



# *IOU News*

Fall 2005      Volume 21 – Number 3



The deep waters of Spirit Lake, Iowa's largest natural body of water, break on the north shore at Mini Wakan. Photo by P. Hertzell, August 2005.

## **Enjoy Fall Birding in Northwest Iowa**

### **2005 IOU Fall Meeting**

#### **Iowa Lakeside Laboratory on West Okoboji Lake**

The Iowa Ornithologists' Union Fall Meeting will be held September 23-25 at the Iowa Lakeside Laboratory located on West Okoboji Lake in beautiful northwest Iowa. The IOU invites members, friends and others interested in birds and birding to take in one of Iowa's most spectacular natural areas.

Lee Schoenewe, IOU member from Spencer, will host

this event. Field trips will be conducted on both Saturday and Sunday to the various wetlands, prairies and woodlands of the Iowa Great Lakes region. Area birders will serve as guides for the field trips.

The Lakeside Lab's 140-acre campus was established in 1909 as one of the first private summer field stations in the

*Continued on page 4.*





## IOU News

is a quarterly publication of the Publications Committee of the **Iowa Ornithologists' Union**

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James J. Dinsmore  
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IOU News deadlines for submission of materials:

Issue	Coverage	Deadline
Spring	March 1 - May 31	February 20
Summer	June 1 - July 31	May 20
Fall	August 1 - Nov 30	July 20
Winter	Dec 1 - Feb 28	November 20

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Fall Field Reports-  
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*this newsletter was mailed to 481 members*



## Dates, Things To Do

### September 09

*Iowa Audubon Pelican Gala* - fundraising banquet, beginning at 6:30pm at Jester Park Lodge on Saylorville Lake. \$60 per person or \$100 per couple. Hors d'oeuvres, wine and soft drinks will be served. Speaker - Paul Baicich.

### September 11

*Pelican Festival*, at Jester Park on Saylorville Lake. 10-4pm; see the largest migration of American White Pelicans in the United States. Park Rangers, naturalists and volunteers will be on hand with spotting scopes. Educational programs will be held throughout the day. Partners with U.S. Army Corps of Engineers, Audubon Iowa, Iowa DNR Wildlife Diversity Team.



### September 23-25

*IOU Fall Meeting*, at the Lakeside Laboratory at Spirit Lake. See details on pages 1, 4-7, or register online at <http://www.iowabirds.org>.

### October 13-16

*Midwest Birding Symposium*, Quad Cities. Field trips, conference sessions, exhibits, silent auction. (563) 322-3911 #108. Or visit <http://www.visitquadcities.com/midwestbirding/> See page 9.

### November 11-13

*Rivers & Bluffs Fall Birding Festival*, Lansing IA. Field trips, Great Horned Owl program, live music, door prizes, auctions. [Ric.Zarwell@mchsi.com](mailto:Ric.Zarwell@mchsi.com) See page 9.

### December 1

End of fall reporting season. Field reports due to editor. See page 9.

### December 14-January 5

Christmas Bird Count Season

### May 19-21, 2006

*IOU Spring Meeting*, Ventura, IA.





## From the President . . .

The new IOU Travel Committee has been appointed. Kent Nickell has agreed to serve as chairman. Other members of the committee are Jim Fuller, James Huntington, Bill Scheible, Ross Silcock and Hank Zaletel. These folks are will be planning trips for IOU members. They may lead trips themselves or contract with other trip leaders or guides. If you have suggestions for trips contact one of the committee members.

Karen Disbrow is going to head up the Membership Committee replacing John Rutenbeck. Arrangements are being made for IOU to have a presence at two upcoming events. We will have a table at the Pelican Festival at Saylorville in September and a booth at the Midwest Birding Symposium. Volunteers, with spotting scopes are needed at the Pelican Festival to help participants get a closer view of the pelicans and other birds present that day. For the Midwest Birding

Symposium we need volunteers to staff our booth. Volunteers need not register to help at the booth. Please contact Karen Disbrow (319) 339-1017, Hank Zaletel [madowl@midiowa.net](mailto:madowl@midiowa.net) or (515) 382-5427 or Aaron Brees [abrees@hotmail.com](mailto:abrees@hotmail.com) if you can help out.

