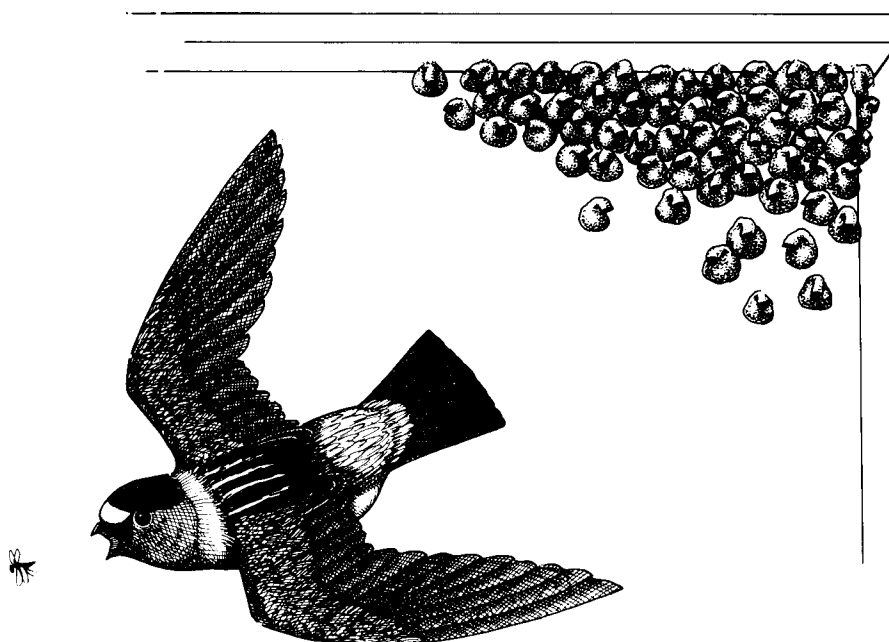


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Fig. 1. Cliff swallow (*Hirundo pyrrhonota*) with nests on a building.

SWALLOWS



Damage Prevention and Control Methods

Exclusion

Netting or wire mesh.

Strip doors.

Habitat Modification

Substrate modification: slick surfaces discourage nesting.

Architectural design: some designs discourage nesting. Avoid overhanging eaves.

Frightening

Not effective for barn or cliff swallows.

Repellents

Not effective.

Toxicants

None are registered.

Trapping

Not allowed.

Shooting

Not allowed.

Nest Removal

Wash nests down with a water hose or knock down with a pole.

Identification

Eight members of the swallow family Hirundinidae breed in North America: the tree swallow (*Tachycineta bicolor*), violet-green swallow (*Tachycineta thalassina*), purple martin (*Progne subis*), bank swallow (*Riparia riparia*), northern rough-winged swallow (*Stelgidopteryx serripennis*), barn swallow (*Hirundo rustica*), cave swallow (*Hirundo fulva*), and the cliff swallow (*Hirundo pyrrhonota*). Of the eight species, barn and cliff swallows regularly build mud nests attached to buildings and other structures, a habit that sometimes puts them into conflict with humans. This is particularly true of the cliff swallow, which nests in large colonies of up to several hundred pairs. Barn swallows tend to nest as single pairs or occasionally in loose colonies



PREVENTION AND CONTROL OF WILDLIFE DAMAGE — 1994

Cooperative Extension Division
Institute of Agriculture and Natural Resources
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Animal and Plant Health Inspection Service
Animal Damage Control

Great Plains Agricultural Council
Wildlife Committee

of a few pairs. Some homeowners consider barn swallows to be at most a minor nuisance. Many homeowners tolerate nesting barn swallows as pleasant and interesting summer companions around the home. This chapter will focus on cliff and barn swallows because of their close association with humans.

The cliff swallow, 5 to 6 inches (13 to 15 cm) in length, is the only square-tailed swallow in most of North America (Fig. 1). It is recognized by a pale, orange-brown rump, white forehead, dark, rust-colored throat, and steel-blue crown and back. The cave swallow is similar in appearance, but has a rust-colored forehead and pale throat; it is restricted to southeast New Mexico and central, south, and west Texas.

The barn swallow, 5 3/4 to 7 3/4 inches (15 to 20 cm) in length, is the only swallow in the United States with a long, deeply forked tail (Fig. 2). Barn swallows have steel-blue plumage on the crown, wings, back, and tail. The forehead, throat, breast, and abdomen are rust colored. Females are usually duller colored than the males.

