

NOTES ON MOLT AND PLUMAGES OF YELLOW RAIL (*COTURNICOPS NOVEBORACENSIS*)

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Underparts from richly rufescent to dull and pale, to variously spotted



IN LOUISIANA

Yellow Rail plumage is quite variable



“All molt occurs on the breeding grounds.”
Pyle 2008

Which plumage has the spots?



CONFUSION

Juvenal vs. Adult

Juvenal vs. Basic I vs. Definitive Basic

Anomalous plumage, morph, cryptic species?

“No specimens found showing first pre-basic molt in museum collections to date.”
Dickerman 1971.



- Forbush 1925. Adult
- Bent 1926. Adult (vs. First Winter plainer; *Juvenal not seen*)
- *Roberts 1932. Juvenile (vs. Adult; assumes two plumages)
- Walkinshaw 1939. Juvenile vs. Adult
- Ridgway & Friedmann 1941. Adult (Juvenal is plainer)
- *Dickerman 1971. BI spotted <LSUMZ example> juvenile as Roberts
- Oberholser 1974. Juvenal (BI like adult)
- *Stalheim 1974, 1975. Juvenal (spots and bars on head, neck) vs. adults
- Ripley 1977. Juvenal/First Fall vs. Adult
- *Bookhout 1995. Basic I (Juvenal not adequately described)
- Taylor 1998. Basic I (3 plumages, based on review of all of the above)
- Sibley 2000. Juvenile (similar to Adult non-breeding)
- NGS 2006. Juvenile (=immature) vs. Adult
- Post 2008. *Wayne's notes (1903-1913) mention molt in winter birds*
- Pyle 2008. Juvenal (speckling face and flanks) vs Definitive or Basic I



<plus various interpretations by latter authors of earlier publications>

YELLOW RAIL PLUMAGES

"All molt occurs on the breeding grounds."
Pyle 2008

Bookhout (1995) Recommends collection of known age and sex to resolve plumage questions.

What is this plumage?



Generally accepted:

- Juvenal (Basic I)
- Basic I (Formative)
- Definitive Basic (Basic II)



rail location



Juvenile (immature)

Adult

METHODS

“Recent material”: known age and sex
collected or salvaged in Louisiana
over a 24 year period 1988-2012
Dates spanning: 9 October - 16 January

N = 50:

8 ad. males		28 males
20 im. males		

6 ad. females		22 females
16 im. females		

48 study skins
+2 skeletal preps with spread wing

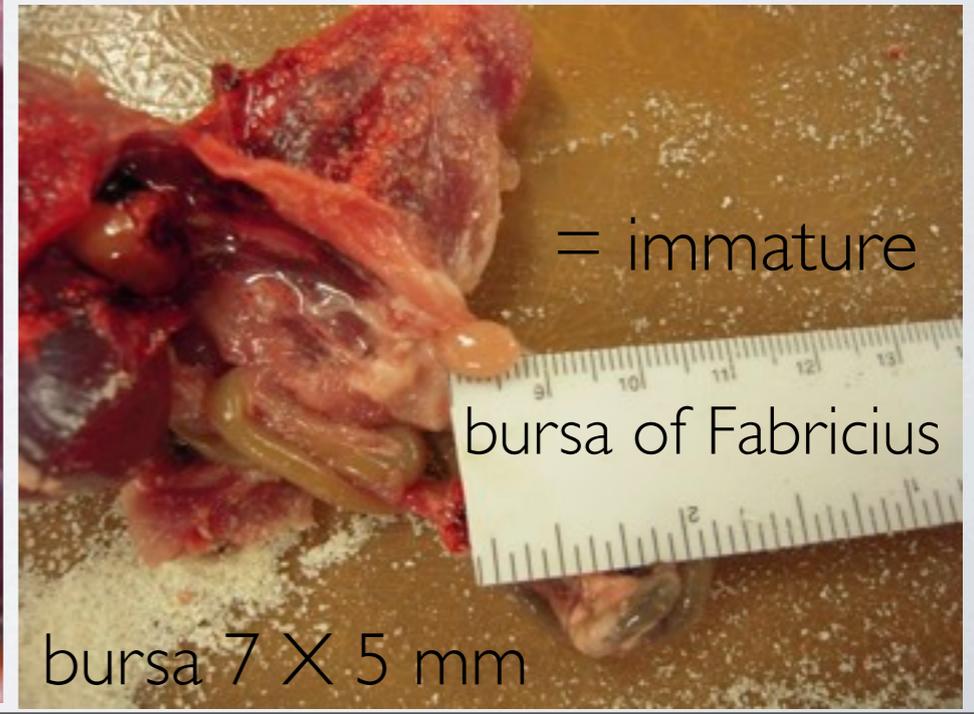
1 im. unknown sex/probable male (skin)
2 im. unknown sex/probable female (skin + skel)



Bookhout (1995) Recommends collection of known age and sex to resolve plumage questions.

AGE & SEX & BODY MOLT

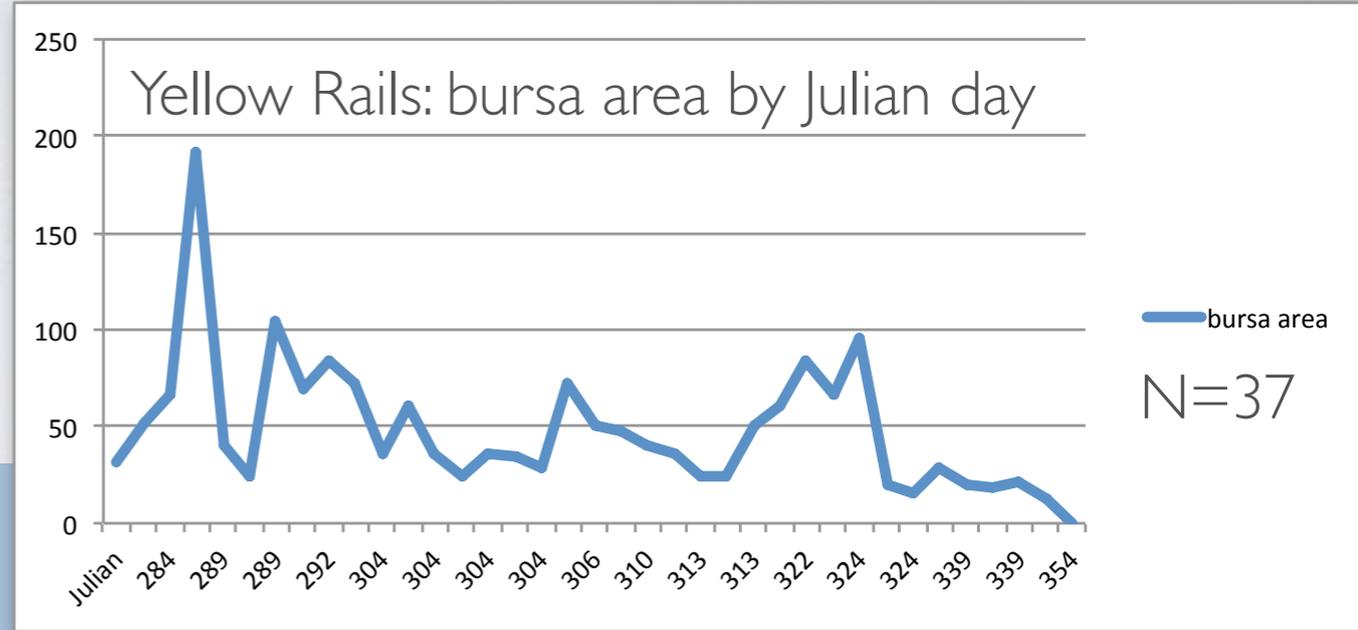
- presence and size of bursa
- gonads and size
- condition of oviduct (straight or convoluted)
- molt evaluated: skin-inside
- assess fat level and skull ossification
- tissue sample archived
- and stomach contents saved



IMMATURES IDENTIFIED BY:

Presence of bursa (both sexes)
(C below)

