TECHNIQUES FOR CAPTURING, HANDLING, AND MARKING NUTRIA

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ABSTRACT

Trapping, handling, and marking methods were evaluated for wild nutria (*Myocastor coypus*) in agricultural areas in Louisiana and Texas. Treadle-operated box traps, set on rafts instead of land, increased retrap response and reduced mortality. A modified leg-hitch sling and the tail-hold method were found best for simple handling, and a light-weight restraining device was developed for close examination. Sodium pentobarbital injected intrathoracically at 50-60 mg/kg was the safest and most consistent anesthetic; carrot baits treated with diazepam effectively tranquilized nutria for safe handling. Nutria showed gross physiological rejection of nearly all marking materials tested (coloring agents and such objects as tags, flags, pins, and collars attached to or through the skin of various parts of the body). A No. 3 self-piercing monel metal animal tag inserted through a web in the hind foot was the only reliable, long-lasting marking method tested, but it was inconspicuous. Acceptable short-term markers included ear tags, a white reflective paint, and radio-transmitter collars.

INTRODUCTION

In a study of nutria and nutria damage in agricultural areas of coastal Louisiana and Texas, population studies and research on control methods required capturing, handling, and marking large numbers of animals. Techniques previously used for marsh nutria proved generally unsatisfactory for agricultural nutria, and we tested a number of additional methods—many originally described for other animals, some modified from the form used for marsh nutria, and some new. This paper presents the results of these evaluations.

For brevity and ease of reference, most of the material is given in tabular form, in order of the methods' general effectiveness, and is discussed only briefly in the text.

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LIVE-TRAPPING

Twelve techniques of live-trapping were evaluated (Table 1). Chasing, with or without dogs (Kays 1956, Williams 1964), was not included because it was impractical in our study areas. Most of the techniques tested, including several successfully used by other workers for marsh nutria, were unsatisfactory for agricultural nutria because of mortality,

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Table 1. Live-trapping methods tested on nutria in agricultural and adjacent areas in Louisiana.

	Earlier reports			
Methods	Author	Species trapped	Techniques used for nutria capture	Remarks
Box trap, treadle	Takos 1943 Kays 1956 Davis 1963	Muskrat Nutria Nutria	Raft set, carrot bait, with land sets adjacent	Excellent initial catch and retrap; reduced mortality from dags and drowning
			Land set, carrot bait	Good initial catch but not retrap; mortality from dogs and drowning
Box trap, tip-top	Taber and Cowan 1963	Birds	Modified by dual drop-doors, spring-released treadle; raft set, carrot bait	Excellent initial catch; reduced mortality; poor retrap and is too bulky
Padded steel trap	Taber and Cowan 1963	Fur bearers, other mammals	Victor No. 2 dbl. spring; jaw padded with burlap, sponge, or leather; offset; tranquilizer bait next to trap	Excellent catch, but leg or foot eventually sloughed, causing crippling or death from infection
Dip-net	Glasgow 1953 Kays 1956	Woodcock Nutria	3-ft diam. loop; night capture with light, on foot or in boat	Good initial catch but not retrap; caused light-shyness on intensively trapped areas
Pole snare	Chabreck 1963	Alligators	Wire slip loop through 16-ft alum. pole; night capture on foot or in boat	Same
Bailey beaver trap	Bailey 1927	Beaver	Set in shallow water in drainage ditches	Good catch; bulky, cumbersome; high mortality from drowning with rapid increase in water level
Diazepam baits	Murray and Dennett 1963	Deer	Carrot bait on raft; capture by hand or with hand net	Excellent in enclosure tests, poor in field—activity scares nutria, who escape
Wire bird trap	Snead 1950 Taber and Cowan 1963	Muskrat Birds	Entrances—funnel, bob-wire, flap door; baited or "drive", set in narrow ditches	Good in enclosure tests, poor in field
Land snare, Wire	Petrides 1946	Mammals	Wire trip and spring trigger; set in dens and runs	Same
Land snare, nylon	Berger and Hamerstrom 1962	Hawks, birds	Modified Bal-Chatri 50-lb nylon line tied to wire fencing and covered; set in dens and runs	Same
Sodium pentobarbital spear	Anderson 1961	Deer	Syringe-tipped spear; 12, 20, 22-gauge needles	Causes flank and internal injury; infection and death

injury, ineffectiveness, or difficulty of use. Box traps, particularly when floated on water, were the most satisfactory method found.

Single- or double-door, noncollapsible, treadle-operated box traps (10 x 10½ x 32 inches) with cut carrots as an attractant were the most effective. Traps set on land in trails, den entrances, or on shore close to water were effective for catching nutria the first time but not for recapturing them. In addition, over 15 percent of the animals trapped on land died—8 percent from drowning during flash floods, 2 percent from attack by feral dogs, 3 percent from heat prostration, and 2 percent from exposure during freees or cold, wet weather. When these live traps were set on 4 x 4-foot or 4 x 8-foot rafts (Fig. 1), they not only provided an excellent initial catch, but were very effective for retrapping; over 80 percent of our recaptures were on rafts. Raft sets reduced mortality from dogs and drowning to 1 percent but did not eliminate mortality from adverse weather conditions. Setting traps on land above flood level next to raft traps almost doubled the overall trapping success; these highland traps prevented drownings, but were still subject to attack by dogs and were ineffective without raft traps or floating bait stations nearby.

Tip-top box traps, unsuccessful by themselves, were effective when modified to include treadle-released, spring-action, dual trap-doors mounted on a wire cage and floated on a 4 x 8-foot raft (Fig. 2). Large pieces of carrot were placed on nails between the two doors as an attractant. Although this trap was effective for initial catches, equalling 10 or 11 land-set traps, it was not effective in retrapping.