A replacement is needed for Dave Edwards the IOU Registrar. Dave has handled dues and registration as well as mailing Iowa Bird Life. These responsibilities could be split between two individuals. If you would be interested in talking about this position or know someone who you think would be a good candidate, please contact me by phone or e-mail. A knowledge of Excel and Word would be very helpful. Dave would like to start training a replacement soon.

Sharon Stilwell  
(515) 223-6518  
[sharonstilwell@msn.com](mailto:sharonstilwell@msn.com)

### IOU Travel Committee

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### CHANGES IN IOU NATURE STORE/ AMAZON.COM AFFILIATION

Those who support the IOU with purchases through the IOU Nature Store will see a new look and some new merchandise. Our affiliation with Withoutbricks, an internet marketing company, has been upgraded to an on-line nature mall with more merchandise than ever before. Perhaps even more exciting for some, the IOU has entered into an agreement with Amazon.com which generates revenue for the organization when purchases are made through the IOU web site. The next time you go on-line to order through Amazon, whether for a gift or for yourself, please remember to go to <http://www.iowabirds.org/main/store.asp> and click on the Amazon logo. Eagle Optics, a source of revenue for the IOU the past few years, no longer has an affiliate program.

Thank you for your support. All proceeds go towards IOU publications.



# IOU 2005 Fall Meeting

September 23–25, 2005      Lakeside Laboratory  
Okoboji, Iowa

*Continued from page 1.*

nation. In 1936 Lakeside became a state institution, and today Iowa State University, the University of Northern Iowa, and the University of Iowa run it cooperatively. Since its foundation, Lakeside's mission has been to provide students an opportunity to get hands-on experience working with Iowa's natural and human environments through its field-oriented summer courses and to provide research facilities and support for graduate students and faculty working on research projects in northwest Iowa.

Lakeside Laboratory is located on Highway 86, which runs on the west side of West Okoboji Lake. The silver water tower on the other (west) side of the road from the Laboratory is the best landmark and easiest way to tell that you have reached the campus.

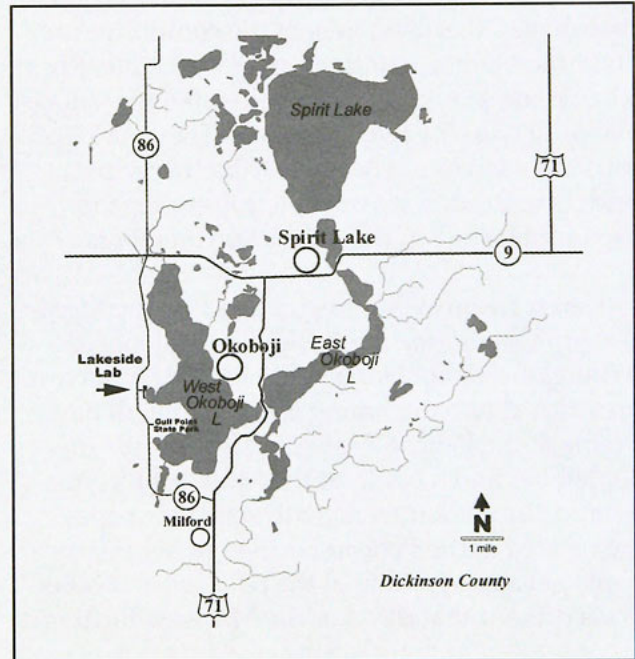
-John Rutenbeck

## FRIDAY, SEPTEMBER 23:

6:00-9:00 p.m.      Registration, Field Trip Sign-up and Social Time

## SATURDAY, SEPTEMBER 24:

- 6:15-7:00 a.m.      Breakfast
  
- 7:00 a.m.            Field trips depart from the Lakeside Lab, and return by 12:00 p.m.
  
