New Hampshire
Fish and Game Department

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Scott R. Mason
Executive Director

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June 7, 2021

His Excellency, Governor Christopher T. Sununu
and the Honorable Council
State House
Concord, New Hampshire 03301

REQUESTED ACTION

Authorize the New Hampshire Fish and Game Department to enter into a Sole Source Cooperative Project Agreement with the University of New Hampshire (Vendor No. 177867) to conduct a research project in support of furbearer management in the amount of $79,817 from the date of Governor and Executive Council approval through May 31, 2022. 100% Federal Funds.

Funding is available in the following account, and is anticipated to be available upon the in the future operating budget:

03 75 75 751520-21580000 - Wildlife Program Management Program - Game Management

20-75000-21580000-304-500841 Research and Management

	FY22
20-75000-21580000-304-500841 Research and Management	$79,817

EXPLANATION

New Hampshire hosts a diverse community of terrestrial furbearer species. These species are an integral part of a functioning ecosystem and provide substantial social, cultural, and economic value to multiple stakeholders in NH. Many furbearer species are widely distributed through the state and their populations are managed through varying harvest techniques. Furbearer trapping and hunting are important social and cultural activities in NH. Moreover, these activities can help maintain populations at socially and biologically desirable levels and are therefore viewed as a critical tool in wildlife management. Trapper activity has declined across the U.S. over the past several decades but has been relatively stable in NH in recent years. Trapping effort in the state varies widely by management region and by species targeted. While public support for trapping is relatively high nationwide (i.e., approval ratings > 60%) and even higher in the Northeast (e.g., 75% approval in Maine), opposition to furbearer trapping in particular and harvest more generally is not uncommon. State furbearer harvest regulations are reviewed bi-annually and informed by trapper-provided data on population trends as well as public input from varying stakeholders. As such, furbearer management decisions are often controversial as the Department tries to way input from diverse groups, often with opposing views.

The above observations underscore the importance of effective furbearer population management which, at a fundamental level, requires accurate information on species' distribution and abundance across space and over time. However, acquiring such information for furbearers is challenging because they are secretive, cryptic, highly mobile, and often persist at low densities. The primary method for assessing furbearer population trends in NH is the use of trapper catch per unit effort (CPUE), which is quantified as the number of individuals trapped per 100 trap-nights. Although this method is efficient due to its use of trapper-provided data, it can entail assumptions that might result in inaccuracy and bias. Principal potential causes of such inaccuracies are the non-random nature of trapping activities across the landscape and the fact that variables affecting trapper effort can differ from those influencing actual changes in furbearer populations (i.e. trapping weather conditions, fur prices, etc.). Additionally statewide trends in CPUE saw recent declines for several furbearing species including fisher, gray fox, and red fox from roughly the late 1990s to 2010. Within approximately the last 10 years CPUE trends have been relatively stable for most species. However, the degree to which CPUE trends reflect furbearer population trends in NH over time is presently unknown, particularly given declines in trapper effort. Alternative population monitoring methods beyond our current CPUE indices can help inform furbearer management and address the concerns of diverse stakeholders. Such methods include hair snares, track surveys, and camera trapping. Technological advancements have increased the effectiveness in detecting wildlife using these methods, particularly in the use of remote cameras. At the same time, statistical models to analyze data have also rapidly evolved.

It is clear that while accurate furbearer monitoring in New Hampshire is critical for effective management, it also represents a substantial logistical and analytical challenge. This research seeks to address this challenge by targeting several key knowledge gaps, namely: 1) the degree to which current furbearer monitoring methods based upon trapper CPUE are reflective of population trends, 2) the efficacy of implementing recently-developed statistical models of abundance estimation from camera trap data over broad spatial scales for furbearer species, and 3) how an efficient furbearer population index method based upon track stations compares to more labor-intensive camera trapping methods. The ability to implement additional methods to index trends in furbearer populations, particularly ones that are independent of harvest data, will be critical to the successful management of these species moving forward. It will also help increase confidence of our diverse stakeholders in the Department's management recommendations.

