Bird Strike Control and Reduction in JAPAN

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Outline

Bird Strike Control and Reduction in JAPAN

◆Introduction – Recorded Bird Strike

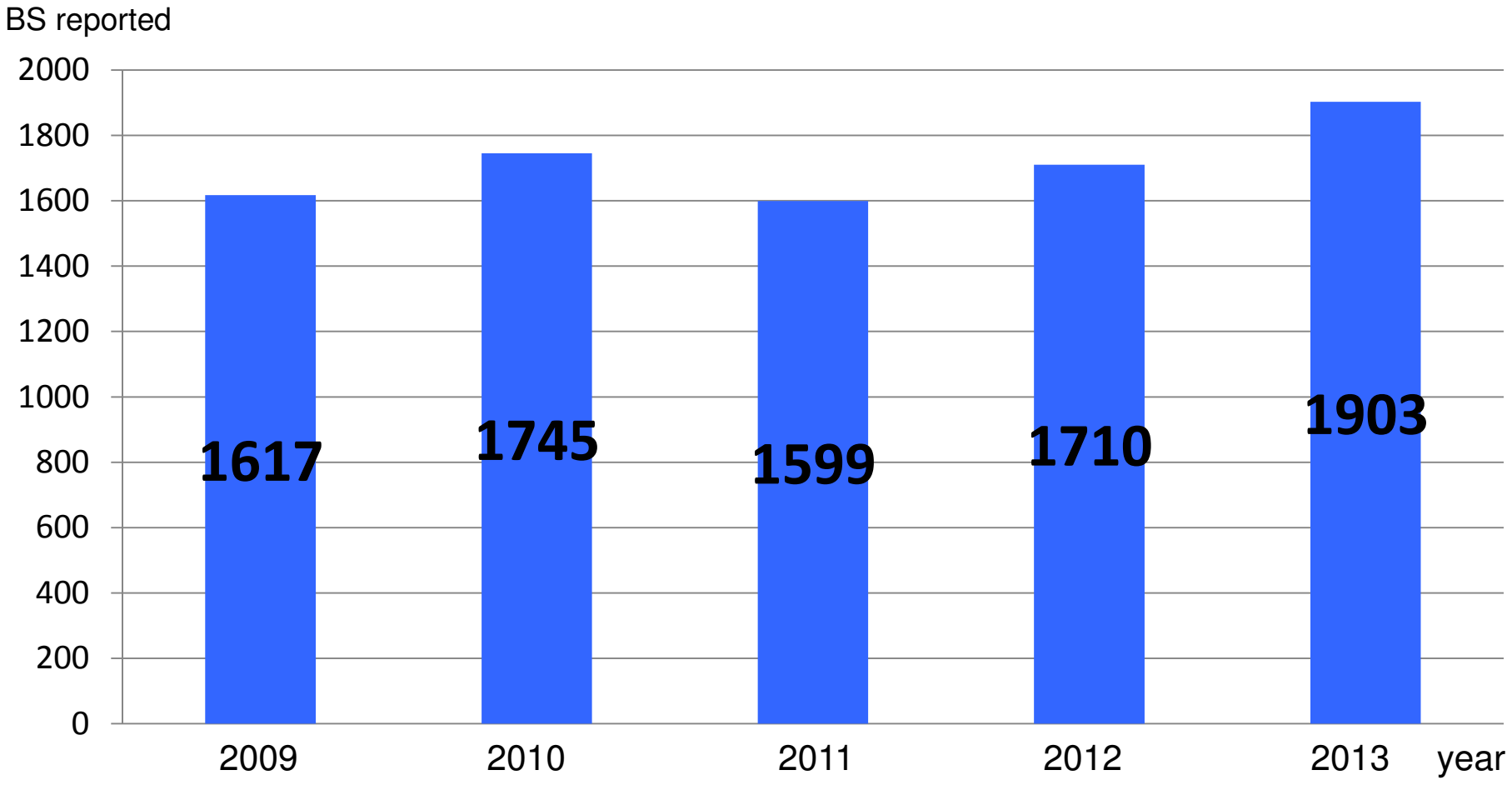
◆Bird Strike Control and Reduction system in JAPAN
- Organization
- Current Efforts
- Program

◆Bird Detecting System in Tokyo INTL Airport (HANEDA)
-Background
-Design Concept
-Composition (presented by NEC on camera system)
-Screen Image
-Evaluation plan on Operation

Introduction - 1

The number of bird strikes in JAPAN.

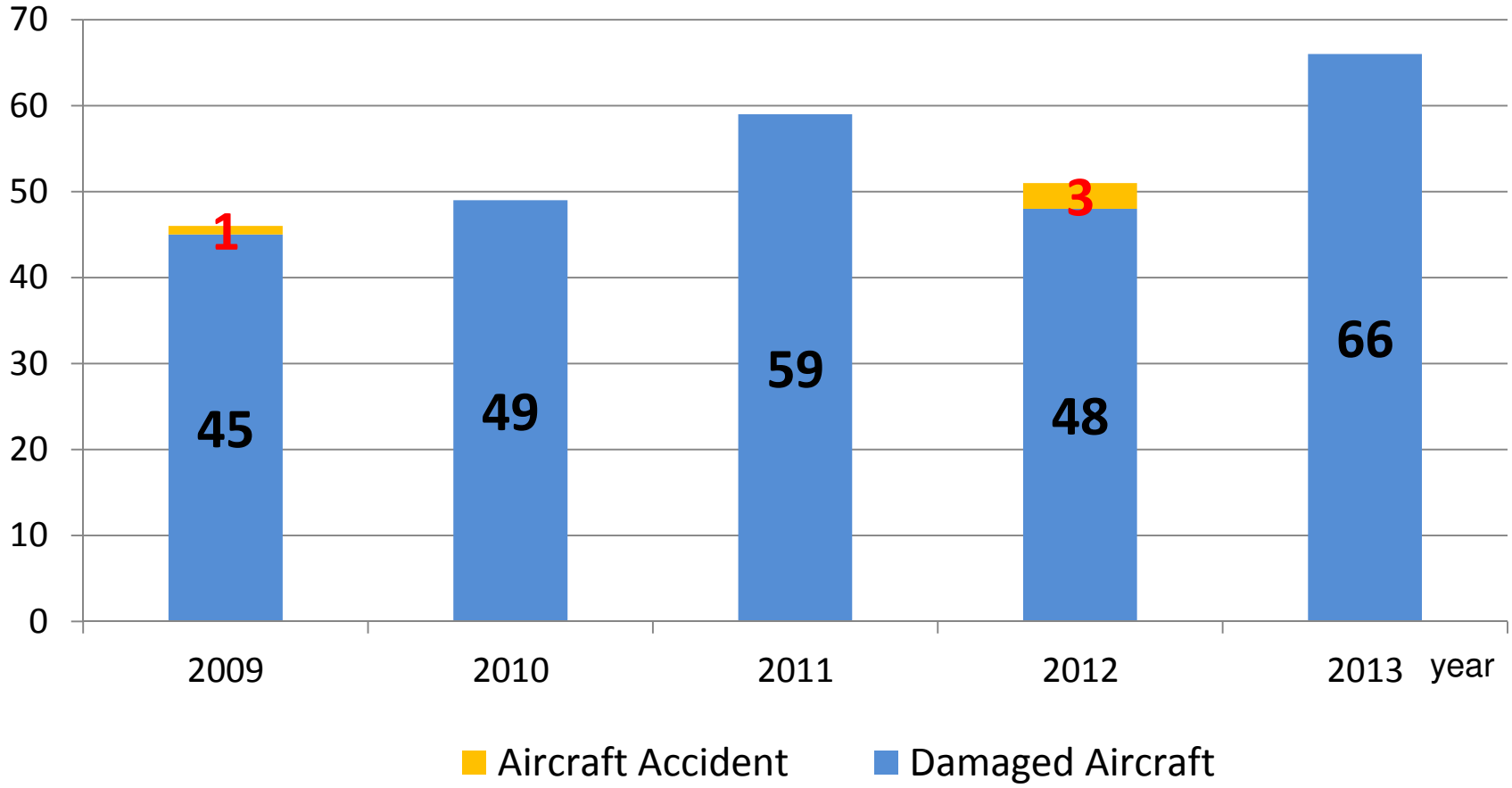
- 89 Civilian airports and 8 airports in Civilian-military joint use.
- Approximately 1900 BS reported in 2013.



