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WORLD BIRD DAMAGE PROBLEMS

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ABSTRACT: There is a lack of information on bird-caused economic losses on a worldwide basis. Some estimates are available for specific problems in the United States, Canada, and parts of Oceania and Europe, but loss estimates are almost totally lacking in Latin America, Asia, and Africa. To justify development of control programs, it is desirable that reliable data on losses be obtained. Such data are helpful at all levels of decision-making about bird control, from research to implementation.

Bird damage situations throughout the world are similar, involving many of the same crops and genera of birds.

This report summarizes major damage problems reported for each continent in tabular form. Agricultural problems are emphasized; other examples are given including bird hazard to aircraft, predation by undesirable species, urban and rural roost problems, birds as carriers or transmitters of disease, and beneficial aspects of some species.

Control methods are not reviewed.

Administrators, farmers, researchers, managers, politicians, and others often have difficulty in adequately expressing bird-caused losses in terms of bushels, dollars, or some other meaningful units. World bird damage problems are numerous, costly, and varied, but often similar from continent to continent. This paper is an attempt to better define the situation and simultaneously issue a call to responsible and interested individuals to contribute their expertise and knowledge in delineating losses and problems. Loss information on a national or worldwide scale is sorely lacking; and most loss figures are very seldom based on facts.

Only a few workers have attempted to estimate losses and describe problems adequately. This is often due to lack of funds, lack of awareness, misinformation, individual biases, cultural or social situations, politics, and a multitude of other variables. In North America, and to a lesser extent in Europe and Oceania there has been, in recent years, an increasing awareness and accounting of birdcaused losses and problems. In most other parts of the world, little or no information is available.

To justify damage control programs, responsible individuals should first have information on losses to evaluate the overall effect and related costs of control measures. They should also decide the economic status of species; whether it is harmful, beneficial, or a combination of both. Most reported bird damage problems are obvious, others suspect, and some totally misdescribed. Frequently birds are blamed for damage that is attributable in part or wholly to insects, plant diseases, or mammals. As the cost-benefit ratio is the basis for determining the real value of any control method, loss data dictate the type of control sought and the measure by which success or failure should be judged (Besser et al., 1971).

Bird damage situations occur where there is an economic loss, a threat to human health and safety, or a nuisance problem. This includes damage to man directly and indirectly; it involves his crops, livestock, homes, buildings, and his general well-being. The problem is worldwide and has serious economic and human implications. This paper does not touch on control methods; it is intended to provide an overview of damage situations and economic losses to agriculture and other interests of man.

Examples of major world bird damage problems are summarized in Tables 1-6. Because of the large number of references used to gather information for this paper, most literature citations are included in the tables but omitted from the text. Common and scientific names of species mentioned in the text and tables, and other important damaging species are listed in the appendix.

Agricultural Crops

<u>Cereal</u> <u>Grains</u>. Probably the most important bird problem to a cereal crop in the United States is damage caused by the red-winged blackbird to ripening corn (Table 1). Objective surveys conducted in 1970 and 1971 showed nationwide losses of \$15 and \$20 million. Damage to emerging corn by common grackles and ring-necked pheasants may be even more important; losses in 1971 may have ranged from \$6 to \$49 million. Regional examples of significant bird damage to cereal grains in the United States include: blackbird damage to rice in 22 counties in Arkansas in 1963 (\$4.2 million); blackbird and sparrow damage to grain sorghum in 23 states in 1974 (\$5.8 million); and a \$0.35 million loss to wheat in Arkansas in 1963.

In Canada, losses to agriculture, primarily wheat, amounted to \$86 million in 10 provinces to seedeating birds and \$33 million in 4 provinces to waterfowl (Table 1). Losses were most significant in Ontario (\$40 million), Quebec (\$24 million), and Manitoba (\$21 million).

Funds for this work were provided to the U.S. Fish and Wildlife Service by the U.S. Agency for International Development under PASA 10-TAB-473-1-67.

Location	Year	Crops	Loss	Major Species	Remarks	Reference
Canada						•
10 provinces		"Agriculture"	\$85.8 million	Seed-eating birds	<pre>\$24 million Quebec; \$40 million Ontario; \$15 million Manitoba;</pre>	Alsager 1976
4 provinces		"Agriculture"	\$33.2 million	Waterfowl	\$18 million Saskatchewan \$ 9 million Manitoba	Alsager 1976
Ontario United States		Sweet Cherries	\$44,500; 2.8%	Starlings, grackles	Niagara Peninsula	Virgo 1971
Nationwide	1971	Corn	\$20 million; 6.8 million bu	Blackbirds	24 states; 2,500 fields examined	Stone 1972
	1971	Emerging Corn	\$6-49 million; 32.5 million b	Blackbirds, crows, u pheasants	Questionnaire survey in 25 states	Stone and Mott 1973
	1974	Grain, Sorghum	\$5.8 million	Blackbirds, sparrows	Questionnaire survey in 23 states	Knittle and Guarino 1976
	1972	Blueberries	\$1.6-2.1 million	Starlings, grackles, robins	5% of crop; 14 states	Mott and Stone 1973
	1972	Grapes	\$4.4 million	Starlings, sparrows, finches	Questionnaire survey in 13 states	Crase et al. 1976
		Cable damage	\$0.25 million/ year	"Woodpeckers"	Bell Telephone Co.; costs to replace damaged cable	Cogelia 1976
		Utility pole damage	\$191,000/year	Pileated, Red- headed, Ladder- backed, and Golden-fronted Woodpeckers	One private company; problem also occurs in Japan, Norway, Finland	Rumsey 1973
Arkansas	1963	Oats	\$122,884	Blackbirds		Agric.Ext. Serv. 1964
	1963	Rice	\$4.2 million	Blackbirds	22 counties	Meanley 1971
	1968	Wheat	\$197,504	Blackbirds		Pierce 1970
California		Almonds	\$85,000 one season	Common Crow	Tulare County; also damage walnuts and pistachios	Simpson 1972
	1973	Grapes	\$4.0 million	Starlings, finches	9 counties	DeHaven 1974
	1964	Livestock Feedlot	\$1,000/day	Starlings	One million starlings at lot	Levingston 1967
	1971	Rice	\$75,000	Blackbirds	Sacramento Valley	DeHaven 1971
	1942	Rice	\$600,000	Waterfowl, blackbirds	Questionnaire survey of 835 rice growers; 12 counties	Anonymous 1943
		Miscellaneous	\$12.75 million	"Birds"	Data from California Dept. of Food and Agric	Clark 1976
Colorado		Livestock Feedlot	\$84/1,000 starlings; \$2/1,000 Redwings	Starlings, blackbirds		Besser <u>et</u> <u>al</u> . 1968