Range

Cliff and barn swallows are found throughout most of North America. Breeding occurs northward to Alaska and the Yukon, across Canada, throughout the western United States, and south into Mexico. Barn swallows are common nesters in most of the southern United States, except Florida. Until recently, cliff swallows did not breed in the southern United States east of central Texas and south of west-central Tennessee or western Kentucky. Reports of new colonies in eastern Tennessee, Louisiana, Alabama, Arkansas, Mississippi, and Florida suggest a range expansion into the southern Atlantic seaboard and Gulf Coast states. Barn swallows are also found in Europe, North Africa, and Asia.

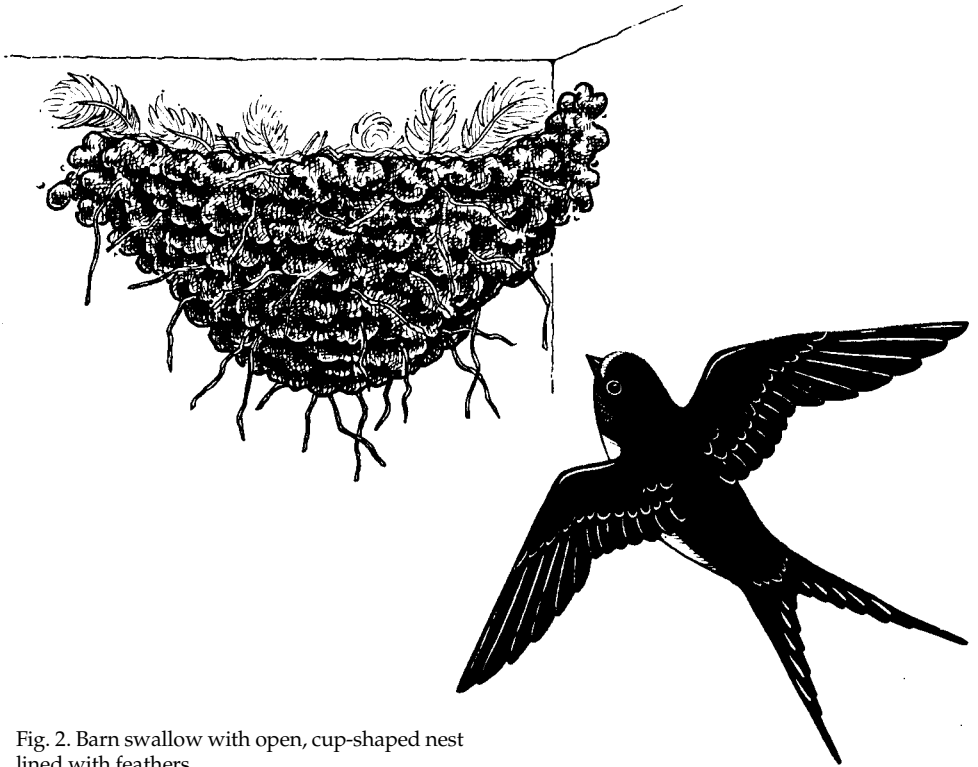


Fig. 2. Barn swallow with open, cup-shaped nest lined with feathers.

Habitat

Four basic conditions are found near most cliff and barn swallow nest sites: (1) an open habitat for foraging, (2) a suitable surface for nest attachment beneath an overhang or ledge, (3) a supply of mud of the proper consistency for nest building, and (4) a body of fresh water for drinking.

The original nesting sites of cliff swallows were cliffs and walls of canyons and vertical banks, usually along permanent streams. Human structures (for example, buildings, bridges) and agricultural-related activities (irrigation, canals, reservoirs) have increased the number and distribution of suitable nesting sites, and cliff swallow populations have increased accordingly. Historically, cliff swallows were presumed to be most common in the western mountains. They spread eastward following human settlement and development of eastern North America.

The preferred habitat of barn swallows includes open forests, farmlands, suburbs, and rural areas with buildings that provide nest sites. Like cliff swallows, barn swallows have benefited

from human activities. Their nests, originally built on cliffs or in caves and crevices, are now built on beams or walls of buildings or other structures. The presence of livestock and power lines for perching are features commonly associated with barn swallow nest sites.

