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Feral Hog Management: Typing Performance Measures to Resources Protected

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FERAL HOG MANAGEMENT: TYING PERFORMANCE MEASURES TO RESOURCES PROTECTED

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ABSTRACT: Feral hogs impact a number of resources including agricultural crops, wildlife, rangelands and watersheds. Additionally, feral hogs pose a disease risk to domestic livestock and humans. The Texas Wildlife Services Program (TWSP) is responsible for managing damage to these and other categories of resources. TWSP is developing performance measures specific to the resource protected which allows for better decisions regarding the intensity of control needed. Conflicts discussed include human and livestock diseases, agricultural crops, rangeland, wildlife predation and competition with native wildlife. Performance measures for each resource will be discussed.

KEY WORDS: control, cost-benefit analysis, feral hogs, management,

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INTRODUCTION

Feral hogs are an invasive species which affect nearly every part of the ecosystem. The IUCN-Invasive Species Specialist group has labeled them as one of the worlds' "100 Worst Invaders". Feral hogs compete with native wildlife for forage, water and mast and depredate ground nesting bird nests, small mammals, reptiles and amphibians. Endangered species, such as sea turtles and several colony nesting birds, are impacted by nest disturbances and egg predation.

Feral hogs depredate crops planted for human or livestock feed. Crops damaged include corn, grain sorghum, wheat, oats, peanuts and hay crops. Vegetable crops, such as spinach, lettuce, melons and pumpkins are often damaged. Rice crops can be impacted both through direct consumption and through damage to levies in the field, which causes water losses and reduced productivity. Feral hogs also consume nut crops, such as pecans and almonds, and damage to the ground under nut trees can affect the success of mechanical harvest methods.

Feral hogs have been linked to 95% declines in understory vegetation, with associated declines in species diversity. Feral hogs have been identified as a cause of plant invasion, both through the physical transportation of seeds as well as the disruption of soils through their rooting activity.

Feral hogs are a reservoir for several diseases of livestock. Of primary concern in the US are pseudorabies and brucellosis. Pseudorabies is fatal to young piglets and is a major concern to domestic swine producers, but the virus may be fatal to a host of other species. Brucellosis in swine is caused by the bacterium *Brucella suis* which can also infect domestic cattle, though not with the same effect as the cattle Brucella caused by *B. abortus.* Feral hogs can also serve as a reservoir and vector for Classic swine fever (hog cholera) which was eliminated in the US but is still present in other countries. Feral hogs are a reservoir for, and can transmit, leptospirosis which also affects humans and animals.

E. coli infections have been linked to feral hogs. In Texas, 4 of 7 (57%) of feral hogs tested in one small area had E. coli which could be pathogenic to humans and 6 of the

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7 (86%) had E coli strains which would have been pathogenic to livestock. E coli loads in certain watersheds can be linked to feral hog populations.

Feral hog damage to property includes extensive damage to fencing, landscaping and green space set aside for flood protection. Vehicles are damaged through highway accidents. Farm machinery has been damaged when it runs through hog rooting hidden in a field.

FERAL HOG CONTROL

Feral hogs are managed by a number of agencies with a wide variety of management objectives. California has protected feral hogs as a game species and permits are required to conduct control. Florida and Hawaii have given feral hogs game status on public lands, but allows landowners to control them at their discretion on private lands. Texas requires a hunting license for recreational hunting but does not regulate feral hogs and they legally are considered the property of the landowner. Kansas, Missouri and other states are actively trying to eradicate feral hogs within their borders.

Feral hog control usually involves an integrated approach. Fencing may be used to exclude hogs from high value crops or ecological areas. Lethal control is often implemented, with a variety of mechanical methods including neck or foot snares, live traps, dogs and shooting.

Performance measures for feral hog control may include an economic analysis (Higgenbotham). It also may include a report of disease samples taken and an infection rate. Mostly, however, feral hog control reporting is based on the number of hogs killed. As an example, in FY 06 WS programs in 20 states and territories reported killing 19,752 feral hogs and collecting 4991 biological samples. For a variety of reasons, the empirical number of hogs killed may be the worst performance measure for damage management.

BETTER MEASURES

<u>Eradication v. Control</u>

Eradication of feral hogs is a worthy goal and is achievable in areas with low hog numbers or, as in island situations, where repopulation from outside sources may be managed.

Feral hogs are prolific and may breed at 6 months of age. In the wild, hogs may produce multiple litters in a short time with 3 litters in 2 years a practical expectation in mild climates. The biological potential for a population starting from a single bred sow can exceed 1400 hogs in 3 years time (Figure 1). To be effective, feral hog control would need to be aggressively applied to the population for any level of population suppression. As an example from the population in Figure 1, an 80% control applied in Month 33 would reduce the population to 284 animals. A second control effort, also at 80% reduction applied within 6 months, would reduce the population to 57 animals. This level of removal would set the population back to the slow portion of the growth curve and would extend the benefits of control for 19 months.

Conversely, a 50% control in Month 33 would reduce the population to 709 and a second 50% reduction would reduce the population to 354. Because of the exponential growth potential of the population, this level of reduction would not reduce populations appreciably and the benefits of control would only last 7 months.

Obviously, the number of hogs removed is only part of the population management performance objective. A better performance measure would also include the % reduction to the local population or the number of hogs remaining in an area so that the future level of control may be estimated.

Numbers v. Biomass

The long list of resources which feral hogs impact requires managers to inspect their hog control strategies for efficacy. Some damage, such as rooting, is strictly a function of adult hogs while other damage, such as disease risk or nest predation is a function of all hogs. Damage to rangeland and crops and competition with wildlife is likely a function of biomass more than numbers.

