Choosing a birding binocular

Introduction

There is no single binocular that is the best choice for every birder. Where you bird, what time of day, in what weather conditions you bird and your physical makeup all have an effect on which binoculars you should choose. Birding on the ocean may require a higher power binocular than you would use in a heavily treed area-that area would make better use of a glass with a wider field of view for following those warblers though the leaves. Light gathering ability becomes the most important factor when birding after sunset or on a very overcast day; however on a sunny day when good light levels are not a problem, sharpness of focus or correct color rendition may be the most important issue. Even your own physical makeup is a factor when choosing the correct binocular. The size of your hands, the distance between your eyes and the wearing of eyeglasses all dictate features to look for in purchasing a birding binocular. In this article, we will try to explain the many confusing binocular terms and how they impact on the choice you make to enhance your overall birding experience.

The Numbers Game

8x42, 10x50, 7x35…what do those numbers mean anyway? The numbers used to designate a particular binocular describe the configuration of that model and from those numbers other performance features can be determined. We'll use 8x42 as our example.

The first number refers to the magnification factor. In this case the image will appear 8 times larger using the binocular compared to how it would look using just the bare eye. The second number is the diameter in millimeters of the objective lens-the lens furthest away from your eye. These numbers carry a lot of weight when choosing binoculars.

Currently 8 and 10 (8X or 10X) binoculars are perhaps the most common although almost any power you might desire is available somewhere. The magnification number affects several factors and should be given much consideration.

1. Image brightness is inversely proportional with magnification-assuming other factors such as optic quality and objective lens size remains equal; as the magnification number goes up, brightness goes down. Obviously this will affect the color rendition and sharpness of the image. Dept of field-or how much depth of the image is in focus at once-is also affected by magnification.

2. As magnification increases the depth of field decreases and the decrease is more noticeable at closer distances. This may cause you to refocus constantly and also can greatly affect eye strain as the eyes try to compensate.

3. Field of view also usually decreases at higher power. Higher magnification may cause more difficulty in following a bird and this can be an important consideration for new birders and young children.

4. Magnification also intensifies movement; therefore, the higher the magnification the more apparent movement will be and this will be directly affected by how steady you can hold the glass.

The size of the objective lens-42 in our example-is directly proportional to the amount of light gathered and transmitted to the eye. The larger the objective lens the more light and therefore the better detail and color rendition. When distance increases or lighting decreases, as at dusk or dawn, larger objective lenses become more important. Were weight and physical size limitations not a problem, then there would be no limit to what we could see! Unfortunately, weight and size do become a problem in the larder lenses, especially after many

hours of birding in the field. Of course, the quality of the optics, the magnification and how stable the optic is held will determine how much can be seen. A poor quality 50-mm objective lens will not give the detail, brightness and color that a high-quality 42mm lens will.

The Difference Between Roof and Porro Designs

Roof prism binoculars have two separate prisms cemented together rather than the offset prisms of the porro design. High quality roofs are also internal focusing unlike prorros, which focus by external movement of the eyepieces. Roof prism binoculars for this reason tend to be more durable and less prone to alignment problems if mishandled. The roofs are also more easily weatherproofed; the porros are typically sealed with "o" rings, which wear over time. Focusing also becomes stiffer as the "o" ring wears due to movement of the eyepieces and the seal may be lost allowing moisture and dust to enter the interior of the glass. In general the roofs are smaller and more streamlined making handling easier and often making a lighter binocular. Optical quality being equal to the roofs will be more expensive due to engineering costs. A very good pair of porro prism binoculars can be found for around $250; roofs of the same quality would cost double that.

Optical Coatings

When light is transmitted through a lens some is always lost through reflection. Poor optics with no coatings can lose as much as 5% on each optical surface. Coated means that thin coatings are deposited on the lens faces to reduce reflective loss and improve light transmission. With the large number of lenses in a binocular or scope, these coatings can be as important as the quality of the lens itself. Since reflected light washes out the colors and detail, the application of coatings to all the optical surfaces decreases these effects. Multiple coatings (Multi-coated) may be applied to optimize transmission of different colors. Various combinations of coatings are available-from a single coating on a single lens to multiple coatings on all surfaces. FMC (fully multi-coated) optics are desired. Note: Many binoculars are labeled "coated" or "multi-coated"- bear in mind that these statements mean some lenses are coated or multi-coated; if all the surfaces are properly multi-coated it should state Fully Multi Coated-don't be fooled!

