Identification of large gulls is a tricky business but just before identifying a gull it is necessary to understand its age.

Gulls are replacing their feathers continuously, from the day they are born and until their third CY they will constantly replace their feathers without a defined seasonal sequence. Nevertheless a chronology in the moulting stages can be identified.

From their 3rd year onwards, gulls moult can be divided to 2 general and major periods known as the complete moult and the partial moult. Notwithstanding we have to remember that moult is individual, different between species, especially the fuscus group (fuscus, graellsii and intermedius), heuglini, and possibly other north eastern gulls with long migratory routes.

But as mentioned, seasonal order can be identified:
Spring moult  
(January/ February – May / June)

Also called the Partial moult.

The gulls will replace their head and body feathers, the lesser and median coverts, their scapulars and mantle feathers, etc...

Autumn moult  
(May / June - December)

Also called the complete moult.

The gulls will replace their primaries and primary coverts, secondaries and secondary coverts, tertials, and several of the body feathers.

* In lesser black backed and especially Baltic Gull (Larus fuscus group), we can find a more complex moult that needs a separate explanation.

There are several aging methods:

1. Aging by calendar year (CY)
   1\textsuperscript{st} CY, May – December , the first year of the fledge, Juvenile
   2\textsuperscript{nd} CY, January – December ,
   3\textsuperscript{rd} CY, 4\textsuperscript{th} CY or Sub Adult, 5\textsuperscript{th} CY onwards.
   This method presents the gull by its exact annual life stage without taking into consideration the gull's moult.
   for example; a gull that was born in 31.12.2010 and is considered juvenile or in its first year of life, will enter in 1.1.2011 to its 2\textsuperscript{nd} CY
   Disadvantages: The division is artificial without any morphological signs

2. Aging by seasons
   This method is the traditional one and is generally used in most guides.
   The main reason to use this method is that the 2 moult seasons each year reflects the major morphological changes in the gull therefore can be described / drown..
   * Fledgling, referred to the born gull until its first flight
   * Juvenile, will usually last from the time the fledge. Is leaving the colony and until its first winter i.e.; August / September
   * First winter, will last from August / September till February / March
   * First summer will start from February / March till August / September
   * ect...
   Disadvantages: this counting method is very confusing, especially when gulls will not always follow these timescales, and there is no specific stating or end date
3. **Aging by feathers**

This is the most advanced aging method and is used by the top gulls researchers worldwide.

According to this logical method, moult is individual and relates to each specific gull date of birth and its personal maturity.

**For example:** a gull that was born in June 2010 has 1<sup>st</sup> cycle feathers, during September / October we will be able to see on the gull few feathers that changed to 2<sup>nd</sup> cycle feathers (usually on mantle and scapulars).

According to this method, we can say that the gull is showing 1<sup>st</sup> cycle feathers on the X and Y areas and 2<sup>nd</sup> cycle feathers on the Z areas.

Usually a single gull will show 2 cycles at any one time, but in specific month in the year immature gulls may show feathers of 3 cycles.

**Disadvantages:** one needs to really understand in gulls aging in order to use this method.

It is possibly useful to use the first method, which is also the easiest of all.

A gull that was born in 2010 will be considered a 2<sup>nd</sup> CY from 1/1/2011 and that’s it!

While using this 1<sup>st</sup> aging method, it is useful to add remarks from the 3<sup>rd</sup> method, alongside an observation date.

For example; a gull 1<sup>st</sup> CY, observed / photographed in 15, December 2010, mantle shows 2<sup>nd</sup> generation feathers, scapulars...

In this short schematic paper I will try to explain and show photos of gulls by age without focusing on the gull Sp.

This paper does not touch different moult strategies such as Baltic Gull that has more complex moult.

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Armenian Gull **1st CY** AE4F9706 Maagan Michael **15.12.10**

Armenian Gull **2nd CY** AE4F1504 Maagan Michael **18.1.11**
Feathers Wear

Feathers erosion is quite fast and therefore they are replaced constantly. Even feathers erosion has its chronological order that evolves from the feathers exposure to the sun, wind, sand, salt and more...

The Juvenile feathers are softer, more vulnerable and therefore erose faster. It is common to watch Juvenile gulls born in May for example that looks quite white already in August.

A feather that is erosed looks whiter or more yellowish and the gull may look very different. When aging a gull, there is a need to consider erosion as part of the ID and aging.

