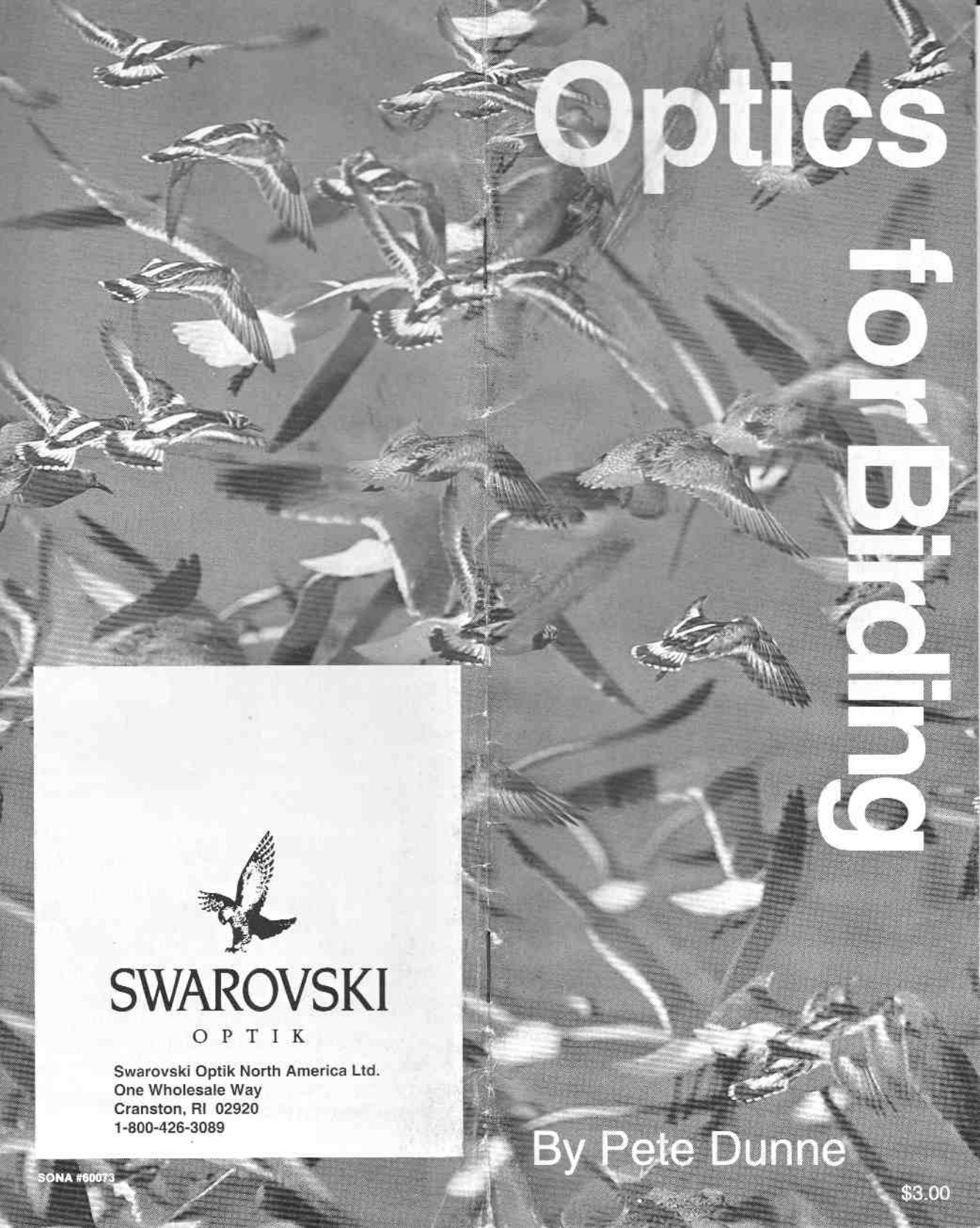
Optics for Birding



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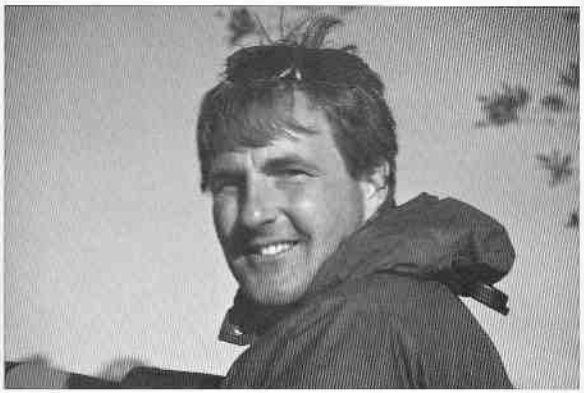


Pete Dunne, of the New Jersey Audubon Society, is one of birding's better known figures and authorities on the optical needs of bird watchers. He is author of The Feather Quest, Tales of a Low Rent Birder, and Hawks in Flight. His regular columns appear in American Birds, Birding, and Living Bird. He and wife, Linda, live near Cape May, New Jersey.

Swarovski Optik North America thanks Pete Dunne for his time and effort in helping bring this pamphlet to you and the birding community.

A portion of the proceeds from the sale of this pamphlet are donated towards the migratory bird research efforts of the Cape May Bird Observatory.

Binoculars for Birders

You are a person who enjoys watching birds and this puts you in good company. In the estimates of the United States Fish and Wildlife Service, over sixty million North Americans have discovered the pleasure and challenge of birding. Chances are, you already own a pair of binoculars—a pair you inherited or bought without much thought; a pair that has served, but maybe did not excel.

But now you are ready to move up to quality optics...binoculars that will make it easy to get onto those hyperkinetic warblers and treetop vireos. You need binoculars that are sharp enough to resolve the details that separate lookalike flycatchers and bright enough to disclose the facial pattern of an "olive backed" thrush stalking the shadows. In short you are ready to buy a pair of "birding binoculars."

Why won't just any binocular do?

Binoculars are the primary tools for bird watching. Different "User Groups" (hunters, yachtsmen, backpackers, concert goers) use binoculars as an accessory to their activity or sport. But binoculars are not just an accessory to birding. Binoculars are the instruments that define birding—the functional equivalent of the first baseman's glove, the musician's instrument, the plow in the hands of the frontier farmer.

