Final Evaluation Report

Your Details	
Full Name	Andrej A. Gajić
Project Title	Let's create better future for sharks, skates and rays in the eastern Adriatic: towards the unique regional protection
Application ID	28584-B
Grant Amount	£ 9738
Email Address	agajic@sharklab-adria.org
Date of this Report	15th of February 2021. (original deadline proposed in the project was postponed due to the COVID-19 pandemic)

Despite all the difficulties we faced caused by socio-political restrictions due to the pandemic of SARS-CoV-2, my team still managed to fulfil all planned activities and to gather better results than initially expected.

The research activities resulted in six original scientific papers as stated in the report below. Besides, due to the high demand, I wrote the 2nd Edition of the book "Sharks, skates and rays of the eastern Adriatic" with several important amendments. Through entire project, the Rufford Foundation received significant media publicity, while my work was featured on National Geographic, then NatGeo WILD Sharkfest 2020, Discovery Channel and dozens other media.

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Unique protection measures are developed and proposed in 4 states				Species-specific unique regional measures for long-term in-situ conservation have been developed and proposed for 31 species of sharks and 24 species of skates and rays. Measures already got governmental support.
Citizen science is encouraged and empowered by ID and scientific tools				Through our portal, fishermen have reported subadult angel shark that was thought to be extinct in the Adriatic as well as numerous other encounters including critically endangered and less known deep-sea species.
Conservation plans are discussed through the EU Environmental Agency				Based on my work through three RSG grants I was appointed as the state representative for the EIONET within the European Environmental Agency. During our annual meeting in Copenhagen, I have discussed conservation plans.
Field expeditions in Slovenia, Croatia, Bosnia and Montenegro				Although the pandemic affected our timeline and work dramatically, expeditions were successfully conducted and we gained highly

				important information on species habitats, breeding sites and distribution that are to be published soon.
IUCN status is proposed for the 3 species previously considered as a DD				Final conclusions through the conducted assessment according to the IUCN principles on blackspotted smoothhound, common stingray and common eagle ray will be published most likely in Marine Policy journal.
Fish markets and stakeholders are engaged in the conservation efforts				During the fish market analysis, I have established strong partnership with over 40 major fish markets in the eastern Adriatic – thus I am receiving records and samples to study in our labs every 2-3 months.
Interactive workshops and lectures for undergraduate and graduate students				"Enrolling in the workshops was one of the wisest decisions that I have made since I have become a student of Marine Sciences" is just one of the many positive feedback I have received. Check them all!
Scientific papers and other publications are prepared and published				The project resulted in the six original scientific papers, of which one is already published. Besides, given the exceptional demand I have finished the Second edition of the book "Sharks, skates and rays".
Local and regional media campaign was successfully conducted				RSG funded work was featured by over 100 media, including National Geographic and Discovery Channel. I have received hundreds of positive comments as well as several important collaborations offers.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

The outbreak of the SARS-CoV-2 and following pandemic that happened in the first stage of the project has remarkably affected global health, various socio-economic conditions and has significantly reduced possibilities for research and conservation. Despite that, endangered animals do not understand any sort of crisis and their vulnerability is still increasing day by day, as pressures such as uncontrolled fisheries, lack of inspections and accumulation of the waste (especially sanitary-medical waste) also increasing daily. Due to the bad epidemiological situation in the Balkans during 2020, most of our planned activities were forced to be postponed or cancelled. Thus, our team was forced to quickly adapt as much as possible to the dramatic

changes and to continue the full efforts to establish the unique regional protection, as a major long-term goal. We have continued to work out in the field and labs, together with our partners in a different way than planned but still highly successful. Besides, during the lockdown we have focused on the raising the awareness, different media campaigns and government/stakeholder engagement.

3. Briefly describe the three most important outcomes of your project.

Unique regional conservation measures are developed, proposed and supported by different governmental bodies
Species-specific long-term in-situ measured for the unique regional conservation of threatened and migratory species are developed and proposed for 31 species of sharks and 24 species of skates and rays. Proposed measures were discussed at the European Environmental Agency EIONET meeting in Copenhagen and have received the support from several EU and non-EU governments and/or representatives.

Immeasurably significant data is gathered through the expeditions and laboratory analysis, while the activities was promoted in the media
So far, the project activities resulted in six original scientific papers that was written in cooperation with five partner institutions from Croatia, Montenegro, Bosnia and Herzegovina, Poland and United States.

