New techniques for counting penguins

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THE WIDESPREAD MONITORING OF PENGUIN POPULATIONS around the Antarctic and on subantarctic islands is dependent on methods to determine annual population sizes (breeding pairs) accurately. Monitoring has typically relied on ground visits to colonies, and photographs of colonies, either oblique or aerial, from which birds were counted manually. These methods require considerable time and effort. Techniques that either increase the precision of individual counts or increase the number of counts for a given effort would improve our ability to identify statistically significant population changes. Scientists from the Australian Antarctic Division have developed customised software that can quickly determine the numbers of penguins in aerial photographs accurately. The software uses readily available hardware and is relatively cheap, both of which are prerequisites for its broad scale adoption and application.

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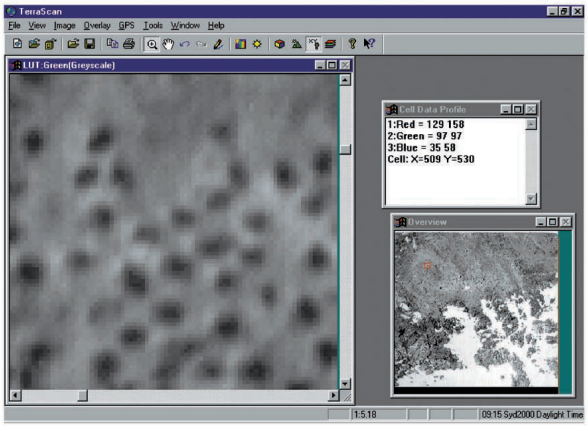
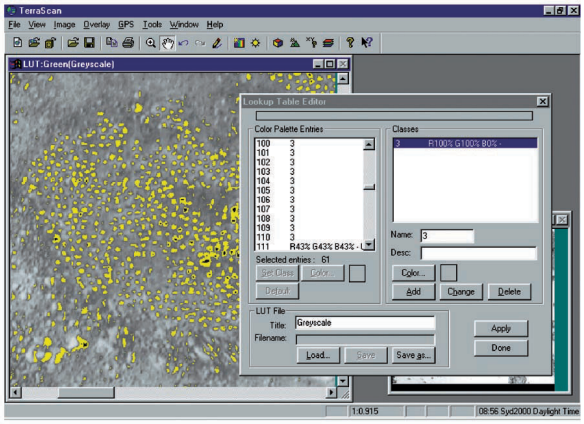
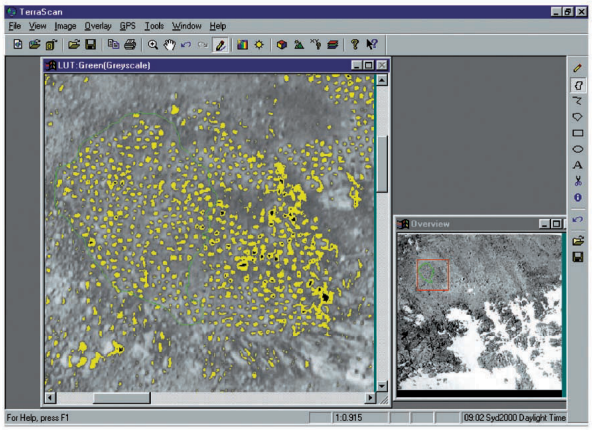


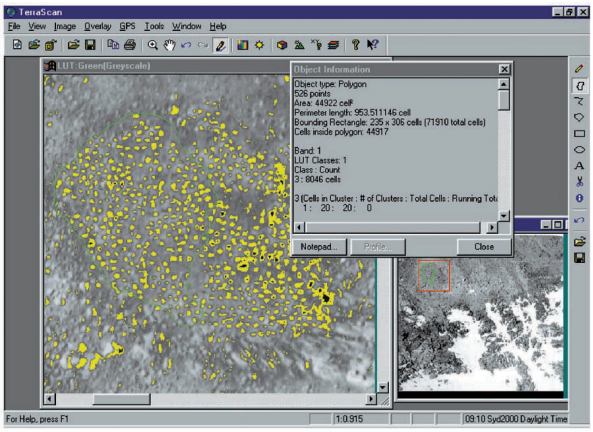
1. A 600dpi TIFF scan of an aerial photograph is converted to a 256 grey-scale image. The image is enlarged to identify individual penguins. Repeated selection of penguin pixels determines the grey-scale range of (penguin) pixel clusters to be used.



2. Once the grey-scale range is determined (eg 35 - 115 above), a colour is used to identify all pixel clusters within the selected grey-scale range on the image. If the range is too broad, 'blurring' will occur, and adjacent penguins will not be separated. Shadows and rocks will contribute some noise to the analyses.



3. A polygon is drawn around the colony or area to be counted. Non-nesting penguins, rocks, shadows and other non-penguin pixel clusters can be excluded.



4. A conservative estimate of pixel clusters (penguins) within the colony or specified area is provided. We are currently investigating the use of higher resolution scans (1200 dpi+) and changing the pixel-cluster threshold to enhance separation of adjacent penguins, and thus provide greater accuracy in census estimates.