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INTEGRATED MANAGEMENT SYSTEMS FOR AUSTRALIAN WHITE IBIS (Threskiornis molucca) ON THE GOLD COAST, QUEENSLAND, AUSTRALIA

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ABSTRACT

Fueled by a large supplemental food supply at landfills in South-east Queensland, Australian White Ibis (*Threskiornis molucca*) populations grew from an estimated 5000 to 10000 between 1995 and 1998. Ibis counted at Coolangatta Airport reflected this growth with a 556% increase between 1989 and 1995. The multimillion-dollar loss of a Qantas airbus engine from ingestion of an Ibis, resulted in the establishment of the Ibis Management Coordination Group (IMCG). This group, comprising government, industry and community representatives, instigated an integrated program of food reduction, restriction of breeding success and public education. The program has become an example for management programs across Australia and demonstrates that off airport initiatives are sometimes required to ensure aircraft safety.

The region's largest Ibis colony of over 3000 birds was located in a remnant forest and wildlife park under the flight-path 4km north of Coolangatta Airport. Food restriction programs included netting eating areas for patrons, designing special feeders for water fowl and macropods to exclude Ibis and altering the forage type for many of the animals at the fauna reserve. Egg and nest destruction was employed to restrict breeding success and evening spotlighting was adopted to disrupt Ibis roosts.

The colony's population decreased 89% within two breeding seasons. Ibis counts at Coolangatta Airport paralleled this decline with a 75% decrease between 1995 and 1998, resulting in significantly reduced birdstrike hazard.

BACKGROUND

Biology

Australian White Ibis are a large bird (length: 65-76cm, wing-span:1.10 -01.25m, weight: 1.4 – 2.4 Kg) whose range includes Indonesia, New Guinea and Australia. Inland wetlands are their usual natural breeding habitat. They nest in colonies, either in trees and shrubs or on the ground if protected from predators. The breeding season is usually between June and March, but year-round clutching occurs where resources are plentiful. Marine and fresh water wetlands and wet grasslands are preferred feeding habitats. Invertebrates and occasional small vertebrates constitute their natural diet.

Australian White Ibis in the urban context

As an opportunistic species, Australian White Ibis have adapted to urban environments, nesting in remnant wetlands , forests, parks and suburban yards. They scavenge at landfills and picnic grounds, consuming almost any relatively fresh food type.
The inland drought of the late 1980's and the draining of inland wetlands caused Australian White Ibis to relocate to urban areas such as the Gold Coast in Southeast Queensland where opportunism has allowed exponential population growth. Regional population estimates doubled from 5000 to 10000 between 1995 and 1998, and with no obvious limiting factor it is not possible to determine the carrying capacity of the region.

Overabundant ibis cause many negative social and environmental impacts, including:

- Risk of aircraft strike – in December 1995 an Ibis disabled a Qantas airbus engine, the damage measured at several million dollars.
- Vegetation damage and fauna displacement.
- Agricultural and Public health risk – ibis are known to carry Newcastle Disease Virus, Avian influenza, and Salmonella (J. McKee, Pers. Com.).

- Annoyance (due to smell, noise and unsightliness) to residents who have ibis nesting in their yards or live in close proximity to a nesting colony.

Establishment of a management program

The Ibis Management Coordination Group (IMCG) was formed at the beginning of 1996 to develop an integrated strategy to curtail Ibis population growth and minimise the negative impacts arising from overpopulation in the Gold Coast Region. The primary objective was to reduce hazard to aircraft. This group, comprising state and local government bodies, airport operators, wildlife tourist parks, an airline company and a community environment group provided the funding and direction for the program. Environmental consultants provided the expertise for undertaking the program. Public relations consultants coordinated the community awareness program.

The program was initiated in July 1996. The Currumbin colony was located in the Currumbin Hill Conservation Park (CHCP), a state government controlled environmental reserve, and Currumbin Sanctuary, an adjacent tourist wildlife park. This colony was chosen as for stage one of the program because:

- it was the largest known colony in the region,
- Ibis numbers were rapidly increasing,
- it was considered to be the colony most likely to have contributed to the increasing foraging population at Coolangatta Airport and therefore most likely to contribute to aircraft birdstrike hazard,
- the colony is positioned directly beneath Coolangatta Airport's northern flight path further increasing strike risk, and
- Currumbin Sanctuary grounds were being over-run with Ibis.

The program has subsequently expanded to other colonies in an attempt to restrict regional population growth. This paper only details the results of the program conducted at the Currumbin colony.