Food Habits

All swallows are insectivores, catching a variety of insects. Stomachs of 375 cliff swallows and 467 barn swallows collected in different areas of the country contained prey from the following orders: Hymenoptera (bees, wasps, and ants) 29%, 23%; Coleoptera (beetles) 27%, 16%; Hemiptera (true bugs) 26%, 15%; and Diptera (flies) 13%, 40% for cliff and barn swallows, respectively.

Cliff swallows may forage over areas up to 4 miles (6.4 km) away from the nest. They forage as a loose unit, and adults may be away from the colony for hours prior to the hatching of young. After the young hatch, a more or less steady stream of adults return to the colony with food for the nestlings.

Barn swallows will fly several miles from the nest site to suitable foraging areas. Long periods of continuous rainfall make it difficult for adult barn and cliff swallows to find food, occasionally causing nestling mortality.

General Biology, Reproduction, and Behavior

Migration

Cliff and barn swallows winter in South America. They begin a northward migration in late winter and early spring overland through Central America and Mexico. Swallows migrate during the day and catch flying insects along the way. They will not penetrate regions unless flying insects are available for food, which occurs after a few days of relatively warm weather, 60 to 70°F (16 to 21°C) or more. Arrival dates can vary greatly with weather conditions. In general, cliff and barn swallows enter the southern United States in mid-March to mid-April and reach the northern portions of their range by early June.

Site Selection

Swallows have a homing tendency toward previous nesting sites. Under suitable conditions, a nest is quite durable and may be used in successive years. Most cliff swallows arrive at a particular colony within a 24-hour period. At large colonies, swallows may arrive in successive waves. Resident adults are the first to return, followed by adults who bred at other colonies, and by young swallows who have not yet bred. The younger swallows include individuals not born at the selected colony.

Swallow nests are inhabited by hematophagous (bloodsucking) insects and mites. Swallow bugs (*Oeciacus vicarius*), most common in cliff swallow nests, can spread rapidly by crawling from nest to nest in a new colony or by clinging to the feathers of adults. Infestations of swallow bugs and mites reduce nestling growth rates and cause up to half of all nestling deaths. Swallow bugs are able to sur-

vive in unoccupied nests for up to 3 years without feeding and await returning swallows in spring. In selecting a nest site, cliff and barn swallows apparently assess which nests are heavily infested with parasites and avoid them. Cliff swallow colonies often are not reoccupied after 1 or 2 years of use because of heavy infestations. Cliff swallows will even prematurely desert their nests *en masse*, leaving their young to starve, when swallow bug populations become too great.

Nest Construction

Cliff swallow nests are gourd-shaped, enclosed structures with an entrance tunnel that opens downward (Fig. 1). The tunnel may be absent from some nests. The mud pellets used to build the nest consist of sand and smaller amounts of silt and clay. The nest chamber is lined sparingly with grasses, hair, and feathers. The nest is cemented with mud under the eave or overhang of a building, bridge, or other vertical surface. The first cliff swallow nests on structures are usually located at the highest point possible, with subsequent nests attached below it, forming a dense cluster.

Barn swallow nests are cup-shaped rather than gourd-shaped, and the mud pellets contain coarse organic matter such as grass stems, horse hairs, and feathers (Fig. 2). The nest cup is profusely lined with grasses and feathers, especially white feathers. Barn swallow nests are also typically built under eaves or similarly protected sites but not necessarily at the highest point possible. Barn swallows often use a beam or the protruding edge of a door or window jamb as the base for the nest, or attach the nest at the juncture of the two walls of an interior corner.

Both male and female cliff and barn swallows construct the nest, proceeding slowly to allow the mud to dry and harden. Depending on mud supply and weather, nest construction may take 1 to 2 weeks. Mud is collected at ponds, puddles, ditches, and other sites up to 1/2 mile (0.8 km) away,

with many swallows using the same mud source. A typical cliff swallow nest contains 900 to 1400 pellets, each representing one trip to and from the nest.

Among cliff swallows, mud gathering and nest construction are social activities; even unmated swallows will start nests. Mated swallows may build more than one nest per season, even though not all will be used. A count of nests under construction will not give an accurate estimate of the number of breeding cliff swallows.