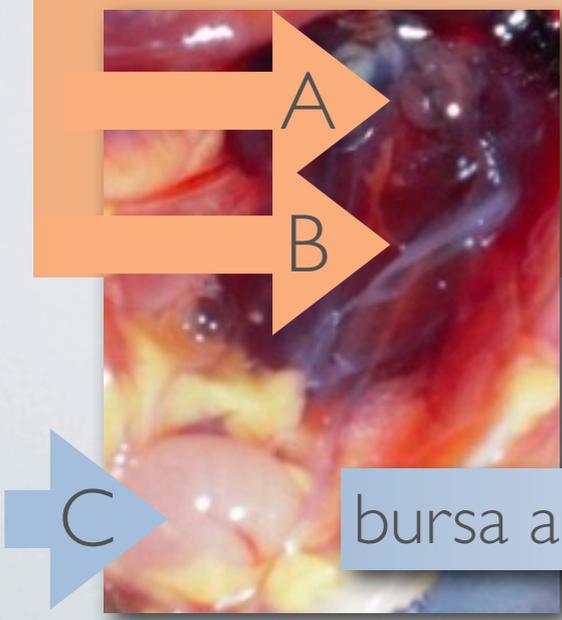
$$\text{bursa area} = L \times W$$



assumes absorption during first year of age

Females with smooth ovary (A) and/or straight oviduct (B)

assumes oviduct is convoluted after breeding (SY)



bursa area = length X width

ASSESS BODY MOLT

- none
- trace
- light
- moderate
- heavy

Sheathed feathers
skin-inside on a
wintering individual
(16 Oct) and
sheathed feathers
(exposed) on a
specimen (14 Mar)



same individual above and below



All molt *does not* occur on the breeding grounds

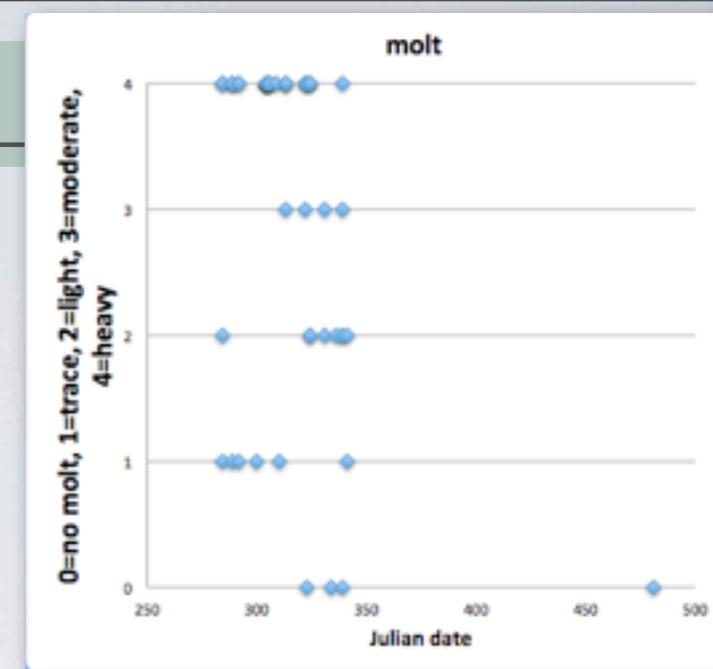
Louisiana specimens of known age/sex (mid-October-mid January):

90% im. males have body molt (N=19 with bursa)

88% im. females have body molt (N=16 with bursa/straight oviduct)

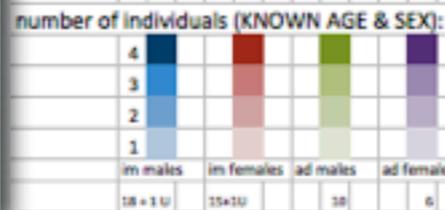
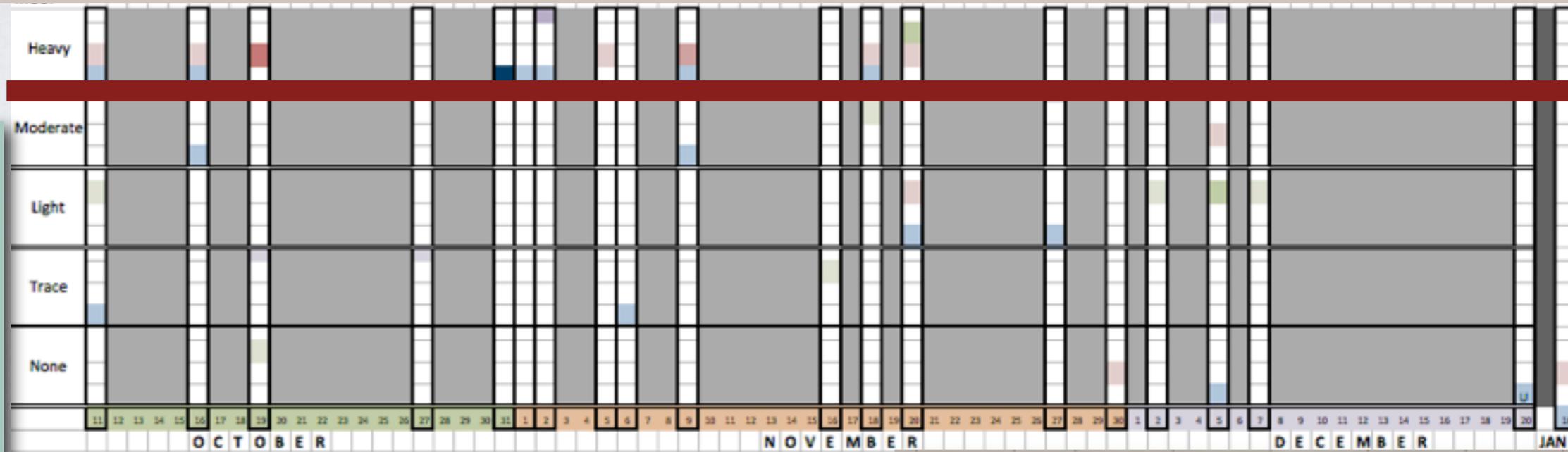
90% ad. males have body molt (N=8, no bursa)

100% ad. females have body molt (N=6, no bursa, convoluted oviduct)

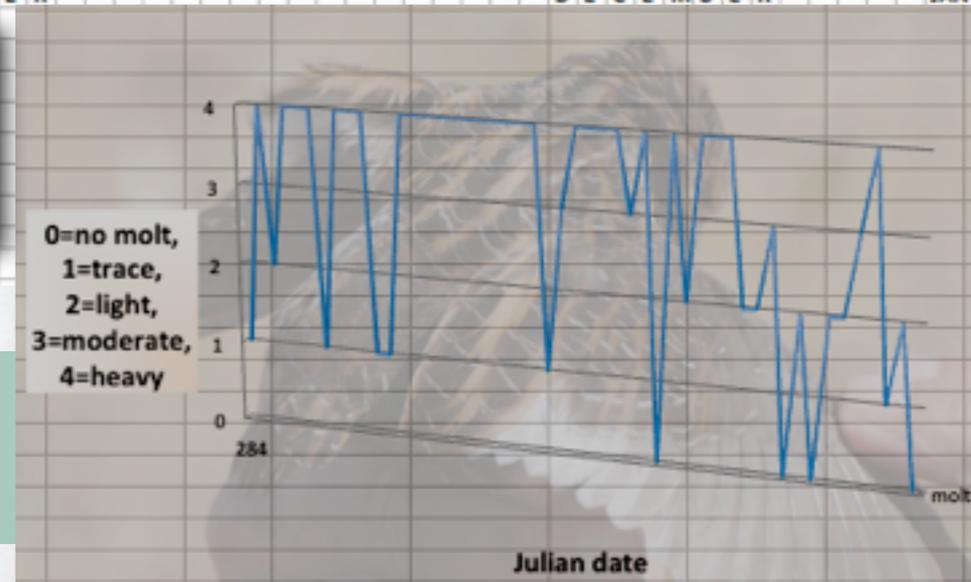


Heavy body molt observed mid-October to late November

immatures (3) with sheathed rectrices on 16, 31 Oct. and 9 Nov - some/all? rectrices may also be replaced on the wintering grounds



Oct-Nov specimens:
35 of 36 with molt



Predict: molt initiated/is heaviest shortly after arrival on the wintering grounds and likely completed within one month

Body molt does occur on the wintering grounds.

Individuals can be transitioning from one plumage to the next...or worn or fresh...

Ims.

worn
molt
fresh

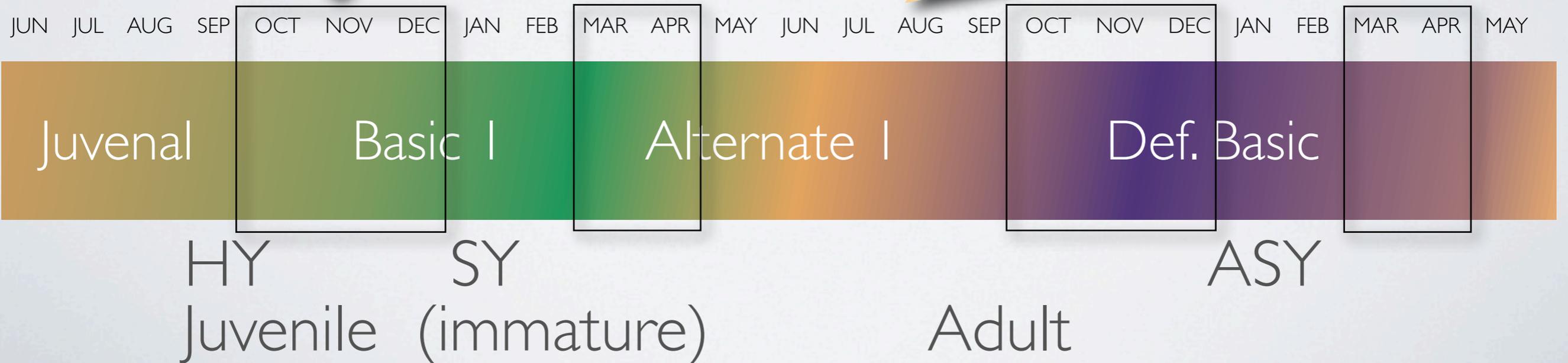
Humphrey Parkes terminology (Pyle 2008)

- **Juvenal** (Basic I)
- **Pre-Basic I** (Pre-Formative)
- **Basic I** (Formative)

Ads.

worn
molt
fresh

- **Definitive Alt.**
- **Definitive Pre-Basic**
- **Definitive Basic**



NO BURSA



Def Alt



Def Basic

Same timeframe

Fresh plumage with dark feather edges

ADULT MALES

N = 8 Range from worn to fresh - accounts for most range in coloration



NO BURSA & convoluted oviduct

ADULT FEMALES

Fresh plumage with dark feather edges



Def Alt



Same timeframe

Def Basic



N = 6 range from worn to fresh but wear accounts for only some color differences - fresh individuals range from buff to "rufescent"



Adult males (top)

vs.