METHODS

The program was based on four main initiatives:

1. A strategic program of bird dispersal from the Currumbin roosting sites in the non-breeding season and restricting breeding success in the breeding season.
2. Reducing artificial food provided to the Ibis at Currumbin Sanctuary by patrons and from surplus feed for the wildlife.
3. Reducing food supplies at landfills and public recreation reserves.
4. A public education campaign that aimed to increase public awareness of the Ibis problem and to reduce artificial food supplies: public feeding of Ibis was considered to be a significant contribution to the Ibis' diet.

Dispersal of ibis from roosts

To disrupt the normal roosting patterns of the Ibis, spotlights were shone on the birds soon after sunset. Vocalised noise accompanied the spotlights.

Egg & nest removal

Nests were inspected for the presence of eggs or chicks. Higher nests were inspected using a mirror attached to extendible poles.

Eggs were removed from nests and were destroyed on site. Empty nests were removed with pronged attachments fitted to poles. In many circumstances, it was necessary to use ropes and specialised climbing equipment to access higher nests.

Nests adjacent to or containing chicks were left undisturbed in order to comply with Queensland Department of Environment permits and ensure animal welfare.

Reduction of food supply at Currumbin Sanctuary

To prevent Ibis from scavenging from patrons, netted eating areas were established adjacent to the major food outlets. Entry to the netted areas was via doorways fitted with heavy-duty plastic strips. Signs encouraged patrons to avoid feeding ibis.

Special feeders were designed to allow waterfowl and macropods access to food, but deny access for Ibis.

Popped grain, which was highly attractive to Ibis, was replaced by lucerne chaff as macropod forage distributed by the patrons.

Reduction of food supply at landfills and public recreation reserves

An attempt to limit available food at the major regional landfills was made by limiting the size of active waste compartments and covering waste. A dispersal trial was commenced at the major regional landfill using Ibis distress calls played through speakers adjacent to the tip-face. At the second largest landfill pyrotechnics were employed to disperse Ibis.

Open waste bins in public areas were replacedwith Ibis-proof waste bins.

Community education

The community education program was designed to encourage the public to embrace the program and reduce artificial food supply for the Ibis at a regional level. It utilised the following tools: signs in public recreation reserves, information brochures, display material, media management, school education curricula, stickers, direct mail and an educational video. The corner stone of the program was the slogan: “Working towards a natural balance” and this message was spread via presentations at conferences, universities and community meetings.

Monitoring

At CHCP monthly overnight roosting counts were taken to allow population dynamics to be assessed. This involved determining the number of birds on site approximately one hour prior to sunset, adding the incoming and subtracting the outgoing birds from the site until last light.

Airport Safety Officers have conducted twelve (12) to fourteen (14) bird counts per month at Coolangatta Airport since 1989. These counts entailed traversing eight (8)-designated sectors within the perimeter fence and recording all birds observed in the sector, whether on the ground or in transit.

For most months since January 1994, Currumbin Sanctuary Staff have conducted foraging counts at least three (3) times per week at Currumbin Sanctuary.

Quantitative assessment of the community education program, the food restriction program at public recreation reserves and landfills, and the dispersal program at landfills is not detailed in this paper.