Table 1.	Examples	of	reported	economic	losses	in	the	United	States	and	Canada.
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Table	1.	Examples	of	reported	economic	losses	in	the	United	States	and	Canada.	(cont'	d.))
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Location	Year	Crops	Loss	Major Species	Remarks	Reference
Louisiana		Pecans	\$1 million/ year	Crows		Louisiana Farm Bureau 1972
Michigan	1974	Cherries	\$1.8-4.3 million	Starlings, robins, orioles		Stone 1973a
Minnesota, North Dakota	1972	Sunflowers	1.2%	Blackbirds	18 counties	Stone 1973b
New Jersey		Miscellaneous	\$0.35 million	"Birds"	Extension survey; Burlington County	Congressional Record-Senate 1962
Ohio	1975	Corn	\$2.2 million	Blackbirds	U.S. Fish and Wildlife Service survey	Winters 1975
0k1ahoma	1970	Peanuts	As high as \$36/acre	Blackbirds	Grackle most important species	Mott <u>et al</u> . 1972
		Sorghum, Corn, Pecans	\$7.7 million	Crows	Questionnaire survey in 73 counties; 7.5% sorghum; 6.0% corn; 8.4% pecans; \$1 per crow	Imler and Kalmbach 1939
Oregon		Sheep (lambs)	72 lambs	Common Raven	2,000-ewe ranch; ravens kill lambs by peck- ing eyes	Larsen and Dietrich 1970
Virginia		Miscellaneous	\$5.0 million/ year	"Birds"		Dudderar and Nelson 1970
Wyoming		Sheep (lambs)	9%	Golden Eagles	Carbon and Sweetwater counties; total predation was 24%; eagles kill only spring lambs	Tigner and Larsen 1977

Table 2. Examples of reported bird damage to agriculture in Latin America.

Location	Crops	Major Species	Remarks	Reference
Argentina	Grains	Blackbirds, parrots doves, ducks	Includes rice, wheat, corn, sunflowers, sorghum, and soybeans	Bucher and Bedano 1976
Bolivia	Corn	Parakeets	Problem serious in Chuquisaca and Tarija departments	Mitchell 1978
Chile	Cereal grains, pastures	Geese		Elias 1977
Colombia	Grains	Parrots, doves, blackbirds, ducks, Dickcissel	Includes rice, corn, sorghum, and wheat	Elias 1977
	Emerging Soybeans	Eared Dove	Serious problem in Cauca Valley	De Grazio and Besser 1970
Costa Rica	Rice	Dickcissel	The supreme pest of rice fields-North American migrant	De Grazio and Besser 1970
Dominican Republic		Black-headed Weaver	\$7.0 million loss in 1971; also corn and sorghum; introduced species	Peña 1977b
Guayana	Emerging Rice	Blue-winged Teal	North American migrant	Grist and Lever 1969
Guatemala	Emerging Corn	Great-tailed Grackle	2	De Grazio and Besser 1970

Location	Crops	Major Species	Remarks	Reference
Hispaniola	Rice, Corn, Sorghum, Peas, Tomatoes	Black-headed Weaver	\$30 million loss in 1971	Peña 1977a
Honduras	Grains	Parrots, doves, blackbirds	Includes corn, sorghum, and wheat	Elias 1977
	African Oil Palm	Black Vulture, Turkey Vulture		Elias 1977
Mexico	Grains	Blackbirds, doves, Dickcissel, ducks	Includes sorghum, soybeans, wheat, corn, and rice	Elias 1977
	Emerging Corn	Great-tailed Grackle, Brown-headed Cowbird		De Grazio and Besser 1970
	Sorghum	Cowbirds, grackles, yellowheads	A major problem in highland plateau states-yellowheads damage emerging sorghum	De Grazio and Besser 1970
Nicaragua		Orange-fronted Parakeet	Perennial problem in Leon area	De Grazio and Besser 1970
Peru	Rice, Wheat, Sorghum	Parrot-billed Seedeater, Drab Seedeater, Greater Red-breasted Meadow Lark	Parrot-billed Problem of major severity Seedeater, Drab Seedeater, Greater Red-breasted Meadow Lark	
Trinidad	Rice	Dickcissel		De Grazio and Besser 1970
Uruguay	Sunflowers	Parakeets, doves	\$2.2 million loss in 1975-76 season; 100,000 tons	La Mañana 1978
	Emerging Wheat	Doves	\$250,000 in 1974	De Grazio and Besser 1975
Venezuela	Rice	Dickcissel, Bobolink	Growers consider birds a virtual plague; North American migrants	De Grazio and Besser 1970
		White-faced Tree Duck	Severe problems in Calobozo district; special hunting season established	De Grazio and Besser 1970

Table 2. Examples of reported bird damage to agriculture in Latin America. (cont'd.)