Adult females (bottom)



Alternate

vs.

Basic

Sexes plumage

similar

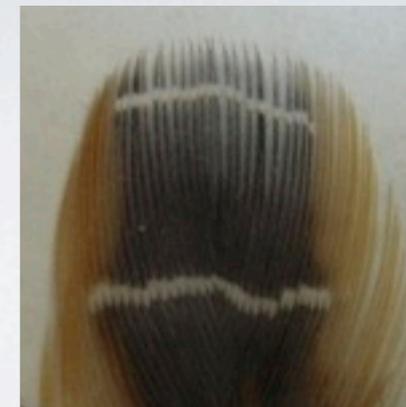
Arrival on wintering grounds:
Alternate is worn and pale,
 more striped on nape, and white
 bars on back thicker

Basic is fresh, richly colored,
 more heavily spotted and more
 thinly barred with white

Basic

vs.

Alternate



Males larger than females



BURSA present
smooth ovary/
straight oviduct

IMMATURE FEMALES

Basic I highly variable

Very
distinctive!



Dickerman's reference specimen is a BI



October November December



molting Juv



Huge range of individual variation of coloration in im. females in fresh B I /formative



all individuals show some white spotting on sides and *majority with prominent white spotting on sides of chest*



BURSA present N=18

IMMATURE MALES

Not as variable as im. females; more adult-like - one individual with spotting like im. female



underparts spotted or plain



Immature males



Basic I

Basic I

Basic I

vs. Juv.

Sexes generally dissimilar in BI

Arrival on wintering grounds:
Juvenal is worn and pale, from adults, more spotted on crown and nape

Immature females



Juv. vs.

Basic I

Basic I

Basic I

Basic I

Basic I is fresh, richly colored, with darker edges and (especially females) more heavily spotted or freckled

Males larger than females

SPOTTED PLUMAGE



im. male

Specimens confirm spotted
plumage is
B I /formative plumage
(not juvenal plumage)



im. male

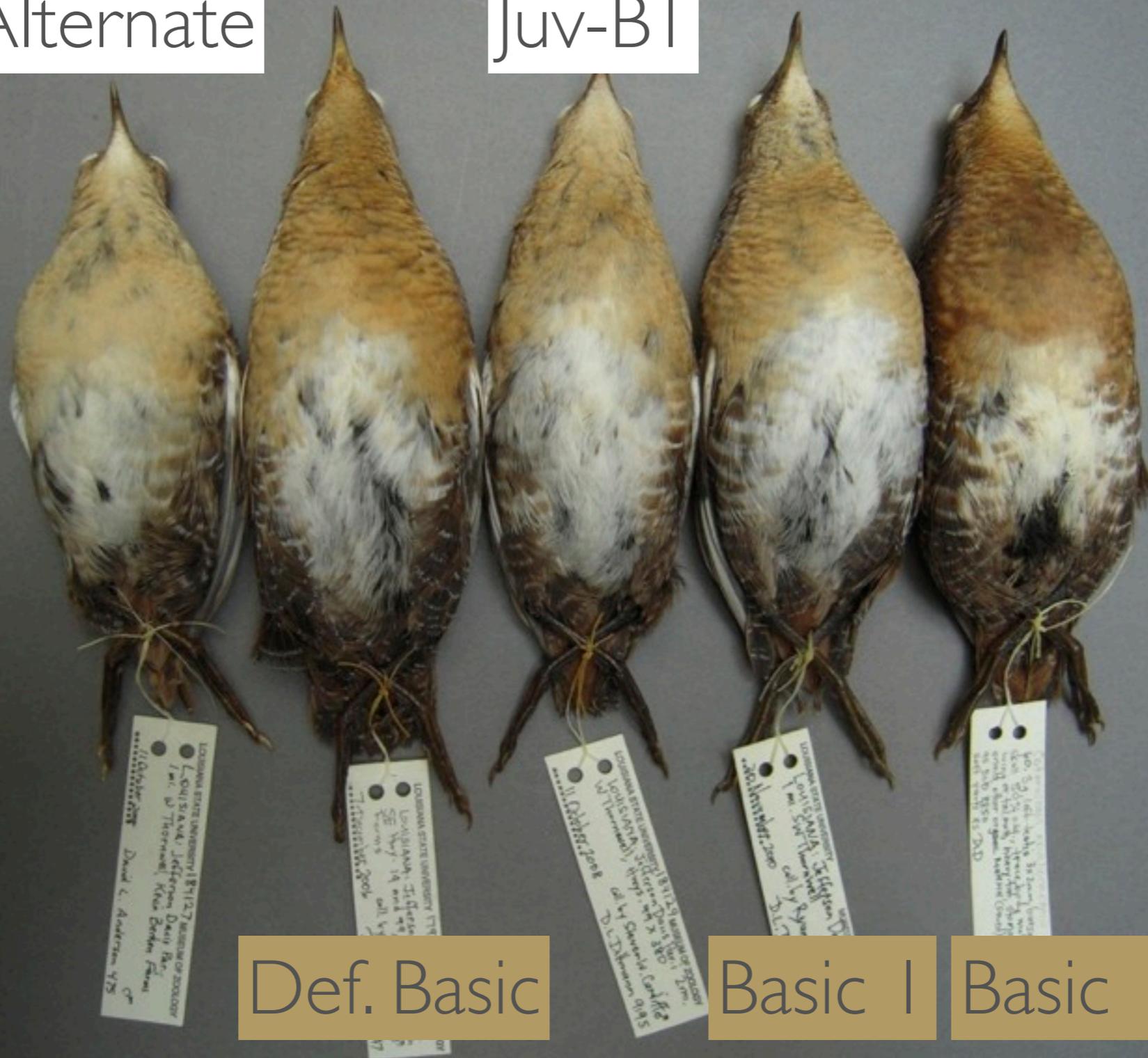
B I females



Males: Def. Basic (2 left) vs. B I (two at right)

Def. Alternate

Juv-B I



Def. Basic

Basic I

Basic I

Females: BI (3 left most) vs. Def. Basic (right most)

Juv-BI

Def. Alternate



Basic I

Basic I

Basic I

Def. Basic

Juvenal vs. alternate - breeding grounds
straightforward?

Juvenal vs. Basic I vs. Definitive Basic...

...on the wintering grounds -
challenging...



delicate & wispy
Juvenal

Basic I

feathers from side of chest

Stahlheim 1975



worn juvs similar to adults
basic I males similar to definitive basic

Useful plumage
characters
subtle or
absent!?

WHAT ABOUT COLOR MORPHS?

individual variation vs. geographic variation?

Ridgway & Friedmann (1941) describes morphs:

- pale
- rufescent



worn vs. fresh

Oberholser (1974) describes “phases:”

- light ochraceous
- dark ochraceous
- light grayish
- dark grayish



worn vs. fresh + age?



rufous vs. typical

RUFOUS MORPH

coloration of some individuals is exceptionally rufescent



Both fresh Basic I
Both males
Both recent specimens

LSUMNS collection: 2 males, plus 2 molting
appear to be attaining rufescent feathers

Sex-related, diet, Basic only?



Wayne 1910

Birds of South Carolina

“an individual with “melanism to some degree”

MELANISM?

James 1987

Proc. Arkansas Academy 41

“melanistic”

however later

published as “with unusually dark plumage”

Bookhout (1995) reports melanism in this species based on this publication.