Resolution

With the extremely high cost of precision ground glass, some manufacturers cut corners and use glass of a lesser quality resulting in an inferior image. The resolution or optical quality should be the same from the center of the lens to the edges. To check this, focus the glass on a map or newspaper tacked to a wall from a distance of about 25'-the lettering should be equally crisp at the center and both edges of the paper.

Eye Relief

Eye relief is defined as the distance between your pupil and the surface of the eyepiece. This distance should be at least 10mm and eyeglasses wearers need greater eye relief to compensate for the distance the eyeglasses stand away form the pupils of the eye. Binoculars are designed with eyecups that adjust in various ways so this distance can be customized for each user. The standard rubber eyecups, which fold down have been replaces by many manufacturers with eyecups that twist up-either smoothly or in click-stops.

Exit Pupil

The exit pupil is the circular beam of light that comes out of the eyepiece of the optics. If you hold your binoculars at arms length and look at the eyepiece, you will see a bright circle of light on the eyepiece. The diameter of that circle of light is the exit pupil. Your eyes must be positioned at that exact spot in order for you to see the full field-of-view with maximum resolution, so for binoculars to deliver their dull light gathering capability, the exit pupil must be equal to or greater than the diameter of your pupil at any given moment. To determine exit pupil diameter, divide the objective lens size by the power rating. In our example, 8X42, the exit pupil would be 5.25. The human pupil is normally about 2-3mm in bright light so an exit pupil of 6 would be well above what is needed to allow a full field of view-even on a bouncing boat! Only in extreme low light would an exit pupil larger than 6 be required. A simple test of optical quality is to observe the circle of light through the ocular lenses-the lenses closest to your eyes. It should be a complete bright circle as shown on the

left below. If only the center is bright or if it is partially shade in gray on the edges, then inferior optics are blocking some of the light and the image viewed will be less than satisfactory.

Focusing

Ease of focus is another consideration. A binocular should focus easily with one finger on the knob, it should turn evenly and smoothly. One full rotation of the adjustment knob should cover one extent to the other. Close focus, or how close an object can be and remain sharp in focus, can be important with small birds that come in close, studying plumage on birds close by, and the study of flowers and butterflies. The lower the number the better, a close focus of 5 or 6 feet is super; more than 15 feet can make birding difficult at a close range.

Diopter Adjustment

The diopter adjustment allows you to separately adjust the focus on one eyepiece to compensate for difference in your individual eye strengths. This adjustment is found on only one of the eyepieces-usually the right. It should move smoothly when turned but maintain its setting so that it does not have to be continually reset. The setting instructions will be included with any binocular purchased, however, this is the common method: Focus the non-adjustable side to sharp focus with the main focus wheel, using only that eye (close the other one) and on a specific object 50 to 75 feet away. Now with only the eye open on the adjustable side, not moving the main focus wheel and looking at the same object, bring the object into sharp focus using only the diopter adjustment. Now both sides of the binoculars are adjusted to come to sharp focus for both of your eyes at the same time. I mark my diopter adjustment wheel (a pencil mark works fine) so that it can easily be restored to the correct setting if moved in error.

Summary

After choosing which features are most important to you, buy the binocular with the highest quality optical glass that you can afford. This will be expensive-but it will be worth it. This is one time when you do "get what you pay for." Not saying that you cannot get a good quality and fine performing glass in a medium price range-you can. You just need to understand that you will forfeit some features to get a reduced price. As stated in the introduction-there is no single "best" birding binocular that will work for every birder. The choice will be different for each individual dependent on their particular needs, wants and physical characteristics. We hope we have given you enough information to make that choice wisely.

For more information:

Websites:

http://www.optics4birding.com/introduction.aspx

http://www.binoculars101.com/bin-choose-backyard.html

http://www.birdwatching.com/optics/binoculars1.html

Books:

Pete Dunne on Bird Watching: The How-To, Where-To, and When-To of Birding by Pete Dunn-this book has a very complete section on choosing optics and is available at Crandall Library.

Note: This publication is a digest and compilation from various sources in books and websites by Mona Bearor for Southern Adirondack Audubon Society.