- 12:00-1:00 p.m.    Lunch
  
- 1:00-2:15 p.m.     IOU Membership Business Meeting  
                         Sharon Stilwell, IOU President
  
- 2:15-2:30 p.m.     Set-up time for presentations
  
- 2:30-3:15 p.m.     *Crex Meadows: A Midwest Birder's Paradise*  
                         Jim Scheib, Iowa City
  
- 3:15-4:00            To Be Announced
  
- 4:00-4:30 p.m.     *The Iowa list: Reflections on past predictions and thoughts for the future*  
                         Dr. James Dinsmore, Ames



Directions to Lakeside Laboratory:

In Dickinson County, from Spencer, drive north on U.S. 71, then turn west onto 86 just after the town of Milford. In about 4 miles, the entrance to Lakeside Lab will appear on the right.

From highway 9, turn south on 86 about 3 miles west of the city of Spirit Lake. The entrance will appear on your left.



Along highway 86, you'll know you are at the turn for the entrance to Lakeside Laboratory when you are directly across from the silver water tower.



6:30-7:30 p.m. Saturday Evening Banquet

7:30-8:30 p.m. *The Preservation of Birds Through Private Conservation*  
 Dr. Robert Ridgely, Vice President,  
 American Bird Conservancy

**SUNDAY, SEPTEMBER 25:**

6:15-7:00 a.m. Breakfast

7:00 a.m. Field Trips depart and return by 12:00 noon.

12:00 p.m. Lunch and Final Compilation



Overlooking Jemmerson Slough, Dickinson County.

**Possible Saturday and Sunday Morning Field Trips:**

- \* *Spirit Lake Tour*, including Kettleston Hogsback, the "Grade" at Spirit Lake, Mini Wakan State Park, Jemmerson Slough and Grover's Lake
- \* *West Okoboji Tour*, including Gull Point State Park, Garlock Slough, Dugout Creek Wildlife Production Area, and Silver Lake
- \* *Spring Run Tour*, including Cheever Lake, Fort Defiance State Park, Four Mile Wildlife Production Area, Little Swan Lake, and Christopherson Slough
- \* *Ruthven Tour*, including Dan Green Slough, Lost Island Lake, Trumbull Lake, and Dewey's Pasture

*Final choices for the trips will be made based on where the most birds are found that week.*

**DR. ROBERT RIDGELY**  
*Evening Banquet Speaker*

Dr. Robert Ridgely received his Ph.D. from Yale University and is a leading ornithologist in the study of endemic and endangered species of birds in the Americas. He is the author of *Birds Of Panama* (first edition 1976, revised 1989) *Birds Of South America Vols. I (1989) & II (1994)* and *Birds Of Ecuador (2001)*.

Previously, he was Director of International Conservation at National Audubon Society and the Director of the Center for Neotropical Ornithology at the Academy of Natural Sciences in Philadelphia (ANSP). He is a Core Leader for Victor Emanuel Nature Tours.

In 1997, he discovered a new species of bird, *Jocotoco Antpitta (Grallaria ridgelyi)*, which was named after him. In 1998 Dr. Ridgely founded the *Jocotoco Foundation (Fundación Jocotoco)* that has created and sustained six habitat reserves in Ecuador. Dr. Ridgely serves on many conservation boards and is currently International Vice President of the American Bird Conservancy.



View of Dan Green Slough, Clay County, from the northwest.



Dewey's Pasture, Clay County, near Mud Lake.



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## REGISTRATION, MEALS AND HOUSING:

Please register online at <http://www.iowabirds.org/main/home.asp> if you have web access even if you plan to pay by check. **This simplifies bookkeeping for the conference.** Otherwise, use the form below, and mail by U.S. Postal.

**HOUSING AT LAKESIDE LAB:** Following is a summary of the motel and cottage units at the Lakeside Lab and rates. The rates quoted do not include bedding and towels. Please provide personal bedding and linens.

