NHSMUN50

National High School Model United Nations

CMS

UPDATE PAPER

NHSMUN
National High School Model United Nations

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Dear Delegates,

I am very excited to welcome you to the Convention on Migratory Species, otherwise known as the Bonn Convention, for NHSMUN 2023! My name is Marcus Grogan, and I will be your Assistant Substantive Director for Session 1 of the conference. This is my first year on NHSMUN staff, so I look forward to this experience just as much as you do! I have experience working on MUN, establishing my high school's first MUN in 2019. If you have any questions regarding MUN or NHSMUN, do not hesitate to ask; I will do my best to answer!

I was born on a small island between Ireland and England called the Isle of Man before doing a bit of country hopping during my childhood to Malta, to England, Guernsey, and now back to England again. This means I have a British accent, and I have heard from other NHSMUN colleagues that this is a popular party trick! I attend the University of Warwick's Law School in the UK. After I graduate in July 2024, I intend to go into legal practice and work in the ESG (Environmental, Social, Governance) sector.

I am currently a full-time student but also work as an English teacher for a South Korean company, supporting students in developing their language skills. Aside from my studies and teaching, my hobbies include traveling as much as possible and finding the best vegan food in new cities and countries.

I know that conferences can be a stressful experience at times, but it will be my first time at NHSMUN too! I can see how much time and effort we put into making this conference as special as possible. I have been working with some wonderful people who are not only very good at their jobs but also love what they are doing to create as wonderful an experience as possible. MUN is such a special program because not only does it allow you to engage with others from all over the world, but it also allows you to grow so much as an individual. I hope that NHSMUN 2024 brings you all excitement and proves to be a great learning experience.

The directors have put together a detailed guide covering a lot about the topics – you should find it super helpful. I know I did! Hopefully, you will find the Update Paper a useful tool to fill you in on the latest events and trends with these topics. Make sure to keep up with all the new happenings.

I am looking forward to seeing what everyone will bring to the conference. I can't wait to meet you all!

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Dear Delegates,

I am thrilled to welcome you to NHSMUN 2024, the 50th anniversary of the world's largest Model United Nations conference! My name is Lauren Sheward, and I will be serving as the Assistant Director for the Convention on the Conservation of Migratory Species (CMS) during Session II. This will be my first year on NHSMUN staff and my fifth year in MUN. In high school, I attended NHSMUN 2020 as a freshman and NHSMUN 2023 as a senior, so I'm excited to be on the other side of the dais!

I was born in Ashburn, Virginia, and moved to Kennett Square, Pennsylvania, the mushroom capital of the world, when I was roughly 11 years old! I attended Kennett High School and was the Secretary-General of my high school's MUN club for two years. Outside of school, I am involved in disability and neurodivergent volunteer programs, my favorite being TOPSoccer. If there's a TOPSoccer near you, I highly recommend giving a couple of hours because those kids are some of the best you'll ever meet. In addition to that, it is a mission of mine to find the best coffee order in the world, but I also love hiking, cooking, photography, and pretty much anything that will make a fond memory.

I am a first-year student at the James Madison University Honors College, studying Integrated Science and Technology with a concentration in environment and sustainability. Even during high school, I knew that I wanted to study STEM, so my passion for MUN took me by surprise. I was shocked that a club I thought was just "political" could be so complex. I spent the next four years having "MUN nerd" as my biggest personality trait, and I don't regret it a second. Recently, I have had the pleasure of working with some of the most incredible and intelligent people I have ever met, and we all have put together some resources (like the background guide and update paper) that will help you structure your research and your debate when the time comes. CMS is a committee especially relevant in today's climate, so I am eager to see the fruition of your hard work and dedication in March!

Lastly, something I preached to the club members I mentored was that MUN has a place for everybody, no matter what their skills. Whether you enjoy writing and note-taking, public speaking, interpersonal communication, or research, MUN can be a place where you thrive. I hope that each one of you can find a skill you excel at during this conference, and please do not hesitate to reach out to me with questions, concerns, stories, problems, introductions, whatever! This opportunity is one I am so glad to be a part of, and I am confident that each one of you will gain either a new friend, an accomplishment, or a fond memory.

Cheers,

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NHSMUN 2024

TOPIC A:
PRESERVING THE GREAT MIGRATION IN THE SERENGETI

Photo Credit: T. R. Shankar Raman

Introduction

The Great Migration is a yearly movement of over a million wildebeests, zebras, and gazelles. This is one of the most remarkable natural events on Earth. This migration is a vital part of the Serengeti-Mara ecosystem. The interactions between many species show the natural world's complexity. These animals are determined to survive and thrive on this journey, facing threats and ecosystem relationships that sustain this annual cycle. Because of its large size, this migration attracts global attention, highlighting critical issues in wildlife conservation and the challenges posed by environmental changes.

Updates and developments are crucial for delegates of the Convention on Migratory Species (CMS) to understand and solve issues facing the Great Migration. New technologies have allowed researchers, policymakers, and local communities to understand this event better and track it. As threats to the Great Migration increase, the need to use these technologies to protect this event becomes even more important. Additionally, the increasing number of people interacting with the Great Migration introduces new benefits and challenges for ungulates. Updates in conservation efforts, land degradation, disease, and more highlight people's multifaceted impact on wildlife and the environment. Delegates of the CMS must work together to develop dynamic solutions for the continuing challenges faced by animals and communities concerning The Great Migration.

Latest Developments in Technology

Recent developments in technology have made it possible to track ecological movements. HerdTracker, an assistive tool for migration, is one of these new developments. This tool allows the real-time dynamics of the Great Migration to be tracked and understood. This web application uses updates from pilots who fly over the Serengeti and Masai Mara, safari guides on the ground, and rangers from the Tanzania National Parks Authority to help glimpse the ecology of these migration patterns. It has been invaluable in understanding the Serengeti's predator-prey dynamics and ecosystem balance. The migration is driven by the seasonal rainfall patterns, which create a cycle of abundance and scarcity in different regions of the Serengeti. The movement of the herds is not predictable, as it depends on many factors, such as weather, food availability, predation, and competition. Therefore, tools such as HerdTracker provide valuable information to conservationists across the region.[1]

HerdTracker provides live webcams, photos, videos, and blogs from the field, giving users an immersive and interactive migration experience. It is easily accessible online, helping safari-goers plan their trips and choose the best locations and camps to witness the migration. It also allows researchers and conservationists to monitor the status and trends of wildlife populations, identifying threats such as poachers or extreme weather events they may face. This is integral in better understanding how humans can respond to the needs of migratory species and bolster conservation efforts.[2]

Tracing recent events in the mass migration helps us understand how the migration responds to manufactured barriers. It also gives insight into how they respond to climate change, allowing us to evaluate new technologies. In November 2023, a substantial herd was spotted near Naabi Hill, Tanzania, heading towards Lake Ndutu for calving. The calving period refers to when wildebeest typically give birth to their young.[3] This observation at Naabi Hill, a crucial point for the migration, brings into focus the interplay between animal movement and human activity.[4] The strategic importance of Naabi Hill, offering sweeping views and a water source, is contrasted by the potential disturbances and dangers from human presence. This highlights the delicate balance between wildlife and human activities. On November 11, 2023, another significant movement was recorded in the Seronera area. Known for its wildlife diversity, particularly predators, Seronera draws herds

1 "About HerdTracker, Wildebeest Migration Updates from Kenya and Tanzania," Discover Africa Safaris, accessed December 19, 2023, https://www.discoverafrica.com/herdtracker/about/.
2 Discover Africa Safaris, "About HerdTracker."
3 "The Great Migration: What, When and Where?" Asilia Africa, accessed January 3, 2024, https://www.asiliaafrica.com/great-wildebeest-migration/.
4 "Massive herd spotted near Naabi Hill," HerdTracker, last modified November 26, 2023, https://www.herdtracker.com/updates/massive-herd-spotted-near-naabi-hill/.