Egg Laying

Cliff swallows usually begin laying eggs before the entrance tunnel is completed. Each day 1 egg is laid until the clutch, usually 3 or 4 eggs, is completed. In Texas, egg laying may begin as early as late March to early April, while in North Dakota nesting may not start until early to mid-June. Within a large colony, the date of egg laying varies due to the staggered arrival dates of the swallows. For small colonies, laying may be more synchronous.

Barn swallows typically lay 4 or 5 eggs, but laying may be delayed for some time after nest building is completed. The breeding season begins in early April in the south to mid-June in the northern portions of the range. Barn swallows are double-brooded, resulting in a prolonged nesting season.

Nest Failures

Renesting will occur if nests or eggs are destroyed. Nests may fall because they were built too rapidly or crumble because of prolonged humid weather or rain. House sparrows (*Passer domesticus*) sometimes usurp empty swallow nests and may also drive off swallows from new nests. A cliff swallow nest taken over by house sparrows is identified by the abundant nest lining (grasses, weeds, feathers, and litter) protruding out of the entrance tunnel. Cats associated with farm and other buildings are common predators of barn swallows.

Hatching

Both sexes incubate the eggs. Incubation begins before the last egg is laid and ranges from 12 to 16 days for cliff swallows and 13 to 17 days for barn swallows. Most studies report incubation of 14 or 15 days. Whitewash on the ground below the nest or on the rim of the nest entrance is a sign of newly hatched nestlings inside the nest. This marking occurs when adults remove fecal sacs from the nest and later when nestlings defecate from the nest.

Fledging and Postnesting Period

Cliff swallow nestlings fledge 20 to 25 days after hatching; barn swallows fledge in 17 to 24 days. The juvenile swallows appear similar to adults but are dull colored and have less sharply-defined color patterns. The fledglings return to the nest each day for 2 to several days to be fed before leaving it permanently. Within a week, juveniles will join flocks and leave the area.

At least some cliff swallows raise 2 broods in a breeding season. Second broods are documented from Virginia and West Virginia but are uncommon in central California. Late nests may result from renesting attempts after a first failure, or from late nesters. The time from start of nest building to departure is 44 to 64 days: 7 to 14 days nest building, 3 to 6 days egg laying, 12 to 16 days incubation, 20 to 25 days to fledging, and 2 or 3 days to leave the nest. Reports of colony occupancy ranging from 110 to 132 days indicate ample time for 2 broods.

After leaving the nest, swallows may remain in the general area for several weeks. By late summer there is a general southward movement, and by the end of September few swallows remain in the nest site. Fall migration of swallows is not well documented.

Damage

Cliff swallows nest in colonies and often live in close association with humans. Many swallow colonies on buildings and other structures are innocuous. In some situations, however,

they can become a major nuisance, primarily because of the droppings they deposit. In such instances they may create aesthetic problems, foul machinery, and cause health hazards by contaminating foodstuffs. Their mud nests eventually fall to the ground and can cause similar problems. Parasites found in swallow nests, including swallow bugs, fleas, ticks, and mites, may bite humans and domestic animals, although these are not the usual hosts. In addition, cliff swallow nests are often used by house sparrows, introducing another avian pest and its attendant damage problems and potential health hazards.

Barn swallows nesting singly or in small groups on a structure can cause similar problems but of a lesser magnitude due to the smaller numbers present.

Legal Status

In the United States, all swallows are classified as migratory insectivorous birds under the Migratory Bird Treaty Act of 1918. Swallows are also protected by state regulations. It is illegal for any person to take, possess, transport, sell, or purchase swallows or their parts, such as feathers, nests, or eggs, without a permit. As a result, certain activities affecting swallows are subject to legal restrictions.

Permit Requirements

A depredation permit issued by the US Fish and Wildlife Service may be required to remove swallow nests. Three of seven administrative regions of the US Fish and Wildlife Service in the continental United States require a permit regardless of the time of year. This includes nests under construction, completed but empty nests, nests with eggs or young, or nests abandoned after the breeding season. Four of the seven regions do not require a permit if eggs or young birds are not present in the nest.

If eggs or nestlings are present, a permit authorizing nest removal or the use of exclusion techniques is required in every region and will be issued only

if very compelling reasons exist. An example might be the safety hazard of a nesting colony located at an airport where aircraft safety is in question and where other methods of control are not applicable. In most cases (for example, swallows nesting on a residence or other building), a permit allowing lethal control will not be issued.