**MOTEL UNITS:** \$46.00/person for single occupancy or \$29.00/person for multiple occupancy.

There are **22 motel units** - heated and air-conditioned; full bath. There are 13 with 2 double beds, 6 with 1 double and 1 single bed, 2 with 1 double bed, 1 with 2 single beds. This is a total of 42 beds in motel units. Rates per night if providing own bedding and towels:

**COTTAGE UNITS:** \$16.00/person for occupancy.

There are **4 stone cottages** - each has 3 single beds. Cottages have no heat or air-conditioning. The cottages do not have baths - there is a common bathhouse for occupants of these units.

There are **6 wood-sided cottages**. There are 2 with 1 double bed, 4 with 1 double and 1 single bed. There is no heat or air-conditioning, and there are no baths.

### Registration Form (print and mail)

Name(s) \_\_\_\_\_  
 Address \_\_\_\_\_  
 City, State, Zip \_\_\_\_\_  
 Telephone \_\_\_\_\_  
 E-mail \_\_\_\_\_

				No. Of Persons		Total Cost
<b>Registration</b>	\$12.00	X	_____		=	_____
<b>Meals</b>						
<i>Sat Breakfast</i>	\$ 5.50	X	_____		=	_____
<i>Sat Lunch</i>	\$ 6.50	X	_____		=	_____
<i>Sat Banquet</i>	\$ 9.50	X	_____		=	_____
<i>Sun Breakfast</i>	\$ 5.50	X	_____		=	_____
<i>Sun Lunch</i>	\$ 6.50	X	_____		=	_____
<b>Lodging</b>						
<i>Friday LL Motel</i>	\$ 46.00	X	_____	1	=	_____
or <i>Friday LL Motel</i>	\$ 29.00	X	_____		=	_____
<i>Friday LL Cottage</i>	\$ 16.00	X	_____		=	_____
<i>Saturday LL Motel</i>	\$ 46.00	X	_____	1	=	_____
or <i>Saturday LL Motel</i>	\$ 29.00	X	_____		=	_____
<i>Saturday LL Cottage</i>	\$ 16.00	X	_____		=	_____

**Total Enclosed:** \_\_\_\_\_

Please make checks payable to Sharon Stilwell.  
 Mail to: Sharon Stilwell, 218 So. 33rd Street, West Des Moines, IA 50265.



I am excited to have the IOU fall meeting back in the prairie lakes region of northwest Iowa. Members attending the meeting will have several good field trip options exploring the lakes, sloughs and associated habitats of the area. Lakeside Laboratory campus is a wonderful venue with a rich history as the premiere biological research station in the state. The Black-headed Gull has been seen in the traditional fall location at the north end of Spirit Lake already this summer, and the cadre of dedicated birders attending are sure to uncover other rarities and fall migration spectacles. I hope to see many of you in September!

-Lee Schoenewe



### AREA LODGING:

The following are all within a few miles of the Lakeside Laboratory. The area hotel/motel tax is 10%.

#### **AMERICINN MOTEL**

(712) 332-9000  
1005 Brooks Park Dr  
Okoboji, IA 51355  
[www.discoverokoboji.com](http://www.discoverokoboji.com)  
Two Persons-Two Queen Beds - \$79.00  
Two Persons-One King Bed - \$69.00

#### **NORTHLAND INN**

(712) 336-1450  
Junction of Hwys 9 & 86  
Spirit Lake, IA 51360  
Single Queen Bed - \$37.00  
Two Queen Beds - \$47.00

#### **RAMADA LIMITED-SPIRIT LAKE/OKOBOJI**

(712) 336-3984  
2704 17th St  
Spirit Lake, IA 51360  
[www.ramada.com](http://www.ramada.com)  
Two Person-Queen Bed - \$99.00 (ask for Kim)

#### **OKOBOJI AVENUE INN**

(712) 338-4701  
1511 Okoboji Ave  
Milford, IA 51351  
[www.okobojiinn.com/](http://www.okobojiinn.com/)  
Single-Queen Bed - \$49.00  
Two Person-Queen Bed - \$59.00  
Two Person-King Bed - \$69.00

#### **SUPER 8 MOTEL**

(712) 336-4901  
2203 Circle Dr W  
Spirit Lake, IA 51360  
[www.super8.com](http://www.super8.com)  
One or Two Person-Two Double Beds - \$55.00  
One or Two Person-One King Bed - \$60.00