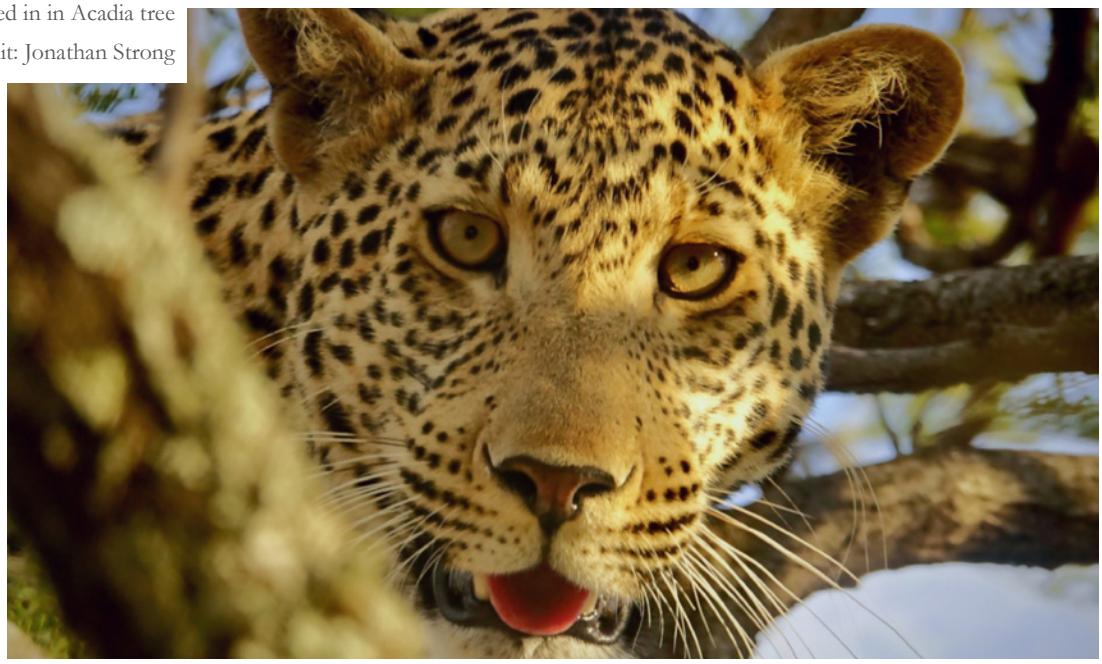
south towards Gol Kopjes, another region in Tanzania.[5] This movement is a testament to the migration's dependency on resource availability. It illustrates the impact of environmental factors such as weather and predation.

The Seronera Valley, too, witnessed a large congregation of wildebeest and zebras on November 6, 2023.[6] This valley is home to many predators, such as lions, leopards, and hyenas, which allows researchers to study the predator-prey relationships present. The Valley's role as a research hub, home to the Serengeti Research Institute, is to support research and analysis of endangered migratory species.[7] This area, with its short grass plains, serves as a critical grazing ground for these species, making it an excellent place for research. The central Serengeti's *kopjes* also provide shelter and vantage points, playing a crucial role in the survival and behavior of the migrating herds.[8]

Through HerdTracker, each observation becomes part of a larger narrative. This tool's comprehensive data collection – from live webcams to firsthand accounts from safari guides and researchers – offers invaluable insights. It helps in planning sustainable tourism, aids researchers and conservationists in monitoring wildlife trends, and illuminates the challenges faced by these animals. HerdTracker is, therefore, a pivotal tool in understanding and preserving the dynamic and awe-inspiring spectacle of the Great Migration. However, what must still be questioned is whether HerdTracker is focusing too heavily on tourist experience rather than conservation.[9] Aside from HerdTracker, satellite imagery, GPS tracking, drones, and camera traps have revolutionized our understanding of the Great Migration. It has created new potential in better quantifying and scaling new and accurate data on migration patterns. These tools provide real-time insights into animal movements and behaviors. They are crucial in monitoring migration and addressing conservation challenges like poaching, crop raiding, and livestock predation. The advent of technologies that have created vast opportunities to track these migrations, coupled with the integration of Artificial Intelligence (AI), has revolutionized our understanding of wildlife phenomena like the Great Migration. The importance of these advancements cannot be overstated, as they unlock vast possibilities in wildlife conservation and ecosystem

5 "Huge herd spotted moving at Seronera," HerdTracker, last modified November 11, 2023, https://www.herdtracker.com/updates/huge-herd-spotted-moving-at-seronera/.
6 "Large herd spotted in the Seronera Valley," HerdTracker, last modified November 6, 2023, https://www.herdtracker.com/updates/large-herd-spotted-in-the-seronera-valley/.
7 "Naabi Hill," Serengeti National Park, accessed January 11, 2024, https://www.serengeti-national-park.com/naabi-hill/.
8 "Seronera," Serengeti National Park, accessed January 11, 2024, https://www.serengeti-national-park.com/seronera/.
9 "Seronera Valley," Serengeti National Park, accessed January 11, 2024, https://www.serengeti-national-park.com/seronera-valley/.

A leopard perched in in Acadia tree
Credit: Jonathan Strong



management.[10]

While these technologies have direct applications in tracking animal migration in the Serengeti, their influence extends globally, aiding in understanding migration patterns worldwide. Their offerings, ranging from safari tours to Kilimanjaro treks, are enriched by technology, allowing for a deeper appreciation of the migratory journey of wildebeests, zebras, and gazelles in search of resources. The World Wildlife Fund's report highlights the importance of emerging technologies in conservation, like artificial intelligence, environmental DNA (eDNA), and networked sensors. eDNA allows for quick and easy collection of biodiversity data by scanning water or soil samples, which can reveal the presence of previously unobserved species in an area. Animal droppings bear huge relevance to data collection during the migration.[11]

These technologies transform conservation efforts, with applications including automating data collection about species. These newer tracking methods are instrumental because they offer efficient, non-invasive, and comprehensive ways to monitor biodiversity and ecosystem health.[12] This helps scientists to focus conservation efforts better. For instance, artificial intelligence can analyze vast amounts of data conservationists collect, such as images and audio recordings, to identify rare species or animal calls. This significantly reduces the manual labor needed. This method also offers a non-invasive way to monitor biodiversity and can provide insights into the ecosystem's health that supports animal migration. Similarly, the World Economic Forum's report underscores environmental innovations such as wearable plant sensors, which impact biodiversity conservation significantly.[13] Wearable plant sensors can continuously monitor the Serengeti ecosystem's temperature, humidity, moisture, and nutrient levels. These plant sensors are attached to plants in an ecosystem. They can help conservationists better understand the ecosystem's health that supports migration, which allows them to take timely action to address any issues.

Researchers are using AI-controlled cameras and microphones to monitor wildlife on the ground. AI-controlled cameras and microphones have the advantage of being able to identify and monitor the movements of various species in the wild. It can map their locations solely through AI analysis of sounds and images. It can also handle larger amounts of data, making tracking on much larger scales possible. Camera traps, acoustic monitoring, and remote sensing technologies like Lidar are other pivotal tools in wildlife conservation, offering insights into animal behaviors and ecosystem dynamics.[14] Data collection can inform studies on extinction and guide conservation officers toward meaningful action. A recent study found that "species groups are going extinct 35 times faster than the previous million years because of human activity."[15] More data can unlock a greater power of foresight.