HANDLING

Mechanical Methods

Various methods of handling small mammals (Baumgartner 1940, Emlen 1944, Erickson 1947, Taber and Cowen 1963) proved cumbersome or unsuited for wild nutria, and those used for fur farm nutria (Kinsel 1958) were ineffective. A wire funnel used by Aldous (1946) and its modified version (Kays 1956) were cumbersome and covered some parts of the animal; it was also difficult to remove animals when they held on to the wire.

For simple laboratory studies, we found that the safest and fastest handling techniques were (1) a modified sling device similar to that described by Snead (1950) and Melchior and Iwen (1965) for weighing and external sexing, and (2) the tail-hold method used by fur trappers (Ashbrook 1948) for transferring the animals to holding cages (Fig. 3). A choker is required to remove nutria from laboratory cages, but nutria in live traps can be snatched out by the tail or let free on the ground and then caught.

To restrain nutria for closer examination or marking, we modified a choker into a restraining device by fitting a girth strap over a lightweight metal pipe (Fig. 4). This device enables one person to safely and efficiently handle all sizes of nutria, but we generally restrained small nutria (under 2 pounds) by hand, wearing thick gloves or mittens. Proper location of the restraining device is along the stomach; several nutria died from strangulation or from injury to the exoccipital condyles when it was located along the side or back. With the device properly placed, we safely handled several hundred nutria without mortality. The device also worked well for muskrats (*Ondatra zibethicus*) and domestic cats and dogs.

Drugs

We tested several drugs to anesthetize or tranquilize nutria for laboratory and field studies (Table 2). Sodium pentobarbital was consistently the safest and most effective anesthetic. Kinsel (1958) reported that 25 mg/kg intraveneously produced surgical anesthesia in ranch nutria for 15-20 minutes. In most studies requiring anesthesia, we used a dose of 50-60 mg/kg, injected intrathoracically with a 1½-inch, 20- or 22-gauge hypodermic needle through the diaphragm near the ventral rib cage

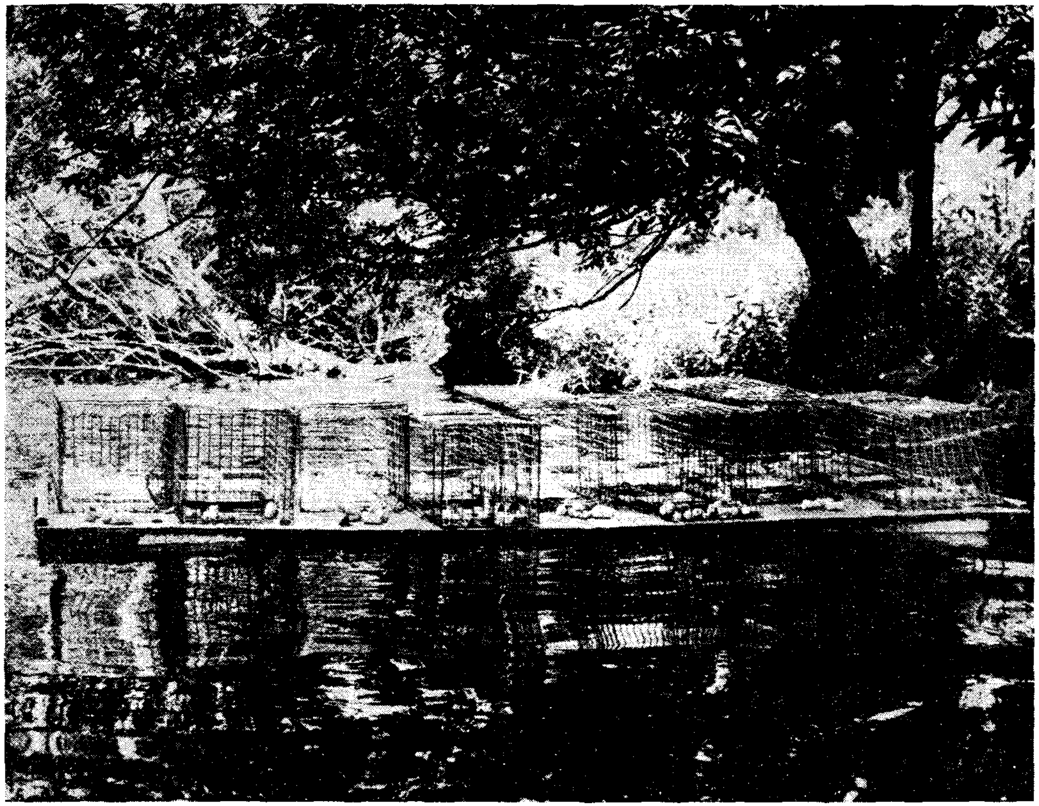

FIG. 1. Treadle-operated box traps (size 10 x 10½ x 32 inches) used on a 4- x 8-foot styrofoam-floated raft for catching nutria. Total catch performance equaled 28 land-set live traps in agricultural areas, and it proved to be the only reliable method of retrapping marked nutria.