RESULTS

The Currumbin Colony

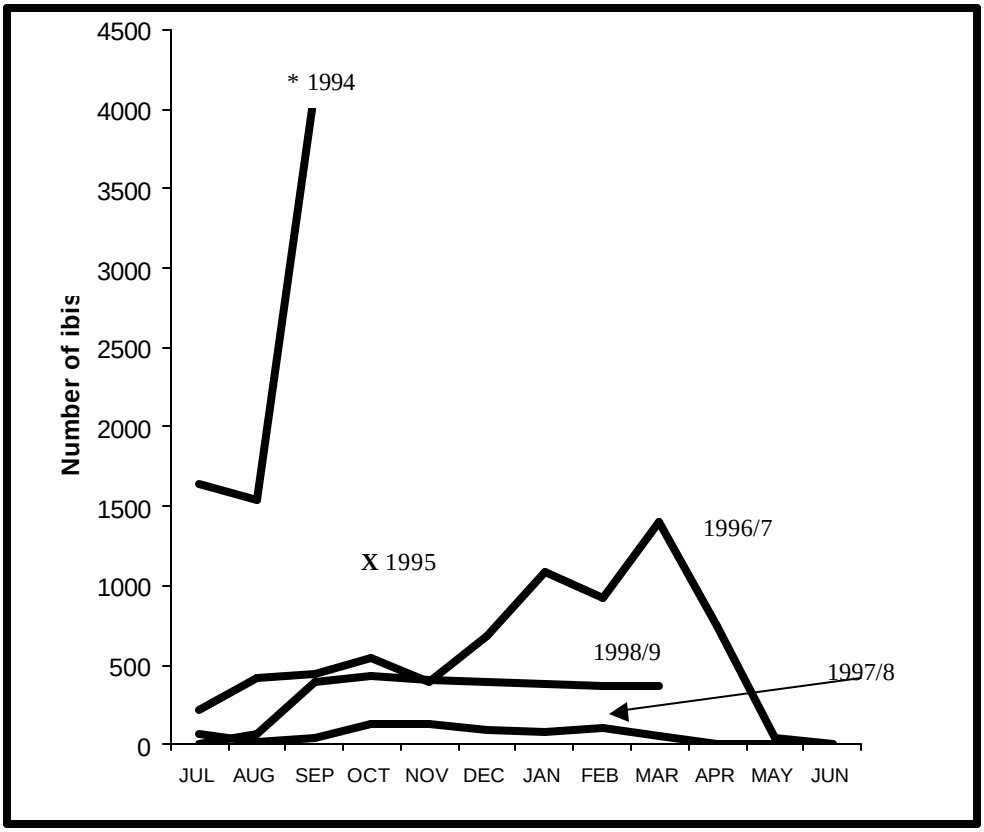
In 1995 the Currumbin colony was the largest ibis colony on the Gold Coast with 1166 birds counted at the CHCP in October 1995 (Brown 1995). Estimates of bird numbers at CHCP by Currumbin Sanctuary staff in July, August and September 1994 ranged between 1500 and 4000 birds. Methods used to derive these later figures are not considered to be as accurate as figures obtained since October 1995. Based on the 1994 estimates and the fact that populations at non-managed sites

increase significantly between October and February (Shaw 1998), the Currumbin colony was estimated to constitute 3000 to 4000 birds at the peak of the 1995/6 breading season.

Between July and November 1996 the program maintained the population in the CHCP below 555 birds: a 53% reduction on the previous year's October count. Figure 1 shows that when the management program stalled in November 1996, the Ibis population grew to over 1400 as a result of birds returning to the colony and successfully breeding. When the breeding season ended in March 1997, Ibis numbers declined to nil over a two-month period. Through the non-breeding season, evening roosts tended to be adjacent to their primary foraging sites such as landfills.

The management program recommenced in June 1997 and has continued to the present.
Figure 1 shows that the population was maintained below 140 through the second season of the program (1997/8), a reduction of 89% on the October 1995 count. Ibis numbers increased through the third breeding season (1998/9), averaging 395 between September and March. In October 1998, 435 birds were counted, a 63% reduction from October 1995.

Figure 1: Ibis population dynamics CHCP July 1994 – March 1999



* Currumbin Sanctuary staff using techniques different from subsequent counts conducted the 1994 counts.
X Count conducted by Brown (1995)

The greatest number of eggs and nests were removed in the first season. The third season (which is still in progress) has required more nests and eggs to be removed than in the second breeding season owing to the larger breeding population. See figure 2.

Figure 2: Comparison of numbers of eggs and nests removed from Currumbin Colony, 1996/7, 1997/8, 1998/9 breading seasons.