Project activities were featured in local, regional and international media in over 100 articles and TV shows. It is worth to emphasize that my RSG funded work was featured through National Geographic and Discovery Channel.

Students and citizen scientists are encouraged and empowered to involve the research and conservation efforts through the interactive workshops
Portal and ID keys, together with the student and wider public education have empowered both citizen scientists and undergraduate/postgraduate students to participate and contribute to our efforts. Thus, through the portal, we have already received confirmed sightings and records of several critically endangered and less-known species. The participants were delighted with our programme.

4. Briefly describe the involvement of local communities and how they have benefitted from the project.

Entire project implied high involvement of the local communities, especially fishermen, divers, owners of the agricultural facilities, undergraduate and postgraduate students and the wider public as well. Citizen science was encouraged and empowered so that fishermen and other stakeholders not just contribute to the knowledge by proper identification and reporting their findings but get directly involved with long-term conservation through on-site stewardship, mitigating of the non-selective gear, and returning live specimens back to the water. Through the portal fishermen reported several critically endangered species without known records in past 3 to 5 years.

5. Are there any plans to continue this work?

Previous three RSG projects focused on the completely unexplored waters of Bosnia and Herzegovina and three other eastern Adriatic. The only omitted state of the region is Albania, due to the almost complete lack of data, high degree of closeness and complexity to work. Stretching in the deepest south-eastern Adriatic, waters of Albania with a wealth of important habitats makes a fascinating place for many highly threatened species of sharks, skates and rays that live, feed and reproduce completely unprotected. While last three RSG project identified 25 endangered elasmobramchs in the eastern Adriatic, only nine are protected in Albania, of which only three are listed on the Red List. After highly successful RSG projects in other eastern Adriatic countries, work in Albania presents the final step towards the unique regional protection – the only effective way to save Adriatic sharks!

6. How do you plan to share the results of your work with others?

The project activities attracted significant media attention, which resulted in over 100 media articles (portals, magazines and newspaper) as well as dozens TV appearances and mini docudramas. This work was featured by National Geographic and NatGeo WILD through the Sharkfest 2020 and by Discovery Channel.

Scientific data is presented in six original papers and 2nd edition of the book, as stated:

Melanomacrophage centeres and diseases occurring in lesserspotted catsharks, *Scyliorhinus canicula* (L.), from the southern Adriatic Sea - importance for monitoring
Andrej GAJIĆ, Amer ALIĆ , Adla KAHRIĆ, Nurija BILALOVIĆ , Jovana ŠUPIĆ and Hajrudin BEŠIROVIĆ Melanomacrophages of fish are commonly explored as biomarkers of water pollution and are considered to be sensitive, albeit non-specific health indicators in water ecosystems. Sharks as long living marine species are good sentinel species. This study presents morphometric data for splenic and hepatic melanomacrophages (MMC), and observed histopathology in ten lesser-spotted catsharks, *Scyliorhinus canicula* (L.), one of the most abundant shark species in the eastern Adriatic Sea. At necropsy, we collected random tissue samples from liver, brain, gallblader, pancreas, spleen, kidney, gills, entire digestive system, thyroid gland, rectal gland, entire urogenital (male samples) and genital system (female samples). There was a minimal number of histopathological lesions in the examined sharks, but morphometric values reported herein were three folds higher than in previous studies in free-ranging sharks.
Contemporary records and some biological traits of the rare and critically endangered angular rough shark, *Oxynotus centrina* (Linnaeus, 1758), from the eastern Adriatic sea

Andrej A. Gajić, Suvad Lelo, Aleksandar Joksimović, Ana Pešić, Jovana Tomanić, Hajrudin Beširović, and
Branko Dragičević

Although it was thought to be extinct by some authors, this paper is describing 15 new records of angular rough sharks from Croatia and Montenegro and brings the novel insight into the species' biology, reproduction, and inner ear functional morphology studied by x-ray and axial computed tomography.

New hope for the critically endangered common angel shark, *Squatina squatina* (Linnaeus, 1758),in the eastern Adriatic sea

Andrej A. GAJIĆ

This paper has described new findings of the critically endangered *S. squatina* – which thought to be extinct from certain parts of the Mediterranean – whit notes on potential nursery ground important for further revitalization and long-term in-situ conservation in both the Adriatic and Mediterranean sea.