Introduction - 2

The number of Damaged Aircraft caused by bird strikes in JAPAN .

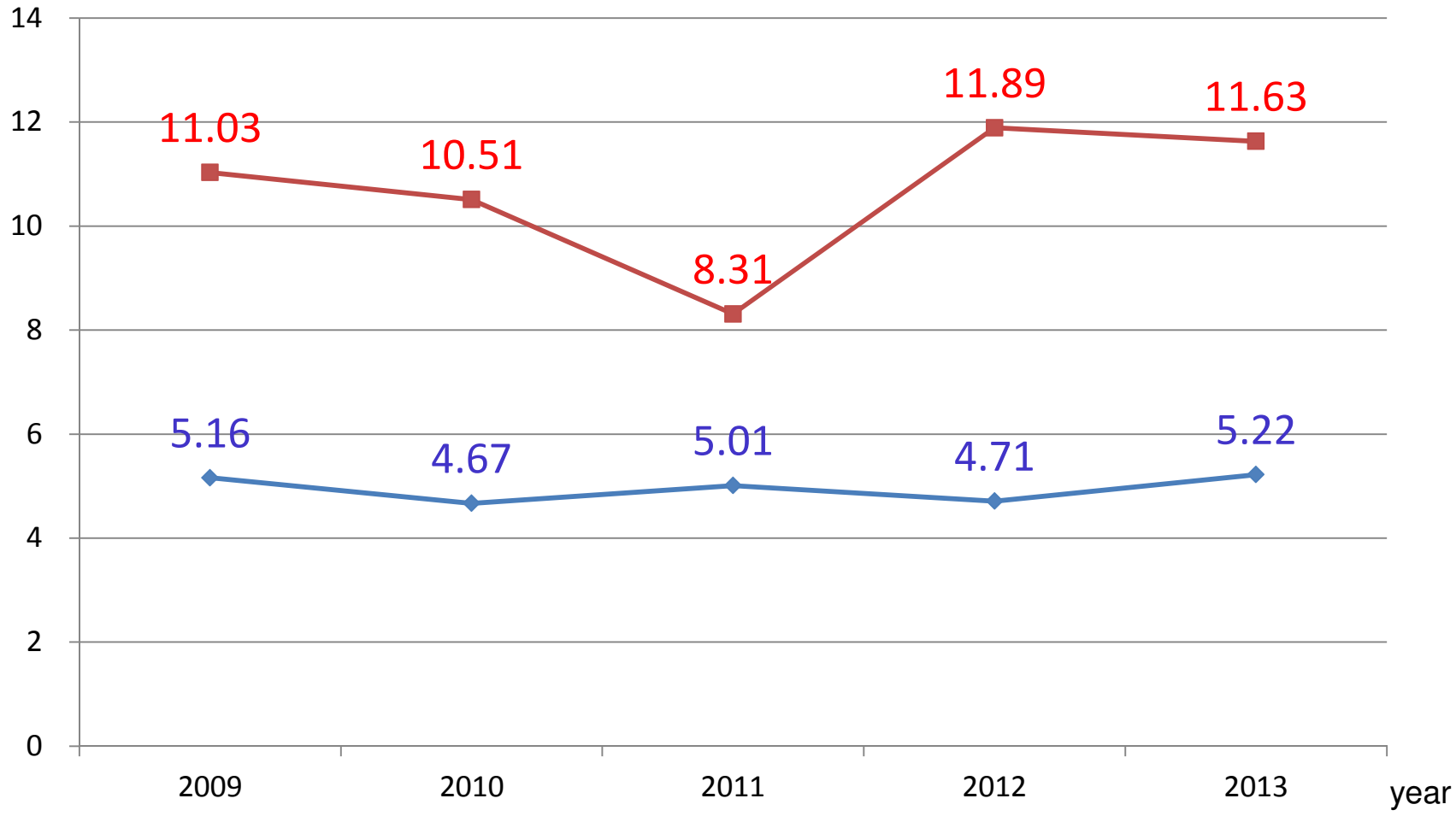
-In 2012, 3 cases are Aircraft Accident of severe damage.



Introduction - 3

国土交通省

The number of bird strikes in JAPAN per 10,000 movements.



Organization

National Committee

Committee to examine measures for BS prevention in Japan

【Member】
- ◆ Wildlife Control Specialists
- ◆ Aircraft Operators
- ◆ Ministry of the Environment
- ◆ Ministry of Defense
- ◆ Civil Aviation Bureau
- ◆ Airport Administrator
- ◆ Bird Patrol Officer

Work together

Regulatory Authorities

CAB,HQ Regional CAB

ICAO(IBIS)

Airport operations Manual /Guidance materials

Advice Instruction

Direct instruction

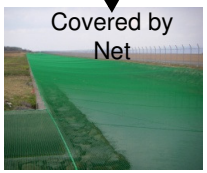
Local Committee at Airports

Committee for BS prevention at the airport.

【Member】
- ◆ Airport Administrator
- ◆ Air Traffic Controller/ Flight Operation Information Unit
- ◆ Airport/Navigation Facility Management Unit
- ◆ Local Government
- ◆ Aircraft Operator
- ◆ Terminal Building Management Company
- ◆ Bird Patrol Officer, etc.