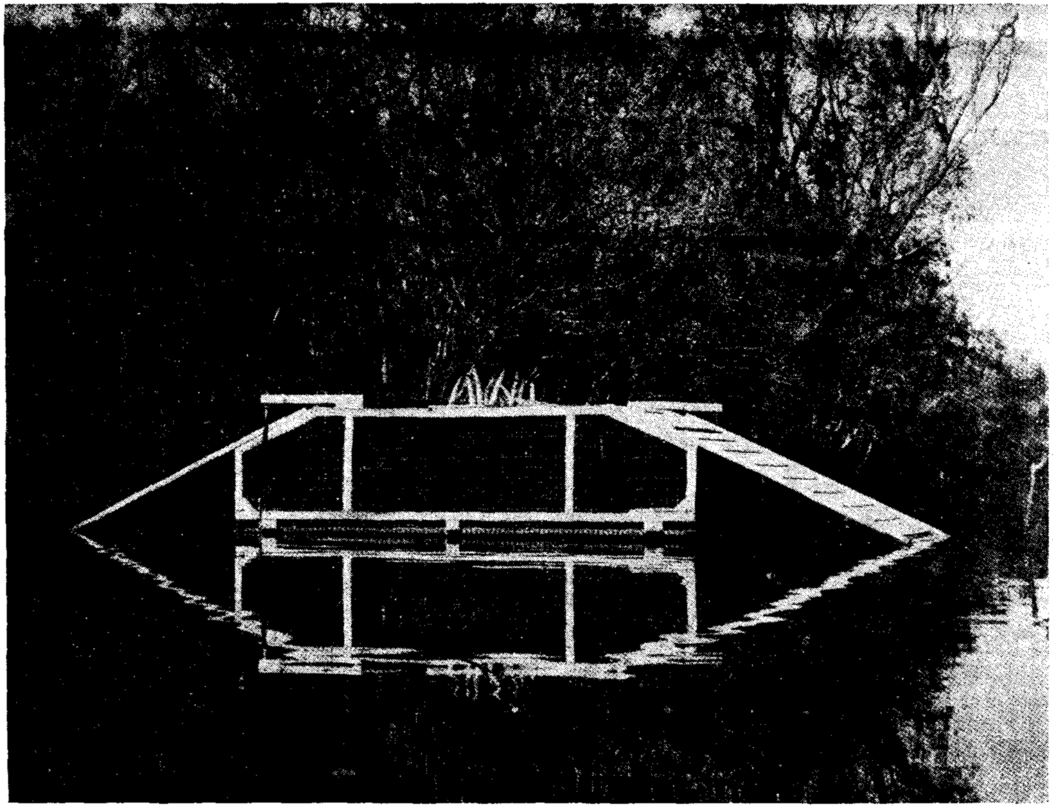

FIG. 2. Multiple-catch trap, with treadle-released, spring-action, dual drop-doors, used to capture nutria in Louisiana.

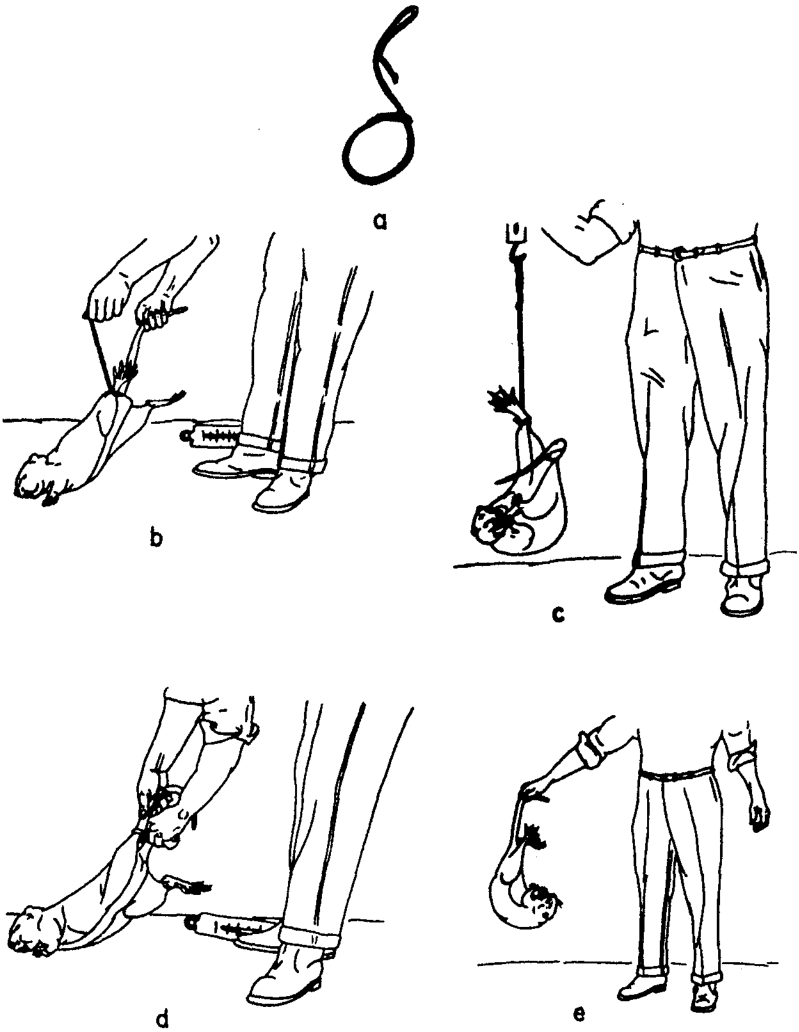

FIG. 3. Laboratory handling techniques used on wild nutria.
a. Leg-hitch sling made of nylon cord.
b. Nutria positioned for sexing and applying sling.
c. Weighing nutria.
d. Removing leg sling.
e. Proper tail hold for carrying wild nutria.