James 1987 also notes that a Sep specimen from Ontario is similar

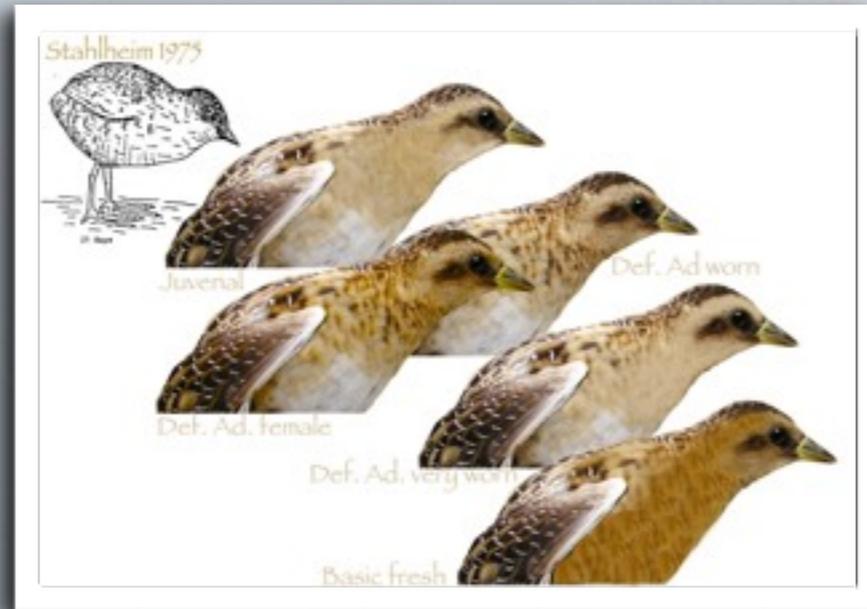


January 1963
AR: White Co.: Beebe
orig. cat. 784
University of Arkansas Museum
no. 85-78-2185
photos of specimen (left)
by Mary C. Suter



Compare to Louisiana
BI /formative specimens

YELLOW RAIL PLUMAGES

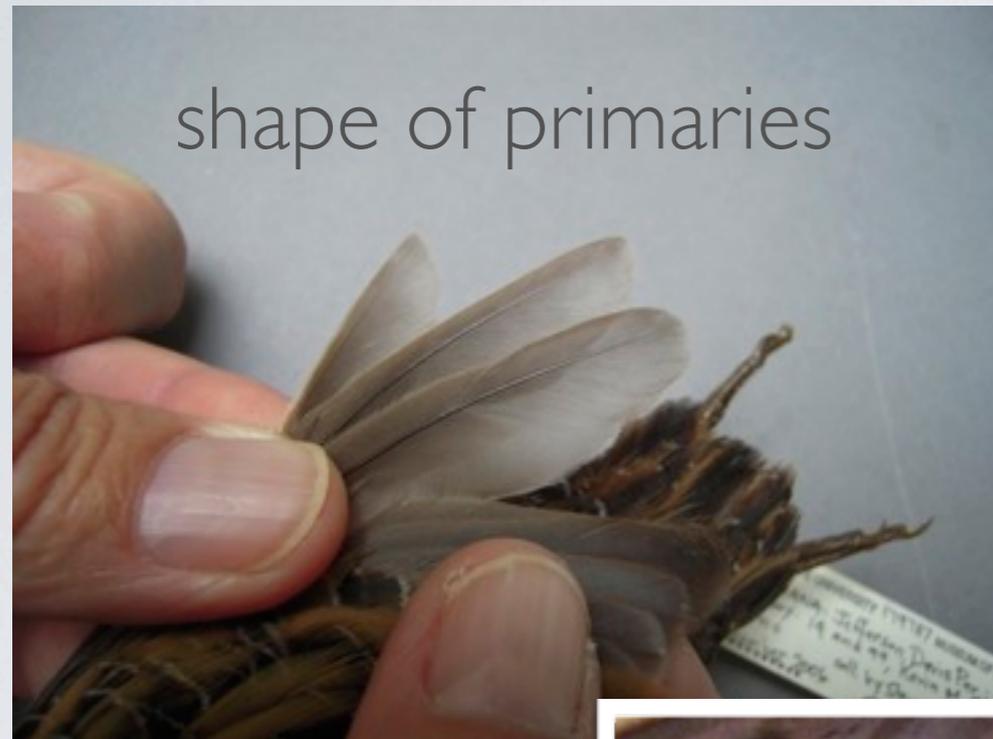


- Juvenal
- Basic I (Formative)
- Alternate I (extent? of body feather replacement; all on wintering grounds?)
- Definitive Basic
- Definitive Alternate (extent? of body feather replacement; all on wintering grounds?)

Can we identify plumage/age in the field/hand?

PYLE 2008

Plumage identification and aging characters:



pattern and shape
of rectrices



amount white
and shape of
medial
secondaries



pattern of primary coverts

Usefulness/
usefulness on
the wintering
grounds?



PRIMARIES AND P COVERTS



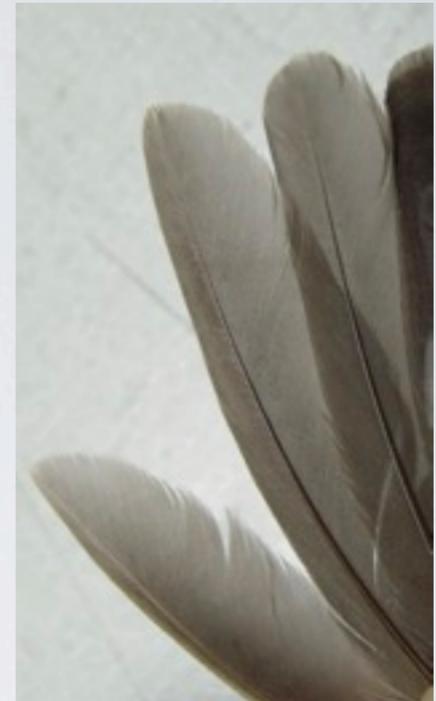
LSUMZ 179412 Ad. female



LSUMZ 101217 Im. female



LSUMZ 184187 Ad. male



DLD 10116 Im. male

P10 & P9 are more pointed than P8, which is rounded in comparison.
 Shape of P8-P10: no obvious difference between ads. and imms.

Primary covert pattern



“HY/SY
 without spots”

Im. males (18) 44% (one or more spots)
 Im. females (13) 69% with spots

Ad. males (10) 80% spotted
 Ad. females (6) 83% spotted

ims. can have spots & ads. can lack spots

PRIMARIES AND P COVERTS



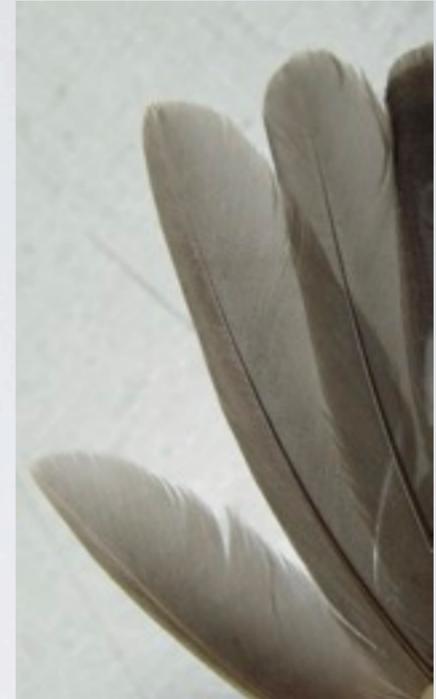
LSUMZ 179412 Ad. female



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vs.



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Ad. males (10) 80% spotted
 Ad. females (6) 83% spotted

ims. can have spots & ads. can lack spots

SHAPE OF S5 "FIFTH SECONDARY"

None with an attenuated tip as Pyle "A" pattern

DLD 10546 Im. male "C"



Results:

Im. males	(18)	44% C <none A>
Ad. males	(10)	50% B <two close to A>
Im. females	(17)	65% C <none A>
Ad. females	(6)	33% B

Secondaries, especially inners, become progressively pointed



Counting secondaries inward to "S5"; "S7" is last typical secondary under tertiaries; "S7" is highly variable in coloration



DLD 10546 im. male

COLORATION OF FIFTH SECONDARY



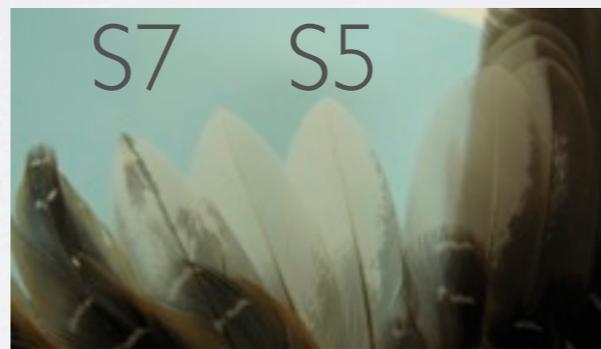
Depth of white patch



DLD 10546 Im. male "C"

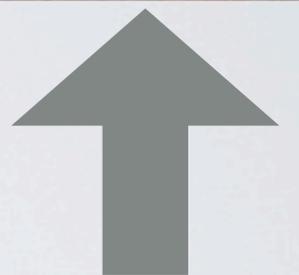
Results:

