

frequency of engaging in FI. We also made observations at four Gulf fishing piers, and conducted angler surveys to measure public attitudes. During 76 deep-sea trips encompassing 369 independent fishing spots, FI was encountered at 18.2% of the spots. Scavenging of discards was observed during 98.5% of those encounters, while depredation of caught fish occurred during 40.3% of FI observations.

Two dolphins were observed entangled in fishing gear. During 100 trips to Gulf fishing piers, dolphins came within 100 m of the piers on 42% of the visits while FI was observed on 17% of the visits. More than 10% of the 104 individual dolphins identified on offshore reefs were encountered repeatedly; most dolphins that frequented the fishing piers were known residents of the nearby inlets. This indicates that discrete populations are involved, and harmful impacts to dolphins on deep-sea reefs and at fishing piers may affect resident communities of animals in those respective areas. Our survey responses indicated that recreational anglers generally enjoy observing dolphins despite FI problems. Mitigation ideas include gear modifications, improved fish release practices, and fostering eco-tour principles by sport fishing operators.

Modeling and analysis of fluid flow around a suction cup bio-logging tag

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As sensing and electronic technology has improved, the use of bio-logging tags for the study of marine mammals has steadily grown. These tags require the electronics to be packaged in a housing that protects it from the environment, maintains proper configuration of the sensors, and provides a means of attachment to the animal. The packaging must provide this functionality in a hydrodynamic form to minimize the forces generated by fluid flow. These forces can remove the tag or adversely affect the behavior or energetics of the animal. Despite the recent advancements in electronics technology, sophisticated analysis and design of the packaging has been lacking. In this work, drag loading of a suction cup tag was analyzed using a computational fluid dynamical (CFD) model. The CFD model was used to analyze the forces acting on the tag over a range of flow velocities and flow orientations. The results from the analysis identified key features of the tag geometry around the suction cups that can be changed to reduce drag by up to 60% in simulation. Additionally, off-axis flow over the tag can result in a doubling of the drag force. The simulation results were validated in an experimental water tunnel. The use of computational modeling accelerates the design process because it provides access to information that might be unavailable in a purely experimental evaluation of the system. These models also enable the designer to quickly evaluate and iterate tag designs in a relatively accurate virtual environment, reducing design effort and expense. Further, the development of the tag packaging in this environment allows the designers to address issues critical to the performance of the system well before the device is ever used on an animal. This work was supported by ONR Grant N00014-11-1-0113.

Threats to spotted seals summering in the Tigil'sky region of the western Kamchatka, Far East Russia

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In spite of the annual hunting quotas no data on the status of spotted seals summering in the estuary of Khairuzova and Belogolovaya rivers (Western Kamchatka) have been collected since Soviet times. In July – August, 2010 we examined numbers of spotted seals in this area and analyzed possible threats to them. In total 3 stable (observed in one and the same place) and 3 temporary haul-outs of spotted seals located on the river shores or sandbanks were found in the area. The number of seals resting on haul-outs depended on water-level: the maximum number of animals was observed during the minimal water-level. In total about 500 spotted seals were found in the estuary. In the water seals preferred several feeding areas, where they in competition with beluga whales hunted for different salmon species. In summer period the estuary is actively used by men for fishing. Fisherman boats caused a significant disturbance for seals resting on land: as the boat approached all animals escaped to the water. Most of the haul-outs were located nearby the shipping routes and sometime fisherman boats stayed nearby the haul-outs during whole low-tide period preventing seals from going onshore for rest. We also observed children throwing stones at hunting seals and local people shooting animals resting on haul-outs. Fisherman poll showed that spotted seals regularly took fish from the nets and this caused negative attitude of natives toward these species. As a result in most cases natives shot seals not for meat or fur but to prevent them from eating fish and damaging nets. In summary the main threats for spotted seals in the estuary – one of the most abundant with salmon area of the Western Kamchatka – are uncontrolled harvesting, conflicts with natives, competition for fish with fishermen and some marine mammal species.

Cetaceans in captivity: The education fallacy and the modern ark's voyage to apathetic attitudes concerning the conservation of wild cetaceans

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The Marine Mammal Protection Act (MMPA) has posited that cetaceans in public display facilities are ambassadors of their species, educating the public about marine conservation issues and inspiring an intrinsic sense of stewardship toward wild populations of cetaceans. Over the course of history, the captive industry has undergone numerous image transformations, ranging from menagerie to "modern ark", recovering species from the brink of extinction through conservation stewardship and environmental education. However, a mere 5-10% of captive facilities actually engage in substantive conservation efforts, either in wild habitats or by planning breeding programs (Bettinger and Quinn, 2000). Additionally, education programs and materials developed by captive facilities generally lack the credibility and accuracy ensured by a peer-review system, and in many cases appear to intentionally mislead the lay community, leading to the erroneous perception that captive facilities are benevolent and significantly safer for cetaceans than wild habitats. Approximately 135 million people attend American Zoological Association (AZA) accredited zoos and aquaria annually (Clayton and Myers, 2009). Potential long-term impacts of these programs on participant perceptions of cetaceans in captivity should be evaluated through qualitative (narrative) and quantitative (survey) research methods, analyzing the validity of the educational value of viewing captive cetaceans.