Wildlife strike prevention program

Various activities



Bird Sweeping Habitat Control

Current Efforts by National Committee

Bird Strike Accident

US Airways Accident

Problem

- BS occurred : **39% at Night, Dusk, Dawn**
- **60% of** BS occurred are by unknown bird species.
- HANEDA has the highest BS events in Japan. **(ca. 10%)**

Improvement Policy

Improving the monitoring system on the ecology of bird

- Bird Strike Information Sharing Site
- Bird Species Identification by DNA or Feather Analysis
- Installation of Bird Detecting System at HANEDA

Improving the control system (Especially at night)

- Introduction of control equipment for night operation

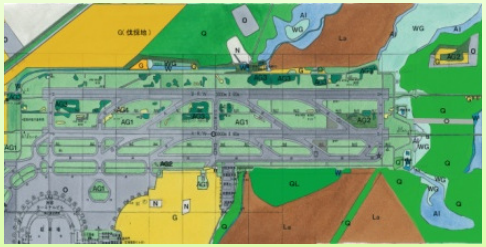
Strengthening leadership of the Committee

- Raising the level of control program of the nationwide airports

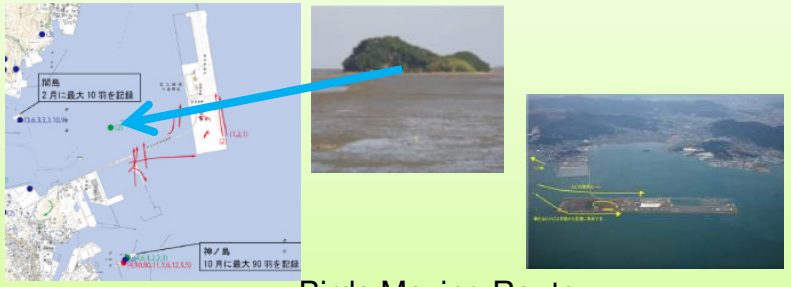
Bird Strike Control Program - 1

Airport Administrator/Operator

Environmental Assessment (Food, Water and Shelter)

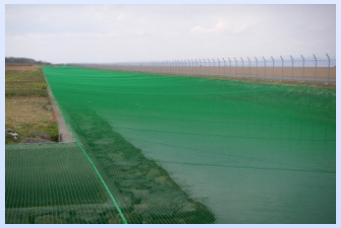


Vegetation at or around Airport



Birds Moving Route

Habitat Control



Water area

Lines over water

Grass area

Removing grass

Nest Management

Cutting trees

Bird Sweeping

Bird Patrol

Distress-call and nose-generating system

Pyrotechnic

Bird Strike Control Program - 2

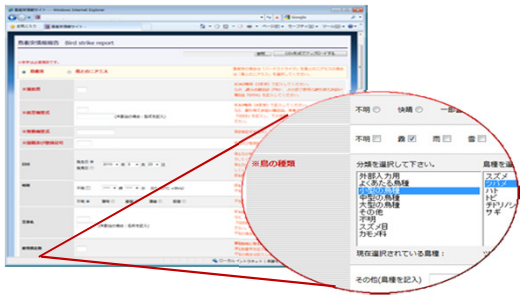
Bird Strike Information Sharing Site https://bird.cab.mlit.go.jp/

- A purpose of this site is collecting the reports of the bird strike that occurred in Japan by Internet, and sharing various information about bird strike with all stakeholders.

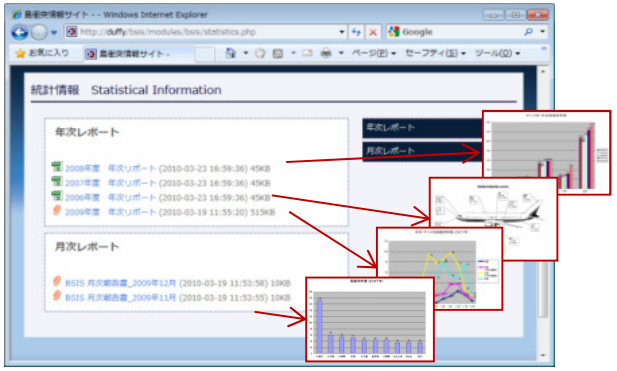
BIRD STRIKE INFORMATION JAPAN

- Collect BS Report from aircraft operators by INTERNET.
  →Afterward, airport administrator add the missing information, for example “Bird species”

- All stakeholders can access the BS Database anytime.



- Sharing various information and documentation with all stakeholders
  - Manuals
  - Statistical Information
  - Best Practices etc.



Bird Strike Control Program - 3

Bird Species Identification by DNA or Feather Analysis

-In order to implement the measures depending on the bird species, we identify BS occurred bird species by DNA or feather analysis fm 2010.

BS occurs, collecting the residue from Runway or the aircraft

Send the residue to the research organization which contracted

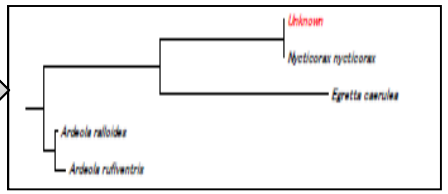
Feather analysis

-Compare to the residue and specimen

(a part of bird body)

DNA analysis

-Analyze the DNA from residue and compare to the DNA DB



(blood, bone, feather etc..)

Bird Strike Control Program - 4

Raising the level of control program of the nationwide airports

Guidance material revised 2014

-This Guidance will help Airport Administrator to plan bird control program at each Airport

Revised

Contents

- ◆Outline of Bird Strike Control and Reduction system
- ◆ Effort and recommendations of the committee so far
- ◆ **Best Practice**
- ◆ Reflection of ICAO Doc 9137 Part 3 revised 2012

