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New Hampshire
Fish and Game Department

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Glenn Normandeau
Executive Director

July 8, 2013

Her Excellency, Governor Margaret Wood Hassan
and the Honorable Council
State House
Concord, New Hampshire 03301

Sole Source

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 moose management in the amount of $695,000 from the date of Governor and Executive Council approval through June 30, 2017. 100% Federal Funds.

Funding is available in account, Game Management, with authority to adjust encumbrances in each of the state fiscal years through the Budget Office if needed and justified:

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

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

FY14	FY15	FY16*	FY17*
$240,000	$320,000	$125,000	$10,000

*Pending State Budget Approval

EXPLANATION

Moose are an invaluable ecological, economic, and recreational resource in New Hampshire. The annual estimated economic expenditure associated with New Hampshire wildlife-watching exceeds $250 million. Because much wildlife-watching and ecotourism in New Hampshire centers on moose, it is imperative to sustain this important resource and to manage it consistent with its unique ecological, economic and recreational values. Moose are also of significant economic importance to the Fish and Game Department, generating over $300,000 per year in direct revenue which is used for wildlife management, law enforcement and department staffing.

Currently, multiple moose populations across their southern range are in decline including those of Minnesota, New Hampshire, and Vermont. Moose productivity and mortality has not been formally assessed in New Hampshire since 2005. Understanding these population metrics is essential to science-based population management. Given that productivity appears to have changed measurably in the past decade and that the population has declined concurrently, a precise assessment of present-day productivity and mortality and the factors driving them, is a high priority for the Fish and Game Department.

This project will provide the Department with current data on moose productivity and mortality rates through the intensive tracking of 80 to 100 radio collared moose cows and calves. These data are essential to New Hampshire's moose management program. They will provide information necessary to make informed management decisions regarding regional moose population declines; they will facilitate more precise achievement of moose population objectives through moose permit issuance and; they will potentially provide a methodology for predicting and mitigating high mortality events in the future.

Respectfully submitted,

Glenn Normandeau
Executive Director

Kathy Ann LaBonte
Chief, Business Division

COOPERATIVE PROJECT AGREEMENT
between the
STATE OF NEW HAMPSHIRE, **Department of 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, **Department of 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 **6/30/17**. 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: **Productivity and Mortality of Moose in Northern 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: Dianne Hall
Address: NH Fish and Game Wildlife Division 11 Hazen Dr. Concord, NH 03301	Address: University of New Hampshire Sponsored Programs Administration 51 College Rd. Rm 116 Durham, NH 03824
Phone: 603-271-2741	Phone: 603-862-1942

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: Kent Gustafson	Name: Pete Pekins
Address: NH Fish and Game Wildlife Division 11 Hazen Dr. Concord, NH 03301	Address: UNH Deparment of Natural Resources James Hall Durham, NH 03824
Phone: 603-271-2461	Phone: 603-862-1017

Campus Authorized Official
Date 4-3-17

F. Total State funds in the amount of $**695,000** 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. from under CFDA# . 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, **Department of Fish and Game** have executed this Project Agreement.

By An Authorized Official of:
University of New Hampshire
Name: Victor G Sosa
Title: Director, Sponsored Programs Administration
Signature and Date: 7-3-13

By An Authorized Official of:
Department of Fish and Game
Name: Glenn Normandeau
Title: Exec. Director
Signature and Date: 7/9/13

By An Authorized Official of: the New Hampshire Office of the Attorney General
Name: Allen Brooks
Title: Senior Assistant Attorney General
Signature and Date: 7/9/13

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

Campus Authorized Official VGS
Date 7-3-13

EXHIBIT A

A. Project Title: Productivity and Mortality of Moose in Northern New Hampshire

B. Project Period: August 1, 2013 – June 30, 2017

C. Objectives: OBJECTIVES

The overall objective of this project is to measure the productivity and the cause and rate of mortality in New Hampshire's moose population. The specific objective related to productivity is:

1) to measure productivity of yearling and adult cow moose.

The specific objectives related to mortality are to:

2) determine cause and rate of mortality of neonatal calf moose,
3) determine cause and rate of mortality of calf moose (December captures),
4) determine cause and rate of mortality of yearling and adult cow moose,
5) measure movement and dispersal of yearlings,
6) analyze weather data to improve predictive models concerning winter tick epizootics, and
7) monitor relative nutritional condition of moose during winter.