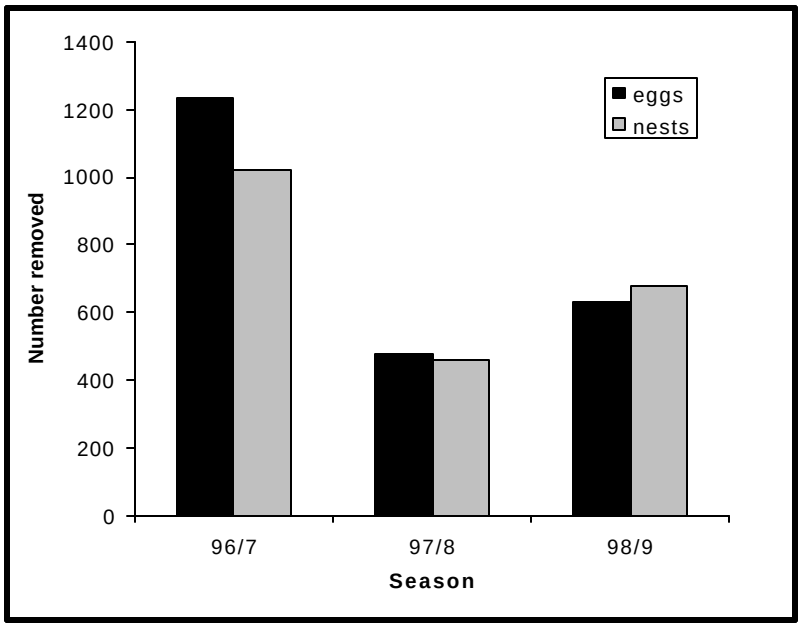
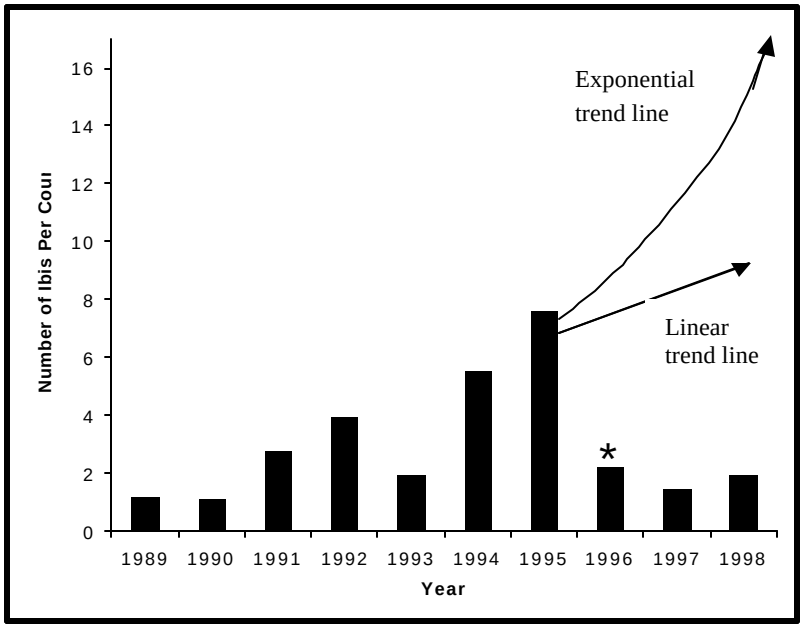


Figure 3: Average ibis counts at Coolangatta Airport, 1989 – 1997
* Indicates the year the ibis management program commenced.



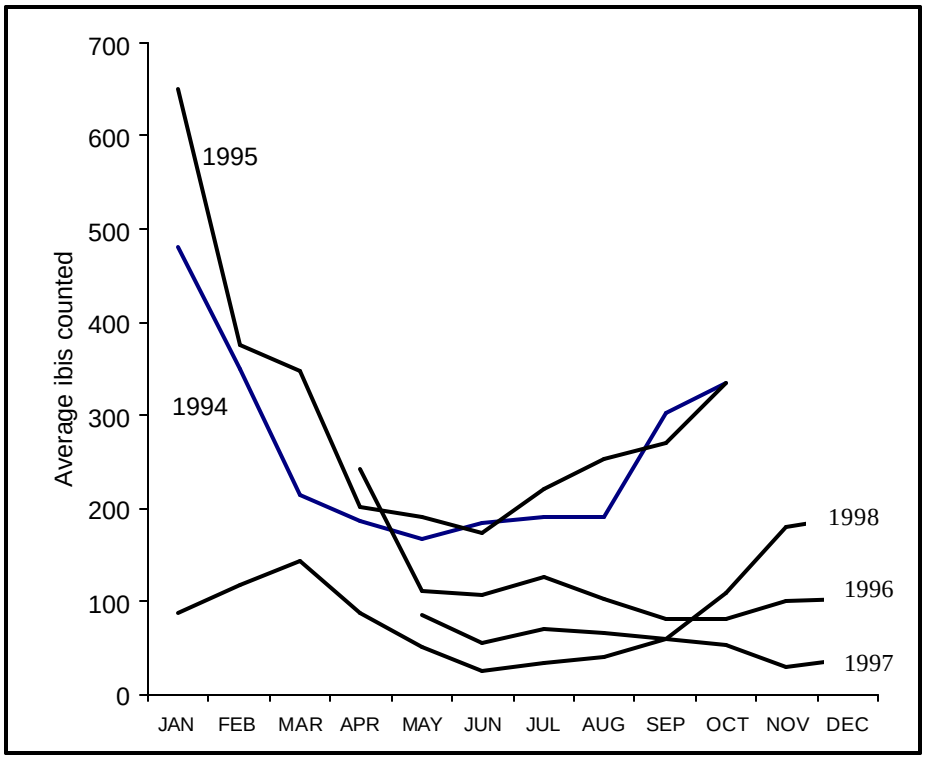
Coolangatta Airport

Between 1989 and 1995 Ibis numbers per count at Coolangatta Airport increased from 1.16 to 7.61, a 556% increase in six years. Such exponential growth mirrored the regional population trend. In figure 3, exponential and linear trend lines have been extrapolated from 1995 to show the expected increase in counts without the intervention of the management program. Significant reductions have been recorded in the three years of the program: on average a 75% reduction compared with the baseline year of 1995. Numbers at the airport were lowest in 1997, the year when Ibis were least populous in the Currumbin colony.