The past Guidance was made in 1998

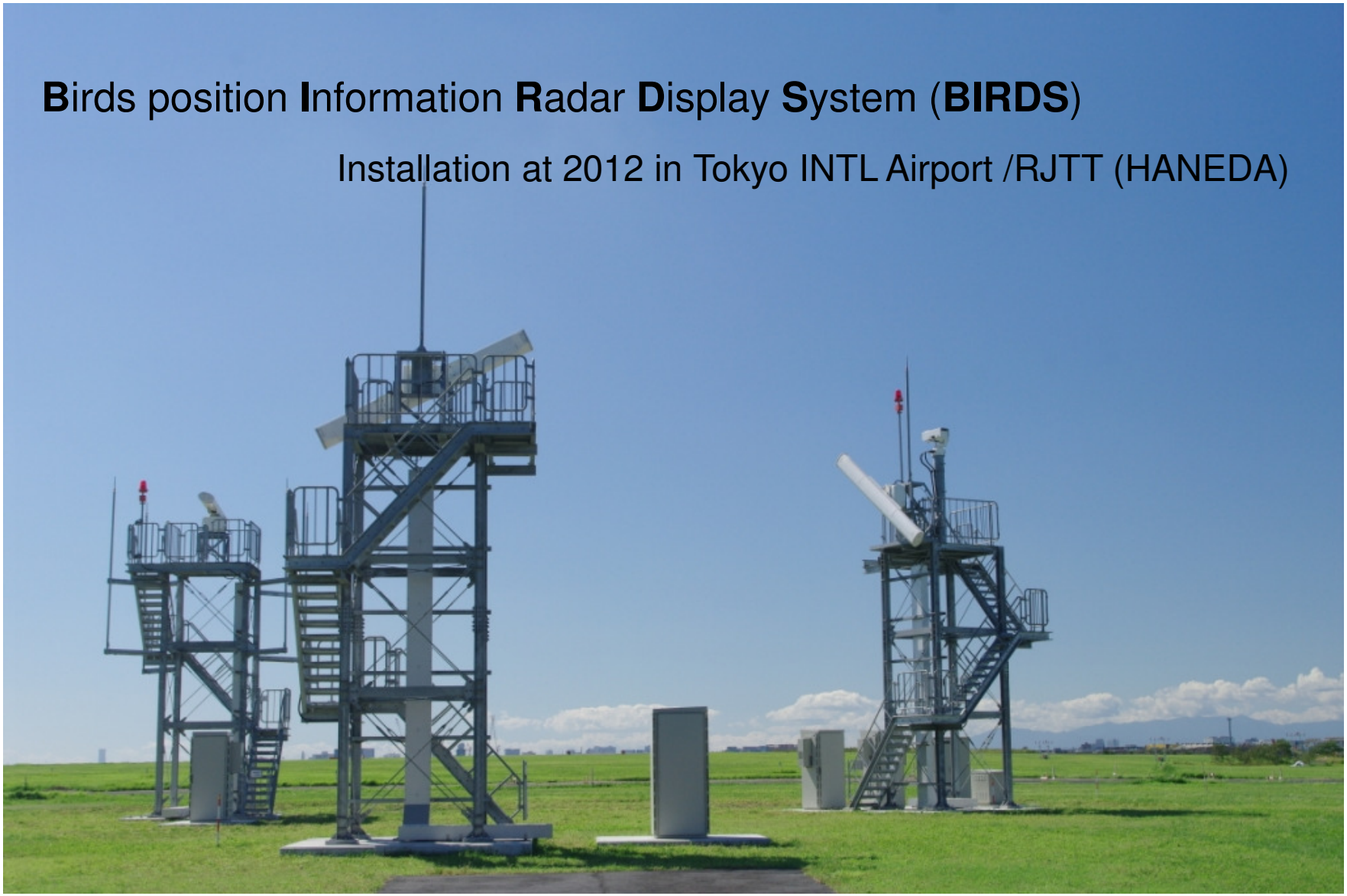
Direct instruction by National Committee

If necessary, National Committee specialists visit the airport, and give direct instructions to Local Committee.

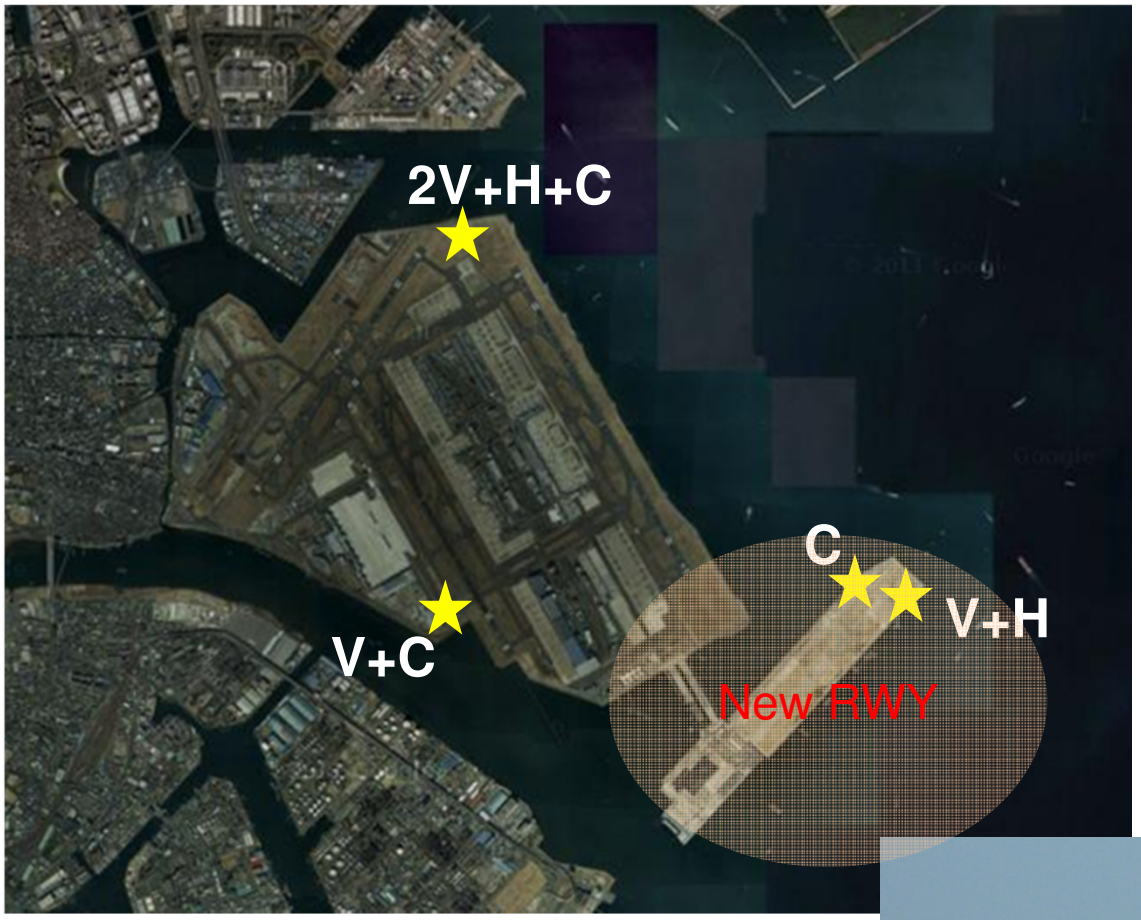
For Example

- ◆Effective way of Bird patrol
- ◆Habitat control to be implemented

BIRDS


Birds position **I**nformation **R**adar **D**isplay **S**ystem (**BIRDS**)
Installation at 2012 in Tokyo INTL Airport /RJTT (HANEDA)

Tokyo INTL Airport /RJTT (HANEDA)



Runway

16L/34R: 3,000 x 60m

04/22: 2,500 x 60m

16R/34L: 3,000 x 60m

05/23: 2,500 x 60m

(05/23 was installed 2010)

Hours of Operation

24 Hours

Number of Traffic

447,000per year

(Approx 1,200flights/day)

BIRDS	
V : Vertical radar	4
H :Horizontal radar	2
C :Camera	3
Noise generating system	3