Every user group has its own peculiar needs and constraints that binocular manufacturers translate into binocular makes and models. Hunters, for example, demand rugged, durable, optically precise binoculars that perform well even in the low light conditions of dawn and dusk. Yachtsmen require optics that are impervious to weather. Backpackers want optics that are light and portable.

But birders demand all these attributes and more. For binoculars to be birder worthy, they

must not only be durable and precise, but also weatherproof and portable. They must focus fast and focus close.

They must offer a generous field of view and provide exceptional depth of field even at close quarters.

This booklet has one objective: to give you the information you need to choose true birder worthy binoculars and spotting scopes.

Forewarned is Forearmed.

There are several things you should know even before talking to a salesperson.

FIRST—As a bird watcher, you represent the largest "user group" in the optics market. Over 30% of all binoculars purchased are used for birding.

SECOND—The needs and constraints of birding are well known to binocular manufacturers but they might not be known to the sales person you deal with. Chances are, after reading this book, you will know much more about birding binoculars than any non-birding salesperson you will meet. Don't let them confuse you.

THIRD—All equipment, including binoculars, is designed to compensate for a human shortcoming. People should never be forced to compensate for their equipment. If the binocular you are considering is flawed in performance or design (i.e. they do not focus close enough...they do not fit your hands...the ocular lenses cannot be adjusted close enough to offer a single image...) do not buy them!. If you do buy them, you will only replace them later.

FOURTH—There are very cheap binoculars and very expensive binoculars. There are binoculars that are good for birding, and binoculars that are not good for birding. There are no good cheap birding binoculars. It takes quality materials and sophisticated engineering to craft birder worthy binoculars. Expect to pay a commensurate price—three to four hundred dollars at least.