For permit requirements in your area, contact the closest US Fish and Wildlife regional office or USDA-APHIS-ADC district office. At the first sign of nest building, contact the appropriate authorities, since swallows can build their nests and lay eggs in a short time. Timing is critical in those regions that require a permit. If a swallow problem has been experienced in the past at a site and is expected to reoccur, then apply for a permit in advance of the birds' return. A fee is charged for a permit.

Damage Prevention and Control Methods

Exclusion

Exclusion refers to any control method that denies a bird physical access to a nest site. Exclusion represents a relatively permanent, long-term solution to the problem. A permit is not required for this method except when eggs or young are in the nest.

Plastic net or poultry wire can provide a physical barrier between swallows and a nest site. Mesh size should be about 3/4 inch (1.9 cm); however, 1-inch (2.5-cm) mesh has been used successfully. If plastic net is used, it should be taut to reduce flapping in the wind, which looks unsightly and results in tangles or breakage at mounting points. Do not use mist net or any other thin, flexible net with loose pockets or wrinkles that could trap or entangle swallows. For best results, install net or poultry wire before the swallows arrive. It may be left up permanently or removed after the nesting season.

Attachment methods may vary according to site requirements and the degree of permanence desired. Net can

be attached using tape, staples, velcro, trash bag ties, or plastic fasteners such as zip ties or polyclips. Polyclips are a useful aid for installing netting. They snap together through the netting strands and allow the use of nails, screws, or wire for attachment. A more elaborate method uses hooks, such as brass cup hooks, mounted on wooden eaves and the sides of buildings. An advantage of hooks or velcro is that the net can be taken down easily during the nonbreeding period or for painting or maintenance of light fixtures. If hooks or staples are used, they should be rust-resistant to avoid unsightly rust stains. For net, a supporting framework of wooden dowels along the edges can ease attachment to the hooks and create a more equal tension on the net (Fig. 3). Net may also be stapled to or wrapped once or twice around wood laths, which are then nailed directly to the structure. On a concrete or cement structure, a power-activated tool, sometimes called a stud gun, can be used to nail the wood lath. The net or wire should extend from the outer edge of the eave down to the sides of the building so the eaves no longer provide swallows with protection from the elements (Figs. 3 and 4). No openings should remain where swallows might enter. Hanging a curtain of netting from eaves is reported effective (Fig. 4). The curtain should be 3 to 4 inches (8 to 10 cm) from the wall and extend down from the eave 18 inches (46 cm) or more. For barn swallows the net or wire should be extended down further than for cliff swallows to cover door and window jambs and to block off interior corners.

Usually, swallows will not fly into a net or other obstruction, but will stop and hover in front of it. If only that section of a building where swallows have nested is netted, the swallows will often choose alternative sites on the same structure. Therefore, any part of a building suitable for nesting must be netted.

Barn swallows frequently and cliff swallows occasionally enter buildings through doors or other open entryways and nest inside among the rafters. In some instances simply clos-

ing the entrance or blocking it with net or wire is practical and effective. At one site, cliff swallows abandoned nests inside barn lofts when entrance ways were partially closed. At warehouses and other buildings with frequent pedestrian or equipment passage, opening and closing an entrance way may be bothersome and impractical. In these situations strip doors of vinyl plastic may be installed (Fig. 5). Strip doors consists of 6- to 16-inch (15- to 41-cm) wide strips of vinyl hung like a curtain and are primarily used to control temperature in refrigerated areas. Strips overlap about 2 inches (5 cm). Strip doors do not require opening and closing like conventional doors and are not damaged by passage of equipment. The use of

net hung as a curtain to block an entrance is recommended only where there is no possibility of its being caught and ripped by equipment. Weighting the bottom of the net will help keep it reasonably taut and in position during windy weather.

Barn swallows have been repelled from nesting by clear monofilament line attached under eaves. The lines were spaced 12 inches (30 cm) apart and were in a parallel or zigzag pattern.