Background

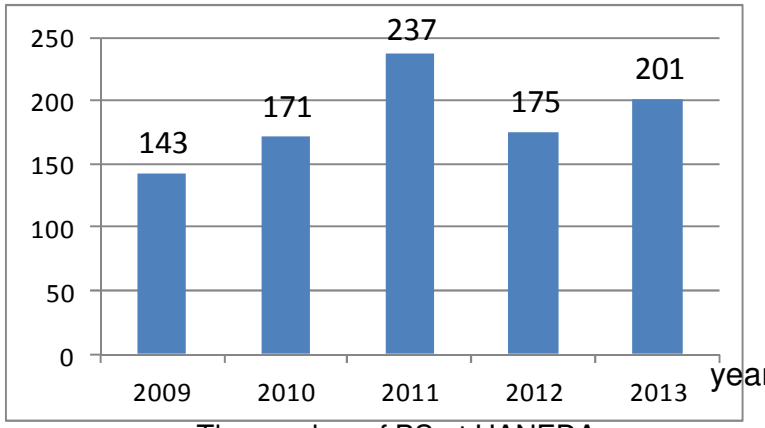
Program

Bird Patrol

Habitat Control

Examination for NEW technology

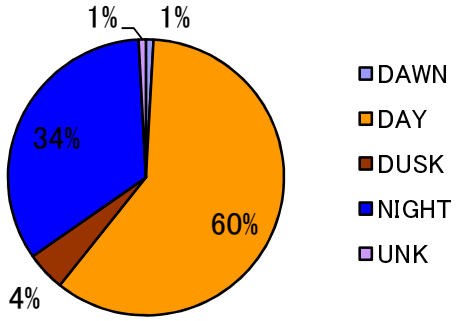
BS reported



The number of BS at HANEDA

Problem & Background

- BS occurred : **39% at Night, Dusk, Dawn**
- **New RWY** was installed In 2010
- **INTL Night Flights** were increasing



Percentage of occurrence time at HANEDA

Considering with **National Committee**

Purpose: To implement year-round BS preventive action

- Bird Patrol applied 24HRs
- Monitoring Bird Movement in and around airport CONSTANTLY
- Introduction of new DEVICE to prevent Night BS

Design Concept

Tactical Approach

(Short term – real time monitoring)

◆ Ability to detect birds flying at higher altitudes by using radar technologies.

◆ Ability to detect activity of birds near ground level and low altitudes by using cameras.

◆ Providing real time information for bird patrollers.

Strategic Approach

(Long term – data analysis)

◆ Better understanding of bird activity (spatial and temporal) at airport.

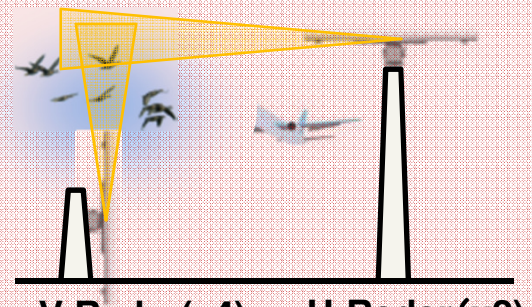
◆ Data for improving the effectiveness of bird habitat control for safer operations and reduction of bird strikes.

Composition

◆ SYSTEM consists in combination of Radar and Camera.
→Camera cover the area where radar is not able to cover: ground level and very low altitude.

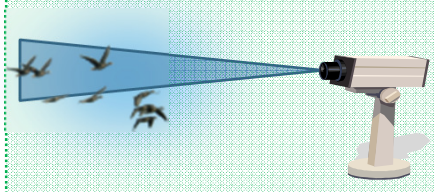
◆Mobile Tablet terminals provide real time information to Bird Patrollers.

Radar



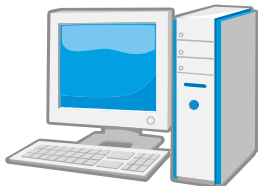
V-Radar(x4)　H-Radar（x2)

Camera



High Sensitivity Camera(x3)

Data Processing Device



Data processing
Maintenance
Monitoring

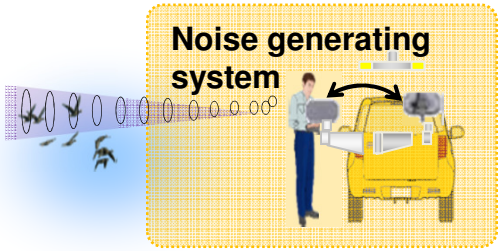
【 AD administrator / Birds Patroller's office】

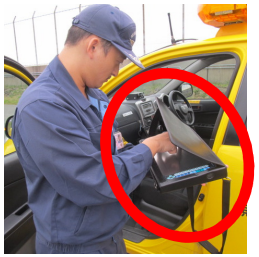
Camera monitor

Operation Terminal

Printer

【Birds Patroller (Outside) 】

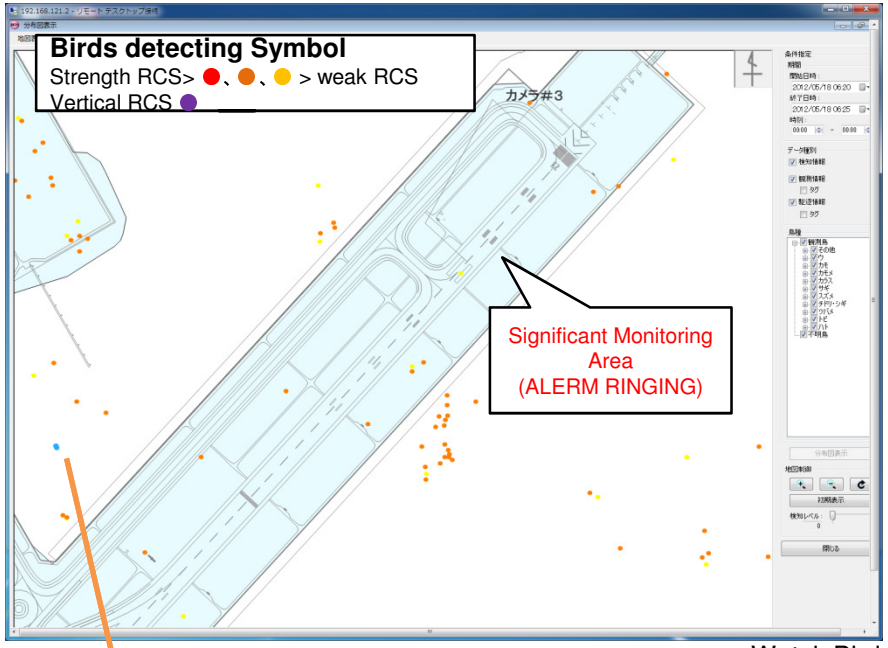




Mobile Tablet

Screen Image

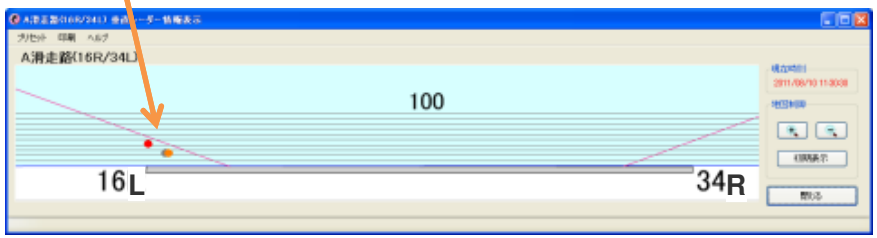
■Horizontal Radar



Check
Flying Altitude

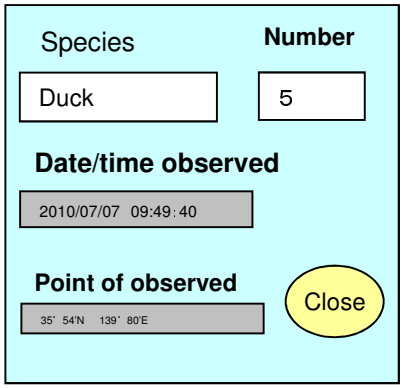
Watch Birds
(if able specified birds species)

■Vertical Radar



■Birds species registration

*Birds patrol officer input observation records with mobile tablet.



