2018 APPLICATION FORM

Small Grants Fund for Working Groups & Task Forces

PERSONAL DETAILS

Title: Pronkevich (**Family name**) Vladimir (**Given Name/s**)

Institution: Federal State-Funded Institution of Science, Institute of Water and Ecology Problems, Far Eastern Branch, Russian Academy of Science (IWEP FEB RAS)

PROJECT DETAILS

Project Title: **Nordmann's Greenshank and Redshank Breeding Ecology Study in the Bay of Schast'e, Sea of Okhotsk, Russia**

Part A. Project Proposal

Purpose: To establish an intensive breeding ecology study on the endangered Nordmann's Greenshank (*Tringa guttifer*, also called Spotted Greenshank) and on the common species Redshank (*Tringa totanus*).

Background:

Nordmann's Greenshank

The Nordmann's Greenshank is listed as endangered in the IUCN Red list of Threatened Species because of its small and declining population (Figure 1, BirdLife International 2016). Based on counts at migration sites, the population number is estimated at only 1,000 to 2,000 individuals. No complete, systematic counts have been conducted on the breeding or wintering grounds.

The species is known to breed in isolated spots on the Russian mainland along the north and west coasts of the Sea of Okhotsk, in the Nevelski Strait, as well as on the eastern and western coasts of Northern Sakhalin (Nechaev, 1991; Andreev, Kondratiev 2001; Pronkevich, 2008; Pronkevich, Voronov, 2013; Revjakina, Zykov, 2014 Figure 2). The breeding range has contracted throughout the past century. The species no longer breeds near the southern coast of Sakhalin Island at Aniva Bay (Kuroda 1936, Nechaev 1991), or near Nabilsky, Chayvo, and Baikal Bays on the north and eastern sides of that island (Revjakina, 2014 Figure 2). Other areas may have breeding populations but these sites are difficult to access and have not been surveyed (Figure 3).

The best information on breeding birds comes from Sakhalin Island, where a steady downward decline has occurred. Incidental surveys show that the number of breeding birds on the north-eastern coast of the island decreased from 12-15 pairs in 1985-1990 to 1-2 pairs in 2005 (only Nyiski Bay still has breeding birds). Many birds are known to breed along the 40-km stretch of the northwest coast of the island from the Tyk River to the Chernaya River. To date, only 30 to 40 pairs are known to exist, although there is a need to survey more inaccessible areas. The decline of breeding birds in Sakhalin is likely due to habitat degradation caused by reindeer (*Rangifer tarandus*) grazing, forest fires (natural and anthropogenic), geological exploration, development of oil and gas reserves and transportation, construction of roads and settlements near oil and gas pipelines, and pollution of coastal reservoirs, marshes and soil cover.

Only one researcher has specifically studied the breeding ecology of the species. Nechaev (1991) collected the only nesting data to date when he discovered five nests of the species near the mouth of the Evay River (Chayvo Bay) on the northern end of Sakhalin in the 1980s. He collected data that indicated the species is biparental, nests in trees and generally in small groups, and that pairs collectively defend their young. He also noted that the species nests in larch forests and uses nearby areas with a mixture of seaside meadow and tidal zone for adult foraging and feeding chicks (Figures 4-6). No birds were marked during his investigation. Currently, no information is available on demographic traits such as adult survival, nest and brood survival, mate and site fidelity, or even rudimentary things such as incubation period and parental roles, chick maturation length, display behavior, and other basic natural history.

Information on migration routes and wintering areas of the birds also remain largely unknown, and is limited to where people have surveyed other shorebird species such as the Spoon-billed Sandpiper (see review in Szabo et al. 2016). It is speculated that the entire world population may stage on the intertidal flats of the Rudong coast of the Yellow Sea in China (Bai *et al.* 2015, Z. Lin, pers. comm.). One Nordmann's Greenshank had a satellite transmitter attached in Thailand and successfully migrated north but it was uncertain if the bird had reached its nesting area before sensors indicated the tag failed or the bird died (Chenxing and Gale 2017).