When the gull is standing, the lesser and median coverts are well seen and due to the shape of the wing, the coverts erosion is faster. Same happens to the head and body feathers.
Two 1st CY Armenian gulls born in the same season photographed in the same day. One is extensively worn (AE4F0691) and the other is a "Normal looking" Juvenile.
Feather erosion from the fledgling stage

Yellow Legged Gull Fledgling IMG_3352 Tel Aviv University Zoological Garden 18.6.10

Early erosion in the nape feathers

Scapulars as all other feathers are 1st cycle feathers (dark brown with pale brown margins)

Start of erosion in the upper tertials

Yellow Legged Gull Fledgling IMG_3662 Tel Aviv University Zoological Garden 9.7.10
Two Yellow Legged Gulls born in the same week, same location - Tel Aviv University Zoological garden, both ringed at the same date: 31, December 2010 (Yoav Perlman)

The bird in the upper photo has never left the nesting site and therefor was not exposed to wind, sand, salty water.

The bird in the lower photo left the nesting grounds during July 2010, wondered along the Mediterranean cost, was seen and photographed in Ashdod penetration ponds on 10 December 2010, 30 January 2011 and in Ashdod seashore on 4 February 2011.

The mantle and scapulars has changed to 2nd generation feathers, these are lighter feathers with central browner "hooks" (unlike 1st generation feathers which are dark brown with light brown margins)

Erosion of the head and chest feathers

Yellow Legged Gull 2nd CY AE4F2199 Ring U1KF Tel Aviv Uni. Zoological garden 29.1.11

Yellow Legged Gull 2nd CY AE4F2401 Ring U0AB Ashdod sea shore 4.2.11
Missing feathers

During coverts moult, especially in 1st and 2nd CY gulls, part of feathers that were covered by other feathers are revealed. These parts are very pale brown - white, creating a feeling of white patches on the gull's wings. Though in comparison to wear, the result is the same, here, the pale – white areas are created due to missing feathers.

Armenian Gull 1st CY AE4F9647-1 Maagan Michael 15.12.10

Lesser covert that has not dropped yet

White area created by dropped feathers,
Armenian gull 1st CY AE4F1426 Maagan Michael 15.11.10

Lesser covert (LC) that has not yet dropped

Missing lower lesser coverts (LLC)

Missing median coverts (MC)

Missing greater coverts (GC)
Median coverts looks "stringy" like jeans Franz

Franz like feathers

Note the growth direction of the secondary coverts from the body towards the edge of the wing

Missing primary median coverts reveals the white base of the primary coverts

Missing secondary coverts reveals the white base of the secondaries
Gull Topography

In order to better understand the difference between the feathers and their exact place it is better to first memorize the gull topography.

The photos and descriptions below are attached with the courtesy of Ies Meulmeeste from the Netherlands  [http://www.iesmeulmeester.nl/index.php?id=6](http://www.iesmeulmeester.nl/index.php?id=6)
Identification and understanding the feather age

The feathers with accordance to their importance in the field are the: Primaries, Secondaries, Tail, Mantle and Scapulars, greater median and lesser coverts.

The attached photo was given with the courtesy of Ies Meulmeeste from the Netherlands  [http://www.iesmeulmeester.nl/index.php?id=6](http://www.iesmeulmeester.nl/index.php?id=6)
Body feathers are generally aged in 2 life cycles a year, flight wing feathers are aged in 1 cycle a year (changing during the complete moult month)

1st CY birds, 1st cycle feather

Mantle / scapulars / coverts – are dark brown with pale brown margins

Primaries and Secondaries are very "clean" sharp edged,
Secondaries are dark brown in the outer feather and pale brown in the inner part of the feather. This shape is also described as the 'Venetian Blind' effect.

1st cycle tail feathers of 1st CY gull shows 4 defined stripes (described in white text below)
Second cycle feathers of 1st CY gull (remains also in the early 2nd CY stage)
Mantle / scapulars white grey with brown "hooks" anchor shape, or double brown lines

Armenian Gull 1st CY AE4F8116 Maagan Michael 15.10.10

First cycle lesser coverts feathers quite worn

Second cycle feather with mirrored J anchor shape

Armenian Gull 1CY AE4F9666 Maagan Michael 2.11.10
Late 2\textsuperscript{nd} CY feathers during the complete moult

Outer Primaries (P10, P9) show no mirror
Secondaries will show "checker shape" with white inner web and dark grey outer web

\hspace{1cm}

2\textsuperscript{nd} cycle Primaries greyish black but not brown as in the 1\textsuperscript{st} cycle
No mirrors are shown

\hspace{1cm}

3\textsuperscript{rd} or 4\textsuperscript{th} cycle mantle and scapulars
(replaced twice in the 1\textsuperscript{st} CY – see above, again during the partial moult, and now again)