In Latin America, grain sorghum, corn, rice, and wheat are the cereals most frequently damaged (Table 2). Other examples include up to 80% loss of rice in Argentina to the brown pintail and chestnut-capped blackbird; \$7.0 million loss to rice by black-headed weavers in 1971 in the Dominican Republic; and \$0.25 million loss to emerging wheat primarily by the eared dove in 1974 in Uruguay. One of the most widespread problems is white-faced tree duck damage to emerging rice; it occurs in Argentina, Colombia, Nicaragua, Surinam, Uruguay, and Venezuela. Another widespread problem is psittid damage to corn and sorghum. The dickcissel is an important pest of rice and sorghum in Central America and northern South America.

In Europe, the wood pigeon causes a serious problem to cereals, especially wheat in England (Table 3). It is also a problem in The Netherlands. In France, the rook and carrion crow are major pests to cereals. House sparrows and tree sparrows are a problem in Germany and The Netherlands; the mallard damages rice in Bulgaria.

In Asia, rice is the grain most often damaged (Table 4). Major species causing problems throughout most of Asia are the munias, sparrows, weavers, crows, psittids, and waterfowl. In Borneo, the pin-tailed parrot finch is a serious rice pest. In Pakistan, 20% of the rice crop was reported lost to white-headed munias; up to 50% loss has been caused by weavers in Thailand. Other significant cereal damage caused by a variety of species occur to sorghum in India and Pakistan, barley in Korea, millet in Korea and Pakistan, and wheat and corn in Nepal.

In the Near East, in Turkey, house and tree sparrows cause major problems to wheat. In Israel, three species of larks cause problems in wheat and barley.

In Africa, the principal vertebrate pest is the red-billed quelea (Table 5). It has the probable distinction of being the most numerous and perhaps the most destructive vertebrate pest in the world. It affects the economics of more than 25 African nations. The cereals most often damaged by quelea are wheat, rice, millet, and sorghum. Examples of serious losses in Africa are: house sparrow damage to rice in Egypt, sorghum damage by laughing and cape turtle doves in Botswana, damage to wheat (\$0.7 million in 1952) by quelea and other species in Kenya, 1.2 million tons of rice lost annually in

Table 3. Examples reported of bird damage to agriculture in Europe.

Location	Crops	Major Species	Remarks	Reference	
Bulgaria	Rice	Mallard		Grist and Lever 1969	
England	Cereal grains	Wood Pigeon	£1-2 million loss annually; wheat damage most important	Seubert 1964, Wright 1959, Moore 1970	
	Fruits	Common Bullfinch	A problem since 1618; disbud flowering fruits, especially gooseberries, apples, pears	Wright 1959, Seubert 1964, Newton 1968, Summers 1975	
	Duck farm	European Starling	Loss of pelleted duck feed; £33,000, 1,000 tons/year	Wright 1973	
Finland	Fruits	Fieldfare, Black- bird, European Starling, Carrion Crow, House Sparrow	Strawberries most frequently damaged; red and black currants second and third	Myllymaki and Tenovuo 1977	
France	Cereals, Pears, Apples	Rook, Carrion Crow	Most important bird problem	Seubert 1964	
	Fruits	Common Bullfinch	Disbud flowering fruit trees; 5-15,000 francs on 1 ha in 1 month	Mahieu and Le Gouais 1968	
Germany	Grapes, Cherries	European Starling	Most important problem; \$2.5 million annually	Seubert 1964, Jackson 1968	
	Cereals	House Sparrow, crows		Jackson 1968	
The Netherlands	Fruits, grains, seed beds	European Starling	Most important problem	Seubert 1964	
	Grains, Peas	Wood Pigeon	Includes damage to emerging peas	Seubert 1964	

Table 4. Examples of reported economic losses to agriculture in Asia.

Location	Crops	Major Species	Remarks	Reference
Bangladesh	Rice	Weavers, finches		Reidinger 1977
Borneo (Highl	ands)	Pin-tailed Parrot Finch, finches	The most dreaded pest	Grist and Lever 1969
India	Cereal grains	Parakeet, sparrows, crows, buntings, weavers		Pearson 1967c
Indonesia	Rice	Streaked Weaver		Grist and Lever 1969
Japan		Tree Sparrow, Spot- bill Duck	Sparrow damage excessive	Ugdagawa 1970
Korea-1973	Emerging and ripening grains	Sparrows, pheasants, doves	Questionnaire survey; doves most important species	Howard <u>et</u> <u>al</u> . 1975
Malaysia	Rice	Java Sparrow		Grist and Lever 1969
Nepal	Corn and emerging Wheat	Rose-ringed and Alexandrine Parakeets Scaly-breasted and Chestnut Munia		Fall 1975
Pakistan	Rice	White-headed Munia, Baya and Streaked Weaver	20% loss	Grist and Lever 1969, Khan 1974
	Millet, Wheat, Sunflowers, Sorghum	House Sparrow, Rose- ringed Parakeet, Baya and Streaked Weaver, Collared Dove	80% sorghum loss in 1974; house sparrow the principal pest	Khan 1974
Philippines	Rice and other grains	Scaly-breasted, Chestnut, and White-bellied Munias, Tree Sparrow		Fall <u>et</u> a <u>l</u> . 1972 Benigno <u>et</u> a <u>l</u> . 1975

Table 4. Examples of reported economic losses to agriculture in Asia. (cont'd.)