Im. males	(18)	55% C	11% A
Ad. males	(8)	17% A	75% B
Im. females	(17)	65% C	0% A
Ad. females	(6)	50% B	



LSUMZ 177275 Im. male "C"
Here - a close call whether a C or a B

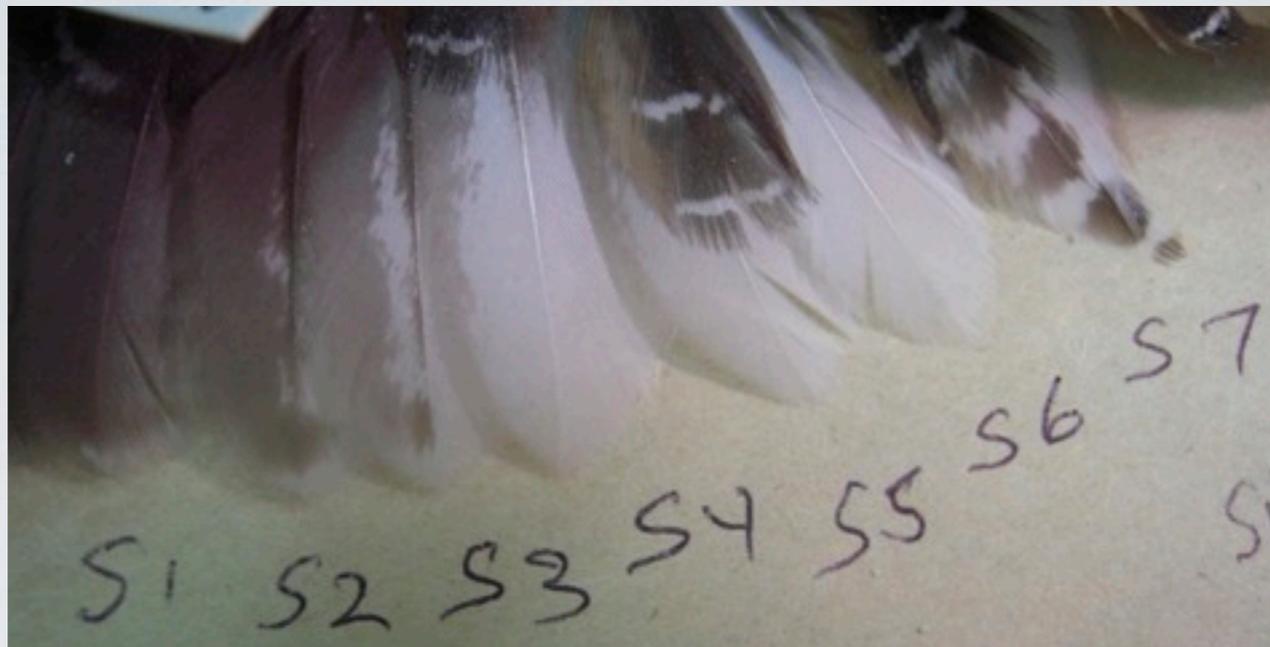
10 basic patterns but no consistent age-related differences; shape more pointed than "S5"



Depth of patch is covered by greater secondary coverts - if less extensive in immatures, than what about *width of secondary patch*: is extent of white more extensive on S1-3?

Width of white patch?

S1-3



DLD 10096 im. female: scored 022



S5 uninformative
S7 too variable

Score amount of white distal 1/2 on S1-3: each feather ranked 0-5
0 = all dark to 5 = all white

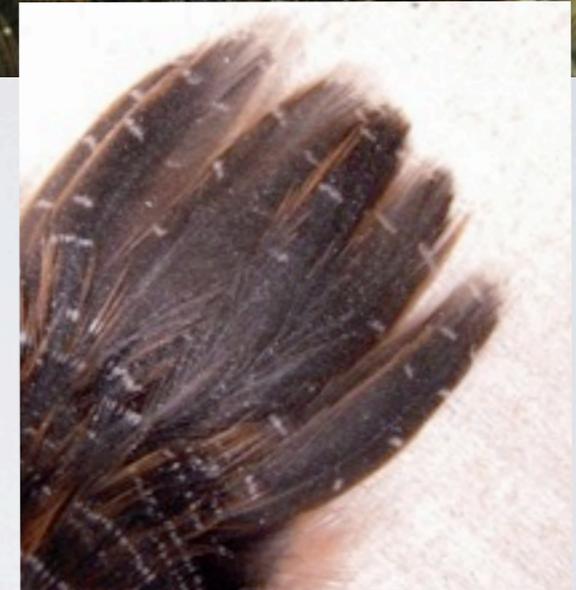


DLD 10546 im. male: scored as 122

Results	N	S1+S2+S3/N	S1+S2/N	S1/N
ad males	8	4.6	2.3	0.7
ad females	6	4.0	2.0	0.3
im males	18	4.9	2.6	0.9
im females	16	4.9	2.7	0.9

immatures have more white than adults

Pyle pattern may separate Juvenal Plumage from other plumages



Im male, DLD 10548

Im female, DLD 10547



Im male, DLD 10550 has active tail molt

Im female, DLD 10549

TAIL PATTERN

10 rectrices hidden by similarly-patterned upper tail coverts
NO specimens with A pattern - difference between B and C diagnosable in the field?

All rectrix molt does not occur on the breeding grounds.
N = 3/50 Louisiana specimens are molting rectrices

Usefulness on the
wintering grounds?

SOFT PART COLORATION



iris color: adults and imms. described as dark brown
<none red/reddish-brown.....seasonal?>

bill color: quite variable - probably not useful unless...
<predominately yellow or orange *may suggest a male*>



tarsi & feet color described as tan to grayish



MOLT LIMITS?

Retained Juvenal feathers or feathers of differing age/
wear of the same molt?



LSUMZ 171702, unsexed im. - presumed female



LSUMZ 181183, im male

Not obvious! on specimens - we
could only identify different
generation feathers were actually
molting



Further study needed to determine extent/
timing of basic body molts...whether feather
coloration/wear is useful to identify different
plumages and age individuals reliably.

plumage age character(s)...???

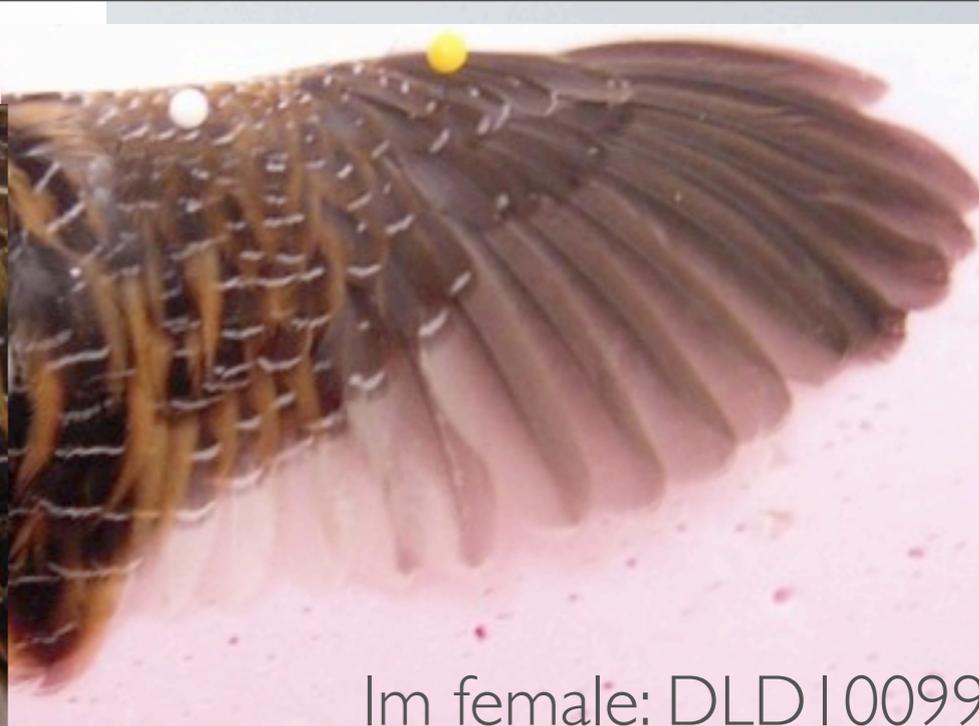
or
individual
variation?

...anyone
handling
Yellow
Rails

should
take
photos
and save
genetic
material:
blood &/
or feather
samples



Ad male: DLD10091



Im female: DLD10099



Im female: DLD10090



Im female: DLD10093



Ad male: DLD10092



Im male: DLD10100

EVIDENCE FOR PRE-ALTERNATE MOLT/ ALTERNATE PLUMAGE?