Redshank

The breeding area of the Redshank extends from the British Isles and Iceland to the East to the coast of the sea of Okhotsk and Hokkaido island; to the North to Scandinavia, Kola Peninsula, southern areas of Western Siberia, South-Eastern Transbaikalia, Amur river valley and the West coast of the sea of Okhotsk; and South to the Caucasus, Tien Shan, Eastern Pamir, the Himalayas, Eastern outskirts of Tibet, and North-Eastern China.

In the world, there are 6 subspecies of Redshanks, including two in Russia. The Russian subspecies in the Far East is called *Tringa totanus ussuriensis* (Buturlin 1934, Nechaev and Gamova, 2009), and is the subject of this study (hereafter called Redshank). Nesting area of the Asian subspecies extends from the Ural Ridge to the Pacific Ocean. In the Far East of Russia, Redshank are distributed on the western coast of the Sea of Okhotsk (the Gulf of Tugurski, Constantine, Ulbanski, Nicholas, Schast'e), Shantar Islands, Khankai lowland, the coast of Peter the Great Bay, the Northern district of Sakhalin island, and the Kuril Islands. The migration of Redshank appears to occur over the mainland, as the species is very rare along the coast of the Tatar Strait (Yelsukov, 2013). The winter location of the Redshank has not been studied, however it is assumed that it is located in South and South-East Asia. There is only one resighting of a ringed Redshank known. The bird was ringed on the Philippine Islands and killed on the Amur River (McClure, 1974).

Redshank is an abundant or very abundant migrant and nesting species on the western coast of the Sea of Okhotsk (Figure 7). During the 1990 nesting period, 13 individuals/km^2 were present in the coastal meadows in the Tugursky Bay. In July 1989, 123 individuals/km^2 were recorded in the Konstantin Bay. In August 1989, the number of Redshank in the coastal meadows of Konstantin and Ulbansky bays were 100 and 231 individuals/km^2 (Pronkevich, 2009). Breeding Redshanks have been located in the Gulf Coast of Konstantine (Voronov, Pronkevich, 1991), where a nest was found on 2 July 1989 and non-flying juveniles were found on 14 July 2012 (Figure 8). There is no doubt that this species also breeds in the Bays of Tugursky, Ulbansky and Nikolay (Pronkevich, pers. obs.).

The density of Redshank on the coastal meadows of the Bay of Schast'e was 30 to 60 individuals/km^2 during July 2009 (Pronkevich, pers. obs.). It was the most numerous of all the waders. The Redshank breeding grounds are elevated sections of coastal meadows and various types of coastal moss bogs that are not flooded during tides (Figure 11). The

breeding period of the Redshank is long, lasting from the first half of June to the end of July. I found two Redshank nests on June 27, 2009 and July 1, 2009 (Figures 9, 10). These nests were found by accident without much effort. The nest is primitive and consists of a hole in a pile of old grass on a small hill or a bump. Full clutch consists of 4 eggs. Eggs are incubated by the female and the male. Chicks often hatch in late June or first half of July, but the discovery of a nest with fresh eggs on 1 July indicates chicks may hatch even in late July.

Redshank arrive in the spring during the first 10 days of April in the southern regions of Khabarovsk Krai, and in mid to late-May on the coast of the Sea of Okhotsk (Yahontov, 1963; Pronkevich, pers. obs.). Redshank departure from breeding sites begins in the second half of July. In the Bay of Schast'e, the latest birds recorded were in late September and early October (Yakhontov, 1963; Babenko, 2000).