These technologies are poised to substantially impact biodiversity conservation, transforming how we interact with and protect our natural environment. Collaborations between organizations such as Atos and the World Wide Fund for Nature show how technological and conservation expertise can come together. Their joint efforts to automate biodiversity surveillance show how technology can address environmental challenges.[16] The partnership has already helped to identify irregular data patterns, which increases data accuracy. Their machine-learning algorithms support research on demographic and environmental animal health.[17] Machine learning is a branch of AI that focuses on the use of data. These technologies can identify patterns and predict

10 "Top Three Emerging Conservation Technologies," World Wildlife Fund, accessed December 29, 2023, https://www.worldwildlife.org/stories/top-three-emerging-conservation-technologies.
11 "Tanzania Safari Tours, Kilimanjaro Trekking, and Zanzibar Beach Holidays," SafariBando, accessed January 23, 2024, https://www.safaribando.com/.
12 World Wildlife Fund, "Top Three Emerging Conservation Technologies."
13 "Top 10 Emerging Technologies of 2023," World Economic Forum, accessed January 23, 2024, https://www.weforum.org/agenda/2023/06/top-10-emerging-technologies-of-2023/.
14 "Great Migration in Serengeti in 2023/2024 - What, When, Where & How Much?" Monkey Adventures, accessed January 23, 2024, https://www.monkeyadventures.com/great-migration-in-serengeti-in-2023-2024-what-when-where-how-much/.
15 Patrick Greenfield, "'Mutilating the tree of life': Wildlife loss accelerating, scientists warn," *The Guardian*, September 19, 2023, https://www.theguardian.com/environment/2023/sep/19/mutilating-the-tree-of-life-wildlife-loss-accelerating-scientists-warn.
16 "Atos and WWF Partner Up to Leverage Technology to Support Biodiversity Conservation," Atos, last modified November 22, 2023, https://atos.net/en/2023/press-release_2023_11_22/atos-and-wwf-partner-up-to-leverage-technology-to-support-biodiversity-conservation.
17 Atos, "Atos and WWF Partner Up to Leverage Technology."

future movements based on historical data and environmental variables. In a rapidly changing environment, the technology used must be equally adaptable. AI provides a way for tech to keep up with the demands of external factors that threaten this migration event.

AI can also be crucial in mitigating human-wildlife conflicts, a significant concern surrounding the Serengeti. For example, AI can analyze data from GPS collars on elephants to predict when they might raid crops, allowing authorities to step in before conflicts occur. This will enable authorities to intervene before the elephants reach and reroute crops. This prevents them from encountering humans that might be deadly to both involved.[18]

The use of AI in migration studies is still in its early stages, and there is significant potential for future developments. For example, advances in AI could lead to more accurate predictions of migration patterns, which could help in planning conservation efforts. Moreover, as AI technologies become more sophisticated, they can assist in the study of other aspects of migration, such as the behavior of individual animals or the interaction between different species. AI has already significantly contributed to our understanding of the Great Migration in the Serengeti. Technology holds great promise for the future of migration studies and wildlife conservation.

Integrating technology in wildlife conservation represents a significant leap forward in protecting the Great Migration. Though at the early stages of their application in conservation, these technologies have shown the potential to revolutionize how we understand and track wildlife. It not only helps monitor and protect wildlife, but it also helps us to understand how ecological interactions occur. As these technologies evolve, their role in safeguarding the future of the Serengeti and other critical ecosystems worldwide becomes increasingly vital.

Recent Human Activity and the Great Migration

The recent impacts of human activities on the Great Migration are important for delegates of CMS to consider as they form potential solutions for conservation. This migration impacts both communities and economies. Therefore, balancing the benefits and challenges of recent human activities is essential for sustainable development and conservation.

The recent influx of tourists in Kenya and Tanzania has a double-edged impact on the Great Migration. Firstly, tourism plays a vital role in boosting local and national economies. This economic growth from increased tourism is often used for conservation research and funding. For example, the Serengeti National Park must pay corporate taxes to the Tanzanian government. So, the park must pay for itself through the revenue that it gets from tourists.[19] Therefore, the economic benefits from the tourism industry have a critical role in the health and management of parks and migratory species. Currently, Tanzania's tourism industry is making a comeback. Revenues have risen from USD 1.95 billion in 2022 to USD 2.99 billion in 2023.[20] Using these profits with the financial assistance of other investors, the Tanzania Wildlife Management Authority (TAWA) is launching a sustainable tourism project across its national parks. As of January 2024, USD 278 million will be used towards wildlife conservation and sustainably improving tourism experiences.[21] This is expected to increase tourism and economic growth and conserve wildlife and their habitats.

Private tour companies are also critical components of this economic growth and following conservation efforts. Tour companies like African Mecca Safaris offer daily tracker news on the migration, enhancing the visitor experience through

18 Jeremy S. Dertien, Hrishita Negi, Eric Dinerstein, Ramesh Krishnamurthy, Himmat Singh Negi, Rajesh Gopal, Steve Gulick, Sanjay Kumar Pathak, Mohnish Kapoor, Piyush Yadav, Mijail Benitez, Miguel Ferreira, A. J. Wijnveen, Andy T. L. Lee, Brett Wright, and Robert F. Baldwin, "Mitigating Human–Wildlife Conflict and Monitoring Endangered Tigers Using a Real-Time Camera-Based Alert System," *BioScience* 73, no. 10 (October 2023): 748–757, https://doi.org/10.1093/biosci/biad076.
19 "Conservation of Serengeti National Park," Serengeti National Park, accessed January 20, 2024, https://www.serengeti.com/conservation-serengeti.php.
20 Victor Oluwole, "Tanzania's Tourism Industry Bounces Back with 37.2% Increase in Tourist Arrivals," *Business Insider Africa*, September 11, 2023, https://africa.businessinsider.com/local/markets/tanzanias-tourism-industry-bounces-back-with-372-increase-in-tourist-arrivals/z042j6h.
21 "Private Investors Committ USD 278 Million to Tanzanian Wildlife Projects," *India Outbound*, January 5, 2024, https://indiaoutbound.info/trade-news/private-investors-commit-usd-278-million-to-tanzanian-wildlife-projects/.

informed, mapped routes that allow tourists to follow the migration closely.[22] Similarly, Titan Travel's "The Best of Kenya and Tanzania - Great Migration and Big Game Safari" tour is another example of how these tourism ventures enable guests to witness nature's marvels while helping economic growth.[23] These tourism activities are crucial for ongoing research and protection of these migratory species. The funds go towards anti-poaching measures, habitat restoration, wildlife research, and more. This ensures the ecosystem's sustainability and the Great Migration's continued existence. While these programs are not entirely dependent on money created by tourism, companies will often reinvest in the animals they observe, creating a more beneficial cycle.[24] This helps to support the limitation of unsustainable tourism practices.[25]

However, several issues appear when humans increasingly interact with wildlife and the environment. One notable problem is land degradation, or when land becomes undesirable because of human activity.[26] The heavy influx of tourists and the infrastructure developed to support them, such as lodges and roads, contribute to land degradation.[27] This degradation affects not only the landscape but also the wildlife that inhabits these areas. In one example, the Katavi National Park in Tanzania started upgrading and expanding its road systems in August 2023.[28] These updates will run a paved road through the park's center. This builds on a large plot of land that ungulates will inhabit during the dry season. This development is expected to decrease animal activity by up to five kilometers in this area. Therefore, the 46 kilometers of roads will impact mammals across an estimated ten percent of the park. The update will leave a lasting impact on wildlife and the environment. The presence of numerous vehicles can cause stress on wildlife, impacting their migration patterns, reproductive success, and overall behavior.[29] Wildlife also risk being harmed or killed by heavy traffic caused by tourist vehicles.[30] Also, this land degradation causes a reduction in green grass and soil quality. These changes can potentially impact the migration patterns of ungulates because they must move to different locations for food. This update can have profound consequences for wildlife and their habitat.