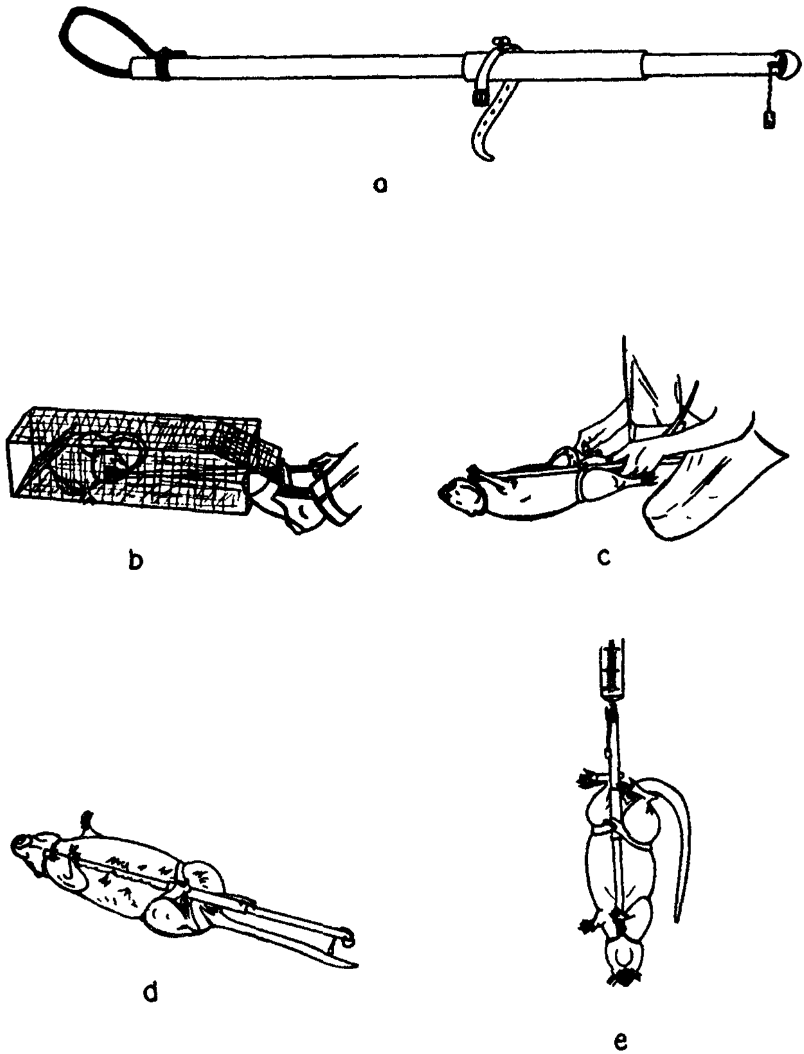

FIG. 4. a. Restraining device for handling nutria.
b. Removing nutria from live trap by slipping choker collar around neck.
c. Securing girdle strap to choker-held nutria.
d. Nutria with properly positioned restraining device.
e. Weighing restrained nutria.

TABLE 2. Drugs tested to facilitate handling and capture of nutria. (All data for single doses. At least 15 animals for each route tested.)

Drug	Route *	Lowest dose lethal (mg/kg)	Effective, nonlethal doses: Range (mg/kg)	Time to act (min)	Duration of activity (hr)	Remarks
Anesthetics						
Sodium pentobarbital	it	100	50-60	2-5	2-3	Lethal if injected into heart or lungs
	ip	100	40-60	10-15	2-3	Lethal if injected into liver
	iv	100	25-60	1-4	2-4	Difficult to administer without shaving fur
	Oral	..	40-150	60	..	Mild sedation only
Succinylcholine chloride	it	6	3-8	1/4–1/2	1/10-1/2	Variable; low doses good for short-term handling
Paraldehyde	im	1 (cc/kg)	.4-.5 (cc/kg)	1 1/2-5	4 1/2-5	Obnoxious smell; nutria not readily revived as reported by Buckley (1951) for beaver
Sodium secobarbital	ip (warm)	50	40-50	1-3	2-3	Variable; either not effective or lethal
	ip (cold)	50	50	0-3	0-2	Same
Tranquilizers and Soporifics						
Diazepam	Oral	..	15-900	10-20	8-36	Normal dose 200 mg for nutria of any size; 0.2% on bait good for handling captive nutria but not for capturing wild ones (See Table 1)
Chloral hydrate	Oral	..	20-50	3-5	1-2	0.2% on bait not good for capturing wild nutria
Alpha-chloralose	Oral	..	20-75	20-30	1-3	Same
Baygon **	Oral	..	20-75	20-30	1-3	Same

* Oral = drug glued to carrot with corn oil, fed ad libitum; it = intrathoracic injection; ip = intraperitoneal injection; iv = intravenous injection; im = intramuscular injection.
** Trade name for O-isopropoxyphenyl methylcarbamate. Reference to trade names does not imply endorsement of commercial products by the Federal Government.

to avoid the heart and lungs. On rare occasions when it was necessary to save particular nutria overdosed with a barbiturate, we found that an intraperitoneal injection of 0.2 cc/kg of picrotoxin generally blocked further absorption. In severe cases, 0.25 cc (total dose) of pentylenetetrazol was given as a stimulant with the picrotoxin.

Of the tranquilizers and soporifics tested, diazepam (a tranquilizer) was the safest and most effective. Murray and Dennett (1963) reported that intramuscular injections caused mild tranquilization in caged nutria at 8 mg/kg, and hypnosis for 12-15 hours at 30 mg/kg. We found that powdered diazepam at 0.2 percent by weight on cut carrots was well accepted and successfully tranquilized captive nutria for safe handling in laboratory and field studies, but this dosage did not permit the capture of free animals. The drug apparently restricted closure of the ear valve, so that the animals would not resubmerge after diving once; however, they could float and swim normally. Nevertheless, they could not be approached quietly enough by boat to be captured. Tranquilized nutria became quite clumsy on land, but they could still not ordinarily be approached quietly enough for capture because of the dense brush in the study areas.

In secondary hazard tests, neither sodium pentobarbital nor diazepam produced any apparent symptoms in bald eagles (*Haliaeetus leucocephalus*), commercial minks, or domestic cats and dogs that were fed sacrificed, drugged nutria.

MARKING

Marking nutria for identification proved a major problem. Nutria showed a gross physiological rejection of almost all materials applied to or inserted through the skin or other parts of the body, even the skull (Tables 3 and 4); and skin tougheners, antiseptics, and antibiotics did not lessen this tendency. Most markers were either sloughed or caused acute festering; marked toes or even the entire foot or tail were sloughed in some cases.