Habitat Modification

Substrate Modification. Modification of the nest substrate has proven effective. Swallows prefer surfaces that provide a good foothold and nest

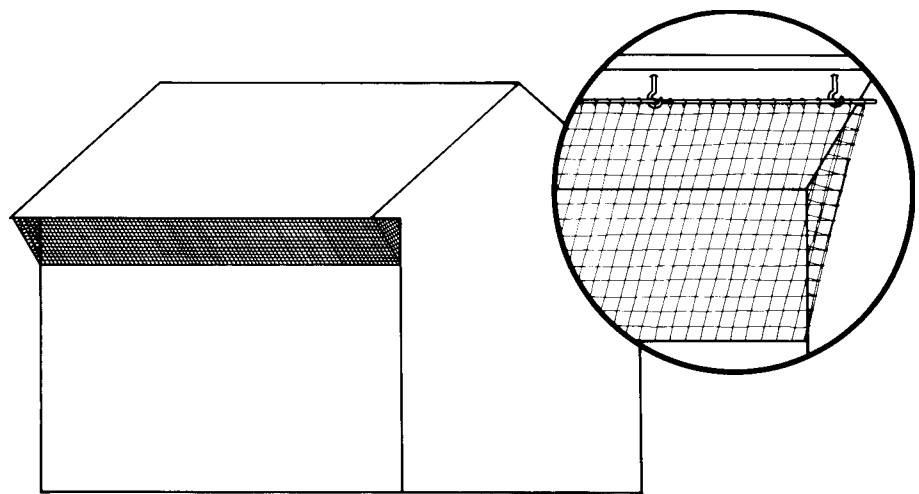


Fig. 3. Netting mounted on building from the outside edge of the eave down to the side of the building. Insert shows a method of attachment using hooks and dowels.

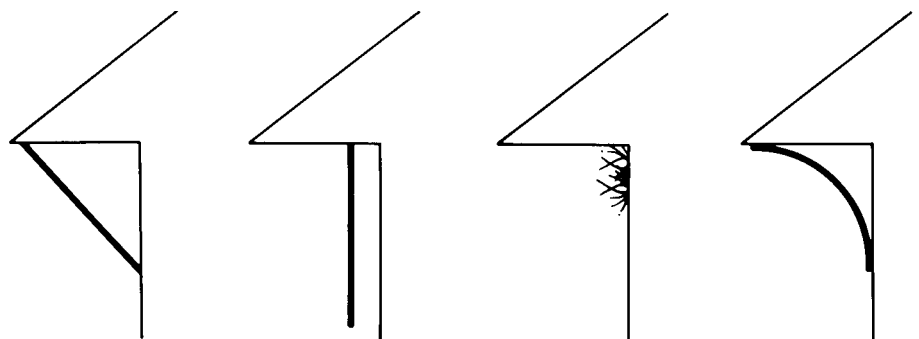


Fig. 4. Four methods which may deter swallow nesting. From left to right: Netting attached from the outer edge of the eave down to the side of the building; a curtain of netting; metal projections along the junction of the wall and eave; fiberglass panel mounted to form a smooth, concave surface.

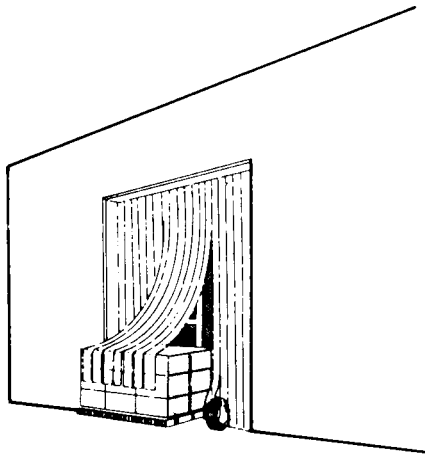


Fig. 5. Strip doors of vinyl plastic allow passage of equipment and exclude swallows and other birds.

attachment. Removal of the rough surface of a wall and/or overhang makes a site less attractive. This may be accomplished in various ways. Fiberglass panels make nest attachment difficult if installed between the eave and wall to form a smooth, concave surface (Fig. 4). A smooth surface is also created by a curtain of aluminum foil or plastic tarp draped from a wire strung along the junction of the wall and roof overhang. Other smooth-surfaced materials such as glass, plexiglass, or sheet metal can be used.

A fresh coat of paint that dries to a slick surface is sometimes effective. On rough surfaces, painting is of doubtful value because it does not alter the basic rough texture of the surface. Painting may be effective on smoother surfaces, but this technique has not been thoroughly tested.

