Species or Forms - Expanding the Conversation

In the fall of 2015 the ABA published a special edition of one of their magazines that concentrated on taxonomy/phylogeny of birds and tried to explain how a species is defined. There is growing interest amongst birders in this subject and more and more questions being asked about how on earth mortal field birders are going to tell one species form another when the basic differences lie in their DNA. Conversely, they complain - back the Redpolls here - that "this bird looks quite different to that bird - what do you mean they are the same species?"

There are professional scientists, ornithologists, taxonomists who work hard to get this stuff right. There are also birders with varying degrees of scientific knowledge but mostly very good indeed at deciding which (field guide" species a bird belongs to. Science, while clarifying things by increasing our knowledge, thereby increasingly muddies the waters for the guy in the forest or marsh, armed only with binoculars and his hard-won skills.

Why does this matter to average birder?

Simply this - whatever we think of our hobby, however many breeding bird atlas surveys or Christmas bird counts we take part in as "citizen scientists" the core activity of birding for most birders is keeping lists of what they see in order to challenge themselves and to try to make his/her list longer than the next birder's. In effect, it is a friendly but competitive sport, indulged in with greater or lesser seriousness by all. But to be able to compare one person's lists with the next person's we need some rules to the game and a master checklist of comparable species.

It's that latter checklist that causes the problems because as knowledge advances what was once Species X suddenly is split into X and Y while clear distinct Species B, C and D are shown to be just different forms of one species and so they are lumped. Our 500 bird life list one week might turn into 502 or 499 over the weekend as new splits and limps are announced. Scientifically correct, but in the field just irritating to the "sportsman or woman".

I am going to contend that there is a very good argument for Birders' species being formalized in a standard list that is close to the scientist's taxonomy but not slavishly so. That birders fix their lists so that they include those distinct bird forms that can be distinguished by sight or by sound in the field as being definably and reliably different from each other.

But before getting to that, let's make sure we al understand what a species actually is. That might seem a silly question because don't we all know what a species is? Let's see …

"How different is different enough?" you ask

That's the million dollar question. Muddy waters. The "old" and commonly understood definition of a species was roughly a group of individuals that actually or potentially interbreed in nature. Hence a species is the biggest gene pool possible under natural conditions.

And, to take one striking example, that would have Common and Hoary Redpolls as one species right away as they can interbreed. Meanwhile, the birders definition of a species is much more centred on birds with distinguishable field marks - which separates CORE and HORE into two species. At the other end of the spectrum, there are at least four visibly and strikingly distinct geographic forms of the Junco, yet they only count as one species "tick" for the birder as science tells us they are undoubtedly the same species under the feathers.

There are other definitions of what comprises a species. I am going to tread carefully here because it is quite a few years since I qualified as a biologist and I have not been professionally engaged in taxonomy since - a subject that has undergone huge changes in the years since we acquired new tools like DNA analysis etc. Nevertheless, I try to follow the literature as they say … Thus, we have:

- Morphological or Phenotypic species: basically, if they look different then they are different (pretty close to listing birders every-day thinking)
- Evolutionary species: "A species is a series of ancestor descendent populations passing through time and space independent of other populations, each of which possesses its own evolutionary tendencies and historical fate"

- Biological species: “Species are systems of populations; the gene exchange between these systems is limited or prevented in nature by a reproductive isolating mechanism or several such mechanisms.”

There is a nice overview of these, and other, definitions at http://biomed.brown.edu/Courses/BIO48/20.SpeciesConcepts.HTML - along with some really hard questions about the exceptions to each system. I also refer readers to this quote from Richard Dawkins, who writes:

“*According to the geographical isolation theory, speciation begins with the accidental geographical division of a single ancestral species into separate populations. No longer able to interbreed, the two populations drift apart, or are pushed by natural selection in different evolutionary directions. Then, if they subsequently meet after this divergence, they either can’t interbreed or don’t want to. They often recognise their own species by some particular feature, and studiously avoid similar species who lack it. Natural selection penalises mating with the wrong species, especially where the species are close enough for it to be a temptation, and close enough for hybrid offspring to survive, to consume costly parental resources, and then turn out to be sterile, like mules*.”

In other words, the science now tells us that a species is a somewhat artificial, but nevertheless useful, construct and no longer the clearly defined "can they breed or not" concept we learned decades ago. Three quotes spring to mind:

"*A usable definition of the word "species" and reliable methods of identifying particular species is essential for stating and testing biological theories and for measuring biodiversity.*" ... so yes, we do need some agreed upon categories.

But, at the same time, and very importantly:

"*Some biologists view species as statistical phenomena, as opposed to the traditional idea, with a species seen as a class of organisms. In that case, a species is defined as a separately evolving lineage that forms a single gene pool. Although properties such as DNA-sequences and morphology are used to help separate closely related lineages, this definition has fuzzy boundaries. However, the exact definition of the term "species*" is still controversial...this is called the species problem.

And, in the case of birding and listing:

"*Biologists have proposed a range of more precise definitions, but the definition used is a pragmatic choice that depends on the particularities of the species of concern*." ... and so it is reasonable to say that what goes onto your list is dependent on the particularities of the species of concern and, I would argue (as others have) that an identifiable "form", which we will, for convenience, call a species for listing purposes etc is a valid category and allows us to differentiate between the Redpolls, the Canada Geese, the Juncoes and other groupings of related birds. when we are keeping our records.

Thus there are "separately evolving lineages that form a single gene pool" within the Redpoll "species" as there are in other recognised species and this is an easy concept to grasp. Some are impossible to separate in the field and so cannot be easily studied outside the laboratory but others (examples above) can be distinguished by field marks or song and it's at that point they it can be argued to be valid to record them as separate forms. This applies both scientifically and in the world of listing. We need agreed standards for certain purposes - scientific studies of populations are one thing, big day competitions are another but it is easy enough to establish our criteria before we start.

- Does another tick on my list matter? Nice to have have, but not at all in the wider scheme of things.
- Am I interested to know that I have seen a particular *form* of Redpoll or Junco under particular conditions? Yes, absolutely.

So what can we do about it to keep us all honest?

I would like to SUGGEST (to keep this simple) we could get by very well if we had two words:

1) FORM - limited to the meaning of a species that is understood by most birders and amateur naturalists and basically working on visible anatomical or audible song/call differences plus the inability to interbreed (ie: pretty much what we all learned 40 years ago). Fix an agreed checklist of the countable species/forms once and for all, and then go away and have a beer but don't assume it has the same biological meaning any more. It

would simply be a system for every-day use in the field and for keeping our checklists synchronised. **This concept is also VERY useful for conservation purposes**.

2) SPECIES - for the professional taxonomists delving away with their DNA analyses and other tools.