

SUPPORTING INFORMATION

Questionnaire administered to research participants

How long have you been managing quail on this property?

Prompt: in what year did you start managing this property for quail?

What is the total size of this property? _____ acres

How many acres of land are currently managed for:

- Quail: _____ acres
- Timber: _____ acres

Prompt: What timber do you harvest (pulpwood, biomass for bioenergy, pine straw, etc.)? _____

- Pasture: _____ acres

Prompt: Is the pasture improved? What do you use the pasture for?

- Row crops/agriculture: _____ acres

Prompt: What type of agricultural production do you engage in (e.g. crops grown)? Is this irrigated or dryland agriculture? How many acres are irrigated? How many acres are dryland?

- Other: _____ acres

List other uses: _____

To better understand the various costs associated with bobwhite quail management on your land, I will ask you about a series of potential costs that you may incur, how frequently you incur these costs (e.g., annually or a one-time fixed cost), and the amount of the expenses.

Do you own or lease the following equipment for use in your quail operations? How many of these equipment do you own or lease? What are the make and model of the equipment?

For equipment owned: What did the equipment cost (\$/item of equipment)? Did you purchase these equipment in the past 5 years?

Equipment purchased \leq 5 years ago: What price did you pay for the equipment?

Equipment purchased >5 years ago: What is the estimated replacement cost for the equipment?

For equipment leased: How much do you pay to lease the equipment each year?

	Own/lease?	Number	Make/model	Purchase/ replacement/lease cost
Car				
Truck				
ATV/UTV				
Tractor <i>(does that include warranty?)</i>				
Backhoe				
Bulldozer				
Mower				
Roller chopper				
Disk/harrow				
Tiller				
Burn package				
Fuel tank: __gal				
Nurse tank: __gal				
Chainsaws				
Excavator				
Front end loader				
Motor grader/Box Blades/Roller packer				
Herbicide sprayer/tank				
Pressure washer				
Supplemental feed spreader				
Seed planter				

Grain bin (bushel size _____)				
Auger				
Hunting wagon				
Horse and mule tack (e.g. saddles, bridals, blankets, harness, etc.)				
Horse/equipment trailers (_____ft)				
Predator traps				
Mueller System				
Other equipment: _____				

How much do you spend each year on fuel and oil for:

- Vehicles?
- Equipment?

How much do you spend each year on maintenance and repairs for:

- Vehicles?
- Equipment?

Do you spend money to maintain pasture for your quail operations (e.g. for use of the horses and mules)? What do you spend each year on maintaining this pasture?

How much have you spent on the construction of:

- Horse barn: \$ _____ (year constructed: _____; # of stalls: _____)
- Dog kennels: \$ _____ (year constructed: _____; # of dogs: _____)
- Equipment shop: \$ _____ (year constructed: _____)

- *Unknown cost:* What is the size of the shop (sq ft)? What type of construction is it?
- Employee housing: \$ _____ (year constructed: _____)
 - *Unknown cost:* Can you describe the houses (type of construction, # of bedrooms and bathrooms)?
- Offices: \$ _____ (year constructed: _____)
 - *Unknown cost:* What are the size of the offices (sq ft)? What type of construction is it?
- Other buildings: \$ _____ (year constructed: _____)
- Fences that are specific to quail management (e.g. fences for horse pastures):
\$ _____; length: _____; type of fence: _____ (year constructed: _____)
- Other large capital assets: \$ _____ (year constructed: _____)
 - What were these assets? _____

How much do you spend on repairs and maintenance of these buildings and fences each year?

How much do you spend each year on:

- Utilities (power, water, phone, Internet): \$ _____
- Office supplies: \$ _____

What percentage of your office operations are specific to quail management versus other land management activities?

How many of the following animals does this property own as part of your quail operations?

- Dogs: _____
- Horses: _____
- Mules: _____

On average, what does each of these animals cost to purchase?

- Dogs: _____
- Horses: _____
- Mules: _____

In the past year what did you spend on veterinary costs for these animals?

- Dogs: \$ _____
- Horses: \$ _____
- Mules: \$ _____

In the past year what did you spend on farrier costs for the horses and mules?

In the past year what did you spend on training and supplies for the dogs?

In the past year what did you spend on feed for these animals?

- Dogs: \$ _____
- Horses: \$ _____
- Mules: \$ _____

Note: the respondent can give their total veterinarian and feed costs for all dogs, horses, and mules and we can determine what % is attributable to quail depending on what % of all animals are used in quail management.