Location	Crops	Major Species	Remarks	Reference
Solomon Islands	Rice	Black Coot		Grist and Lever 1969
Thailand		Scaly-breasted, Chestnut, and White-bellied Munias, Tree and Plain-backed Sparrows, Baya and Streaked Weaver	Up to 50% loss	Jackson 1978
Vietnam		"Parrots"		Grist and Lever 1969

Location	Crops	Major Species	Remarks	Reference
Botswana	Sorghum	Laughing Dove, Cape Turtle Dove	Field and storage losses	Irving and Beasley 1975
Cameroon	Emerging and ripening Rice and Wheat, Millet, Sorghum	Red-billed Quelea, Golden Sparrow, Tree Duck, Crowned Crane, Ruff, "Weavers", "Starlings"		De Grazio et al. 1971, De Grazio 1972
Chad	Rice, Wheat, Millet, Corn, Sorghum	Red-billed Quelea, Golden Sparrow, "Weavers", "Starlings	11	De Grazio et al. 1971, De Grazio 1972
Ethiopia	Millet, Rice, Sorghum	Red-billed Quelea, Go Sparrow, "Weavers"	lden	De Grazio 1973
Ghana	Coconut, Oil Palm	"Weavers"	30-40% defoliation damage at experiment station	De Grazio 1972
Kenya	Wheat, Rice, Millet, Sorghum	Red-billed Quelea, "Doves", "Weavers", "Starlings"	In 1952, \$0.7 million loss; 100,000 bags	Pearson 1967c, De Grazio 1973, De Grazio and DeHaven 1974
Liberia	Rice	"Weavers", "Mannikins"		De Grazio et al. 1971, De Grazio 1972
Libya	Wheat, Barley, Millet, Sorghum	"Sparrows"		Pearson 1967c
Mali	Rice, Sorghum	Red-billed Quelea, "Weavers", "Parrots"	Irrigated rice schemes have annual damage	De Grazio et al. 1971, De Grazio 1972
Malawi	Rice	Red-billed Quelea, "Weavers"		De Grazio et al. 1971
Mauritania	Date Palm	"Weavers"		De Grazio 1972
Madagascar	Rice	Red Fody	1.2 million tons lost annually	Pearson 1967c
Morocco	Wheat, Rice, Sunflowers	House Sparrow, Spanish Sparrow	Wheat loss most severe; \$4.0 million loss	De Grazio et al. 1971, Correspond- ence in DWRC file
	Olives	European Starling, Thrush		De Grazio et al. 1971
Nigeria	Rice, Wheat Millet, Sorghum Corn, Palms	Red-billed Quelea, Golden Sparrow, "Starlings", "Doves", "Weavers"	\$2.8 million/year loss in one province	De Grazio et al. 1971, Ward and Jones 1977, Pearson 1967c
Niger	Millet, Rice	Red-billed Quelea, "Weavers", "Water- fowl"		De Grazio et al. 1971, Grist and Lever 1969
Senegal •	Rice, Sorghum, other grains	Red-billed Quelea, Golden Sparrow, Ruff, "Weavers", "Starlings", "Doves"	100,000-200,000 tons of grains lost	Bruggers 1976, De Grazio 1972, Pearson 1967c

Table 5. Examples of reported economic losses to agriculture in Africa. (cont'd.)

Location	Crops	Major Species	Remarks	Reference
South Africa	Cereals	Red-billed Quelea	Most notorious example of a bird damage problem; \$1.4 million loss of sorghum in 1953.	Hey 1964, Pearson 1967a
Somalia	Rice, Millet, Sorghum	Red-billed Quelea, Golden Sparrow, Red Bishop, "Weavers"	\$150/acre; great pests of rice	Jackson 1978, Holcomb 1976, De Grazio 1973
Sudan	Sorghum	Red-billed Quelea	\$200,000 "Sudanese pounds" annually	Schmutterer 1969
Sudan	Cereals	Red-billed Quelea, "Doves", Black- breasted Lark, "Bish "Waterfowl"	Includes waterfowl damage to emerging rice ops"	Beshir 1976
Tunisia	Wheat, Olives	Spanish Sparrow, European Starling	Starling damage to olives- 15,000 metric tons	Bortoli 1969, Touzeau 1958
Tanzania	Wheat, Rice, Millet, Sorghum	Red-billed Quelea, Chestnut Weaver, "Weavers", "Doves"		De Grazio 1973

Madagascar caused by the red fody, severe wheat loss in Morocco caused by house and Spanish sparrows, an instance of \$2.8 million lost in one province in 1 year in Nigeria to quelea and other species, 100,000 to 200,000 tons of cereals lost annually in Senegal. Quelea are implicated in the most notorious bird damage problem to cereals in South Africa--a \$1.5 million loss in sorghum. Quelea also cause a \$150/acre loss to rice in Somalia, and an annual loss of 200,000 Sudanese pounds to sorghum in Sudan. Other species that cause damage to cereals in Africa include doves, weavers, waterfowl, starlings, ruffs, crowned cranes, psittids, bishops, crows, and black-breasted larks.

