Unmanned Aircraft System for Ecological Research and Monitoring

Matthew A. Burgess, John H. Perry, Brandon S. Evers, Thomas J. Rambo, Thomas M. Reed, H. Franklin Percival, Peter G. Ifju, Scot E. Smith, Bon A. Dewitt, H.Y. Rodriguez-Asilis, Zoltan Szantoi, Peter C. Frederick, and D.A. Wolfe
Developmental Criteria

- Portable/sturdy lightweight construction √
- Hand launch capable/small field recovery √
- Quiet/stable operation √
- Cost-efficient ？
- 5 mile communication downlink radius X √
- Autonomous flight control/manual override √ √
- 2 hour flight duration X
- 1 person operation X
- Accurately georeferenced imagery √
- Rapid data assessment/turnaround time ？
Airframe Evolution

Fold-Bat (2002-3)

Tadpole (2004-5)

Polaris/Nova (2006-8)

Nova 2 (2008)
International Micro Air Vehicle Surveillance Competition History

Year
Maximum Dimension, in.
20 10 5 2.5

UF 4.5 in. record
MLB UF UF UF BYU UF UF KKU UF
Nova 2.1
(2009-2010)

- 9 ft wingspan
- 11 lb AUW
- 1.25 hr duration
- 50 linear miles per flight
Procerus Gamepad Controller

Gateway M-Series Laptop

Radio-Shack USB-RS232 Converter

Garmin 18xLVC Receiver

900Mhz Antenna

Procerus Commbox
Launch
Mission
Landing
Recovery
Population Surveys
Mission Planning
Precision Mission Execution
Google Earth™/D.O.Q.Q.’s on Steroids
Multispectral
Processing
### Change Analysis

<table>
<thead>
<tr>
<th>Class</th>
<th>Subclass</th>
<th>Area (m²)</th>
<th>% Total</th>
<th>% Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open Water</td>
<td></td>
<td>50,281</td>
<td>20%</td>
<td>72%</td>
</tr>
<tr>
<td>Decomposing (Submerged)</td>
<td></td>
<td>19,712</td>
<td>8%</td>
<td>28%</td>
</tr>
<tr>
<td>Vegetation</td>
<td></td>
<td>180,007</td>
<td>72%</td>
<td></td>
</tr>
<tr>
<td>Frog’s Bit, Water Hyacinth, &amp; Cupscale</td>
<td></td>
<td>46,944</td>
<td>19%</td>
<td>26%</td>
</tr>
<tr>
<td>Decomposing (Emergent)</td>
<td></td>
<td>45,889</td>
<td>18%</td>
<td>25%</td>
</tr>
<tr>
<td>Water Lettuce</td>
<td></td>
<td>29,599</td>
<td>12%</td>
<td>16%</td>
</tr>
<tr>
<td>Luziola</td>
<td></td>
<td>26,386</td>
<td>11%</td>
<td>15%</td>
</tr>
<tr>
<td>Lotus</td>
<td></td>
<td>22,433</td>
<td>9%</td>
<td>12%</td>
</tr>
<tr>
<td>Shadow/Unclassified</td>
<td></td>
<td>8,757</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>250,000</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Herbert Hoover Dike
WHAT’S NEXT?

HARDWARE
FLAPS
INDUSTRIAL CAMERA

SOFTWARE
OPTIMIZE FLIGHT PLANNING
DATA PROCESSING
PATTERN RECOGNITION
RELIEF

APPLICATIONS
STATISTICS
EXPERIENCE
Houston, .....