We would now like to obtain information about your staff and management budget. We will ask about salaries because this allows us to determine the value of time spent by staff on land and quail management, which will help us to better estimate the value that quail plantations provide to the economy and improved land management.

What do you spent annually on salaries for all your staff that work on quail management?

How many staff do you employ that engage in management, hunting or other activities related to quail management? Are these staff full or part time? What are their salaries (\$/year, \$/month, etc.)?

	Number	FTE	Salary
Manager			
Assistant manager			
Field technician			
Scout (not field technician)			
Wagon driver (not field technician)			
Dog trainer and handler			

Other: _____			
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What do you spend annually on benefits for staff (i.e. FICA) who work on quail management?

What did you spend each year on:

- Retirement costs: \$ _____
- Workers compensation: \$ _____
- Contract labor: \$ _____
 - What contract labor do you hire? _____
- Payroll services: \$ _____
- Other labor expenses (e.g. training): \$ _____
 - What were these expenses? _____

Time allocation:

How many weeks each year do your staff spend on the following tasks? What equipment do they use? Which staff engage in these tasks (e.g., field technicians), and how many staff engage in these tasks?

	Number and type of staff	Number and type of equipment	Time (e.g., number of days, weeks, months)
Burning Process: Preparing fire breaks, site preparation, pile burning, acreage burning, pre/post-burn mowing or chopping			
Hardwood/exotics removal			
Mowing/chopping hunting lanes			

Supplemental feeding for quail			
Applying herbicides or fertilizer			
Predator management			
Road maintenance			
Pine establishment (e.g. land clearing, planting seedlings)			
Fallow field management			
Pasture Maintenance			
Fence Maintenance			
Equipment/Vehicle maintenance			
Dog/horse training			
Quail hunting (preparation & in the woods)			
Other land management practices (e.g., other mechanical forestry operations in the quail woods)			

How much do you spend each year on:

- Seeds for fallow fields or feed strips for quail (*e.g. ragweed*): \$ _____
- Herbicide related to the land managed for quail: \$ _____
- Fertilizer related to the land managed for quail: \$ _____
- Predator trap bait: \$ _____
- Supplemental feed for quail: \$ _____

In the past year what did you spend on insurance (property, liability, etc.)?

In the past year what did you spend on property taxes?

Are there any other costs pertaining to your land management, specifically your quail management, that we have not covered? Please explain. What were these costs?

What is your total operating budget for your quail operations?

Note: If the respondent wants to provide information about the hunting lodge and hunting side of the operations then collect that information.

Please would you provide us with your average annual income from:

- Quail hunting leases
- Timber revenues from the quail hunting area
- Any other sources of revenue from lands managed for quail

Would you mind sharing the total summary of your 2020-21 hunting averages?

How many half or full days were hunted last season on this property?

How many coveys were flushed each hour?

How are hunting revenues generated (e.g. leases, per day hunts, hunting club fees)?

How much do you charge for hunting?

How many years have you earned revenues from quail hunting?

Do you manage for other game species on the same land that is used for quail management?

Which species? What revenues do you generate from these other game species?

Additional Questions

If this land was not being managed for quail, what would it be managed for (i.e., what would the best alternative use be)? What would the net revenues on that alternative land use be?

Are there other landowners or land managers that you would suggest we contact? Thank you for your time!

Calculations for the per hectare cost of land stewardship and bobwhite management

We calculated the annual depreciated expense of equipment used in land stewardship and bobwhite management as the sum of annual depreciation expenses for property trucks, 4 wheelers, ATVs, UTVs, bulldozers, dump trucks, tractors, forestry packages, front end loaders, tree cutters, feller bunchers, mowers, disks, harrows, choppers, skid steers, grapples and buckets, shredders, tillers, box blades, backhoes, roller packers, excavators, chainsaws, herbicide sprayers, planters, supplemental feed spreaders, motor graders, grain bins, grain drills, augers, burn equipment, fuel and water tanks, trailers, predator traps, and the Mueller system. We included annual tractor warranties in this calculation. We calculated equipment housing as the annual depreciated expense of equipment shops and pole barns (assuming a 50-year useful life and no salvage value). We summed annual insurance payments on vehicles and equipment to measure insurance on equipment. We summed the annual depreciated expense of equipment and housing, insurance on equipment and annual lease and rental fees for equipment to calculate total annual equipment costs for each property. We estimated annual equipment operating costs as the sum of annual maintenance and repair costs for equipment and equipment housing, fuel costs, and costs of labor used to repair equipment (i.e., annual salaries and benefits paid to mechanics).