In Oceania, rice and wheat are the cereals most frequently damaged by the house sparrow in New Zealand, and by psittids, crows, and waterfowl in Australia (Table 6). In New Guinea, the spotted tree duck, whistling tree duck, black duck, and pied goose damage both emerging and ripening rice.

<u>Oil Crops.</u> In the United States, blackbird damage to sunflowers is becoming an increasingly important problem, particularly in the Dakotas and Minnesota. The problem is also evident in parts of Canada.

In Latin America, psittid damage to sunflowers is widespread and occurs in Argentina, Bolivia, Brazil, Paraguay, and Uruguay. It is most acute in Uruguay where, in 1974, \$0.6 million was lost to the monk parakeet. Damage to sunflowers is also caused by the house sparrow in France and Turkey, by the tree sparrow in Korea, by the rose-ringed parakeet, house sparrow, and baya weaver in Pakistan, and by the house and tree sparrow in Morocco.

There are no reported instances of bird damage to soybeans or oil palm in the United States or Canada. In Latin America, the eared dove is a major pest to emerging soybeans in Argentina, Colombia, and Uruguay, and the white-winged dove to soybeans in Honduras, Mexico, and Nicaragua. Black and turkey vultures cause damage to oil palm fruits in Colombia and Honduras. In Malaysia, parakeets damage oil palm. In Africa, weavers are a problem to coconut, oil and date palm in Ghana, Mauritania, and Nigeria.

<u>Fruits.</u> Bird damage to fruits is an important problem in the United States and Canada. Examples of major losses include \$4.4 million to grapes in 13 states in 1972, primarily by starlings, sparrows, and finches; \$1.6-2.1 million to blueberries in 14 states in 1972, primarily by starlings, common grackles and robins; \$1.8-4.3 million to cherries in Michigan in 1974, primarily by starlings, robins, and Baltimore orioles; and \$0.04 million to cherries in the Niagara Peninsula, Ontario, in 1965, primarily by starlings and common grackles.

In Latin America, monk parakeets damage a variety of fruits in Argentina, Bolivia, Brazil, Paraguay, and Uruguay. The brown jay is implicated in Costa Rica. Psittids attack mangoes in Honduras and Mexico.

In Europe, bird damage to various fruits is probably the most important and widespread problem. The common bullfinch removes buds of fruit trees throughout Europe and is a great problem to the fruit industry. For example, in France, bullfinches can cause losses of up to 5,000-15,000 francs per hectare per month. Losses to orchards and vineyards by the European starling are estimated at \$2.5 million annually in Germany. In Finland, strawberries and currants are the most frequently damaged fruits, primarily by the fieldfare, blackbird, and European starling. Other important species that damage fruit in Europe are the wood pigeon, house and tree sparrows, tits, rook, carrion crow, woodpeckers, blackbird, jackdaw, black-billed magpie, and European Jay.

Table 6. Examples of reported economic losses to agriculture in Oceania.

Location	Crops	Loss	Major Species	Remarks	Reference
New Zealand	Wheat	13-44,000 NZ \$ 5% (2.6-8.4%)	House Sparrow	Hawk's Bay 1968; eleven wheat fields given in example	Dawson 1970
	Fruits		Blackbird, Thrush, Starling, White Eye, House Sparrow	Questionnaire survey; 1966-67 season; straw- berries, grapes, cherries, apples, pears	Dawson and Bull 1970
Australia (North)	Rice		Long-billed Corella, Black Cockatoo		Grist and Lever 1969
New South Wales			Sulphur-crested Cockatoo, Common Starling, Australian Crow, sparrows		Grist and Lever 1969
Australia (North)			Pied Goose		Grist and Lever 1969
New South Wales			European Coot, Eastern Swamp Hen, Black Duck, Australian Wood Duck, Gray Teal, Dusky Moorhen, Black-tailed Native Hen		Grist and Lever 1969
Australia	Wheat		Parrots, corellas, galaks		Wheeler 1977
New Guinea	Emerging and ripening Rice		Spotted Tree Duck, Whistling Tree Duck, Black Duck, Magpie G	Goose	Grist and Lever 1969

In the Near East, in Turkey, starling damage to green and ripening olives can be as high as 20%, and damage to the young fruit stage of watermelons by the magpie, jackdaw, and hooded crow is 90% in some areas. The house sparrow is a problem in vineyards and the European goldfinch disbuds apple trees in Palestine. Losses to fruits are caused by parrots, finches, and crows in Bangladesh, and by crows in Korea. Rose-ringed parakeets damage mangoes and guava in Pakistan.

In Africa, the European starling and a thrush damage olives and the white-vented bulbul is a problem on fruit in Northeast Africa. In South Africa, the European starling, redwing starling, and cape sparrow cause problems. Various sparrows and weavers are a problem in Sudan. In Tunisia, the European starling damages olives to the extent of 15,000 metric tons per year.

Fruit problems in Oceania are reported from New Zealand where damage to strawberries, grapes, cherries, apples, and pears is caused by the blackbird, thrush, common myna, gray-backed white-eye, and house sparrow.