Permanent Markers

The only reliable, long-lasting marker found was a No. 3 (1/16-inch) self-piercing monel metal animal tag inserted through the web of a hind foot. This caused no more than superficial lesions, and the only losses recorded in over 3 years were due to improper crimping. Although many web-tags were returned by fur trappers, we found that the tag could be easily overlooked (in skinning, the feet are normally the first part of the nutria to be cut off and discarded). Consequently, to increase the return of marked animals, we also frequently marked each ear by inserting a No. 3 tag in the cartilage near the base of the ear and added to the tag a small (3/16 x 5/8 inch), double-fold, heat-sealed plastic flag, color-coded for a particular study area. The ear-tags were not retained as effectively as the web-tag, but provided much supplemental information and were well recognized by trappers, at least while the colored flags lasted.

Clipping the toes above the first joint and punching holes in the web (both type of wounds cauterized with silver nitrate) were satisfactory ways of marking, but marked animals were not recognized and reported by fur trappers. In addition, because trappers in the area sometimes used the wrong size of steel traps (No. 1 instead of No. 2 or No. 3), there were a number of nutria in the population that had lost their toes in traps and escaped; these were sometimes confused with toe-clipped nutria. In areas where commercial trapping is limited or only proper steel traps are used, mutilation of the toes and webs should be of value for permanent marking. The code we used, a modification of that used by Baumgartner (1940) and Aldous (1940), is shown in Fig. 5. The method is not suitable for tracking. Tracks of toe-clipped or web-split nutria were not discernible in any of our study areas.

TABLE 3. Marking methods tested on penned or free-roaming nutria in Louisiana and Texas.

Marker	Earlier reports: Author	Earlier reports: Species marked	Method	Duration	Remarks
Metal Animal Tags					
Self-piercing National # 3 (4-1005)	—	—	Through any large web, hind foot	3 yr (at least)	2 of 25 lost in pen tests (lock failure); in field, 1% of 414 lost
	—	—	In ear cartilage at base of skull; with 3/16″ x 5/8″ plastic flag; both ears	1-2 yr	Tag loss <30%, both tags seldom lost in first year; but flags worn or torn off in <1 year
	Baumgartner 1940 Hay 1958	Squirrel Beaver	Through fold in pliable part of ear; no flag	6-18 wk	In pen and field tests, 75% tag loss from sloughing in 18 wk
	—	—	Same, with 3/16″ x 5/8″ plastic flag	1-12 wk	In pen and field tests, 75-80% tag loss from sloughing in 12 wk
	Labisky and Lord 1959	Rabbit	Same, with ¾″ x 1½″ plastic flag	1-85 days	In field, 65% tag loss in 4 wk, 95% in 12 wk
	—	—	Through skin of nape	6-7 days	In pen tests, 100% loss from sloughing or torn out in 1 wk
Self-piercing National # 1	Kays 1956 Davis 1963	Nutria Nutria	Various parts of ear; no flag	3-16 wk	In pen tests, 50% loss from sloughing in 16 wk
Rabbit ear tag (National 4-41)	Richter 1955 Labisky and Lord 1959	Rabbit Rabbit	Through small hole in ear; skin toughener, cauterized with $AgNO_3$ or untreated; with washers and reflective tape	50-55 days	In pen tests, 100% loss from sloughing in 8 wk

Mutilation					
Toe clip	Aldous 1940 Baumgartner 1940 Hensley and Twining 1946 Davis 1963	Beaver Squirrel Muskrat	Toes (except thumb, which animal needs) clipped above first joint, cauterized with $AgNO_3$	Life of animal	Unreliable where toe loss to trapping is common; very minor natural losses also occur from freezing. Regrowth common if only phalange clipped
Web punch	Kinsel 1958	Nutria	3/16″ hole with paper punch, cauterized with $AgNO_3$	Life of animal	Holes may enlarge and split
	Aldous 1940	Beaver	Same, not cauterized	5-6 mo	Heals and is unrecognizable or web splits
Web split	Davis 1963	Nutria	Web cut with knife, cauterized with $AgNO_3$	Life of animal	Unreliable because some webs split naturally in wild
Tail notching, cropping, or branding	Bradt 1947	Beaver	Tail notched, cut off, or branded with wood burner at varous lengths	Life of animal	Tail sloughs off at location of notch or brand; unreliable because some natural tail sloughing from freezing
Ear cropping or punching	Kinsel 1958	Nutria	Ears cropped or punched with leather punch	Life of animal	In pen tests, some infection, hole occasionally split by scratching; unreliable because of natural ear injuries
Tattoo	Aldous 1940 Kinsel 1958	Beaver Nutria	In web; white or dark ink applied with plunger-operated tattoo needle	3-6 mo	White ink lost; dark ink becomes unrecognizable as web darkens with age
	Schwartz 1941 Kinsel 1958	Rabbit Nutria	Same, in ear	<60 days	In pen tests, unrecognizable in 60 days
Fur clipping	Baumgartner 1940	Squirrel	Fur clipped down to skin in patterns	60-80 days	Recognizable only in daylight

