Choosing Optics for Birding

Birding is a popular hobby that involves observing and identifying birds in their natural habitats. Whether you are a seasoned birder or a beginner, good optics can make all the difference in your ability to see birds up close and in detail. Binoculars and spotting scopes are essential tools to enjoy this activity fully.

While it is possible to spot birds with your unaided eyes, you will miss many important details that are often necessary to make an identification. This is especially true for birds that are far away or in low-light conditions. By using binoculars or spotting scopes, you can magnify the image of the bird, making it easier to see fine details like feather patterns and coloration. Here are some tips to help you make the right choice.

Choosing the Right Optic

When selecting an optic for birding, several key factors must be considered when choosing one that is just right for you. First, consider the magnification and objective lens size. Binoculars typically have a magnification of between 7x and 10x, while spotting scopes can have magnifications of 20x or higher. Higher magnification can be helpful for spotting birds that are far away, but it can also make the image more difficult to hold steady and focus. The objective lens size refers to the diameter of the front lenses and determines how much light the optic can gather. A larger objective lens will provide a brighter and clearer image, making the optic heavier and more difficult to hold steady. More glass is also more expensive.

A wider field of view makes finding a subject quicker and easier, particularly when panning a wide area or tracking a moving subject. It can often make the difference between spotting your subject or not.

Close-focusing binoculars are essential for birders to see birds in great detail, even at a close range.

Give some thought to the overall size and weight of the optic. If you plan to carry them around for long periods, choose something comfortable to hold and easy to carry around.

Most importantly, consider the quality of the optics. The lenses and coatings significantly affect the clarity and brightness of the image while minimizing eye fatigue. The quality of the view makes all the difference in enjoying your birding experience fully.

Optics Terminology

Two numbers describe all binoculars; the first is the magnification, and the second is the diameter of the objective lens, the lens closest to your subject, also called the aperture. For example, an 8 x 42 binocular (8 by 42) has a magnification or power of 8x with a 42mm lens.

Magnification: Also known as the instrument's power, magnification refers to the degree to which an object viewed through the binoculars is enlarged or appears closer to the unaided eye. Generally, increasing power will reduce the field of view and brightness. More power does not necessarily equate with better.

Lens Objective: The front lenses, when looking through the optic, are measured as the diameter of the lens in millimetres. In general, the larger the objective lens, the brighter the image will be with more detail and sharpness, especially in low-light conditions. Larger objectives also add more weight and cost.

Ocular Lens: The lens closest to your eye, or the eyepiece, which magnifies the image produced by the objective. Eyepieces consist of three to six optical elements or more. The eyepiece design determines the image quality and affects the field of view and eye relief. The eyepiece should have a rubber eyecup for more comfortable use.

Field of View (FOV): The linear field is the size of the viewing area that you can see at 1000 yards (or metres). The greater the FOV, the more area you will see in the image. The angular field of view is the same expressed in degrees. Most binoculars will have either the linear or angular FOV indicated on the binocular. If you only know the angular field and want to know the linear field, multiply the angular field by 52.5. For example, an angular field of 6° would have a linear FOV of 315 ft.

Eye Relief: The distance from your eye to the eyepiece where you can comfortably observe the entire field. Also referred to as the eyepoint, measured in millimetres. Longer eye relief is most helpful to eyeglass wearers who need a minimum of 16mm. When wearing eyeglasses with binoculars, fold, or twist down the rubber eyecups for the widest field possible.

Exit Pupil: The amount of light that leaves the eyepiece available to your eye. The larger the exit pupil, the brighter the image. You can see the exit pupil by holding the binoculars at arm's length. It is a function of the objective diameter divided by the power. For example, an 8 x 42 binocular would have an exit pupil of 5.25mm. The pupil of your eye will dilate in dark conditions to somewhere between 5 and 9mm, so an exit pupil greater than 5mm is a good choice when viewing in low-light conditions.

Close Focus: This is the minimum distance the binocular can be focused while keeping sharp focus, typically from 6 to 12 ft., is ideal. Birders often encounter birds in various settings, from open fields to dense forests, so having binoculars that can focus on objects as close as a few feet away can help them observe birds in a wide range of environments. Also great for viewing insects, dragonflies, and butterflies. Conversely, you should expect all binoculars to be able to focus on an infinite distance, like the horizon or the Moon. Fun fact: turn the binoculars around and view through the objective end for use as a field microscope!