Respectfully submitted,

Scott R. Mason
Executive Director

Kathy Ann LaBonte
Chief, Business Division

COOPERATIVE PROJECT AGREEMENT
between the
STATE OF NEW HAMPSHIRE, **Fish and Game**
and the
University of New Hampshire of the UNIVERSITY SYSTEM OF NEW HAMPSHIRE

A. This Cooperative Project Agreement (hereinafter "Project Agreement") is entered into by the State of New Hampshire, **Fish and Game**, (hereinafter "State"), and the University System of New Hampshire, acting through **University of New Hampshire**, (hereinafter "Campus"), for the purpose of undertaking a project of mutual interest. This Cooperative Project shall be carried out under the terms and conditions of the Master Agreement for Cooperative Projects between the State of New Hampshire and the University System of New Hampshire dated November 13, 2002, except as may be modified herein.

B. This Project Agreement and all obligations of the parties hereunder shall become effective on the date the Governor and Executive Council of the State of New Hampshire approve this Project Agreement ("Effective date") and shall end on **5/31/22**. If the provision of services by Campus precedes the Effective date, all services performed by Campus shall be performed at the sole risk of Campus and in the event that this Project Agreement does not become effective, State shall be under no obligation to pay Campus for costs incurred or services performed; however, if this Project Agreement becomes effective, all costs incurred prior to the Effective date that would otherwise be allowable shall be paid under the terms of this Project Agreement.

C. The work to be performed under the terms of this Project Agreement is described in the proposal identified below and attached to this document as Exhibit A, the content of which is incorporated herein as a part of this Project Agreement.

Project Title: **Evaluating Furbearer Monitoring Methods in New Hampshire**

D. The Following Individuals are designated as Project Administrators. These Project Administrators shall be responsible for the business aspects of this Project Agreement and all invoices, payments, project amendments and related correspondence shall be directed to the individuals so designated.

State Project Administrator		**Campus Project Administrator**	
Name:	Kathy Ann Labonte	Name:	Kim Becker
Address:	NH Fish and Game Department Business Division 11 Hazen Drive Concord, NH 03222	Address:	Keene State College Sponsored Programs Administration 229 Main Street, Rm 201 Keene, NH 03435
Phone:	603-271-2741	Phone:	603-358-2443

E. The Following Individuals are designated as Project Directors. These Project Directors shall be responsible for the technical leadership and conduct of the project. All progress reports, completion reports and related correspondence shall be directed to the individuals so designated.

State Project Director		**Campus Project Director**	
Name:	Daniel Bergeron	Name:	Remington Moll
Address:	NH Fish and Game Department Wildlife Division 11 Hazen Drive Concord, NH 03222	Address:	University of New Hampshire Natural Resources James Hall Rm 266 Durham, NH 03824
Phone:	603-271-2461	Phone:	603-862-3054

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F. Total State funds in the amount of **$79,817** have been allotted and are available for payment of allowable costs incurred under this Project Agreement. State will not reimburse Campus for costs exceeding the amount specified in this paragraph.

Check if applicable

☒ Campus will cost-share **25** % of total costs during the term of this Project Agreement.

☒ Federal funds paid to Campus under this Project Agreement are from Grant/Contract/Cooperative Agreement No. **F21AF01526 (W-112-R-1)** from **Department of Interior / Fish and Wildlife Service** under CFDA# **15.611**. Federal regulations required to be passed through to Campus as part of this Project Agreement, and in accordance with the Master Agreement for Cooperative Projects between the State of New Hampshire and the University System of New Hampshire dated November 13, 2002, are attached to this document as Exhibit B, the content of which is incorporated herein as a part of this Project Agreement.

G. Check if applicable

☐ Article(s) of the Master Agreement for Cooperative Projects between the State of New Hampshire and the University System of New Hampshire dated November 13, 2002 is/are hereby amended to read:

H. ☒ State has chosen **not to take** possession of equipment purchased under this Project Agreement.

☐ State has chosen **to take** possession of equipment purchased under this Project Agreement and will issue instructions for the disposition of such equipment within 90 days of the Project Agreement's end-date. Any expenses incurred by Campus in carrying out State's requested disposition will be fully reimbursed by State.

This Project Agreement and the Master Agreement constitute the entire agreement between State and Campus regarding this Cooperative Project, and supersede and replace any previously existing arrangements, oral or written; all changes herein must be made by written amendment and executed for the parties by their authorized officials.