- N=2 of 2 spring specimens (March 1891 and April 1874) show extensive body molt/new fresh feathers.
- Our worn adults show a coarser pattern on neck; broader white bars on back that do not appear possible by wear of Basic plumage may be better explained by an intervening plumage.
- if body molt for SYs also occurs on wintering grounds then we should see birds return in worn spotted-type plumage - because we have not, suggests this plumage is replaced by a first alternate plumage.

MENSURAL

males appear larger than females

DATA

based on Louisiana specimens of known age and sex

Sex	weight (g)	stdv	culmen (mm)	stdv	bill width at gape (mm)	stdv	bill depth nares (mm)	stdv	bill depth gonys (mm)	stdv	wing chord (mm)	stdv	tarsus (mm)	stdv
All males	54.9	5.95	13.78	0.66	6.42	0.72	4.91	0.31	4.15	0.19	86.2	2.48	23.3	1.51
Ad males	59.1	4.73	13.73	0.69	6.44	0.72	5.08	0.31	4.24	0.14	85.5	2.52	23.36	1.47
Im males	54.18	6.69	13.81	0.66	6.41	0.69	4.84	0.29	4.10	0.19	81.9	2.47	23.3	1.73
All females	46.5	4.64	12.64	0.79	5.65	0.55	4.33	0.28	3.72	0.26	80.4	2.31	21.5	1.04
Ad females	44.1	5.56	12.23	0.89	5.82	0.61	4.45	0.03	3.68	0.23	79.3	2.21	21.5	1.17
Im females	47.4	3.82	12.8	0.71	5.58	0.53	4.28	0.28	3.83	0.31	80.8	2.28	21.5	1.02

All measurements have overlap between sexes but measurements can be useful.

circled - re-measured (error) and were below bar - but other "large" measurements were correct so there are some larger females

Weight:

males greater than 54 g

females less than 50g

(especially if only light to moderate fat)

Wing chord:

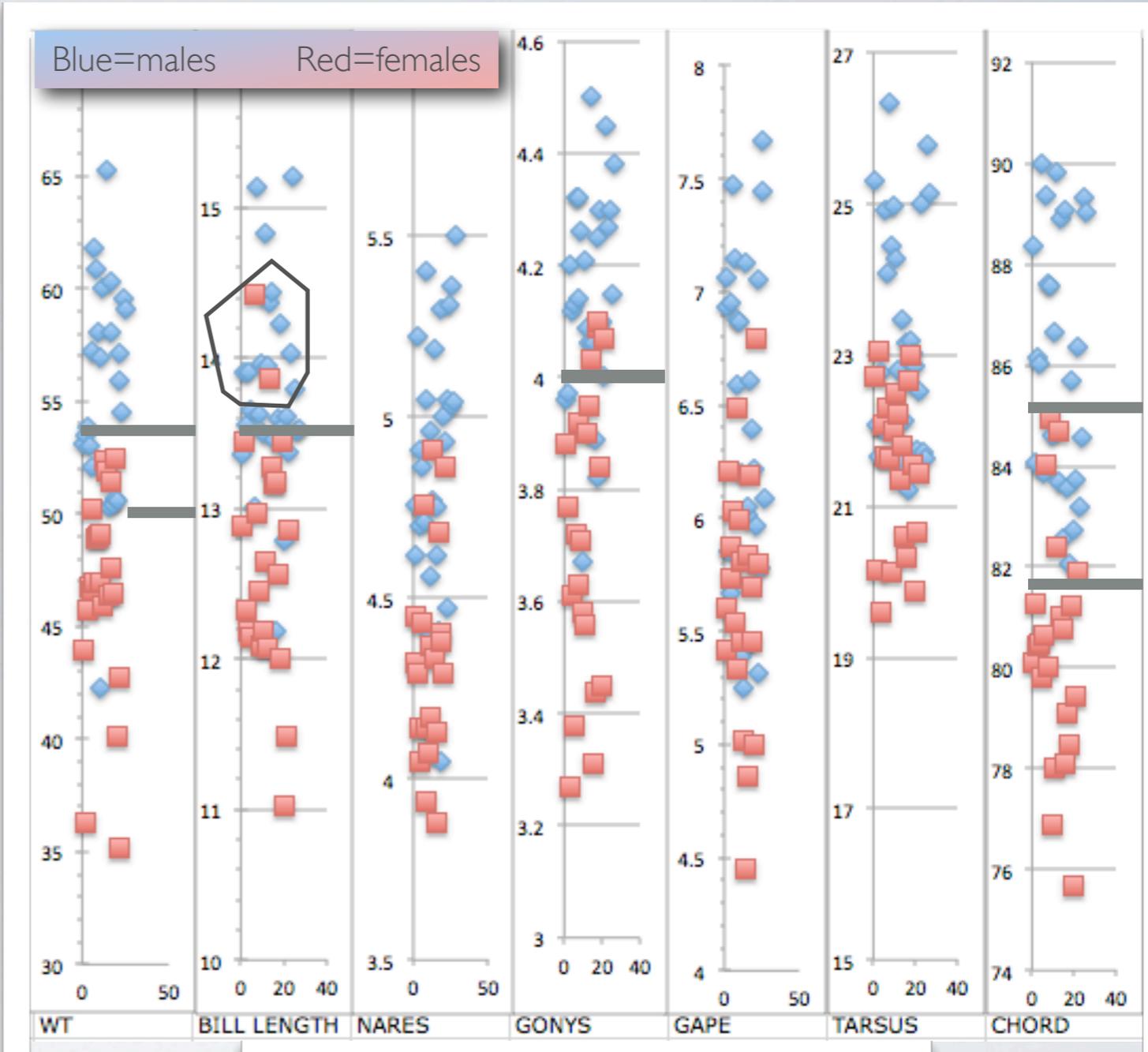
males greater than 85 mm

females lesser than 82 mm

Bill:

Length: males longer than 13.5mm

Gonys depth: males greater than 4 mm



All measurements have overlap between sexes but measurements can be useful.