Study Approach:

General Approach

For the purpose of our study of the key endangered Nordmann's Greenshank it is decided to deal first with a similar, but common species, the Redshank, to elaborate the least invasive approaches and methods of studies. This should work well because Nordmann's Greenshank and Redshank both breed in similar areas on the Bay of Schast'e, and Redshank are numerically very abundant and nests are easy to locate. There is some concern that the process of capturing birds and the presence of tags on birds will attract predators and lead to higher predation of adults and young. I anticipate more focus on Redshank in the summer of 2018, with a smaller effort on Nordmann's Greenshank as I learn what can be done safely. Once methods are determined, I will focus more energy on Nordmann's Greenshank.

Nordmann's Greenshank

To overcome the lack of information and allow targeted and effective conservation of Nordmann's Greenshank, I envision a three-phase approach to better understand the natural history of the species, their current status and trend, and most importantly, factors limiting this population. ***The first phase is to obtain basic breeding ecology and migration information – this is the subject of this proposal and is explained in more detail below.*** The second phase is to conduct a more intensive migration tagging study to determine important sites throughout the species annual cycle. This second phase will be conducted in collaboration with many other researchers on the species migration and wintering range. The third prong is to use the information from the first two prongs to conduct a systematic ground survey throughout the entire breeding range. This third phase is vital for building evidence to protect critical areas. I anticipate submitting other proposals to help fund work on the latter two parts.

Objectives:

1. To determine best methods for capturing Redshank and Nordmann's Greenshank while minimizing mortality of adults and young.
2. To start establishing a marked population of breeding Redshank and Nordmann's Greenshank so as to collect vital demographic rates and natural history information.

3. To document important staging and wintering sites of Nordmann's Greenshank from resightings of colour-tagged birds.
4. To track and document important staging and wintering sites of Redshank using light-level geolocators and resights of colour-tagged birds.

Methods: I propose to establish a breeding ecology study of the Nordmann's Greenshank and Redshank in the western part of the Bay of Schast'e (Figure 6) between late May and mid-July 2018. I envision a minimum of a 3-5 year study so as to allow basic demographic data to be collected. I chose this site because most of the other known breeding sites of the species are difficult to access for researchers. I will establish a base camp at the mouth of the Zimnik River (N 53.470086 E 140.913547) and walk to nearby wetland areas to locate breeding birds. In addition, a permanent 5 km survey route will be established from the base camp along the western coast of the Bay of Schast'e at the junction of the seaside meadow and the tidal zone (Figure 5). This area will be searched on foot every 3 days during high tide, when incoming water restricts the bird's feeding areas, making them more accessible for counting foraging birds and relocating banded birds from earlier marking. Counts in this area may provide insights to birds migrating through the area in early spring and late summer.

Wetland areas will be visited during pre-breeding when adults are actively displaying. I will observe adults from portable hides to document whether pairs become established and to locate nests. Nest locations will be determined by watching adults displaying nest attendance behaviors, observing how adults respond to approaching humans or other animals, and by observing their flights from nesting areas to feeding areas. Once nests are located I will take GPS coordinates and install trap cameras to record nest behavior and any predation. Once nests have hatched or failed, I will record the nest size, nesting material, and overall structural aspects (recall only 5 nests of the Nordmann's Greenshanks have been located to date, and never on the mainland). I will also record the habitat characteristics surrounding the nest site.

I will visit nests found with <4 eggs (modal clutch size) daily until clutches are completed or until clutch size remains unchanged for 2 consecutive days. If clutch size remains unchanged from nest discovery or a nest is discovered with 4 eggs, I will float eggs when possible (not likely possible for nests high in trees) to determine their incubation stage and estimate a hatch date (Liebezeit et al. 2007). Eggs also will be measured when possible. Nests will be monitored every 5 days until 3-4 days prior to the estimated hatch date, at which time I will check nests every 2 days until hatched. Our goal is to mark chicks at or very near the nests if possible. Extreme caution will be used around Nordmann's Greenshank nests to avoid stepping on young (i.e., tall vegetation will be avoided so as to not step on chicks) and attracting predators (i.e., nest sites will not be visited when avian or mammalian predators are present). I will assess fate of all nests using methods outlined in Brown et al. (2014) and estimate nest survival rates using program MARK (assuming sufficient sample sizes to do so, White and Burnham 1999).