IN WITNESS WHEREOF, the University System of New Hampshire, acting through the **University of New Hampshire** and the State of New Hampshire, **Fish and Game** have executed this Project Agreement.

By An Authorized Official of:
University of New Hampshire
Name: Karen M. Jensen
Title:Director, Pre-Award
Signature and Date: Karen Jensen 6/4/21

By An Authorized Official of:
NH Fish and Game Department
Name: Scott Mason
Title: Executive Director
Signature and Date: Scott R Mason 6/7/21

By An Authorized Official of: the New Hampshire Office of the Attorney General
Name: Joshua Harrison
Title: Asst. Atty. General
Signature and Date: [signature] 6/17/2021

By An Authorized Official of: the New Hampshire Governor & Executive Council
Name:
Title:
Signature and Date:

Campus Authorized Official KJ
Date 6/4/21

EXHIBIT A

A. Project Title: Evaluating Furbearer Monitoring Methods in New Hampshire

B. Project Period: 06/01/21-05/31/22

D. **Objectives:**

The overarching goal of this proposed project is to evaluate methods for furbearer monitoring that can detect population changes across space and over time. Specific objectives include:

Objective 1. To determine the efficacy of an emerging non-invasive technique to estimate furbearer abundance using camera trap data.

Objective 2. To compare abundance estimates from Objective 1 with previously established methods for estimating the relative abundance and occurrence of furbearers.

Objective 3. To compare occurrence estimates from camera traps with those from track station surveys.

Objective 4. To determine the effect of lure on the detection rates and occurrence estimates of furbearers.

STUDY AREA AND STUDY DESIGN

The study area will consist of the Southeast Management Region in New Hampshire (Wildlife Management Units L and M; NHFG 2020). The predominant forest type in this study area is Appalachian oak-pine, which is characterized by oak (Quercus sp.), hickory (Carya sp.), white pine (Pinus strobus), and other hardwoods (NHFG 2015). This forest type serves as the primary habitat for the focal furbearer species (DeGraaf and Yamasaki 2001). The major impacts on this forest habitat in the study area are ongoing habitat conversion, fragmentation, and degradation due to anthropogenic landscape development (DeGraaf et al. 2006, NHFG 2015).

A total of 75 sites will be established throughout the study area using a Generalized Random Tessellation Stratified design, which results in a spatially random and balanced sampling scheme (Stevens and Olsen 2003, Moll et al. 2018). Given that the predominant landscape variation in the study area is the degree of anthropogenic development, three development strata will be established for the sampling regime. These strata will consist of three levels of development based upon housing density (Theobald 2004), including suburban (49-750 houses/km2), exurban (6-49 houses/km2), and rural (<6 houses km2). These categories capture not only the gradient of anthropogenic development, but also effectively sample concomitant landscape-level variation in forest habitat composition and configuration. Within each of these three strata, 25 study sites will be established. Backup sites will be generated within each stratum to accommodate challenges in land permission or access.

METHODS

Objective 1. To determine the efficacy of an emerging non-invasive technique to estimate furbearer abundance using camera trap data.

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In the summer of 2021, motion-triggered camera traps will be deployed using previously established methods, camera models, and camera settings shown to optimize detection rates for the focal species (Moll et al. 2018, 2020b, Lepard et al. 2019). The cameras will be placed at approximately knee-height (30-50 cm) and affixed to a tree or other suitable vegetation. For 60 days, the camera traps will record both short videos (15 s) and images of any species passing in front of it. These video and image data will be brought into the laboratory for analysis, and the species and video duration within a pre-determined camera viewshed frame will be recorded. This information will be used to fit a Random Encounter Staying Time (REST) model to estimate species abundance (Nakashima et al. 2018, Garland et al. 2020). This model uses the frequency of species detections and the duration that individuals remain in the camera viewshed to probabilistically estimate abundance.