The influx of people also poses risks, such as disease transmission to local communities and wildlife. Diseases brought in by tourists worldwide can lead to outbreaks among wildlife, livestock, and other humans. This endangers the health and biodiversity of the Great Migration. According to an article published in August 2023 by *One Health Outlook*, several diseases impact both Maasai communities and animals. These include Rift Valley fever, rabies, brucellosis, anthrax, African Trypanosomiasis, and more. As more people interact with animals through tourism, the likelihood of contracting and spreading diseases increases. With factors like increased animal and wildlife populations, closeness between populations, competition for resources, and more, the effects of disease are predicted to worsen as well.[31] *Scientific Reports* published an article in September 2023 about Kenya's Rift Valley fever virus (RVFV). Originally caused by mosquitos, this study found that Rift Valley fever (RVF) outbreaks appear every five to ten years. However, the time between outbreaks in both animals and humans has been decreasing in the last

22 "The Socio-Economic Impacts of the Great Migration," African Mecca Safaris, accessed January 12, 2024, https://www.africanmeccasafaris.com/the-socio-economic-impacts-of-the-great-migration/.
23 Aaron Webber, "The Great Migration in Africa: A Complete Guide," A-Z Animals, accessed December 17, 2023, https://a-z-animals.com/blog/the-great-migration-in-africa-a-complete-guide/.
24 African Mecca Safaris, "The Socio-Economic Impacts of the Great Migration."
25 Webber, "The Great Migration in Africa: A Complete Guide."
26 Lennart Olsson, Humberto Barbosa, Suruchi Bhadwal, Annett Cowie, Kennel Delusca, Dulce Flores-Renteria, Kathleen Hermans, Esteban Jobbagy, Wener Kurz, Diqiang Li, Denis Jean Sonwa, Lindsay Stringer, Timothy Crews, Martin Dallimer, Joris Eekhout, Karlheinz Erb, Eamon Haughey, Richard Houghton, Muhammad Mohsin Iqbal, Francis X. Johnson, Woo-Kyun Lee, John Morton, Felipe Garcia Oliva, Jan Petzold, Mohammad Rahimi, Florence Renou-Wilson, Anna Tengberg, Louis Verchot, and Katherin Vincent, "Land Degradation," in *Climate Change and Land* (Cambridge: University Printing House, 2022), 347, https://www.ipcc.ch/srccl/chapter/chapter-4/.
27 "Overtourism in the Serengeti," Serengeti Watch, accessed January 1, 2024, https://serengetiwatch.org/overtourism/.
28 Tim Caro, "Road Upgrade Through Remote Tanzanian Park Threatens Wildlife (Commentary)," *Mongabay News*, August 31, 2023, https://news.mongabay.com/2023/08/road-upgrade-through-remote-tanzanian-park-threatens-wildlife-commentary/.
29 "Too Much Tourism in the Serengeti?," Conservation Action Trust, last modified October 2019, https://www.conservationaction.co.za/too-much-tourism-in-the-serengeti/.
30 Serengeti Watch, "Overtourism in the Serengeti."
31 Paul Gwakisa, Janeth George, Calvin Sindato, Anibariki Ngonyoka, Happiness Nnko, Justine Assenga, Sharadhuli Kimera, and Moses Ole Nessele, "Pillars for Successful Operationalization of One Health as an Ecosystem Approach: Experience from a Human-Animal Interface in the Maasai Steppe in Tanzania," *One Health Outlook* 5, no. 11 (August 2023), https://doi.org/10.1186/s42522-023-00087-0.

Elephants in the Serengeti
Credit: Floodmfx

decade.[32] This increases the likelihood of disease, especially in places where humans and animals interact.[33] For animals, RVF is deadly, especially for young animals. It can also cause miscarriages in pregnant females. Although this disease primarily impacts ungulates and livestock, people can also be infected with RVF from contact with the blood of an infected animal. In people, the illness often appears like a mild flu, but it can cause death in severe cases.[34] Therefore, this recent discovery that RVF outbreaks are becoming more common is especially concerning considering the deadly impacts it can have on humans and animals.

Furthermore, human-related climate change has negatively impacted the Great Migration. Largely caused by CO2 produced by human activities, extreme climate events, and global warming are becoming more severe and common.[35] This exposes animals to new dangers and challenges. These changes can increase the demand for water and grasses during droughts and threaten paths with flooding during prolonged rainy seasons.[36] Not only do animals have less access to food and water, but they also risk habitat loss. Therefore, the change in weather and environment has inspired animals to alter their migration patterns and move towards more habitable environments.[37] In one example, extreme weather in Tanzania affected migration patterns in December 2023. During this time of the year, Tanzania is experiencing "short-rains."[38] However, unseasonal heavy rainfall, flooding, and landslides have resulted in extreme damage to the terrain.[39] This impacted at least 750 acres of land and has contaminated most water sources, raising the likelihood of disease for both people and animals.[40] This stressful event for ungulates can

32 Mathew Muturi, Athman Mwatondo, Ard M. Nijhof, James Akoko, Richard Nyamota, Anita Makori, Mutono Nyamai, Daniel Nthiwa, Lilian Wambua, Kristina Roesel, S. M. Thumbi, and Bernard Bett, "Ecological and Subject-Level Drivers of Interepidemic Rift Valley Fever Virus Exposure in Humans and Livestock in Northern Kenya," *Scientific Reports* 13, (September 2023), http://doi.org/10.1038/s41598-023-42596-y.
33 Gwakisa, et al., "Pillars for Successful Operationalization of One Health as an Ecosystem Approach."
34 "Rift Valley Fever," World Health Organization, accessed January 23, 2024, https://www.who.int/health-topics/rift-valley-fever.
35 "Causes of Climate Change," European Commission, accessed January 23, 2024, https://climate.ec.europa.eu/climate-change/causes-climate-change_en.
36 "Climate Change," Serengeti Watch, accessed January 23, 2024, https://serengetiwatch.org/climate/.
37 Daisy Dunne, "Analysis: Africa's Extreme Weather has Killed at Least 15,000 People in 2023," Carbon Brief, last modified October 25, 2023, https://www.carbonbrief.org/analysis-africas-extreme-weather-have-killed-at-least-15000-people-in-2023/.
38 "How Weather Affects the Serengeti-Mara Migration," Mondisti, last modified August 29, 2023, https://mondisti.com/the-great-migration-tanzania/.
39 "Tanzania Flooding Continues, Fatalities, and Casualties Rise; The Climate-Change Factor is on Display," *Black Headline News*, December 6, 2023, https://www.bhnnow.com/post/tanzania-flooding-continues-as-fatalities-and-casualties-rise-the-climate-change-factor-on-display.
40 "Tanzania: Heavy Rains and Flooding Flash Update No. 2, 12 December 2023," United Nations Office for the Coordination of Humanitarian Affairs, last modified December 12, 2023, https://reliefweb.int/report/united-republic-tanzania/tanzania-heavy-rains-and-flooding-flash-update-no-2-12-december-2023.

impact their movements, behavior, and reproductive success in the Great Migration. Therefore, as human-related extreme weather events are expected to become more frequent and more serious over time, the effects of this update are important to consider. The number of people interacting with the Great Migration is increasing. For animals, this has a nuanced impact. While income from tourists can be used for conservation research and funding, human activities can also lead to land degradation, disease, and global warming. Therefore, effectively balancing this relationship is crucial for the conservation of the Great Migration.

Conclusion

In 2023, the Great Migration was described as '...one of violence and endurance as they battle onwards, past granite kopjes where cheetah or lion lie in ambush, through flood-swollen and crocodile infested rivers, over parched plains scorched by wildfires, to sanctuary in the north…' is reliant upon technological pursuits and positive human engagement.[41] The journey of ungulates in the Masai Mara Migration of 2023 highlights the vital role of advanced mapping, tracking technologies, and human interactions.

AI, GPS, and other innovative tools have brought a new depth of understanding to this natural spectacle. By effectively monitoring these animals' migratory paths and behavior, these technologies have enhanced understanding of their needs and challenges. They have also bolstered conservation efforts. The data gathered provides crucial insights for managing the ecosystem, ensuring sustainability, and addressing challenges posed by environmental changes and human interactions. As we progress, the continued application of these technologies in tracking and protecting will remain a cornerstone in preserving this magnificent phenomenon for future generations. In thinking about solutions to the demands of the Great Migration, CMS needs to question the relevance of new technologies and the potential dangers they pose.