<u>Nuts</u>. Bird damage to nut crops is an important problem in many parts of the United States. Examples of significant losses are: \$1.0 million annually to pecans in Louisiana and \$0,085 million in one season to almonds in Tulare County, California, by the common crow; \$150/acre to pistachios in Tulare County, California, by the scrub jay; and up to \$36/acre to peanuts in Oklahoma by common grackles and other species. Serious nut damage has not been reported from any other countries with the exception of pied crow damage to peanuts in Northeast Africa.

<u>Truck and Vegetable Crops</u>. Bird damage to truck and vegetable crops is usually considered a minor problem, however, there are exceptions. For example, a \$60,000 loss of emerging lettuce to the American widgeon occurred in California in 1 week and a \$76,956 loss of vegetable crops to birds occurred in Massachusetts in 1974. There are a variety of species and crops involved in California.

Other examples include black-headed weaver damage to peas and tomatoes in the Dominican Republic; blackbird damage to garbanzo beans in Mexico; wood pigeon, tit, crow, and starling damage to garden crops in England, France, and The Netherlands; sparrows on peas and beans in Egypt; larks on vegetables in Palestine; greenfinches and buntings on sesame and cabbage in Korea; parakeets on mustard in Pakistan; and sparrows and bishops on vegetables in Sudan. Livestock Feedlots. Most reported damage in livestock feedlots occurs primarily in the United States. In Colorado, feed losses to starlings were calculated at \$84 per 1,000 birds, and in California at \$1,000 per day. In Arkansas, there was a loss to blackbirds of \$221,344 in 1963. In England, one example was given at a duck farm where starlings consumed 1,000 tons of pelleted duck feed in one year amounting to 33,000.

Bird Hazard to Aircraft

Hazard to aircraft is probably the most important bird problem in terms of human safety and economics. It is estimated that worldwide losses amount to \$1.0 billion annually (Jerome, 1976). In North America, from 1960 to 1972, losses were calculated to be more than \$100 million (Solman, 1973). In 1968, the U.S. Air Force estimated that costs of replacement parts were between \$10 and \$20 million (Solman, 1970). In England, the Royal Air Force estimated their losses at \$1.0 million annually; in Germany, the Air Force estimated "losses in 1966 at \$15 million (Jacoby, 1970). The first record of a bird-aircraft collision resulting in a human death occurred in 1912 in California (Solman, 1973). There are other instances of human deaths, including 62 lives lost in Boston in 1960 (Pearson, 1967a). The two most common species causing bird-aircraft problems are gulls and European starlings, although there are a variety of species involved.

Predation on Desirable Species

From an economic standpoint, bird predation is a minor factor except in certain local situations. Examples are predation on eggs and young of shorebirds by herring gulls along the New England Coast (Spencer, 1972), and grackle and jay predation on white-winged dove eggs and young in South Texas and Mexico (Cottom and Trefethen, 1968). Predation on lambs by eagles, ravens, and crows occurs worldwide. Some examples of losses are 23 lambs killed by golden eagles in 23 days in 1974 in Montana (Balser, 1978); 72 lambs killed by common ravens on a 2,000-ewe ranch in Oregon in 1966 (Larsen and Dietrich, 1970); 3,362 lambs and adults of 413,383 sheep lost in 1963 in South Africa to pied crows and cape ravens (Rowley, 1969); and 17 healthy lambs killed at one site in August-September 1963 in Australia by Australian ravens and crows (Rowley, 1969).

Urban and Rural Roost Problems

Urban and rural roost problems are widespread. Birds in these nuisance situations cause general irritation to residents, are a threat to aircraft and local crops, represent a potential health hazard, cause power failures, and cause damage to trees, structures, and equipment. Some examples of bird problems in urban areas include tree roosts in residential areas of Denver, Colorado (Pearson, 1967b), Ames, Iowa (Bliese, 1959), and cities in Germany (Seubert, 1964). Species most often associated with this problem are starlings, blackbirds, pigeons, and sparrows. Examples of rural roosts that caused problems include a 4- to 5-million blackbird and starling roost at Ft. Campbell, Kentucky, in 1975 (Free, 1975), and a 3-million blackbird and starling roost at Green Briar, Tennessee (Eisman, 1975).

Birds as Carriers or Transmitters of Diseases

Stefferud (1966) speculates that the introduction of diseased rock pigeons may have contributed to the extinction of the passenger pigeon. Species such as starlings, sparrows, pigeons, domestic waterfowl, blackbirds, and Psittids may play a role as a source of infection of diseases like duck plague, histoplasmosis, avian tuberculosis, cryptococcosis, salmonellosis, transmissible gastroenteritis (TGE), ornithosis, Newcastle disease, encephalitis, and other diseases that affect man and his domestic animals (Friend and Pearson, 1973; Spear, 1962; Rankin and McDiarmid, 1968; Steele and Galton, 1971; Siegmund, 1973; Delaplane, 1956; Olsen, 1956; Parsons, 1968).

Beneficial Aspects and Displacement of Desirable Species

Most species implicated in damage situations are not harmful at all times or seasons of the year. During some periods of the year they are beneficial. White-winged doves that cause damage to cereals in Mexico and Nicaragua are highly valued by hunters (Cottom and Trefethen, 1968). Snail hawks help control snails that damage rice plants in Surinam, and crested mynas consume army worms in the Philippines (Grist and Lever, 1969).