Marker	Earlier reports: Author	Earlier reports: Species marked	Method	Duration	Remarks
Metal pins					
Safety pin (stainless steel, nickel, or plastic coated)	Taber 1949	Pheasant	Through skin of nape; head of pin pinched or modified into locking device; with ¾″ x 2¾″ plastic flag	2-16 wk	In pen tests, 45% loss from sloughing in 6 wk; in field 90% loss in 12-16 wk; sloughing not reduced by skin tougheners or antibiotics
	Southern 1940	Rabbit	Through various parts of ear; with 1″ x 2″ plastic flag or plastic disk	4-34 days	In pen tests, 100% loss from sloughing in 35 days
Nickel fish pin	Hensley and Twining 1946	Muskrat	Through skin of nape; with plastic button and/or ¾″ x 2¾″ plastic flag	2-10 wk	In pen tests, 50% loss from sloughing in 30-45 days; in field, 95% loss in 10 wk
	—	—	Through hind leg between tibia and Achilles tendon; with plastic button on each side	30-55 days	Acute infection in 2 wk; some feet sloughed in 25-30 days; immobilization in 55 days
	—	—	Through base of tail; with plastic button on each side	15-30 days	Tail festers and sloughs; some nutria died from infection
Collars and Harnesses					
Radio transmitter collar, ¼″ copper flashing (serves as antenna)	Dodge and Church 1965 Mech *et al.* 1965	Hare and mt. beavers Mammals	Fitted to individual nutria; plastic-coated vinyl tubing, dental acrylic, and electrical tape around entire package	30-60 days	Festering of neck region; very few nutria retained package over 60 days without lesions

Leather strap harness (cat harness)	Hahn and Taylor 1950	Deer	Riveted or metal buckle; with bells and plastic flag	4-7 days	Leather stretches when wet, nutria escapes or gets foreleg through
Patent leather harness	Hewson 1961	Hare	Same	1-12 wk	Lesions and festering in 1 wk; foreleg hangs in collar; severe traumatism
Plastic strap or tubing	Labisky and Mann 1962	Pheasant	Looped under each armpit; with ¾″ x 2¾″ plastic flag riding near nape	<12 days	In pen tests, severe festering under arms in 12-14 days; one nutria immobilized in 25 days
	Ealey and Dunnet 1956	Hare	Collar; jess knot and metal ferrule, rivet, or buckle; with or without plastic flags or reflective tape	7-35 days	Festering in 7 days; discoloring plastic, severe lesions in wrist, armpit, and neck regions in 2 wk
Plastic-coated copper or heavy-duty steel wire	——	——	Collar; ferrule fasteners; with ¾″ x 2¾″ plastic flag or reflective tape	7-90 days	In pen and field tests, festering in 7 days, discoloring plastic; severe lesions in wrist, armpit, and neck regions; 3 of 14 nutria died from infection
Bands					
Alumnium leg band (National 4-5321G or 1-8906 Atlas Seal)	Errington and Errington 1937	Muskrat	Slipped through two slits in skin of nape	30-60 days	In pen tests, 100% loss from sloughing or torn out after festering started
	Cook 1943 Takos 1943	Muskrat Mammals	Through hind leg between tibia and Achilles tendon	30-55 days	Acute infection in 2 wk; some feet sloughed in 25-30 days; immobilization in 55 days
	Takos 1943	Muskrat	Fit loosely above heel, hind foot	<40 days	Swelling and festering in 2 wk; nutria sloughed entire foot or died from infection

Marker	Earlier reports: Author	Earlier reports: Species marked	Method	Duration	Remarks
Expanding plastic leg band (National bandette 4-911)	Davis 1963	Nutria	Same	<40 days	Same
Monel metal bird band, size 3, 4, 5	Cooley 1948 Kinsel 1958	Squirrel Nutria	Around front toe and free outer toe hind foot	<30 days	Toes swell and fester, are sloughed
Monel metal bird band, size 7B, 8, 9	Hensley and Twining 1946	Muskrat	Fitted around base of tail	<30 days	Tail festers and sloughs; some nutria died from infection
Miscellaneous					
Plastic internal fish tag (Howitt, all styles)	Barnes and Longhurst 1960	Deer	Through slit in skin nape, shoulder, back, or rump	27-50 days	In pen tests, 100% loss from sloughing in 7 wk; sloughing not reduced by skin tougheners or antibiotics
Nylon line or plastic tubing	—	—	Through skin of nape; with ¾″ x 2¾″ plastic flag	>30 days	In pen tests, festering in 15 days, sloughing underway by 30 days
Plastic cylinder, ¼″ dia. x 1″; painted	J. A. Gibb New Zealand (pers. comm.)	Rabbit	Attached to lower ear lobe with stainless steel pin	11-14 days	In pen tests, 100% loss from sloughing in 2 wk

Plastic disk, ⅝″ dia.	Tyndale-Biscoe 1953	Rabbit	Disk riveted on each side of ear; hole punched and cauterized with $AgNO_3$; with 1″ x 1″ or ½″ x ½″ plastic flag	4-74 days	In pen tests, 100% loss from sloughing or scratching out in 10 wk
Plastic strap	Trippensee 1941	Mammals	Folded around ear and stapled	1-14 days	In pen tests, 100% loss from scratching in 2 wk
	Creighead and Stockstad 1960	Ungulates	Through slit in ear; jess knot and rivet; skin toughener, cauterized with $AgNO_3$, or untreated	1-12 days	In pen tests, 100% loss from sloughing or scratching in 12 days
Nylon dart and streamer (*Floy* FT-6, FT-2, FM-5)	Chabreck 1963	Alligator	Through slit in skin; nape, shoulder, back, or rump	4-7 days	In pen tests, 100% loss from sloughing in 1 wk; streamers near rump chewed off; sloughing not reduced by skin tougheners or antibiotics
Skull screw (Stanley, wood eyelet, zinc chromate finish, 1½ mm dia. x 10 mm)	—	—	Hole drilled in lambdoidal ridge of sagittal crest; screw turned till tight; with ¾″ x 2¾″ plastic flag	1-2 days	Sloughed or scratched out, although firmly attached (drugged nutria could be lifted by screw); no change in behavior