Additionally, tourism's impact can be hugely beneficial to supporting sustainable practices but can be equally as damaging. It offers substantial economic benefits necessary for local communities and conservation efforts. However, it also brings environmental challenges like habitat degradation and wildlife disturbance. Adapting to the changes in the migratory landscape is essential to balance these impacts. With this in mind, dynamic and collaborative responses to an ever-changing migratory landscape are essential for CMS delegates.

41 "The Great Migration in Africa," Serengeti National Park, accessed December 18, 2023, https://www.serengeti.com/great-migration-africa.php.

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TOPIC B:
THE CONSERVATION OF PACIFIC SHARK SPECIES

Photo Credit: istolethetv

Introduction

As a keystone species, sharks contribute to ocean ecosystems in several ways. The health of coral reefs, seagrass beds, and even commercial fisheries is dependent on sharks.[1] Sharks are also very economically relevant, with some of the world's largest shark meat consumers being Europe and South America. Many consumers worldwide engage in the consumption and distribution of shark products without even realizing it.[2] Threatened shark species can be found in pet food products, skincare and makeup, and vaccines.[3] In the past half a century, shark populations have declined by 71 percent and threatened the conservation status of sharks around the globe.[4] Climate change, habitat loss, and human activities such as overfishing and the shark meat trade have led to the continued disappearance of sharks for years and continue to do so now. However, with COP28 recently concluded, efforts to conserve marine life around the globe and slow the harmful effects of climate change have been reignited. With them, there is hope that shark species will recover from their threatened and endangered statuses. World leaders have made commitments and recent groundbreaking developments in environmental cooperation, which has the potential to allow shark species to recover fully and restore the oceans to their natural glory.

Recent Anthropogenic Impacts on Sharks

Climate change has become a growing issue in recent years, with scientists and conservation activists bringing awareness to the planet's rising temperatures. One of these such efforts is shark ecotourism, an experience in which tourists pay to interact with wild sharks. This concept is helpful for several reasons—it benefits the economy where these sharks live and helps break the negative stereotypes surrounding sharks. Although shark ecotourism is practiced around the world, most of it occurs in Mexico, Honduras, the Bahamas, Maldives, Australia, and other places with large shark populations.[5] Shark ecotourism has existed for many years, with individual businesses investing USD 100,000–500,000 annually. More popular locations can bring up to USD two million annually. Tourists are also supportive of the sustainability efforts made by shark ecotourism, as they are 67.4 percent more likely to choose a vacation spot if they believe the marine life there is treated well.[6]

Tourists who engage in shark ecotourism support environmental conservation efforts, which is important for many countries practicing this ecotourism. The shark ecotourism industry is also expected to return now that international travel is growing after the COVID-19 pandemic. Despite the creation and support for this industry, shark ecotourism management needs to do more to protect the sharks themselves. Some places will use chum, or bloodied pieces of chicken and fish, to attract sharks for photos. When chum is not eaten and begins to decay, it forms microbes that lead to coral death and algal blooms.[7] Additionally, shark baiting and wrangling cause sharks to strike the sides of cages, leading to injury and death. A recent study from the University of Granada in Spain found that whale shark diving, in particular, has grown in popularity. Because more people are visiting ecotourism sites, regulating tourists and effectively protecting sharks is becoming harder. Swimmers will sometimes ignore rules and attempt to pet or poke the sharks, which causes them to become stressed. As well as that, even just knowing that a human is nearby makes sharks anxious and erratic because they believe a predator is nearby and try to escape.[8] Of 708 whale sharks identified in

1 "The Importance of Sharks," Oceana, accessed December 10, 2023, https://europe.oceana.org/importance-sharks-0/.
2 Md Robiul Hasan, Jennifer A. Chaplin, Peter B. Spencer, and Matias Braccini, "Consumption of shark products: The interface of sustainability, trade (mis)labelling, human health and human rights," *Fish and Fisheries* 24, no. 5 (June 2023): 777-795, https://doi.org/10.1111/faf.12768.
3 Melissa Cristina Márquez, "There May Be Shark In Your Make Up And Pet Food," *Forbes*, September 8, 2019, https://www.forbes.com/sites/melissacristinamarquez/2019/09/08/there-may-be-shark-in-your-make-up-and-pet-food/?sh=135b8f207098.
4 Mary Kate McCoy, "Meet the Startup Using Magnets to Keep Sharks at Bay," Conservation International, last modified January 8, 2024, https://www.conservation.org/blog/meet-the-startup-using-magnets-keep-sharks-at-bay.
5 Verónica M. Garrido, "Misguided ecotourism may lead to changes in whale shark behavior," *El País: Science*, September 27, 2023, https://english.elpais.com/science-tech/2023-09-27/misguided-ecotourism-may-lead-to-changes-in-whale-shark-behavior.html.
6 Sam Baird, "New Study Values Madagascar Whale Shark Tourism at $1.5 Million Amid Calls for Stronger Protections," *Marine Megafauna Foundation*, October 17, 2023, https://marinemegafauna.org/news/madagascar-whale-shark-ecotourism.
7 "Shark Ecotourism," Shark Stewards, accessed January 7, 2024, https://sharkstewards.org/shark-ecotourism/.
8 "Shark ecotourists may have a negative effect on shark behavior," Nature Publishing Group, accessed December 30, 2023, https://phys.org/news/2023-09-shark-ecotourists-negative-effect-behavior.html.

the study, 76 percent were injured, most likely by propeller cuts from boats violating speed limits.[9] Sharks have been observed to swim at slower speeds, become frantic, and indicate escape behaviors when near humans.[10] Despite this evidence, shark ecotourism is shown in a very positive light because of its impact on local economies. Therefore, no one is held accountable for mistreating sharks and their habitats, and minimal effort has been made to expose or regulate the industry.

In the long term, it is difficult to determine how unsustainable practices will affect sharks. Exposure to ecotourism causes increased metabolic activity, injury, and sudden shifts in energy. These three things can cause immense damage to a shark.[11] They could even suffer reduced reproductive capabilities in the future.[12] However, because ecotourism has just begun to recover from the pandemic lockdowns, very few changes have been made to protect the sharks further. Shark ecotourism has created thousands of jobs and customer satisfaction, so there is no motivation to change current practices. Ecotourism was designed to protect the environment and benefit the economy, especially in places where shark finning is an issue. However, sharks and the environment can easily degrade further when shark ecotourism businesses do not uphold standards and enforce rules. Multiple studies have highlighted humans' harm to sharks, but very few efforts have investigated the impact of ecotourism. The only times that governments have banned shark ecotourism within their countries is when an agitated shark attacked someone, but it is becoming clearer that people would not be at risk if the sharks in these areas were treated better.[13]

Another threat to the health of shark populations is ocean acidification. The natural pH of the world's oceans before the Industrial Revolution was around 8.2.[14] With the planet's warming, the pH has slowly dropped to 8.05.[15] While this might not seem like a huge difference, even a small change in pH impacts marine life. For example, the acidification of the oceans has been slowly lowering coral skeletons' density, making them more vulnerable to erosion.[16] The health of coral reefs is critical because although they only make up less than 1 percent of the ocean floor, coral reefs are home to more than 25 percent of all marine life.[17] Coral reefs allow for biodiversity, improving marine species' ability to adapt to climate change. However, because of ocean acidification, coral reefs are being bleached and withering away. All ecosystem levels are threatened without coral reefs, from apex predators like sharks to sea cucumbers and urchins. Because the oceans are acidifying at a rate that marine life cannot compete with, it is estimated that over 1,600 species of fish and over 600 species of coral are threatened by ocean acidification and climate change.[18] Also, sharks, in particular, suffer at the hands of dropping pH.