Some species causing displacement of beneficial species include the starling which causes nest abandonment of the downy and acorn woodpeckers in the United States (Howard, 1959; Williams and Schwab, 1973), and the skylark in New Zealand (Howard, 1959). The brown-headed cowbird parasitizes Kirtland's warbler nests in Michigan (Winters, 1973).

Miscellaneous Problems

Another example of a widespread bird problem is the predation of fish by various fish-eating birds. In 1939, 38 states in the United States reported fry losses amounting to about \$228,000 per year (Lagler, 1939).

Birds, primarily pigeons and sparrows, can cause fires in buildings by carrying lighted cigarettes or other flammable material to their nests. In one instance, it was speculated that if 1% of undetermined fires were caused by birds, annual losses amount to \$8.5 million (Schneider and Fall, 1970).

Woodpeckers cause significant damage to cables, wooden utility poles, buildings, and shingles. In 1 year, one private company in the United States had \$191,000 in damage to utility poles that was caused by pileated, red-headed, ladder-backed, and golden-fronted woodpeckers (Rumsey, 1973).

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APPENDIX 1. Common and scientific names of birds.

Common Name	Scientific Name	Common Name	Scientific Name
UNITED STATES AND CANADA		Snail Hawk	Rosthramus sociabilis
Canada Goose	Branta canadensis	White-winged Dove	Zenaida asiatica
American Widgeon	Mareca americana	Eared Dove	Zenaida auriculata
Golden Eagle	Aquila chryseatos	"Doves"	Leptotilia spp.
Sparrow Hawk	Falco sparverius	Picazuro Pigeon	Columba picazuro
Ring-necked Pheasant	Phasianus colchicus	Spot-winged Pigeon	Columba maculosa
"Gulls"	Laridae	Monk Parakeet	Myiopsitta monachus
Herring Gull	Larus argentatus	Green-rumped	Forpus passerinus
Glaucous-winged Gull	Larus glaucescens	Parrotlet	
Rock Pigeon	<u>Columba livia</u>	Orange-fronted	Aratinga canicularis
Passenger Pigeon	Ectopistes migratorius	Rection lay	Peilophinus movicanus
White-winged Dove	Zenaida asiatica	Groop Jay	Cuanoconau uncas
Pileated Woodpecker	Dryocopus pileatus	Magnie lau	Colocitto formaco
Red-headed Woodpecker	Melanerpes erythro-	Mayican Crow	Convus importus
	cephalus	Thruch	Tundus sop
Ladder-backed Woodpecker	Dendrocopos scalaris	Chestnut espeed	Applains puficanillus
Golden-fronted Woodpecker	Centurus aurifrons	Blackbird	Ageratus ruricapititus
Acorn Woodpecker	Melanerpes formicivorus	Shiny Cowbird	Molothrus bonariensis
Downy Woodpecker	Dendrocopos pubescens	Yellow-hooded	Agelaius icterocephalus
"Flickers"	Colaptes spp.	Blackbird	
Scrub Jay	Aphelocoma coerulescens	Red-breasted Blackbird	<u>Leistes</u> <u>militaris</u>
Common Raven	Corvus corax	Bobolink	Dolichonyx oryzivorus
American Robin	Turdus migratorius	Great-tailed	Cassidix mexicanus
European Starling	Sturnus vulgaris	Grackle	
Kirtland's Warbler	Dendroica kirtlandii	Yellow-headed Blackbird	<u>Xanthocephalus</u> <u>xantho</u> -
Red-winged Blackbird	Agelaius phoeniceus	Brown-headed	Molothrus ater
Common Grackle	Quiscalus quiscula	Cowbird	
Common Crow	Corvus brachyrhynchos	Greater Red-	Pezites militaris
Brown-headed Cowbird	Molothrus ater	breasted Meadow- lark	
"Orioles"	Icterus spp.	Black-headed	Ploceus cucullatus
Baltimore Oriole	Icterus galbula	Weaver	
House Sparrow	Passer domesticus	Dickcissel	<u>Spiza</u> americana
"Finches"	Carpodacus spp.	Parrot-billed	Sporophilia peruviana
LATIN AMERICA		Seedeater	
White-faced Tree Duck	Dendrocygna viduata	Drab Seedeater	Sporophilia simplex
Brown Pintail	Anas georgica	<u>EL</u>	IROPE
"Geese"	Chleophaga spp.	Mallard	Anas platyrhynchos
Blue-winged Teal	Anas discors	European Oyster- catcher	Haematopus ostralegus
Black Vulture	Coragyps atratus	Lapwing	Vanellus vanellus
Turkey Vulture	Coragyps aura	Golden Plover	Pluvialis dominica
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APPENDIX 1. Common and scientific names of birds. (cont'd.)