What are binoculars

Binoculars are twin barreled telescopes whose barrels are aligned to fall on the same spot. They are superior to a telescope insofar as they can be used with both eyes open—making long term viewing easier. Since binoculars are usually hand held, they are also more portable and faster to use than telescopes.

Binoculars are divided into two basic design classes: Porro prism and Roof Prism. Porro prism or "traditional binoculars" are wide-bodied. The big lens in front (the objective lenses) and the smaller one in back (the ocular lenses) are offset—i.e. not aligned along a vertical axis.

Roof prisms, which became popular in the late 60s and 70s are longer and sleeker in design with the objective and ocular lenses falling in alignment along the same tube.

Both designs have advantages and disadvantages. Because Porro prism binoculars have fewer internal "elements" (lenses and prisms) and more generous tolerance specs, they are generally brighter, less expensive to manufacture, and less expensive to repair in the event of a mishap. Roof prisms, though more expensive, also tend to be more rugged with elements more firmly anchored within the barrels. Many people also find Roof prism binoculars easier to hold steady for extended periods.

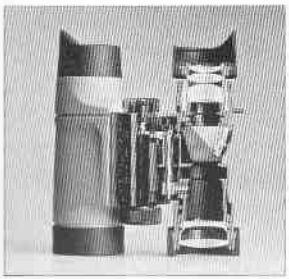
Binocular Shape

The important thing about binocular shape is how they feel in your hands. If you grasp a pair of binoculars and bring them to your eyes and your finger does not fall comfortably upon the focus wheel, or if you have to shift your grip to move the focus wheel, then the binoculars are poorly designed or too large for your hands. Put them back on the shelf.

Likewise, if you bring the binoculars up to your eyes but find that you cannot draw the eyepieces close enough to offer a single image, put them back on the shelf. The minimum

"interpupillary distance" offered by some models is simply not close enough to accommodate people with closely-set eyes.

Shape directly relates to how easily and steadily binoculars may be held and this directly affects image quality. "Mini" binoculars, favored by backpackers because of their reduced size and weight, offer little to anchor a shake-free grip so birders generally avoid them. Large, bulky or "Marine" binoculars force users to hold their elbows high and widely spaced, decreasing stability and increasing muscle fatigue. Birders avoid these, too.



Binocular Weight

Binoculars are literally a weight around your neck. How much you want to bear is up to you but in general, 20-30 oz. is about as much as most people care to consider.

The elements contributing to the overall weight in a pair of binoculars include: the optical elements, the body, and the outer covering. High quality optics, made of barium crown glass (BAK-4), are denser and heavier than optics made of the cheaper boro-silicate glass (BK-7). The quality of the image you see is directly related to the quality of the optics. To reduce overall weight, quality binocular bodies are cast out of aluminum or rugged space age synthetics. To help protect the internal elements many binoculars are "armored"—covered with shock absorbing rubber or polyurethane shell instead of a leather-type or guttapercha covering.

Focusing

Birding demands binoculars that focus quickly. When attention is diverted from a close-at-hand warbler, to a distant, fast disappearing hawk, time spent spinning the focus wheel to go the range of focus is, well, time spend spinning your wheels. A binocular that can go from close focus to infinity quickly and smoothly is invaluable in the birding arena.

Birding binoculars should be center focusing binoculars. This means that by moving a well positioned wheel, both barrels of a binocular are adjusted quickly and simultaneously. An individual eyepiece adjustment ring (or knob) is available to compensate for the small differences that exist between an individual's eyes. It is set once—then never again. Some military or marine binoculars offer individual eyepiece focusing—a system that employs adjustable rings that encircle both ocular lenses. This system is slow, cumbersome and therefore, ill suited for birding.

Some binoculars offer levers instead of wheels for "quick focus." These are appealing in theory but in fact require a two handed grip and a bit of dickering to get a sharp image. They also tend not to be very durable.