### CAMPING:

#### **GULL POINT STATE PARK:**

1500 Harpen Street (off of IA Hwy 86)  
Milford, IA 51351  
712/337-3211  
E-mail address: [Gull\\_Point@dnr.state.ia.us](mailto:Gull_Point@dnr.state.ia.us)



The Gull Point campground is one of the most popular in the lakes area. The campground is well shaded and features paved roads, playground equipment, modern restroom and shower facilities, as well as a sanitary dump station. There are a total of 112 campsites, 60 with electrical hookups. Camping permits are obtained through self-registration at the campground. Camping fees can be paid at the site. Modern Area: \$13 per night/electric site or \$8 per night/non-electric site. Non-modern Areas: \$11 per night/electric site or \$6 per night/non-electric site



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# IOU Birders Online and on the Air Waves

*Gerald White*

A poll was conducted on *IA-Birds*, the IOU hosted list serve to determine if the IOU should designate a Family Radio Service/General Mobile Radio Service (FRS/GMRS) channel for the purpose of communicating in the field. The responses were in favor of having a designated channel for birders to monitor. I should mention that the poll did not have a large representative response from birders, probably because many birders are not using radios at this time.

Personal FRS/GMRS radios could be an asset to Iowa birders while in the field. ABA birders have used a common channel for several years, but I suggested in a recent *Wing-ing-It* article that the ABA birders should abandoned the FRS 11/22 recommendation and switch to FRS/GMRS channel #5, using channel #6 in the event of channel congestion. The rationale is to take advantage of the power available with GMRS.

When the ABA made their recommendation a few years back, 14 FRS channels were all that was available to the public for personal use. Since that time the FCC has established additional channels for GMRS. One advantage of GMRS over FRS is the additional power that is available to the GMRS units. The additional power will contribute to more distant communication. Up to 5 watts of power is allowed for GMRS, which is ten times the limit of 1/2 watt for the FRS units

Channels 1 through 7 are shared by FRS and GMRS; since both units would be on the same frequency they can talk to each other on those channels. Selecting a channel between 1 and 7 would not restrict the radio type or power. You may ask why not use a sub channel for more privacy? The bottom line is that the radio manufacturers have not agreed on a standard for the tones or a numbering scheme, so different brands

or models of the same brand may not receive the signal when using a sub channel.

Not every birder carries a cell phone; nor will everyone carry a radio. However, radios have been used on IOU outings in the past and have been very successful. We just need to have an established channel so those that wish to use the radios can find each other. The IOU will have a business meeting this fall and I am going to present a proposal which would suggest the IOU use the #5 and #6 channels.

If you are considering a radio purchase, please be aware that there are regulations regarding radio use.



## UNSCRAMBLE THE IOWA ORNITHOLOGISTS' NAMES!

*Maybe win big prizes!*

1. Dr. Tartar Lutchie
2. Sharen Crumbee

*Send your guesses to the IOU News:  
email: [phertzel@rconnect.com](mailto:phertzel@rconnect.com)  
postal: 1432 E State St., Mason City, IA, 50401*



## Fall Field Reports - Paul Hertzell

The fall reporting season consists of the four months of August, September, October and November. More so than in any other period, birders must share the fields and streams with hunters. Some birders simply stay at home during the most popular seasons, preferring not to put themselves at risk. Others restrict themselves to non-hunted lands, while some dress in bright orange and go off to their favorite locations in spite of the hunting activity. To help you plan for your fall birding, here are the schedules for some of the key seasons:

**Snipe & Rails:** Sep 3 into Nov.

**Most upland gamebirds:** Begins in Oct, through Jan.

**Ducks north:** Sep 17-21, Oct 15-Dec 8.

**Ducks south:** Sep 24-28, Oct 22-Dec 15.

**Ducks (youth):** Oct 8, 9.

**Deer (youth):** Sep 17-Oct 2.

**Deer (antlerless):** Nov 25-27

**Deer (shotgun):** Dec 3-7, 10-18.

Ornithologically speaking, the fall season ends November 30. If you are able to squeeze in any fall birding, be sure to record your significant sightings with the IOU. The best



The Black-headed Gull has become a fall fixture at Spirit Lake.

way to do this is through the website [Iowa Birds & Birding: http://www.iowabirds.org](http://www.iowabirds.org). If you don't yet have a user profile, visit the site today and create one- it's easy to do! Reports may also be sent as e-mails to [phertzell@rconnect.com](mailto:phertzell@rconnect.com), or through the postal system.