Inter-pupillary distance or IPD: The distance between the centres of the user's pupils. This should match the adjustment of the binoculars so that you see one concentric circle between the two barrels. Those with narrow-set eyes will find this more relevant among various brands of binoculars.

Diopter Ring: This feature allows the user to compensate for differences in vision between their two eyes. By rotating the eyepiece, the user can change the lens's focal length and adjust for any difference in the refractive power of their eyes. Once the diopter has been adjusted, the binoculars can be focused on an object at a different distance by using the focusing wheel to adjust both tubes together without needing to readjust the diopter. The user can quickly and easily change the binoculars' focus without losing the custom adjustment they made to compensate for their vision.

Armouring: Most binoculars have a rubber or synthetic coating on the body of the binocular that provides a non-slip gripping surface, added protection against scrapes and minor impacts and improved durability. Be aware that chemical mosquito repellants can cause damage to rubber armouring.

Waterproofing: All binoculars should be waterproof, nitrogen purged internally and sealed. This makes the binocular impervious to the elements, salt water, and dust. The nitrogen prevents oxidation and internal fogging. The industry standard is that the unit should withstand submersion in 16 ft. of water for 5 minutes without damage. Water-resistant is not waterproof.

How Binoculars Work

Binoculars use a combination of lenses to magnify and focus the image of distant objects. The basic design of binoculars consists of two parallel tubes, each containing a set of lenses that work together to create a larger, more detailed image of distant objects.

The front lenses of the binoculars, known as the objective lenses, gather light and focus it onto a smaller image, known as the objective lens' focal point. The larger the objective lens, the more light it can gather and the brighter and clearer the picture.

After passing through the objective lenses, the light travels to a set of prisms inside the binoculars. These prisms, typically made of high-quality glass, are designed to reflect the light and redirect it toward the eyepiece lenses.

The eyepiece lenses magnify the image created by the objective lenses. They typically use a set of two or more lenses that work together to increase the size of the image. The magnification power of the binoculars is determined by the ratio of the objective lens' focal length to the eyepiece's focal length.

Modern binoculars may also offer additional features such as image stabilization, which can help reduce hand-held shakiness, and lens coatings that can improve image contrast and reduce glare.

When you look through the binoculars' eyepieces, you see a magnified, focused image of the object you observe. The distance between the eyepieces can be adjusted to suit the user's inter-pupillary distance. Many models offer a focus mechanism called the diopter ring to adjust for differences in the user's eyesight and the distance to the observed object.

Porro vs. Roof Prisms

The Italian optics pioneer Ignazio Porro is credited with developing Porro prism binoculars in the mid-1800s. Porro prism binoculars utilize two right-angled prisms in each barrel and an external focus mechanism to slide the eyepieces along an external tube to achieve focus. Porro prism binoculars tend to accommodate a smaller IPD, are less expensive to produce, and are fast focusing.

Roof prism binoculars were developed in the late 1800s and patented by German optics manufacturer Carl Zeiss in 1905. The design reflects light through a series of five small prisms in each barrel. The eyepieces are in line with the objective. Special coatings are applied to reduce internal reflections and enhance brightness. The focusing mechanism is housed internally with only the focus knob outside the binocular, allowing for a better seal against external elements, increased durability and waterproofing. Roof prism binoculars have become a favourite choice with birders. Although usually more expensive by design, the advantages include ease of handling, lighter weight and close focusing.

Quality of Optics

The quality of optics is a critical factor in determining the clarity, sharpness, and brightness of the images viewed. These measures depend upon several factors, including the type of glass used, the quality of the lens coatings, and the instrument's design. The most common types of glass used in high-end binoculars and spotting scopes are extra-low dispersion (ED) glass and fluorite glass. ED glass has a lower refractive index, reducing chromatic aberration in the images viewed. On the other hand, fluorite glass has an extremely low dispersion, which results in even better colour accuracy and sharpness in the images.

A few manufacturers, like Kowa Optics, use Eco-Glass, an environmentally friendly glass that does not contain arsenic, lead, or other harmful substances in the manufacturing process.