\hspace{1cm}

2\textsuperscript{nd} cycle secondaries
Checker shape feathers
Inner web – white
Outer web – dark grey

\hspace{1cm}

Tail Feathers

\hspace{1cm}

No additional stripe in R6

No outer tail white stripe

Central feather with snake like shape but no "stains as appears in the 1\textsuperscript{st} stage

Armenian Gull 2nd summer 2nd CY AE4F4110 Maagan Michael 24.8.10

Armenian Gull 2nd CY AE4F9755 Maagan Michael 15.12.10
2nd CY Third or 4th generation coverts (process of complete moult)
In this case grey feathers with brown centers

3rd CY Third generation flight feathers (process of complete moult)
Black primaries, P10 will show small white undeveloped spot, Secondaries will show remains of black stripes, Tail feathers will show remains of black stripes
3rd cycle primaries with Black remain

3rd cycle tail feathers with Black remains
**4th CY feathers (Sub Ad.)**

4th cycle feather is as Ad. Feather and is not different from any Ad feather.

During the gull's 4th CY, most of its feathers are adult ones, nevertheless it is still possible to find some 3rd CY black feathers and therefore age the gull.

In most cases these feathers will be the lesser and median coverts above the primaries.

Mantle / scapulars / coverts – as adult with exception of few Black Hand coverts

Primaries – as adult

Secondaries – as adult

Tail feathers (R) – as adults

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Armenian Gull 4th CY AE4F9762 Maagan Michael 15.12.10
Reporting gulls moult

**Primaries (P)**

Total of 10
Primaries are moulted from the inside – out
the external primary is P10 and the most inner primary is P1

When P5 for example is missing we will report the moult as P4/P6 which means that P1 – P4 are new and fully grown, P5 is missing, and P6 – P10 are all old and present

In many occasions during moult a primary can be half grown and the next one after – missing
For example P4 in half grown and P5 is missing, it is costumed to report the feather stage of growth.
So if a gull for example finished growing P4 (means P1-P4 are fully grown), P5 is half grown, P6 is missing and P7-P10 are old, the report will be: P4/P7  P5=50%, P6=0%

The size of the primary is measured in numbers: 0 - 5
0 = the feather is old and not yet replaced
1 = the feather is missing or the shaft just burst out the follicle, and is less than 25% of its full size.
2 = the feather is longer than 25% but shorter than 50% of its full size
3 = the feather is longer than 50% but shorter than 75% of its full size
4 = the feather is longer than 75% but shorter than 100% of its full size
5 = the feather is in its full size, and in all cases longer than its predecessor.

This numbering is creating the PMS (Primary moult sequence), for example:
P1-P4 are new will be marked as 5, i.e; 4 x 5 = 20
P5 is half grown (50%) will be marked 3, i.e; 3 x 1 = 3
P6 is 25% grown will be marked 1, i.e; 1 x 1 = 1
P7-P10 are old will be marked 0, i.e; 4 x 0 = 0
PMS is 20 + 3 + 1+ 0 = 24
Maximus PMS is 50, in armenicus, michahellis, cachinnans usually in December - January
Sample for PMS report:

P5/P8, P6=20%, Black from P5, Mirror P9+P10, PMS; (5x5) + (2x1) + (3x0) =28
For further examples: http://www.gull-research.org/armenicus/05cysept.html

- A gull will usually replace between 1-3 primaries simultaneously, in many cases each feather will be in a different growth stage.
- It is possible to find gulls that has different moult in each wing (though follow the same sequence), in such event the PMS report will be for each wing separately
- It is possible to find gulls that show double moult sequence, i.e; replacing P9 and P1 at the same time.
- In Baltic Gull (Larus fuscus fuscus), it is possible to find differed moult, which reflects in a unique wing appearance, usually in October – November P1-P4 are new, P5-P10 are old but in their full size.
  This shows that the gull replaced P1-P4 in its breeding grounds and will replace P5-P10 in its wintering grounds.

Next photo shows Armenian Gull with P5/P8, i.e; P5 is new and in its full size, P8 is old and yet not dropped.
The gull has 5 new feathers that are marked 5, one growing feather that is marked 3 (see explanation above), one missing feather that is marked 1 and 3 old feathers that are marked 0
In the below photo case the PMS report is:
P5/P8, P6=60%, PMS; (5x5) + (1x3) + (1x1) + (3x0) =29
P10 is old
P9 is old
P8 is old
P7 is missing
P6 is growing 66% of its full size
P5 is new
P4 is new
P3 is new
P2 is new
P1 is new
Primary moult is different gulls

Adult Gulls – average primary moult dates

- Armenicus (Israel)
  - Michahellis (Israel)
  - cachinnans
- fuscus
- heuglini
**Secondaries (S)**

Total of 18 in each wing

The secondaries are replaced from the direction of P1 towards the base of the wing.