## 4th Annual Rivers & Bluffs Fall Birding Festival - Nov 11-13

This is peak time for close-up views of 15-20 thousand elegant Tundra Swans and several hundred thousand colorful ducks and geese. Also see numerous Bald Eagles, hawks and other interesting species. In '04 we saw 5 Golden Eagles, and 91 total species.

### HIGHLIGHTS

**Half-Day Field Trips** on Sat. and Sun. led by naturalists - explore IA, MN and WI

**Heated River Boat Excursion** trips with Captain Jack for closest views (extra charge)

**Live-Great Horned Owl Program**, talks by other top naturalists from Tri-State Area

**Excellent vendors** - including Eagle Optics, and various artists

**Door-Prizes, Gift Certificates** and both Silent and Live Auctions to aid Conservation

**Live Music Saturday Night** - Joe & Vicki Price (Iowa Blues Hall of Fame performer)

**Made-from-scratch Sourdough Pancake Breakfast** - UM Sunday School (7am to 1pm)

Enjoy the Best Local Restaurants and Pubs

**Festival Headquarters:** KEE High School, 569 Center Street, Lansing, IA.

**Registration:** On-site, beginning 5 PM Friday, Nov. 11. \$10 Adults; \$2 age 7-17; age 6 or less Free! Additional details available in mid-September from [Ric.Zarwell@mchsi.com](mailto:Ric.Zarwell@mchsi.com).

## 2005 Midwest Birding Symposium

Davenport and Bettendorf, Iowa • Rock Island and Moline/East Moline, Illinois

A black and white photograph of a bird, possibly a grebe, standing in a grassy field with a river or lake in the background. The scene is misty or overcast.

October 13 - 16

Spread Your Wings on the Mississippi

[www.visitquadcities.com/midwestbirding](http://www.visitquadcities.com/midwestbirding)  
(563) 322-3911 ext. 108

Mississippi River trips • Guided field trips • Exhibits, family programs, silent auction  
Sessions on raptors & river ecology with nationally-recognized speakers

IOWA  
life changing

U.S. Fish and Wildlife Service  
Great Lakes - Big Rivers, Region 3

ILLINOIS



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# What Kinds of Graphics Files do IOU Publications Prefer?

## And Why Are There Different Kinds?

Paul Hertzell

It has been a traditional purpose of the IOU to provide a continuous, permanent record of Iowa's birdlife and the people who study it. For years, documentation of this history has been preserved on film and on slides, with many images reproduced in the paper journal, *Iowa Bird Life*.

With digital cameras rapidly replacing film cameras as the preferred tool for capturing photographic images, electronic files have become the standard medium for storing and sharing photographic information. IOU members are taking fewer slides and photographs and have begun accumulating *tifs* and *jpegs*, sequences of numbers brought to life with the help of an electrical impulse. For those new to the strange and wonderful world of 24-bit, baseline lossy compression, we offer below some suggestions and requests from those currently charged with reading, storing, and displaying in IOU publications these images, and some further information that we hope is helpful.

### Iowa Bird Life

Images submitted to *Iowa Bird Life* are candidates for publication in print, so high resolution and high dpi are best.

Electronic images should be *tifs* or high resolution *jpegs* preferably of at least 300 dpi. These can be sent in e-mail attachments, on CD, or 3.5" diskettes.

### IOU Records Committee

Images sent to the IOU Records Committee on CD may be of any format, but will be reproduced as 72-dpi *jpeg* files so that they are suitable for internet viewing by committee members. Electronic images are best sent as unaltered *tifs* or high-resolution *jpegs* with minimal file adjustments prior to compression, and preferably less than 1 megabyte in size.