■Birds camera monitoring

Evaluation Plan on operation

Initial Phase → Operational Trial Phase → Reduction BS Phase (PLANNED)

Initial Phase

◆Mastery of the usage, for example, learning the capability of the radars and cameras

◆Adjustment of RCS levels suitable for the weather and environment characteristics of the airport.

◆Accumulation of observation records of the bird patrollers and of detection information of the radars and cameras.

◆Analysis of the accumulated data for habitat control.

◆Improving efficiency of bird patrol (with mobile tablet)

Operational Trial Phase

◆Study of further analytical methods of the accumulated data, for implementation and evaluation of effective and efficient bird strike control program.

◆Assisting bird patrol activity by real-time monitoring.

◆Using of the statistics function of camera, which was developed after initial phase.

Reduction BS Phase (PLANNED)

◆“Speedy Bird Sweeping”

◆“Proactive Control with data analysis”

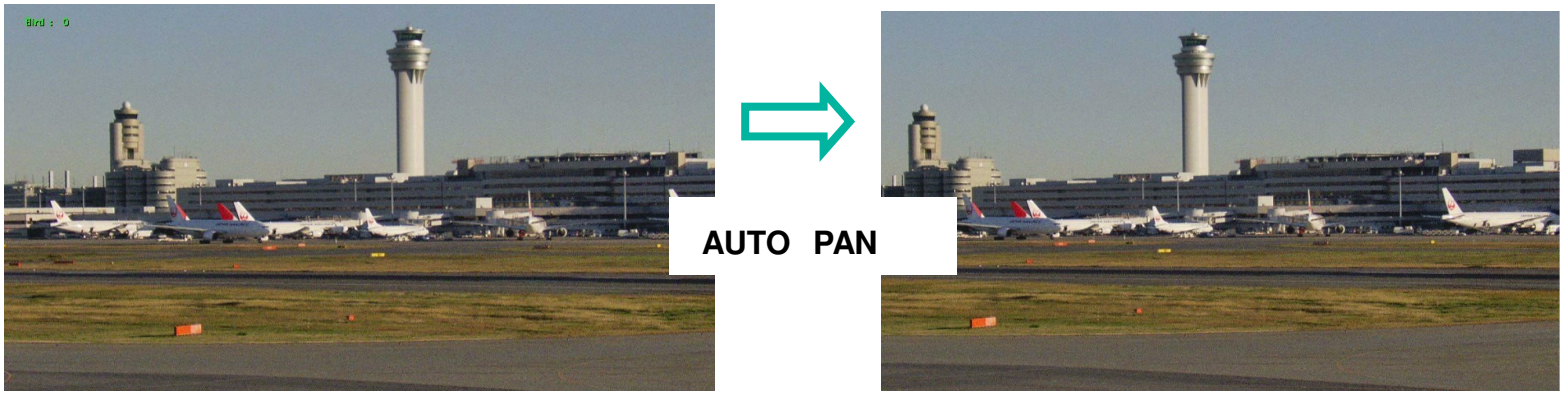
Camera and image processing

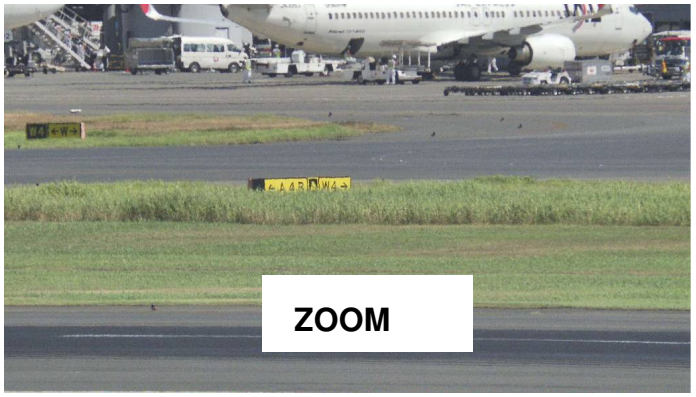
- **High sensitivity camera**
  - Automatic bird detection through image processing
  - Ability to capture/store video images
  - Automatic rotation
  - Manual pan and tilt zoom for visual confirmation

Performance Type of Camera	Full High Definition
The Number of Pixels	1,920 x 1,080 pixel
Frame Rate	30 fps
Lens Focus Range	16.7 mm-1,000 mm
Image Processing Function	Automatic detection of moving birds through image processing

Camera and image processing

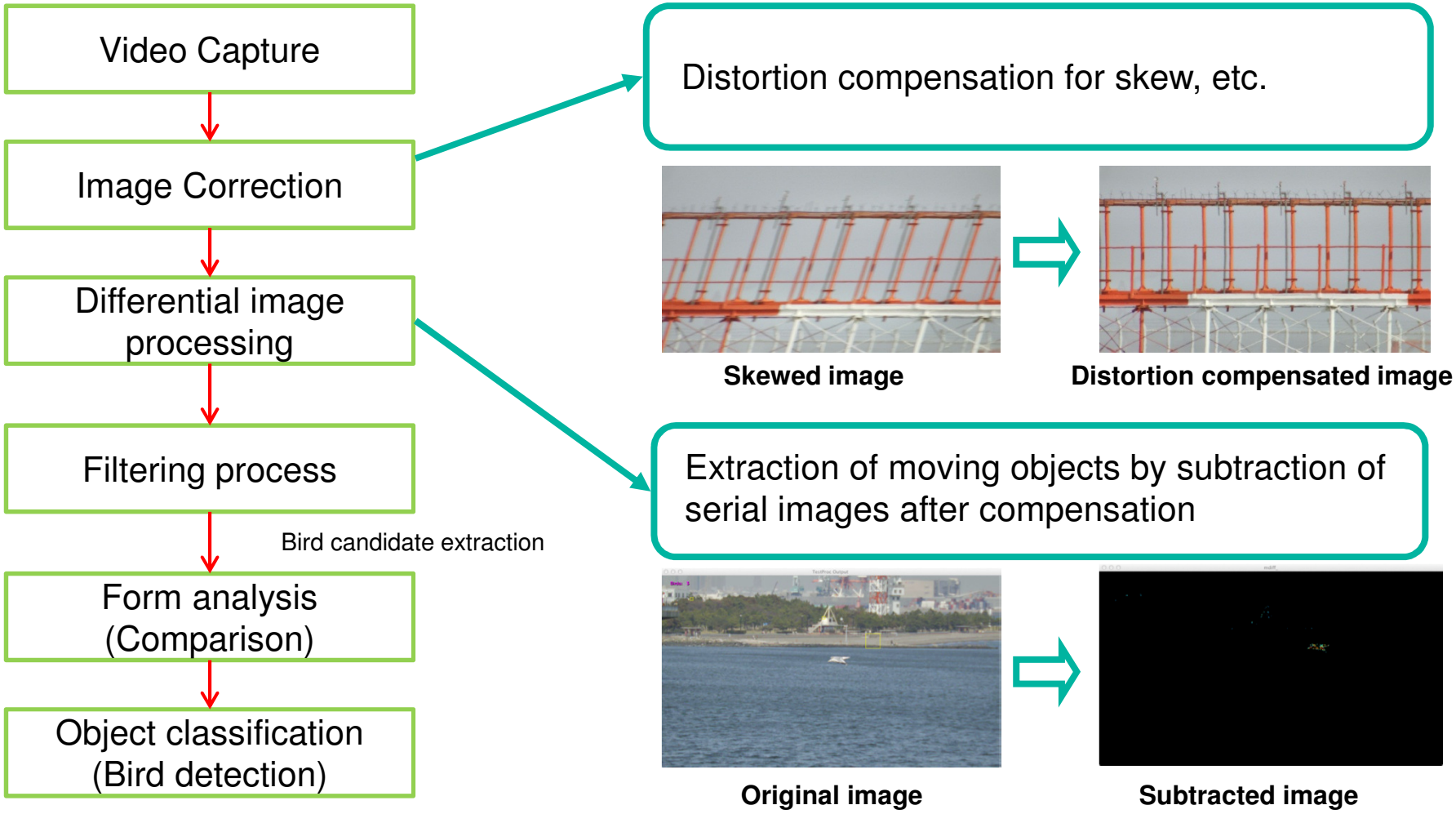
- **Two ways of operation: automatic vs. manual mode**
  - Automatic mode: automatic monitoring and detection of moving birds
  - Manual mode: ability to control PAN/TILT/ZOOM/IRIS for visual confirmation
  - Manual mode: DB registration of bird data (species, location, deterrence method)