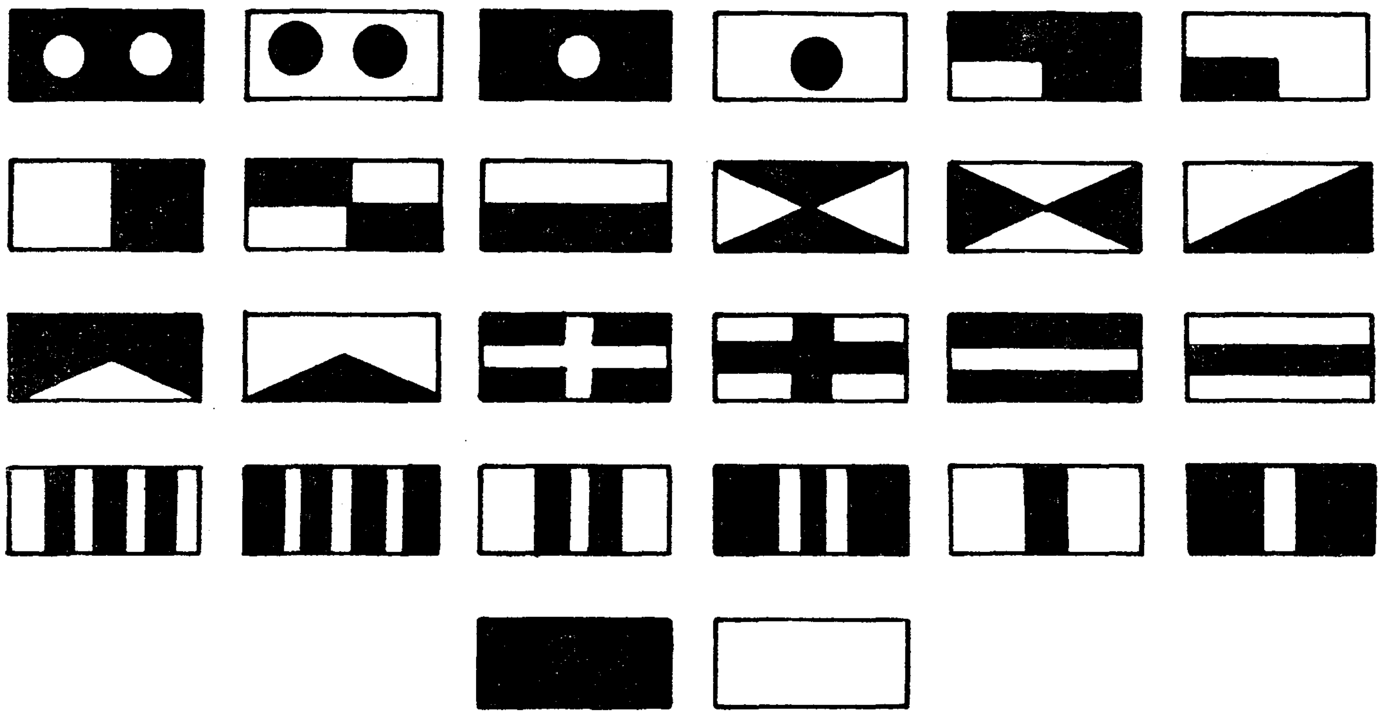

FIG. 5. Basic designs used with *five* colors for identifying 240 individual nutria; heat-sealed double-fold polyvinyl chloride flags as base, with patterns made of single-thickness polyvinyl chloride heat-sealed on top.

Markers for Identification from a Distance

Conspicuous markers tested for identifying individuals from a distance included various plastic flags, buttons, and disks attached through the nape, ear, tail, or hind leg. Nutria readily sloughed most of these, generally within 30 days. Only two attachment methods were satisfactory even for short-term marking—a modified stainless steel safety pin and a straight nickel fish pin inserted through a fold of skin on the nape. These pins were used to attach double-fold, heat-sealed plastic flags with additional pieces of different colored pastic heat-sealed on both sides to form coded patterns (Fig. 6). Patterns and colors were designed so that they would not merge when observed at night under artificial light. Although these nape markers were sloughed, the wounds usually healed within 2 weeks and did not injure the pelt. Collars or harnesses produced severe lesions and festering, injured the pelt, and often permanently injured the animal.

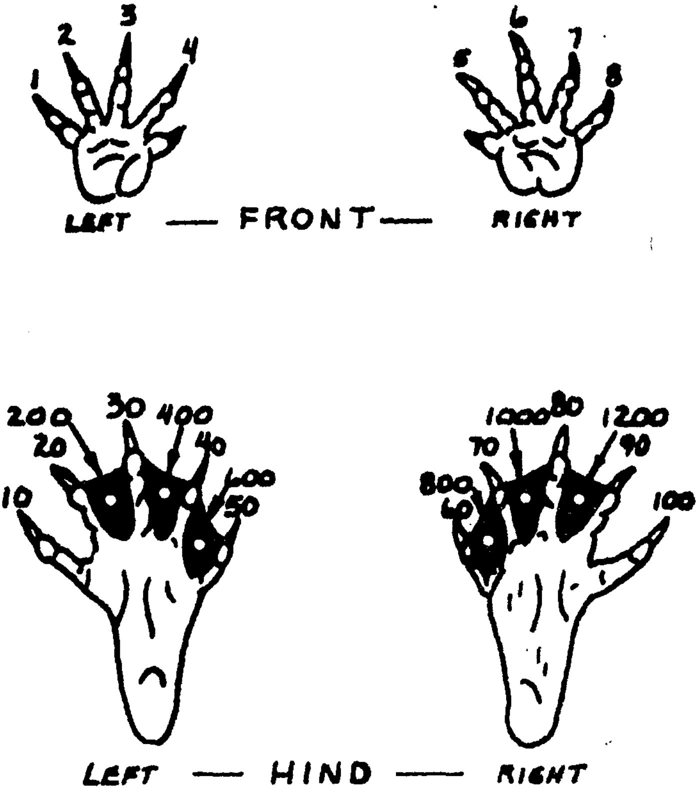

FIG. 6. System of digital mutilation (after Baumgartner 1940) and web punching (after Aldous 1940) used to mark nutria in Louisiana; holes punched with ¼-inch diameter paper punch and cauterized with silver nitrate solution.