Usually P1 – P15 will be replaced (inwards) and then P18 (the most inner one will drop), then P17, P16 till P16 and P15 meets.

Secondaries are replaced in groups and it is common to see several secondaries missing at the same time.

There is no iron rule, so we can find gulls missing 4 secondaries, while other are missing 8 secondaries.

The secondaries are marked **S**

the moult report can be either by numbering: S1-S5 or by percentage, general reporting is also common, i.e; several central secondaries are missing, or, few inner ones are missing, ect.

Usually S1 will replace when P6 is in its 50% of growth, i.e; the primaries are about half way of the moult
**Tertials (tt)**

There are 6 in each wing, the uppermost is marked tt1 and the lower most tt6. There is a debate whether the 3 lower tertials are part of the secondaries, but some researchers show that the mechanism that monitors the moult of these feathers is different from the one which monitors the secondaries.

The timing of the tertials moult in different form the secondaries. The moult of the tertials is from the upper one down. In juveniles the 3 upper tertials will replace about the same time as the median coverts (it is worthwhile mentioning that at this period no secondaries has started to replace).

Tertials 6 – 4 are placed on each other and therefore are to follow when watching gulls.
Primary Coverts Greater (PC)
These coverts are usually replaced simultaneously with the primaries and therefore are ignored while reporting moult.

Greater Secondary Coverts (GC)
For convenience and in order to avoid counting small feathers, these coverts are reported in % regardless their real number on the wing.
The coverts are divided to 4 quarters: 1-25%, 25-50%, 50-75%, and 75-100%
If for example there are about 5 greater coverts missing, we will divide 5/24 = 20.8%, so we can define the missing coverts as 1-25%
In such case even if we were mistaken in the counting of missing feathers, we are still in the group area.

Median Coverts (MC)
These coverts are replaced like secondaries, from the inside – out.
The coverts are placed in 3 lines along the wing.
These feathers are also referred as 24 in a wing, and the report regarding moult is done in percent. (See explanation above).

Lesser Coverts (LC)
Here we relate to all coverts, primary or secondary as one.
For convenience these coverts were divided to 2 groups: Upper Lesser coverts (ULC), and Lower lesser coverts (LLC), and also here, regardless their numbers, they are referred to as 24 in a wing, and divided to 4 percentage groups as mentioned above.

Mantle
The report regarding these feathers refers to the feather generation: first, second or third generation

Scapulars (SC)
Divided to 4 separate groups
Upper upper Scapulars or in short UUS
Upper lower Scapulars or in short ULS
Lower Upper Scapulars or in short LUS
Lower lower Scapulars or in short LLS
And here as well we refer to all 4 lines together as 24 feathers (regardless the real higher number).
Here we count new feathers and report the number in percent: 1-25%, 25-50%, ect.
For example; if we counted 5 new scapulars, 5/24 = 20.8%, so we can define the new scapulars as 1-25%.
We can also refer to the area of new feathers, for example; the UUS show 50% 1st generation feathers, and 50% 2nd generation feathers.

A link to a report sheet used in Europe (with the gratitude of Mars Muusse)
http://www.gull-research.org/miscellaneous/checklist%20michahellis-graellsii-teus%20(version%202009-1).mht

Moult directions
Taken from the fast identification guide for the gulls of Israel by Amir Ben Dov and Yoav Perlman, http://www.slideshare.net/warbler
Aging a gull from a photo

1. Primaries are dark grey – black, neither P10 nor P9 has any sign of a mirror, therefore these are 2nd generation feathers. All feathers look clean and fresh, just replaced.

2. Secondaries have "checker like" coloration, dark brown – black outer web and grey inner web and are also 2nd generation feathers.

3. Tail has no outer white stripe, R6 has no double stripe, the inner "snake like" marking, all refers to 2nd CY bird.

4. Mantle and scapulars are grey, 3rd generation feathers, with patches of 2nd generation dark brown feathers.

5. Greater, median and lesser coverts show 2 generations of feathers: grey 3rd generation and brown 2nd generation.
Unclear moult in 2\textsuperscript{nd} CY Armenian Gull

Armenian Gull 2\textsuperscript{nd} CY AE4F0342 Maagan Michael 22.7.11