Some manufacturers also offer permanent focus or non-focusing binoculars. These would be fine, if birds never approached closer than fifty feet—which is about as close as permanent focusing binoculars can offer a clear image. But as birders know, birds do appear closer than 50 feet. In fact, sometimes—in cattail marsh, dense woodlands, or tropical forests, a bird might be no more than ten feet away and because of poor light or obstructing vegetation, an identification cannot be made with the naked eye. At times like these a binocular that offers super-close focus may make the difference between a Life Bird or a shoulder shrug—which is to say, all the difference in the world.

Birding binoculars should be able to focus down to 15 feet. Binoculars that offer a close focus down to nine or ten feet are prized. If you do a great deal of woodland birding, or watch

birds coming to your feeders at very close quarters, close focusing binoculars are a must.

Magnification

Binoculars come in different powers designated by the first number of the binomial legend etched on all binoculars (examples: 6 x 30, 7 x 42, 8 x 30, 10 x 42). The second number refers to the diameter of the objective lens in millimeters and will be discussed in the section dealing with "Light and Brightness.

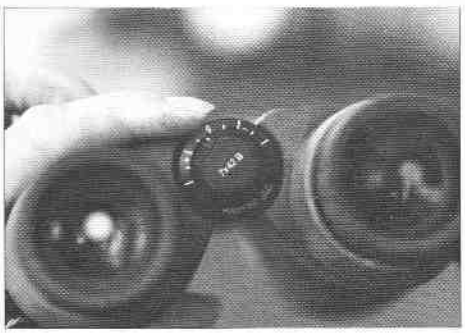
Simply put, a 6x binocular (six power) makes distant objects appear six times closer than they really are; a 10x binocular makes the object appear closer still—ten times closer.

The tendency is to believe that bigger is better—that the more "power" a binocular has, the better it will perform. This is not necessarily so and there are several reasons for this.

First, although higher magnification will increase the size of a distant bird and enhances the details that will be seen, increased magnification also magnifies the effects of hand shake and heart beat. The image may well be bigger but details, as measured by image perception, will remain essentially the same.

Greater magnification also results in a smaller field of view, a darker image, and a shallower depth of field—all of which directly affect binocular performance.

Almost all active birders use binoculars that offer between 7x and 10x. What magnification



you choose hinges on a number of considerations. In general, lower magnification is to your advantage if: (1) you are a beginning birder,

unpracticed at locating birds with binoculars; (2) you are a birder having difficulty holding higher magnifications steady; (3) much of your birding is conducted at close quarters in woodlands or rain forests or from the deck of a moving boat. (4) you are a highly skilled birder more interested in speed than in seeing "field marks" of birds you recognize by their JIZ (general impression and shape).

Ten power binoculars get the nod if: (1) your hands are steady; (2) most of your birding is conducted over great distance and open spaces; (3) you do not commonly include a spotting scope in your optical arsenal.

If you are still undecided between 7x or 10x binoculars, consider a compromise—like an 8x but NEVER BUY A ZOOM BINOCULAR! They are optically inferior and even at the lowest magnification, offer a comparatively limited field of view. If you look at the optic lines offered by the finest optical companies or if you look at the instruments in the hands of the finest field birders, you will never see a zoom binocular. This should send a clear message to the discerning consumer.

Light and brightness

Once—and not long ago; and not without reason—much was made about binoculars and brightness and light loss. Guides to purchasing optics expounded upon the mysteries of the "twilight factor," and "relative brightness," and "relative light efficiency." Sales people who know little about binoculars except, perhaps, how to read charts still expound upon these mysteries.

Certainly a bright image, offering sharp contrast and accurate color rendition is important to birders—in fact, it is essential. The fact of the matter is that since the advent of coated lenses...and multi-coated lenses...and phase coated Roof prisms...all the old rules governing

glass and light have been bent. If you are willing to pay the price for quality binoculars, you are virtually assured of owning binoculars that offer superior brightness.

The problem used to be this. Every time light strikes polished glass (like a lens; like a prism) 5% of it was lost, reflected away. In every binocular there are 10-16 glass surfaces whose cumulative loss of light equalled about 50%. The net result was a dark image.