STUDY AREA

The study area will be the same as used in previous research conducted in the early 2000s (Musante 2006, Scarpitti 2006). It is ~1000 km2 located in eastern Coos County in northern New Hampshire and considered of the best habitat and highest moose density in New Hampshire; reusing this area will provide unique, comparative data about population characteristics measured a decade previously. This area is within the towns of Berlin, Success, Milan, Dummer, Cambridge, Millsfield, and Shelburne and includes most of Wildlife Management Units (WMU) B, C1, and C2; the core of the study area is located within the Androscoggin River watershed.

The majority of forestland is privately owned and commercially harvested. Hunting, fishing, trapping, and snowmobiling are common recreational activities in the area. Logging roads and ORV trails occur throughout, providing reasonable year-round access. The dominant cover type is northern hardwood forest with a mix of American beech (Fagus grandifolia), yellow birch (Betula alleghaniensis), and sugar maple (Acer saccharum); balsam fir (Albies balsamea), red spruce (Picea rubens), and white pine (Pinus strobus) are common on more poorly drained sites.

METHODS

Capture

Moose will be captured and radio-collared in 2 successive Decembers (2013 and 2014). The capture goal each year is 20 calves and 20 yearling/adult cow moose to produce an overall sample size of 40 calves and 40 yearling/adult cows. Moose will captured by aerial darting from a helicopter (subcontract) using the Berlin Municipal Airport (Milan, NH) as the staging base (as in the previous study). Sex of calves and relative age of cows will be established upon capture and a blood sample collected. Ages will be determined using tooth wear and replacement. An assessment of overall body condition will be made (very thin, thin, normal, fat). External parasites (i.e., ticks), hair, and fecal samples will be collected from each animal. Body measurements will include hind hock length, chest girth, and neck circumference (cm) and unusual conditions/features will be noted.

All calves and the majority of yearling/adult cows (30/year) will be fitted with conventional VHF radio-collars; 10 yearling cows will be fitted with a Global Positioning System (GPS) radio-collar.

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Both collar types possess a mortality sensor that increases the signal rate when the collar remains motionless for a predetermined amount of time, typically 4 h. Uniquely numbered ear tags will be attached to both ears; color will be unique to the capture year. Collars retrieved from deceased moose in year 1 will be refurbished and redeployed if possible.

Productivity - Objective 1

To measure productivity (fecundity, calves per cow), radio-collared cows will be approached on foot (walk-in) and observed at regular intervals 2-3 times weekly, 1 May-1 July, until birth occurs (Musante 2006). They will be stalked within sighting distance using telemetry homing techniques (Mech 1983). Priority will be given to cows identified as pregnant from protein-B serum assays of blood samples collected at capture. Parturition date will be assigned by backdating from the estimated age of neonates; calves are aged as <1 day-old (0 days), 1 day-old, 2 day-old, 3-7 day-old (5 days), or >7 days based on coordination, mobility, wet or dry appearance, and presence of an umbilicus (Larsen et al. 1989). Other evidence will include observation of the birth site, calf beds or tracks, and behavior and posture of cows associated with the protection or leading of young. Though time consuming and labor intensive, walk-ins are the best method to monitor calving because aerial observation would be largely hindered by dense canopy and thick vegetation typical of calving habitat in New Hampshire (Scarpitti et al. 2007). Cadmium and selenium levels will be assessed using tissue and/or blood samples collected from moose mortalities or harvested moose.

Cause and Rate of Mortality – Objectives 2-4

Neonatal and postpartum mortality will be measured by monitoring calves-at-heel 1-2 times weekly for ~2 months post-partum (to 15 August). Sign such as beds, tracks, fecal matter, birthing membranes, and evidence of predation will be noted. Cause-specific mortality will be difficult to determine due to elapsed time between relocations, movement of collared cows, and dense vegetation. However, observation of cow behavior and evidence (e.g., tracks and beds) at location sites aids to establish fate of the calf (Musante 2006). Cows will be observed >3 separate times after initial absence of the calf before assigning mortality. The mortality date will be set as the midpoint between the last observation and documentation of absence.