When nests cannot be found for particular pairs, I will search nesting areas repeatedly during anticipated peak hatching dates to locate alarm-calling adults, which is indicative of a hatched clutch. Because adults frequently lead young to seaside meadows to feed, I will also search these areas repeatedly to locate adults with young. Adults found with chicks will be captured by placing mist nets flat on the ground over suspected chick locations and playing a chick distress tape. Adults can then be caught when humans scare them into the net after they visit newly hatched chicks to brood them. Adults feeding in seaside meadows will also be captured with the help of bait placed near mist nets located at the junction of seaside meadows and tidal zone. Chicks will also be captured opportunistically during these efforts. Marked adults and broods will be monitored from a distance to determine their movements away from nesting areas and along the intertidal areas. This will provide information on brood survival, as well as range size that can help inform monitoring programs. I also plan to use an automatic trap to catch adult Redshank on nests or near chicks. Due to the dangers of stepping on chicks, we will try to capture Nordmann's Greenshank chicks and parents principally in the shorter grass meadows, where young are more visible.

All adults will be weighed, measured, and marked with a federal metal leg band (Moscow Centre for Banding Birds). I will place an engraved red leg flag on the tibia of Nordmann's Greenshank, and yellow flag over an engraved red flag on the tibia of Redshank representing a bird marked on the mainland near Sakhalin Island. All adults will also have 2-3 unique color leg bands placed adjacent to the metal band on the opposite tibia from the flag(s) to aid in the identification of individuals in the grass. All chicks will be marked with a metal band and a single red color band denoting capture year (i.e., each year will have a unique placement of metal band and color band – thus individual chicks cannot be differentiated). Adult wing and body molt, and brood patch on Nordmann's Greenshanks will also be scored. Finally, I will collect several drops of blood from the metatarsal vein of adults and young to be used in future studies to genetically assign sex and parentage, and to provide baseline samples for genetic diversity estimates.
A second major component of this study will be tracking the migration of the two species after they leave their breeding territories. To do this, I will rely on resightings of leg flagged birds during migration and while wintering. Given this is unlikely to achieve large success, I also propose equipping a subsample of Redshank adults (14 maximum) with a modified leg flag equipped with a 1.12 gram geolocator (model MK5093, Biotrack, Newmarket, Ontario). This modified flag with a geolocator will replace the engraved flags described above. Geolocators have been used extensively during the past 7 years to learn about migration of birds that are too small to carry the larger PTT satellite tags (Clark et al. 2010). These devices gather and save light intensity data throughout the year that can be downloaded when the bird is captured at a subsequent date. Testing of light geolocators on Redshanks will allow us to determine the feasibility of using these devices on Nordmann's Greenshanks in future years.

In 2019 – 2022, I will repeat the activities described above, as many of the demographic objectives require multiple years of data. In 2019, I will put extra effort into returning to nesting and feeding areas where I tagged adults in 2018 to see if they successfully returned. I will attempt to recapture adults with geolocators so as to download movement data. These data will be used later to generate migratory tracks for each individual using FLightR (Rakhimberdiev et al. 2015), providing information on arrival and departure dates, migration

rate, stopover regions, and the number of days birds spent at each stopover during fall and spring migration (after Zhao 2016). I will also denote returns of all marked adults and young so as to generate the first data on adult site fidelity, adult survival and chick philopatry. Based on site fidelity of adult Nordman's Greenshank (as well as behavioral observations of predators during capture efforts), I will determine whether capturing adult and juvenile Nordmann's Greenshank can be done safely. If determined to be safe, I envision attaching geolocators or other more advanced tracking devices on Nordmann's Greenshank in 2019. Because Nordmann's Greenshank is an endangered species, I don't want to harm them.