### IOU News

Images sent to the *IOU News* may be of any standard format, but most will be resized and rewritten as *tifs* before printing. If electronic files are sent over the internet, every effort should be taken to keep the file size under about 350K.

### Iowa Birds & Birding Website

Electronic files should be medium or highly compressed *jpegs* producing files in a range of 25K-100K. Flat color or grayscale graphics may be *gifs* under about 100K.

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### Some Information on Camera Output.

All digital cameras create an image by allowing light to strike a photo-sensitive surface, and then writing an electronic file that describes the event. If you have ever looked at the encoded data, you will have seen something like the following, which I snipped out of an uncompressed image file, "... ÆnÖÜÛ+g++ââNÛæçMâèèiCêí+...", and which likely means "... now for the next two pixels, mix five parts pure blue with two parts red and a tiny bit of green ...". The symbols are brought to life as discrete points of light (pixels) on a digital display monitor, so long as there is a piece of computer software that can read the code properly. It's all very ingenious, but also very technologically specific. My mother (and many people) can look at the funny shapes on a piece of sheet music, and then hear the melody in her head, but I don't know anyone who can read the code for an image file and then visualize the image.

Two fundamental problems with writing a digital description of a continuous tone photographic image are (1) finding a way to be faithful to the incredible diversity of colors and intensities present in the real world, and (2) keeping manageable the amount of written information needed to do a good job. Two file types, each with different advantages, have emerged as today's standards in addressing these problems—*tifs* and *jpegs*. Both types are capable of describing images in millions of distinct colors (though this level of diversity is not always utilized), but the two are quite different in their abilities to keep file size small.

In the early days of personal digital display monitors, 8-bit color was common. An 8-bit color image sends information to a monitor's pixels from a color table of 256 different colors ( $2^8 = 256$ ). Indeed, the early world wide web browsers had a default color capacity of only 216 shades, a particular set which became known as "web colors". These low numbers are not sufficient to simulate well the richness of a continuous tone photographic image.

To access more of the rainbow, and to do so while ranging from the darkest dark to the lightest light, standard *tifs* and *jpegs* (and other file types) are capable of storing 256 intensities of red light, another 256 intensities of green, and another 256 intensities of blue, for each pixel. That's  $2^8 \times 2^8 \times 2^8 = 2^{24}$  distinct blends of color, or about 16 million different colors. Thus, *tifs* and *jpegs* are described as 24-bit color images, and have the ability to reproduce an image from the real world so well, the most critical human eyes can have trouble telling the difference. You may read in a discussion of your digital camera that it outputs "8-bit jpeg files", but this is not precise. The camera builds a digital file that contains 8-bit information per color channel, but there are 3 color channels, red, green and blue, so the information encoded per pixel is 24-bit.

So, imagine a small image that is 100 pixels by 100 pixels. That's 10,000 total pixels, each of which needs someone to tell it what color it should be. If the image was built from a *tif* file, then the file has stored a unique piece of red infor-



mation, a unique piece of green information, and a unique piece of blue information for each pixel, which is 30,000 (30K) pieces of information. Throw in a couple thousand other pieces of information to describe the type of file, its dimensions and other parameters, and you have all that's needed to hold the essence of the image. Indeed, if you take any approximately square photographic image on your computer right now, and reduce it to 100 X 100 pixels, then resave it as a *tif* image, the result almost certainly will be a file of approximately 34K. That's what *tif* files do- they hold all the information, sequentially, pixel by pixel.