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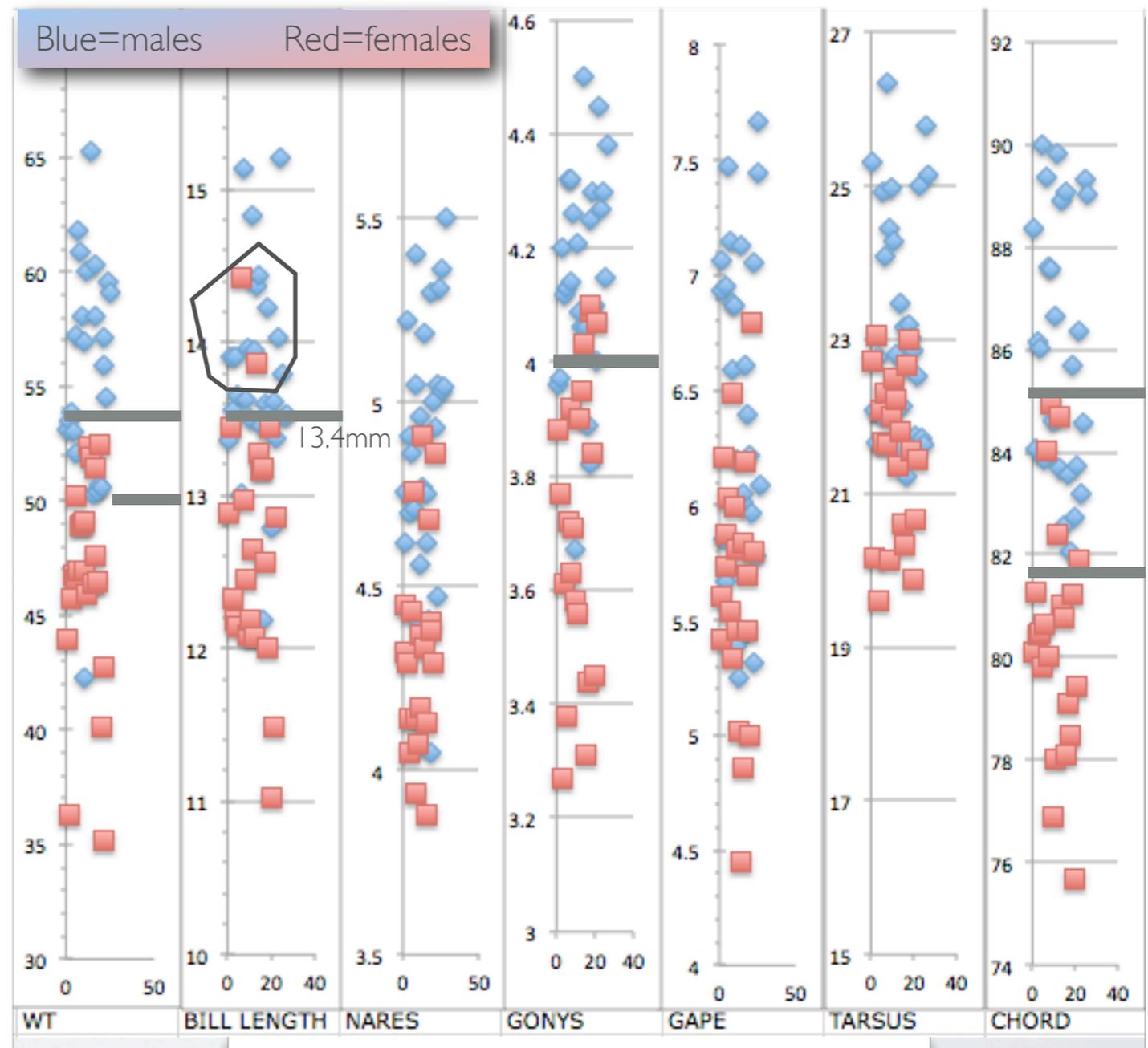
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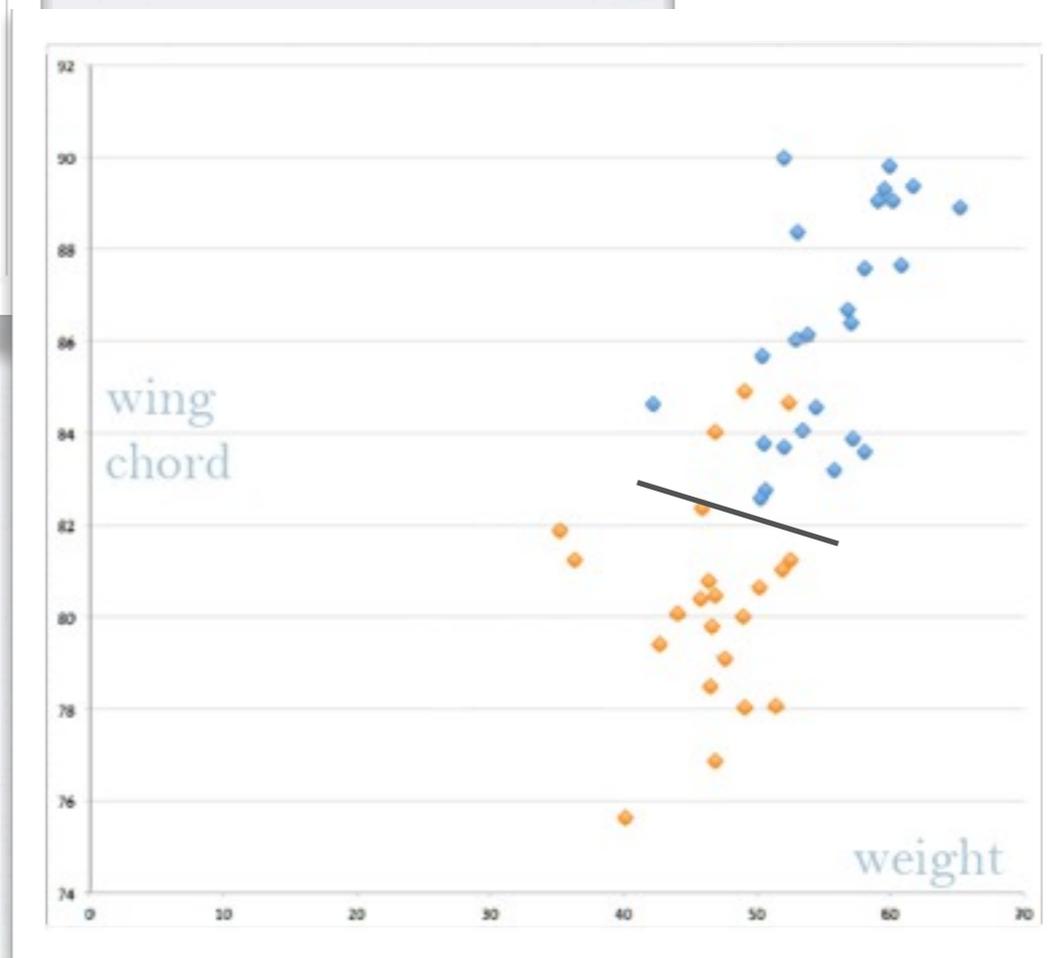
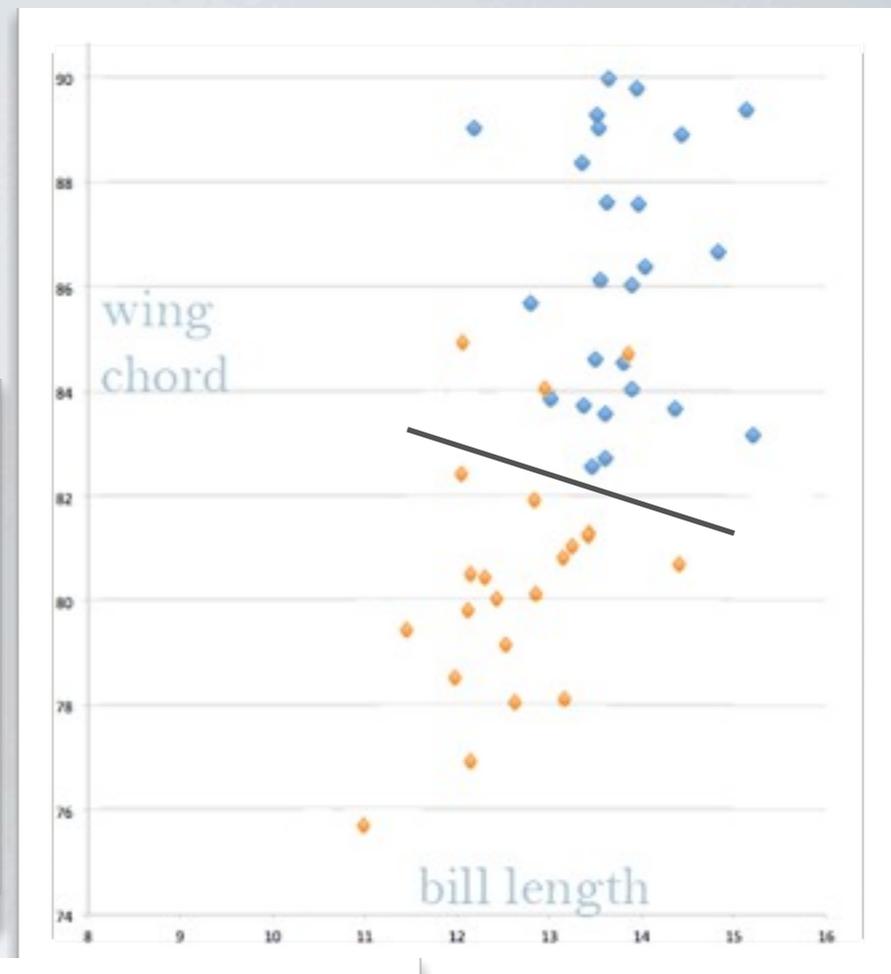
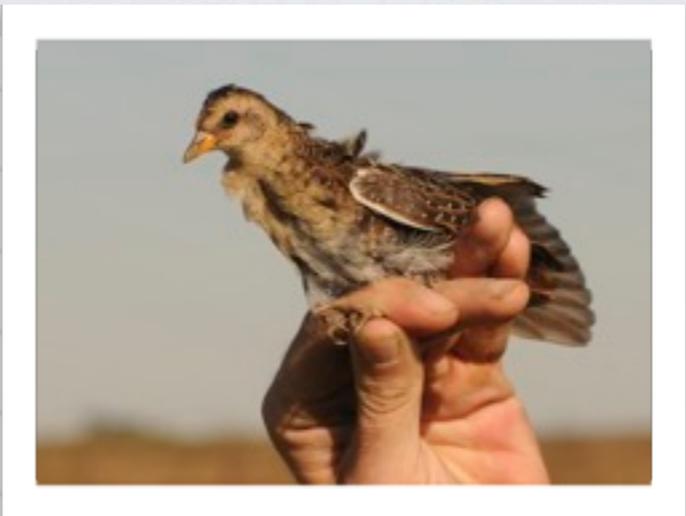
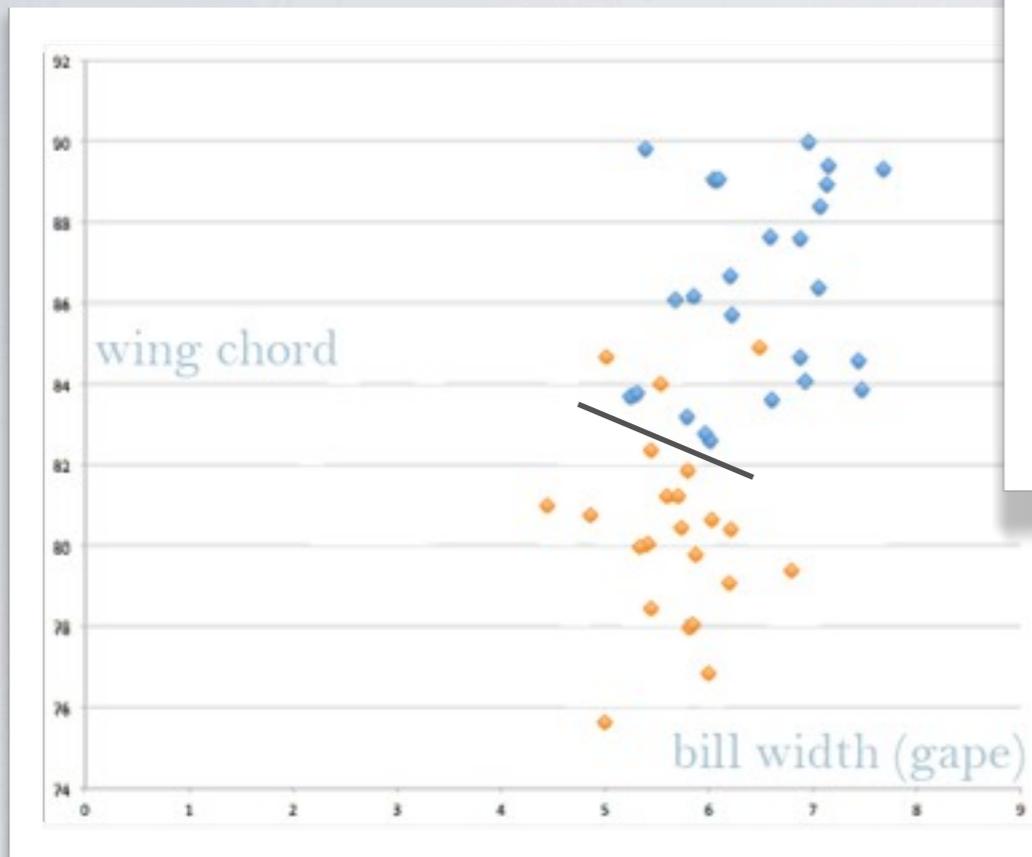
Bill:

Length: males longer than 13.5mm

Gonys depth: males greater than 4 mm



Although a small sample size... and, except for 3 “big” females (wing chord)...measurements are probably useful tool to separate sexes



- ★ weight
- ★ wing chord
- ★ bill length
- ★ bill width at gape

...but still recommend genetic samples to confirm released individuals

preliminary

KEY TO AGE/SEX YELLOW RAILS ON WINTERING GROUNDS

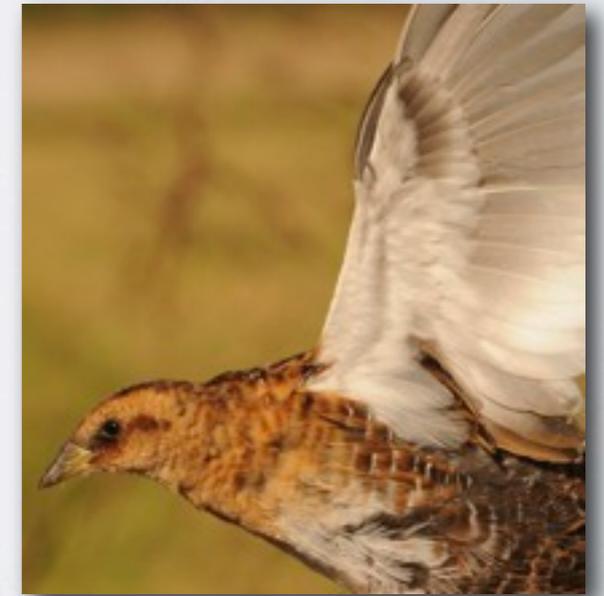
plumage	wt.	wing chord	bill length	buff eyebrow broad	white back barring wide	buff ventral feathers pale/worn	feathers lax and airy/retained Juv plumage	all buff underparts feathers lack darker edges	streaked nape without white spots	crown with white spots	white spots/edged with dark on sides	buff/rufous ventral fresh edged darker	??? TBD
Male, def. alt.	>54g	>85mm	>14.0mm	YES	YES	YES	NO	NO	YES	NO	NO	faded or worn off	
Male, def. basic	>54g	>85mm	>14.0mm	YES	NO	NO	NO	NO	yes or with few spots	none/hind crown only	NO	YES	
Male, juv	>54g	>85mm	>14.0mm	possibly	NO	YES	YES	YES	NO	YES	NO	NO	
Male, IB	>54g	>85mm	>14.0mm	NO	NO	NO	NO	NO	YES - possibly without	YES	rarely	YES	
Female, def. alt.	<50g	<82mm	<13.5mm	YES	YES	YES	NO	NO	YES	NO	NO	faded or worn off	
Female, def. basic	<50g	<82mm	<13.5mm	YES	NO	NO	NO	NO	NO	YES	NO	YES	
Female, juv.	<50g	<82mm	<13.5mm	possibly	NO	YES	YES	YES	NO	YES	NO	NO	
Female, IB	<50g	<82mm	<13.5mm	NO	NO	NO	NO	NO	NO	YES	YES	white spotting	

- size classifies most males vs. females (Plot measurements on scatter plots to better separate sexes)
- spotted BI classifies most immature females
- Basic I males = Def. Basic males? (Def. Basic females smaller)

CONCLUSIONS



- juvenal and worn alternate adult plumages very similar
- juveniles and adults can arrive on wintering grounds in worn plumage
- body molt does occur/concludes on the wintering grounds for some juvs and ads
- rectrices may also be replaced on the wintering grounds
- fresh underpart feathers of Def. Basic and Basic I /Formative range from buffy to rufescent
- spotted plumage is Basic I /Formative: common in females rare in males
- there is a pre-alternate molt of body feathers - needs further study
- Pyle (2008) aging characters not useful
- size helpful to identify many males (larger) and females (smaller)
- reported melanism more likely represents normal individual variation
- morphs previously described likely pertain to worn vs. fresh plumage, age, different plumages
- rare 'rufous morph'- endpoint of individual variation - needs further study



RECOMMENDATIONS

- juvenal plumage needs to be described - examine plumage of specimens/photos of birds in fresh juvenal plumage from breeding grounds;
- ascertain amount of body molt that occurs on the breeding grounds - are there regional differences of how much molt occurs prior to southbound migration;
- test the utility & accuracy of our key;
- researchers handling Yellow Rails should obtain measurements including weight, take photographs, and collect and archive feathers/genetic material.
- develop standardized photo schema and photo repository to archive images of banded Yellow Rails.



immature male?

Conservation of Yellow Rails

- monitor movements of Yellow Rail dispersal from rice fields after the second harvest;
- develop a program for rice farmers to leave strategic patches of rice uncut to provide Yellow Rail habitat.

Suggested photos:

- dorsal and ventral views of spread wing
- breast and upper sides
- face, crown, nape, capture bill color
- tail
- measurements taken against a ruler

ACKNOWLEDGMENTS

- The Yellow Rails & LSUMNS
- USFWS for Federal collection and salvage permits
- Louisiana Dept. of Wildlife & Fisheries for State collection and salvage permits
- Kevin M. Berken Farms, Kevin & Shirley Berken, Richard Guillory; Berken Brothers Farms, Clarence & Stephen Berken, Bayou Land Farms and Edward Wild & Sons Farms; Dale Hughes Farm
- Kimberly G. Smith and Mary C. Suter for info/photos of U. Arkansas “melanistic” specimen
- X-ray of Yellow Rail wing by Prosanta Chakrabarty



YELLOW RAILS & RICE FESTIVAL 2013



Yellow Rails and Rice Festival

The Yellow Rails and Rice Festival 2013

Visit past festivals:



[YRARF 2009 photos](#)
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[YRARF 2013](#)



Centrally located,
YRARF 2013 is based
in Jennings, LA

Festival updates



A festival like no other...

The fifth annual Yellow Rails and Rice Festival is scheduled for 23-27 October 2013. Designed with fun in mind, its primary goal is to provide participants a unique venue to view Yellow Rails while at the same time bringing birders and farmers together to realize the value to birds of the area's "working wetlands." The festival schedule is casual and participants can attend all field days (weather permitting) or come and go at their leisure. Leaders/facilitators are positioned at field sites and help participants spot birds as well as provide information or answer questions. In addition to visiting rice fields, participants can explore nearby birding areas, join trips to local points of interest, or venture farther afield to search for specialty birds in other Louisiana habitats, such as the pineywoods or Cameron Parish coast. Many of the agencies and organizations that study, manage, and protect Louisiana's birds and habitats assist at the festival, as well as have information booths during the opening reception (icons displayed below) so that participants can learn more about their activities. A banding workshop is

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BIRD BANDING WORKSHOP. Join Dr. Erik I. Johnson for an introduction to bird banding, learn how to assess molt, age, and sex of birds in the hand. Indoor workshop Thursday evening followed by field sessions Friday and Saturday. Click on rail for more detailed description.
Additional fee.

Also offered...a banding workshop led by Dr. Erik I. Johnson