The REST model abundance estimates will be analyzed as a function of habitat variables developed within a Geographic Information System (GIS) consisting of remote-sensing products across the study area. This GIS will consist of data related to i) habitat cover types such as those delineated by the 2015 New Hampshire Wildlife Action Plan (NHFG 2015); and ii) forest and urban development land classifications as mapped by remote sensing layers such as the National Land Cover Database (Homer et al. 2015). These variables will include compositional metrics related to the proportion and type of forest surrounding study sites (Hesselbarth et al. 2019). These variables will be coupled with local-scale measurements taken in the field, such as stem density and coarse woody debris (Lesmeister et al. 2015). These local-scale measurements will be taken using a transect-based approach around each camera trap (sensu Lesmeister et al. 2015). This modeling procedure will allow for potential extrapolation of species abundance and density beyond the study sites, allowing for a probabilistic map of each species to be created across the management region.

Objective 2. To compare abundance estimates from Objective 1 with previously established methods for estimating the relative abundance and occurrence of furbearers.

The abundance estimates from the REST model described above will be compared with two previously established methods for estimating relative abundance and occurrence using images collected from camera traps. The first of these is the Royle-Nichols model, which uses the frequency of detections for each species at each camera site to provide an estimate of relative abundance (Royle and Nichols 2003, Kéry and Royle 2015). The second method uses occupancy models, which account for imperfect detection (i.e., a species uses the area around a site but is not captured on camera) to estimate species occurrence in a hierarchical probabilistic framework (MacKenzie et al. 2002, Moll et al. 2016). Both methods will incorporate the same habitat variables incorporated into the REST model above. The three estimates from the three modeling approaches (REST, Royle-Nichols, and occupancy) will be compared using correlation analysis. The outcome of this analysis will help inform which of these methods would be most efficacious for evaluating the accuracy of CPUE trends, which could be accomplished by future work that expanded the spatial and temporal scales of the field methods to contain multiple management regions and years.

Objective 3. To compare occurrence estimates from camera traps with those from track station surveys.

Track station transects will be established in the vicinity of each camera trap site (i.e., within ~1 km) along roads or paths. The location of these transects will be partially driven by accessibility because a component of this objective is to strategically evaluate a relatively efficient, low-cost furbearer monitoring method. The establishment of scent station transect will follow methods employed by long-term monitoring efforts in other states (e.g., Missouri; Conlee et al. 2019). These transects will

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be established in early fall (September and October). Each transect will consist of 5-10 scent stations, which will be 36-inch diameter circles of sifted soil. Stations will be spaced 250-500 m apart from one another. A scent lure (e.g., skunk essence; Buyaskas et al. 2020) will be placed at the center of each station. Each station will be established for one night and checked the following day. The presence of focal species will be determined via track identification. This information will be used to fit an occupancy model similar to that described in Objective 3, with the exception that spatial rather than temporal replicates will be used to account for imperfect detection (Kendall and White 2009). The estimates of this model will be compared to that of the camera trap occupancy model using least squares linear regression.

Objective 4. To determine the effect of lure on the detection rates and occurrence estimates of furbearers.

The three Objectives above all depend on detections of furbearers by camera traps. This Objective evaluates whether the use of lure can substantially increase detection rates for the focal species. Increased detection rates could potentially reduce the length of time required to sample sites to achieve critical levels of data, thereby reducing the time and resource costs of monitoring. However, placing lure invalidates the REST model (Objective 1) and might induce bias into the Royle-Nichols and occupancy models (Objectives 2 and 3). To assess these trade-offs, a scent lure will be placed at a random subset of half of the camera traps ($N = 37$) following the data collection periods for Objectives 1-3 above. The lure will consist of skunk essence, which has been shown in other systems to influence furbearer detection rates of some of the focal species (Buyaskas et al. 2020). Placement of the lure will occur in fall over a period of several weeks and cameras will continue recording images for at least two weeks following lure placement. This experimental approach will determine both the effects of the lure compared to non-lure sites and the duration of any such effects on the focal species. Occupancy models will be fit to the data and the effect of lure on species' detection rates will be compared using a repeated-measures analysis of variance taking a before-after, control-impact approach (Moll et al. 2009). The effect of lure will be assessed both on detection rates and occurrence estimates.