Sharks are diverse and often have very different diets, so their teeth are very different. Horn sharks have small, flat teeth for crushing urchins and crustaceans, tiger sharks have serrated teeth for ripping apart seals, and whale sharks have teeth that barely serve any purpose. However, shark teeth are not rooted into the gum and fall out and get replenished often. Because of this, there is speculation that rising acid levels will make shark teeth more brittle and unable to hold onto prey. During COP 28, this issue was brought to light, and a solution was presented. The International Atomic Energy Agency (IAEA) and the Kuwait Institute for Scientific Research (KISR) will release a research vessel named AlMostakshif in the hopes of sampling a large geographic region and determining how ocean

9 Garrido, "Misguided ecotourism."
10 Joel H. Gayford, William D. Pearse, Rafael De La Parra Venegas, and Darren A. Whitehead, "Quantifying the behavioural consequences of shark ecotourism," *Scientific Reports* 13, no. 1 (2023): 1-11. https://doi.org/10.1038/s41598-023-39560-1.
11 Gayford, Pearse, De La Parra Venegas, and Whitehead, "Quantifying behavioural consequences," 1-11.
12 Gayford, Pearse, De La Parra Venegas, and Whitehead, "Quantifying behavioural consequences," 1-11.
13 Garrido, "Misguided ecotourism."
14 Amihan Althea, "Impact of Ocean Acidification on Coral Reefs and the Marine Ecosystems in Philippines," *International Journal of Natural Sciences* 3, no. 2 (November 2023): 48-60, https://doi.org/10.47604/ijns.2178.
15 "Average ocean pH level worldwide from 1985 to 2020," Statista, published August 23, 2023, https://www.statista.com/statistics/1338869/average-global-ocean-ph/.
16 Althea, "Impact of Ocean Acidification," 48-60.
17 "What is biodiversity and why is it so important?" *Great Barrier Reef Foundation*, September 1, 2023, https://www.barrierreef.org/news/explainers/what-is-biodiversity-and-why-is-it-so-important.
18 *Great Barrier Reef Foundation*, "What is biodiversity and why is to so important?"

acidification is impacting marine life.[19] This collaboration has great promise and was praised by those at COP 28.

Producers and manufacturers may try to keep it a secret, but shark products are found in many of our products. Pet food, sunscreen, makeup, skincare, and vaccines all contain shark products.[20] Sharks are also important to the cultures of many different places, such as Hawaii, China, and all across the Pacific. Because of this, shark fishing is one of the most popular industries for shark migratory pathways in countries like Mexico and Honduras.[21] In fact, in areas where shark populations were dwindling because of overfishing, shark ecotourism was meant to protect the species. Ecotourism was marketed as a way to help the local environment recover while also providing people with jobs. Despite that, shark overfishing is still a huge problem for many species. Overfishing occurs when sharks cannot reproduce faster than they are removed, and it is a risk to 100 percent of threatened shark species and a threat to 67 percent of shark and ray species.[22] If overfishing no longer existed, only about 33 percent of sharks would be at risk of endangerment. Overfishing is of particular risk to sharks because of their biology. Sharks are slower to mature, have longer pregnancies, and produce fewer offspring than commercially fished species like trout, tuna, and salmon. Even though overfishing is the greatest threat to sharks, not all sharks are caught intentionally. Most sharks caught by nets are classed as bycatch, which means they were caught when the intention was to catch a different type of fish. Despite this, almost all bycaught sharks are still sold, sometimes illegally.[23]

People are often surprised to learn that certain products contain parts of sharks, mostly because producers and restaurants will purposefully label products vaguely by saying that a product contains "shark meat" but not clarifying if it comes from an endangered species. This is sometimes to avoid the legal consequences of selling illegal shark meat, but it also appeals to conservationists who will only buy sustainable products. Shark meat, fins, cartilage, and leather are sold globally. Shark cartilage is a health supplement supposedly capable of aiding arthritis, and shark leather is used on luxury clothing and accessories. Many facial cleansers and moisturizers on the market currently advertise squalene, which is shark liver oil.[24] Shark teeth and jaws can also fetch huge amounts of money on the black market, with whole jaws priced at tens of thousands of dollars.[25] To avoid being misled by companies who misuse shark products, experts suggest that consumers avoid products with vague labeling like "shark steaks."[26] The best action is for consumers to refuse to buy unsustainable or misleading shark products. By doing this, you can force shark fisheries to practice sustainable fishing and curb the trade of illegal shark products.

Scientists are beginning to combat the lack of shark meat regulation through technology. Environmental DNA, or eDNA, has recently started to help identify the genetic remains of animals passing through an area. It happens like this: through a small plastic tube, a bit of ocean water is taken to be sampled. In this water, particles like dead animal cells or bits of soil are tested to see what animals have left behind in their travels.[27] This revolutionizes shark conservation efforts because we can now find where and when animals have traveled through the oceans. We can identify if invasive species have taken over specific habitats or how sharks and other marine species cope with lower pH levels in our seas. With time, this method may become the most reliable shark tracking method. One potential issue is that no easy or live eDNA testing system exists. Testing eDNA requires a team of practiced scientists who must do the procedure. Because of this, it can be difficult to test certain dangerous or isolated areas of the globe. Also, eDNA can only find out what has happened in the near past, so it cannot track sharks in real-

19 Melissa Evans, "New IAEA-KISR Ocean Health Project to Help Fill Gaps in Ocean Data," *IAEA*, December 11, 2023, https://www.iaea.org/newscenter/news/new-iaea-kisr-ocean-health-project-to-help-fill-gaps-in-ocean-data.
20 Marquez, "There May Be Shark."
21 "Sharks in Atlantic, Gulf, and Caribbean Coastal Waters," NOAA Fisheries, published September 25, 2023, https://www.fisheries.noaa.gov/atlantic-highly-migratory-species/sharks-atlantic-gulf-and-caribbean-coastal-waters.
22 "What is overfishing?" Shark Trust, accessed December 19, 2023, https://www.sharktrust.org/shark-threats.
23 Shark Trust, "What is overfishing?"
24 Shark Trust, "What is overfishing?"
25 Shark Trust, "What is overfishing?"
26 Shark Trust, "What is overfishing?"
27 Dino Grandoni, "The high-tech hunt for one of the world's most elusive sharks," *Washington Post,* September 29, 2023, https://www.washingtonpost.com/climate-solutions/interactive/2023/edna-angel-shark-biodiversity/.

time. A different piece of technology was recently developed that may help with these problems. A group of researchers in South Africa developed the Fin Spotter, which is an AI program that identifies shark traits in photos to see if that shark has been spotted in other regions.[28] If the accuracy of this program improves, the combined use of the Fin Spotter and eDNA will be a massive help to marine life everywhere.

Sharks are under the domain of the Convention on the Conservation of Migratory Species of Wild Animals because they are just that: wild migratory animals. Sharks are crucial in helping scientists understand the ocean's state and the health of its ecosystems. Sharks maintain coral reef habitats and food chains by picking off smaller and weaker fish species. An overabundance of one species in a coral reef could indicate a dying shark population and ecosystem.[29] Recently, though, the migration pattern of sharks has been falling apart. The National Oceanic and Atmospheric Administration (NOAA) has confirmed that some shark species migrate from the south to the north earlier and return south later in the year.[30] As ocean temperatures warm, sharks seek to escape from warmer waters and stay north longer. Sharks also seem to be driven by schools of fish with the same goal. When prey fish travel north sooner, sharks quickly follow. If sharks move from their resting habitats sooner and for longer periods, marine animals lower on the food chain will begin to take over coral reefs, resulting in the dominance of algae and the deaths of thousands of fish.[31] So, even though scientists depend on sharks to determine the health of marine life, human impact on the climate is affecting oceans, sharks, and thousands of other marine species.