Currumbin Sanctuary foraging counts

Foraging counts at Currumbin Sanctuary diminished over successive years following the introduction of the program against a trend of increasing numbers prior to the program. At the peak in January 1995, 650 birds were counted. This compares with an average count of 88 birds in January1998, a reduction of over 85%.

Figure 4: Ibis foraging at Currumbin Sanctuary 1994 – March 1999



DISCUSSION

The management program has successfully reduced the population of the Currumbin Ibis colony. The second season of operation produced the best results, which was paralleled with the lowest Ibis counts at the airport. This indicates that aircraft hazard is linked to the size of the Currumbin colony. In the third season, Ibis numbers in the breeding colony increased and the numbers of nests and eggs removed reflected this increase. Such a response was due to:

1. Dead and non-climbable trees becoming “island refuges” where birds established nests in high density.

2. Some Ibis habituating to the spotlights hence were not deterred from roosting at the site: roosting is a precursor for nesting.
3. The expansion of the program to other colonies across the region encouraging Ibis back to this colony which is the most difficult for workers to access due to the climbing required.
4. The regional Ibis population continuing to be fueled by large supplemental food supplies at landfills.

Increases in the Currumbin colony size in the third breeding season resulted in more Ibis at Coolangatta Airport and Currumbin Sanctuary. Despite these increases, ibis numbers in the breeding colony, at the airport, and within Currumbin Sanctuary, remained significantly below recordings prior to the introduction of the program.

Whilst the techniques employed in the program have been successful, we have recognised rapid behavioural adaptation by the Ibis to some of the techniques. The egg and nest removal program has resulted in the relocation of breeding pairs to new colonies or smaller established colonies. For instance, the Olney Ct. colony in Southport increased from 103 nests in 1995 (Brown 1995) to 900 nests in 1997 (Shaw 1998). For each breeding season since the program's inception new colonies have been identified. This in part was due to the underlying regional population growth, but was mainly due to relocation of birds from sites where the program had been operating. Climbing, or the use of extension poles can not reach areas of the Currumbin colony. Ibis have identified these areas and subsequently high-density nesting has occurred in isolated pockets within the canopy of the forest.

Egg pricking was trialed on a small scale without success. It has been suggested to dip eggs in paraffin oil to encourage continued incubation of non-viable eggs. At most colonies, access to eggs is difficult and owing to the ability of ibis to extend their breeding season, this seems an unsuitable technique.

The removal of exotic plant and vine species, such as Cocas Palm and Bougainvillea, which are used as nesting substrate, has successfully resisted repeat nesting. This procedure could be used more widely

Spotlighting has been used as an effective tool for dispersal of Ibis. It is particularly suitable in roosts shared by other species, as most other species seem un-perturbed by the lights. The long-term viability of spotlighting is questionable however, as Ibis populations appear to have become resistant with some individuals displaying no signs of disturbance. Unless the lights can be interchanged or combined with some other mechanism to induce negative stimuli, other techniques will need to be designed for maintenance programs at roosts. Suggestions for future trial include laser light, strobe light, water canon, pyrotechnics and recorded distress calls emitted from portable speakers.

Landfills supply over 70% of the Ibis population with a substantial proportion of the daily food requirements (Brown 1995, Shaw 1998). Strategies employed to restrict food supply at landfills have had little or limited success. Ibis quickly habituated to distress calls and there have been operational difficulties with pyrotechnics. The long-term success of the management program is dependent on restricting this primary attraction to the region. Strategies that resist habituation will be required; it appears likely that an array of techniques may achieve this end rather than any one used on its own.

The success of the program will be measured by its ability to exclude supplemental food supplies and decrease the regional population. By expanding the program to all colonies and quickly identifying new ones, breeding success can be restricted. Maintenance strategies that resist habituation must be found to ensure long-term viability and minimise cost.

The importance of the IMCG as an organisational body to guide and fund the program can not be understated. By drawing together key stakeholders and community groups and contracting the expertise required, an organisational framework has been established that is now a template for other working parties involved in wildlife issues in Australia.

REFERENCES

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