In partial compensation, binocular manufacturers could increase the size of the objective lens. The size of the objective lens is measured in millimeters and appears as the second number of the legend stamped on binoculars (example: 7x42, 8x30, 10x50). Larger objective lenses allow more light to enter the binocular, increasing the diameter of the shaft of light that exits the binocular to fall upon the human eye. This shaft of light, seen as the bright dot swimming in the center of the ocular lens, is called the "exit pupil" and it is still an important consideration when buying optics. Here's why.

The human eye has a pupil, too—one that opens and contracts in response to light conditions. In bright light, it can narrow to about 2 mm. In poor light it can expand to about 7 mm (depending on your age) thus establishing the functional limit of the binocular's exit pupil—because any light falling outside the maximum limit of the human eye serves for nothing.

Beginning in World War II, it was discovered that a coating of reflection reducing material (like magnesium fluoride) applied to the surface of glass could reduce light loss caused by reflection from 5% to almost 1%. This coating appears as a blue, or purple, or green glaze on the lenses. Later it was discovered that by applying multiple, thin coatings instead of a single coating, light loss could be further reduced to a mere fraction of 1%.

Recently, several manufacturers of superior quality roof prism binoculars have begun coating the "Roof prism" with a material that compensates for the modest wave length shift inherent in the roof prism design with the result that

"phase-corrected" roof prisms offer the same sharp image contrast found in Porro prism binoculars.

The important consideration when buying binoculars is to make sure the optics are "fully coated" or, better still "fully multi-coated." The operative word is "fully" because this means that all air to glass surfaces both inside the binocular and out have been treated to reduce light loss. Different manufacturers use different, patented names to distinguish their coatings. The important thing is to be sure that all glass surfaces, inside and out, are single or "multi-coated" to reduce light loss.

The process used to coat binocular lenses is exacting and costly. It accounts for much of the price difference between quality binoculars and less expensive binoculars. But a commensurate price can also be your assurance that you are buying binoculars that are bright and sharp enough to perform in the field.

Field of View and Depth of Field

Field of view is the measure of the distance from one side of a binocular's image to the other as seen through a stationary binocular. This measurement, either inscribed on the binocular or included in the accompanying literature, may be designated in degrees of arc (ex: 6, 7); feet at 1,000 yards (ex: 415 feet at 1,000 yards); or meters at 1,000 meters.

However the measurement is noted, a wide field—one that offers no less than 6 degrees of arc or a minimum of 300 feet at 1,000 yards) is essential to birding. A wide field makes it easier to pick up and identify fast flying birds. It makes it possible to scan a sky, an ocean, or an open marsh quickly. It's also easier to locate birds at close quarters in a maze of branches.

Birding binoculars should also offer good depth of field—a sharp, adjustment-free image from near to far. A generous depth of field assists when trying to locate a close-at-hand

bird in a maze of branches. A generous depth of field mitigates the need to make focus adjustments every time a bird moves a little closer or a little farther away.

Both field of view and depth of field are closely related to magnification. In general binoculars with lower magnifications offer greater depth of field, and a wider field of view than binoculars with higher magnification.

Eye Relief

Very closely related to field of view, Eye relief refers to the distance between the ocular lens and the human eye. This distance is measured in millimeters. Eye relief is a very important consideration for birders who use eyeglasses in the field and who do not remove their eyeglasses when fitting binoculars to their eyes. Because the eyes of eyeglass wearers are already set 10-15 mm behind a glass barrier, they demand a very "high" eye point—a binocular that offers a minimum of 15 mm of eye relief. With rubber eyecups rolled down or otherwise retracted, eyeglass wearers can enjoy the same wide field enjoyed by non-eyeglass wearers.

NOTE: Just because a pair of binoculars comes with rubber eyecups does not mean they offer good or even adequate eye relief for eyeglass wearers. The test is in the length of the actual eye relief.