Let's create a better future for sharks, skates and rays in the eastern Adriatic: towards the unique regional protection

Andrej A. Gajić

There are significant disagreements in the legal acts across the eastern Adriatic countries resulting that certain highly threatened and migratory species are often unprotected among the neighboring countries. Further, some Red lists are missing the key endangered species and require an urgent review.

Manuscript finalization

The morphology, anatomy and histology of the blackspotted smooth-hound shark embryos (*Mustelus punctulatus* A. Risso, 1827) from the eastern Adriatic Sea

Andrej A. Gajić, Suvad Lelo, Adla Kahrić, and Hajrudin Beširović

This paper aims to fill the significant gap in the understanding of the Mediterranean smoothhound sharks by bringing the very first insight into the morphology, anatomy, and functional histology of the final stage embryos accidentally caught by small-scale fisheries in Bosnia and Herzegovina.

7. Timescale: Over what period was the grant used? How does this compare to the anticipated or actual length of the project?

Pandemic and related socio-political issues have significantly affected the original timescale, so that all the activities after March 2020 were forced to be cancelled and postponed to different dates later the year. I had the most problems with the field studies in different countries with dissimilar epidemiological measures, which forbade crossing the border for the non-citizens. As e-meetings haven't worked for the

government in most of the cases, I was forced to wait for the better epidemiological situation. Most of the workshops and lectures were in online format via Zoom. Thus, the entire project was moved to February 2021 which is far beyond the predicted deadline. But notwithstanding the great difficulties faced, I gracefully managed to fulfil all the proposed activities and to obtain even better results than expected.

8. Budget: Provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Staff costs				
Project coordinator	500	500		N/A
Project members	300	300		N/A
Media and promo assets				
Roll-up panels (2x2)	180	183	+3	N/A
Portal and database development, hosting and domain plus trans.	1150	3350	+2200	Co-funded by a company which support our work
Leaflets, Posters and Brochures (DTP/print)	769	430	-339	As the workshops were online, allocated in the field studies
Equipment & Rents				
Boat rental	332	350	+18	Covered from the differences in customs costs
Technical diving equipment for three additional divers	810	810		N/A
Microsoft Surface 2	1353	1350	-3	I have purchased a better model
Trident OpenROV 100m tether	350	350		N/A
Trident protective Hard Case	330	330		N/A
SeaLife DC Dome lens	576	575	-1	Customs costs
SeaLife DC Super Macro lens	153	155	+2	Customs costs
Field kit for pathology (with shipping / taxes)	270	275	+5	Customs costs
Surgery, suture and dissection kits (with shipping and taxes)	220	200	-20	Customs and shipping costs

Travel and Filed studies				
MONTENEGRO Budva – Bar - Ulcinj	430	430		N/A
CROTIA Northern Adriatic expedition	930	245	-685	As this expedition was only partly completed, I allocated funds for larger studies in nearby location Murtersko more
CROATIA Murtersko more expedition **(allocated difference from above)**		2503	+2503	This highly successful study was a joint effort with Foundation Ensmeble grant
CROATIA Split – fish markets and meetings	445	445		N/A
SLOVENIA Koper – fisheries analysis and meeting	640	640		Although we completed the trip, we haven't finished the field studies as planned yet.
BOSNIA AND HERZEGOVINA Malostonski bay		1054	+1054	The field studies were supported by our partners in Bosnia and Herz.
TOTAL	**9738**	**14475**	**+4737**	Co-funded by our personal contrib., partners and Found. Ensemble. **Exchange rate varied, with average value 1 GPB (£) ≈ 2,23 BAM (KM)**

9. Looking ahead, what do you feel are the important next steps?

While last three RSG project identified 25 vulnerable, endangered and critically endangered elasmobramchs in the eastern Adriatic, only nine species are protected in Albania, of which only three are listed on the Red List. After highly successful RSG projects in other eastern Adriatic countries, work in Albania presents the final step towards the unique regional protection, the only effective way to save Adriatic sharks! As I have stated in my 1st Booster grant proposal, I am planning to apply now for the 2nd Booster grant in order to work only in Albanian waters which contain important diversity and present a breeding/nursery grounds for many threatened elasmobranch species.

During the previous grant I have already developed a cooperation with the National Environmental Agency in Albania, as well as several other NGOs based in Albania.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

Yes of course! The logo of the Rufford Foundation was used in all produced promo materials – roll-ups, portal leaflets, brochures and booklets that were distributed.