E. **Scope of Work:**

INTRODUCTION AND JUSTIFICATION

1.1. The importance and status of Northeastern furbearers

The Northeastern U.S. hosts a diverse community of terrestrial furbearer species (hereafter "furbearers"). These species are an integral part of a functioning ecosystem and provide substantial social, cultural, and economic value to multiple stakeholders (NHFG 2015, White et al. 2015). Ecologically, furbearers contribute directly to processes such as prey population regulation and seed dispersal (Willson 1993, Hanski et al. 2001), which in turn influence floral and faunal biodiversity, ecosystem stability, and community-level dynamics such as disease transmission (Crooks and Soulé 1999, Ostfeld and Holt 2004). Beyond these ecological roles, furbearers are valued by stakeholders for a variety of reasons. Hunters and trappers derive recreational and economic value from furbearer harvest (Dorendorf et al. 2016, Duda et al. 2020). Indeed, the broader U.S. fur trade industry constitutes a multi-billion dollar annual enterprise that provides substantial material benefits to society (Fur Information Council of America 2015). Moreover, harvest activities comprise important cultural traditions for many participants (Dorendorf et al. 2016). Other stakeholders place high existence and aesthetic values on furbearers (Manfredo 2008), especially more charismatic species (e.g., red foxes Vulpes vulpes; Kimmig et al. 2020). Finally, some furbearer species (e.g., striped

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skunk Mephitis mephitis and coyote Canis latrans) can come into conflict with humans, which can lead to negative views and require targeted management solutions (Glas et al. 2019).

Many furbearer populations in the Northeastern U.S. have increased over the past century due to a combination of increased regulation and widespread expansion of forest habitat following regional agricultural land abandonment in the late 1800s and early 1900s (DeGraaf and Yamasaki 2001, Foster et al. 2002). As a result, many regional furbearer species are widely distributed and their populations are managed for sustainable harvest. Seven terrestrial furbearer species can be harvested via hunting or trapping in New Hampshire: coyote, fisher (Pekania pennanti), gray fox (Urocyon cinereoargenteus), raccoon (Procyon lotor), red fox, striped skunk, and Virginia opossum (Didelphis virginiana). State furbearer harvest regulations are reviewed bi-annually and informed by trapper-provided data on their populations (see §1.3 below) as well as public feedback from diverse stakeholders (Organ and Ellingwood 2000). Three additional terrestrial furbearer species occur in New Hampshire but are currently protected from harvest: American (pine) marten Martes americana, bobcat Lynx rufus, and Canada lynx Lynx canadensis. Hereafter, this proposal focuses on five furbearer species in New Hampshire – bobcat, coyote, fisher, gray fox, and red fox – while noting that the research approach presented herein could also provide information regarding the larger furbearer and wildlife community.

1.2. Furbearer harvest in New Hampshire

As in the broader region, furbearer trapping and hunting are important social and cultural activities in New Hampshire (Daigle et al. 1998, White et al. 2015). Moreover, these activities can help maintain populations at socially and biologically desirable levels and are therefore a critical tool in wildlife management (Payne 1980, Tate 2015, White et al. 2015). Trapper activity has declined across the U.S. over the past several decades (Daigle et al. 1998) but has been relatively stable in New Hampshire in recent years, with approximately 500 trapping licenses currently active (NHFG 2020). Trapping totals in the state vary by management region and species. In 2019/20 coyotes were the most-trapped of the five focal furbearer species (N = 332 individuals), gray fox were the least-trapped (N = 23), and the North Management Region had the greatest total number of trapped individuals across all five focal species (N = 197; NHFG 2020). Considering all harvestable species, the total value of fur harvest in New Hampshire was $30,227 in 2019/20 (NHFG 2020). Fisher have the most restrictive harvest regulations, with a combined trapping and hunting bag limit of two per season and a proposed requirement to submit lower jaws to provide age data that inform management decisions. Other species have no season limits (NHFG 2021). Coyotes have the fewest restrictions, with open hunting year-round and a 3 month night-hunting season (NHFG 2021).