Each marked animal will be monitored continuously by remote data loggers located at 2 accessible, high-elevation sites affording near complete coverage of the study area: the Milan Hill Fire Tower (Milan) and Owl's Head Mountain (Dummer). The dataloggers store individual radio signal strength and frequency that allows identification of individual mortality signals. The dataloggers will be checked daily and manual VHF monitoring at these same sites will occur every 2 days minimally. Mortality of marked moose (calves and yearling/adult cows) will be verified on the ground after a mortality signal is emitted from the radio-collar. Additional ground or aerial telemetry may be necessary to locate animals not detected by the data loggers.

A mortality signal will trigger a field search for the deceased moose via standard ground-based triangulation. Responders will investigate a mortality signal within 24 h of detection. When possible, the entire carcass will be removed for laboratory processing; in other cases (presumably most), a field necropsy will be performed and photographs of the carcass, surroundings, and any lesions will be taken (both inside carcass and after removal of affected organ). Distinction between scavenging and predation will be noted and documented by photograph. Tissue and parasite samples from all major organs (lung, liver, kidney, intestine, heart, brain) and a femur fat sample will be collected. Additionally, a central incisor, hair sample, and ticks (if present) will be collected. Proper preservation methods will be used and samples will be submitted for laboratory processing and subsequent pathology by the NH Veterinary Diagnostic Laboratory.

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Movement & Dispersal of Yearling Cows – Objective 5

The yearling age class represents individuals that either disperse away from or occupy available local habitat. The subset of yearlings marked with GPs radio-collars and surviving calves with VHF collars will be used to measure movement and dispersal of yearlings. The dispersal site and movement pattern and distance will be measured relative to the original capture site. Movement data will be collected from GPS radio-collars remotely (based on proximity to the collar); weekly locations of yearling cows wearing VHF radio-collars will provide similar movement data. Movement data will be compared to previous studies to provide a relative assessment of dispersal, assuming that relationships exist among mortality rates, population density, and dispersal distance/movement within a population.

Weather Data and Winter Tick Epizootics – Objective 6

Weather measurements will be obtained from the First Connecticut Lake weather station (#27-999-01 – Pittsburg) and the Berlin weather station (#27-0690-01) (National Climatic Data Center). Monthly and daily mean ambient temperature, precipitation, and snow fall/cover will be calculated for each site during April and October-December 2001, and 2008-2014; known winter tick epizootics leading to increased mortality in 2002 and 2011 provide relevant temporal incidents. These weather and environmental data will be analyzed relative to measurements of tick abundance at moose harvest check stations and spring hair-loss surveys that have occurred annually since 2008. This analysis will investigate possible relationships between seasonal weather/ground conditions and tick abundance in an attempt to identify conditions that may predict/cause die-offs. Based on a similar limited analysis through spring 2010, Bergeron (2011) suggested the possibility of the epizootic and high mortality in 2011.

Relative Nutritional Condition – Objective 7

Moose urine collected from snow (snow-urine) has been used to calculate urinary UN:C and K:C ratios that indicate the degree of nutritional restriction and endogenous protein catabolism in Isle Royale moose (DelGiudice et al. 1997). Multiple samples of snow-urine will be collected 4-6 times monthly from January-April for 3 winters throughout the study area; collection will occur 24-48 h after a snowfall event to avoid excessive dilution of the sample. Snow-urine samples will be located by utilizing the radio-marked moose; their tracks will be followed until a suitable sample is located (DelGiudice et al. 1997). An attempt will be made to distinguish between calf and adult samples. Samples will be analyzed for urinary urea nitrogen (UN), creatinine (C), and potassium (K). Relevant ratios will be used to assess the relative nutritional status, potential restriction, and environmental influences at the population level (DelGiudice et al. 1997, Moen and Delgiudice 1997).