The lens coatings on the optical elements are also essential in improving image quality. Anti-reflective coatings are applied to the lens surfaces to reduce the amount of light lost through reflection, thereby increasing the light transmission and resulting in brighter, sharper images. Several coatings are used, including single-coating, multi-coating, and fully multi-coating. Fully multi-coated lenses provide the highest level of light transmission and the best image quality. Many higher-end roof prisms also have dielectric coatings applied to each surface that can boost reflectivity up to 99%, enhancing the optical system's overall performance.

The quality of the prisms used, the alignment of the optical elements, and the quality of the mechanics all play a role in producing clear, sharp, and bright images. High-end binoculars and spotting scopes use roof prisms, which are more compact and lightweight than traditional Porro prisms. Roof prisms also provide better image quality, as they are more efficient in transmitting light and reducing chromatic aberration. There are two common types of prisms: BK-7 and BaK-4. Both types use high-quality borosilicate glass, with the BaK-4 also using barium oxide as an additive. The BaK-4 has a higher density and eliminates internal light scattering more than the BK-7. They also cost more to produce.

The results of using high-quality optics in binoculars and spotting scopes are remarkable. The images viewed through such instruments are clear, sharp, and bright, even in low-light conditions. The colours are accurate and true to life, making it easier to identify the subjects being observed. High-quality optics also provide a wider field of view, making it easier to track moving subjects and locate distant objects.

When choosing binoculars or spotting scopes, it is essential to consider the quality of optics to ensure the best viewing experience. The use of high-quality glass, anti-reflective coatings, and the instrument's design all play a role in improving image quality. High-quality optics produce clear, sharp, and bright images with accurate colours, a wider field of view, and reduced chromatic aberration.

Overall, binoculars are an essential tool for birdwatchers, nature enthusiasts, and anyone who wants to get a closer look at distant objects. Understanding how they work can help you select the suitable binoculars for your needs and get the most out of your observations.

Choosing a Spotting Scope

For birding enthusiasts, a spotting scope is essential for getting a closer look at distant birds and other wildlife. A spotting scope is a telescope designed to supply a clear, magnified view of distant objects.

While scopes may come with a high price tag, their exceptional quality and versatility for bird watching are unrivalled. Scopes excel in scanning wide areas for birds and seeing faraway subjects such as shorebirds, waterfowl, and birds of prey.

When choosing a spotting scope for birding, several factors must be considered to ensure that you select the best option for your needs.

Objective Lens Diameter

The objective lens diameter is another crucial factor to consider when choosing a spotting scope for birding. The larger the objective lens diameter, the more light the spotting scope can gather, which results in a brighter and clearer image.

However, larger objective lenses can also make the spotting scope heavier and bulkier, making them more challenging to carry in the field.

Magnification

Unlike binoculars with magnifications from 7x to 10x and only one power, spotting scopes are designed to work at higher magnifications with zoom eyepieces ranging from 15x to 60x or more, providing a closer view of distant birds.

Finding a balance between magnification and image stability is essential to ensure that you can observe birds effectively. However, it is vital to remember that higher magnification can make the image shaky and harder to focus. This is because high magnification increases the effects of atmospheric distortion and slight movements in the spotting scope or the observer's hand.

Angled vs. Straight

There are two body styles for spotting scopes: one where the eyepiece is positioned straight off the back of the scope and another where it is angled at 45 degrees from the scope's body. Which one to choose depends on personal preference and the intended use of the scope. For bird watching, some people find a straight scope more convenient for acquiring targets, while others prefer an angled orientation as it allows them to look down into the eyepiece without straining their neck. An angled scope is usually preferred when sharing the scope with a group or observing the sky. Try out both types to determine which is most comfortable for you.

Tripods

A sturdy tripod is a crucial accessory for spotting scopes that allow for stable scope support, reducing the effects of hand movements and ensuring clarity and detail when observing birds and other wildlife. Even slight movements can cause the image to shake or wobble at higher magnifications, making it difficult to focus on the observed object. Further, it reduces eye strain and fatigue, allowing for extended observation periods and enhancing the viewing experience. The best tripods for birding should provide a sturdy mount for the scope (will not blow over in a wind gust), a quick and smooth head for maneuverability in all directions, easy-to-use leg extensions and adjustments, and tall enough to look through your scope at eye level without having to stoop or bend over. Weight is also a consideration.

Durability and Weather Resistance

When using a spotting scope for birding, you will likely be exposed to various weather conditions, including rain, wind, and dust. Look for a spotting scope with a durable, waterproof design to ensure it can withstand rain and moisture without damage. A stay-on field case is a good investment.