United Nations and Other Legal Efforts

At the 19th meeting of the Conference of the Parties (COP19), it was agreed that 54 shark species would be added to the CITES Appendix II on November 25, 2023.[32] This officially classifies them as being not necessarily threatened with extinction but needing monitoring to aid in their survival. As of November 25, 2023, 146 shark species have been added to CITES Appendix II, with some having the critically endangered status that puts them in Appendix I.[33] This new classification of shark species will make it harder to obtain permits to fish in certain areas for sharks. Alongside the events of COP19, COP28 occurred recently with promises to commit to a "green transition." For the first time in COP history, fossil fuel use was addressed, and commitments were made to move away from nonrenewable resources.[34] While this is anticipated to be a slow-moving process, if successful, it will help prevent global temperatures from skyrocketing. The habitat of sharks and other marine species rely on steady ocean temperatures, and they could make a population recovery if developed countries can commit to reducing their fossil fuel consumption.

Updated at COP28, the Programme of Work and Mediterranean Action Plan of the United Nations Environment Programme (UNEP/MAP) follows the model of the Sustainable Development Goals to promote action. By 2030, the Contracting Parties have committed to protecting at least 30 percent of coastal and marine areas.[35] This would make it extremely difficult for fisheries to overfish sharks or dock boats in shark habitats. The Specially Protected Areas and Biodiversity (SPA/BD) Protocol aims to protect six additional species of sharks and rays by highlighting areas

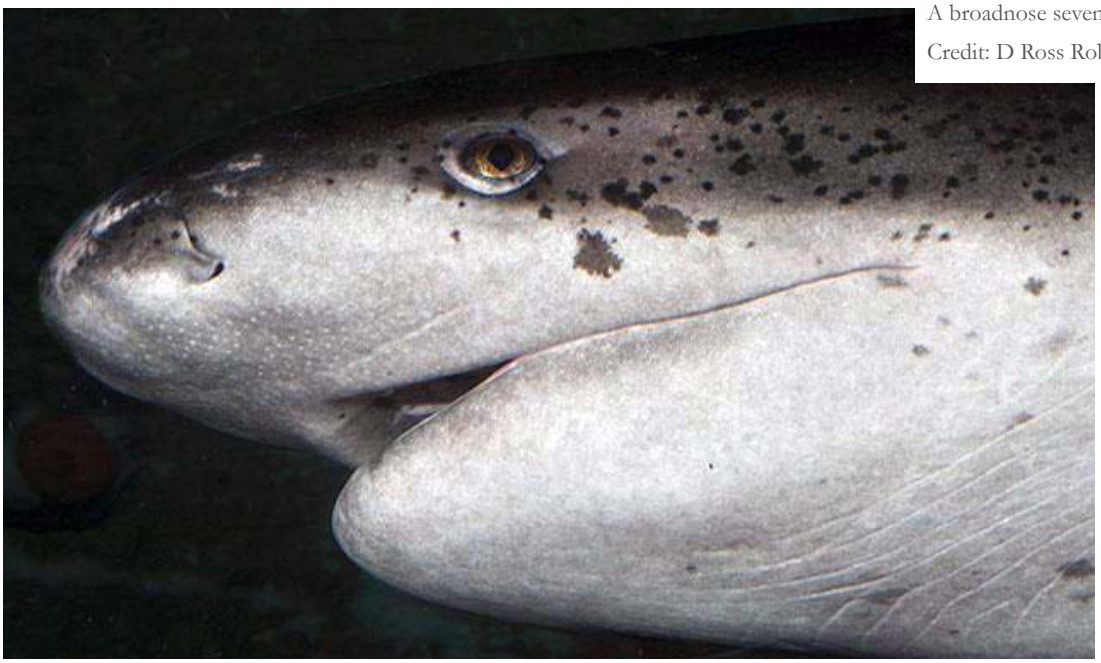
28 Gabrielle Jones, "These 'shy' sharks are under threat, so researchers are using AI to track them," *CNN,* November 16, 2023, https://www.cnn.com/2023/11/16/world/cape-radd-shy-sharks-fin-spotter-ai-tracking-south-africa-spc-scn/index.html.
29 Oceana, "The Importance of Sharks."
30 Mark Taylor, "NOAA Study Finds Ocean Temperatures Impacting Migration Patterns," *Saltwater Sportsman*, September 8, 2023, https://www.saltwatersportsman.com/news/noaa-study-finds-ocean-temperatures-impacting-migration-patterns/.
31 Taylor, "NOAA Study."
32 Convention on International Trade in Endangered Species of Wild Fauna and Flora, "Delayed CITES listings of sharks and straw-headed bulbul came into effect on 25 November 2023 as agreed by CoP19," news release, November 27, 2023, https://cites.org/eng/news/delayed-cites-listings-sharks-bulbul-25-november-2023.
33 Convention on International Trade in Endangered Species of Wild Fauna and Flora, "Delayed CITES listings of sharks and straw-headed bulbul came into effect on 25 November 2023 as agreed by CoP19."
34 United Nations Office for Disaster Risk Reduction, "COP28 ends with progress on loss and damage, Santiago Network and transition away from fossil fuels," news release, December 13, 2023, https://www.undrr.org/news/cop28-ends-progress-loss-and-damage-santiago-network-and-transition-away-fossil-fuels.
35 United Nations Environment Programme, "Barcelona Convention COP23 commits to a green transition in the Mediterranean," press release, December 8, 2023, https://www.unep.org/unepmap/news/press-release/barcelona-convention-cop23-commits-green-transition-mediterranean-adopts-ambitious-measures.

of importance along migratory routes.[36] Edits to the Land-Based Sources (LBS) Protocol aim to manage agriculture, aquaculture, and urban stormwater management to reduce runoff and plastic pollution to marine ecosystems.[37] It is clear that COP28 intended to expedite the goals of past resolutions and decisions, and this urgency was reflected in the edits made to these documents.

Individual efforts to conserve shark populations have been positive by the end of 2023. In Europe, fisheries, scuba companies, aquariums, and restaurants came together to discuss possible conservation efforts. Commercials meant to spread awareness, sustainable catch-and-release regulations, and identify concerning areas are among some strategies to help shark populations recover.[38] So far, whether or not these commercials have impacted fisheries and shark populations is inconclusive. The Western and Central Pacific Fisheries Commission (WCPFC) recently banned the sale of bycatch sharks. The eastern coast of the United States also saw a slight decrease in catch-and-release strategies used on sharks. In Costa Rica, Congresspeople are being contacted and petitioned to take action. A letter was sent to Costa Rica's Environmental Commission expressing disappointment over a bill that failed to pass. The bill intended to prohibit the extraction of shark species to commercialize their habitats for fishing and intended for sharks to be listed as "wildlife" and not "commercial species." Actions like these have occurred in conjunction with international conservation efforts, although they have yet to yield any results.[39]

In the United States, Texas recently passed a bill prohibiting the sale, purchase, transport, and possession of shark fins with the intent to sell.[40] Shark finning occurs when sharks' top, side, and tail fins are cut away and kept. Then, the finless shark is dropped into the ocean, where it dies of either suffocation, starvation, or blood loss.[41] In 2022, nearly 400 shark fins from many threatened species were found at a single seafood restaurant in San Antonio. The restaurant owners were charged with a class B misdemeanor and punished with 180 days in jail and a USD 2,000 fine. Several restaurants have since been known to trade 30,000 pounds of shark fins. With the new bill, these shark fins must be discarded, yielded to police,

36 United Nations Environment Programme, "Barcelona Convention COP23 commits to a green transition."
37 United Nations Environment Programme, "Barcelona Convention COP23 commits to a green transition."
38 Denis Loctier, "European Sharks 'in danger and not dangerous,' warns marine expert," *Euronews.green*, December 19, 2023, https://www.euronews.com/green/2023/12/19/european-sharks-in-danger-and-not-dangerous-warns-marine-expert.
39 Turtle Island Restoration Network, "Taking Action to Protect the Sharks of Costa Rica," news release, September 20, 2023, https://seaturtles.org/taking-action-to-protect-the-sharks-of-costa-rica/.
40 Mara Asmis and Luke Metzger, "New Texas law further restricts shark 'finning'," *Environment Texas Research and Policy Center*, August 29, 2023, https://environmentamerica.org/texas/center/articles/new-texas-law-further-restricts-shark-finning/.
41 Asmis and Metzger, "New Texas law."