Metal projections such as Nixalite® and Cat Claws® are sharp, needle-like wire devices generally installed on building ledges and window sills to discourage pigeons and starlings from roosting. Although adaptable to mounting and use under eaves, metal spines have not been widely used for swallow control (Fig. 4). In one instance, cliff swallows learned to land on the metal spines and eventually built nests attached to them.

Architectural Design. Although all the factors that constitute a suitable colony site are not yet understood or

documented, architectural design does influence colony site suitability. Buildings with overhanging eaves at acute to right angles with the wall are potential nest sites. Conversely, sites where the overhang and wall meet at an obtuse angle or are rounded and concave are rarely used. The width of the overhang may be important to site suitability, although the point at which this becomes critical is unknown. Few colonies are observed with an overhang of less than 6 to 8 inches (15 to 20 cm).

Substrate texture is a factor; wood, stucco, masonry, and concrete surfaces are favorable substrates for nest attachment. Metal is rarely used as a nest substrate. Nests on metal surfaces are usually located at a crotch or joint where the swallow can gain a foothold. In situations where construction is planned and swallows are present on nearby structures, consideration to materials and design may eliminate future problems. Swallows may move to nearby structures if control is applied at an existing colony.

Frightening

Hawk, owl, or snake models; noise-makers; and revolving lights have shown little, if any, success or are unproven against swallows. As evidenced by nests in and on buildings, barn and cliff swallows are relatively tolerant of human activity and other disturbances.

Repellents

Chemical roost repellents (polybutenes, sticky pastes, sprays) have not been proven effective. Unless a suitable nesting site is almost entirely covered with repellent, swallows will still be able to land, gain a foothold, and begin nest construction. A sticky repellent may actually be counterproductive by improving nest adherence. Cliff swallow nests built over a sticky repellent have been observed. Since state pesticide registrations vary, check with your local Cooperative Extension office for information on possible repellents.

Toxicants, Trapping, and Shooting

There are no chemical toxicants currently registered by EPA for swallow control, and shooting, trapping, or harming swallows is not permitted.

Nest Removal

Nest removal should be initiated at the first sign of nest building because of the difficulty in obtaining a permit to remove nests with eggs or young. Usually nests can be washed down with a water hose or knocked down with a pole. Removing nests by these methods is a messy and time-consuming process and may cause dispersal of nest parasites and water damage to the building.

As builders of mud nests, swallows have evolved to persist despite nest failures from rain or moisture. Washing down nests is nothing more than an artificial rainstorm. Because swallows will persistently rebuild nests, removal will be required for several days during nest building. Persistence is undoubtedly affected by the physiological condition of the swallows, past nesting history at the site, and the availability of alternate sites. The swallows may return the following year, and unless additional control measures are implemented, the whole process may need to be repeated.

Leaving swallow nests intact may be appropriate in some instances. For example, if swallows have established a colony, raised their young, and left, nest removal would also remove nest parasites, thus improving the site for the swallows returning the next spring. Swallow bugs will overwinter in the nests, and if the parasite load is high in the spring, the swallows might abandon the colony. If not, they would probably reoccupy the nests. At the first signs of reoccupancy, such as repair of old nests or building of new nests, nest removal (with a permit in some locations) should be started and continued until the nesting attempts end.

Economics of Damage and Control

Costs of damage are difficult to quantify and vary with the particular site and the method of control employed. The cost of actual or potential damage can range from the cleanup of droppings on and around a structure, to thousands of dollars from swallows contaminating foodstuffs at a processing center or posing a danger to aircraft at an airport. Similarly, control costs vary greatly. When hosing is used, costs are primarily labor-related. Net is relatively inexpensive (from about \$9 to \$33 per 1,000 square feet depending on quantity purchased, 1992 prices) and is reported to be effective for 4 to 5 years before replacement is necessary. Labor and other equipment costs to install netting, however, can be quite high. For example, mounting net on a concrete versus a wooden structure, or 100 feet (30 m) versus 10 feet (3 m) above the ground can drastically increase costs. Costs for each site must be judged on an individual basis.

Acknowledgments

Figures 1 through 5 by Arlene Chin, Senior Artist, Visual Media, University of California, Davis.

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