The severe wounds caused by collars and harnesses were particularly troublesome in our radio-telemetry studies. Of over 50 nutria instrumented, only two did not eventually show adverse reactions to the antenna-collar units we used. Therefore, we normally monitored an instrumented animal no longer than a month without retrapping it to

TABLE 4. Coloring agents tested for marking nutria

Coloring agent	Application	Duration (days)	Remarks
External Markers			
Codit white reflective liquid	Spray; unshaved pelage	28-30	Visible in daylight and artificial light at night
	Spray; shaved pelage	12-15	Hard to recognize after 2 wk
	Spray; tail	5-7	Flakes off
Hair bleach and creme developer	Hand rubbed on pelage in stripes and spots	20-30	Not recognizable after 30 days in wild
#633 Vermillion dye; DuPont oil orange dye	Saturated solution in ethanol; animal soaked	13-19	Unshaved pelage, good; lasts only few days on shaved pelage or tail
Eosine red fluorescent dye	Water solution; animal soaked	5-6	Lost in swimming
Fluoral 7 gal. yellow dye; Sudar red "O" dye	Saturated solution in ethanol; animal soaked	2-3	Lost in swimming
Yelloy-green life jacket dye	Water solution; animal soaked	1-2	Lost in swimming
Easter egg dye (red, green)	Vinegar and water solution	<1	Lost when animal enters water
Crocein scarlet dye; shoe dye (various colors)	Brushed on pelage	<1	Lost when animal enters water
Cloth dye (red, yellow, blue)	Water solution; animal soaked	<1	Lost when animal enters water
Hydrogen peroxide bleach (6%) with and without developer	Straight solution; animal soaked	0	No effect even when animal kept in sun
Powdered aluminum pigment	Mixed with paint thinner; brushed on pelage	24-26	Festering and abcesses in 20-26 days; flaked off rapidly when other carriers (corn oil, acetone, ETOH, Ethanol) used
Internal Markers			
Codit white reflective liquid	Oral, ad lib. on carrot-corn oil bait	4-6	Recognizable both microscopically and grossly under artificial light
Powdered aluminum pigment	Oral, ad lib. on carrot-corn oil bait	4-6	Recognizable microscopically

check for abrasions; if any were found, the collar was removed and the animal released. Since neck wounds usually healed in 20-30 days, however, such animals could later be reinstrumented.

Several dyes and paints were also tested as conspicuous markers (Table 4). Most either produced infection or were quickly lost in the water or during grooming. The most satisfactory one tested was Codit reflective liquid (3M Co.)**, which did not cause infection and was discernible up to 30 days after application. At night, Codit-marked nutria could be recognized as far as the light beam carried, but specific markings could not be recognized unless the animal was quite close to the observer. Codit was also satisfactory as a fecal tracer for bait acceptance and movement studies, but powered aluminum pigment was equally reliable as a tracer and was easier to mix with baits.

DISCUSSION AND CONCLUSIONS

The nutria's gross physiological rejection of foreign materials and sloughing of extremities occurred under all environmental conditions. We could not explain it except as an inherent survival mechanism. We caught nutria throughout Louisiana and Texas that had sloughed their tails, digits, paws, or limbs and still remained viable and aggressive. On the other hand, in enclosure tests where necrosis occurred without sloughing, the animals usually became inactive or died because of spreading infection.

This rejection process was the greatest difficulty we encountered in devising methods for nutria study. It prevented any permanent way of identifying and following individuals from a distance (conspicuous markers, coloring agents, radio transmitters); the best methods found for this purpose lasted no more than a month. With this limitation, techniques developed for trapping, handling, and marking nutria were generally satisfactory, and should prove useful for other laboratory and field studies.

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NEW DESIGN FOR A LARGE PORTABLE MAMMAL TRAP[1]

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ABSTRACT

Inaccessibility of efficient trapping sites for the European wild hog *(Sus scrofa)* stimulated the design and use of a portable live trap. Materials for several traps can be transported at one time in a pickup truck and the trap can be assembled by one person in less than 15 minutes. Relatively low cost and convertibility into a larger multi-capture trap are other attributes.

A research project involving the live capture of European wild hogs *(Sus scrofa)* prompted the design and construction of a more portable live trap for this species. Prior to development of this trap, rigid and more stationary traps of the same general appearance were used (Matschke, 1962).

Due to the seasonal and altitudinal movements of wild hogs the frequent relocation of traps to new trap sites is necessary for maintenance of trapping success. However, movement and proper placement of large rigid traps were limited to areas readily accessible by means of a pickup truck. Only one trap could be transported at a time. Movement of traps from the vehicle to good trap sites was limited by the size, weight, and general bulk of the trap as well as the rugged terrain of the East Tennessee mountains. The ability to place live traps in good trap sites and away from potential human interference is an important aspect of the success of any project requiring the live-trapping of mammals.

Appreciation is expressed to personnel of the Great Smoky Mountains National Park for encouragement and suggestions regarding the design and construction of this trap.

METHODS

Figure 1 illustrates the trap being assembled. Heavy duty (80X) black iron pipe (O.D. = 0.812 in.; I.D. = 0.546 in.) was used to construct the framework of the individual panels. Long panels were fitted with a centered vertical brace and the end panel with a centered horizontal brace (Figs. 2 and 3). Joints in the frame were all fillet and electric arc-welded. Ten-gauge chain link fencing was laced to inner supports of long panels with 12-gauge soft wire. The chair link was tack-welded on ends of long panels (Fig. 4, Detail A).

All panels and the door frame are fastened together with O.5 inch steel rods (pin) through connecting links on each panel (Fig. 4, Detail B). Connecting links are 3.5 inch sections of pipe and welded to the

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