Permits and Safety Concerns: As Nordmann's Greenshank is an endangered species with a small population size, I realize it is important to take all precautions to minimize harm to the species. I have submitted permit requests to the Russian government (Ministry of Natural Resources) to capture adults. This permission is required to tag Nordmann's Greenshank with colored rings.

Perhaps the most invasive aspect of this study may be the use of light-level geolocators. Light geolocator will be used to study the migration of the Redshank. The weight of Redshank is 88-155 grams. These small devices, which weigh < 1.12 grams, are less than 0.7-1.3% of the bird's body weight. This is far below the recommended 5% body weight limit listed in the "Guidelines to the Use of Wild Birds in Research" (Fair et al. 2010). Further, these tags will be attached to the legs of the adults and not attached using harnesses that could impede flight. The leg flag attachment method has proven to have very few negative effects, and when found, only on very small shorebirds (Weiser et al. 2016). Similar-sized tags used on a species similar in size and ecology to Redshank (i.e., Lesser Yellowlegs) demonstrated no negative effects (Lanctot, pers. comm.).

Anticipated Results:
1. New data on biology and behavior of the Nordmann's Greenshank and Redshank, which will help in development of future monitoring programs for the species.
2. First estimates of vital demographic traits (e.g., nest survival, brood survival, and after a few years, adult survival) providing insight into where the species may suffer the highest mortality during its annual cycle.
3. Collection of blood samples that can be used in future studies to sex and assign parentage, as well as provide baseline genetic samples for assessing species diversity.
4. Identification of migration routes, stopover sites, and duration of stay at various sites throughout the Redshank's annual cycle, providing information to support protection of key areas (after field work in 2019). If lucky, a few of the Nordmann's Greenshank may also be resighted, providing the first links between this breeding location and southern areas.
5. Document the number of birds moving through the Gulf of Schast'e during early spring and late summer.

I anticipate learning many other things that will help us begin to understand these poorly studied species (see Appendix 1).

Anticipated Products: Information obtained from this study will be used in preparing justifications for the protection of natural areas in the region, and in the preparation of the Red Book of Khabarovsk Province and Russia as a whole. Locations of nesting pairs will also be used to mitigate and help regulate industrial activities. I also will publish information learned from this study in popular (e.g., *Audubon* Magazine, East Asian-Australasian Flyway Partnership [EAAFP] newsletter) and peer-reviewed journals (e.g., *The Auk: Ornithological Advances, Conservation Biology, Bird Conservation International*), as well as disseminate relevant information to EAAFP task force and working groups (e.g., Spoon-billed Sandpiper task force, Shorebird Working Group), and governmental organizations throughout the species' breeding range. In addition, I will share the migration track information with those working on the species during the nonbreeding season to help them determine high priority areas for conservation.

Collaborations: This project will be coordinated by the Institute of Water and Ecology Problems of the Far Eastern Branch of the Russian Academy of Sciences (Khabarovsk, Dr. V.V. Pronkevich). Fieldwork assistance will be Mr. A. A. Averin (Bastak Reserve, Birobidzhan). Financial, logistical or planning assistance are also being provided by the Wildlife Conservation Society (Beringia Program, Drs. Jonathan Slaght, Rebecca Bentzen, Eugenia Bragina), the US Fish and Wildlife Service, Migratory Bird Management Division (Dr. Richard Lanctot), World Wildlife Fund (Amur Branch), and BirdsRussia. Efforts are also underway to have two graduate students begin working at the site. One student would be based in the United States and the other in Russia, promoting collaboration between the countries in conducting ornithological studies.

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Figure 1. Breeding adult Nordmann's Greenshank (*Tringa guttifer*, also called Spotted Greenshank).

Figure 2. Non-flying chick Nordmann's Greenshank.