Common Name	Scientific Name	Common Name	Scientific Name
Herring Gull	Larus argentatus	Tree Sparrow	Passer montanus
Black-headed Gull	Larus ridibundus	Java Sparrow	Padda oryzivora
Common Gull	Laridae	Chestnut Munia	Londhura malacca
Wood Pigeon	Columba palumbus	Plain-backed Sparrow	Passer flaveolus
Rock Pigeon	<u>Columba livia</u>	"Finches"	Fringillidae
Swift	Apus apus	Black-headed Bunting	Emberiza melanocephala
Carrion Crow	Corvus corone	"Greenfinches"	Carduelis spp.
Rook	Corvus frugilegus	"Buntings"	Emberiza spp.
Jackdaw	Corvus monedula	European Goldfinch	Carduelis carduelis
"Crows"	Corvus spp.	AF	RICA
Black-billed Magpie	Pica pica	Marabou Stork	Leptoptilos crumeniferus
Eurasian Jay	Garrulus glandarius	"Tree Ducks"	Dendrocygna spp.
"Tits"	Parus spp.	Egyptian Goose	Alopochen aegyptiacus
Fieldfare	Turdus pilaris	Spur-winged Goose	Plectropterus gambensis
Blackbird	Turdus merula	Garganey Teal	Anas guerguedula
European Starling	Sturnus vulgaris	White-faced Tree Duck	Dendrocvona viduata
House Sparrow	Passer domesticus	Vultures	Cathartidae
Tree Sparrow	Passer montanus	Black Fagle	Pteroaetus verreauti
Common Bullfinch	Pvrrhula pvrrhula	Crowned Crane	Balearica regulorum
ASIA		Ruff	Philomachus pugnax
Spotbill Duck	Anas poecilorhyncha	Black_tailed Godwit	Limosa limosa
Vulture	Cathartidae	Laughing Dove	Streptopelia seneralensis
Ring-necked Pheasant	Phasianus colchicus	Cape Turtle Dove	Streptopella canicola
Oriental Turtle Dove	<u>Streptopelia</u> orientalis	Pink-headed Turtle Dove	Streptopelia roseogrisea
"Doves"	Columbidae	African Mourning Dove	Streptopelia decipiens
Collared Dove	Streptopelia decaocto	"Doves"	Columbidae
"Parrots"	Psittacidae	"Parrots"	Psittacidae
Alexandrine Parakeet	Psittacula eupatria	Rose-ringed Parakeet	Psittacula krameri
"Parakeets"	Psittacidae	Black-breasted Lark	Melanocorypha bimaculata
Rose-ringed Parakeet	Psittacula krameri	Cape Raven	Corvus albicollis
"Larks"	Alaudidae	Pied Cow	Corvus albus
House Crow	Corvus splendens	White-vented Bulbul	Pycnonotus barbatus
"Crows"	Corvus spp.	"Thrush"	Turdus spp.
Black-billed Magpie	Pica pica	"Glossy Starlings"	Lamprotornis spp.
Hooded Crow	Corvus cornix	European Starling	Sturnus vulgaris
Jackdaw	Corvus monedula	Redwing Starling	Onvchognathus morio
Crested Myna	Acridotheres cristatellus	Red-billed Quelea	Quelea quelea Passon lutous
European Starling	Sturnus vulgaris	"Weavers"	Placeidae
Scaly-breasted Munia	Lonchura punctulata	Weavers Ded Dickon	Floce Idde
White-headed Munia	Lonchura maja	Red Bisnop	Euprecies orix
White-bellied Munia	Londhura leucogastra	Spanich Spannow	Passon bioponicliancia
"Weavers"	Ploceidae	Spanish Sparrow	Passer nispanioriensis
Pin-tailed Parrot Finch	Erythrura prasina	Reu-neaded Quelea	Quelea ervinrops
House Sparrow	Passer domesticus	Chostnut Vierea	Querea carainalis
Baya Weaver	Ploceus philippinus	Chestnut Weaver	Proceus rubiginosus
Streaked Weaver	Ploceus manyar	wray-neaded Sparrow White-browned Sparrow Weaver	Plocepasser mahali

APPENDIX 1. Common and scientific names of birds. (cont'd)

Common Name	Scientific Name	Common Name	Scientific Name
"Mannikins"	Plocepasser mahali	Dusky Moorhen	Gallinula tenebrosa
"Sparrows"	Ploceidae	Black-tailed Native Hen	Tribonyx ventralis
Red Fody	Foudia madagascariensis	Black-backed Gull	Larus fuscus
Napoleon Bishop	Euplectes afra	Red-billed Gull	Larus sp.
Black-headed Weaver	Ploceus cucullatus	Sulphur-crested Cockatoo	<u>Cacatua</u> galerita
Buffalo Weaver	Bubalornis albirostris	"Parrots" "Corellas"	Psittacidae <u>Cacarua</u> spp.
Tree Sparrow	Passer montanus	"Galaks"	Psittacidae
Yellow-backed Weaver	Ploceus capitalis	Long-billed Corella	Cacatua tenuirostris
Cape Sparrow	Passer melanurus	Black Cockatoo	Calyptorhynchus funereus
Black-winged Bishop	Euplectes hordeacea	Skylark	Alauda arvensis
Masked Weaver	Ploceus taeniopterus	Australian Crow	Corvus ceciliae
Cinnamon Weaver	Ploceus badius	Australian Raven	Corvus coronoides
Yellow-fronted Canary	Serinus mozambicus	Crow	Corvus mellori
OCEANIA		Blackbird	Turdus merula
Pied Goose	Anseranas semipalmata	"Thrush"	Turdus ericetorum
Gray Teal	Anas gibberiformes	European Starling	Sturnus vulgaris
Black Duck	Anas superciliosa	Common Myna	Acridotheres tristis
Australian Wood Duck	Chenonetta jubata	Gray-backed White-eye	Zosterops lateralis
Spotted Tree Duck	Dendrocygna guttata	House Sparrow	Passer domesticus
Whistling Tree Duck	Dendrocygna arcuata	"Sparrows"	Ploceidae
European Coot	Fulica atra		
Eastern Swamp Hen	Porphyrio melanotus		

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