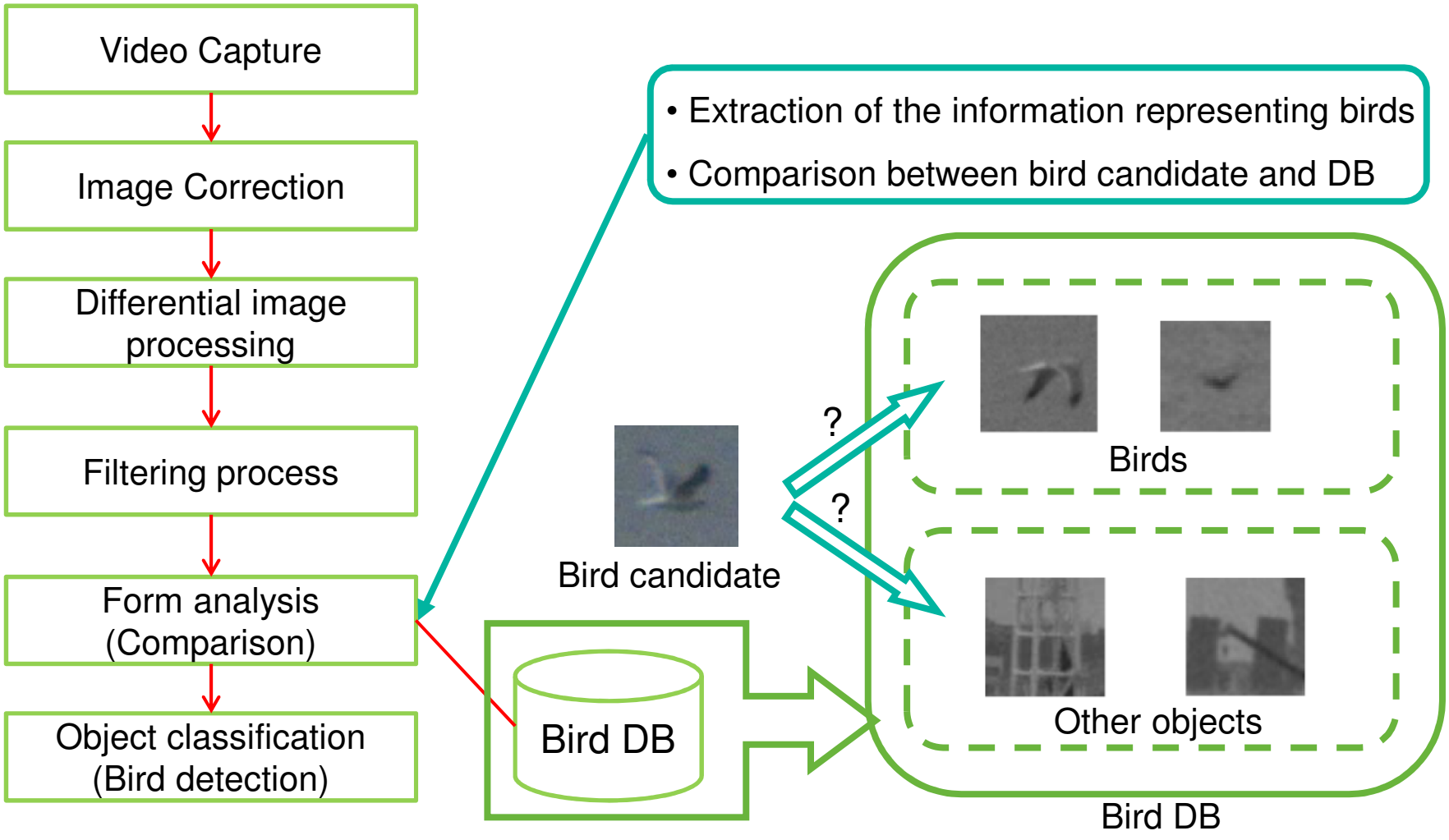
Camera and image processing

Advantage of utilizing advanced image processing techniques



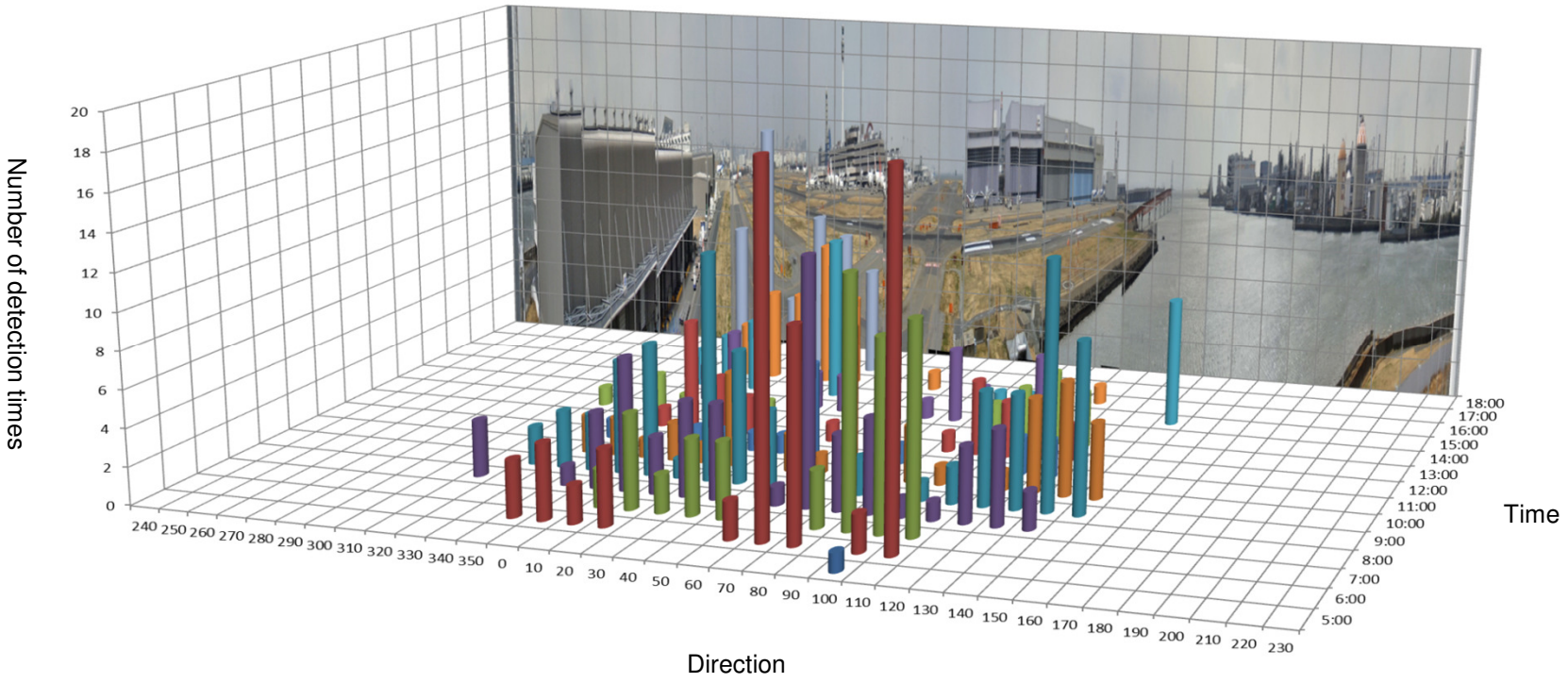
Camera and image processing

Advantage of utilizing advanced image processing techniques



Camera and image processing （Statistic graph 1/2）

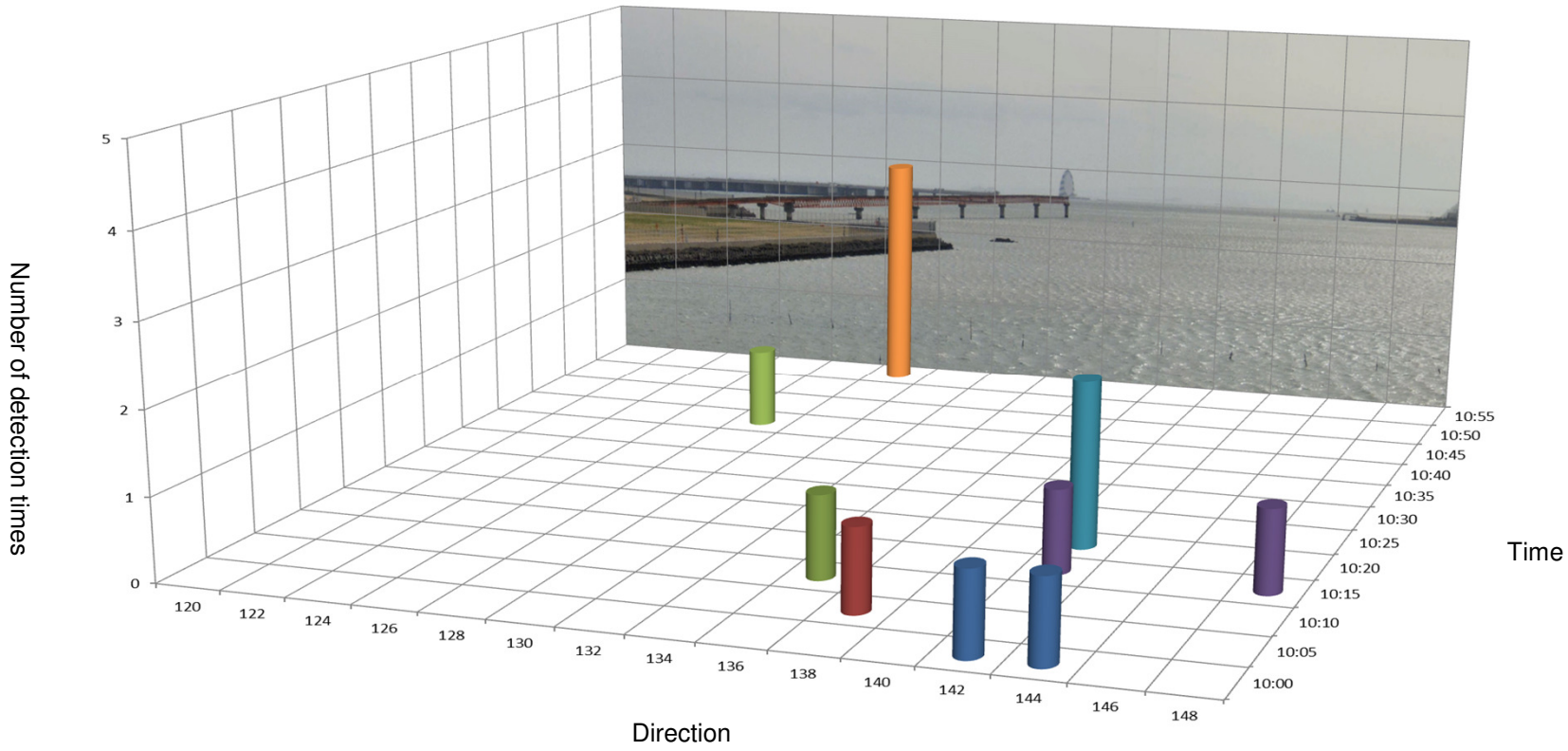
- Based on the data from the log files, such as camera's direction and time of bird detection, it is possible to create statistic graphs for better understanding of allocation of birds. The statistic data can be divided by camera direction (every 10 or 2 degrees) or time (every 1 hour or 5 minutes).
- The statistic graphs can be visually supported by background images, taken in advance by bird detection camera, displayed in both combined 360-degree or 30-degree view.



Sample 1: Statistic graph showing data taken at 10- degree interval captured from 5AM to 6PM. Supported by 360-degree combined image view.

Camera and image processing （Statistic graph 2/2）

- The operator can extract the camera log file according to preferred time and direction for more detailed analysis.



Sample 2: Statistic graph showing data taken from 10AM to 11AM within range of 30-degrees (from 120 to 150 degrees) at 2-degree interval. Supported by 30-degree image view.


Thank you
for your attention !!!