Figure 3. Locations where Nordmann's Greenshank are known to breed (blue dots, based on recent surveys), where they may be breeding but surveys have not been conducted recently (green dots and lines), and where the species no longer breeds (red line) in the Russian Far East.

Figure 4. Coastal breeding habitat of the Nordmann's Greenshank and Redshank.

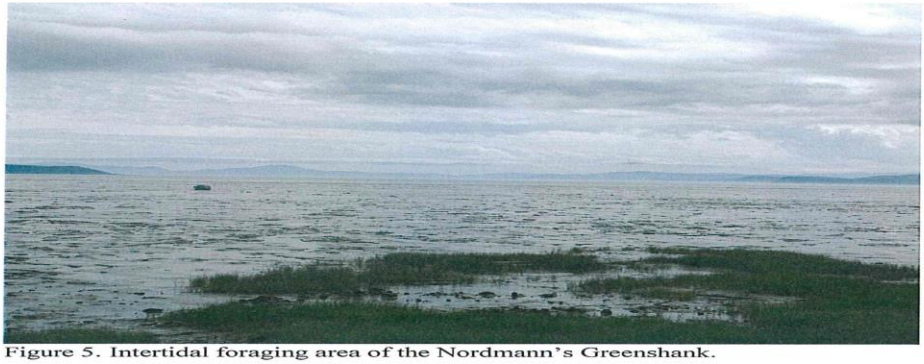

Figure 5. Intertidal foraging area of the Nordmann's Greenshank.

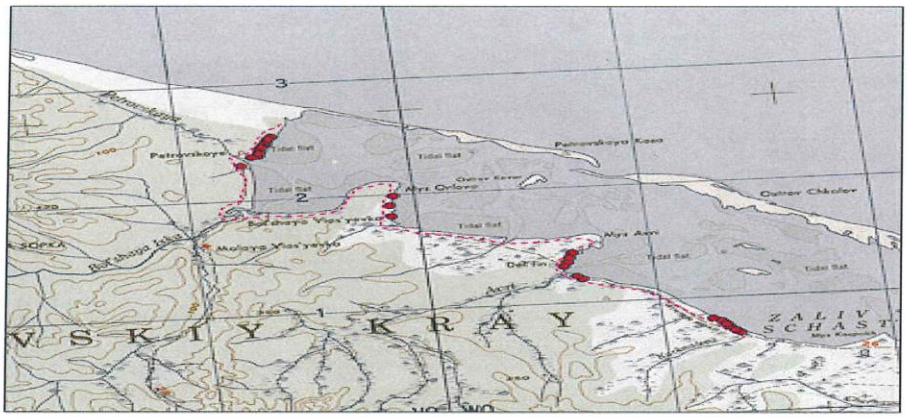

Figure 6. Study area proposed for work in the Bay of Schast'e in 2018. Red dots indicate locations where Nordmann's Greenshank have previously been observed during incidental observations in 2009, and the pink dotted line represents the proposed survey route used to locate foraging birds away from their nest sites. Scheme scale 1:300.000.

Figure 7. Redshank in the Bay of Schast'e in 2009.

Figure 8. Redshank chicks in the Bay Konstantine (2012).

Figure 9. The nest of the Redshank in the Bay of Schast'e in 2009.

Figure 10. The nest of the Redshank in the Bay of Schast'e in 2009.