Digiscoping

Digiscoping refers to using a digital or smartphone camera to take pictures or videos through a spotting scope or telescope. With an adapter between the scope and camera, an added benefit of a good scope is that it can become a telephoto lens for your smartphone or DSLR.

Some of the advantages of digiscoping include the following:

High-quality images: Digiscoping allows you to capture high-quality images and videos of distant objects that otherwise would be difficult to capture.

Compact and portable: Digiscoping is much more compact and portable than carrying a large camera lens or a bulky telescope. Spotting scopes are lightweight and easy to carry, making them perfect for birdwatching, nature photography, or travel.

Cost-effective: Spotting scopes and digiscoping accessories are relatively affordable compared to expensive camera lenses or telescopes.

Versatility: You can use a spotting scope for observation and digiscoping, making it a versatile tool for birdwatching, wildlife observation, and astrophotography.

Ease of use: Digiscoping is relatively easy to learn and requires minimal setup. Once you have attached your camera to the spotting scope, you can take pictures and videos immediately.

Increased reach: With a spotting scope and camera setup, you can zoom in on distant objects and capture images that you may not be able to see with the naked eye.

Finally, choosing the proper spotting scope for birding can make all the difference in your ability to observe and identify distant birds and other wildlife. By considering factors such as magnification, objective lens diameter, eye relief, and durability, you can select a spotting scope tailored to your specific needs and preferences. Going one step further, adding a camera or smartphone to your spotting scope is an affordable way to capture high-quality images and video. You can enjoy a lifetime of exciting birdwatching experiences with the proper spotting scope.

Tips for Buying Optics

1. Consider the purpose: Be clear about the intended use of the optics, whether it is for birding, hunting, stargazing, or any other activity.

2. Determine your budget: Determine how much you can afford to spend on optics before you start your search. With optics, you get what you pay for and can expect higher-price models to outperform lower-cost models.

3. Research and compare: Look up various models and compare them based on features, specifications, and customer reviews. Then compare prices.

4. Choose the correct magnification: Consider the magnification power of the optics, depending on the intended use.

5. Go for high-quality glass: Look for optics that use high-quality glass and lens coatings for superior image quality and clarity. As a minimum standard, look for fully multi-coated lenses and prisms.

6. Check for durability: Optics should withstand the rigours of outdoor use, so look for features such as waterproofing, rugged construction, and scratch-resistant coatings.

7. Consider the weight and size: Make sure the optics are lightweight and compact enough for your needs, especially if carrying them for extended periods.

8. Look for ergonomic design: Optics should be easy to grip, focus, and adjust, even while wearing gloves. How do they feel in your hand, to your eyes and around your neck?

9. Test the optics before buying: Whenever possible, field-test the optics in natural and lower-light conditions before purchasing to ensure that they meet your expectations. Check for any optical distortions by viewing horizontal and vertical lines at a distance. Colours should be neutral as nature intended.

10. Consider the warranty: Look for optics with a good warranty and after-sales support, as this can help protect your investment and provide peace of mind. Most optics brands offer a Lifetime Warranty but remember that a warranty is only as good as the company offering it.

Cleaning and Care for Your Optics

It is important to take safe care of your optics to ensure they last for years to come. When not in use, keep them in a cool, dry place, preferably in their case. Avoid exposing your optics to extreme temperatures or moisture, as this can cause damage to the lenses and internal components.

All optics will eventually require cleaning regardless of their cost. Care needs to be taken when cleaning optics so as not to scratch the lenses or damage the lens coatings.

Here are a few tips for cleaning and maintaining your binoculars or spotting scope in the field:

- Eliminate as much dust and dirt as possible from the lens using a soft-bristled brush or blower.
- Use a lens cleaning solution designed for coated lenses. Place a few drops of lens cleaning solution onto a lens tissue or cleaning cloth. Never apply fluid directly to the lens. Avoid harsh chemicals or abrasives that could scratch or damage the coated lenses.
- Gently wipe the lens surface in a circular motion, starting from the center and moving outward, to remove oil, fingerprints, and grime.

In conclusion, good optics are essential for birding enthusiasts who want to get up close and personal with their feathered friends. By selecting the right optic for your needs and taking good care of it, you can enjoy a lifetime of incredible experiences observing birds in nature.

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