A small hog (<60 lbs) consumes 5% of its body weight daily when it is available. A large hog will consume 3% as a maintenance diet and up to 5% of specialty feed such as grain crops or acorns. A 40 lb hog consuming 5% of its body weight will eat 2 lbs of grain or mast daily. A 150 lb hog consuming 3% of its body weight will consume 4.5 lbs daily. The same hog in a corn field will consume 5% or 7.5 lbs daily.

As seen above, control of populations should focus on the numbers and percentage of the population removed, with young sows (6-9 months) the most effective target. When protecting crops, rangeland or attempting to minimize competition with wildlife, targeting large hogs is the most effective. The performance measure for feral hog control for crop and rangeland protection should contain an estimate of hog weights removed to calculate biomass removed.

In a recent experiment in Texas, WS attempted to estimate biomass of hogs removed during aerial shooting operations. Weights were estimated from the air and hogs were classified in 3 broad categories of small (<50 lbs), medium (50-220 lbs) and large (>220 lbs). Biomass removed was then estimated by assigning an average weight to each group multiplied by the numbers removed in each group.

WS conducted the experiment in 2 different areas in early FY 2008. One area (Site A) had received no aerial hunting and little hog removal for several years. In this area, 365 hogs were removed in 7.4 hours of flight time for a rate of 49.3 hogs per hour. Of these, 39 (10.7%) were small hogs, 250 (68.5%) were medium hogs and 76 (20.8%) were large hogs. The biomass removed was estimated at 40,390 lbs. These hogs were removed on approximately 80 square miles and the removal rate was 4.56 hogs per square mile or 505 lbs of hogs per square mile.

On a second site (Site B), WS removed 130 hogs in 14.7 hours of flying for a rate of 8.84 hogs per hour. Site B was also about 80 square miles. Of the 130 hogs, 88 (67.7%) were small hogs, 38 (29.2%) were medium hogs and 4 (3.1%) were large hogs. Using the same average weights as Site A, the biomass removed was 6940 lbs (86.75 lbs per square mile) or only 17% of Site A. Hogs taken per square mile was 1.62 or 35% of Site A .

Table 1 shows the comparisons.

UOM	Site A	Site B	B/A
Total hogs	365	130	.356
Hogs/ hr aerial	49.3	8.84	.179
Hogs/sq mi	4.56	1.62	.355
Total biomass removed	40,390 lbs	6940	.172
Biomass removed/sq mi	505	86.75	.172

Table 1: Comparisons of feral hog removal rates for 2 sites in TX FY 08.

DISEASE REDUCTION

Disease reduction presents a difficult proposition for performance measures. A single infected feral hog penetrating the

biosecurity of a confinement operation can ruin the performance record for an agency. Zero tolerance is an admirable goal, but may not be practical in transitional herds of domestic swine. The best performance measure may be the estimated reduction of disease risks.

Disease risk reduction involves modeling several parameters of feral hog diseases at once. For pseudorabies, the infection rate and exposure rate to domestic swine are the key factors in disease risk. Pseudorabies positive hogs may well harbor the virus, but may not be shedding the virus when they come in contact with domestic swine. The probability of virus shedding increases as the infection rate increases within a population.

Infection rates are best determined by aggressive sampling. Low intensity sampling may identify pockets with the disease, but may not provide infection rates suitable for disease risk reduction modeling. Interestingly, Texas WS conducted aggressive sampling associated with one of the above population reduction efforts. Opportunistic sampling (<25 samples over 2 years) had identified no pseudorabies in one portion of the area and a 50% rate in the adjacent portion of the property. When 100 samples were collected in 3 days, the area with no previous positive samples remained pseudorabies free, while the other area had a 52% rate, statistically similar to the opportunistic sampling.

Brucellosis is spread by any hog with the disease. The reduction in hog numbers, or more specifically the reduction in the adult portion of the hog population, should equate to the reduction in brucellosis risk.

E coli is deposited in watersheds through feces and the relationship of hog size to dropping amounts is similar to relationship between hog size and consumption rates. Hogs under 60 lbs will deposit 5% (dry weight) of their body weight in feces while larger hogs will deposit 3-5% of their weight daily. While the volume of bacteria within the feces has not been determined for the various sizes of hogs, there is little reason to expect it to be significantly different per liter of feces. E coli reductions will be similar to reductions in biomass, but will likely not be a strict linear reduction, as smaller hogs will deposit a proportionally higher volume of feces per pound of body weight. However, overall reductions in biomass will yield lower deposits of E coli.

PROPERTY DAMAGE

Property damage may well be the worst case for performance measures. Property damage is a function of availability of the property as well as the behavior of the hogs. As adaptable as hogs are, they may be successfully averted away from a limited resource by hazing. However, they are likely in another place damaging other resources. A hog which has nightly travels of 5 miles will have the opportunity to damage numerous fences if paddocks are 30 acres, while it will not encounter a single fence in a 10,000 acre pasture. Pre- and post- control estimates of damage are the only applicable measure of effectiveness for property damage.

SUMMARY

While farmers and politicians like to see numbers and “body counts” for feral hogs, other performance measures may be needed to scientifically assess the success of a feral hog control program. Methods are needed to determine the percentage of the population removed. Estimates of biomass removed may yield better estimates of protection than simple numbers removed. Changes in biomass over time may also provide insight to population status. Accurate estimates of infection rates are needed to determine risk reduction for pseudorabies.