Although public support for trapping is relatively high nationwide (i.e., approval ratings > 60%; White et al. 2021) and even higher in the Northeast (e.g., 75% approval in Maine; Duda et al. 2020), opposition to furbearer trapping in particular and harvest more generally is not uncommon. Efforts to limit or eliminate furbearer harvest have been put forth in recent years in New Hampshire (e.g., 2019 House Bill 442), Vermont (Royar 2018), and Maine (McLaughlin 2020). Such efforts have been made on local, state, and national scales with varying levels of success for decades (Gentile 1987, Andelt et al. 1999). The motivation behind such efforts vary, but stem primarily from concern that harvest compromises animal welfare (Andelt et al. 1999) or imperils populations (Royar 2018, Duda et al. 2020).

1.3. Monitoring and managing furbearer populations

The above observations underscore the importance of furbearer population management. At a fundamental level, such management requires accurate information on species' distribution and abundance across space and over time. However, acquiring such information for furbearers is

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challenging because they are secretive, cryptic, highly mobile, and often persist at low densities (DeGraaf and Yamasaki 2001, Feldhamer et al. 2003, White et al. 2015, Linden et al. 2017). The primary method for assessing furbearer population trends in New Hampshire is the use of trapper catch per unit effort (CPUE), which is quantified as the number of individuals trapped per 100 trap-nights (NHFG 2020). This method is also employed by other states in the region (e.g., Vermont; Royar 2018) and the broader U.S. (White et al. 2015). Although this method is efficient due to its use of trapper-provided data, it can entail assumptions that might result in inaccuracy and bias (Gese 2001, Allen et al. 2020). Principal potential causes of such inaccuracies are the non-random nature of trapping activities and the fact that variables affecting trapper effort differ from those influencing furbearer populations (Ahlers et al. 2016, Dorendorf et al. 2016). Between 2000 and 2010, statewide trends in New Hampshire for CPUE were stable for coyote and declining for fisher, gray fox, and red fox (NHFG 2020). From 2010 to 2020, these CPUE trends were relatively stable for all species (NHFG 2020). The degree to which CPUE trends reflect furbearer population trends in New Hampshire over time is presently unknown.

Alternative population monitoring methods beyond CPUE indices can help inform furbearer management and address diverse stakeholder views. Such methods include hair snares, track surveys, citizen observations, and camera trapping (Long et al. 2008, White et al. 2015). Of these, the utility of camera traps has risen in recent years (Steenweg et al. 2017, Gilbert et al. 2020). Technological advancements have increased camera traps' effectiveness in detecting wildlife while extending their battery life and durability (Burton et al. 2015). At the same time, statistical models to analyze camera trap data have rapidly evolved (Kéry and Royle 2015, Moll et al. 2018, 2020a). Occupancy models fit to camera trap data provide a robust method for evaluating species' occurrence while accounting for imperfect detection (i.e., a species occurs at a site but is not detected; MacKenzie et al. 2003). There has also been marked development in statistical methods that enable abundance and density estimation from unmarked individuals detected by camera traps (reviewed by Gilbert et al. 2020). Two of these methods – the Royle-Nichols and the Random Encounter Staying Time models (Royle and Nichols 2003, Nakashima et al. 2018) – enable insight into both abundance and species-habitat relationships, which can be critical for extrapolating predicted abundance beyond the immediate sites of data collection (Nakashima et al. 2020). These methods therefore potentially facilitate population monitoring for furbearers without the need to identify individual animals as in traditional capture-recapture approaches.

Despite these advantages, camera trapping can be more labor-intensive compared to simpler, but perhaps less accurate, monitoring methods (Long et al. 2008, Gilbert et al. 2020). In particular, voluminous video and image data from camera traps can require substantial processing time to identify species and organize the resultant data into a format amenable to statistical analysis (Lepard et al. 2019, Locke et al. 2019). Moreover, several of the most promising methods to estimate abundance from unmarked individuals in camera trap data require additional field testing to ensure accuracy (Chandler and Andrew Royle 2013, Nakashima et al. 2018, Gilbert et al. 2020). Track stations are one efficient alternative approach for monitoring furbearers over broad spatial scales (Long et al. 2008). Such stations are limited compared to camera traps in that they can only provide information on furbearer occurrence rather than abundance. Nonetheless, track stations can be run over relatively short periods over broad scales and can provide insight into long-term population trends (Conlee et al. 2019).