Rufford Foundation received significant media publicity during the course of the project as I highlighted the importance of the Rufford-funded projects for the proper long-term conservation during my appearances in dozens of both local and regional media. Besides, I have discussed my RSG funded work through my mini docudrama and articles for National Geographic, NatGeo WILD and Discovery Channel.

11. Please provide a full list of all the members of your team and briefly what was their role in the project.

The project team was slightly changed compared to the previous grant, while I have decided to include the student volunteers who demonstrated more enthusiasm and interest within the activities from the previous project.

Full Name	**Role in the project**
Andrej A. GAJIĆ B. Eng, M.Sc. P.Biol.	Principal investigator, responsible for project management, quality of the research, cooperation with government, EEA representative and educational events. Andrej conducted and oversaw both field expedition and laboratory research, and wrote all papers related to the grant activities. Furthermore, he wrote the proposals for the species-specific long-term conservation.
Adem HAMZIĆ PhD	As a former FAO expert, Adem was an adviser during the development of legal reinforcement acts for the unique protection of sharks, skates and rays.
Adla KAHRIĆ M.Sc.	Adla supported research and conservation activities related to skates and rays; and joined the fisheries analysis in Slovenia.
Neira DEDIĆ M.Sc.	Neira worked on the spatial ecology, feeding habits and reproduction of skates and rays.
Dario ŠAKIĆ M.Sc.	as qualified bio-geographer Dario continue to map the distribution, nursery and breeding grounds of elasmobranchs.
Martina PEŠA DVM	Martina worked on the assessment of the effects of pollution on disease development in sharks, skates and rays.
Marija VUČIĆEVIĆ M.Sc.	Marija as new team member oversees the educational activities and worked on raising the awareness, education and promotion
Belma NAHIĆ M.Sc.	Belma coordinated volunteer team(s) during the course of the field studies in Bosnia and Herzegovina.
VOLUNTEERS AND SUPPORTERS	Included undergraduate and graduate students: Vojo Milanović, Melisa Fejzić, Selma Dizdarević, Dženeta Klepić, Vedrana Pilić, Almedina Hodo, Jasmin Brkić, Eldar Razić, Amna Zukić, Slađana Mihajlović, Amina Hadžiemrić, Ena Milković, Ajla Isajlović, Ana Kovač and Milica Đokić.
Hrvoja GAVRANČIĆ dipl.iur	Ensured the quality of development and proposed legal acts and align them with other international Action Plans and Strategies. Besides, Hrvoje worked in the underwater studies.
Goran HADŽIĆ	Technical diver, responsible for sampling and photographing
Renat PLEHO	Divemaster, responsible for sampling and photographing

12. Any other comments?

I would like to express my sincere gratitude to the Rufford Foundation, especially for Josh for well managing the team and good advice for my work and Jane for easy and comfortable communication. Of course, I would like to thank to the foundation Trustees for approving my 3rd grant and for trusting in my work and effort. My Rufford grants present the fundament of my conservation work on the regional scales, while first grant was the basis for my further professional career. It is one of the reasons that my work got recognied on the international level and even in National Geographic and Discovery Channel! It was an absolute pleasure and honour to coordinate such important efforts and I am sure that my team definitely created a solid fundament for the unique regional long-term in-situ conservation. So, Albania - here we come!

Please enjoy several most important moments during the course of the project(s) in the continuation of the report and do not hesitate to contact me in case there are any other information you might need.

Discussing the proposed unique conservation measures at the EIONET annual meeting of the European Environmental Agency in Copenhagen, Denmark.

I was invited by the President of Bosnia and Herzegovina Mr. Željko Komšić to discuss the importance of local research and proper regional conservation.

One of the improvised home wet laboratories during the lockdown caused by the pandemic of SARS-CoV-2.

Sampling the blood and tissues during the Fish market analysis. Commercially caught smoothhound sharks from the fish market in Split, Croatia.

Large field expedition in Croatia organized by DC Bosna and Sharklab ADRIA included species and habitat mapping, pollution assessment and samplings.

Emina with the Black-spotted smoothhound shark, Mustelus punctulatus Risso, 1827 prior to the detailed laboratory analysis.

Cover page of the Večernji list, one of the most read newspaper in Croatia and Bosnia and Herzegovina – featuring my interview on elasmobranch conservation.

I was recognized and featured on the NatGeo WILD Sharkfest 2020, discussing my work and efforts to establish the unique regional conservation of elasmobranchs.

During the course of the project, I wrote six original scientific papers and had dozens of media appearances with significant publicity given to the Rufford.