jaw rotated. Simple closing of the mouth would not likely account for such carving out, especially when one considers how small the teeth are at that point in the jaw. This would tend to be enhanced by the cutting action of the larger lateral teeth farther forward, which would be expected to have weakened or penetrated the fiberglass overlay as they passed across the surface of the board.

The Wetsuit

Mr. Allman was wearing a full body wetsuit at the time of the attack. Brand Name: O'Neil Supersuit. Model: Heat. Colors: dark blue, charcoal grey and black with a bright orange interior liner. Patterns: torso-grey; left arm-grey with black stripe; right arm-blue with a black stripe; legs-blue and black panels with grey knee pads. The company name was screened in white on the right arm, right chest and right thigh. The model name was screened in white on the left thigh.

Damage to Wetsuit

It was difficult to fully ascertain the damage to the wetsuit from the attack due to damage from paramedics and medical personnel during emergency treatment of Mr. Allman's injuries. However, there were two clear tooth marks on the right arm near its juncture with the torso (axilla). The mark nearest the seam was 6.25 cm (2.5") wide with 5 cm (2") at the center a clean puncture. The remaining damage at each end of the mark appears to be from tearing. The second tooth mark is about 5 cm (2") distal (down the arm) from the right edge of the larger tooth mark. It is considerably smaller at about 3.5 cm (1 3/8") wide. This mark is a clean puncture without any tearing at the edge. The damage may have been the result of contact with the right upper first tooth and third tooth. This would satisfy the particulars for the injury to Mr. Allman's right shoulder and upper arm. As soon as the medical reports arrive, I will be able to refine this further.

General Comments

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At 3.6 meters (predicted) length, this would be the smallest white shark to have attacked a surfer in Oregon waters to date. The massive damage to the board, resulting in its being severed into two pieces, indicates both a determined attack and inferentially that the shark had the board securely in its mouth as it sank vertically in the water column. A combination of the damage from the bite and the upward force of positive buoyancy apparently worked in concert to cause the board to break up as a result of tensile failure. It is of interest that, while Mr. Allman suffered two separate injuries at 1) lower, mid-body and 2) on the right arm and shoulder, there is no evidence of bite marks on the board at the level of the shoulder. At this point I would venture that this favors a multiple bite attack scenario, something we had not seen in previous attacks in Oregon. I will have to review all of the data before I make a final determination for the full report. The other alternative, i.e., both injuries occurring during the same bite sequence, would not seem to be likely due to the large distance separating the two injuries [18-20"].

I believe that the final report will be ready for you by the end of September unless there are unforeseen delays in obtaining the medical reports. Cheers!

Sincerely,

Sid -

Sid F. Cook
President

SFC:dd

cc: Mike Allman
Leonard Compagno

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