1.4. Knowledge gaps targeted by this proposal

The observations above make it clear that while accurate furbearer monitoring in New Hampshire is critical for effective management, it also represents a substantial logistical and analytical challenge. This proposal seeks to address this challenge by targeting several key knowledge gaps, namely: 1)

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the efficacy of implementing recently-developed statistical models of abundance estimation from camera trap data over broad spatial scales for furbearer species, and 2) how an efficient furbearer population index method based upon track stations compares to more labor-intensive camera trapping methods. Addressing these knowledge gaps is a key first step towards evaluating the degree to which current furbearer monitoring methods based upon trapper CPUE are reflective of population trends.

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E. Deliverables Schedule: Quarterly progress reports; GIS layers depicting probabilistic estimates of furbearer populations for each species and final report upon project completion (05/31/22).

F. Budget and Invoicing Instructions: Campus will submit invoices to State on regular Campus invoice forms no more frequently than monthly and no less frequently than quarterly. Invoices will be based on actual project expenses incurred during the invoicing period, and shall show current and cumulative expenses by major cost categories. Eligible cost-share (i.e., PI salary and fringe) will be documented and provided on invoices for each billing period, as applicable. State will pay Campus within 30 days of receipt of each invoice. Campus will submit its final invoice not later than 60 days after the Project Period end date. Payment of final invoice shall be contingent upon reciept of final report.

Budget Items	State Funding	Cost Sharing	Total
1. Salaries & Wages	26,898	12,220	39,118
2. Employee Fringe Benefits	0	5,352	5,352
3. Travel	2,800	0	2,800
4. Supplies and Services	27,060	0	27,060
5. Equipment	0	0	0
6. Facilities & Admin Costs	23,059	9,035	32,094
Subtotals	79,817	26,607	106,425
Total Project Costs:			106,425

Budget Narrative (internal)

A. Graduate Student (GS) Stipend.

One academic year of sponsor support for a Ph.D. student (Level 2) who will be responsible for conducting the proposed work under the supervision of the Project Director Dr. Remington Moll. The graduate student stipend is based upon the current University of New Hampshire Rate Sheet . The graduate student will be supported by the department in periods outside the academic year.

B. Labor (Exempt partial fringe)

500 hours of undergraduate research technician support to assist with field and laboratory efforts at a rate of $10/hour.

C. GS Tuition and Benefits (Supplies and Services)

The proposed tuition covers costs for 12 credit hours, health care, and fees for a graduate student based upon the current University of New Hampshire Rate Sheet.

D. Travel – Domestic.

This value reflects travel required to visit study sites to conduct field work (5000 miles at the current UNH mileage rate of $0.56/mile) .

E. Materials and Supplies.

Purchase of camera traps (at an estimated rate of $150 per camera) and associated supplies, including batteries, lock boxes, python cables, and lure (at an estaimted rate of $51.67 per site).

F. Indirect Costs (F&A):

Facilities & Administrative (indirect) costs are calculated according to UNH's current negotiated rate agreement with the Federal government. For the proposed budget, an "on campus" rate with a Modified Total Direct Costs (MTDC) base is applied. Graduate student tuition and health care is not included in the MTDC base.

G. PI Salary and Fringe (Matching Funds)

Matching funds are provided via 1.41 months/year of the PI's salary plus UNH fringe rates

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EXHIBIT B

This Project Agreement is funded under a Grant/Contract/Cooperative Agreement to State from the Federal sponsor specified in Project Agreement article F. All applicable requirements, regulations, provisions, terms and conditions of this Federal Grant/Contract/Cooperative Agreement are hereby adopted in full force and effect to the relationship between State and Campus, except that wherever such requirements, regulations, provisions and terms and conditions differ for INSTITUTIONS OF HIGHER EDUCATION, the appropriate requirements should be substituted (e.g., OMB Circulars A-21 and A-110, rather than OMB Circulars A-87 and A-102). References to Contractor or Recipient in the Federal language will be taken to mean Campus; references to the Government or Federal Awarding Agency will be taken to mean Government/Federal Awarding Agency or State or both, as appropriate.

Special Federal provisions are listed here: ☐ None or **2 CFR 200 Uniform Guidance and USFWS Standard Terms and Gonditions, as applicable, at https://www.fws.gov/grants/atc.html** .

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Date 6/4/21