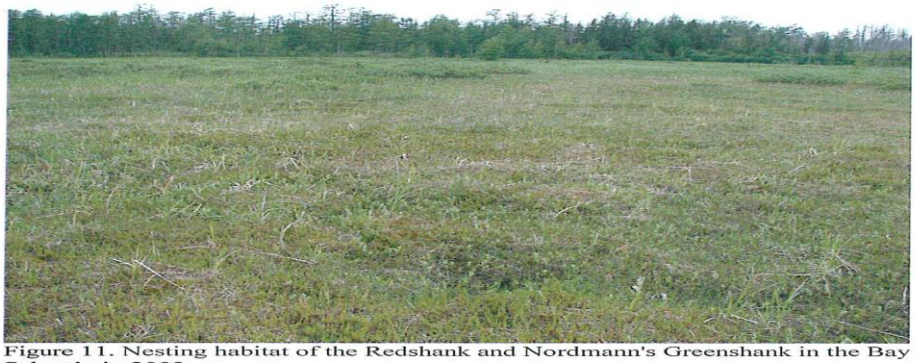

Figure 11. Nesting habitat of the Redshank and Nordmann's Greenshank in the Bay of Schast'e in 2009.

Appendix 1. More detailed natural history information and improvements in methodology to be obtained from conducting a breeding ecology study.[a]

1. Arrival date and dynamics of arrival (e.g., do birds arrive as singles, pairs, groups; do males arrive before females?).
2. Observations of bird behavior (e.g., time budgets) during nesting and brood-rearing, using humans in hides and video monitoring equipment.
3. Perfecting methods to search for nests.
4. Role of males and females in incubation and brood-rearing.
5. Length of the incubation period and time chicks remain in nests.
6. Adult behavior, timing, and habitats used as family's transition from the nesting area to the seaside meadows to the tidal zones.
7. A detailed geobotanical description of larch forests (habitats where the birds make their nests) and coastal grasslands (habitats, where the growing Chicks).
8. Qualitative examination of foods eaten by adults, gathered through observing birds with binoculars.
9. Information on antipredator behavior and identification of most common predators.
10. Information on chick growth and fledging, and their independence from adults.
11. Digital recording of sounds produced by adults and chicks for possible future analysis and producing sonograms.
12. Observations of foraging behavior of adults and young.

[a] Some of the natural history information will be dependent on us being able to genetically or behavioral sex birds. At this point, we are uncertain how long this may take.

PROJECT BUDGET (please outline your entire project, not just the component for which funds are being sought)

Budget

Budget: Cost to conduct Nordhamm's Greenshank and Redshank breeding ecology camp at Bay of Schast'e, 20 May to 15 July 2018.[1] All values are in United States dollars.

Item	Description	Cost/unit	Wildlife Conservation Society	EAAFP Cost
Equipment				
Batteries	36 AA for cameras	$1.35 / unit		$49
Band gear	engraved flags, rings			$100
Geolocator	MK5093 Biotrack – 14 pcs	$150 / unit	$2,100	$0
Travel				
Fuel	car			$167
Fuel and oil	boats			$167
Gas	cooking			$67
Fuel	electric generator			$67
Food	field food, 2 people x 60 days	$16.67 / day		$2,000
Salary				
Field	salary, 2 people x 60 days	$22.23 / day		$2,667
Subtotal				$5,284
Overhead[2]	10%			$528
Total Cost				$5,812

[1] Budget does not include in-kind costs of field gear and vehicles (aside from geolocators) necessary to conduct study (see below). Additional funds are being sought from other organizations to conduct field camp in future years.
[2] A modest 10% overhead is requested if the funds are administered to the institute. These funds would not be needed if grant can be made directly to Vladimir Pronkevich.

In-kind Equipment Available:

General Gear
1. Vehicle – 1
2. Inflatable boats with motors - 2
3. Trailers for transportation of boats - 2
4. Camping gear: tents, sleeping accessories, cook stove, fuel tanks
5. Electric generator - 1

Scientific Gear
1. Mist nets for catching birds - 300 m total
2. Nest Cameras – 3
3. Satellite phone - 1
4. GPS / Glonass units - 5
5. Recording equipment - 1
6. Quadrocopter drone - 1
7. Binoculars - 2
8. Spotting scope - 1

PAYMENT DETAILS

To ensure prompt payment of successful applications please complete the following details and submit with your application.

PREFERRED PAYMENT METHOD

Electronic funds transfer (EFT)