RESEARCH TIME LINE

Project length: 4 years (8/13-6/17)

2 Graduate Students: 2.5 year matriculation + 0.5 year research tech

Student 1: Sept 13-Dec 15

Student 2: Sept 14-June 17

Capture Events: December 2013 & 2014

Spring-summer field seasons: 2014, 2015, 2016, 2017

- Winter tick mortality
- Neonatal mortality
- Productivity
- Hair loss surveys

Winter field seasons: 2014, 2015, 2016

- Mortality: all age classes

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D. Scope of Work: INTRODUCTION AND JUSTIFICATION

There is little question as to the economic, biological, and sociological importance and value of moose (Alces alces) in New Hampshire. Moose are an embedded and highly visible thread in northern New Hampshire's economic and social fabric. Much regional and local ecotourism is linked directly with moose, the moose hunt is a unique once-in-a-lifetime opportunity for many, and the forest industry, the region's primary economic driver along with tourism, provides optimal moose habitat.

The annual estimated economic expenditure associated with wildlife-watching in New Hampshire is >$250 million with ~45% attributed to non-residents. Annual participation includes >345K people spending 2.5 million days watching wildlife and $115 million in trip-related expenses; expenditures associated with wildlife-watching since 2001 exceed that of hunting and fishing combined (USFWS 2006). Because much wildlife-watching and ecotourism in northern New Hampshire centers on moose, and arguably much was created in direct response to the growth of New Hampshire's moose population since the 1980s, it is imperative to manage the population in concert with biological, economic, and sociological values.

The economic importance of moose hunting to the New Hampshire Fish and Game Department (NHFG) is unquestioned; revenue from applications and moose hunting permit sales peaked at $410K in 2007 but has since declined 20% to $325K in 2012. Similarly, permit applications peaked at 17.8K in 2007 and declined 17% to 14.8K by 2012. These declines are directly related to the perceived decline in the moose population causing permits to be reduced 60% since peaking at 675 in 2007 (275 permits in 2012; NHFG, unpub. data).

Because of their biological, economic, and sociological importance, moose have been researched in New Hampshire since the inception of the first hunt in 1988. Research has focused principally on applied management issues including use of roadside salt licks (Miller and Litvaitis 1992, Silverberg et al. 2002, 2003), ecotourism and moose viewing (Silverberg 2000), moose browse impacts in deeryards (Pruss and Pekins 1992), aerial surveys (Adams et al. 1997), habitat use (Scarpitti et al. 2005, Scarpitti 2006), population dynamics (Musante 2006, Musante et al. 2010), calf survival and neonatal habitat (Scarpitti et al. 2007), winter ticks (Musante et al. 2007, 2010, Bergeron and Pekins 2013), browsing impacts on forest regeneration (Bergeron et al. 2011), and analysis of physical and reproductive characteristics of harvested moose (Adams et al. 1995, Musante 2006, Bergeron et al. 2013).

Collectively, this research has arguably made New Hampshire a regional leader in moose management with all New England states implementing (in part) its research information and management strategies. The last major research initiative in New Hampshire (2001-2005) involved radio-collaring ~100 moose in northern New Hampshire and resulted in three primary conclusions: 1) winter ticks measurably influence calf survival and overall population productivity, 2) habitat quality is not problematic and considered good, and 3) the dynamics of the moose population is most affected by adult cow survival and calf mortality (Musante 2006, Scarpitti 2006).

Currently, multiple moose populations across their southern range are in decline (e.g., Minnesota, New Hampshire, and Vermont); Minnesota has cancelled moose hunting in 2013, New Hampshire and Vermont have reduced permit allocations. Conversely, no obvious decline has occurred in the

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adjacent Maine moose population. However, no state has entirely similar conditions with regard to climate and weather, habitat quantity and quality, distribution of forest types and age classes that influence forage and thermal cover, timber harvesting activity, deer density, predators, and relative human impacts. For example, deer density is lower in northern New England than in Minnesota, in Minnesota both wolves and black bears predate moose, and seasonal weather and snow conditions are dissimilar in the most productive moose habitat in Maine and New Hampshire. In response, current research and management are focused mostly on mortality factors and the relationships between warming temperatures that influence parasite load, disease, and overall nutritional condition and productivity of moose.