Weather Resistance/Water Proof

Birding is an activity conducted outside and from the moment a birder takes his or her binoculars outside, the outside is trying to get inside those binoculars. In general "Internal Focusing" binoculars are better sealed against dust, pollen, and moisture than "external focusing" binoculars. To tell the difference, move the focus wheel and see whether or not the ocular bridge moves.

A very few superior binoculars are water

proof (not "water resistant," not "weather resistant," not "splash proof"). They are waterproof—able to withstand complete emersion and remain dry inside. This is a difficult (and expensive boast) and binoculars that really are waterproof/submersible will certainly tout this.

You need not bird regularly in pouring rain to appreciate the benefits of well built, well sealed optics. The day you jump from your air conditioned car into a steamy Florida afternoon and train your now completely fogged binoculars upon the swallow-tailed kite soaring overhead will make you a convert.

Other Important Considerations:

Whether you are a World Series of Birding combatant, a rock climbing hawk watcher or a casual backyard birder who is meticulously careful with equipment—accidents do happen. All birding binoculars should be able to shrug off the occasional bump and ding. Superior binoculars are impervious to airline baggage handlers, children, and tumbles onto pavement precipitated by a combination of motion, gravity, and a fall to the roadway after being left on the roof of a car.

Well constructed, well sealed, armored binoculars offer another advantage. They need no special care—they don't even need to be returned to a case after use! Hang them up on the hook by the back door. Put them under the front seat of the car. They are there when you need them. Ready at a moment's notice without having to run to the closet...and grab the box from it's place on the top shelf (out of the reach of the kids)...and open the case...and remove the binoculars...and extract the plastic plugs that protect the lenses...and run back to the kitchen window....to study the vibrating branch where the bird (that just left) had been perched.

Lens protection is important so most manufacturers of quality birding binoculars include custom fitted rain guards with their optics package. Rain guards keep things like rain drops, salt spray, sandwich drippings and hot breath from obscuring optics in the field. They also help keep dust off lenses when the binoculars are not in use. Some binoculars also come with protective cups for the objective lens.

Binoculars should come with durable, supple, and adjustable neck straps. Leather straps are

chic but crack and rot under normal field use. Plastic straps loose their suppleness in cold weather and will loop when binoculars are raised—invariably falling directly between the ocular lens and your eye. Most quality binoculars now come with straps made of braided nylon. Wider straps help distribute weight evenly, saving wear and tear on a birder's neck.

Speaking of wear and tear, perfection is an ideal that optics manufacturers strive for. Filling the gap between technical precision and ideal perfection is the manufacturers equipment warranty. Quality optics come with a warranty that covers materials and workmanship. Again, a very few superior optics offer lifetime warranties to the original owner—a special bonus for those who purchase optics designed and built to last a lifetime.

Spotting Scopes

In time, after the birds of woodland and field have been mastered and savored, many birders feel compelled to reach for the horizon. They turn their identification skills upon migrating hawks, wintering seabirds or feeding shorebirds. This kind of birding involves careful study over great distances for extended periods and in this arena, a spotting scope is ideal.

Spotting scopes rest upon a tripod, a shoulder stock, or a specially designed window mount. Thus stabilized they make higher magnification possible, bringing birds on the horizon within reach. Popular powers include 20x, 30x, 40x and 60x. Zoom eyepieces are popular and do not, as a rule, suffer the shortcomings inherent in zoom binoculars. In fact, a few spotting scopes with zoom eyepieces offer exceptional optical performance.

Like binoculars, spotting scopes come in a range of quality and price and also like binoculars, you get what you pay for.

The Bottom Line

Birding is an activity that offers challenge, excitement, and a lifetime of pleasure. The better your optics, the less frustration you will know and more pleasure you will get out of birding.

When buying binoculars (and spotting scopes), the rule of thumb is simple. Buy the best binoculars you can possibly afford and buy them as soon as you can afford them. If you can't immediately afford the quality binoculars you want, tolerate the ones you have or borrow a pair from a friend. Save for the optics you really want. If you settle for less, you will only regret your half-step purchase until the day you replace them with the binoculars or spotting scope that you really wanted all along.

Good Birding! P.D.