A broadnose sevengill shark
Credit: D Ross Robertson

or destroyed immediately.[42] This dramatically discourages the fishing and trading of shark products, limiting overfishing in some regions of the Gulf of Mexico. In California, researchers have been tracking a species of shark around San Francisco Bay and advocating the California Fish and Game Commission to protect the broadnose sevengill shark.[43] The San Francisco Bay is the only known nursery for this shark species, so without the protection of the state of California, it is likely that the sevengill shark will go extinct.[44] Advocacy in these states is vital because they are so close to waters that provide habitats for threatened species.

Beyond any international jurisdiction lies the high seas. Although they are not technically under the influence of any one governing body, they do not escape from the impacts of human activity. The High Seas Treaty, or the Biodiversity Beyond National Jurisdiction (BBNJ) Agreement, was signed in September of 2023 to combat this. This treaty is the first international legally binding document that works to conserve and sustainably regulate marine biodiversity in areas beyond any one country's influence.[45] The ratification of this treaty is groundbreaking because over 80 countries have agreed to collaborate over an area that no individual has power over. A few systems have been implemented to ensure it achieves its "30x30" goal of protecting 30 percent of marine ecosystems by 2030. The Global Ocean Observing System (GOOS), led by the Intergovernmental Oceanographic Commission (IOC), has developed a few measurements to track. The high seas' biological, physical, and biogeochemical states will be monitored to track the oceans' health and variability.[46] Once identified, protecting any aspect of marine life that falls under the BBNJ Agreement will become easier. Despite this leap in progress, monitoring such a large area for an extended period has proven challenging to report results and data accurately.[47] However, GOOS and the IOC have agreed to combine efforts to have countries deliver resources and contributions. When that happens, the spread of accurate knowledge, observations, and data can occur, and steps can be taken to conserve and protect marine life and the future of threatened shark species beyond any coast.

With recent legal work to protect critical shark species and their environments, conservation efforts are improving for sharks. However, these changes are expected to take time, funds, and effort to improve the well-being of sharks in the long run. Therefore, delegates of the CMS should consider these updates to work together to solve current issues in the conservation of Pacific shark species.

Conclusion

The survival of sharks worldwide is crucial to many different aspects of marine life, but it remains alarmingly overlooked. Sharks are indicators of environmental health in our oceans, and their disappearance will have irreversible consequences on the traditions of humans and the life of aquatic fauna and flora. Sharks have significant cultural ties in many countries, meaning parts of them are eaten and used differently. Because of this, shark fisheries and distributors will go to great lengths to hide their activities from authorities. Through the efforts of several international organizations, technological advancements, and spreading awareness, sharks will have the opportunity to bounce back from the persistent human activities that threaten them with extinction. However, several questions remain. Whether or not it is possible for governments to feasibly control the shark meat trade and place restrictions on a long-standing tradition is still up for debate, as are the limits of our technology and knowledge when it comes to migratory patterns and habitats. CMS aims to conserve the migratory pathways and lives of threatened species around the globe and works together with many other organizations to do so. To bring these species back from the brink of extinction, delegates must cooperate and understand the abilities and willingness of their countries to restore and preserve these keystone species.

42 Asmis and Metzger, "New Texas law."
43 Nathan Frandino, "In San Francisco Bay, ecologists work to protect sevengill sharks," *Reuters*, September 14, 2023, https://www.reuters.com/science/san-francisco-bay-ecologists-work-protect-sevengill-sharks-2023-09-14/.
44 Frandino, "In San Francisco Bay."
45 UNESCO, "With the 'High Seas Treaty' on biodiversity signed, what do we need to do next?" news release, October 26, 2023, https://www.unesco.org/en/articles/high-seas-treaty-biodiversity-signed-what-do-we-need-do-next.
46 UNESCO, "With the 'High Seas Treaty' on biodiversity signed, what do we need to do next?"
47 UNESCO, "With the 'High Seas Treaty' on biodiversity signed, what do we need to do next?"

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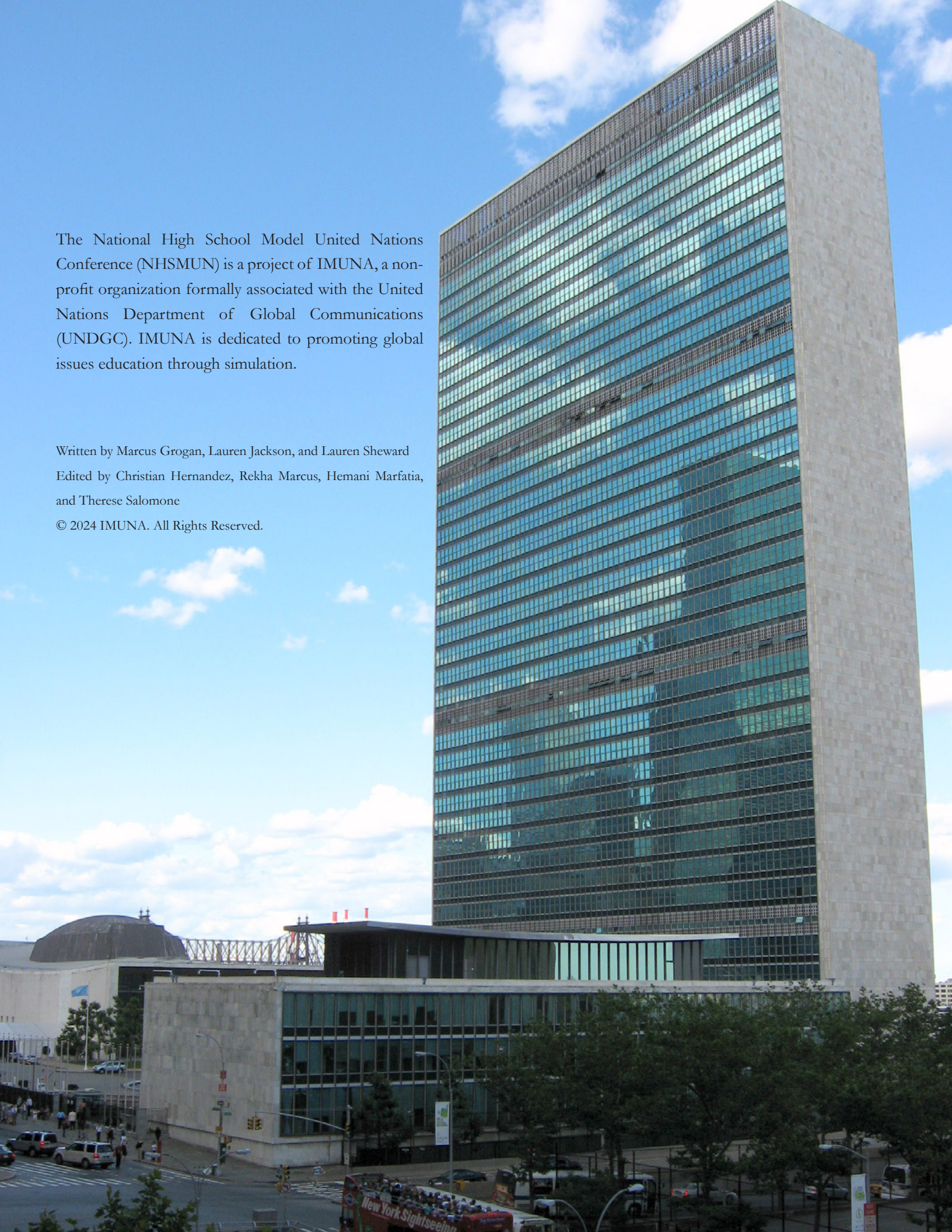

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