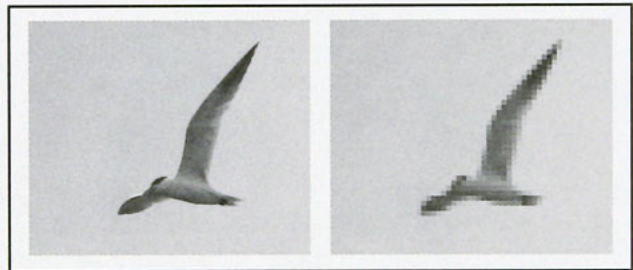
By today's standards, a 34K file is a small file, easily stored, and easily sent over the internet. But 100 pixels by 100 pixels is also a visually small image. Any digital camera worth owning is capable of creating images much, much larger. The maximum setting on my camera is 2592 X 1944 pixels, which, when expanded, is an image consisting of over 5 million pixels, and would require a monitor 3-feet wide to display at 72 pixels/inch. And in order for it to reflect 24-bit color, then somehow its code must store over 15,000,000 pieces of information (15,000K). A friend recently tried to send to me over the internet a file half that size. It not only froze my computer, but it prompted a warning message from my system administrator.

The *tif* file format has no trouble managing and encoding this much information, and can handle even larger images and more colors. But such files are too large to put at a website, or send over the internet, or store in a limited-memory environment. The data for one such image would completely fill the memory card that came with my camera. Still, many photographers want the camera to output image information in a raw, unprocessed form, so they can build an accurate *tif* file out of it using a program like Adobe Photoshop. To do this, they need a memory card with a very large capacity, and the camera must be capable of giving up its *raw* file, which not all digital cameras can do.

On the other hand, just about every digital camera has the capability of writing its output in *jpeg* format, a file type of flexible size that uses 24-bit color. These are highly processed files, many steps removed from the simple recording of the data resulting from light striking the camera's internal photo surface. Unlike *tifs*, they do not hold the color information sequentially, pixel by pixel. Instead, the majority of the color data is approximated, locally, in exchange for a simpler, more coherent piece of mathematics capable of describing it. The size of the image file created is fully adjustable, but continued reduction comes at increasing cost- the color data initially detected by the camera is replaced by worse and worse approximations. These approximations are referred to as "compression levels". A low compression level means little compression and therefore excellent approximation, a high quality image, and a large file size. High compression means poor approximation, a low quality image, and a small file size.

When IOU editors ask for "high resolution *jpeg*s", they

are asking for low compression, high quality images. A little compression is not a bad thing, because the *jpeg* process is very effective at selecting for removal unnecessary complexities in a file, particularly at the high quality, low compression end. Even a slight amount of compression can reduce the file size dramatically, with little or no visual effect in the quality of the image. Our 15-megabyte *tif* can be reduced to a 1.5-megabyte *jpeg* still with excellent clarity. And with just a little more compression, the file can be brought into suitable range for internet transfer.



The *jpeg* compression process begins by devaluing individual pixel color information in favor of qualities like brightness and saturation. Then the image is dissected into tiny 8x8 pixel cells, and a mathematical algorithm is applied to each cell. The visual result of the algorithm is that the information in a cell appears "smeared" with respect to an average value for the cell. File space is saved because it is simpler to store the color values if they are related to each other- which they are, by virtue of having been smeared. The more the cell blurs, the less space its description takes. At highest compression, all pixels in a cell could take on a single value, and the image would appear very coarse, as depicted above. This process is known mathematically as a wavelet, and its most extraordinary value is at the low compression end where it is able to reduce an image's file size dramatically, perhaps 10-fold, with very little perceptible loss in the clarity of the image.

### Some Additional Thoughts.

Not all software programs write the result of the *jpeg* compression process in the same way. There are multiple ways to encode the approximations, and there are different opinions on how much control to give the user. For example, some programs appear to offer the user 100 compression levels, while others think 10 levels are enough. The program used by my digital camera simply asks if I prefer "superfine", "fine", or "normal". Some programs can give the user the ability to provide certain special effects in the displaying of the image. Probably time spent experimenting with all of this is time well spent. If, in experimenting with different compression levels, you have created files that others have trouble reading, check to see if you are inadvertently creating "progressive" *jpeg* files, instead of "baseline" *jpeg* files. Not all software can read progressive files.

If you have reason to send an image file across the internet to a friend, it is not a good idea to embed it in another file, like a Microsoft Word file. Just send the image file directly as an attachment. Embedding the file usually will result in the file being rewritten by the host program, drastically altering its carefully created file features, sometimes bloating the file with an enormous amount of unnecessary data.



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