If landowners contracted labor to conduct land stewardship activities (e.g., prescribed burning, planting pines, trapping predators, maintaining roads) then we summed these costs to estimate total annual expenditures on contract labor. We estimated salaries and benefits for employees who engaged in land stewardship by summing salaries, workers' compensation, social security, SUI, FUTA, retirement benefits, Medicare, dental care, health care and payroll expenses for land managers, assistant managers, and field technicians. We calculated additional annual variable costs of land stewardship and bobwhite management as the sum of materials

used to repair roads on the property, chemicals, herbicides, bait for predator traps, supplemental feed for bobwhite, seed, and office expenses that directly pertained to bobwhite management. We estimated the total annual costs of bobwhite management as the sum of ownership and operating costs for equipment used in bobwhite management, salary and benefits for employees who worked on bobwhite management, and annual recurring costs associated with bobwhite management (i.e., purchase of chemicals, seed, supplemental feed for bobwhite, predator trap bait, road maintenance on bobwhite properties to allow equipment to be moved around the property, and office expenses that directly pertained to bobwhite management).

Calculations for the per hectare investment in bobwhite hunting

We calculated the annual depreciated expense of equipment used in hunting as the sum of annual depreciation expenses for horse trailers, hunting wagons, and tack. We calculated annual infrastructure costs as the annual depreciated expense of hay barns, horse barns, dog kennels, and horse pasture fences (assuming a 50-year useful life and no salvage value). We estimated annual hunting equipment costs as the sum of annual depreciated expenditures on equipment and hunting infrastructure, and maintenance and repair for hunting infrastructure. We calculated the depreciated purchase costs of hunting animals, assuming a useful life of eight years for hunting for bird dogs, 15 years of hunting for horses and mules, and no salvage value for hunting animals. We calculated the annual variable costs of hunting operations as the sum of annual feed costs for hunting animals, veterinary and farrier costs, and bird dog training (which included salaries and benefits for dog trainers). We generated annual hunting costs by summing annual hunting equipment costs, depreciated purchase costs of hunting animals, and annual variable costs of hunting operations.

Table S1. Salvage values and useful life for assets.

Assets	Salvage value of asset (percent of cost of asset)	Useful life of asset (years)
Property trucks	30	7
4 wheelers/ATV/UTV	0	5
Tractors	40	15
Front end loaders	40	15
Tree cutters	25	10
Mowers	25	10
Disks/harrows	25	10
Choppers	25	10
Herbicide sprayers	25	10
Planters	25	10
Grain bins	0	30
Fuel/water tanks	25	10
Predator traps	0	10
Box blades	25	10
Chainsaws	0	5
Motor graders	40	15
Supplemental feed spreaders	25	10
Tillers	25	10
Grain drills	25	10
Auger	0	15

Trailers	25	10
Excavators	40	15
Skid steers/shredder	40	15
Bulldozers	40	15
Feller bunchers	40	15
Backhoes	40	15
Roller packers	40	15
Burn packages	0	5
Dump truck	40	15
Mueller system	0	10
Hunting wagons	20	25
Grapples and buckets	25	10
Tack	0	10

Table S2. Total investment in different equipment and infrastructure used for wild bobwhite management ($n=37$ properties).

Equipment[†]	Mean cost of equipment (\$)	Median cost of equipment (\$)	Number of properties with item of equipment	Mean number of equipment owned per property
Vehicles				
Truck	39,997	40,000	33	4.39
UTV/ATV	12,691	12,500	36	3.97
Heavy equipment				
Tractor	102,589	110,000	33	4.12
Front end loader	115,927	115,000	19	1.16
Excavator	165,305	160,000	7	1.00
Backhoe	76,600	82,500	10	1
Dump truck	38,000	40,000	4	1.25
Skid steer	65,083	50,000	6	1
Shredder	20,250	20,250	2	1
Bulldozer	151,500	151,500	2	1

Feller buncher	80,725	52,500	4	1
Bobwhite feed				
Feed spreader	24,590	15,000	35	1.31
Grain bin	22,873	20,000	32	2.22
Auger	6,333	5,000	21	1.14
Hauling equipment				
Utility trailer	5,862	3,500	81	1
Cultivating tools				
Disk/harrow	15,510	12,000	36	3.69
Chopper	15,053	12,000	25	2.64
Planter	14,737	13,500	15	1.27
Tiller	13,134	10,000	19	1.47
Grain drill	12,786	10,000	17	1.24
Road maintenance				
Box blade	9,774	5,000	29	1.76
Motor grader	72,944	75,000	8	1.13