Moose management in New Hampshire is guided by its 2006-2015 Big Game Management Plan (NHFG 2006) with harvest quotas/permit levels set to achieve specific population objectives within management regions. These quotas are set annually in response to a population index derived from annual moose sightings by deer hunters (Bontaites et al. 2000). Maximum permit levels (675) occurred in 2007 and have been reduced to 275 in 2012, a reflection of the continual decline in this sighting rate and the ability to achieve population objectives. The only recent, suspected occurrence of a winter tick epizootic since 2002 occurred in 2011, with widespread calf mortality reported in northern New England. Although actual mortality of yearling/adult cows and productivity is unknown since the 2001-2005 study, it is suspected that increased mortality and/or reduced productivity is occuring in adult age classes. Data collected from harvested moose indicate a constant decline in corpora lutea counts (an indicator of productivity) in yearlings (50% since 2004) and adult cows, with few yearlings currently reproducing (Bergeron et al. 2013). Actual mortality rates are unknown, but critical to interpret the dynamics of the moose population; periodic, high mortality of calves, reduced overall productivity, and increased mortality in productive age classes would exacerbate the predicted slow decline of the population based on modeling with decade-old data (Musante 2006).

The general relationship between warming temperatures and both parasites/diseases and deer populations is that milder, wetter weather and shorter winters produce more favorable conditions for both. The principal parasites/diseases of moose are winter tick (Dermacentor albpictus), brainworm (Parelaphostrongylus tenuis; deer-related), lungworm (Dictyocaulus viviparous), and liver fluke (Fascioloides magna) (Lankester and Samuel 1998), and recent studies in New England have identified moose with West Nile virus, EEE, and canid tapeworms (Echinococcus granulosus). In concert, these maladies can result in mortality or produce debilitating effects and/or reduced nutritional condition that effectively reduces productivity and population size. Most disease/parasites can be identified through standard field measurements including observation (e.g., winter tick), blood sample (e.g., brainworm, EEE), or necropsy (e.g., lungworm, liver fluke); nutritional condition (or restriction) can be assessed with femur bone marrow, snow-urine analysis (DelGiudice et al. 1997), and relative tick load (Samuel 2004). With a large sample size of marked moose, researchers can quantify the relative occurrence and influence of parasites/diseases among age classes of moose, and ultimately their relationships with productivity and mortality in the population. Additionally, productivity may be adversely affected by high cadmium and low selenium levels (Gustafson et al. 2000).

Because the productivity and mortality rates used in previous population models (Musante 2006) have since decreased and increased respectively, measurement of current productivity and mortality is essential to adequately predict population response upon which harvest quotas are set. A large sample of radio-marked animals (80-100) would provide the ability to measure productivity and mortality within age classes (calf, yearling, adult), with surviving calves and yearlings contributing data to the later age classes throughout the study. Fieldwork would focus on direct measurements of

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productivity, rate and cause of mortality, and recruitment and predation of calves, versus more labor-intensive habitat use measurements.

Calf survival, mortality of adult cows, and overall productivity are the most critical measurements required to predict the future status and direction of New Hampshire's moose population. Given that productivity has changed measurably in the past decade and that the population has declined concurrently, measurement of the productivity and rate and causes of mortality within the population is of high priority to guide moose management, with direct implications to the economy in northern New Hampshire. This study is designed to measure the mortality, productivity, incidence and influence of diseases/parasites, and winter nutritional condition of moose in New Hampshire.

E. Deliverables Schedule: refer to section D

F. Budget and Invoicing Instructions: Sponsor written authorization is required for the project start. Once authorized expenses will be reimbursed as of the project start date listed in Exhibit A item B 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, and shall document cumulative cost sharing through the end of the invoicing period. State will pay Campus within 30 days of receipt of each invoice. Campus will submit its final invoice not later than 75 days after the Project Period end date.

Budget Items	State Funding	Cost Sharing	Total
1. Salaries & Wages	161,451	67,712	229,163
2. Employee Fringe Benefits	6,221	30,528	36.749
3. Travel	47,329	0	47,329
4. Supplies and Services	399,677	0	399,677
5. Equipment	0	0	0
6. Facilities & Admin Costs	80,322	25,542	105,864
Subtotals	695,000	123,782	818,782
F&A under-recovery		58,902	58,902
In Kind Contribution		48,980	48,980
Total Project Costs:			926,665

Campus Authorized Official _____
Date 1-3-13

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 .

Campus Authorized Official _____
Date 7-7-13