Roller packer	13,900	9,500	10	1
Mowers and tree cutters				
Mower	11,939	10,000	33	4.09
Tree cutter	8,911	9,500	43	1.05
Additional items				
Herbicide sprayer	6,263	4,500	34	2.09
Mueller system	35,958	30,000	6	1
Infrastructure				
Equipment shops/pole barns	125,068	60,000	35	2.74

	Mean expenditure on equipment	Median expenditure on equipment	Number of properties with item
Burning equipment	2,170	800	29
Chainsaws	2,544	1,800	31
Grapples and buckets	16,000	16,000	1
Predator traps	17,830	11,000	30
Tanks	16,529	7,500	31

† Mean cost of equipment per property=\$1,087,265 ; median cost of equipment per property=\$1,118,475 .

Table S3. Number of employees and benefits earned by employees working on wild bobwhite properties (*n*=37 properties).

	Land manager	Assistant manager	Field technician	Mechanic	Dog trainer
Number of properties that hired each position full-time	34	15	30	3	10
Mean number of staff per property that hired this position	1	1.13	4.03	1	1.10
Percentage of staff that received benefits:					
401k	63.6%	76.5%	63.2%	100%	63.6%
Workers' compensation	78.8%	88.2%	81.2%	100%	100%
Health insurance	72.7%	70.6%	64.1%	66.7%	72.7%
Housing provided	66.7%	47.1%	35.9%	33.3%	54.5%
Housing allowance*	3.0%	5.9%	5.1%	0%	0%

Personal use of property vehicle	75.8%	17.6%	17.1%	33.3%	11.0%
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* An additional payment provided to employees to cover the cost of rent.

Table S4. Total investment in different equipment and infrastructure used for bobwhite hunting ($n=34$ properties).

Equipment[†]	Mean cost of equipment (\$)	Median cost of equipment (\$)	Number of properties with item of equipment	Mean number of equipment owned per property
Vehicles				
Hunting wagon	38,020	32,500	31	1.58
Horse trailer	24,255	25,000	29	1.62
Infrastructure				
Dog kennel	278,240	200,000	33	1.21
Hay barn	86,833	60,000	6	1
Horse barn	526,944	300,000	31	1.10
Pasture fencing	48,608	20,000	21	N/A

	Mean expenditure on equipment	Median expenditure on equipment	Number of properties with item
Tack	25,307	20,000	27

Table S5. Different revenue sources generated on wild bobwhite properties in the southeastern United States (n=37).

	Mean (\$) generated	Median (\$) generated	Min (\$) generated	Max (\$) generated	Number of properties earning income
Timber sales					
Annual timber harvest	138,846	104,167	2,000	434,216	15
Net present value of timber production (2 to 10 years between harvests) [†]	353,216	196,724	14,052	1,232,891	9
Crop production	358,967	160,000	6,000	1,995,000	13
Non-bobwhite hunts	136,915	47,500	4,320	532,000	8
Livestock	125,000	125,000	125,000	125,000	1

Property rentals [‡]	60,933	20,000	7,800	155,000	3
Dog sales	15,500	15,000	4,500	27,500	4
Carbon credits	18,000	18,000	18,000	18,000	1
Donations [*]	165,000	165,000	165,000	165,000	1
Field trials	50,000	50,000	50,000	50,000	1
Farm bill	50,000	50,000	50,000	50,000	1
Dog training	11,000	11,000	11,000	11,000	1
Total revenue generated per year	300,577	210,000	15,000	1,012,500	13
from sold bobwhite hunts (leases and day hunts) ^{**}					

[†] The net present value of timber production has not been divided by the number of years between harvests and should not be interpreted as annual revenues from timber production.

[‡] Three landowners rented out houses near or on the property.

^{*} The previous landowners left an endowment and other landowners made contributions.

^{**} Note that these revenues included the sale of hunts to trusted clients, company employees, and friends. Revenues depended on the number of hunts sold, the price per hunt, whether one or two hunting wagons were being run (which allowed for more consecutive

hunts). These revenues also include payments by extended family to hunt on the property or subsidies paid by clients towards land stewardship costs, in order to be permitted to hunt on the property.