

John Bortle's Dark Sky Scale

Class 1: Excellent dark-sky site. The zodiacal light, gegenschein, and zodiacal band are all visible - the zodiacal light to a striking degree, and the zodiacal band spanning the entire sky. Even with direct vision the galaxy **M33** is an obvious naked-eye object. The Scorpius and Sagittarius region of the Milky Way casts obvious diffuse shadows on the ground. To the unaided eye the limiting magnitude is **7.6 to 8.0** (with effort); the presence of Jupiter or Venus in the sky seems to degrade dark adaptation. Airglow, (a very faint, naturally occurring glow most evident within about **15°** of the horizon) is readily apparent. With a **12½"** scope stars to magnitude **17.5** can be detected with effort, while a **20"** instrument used with moderate magnification will reach **19th** magnitude. If you are observing on a grass-covered field bordered by trees, your telescope, companions, and vehicle are almost totally invisible. This is an observer's Nirvana!

Class 2: Typical truly dark site. Airglow may be weakly apparent along the horizon. **M33** is rather easily seen with direct vision. The summer Milky Way is highly structured to the naked eye, and its brightest parts look like veined marble when viewed with ordinary binoculars. The zodiacal light is still bright enough to cast weak shadows just before dawn and after dusk, and its color can be seen as distinctly yellowish when compared to the blue-white of the Milky Way. Any clouds in the sky are visible only as dark holes or voids in the starry background. You can see your telescope and surroundings only vaguely, except where they project against the sky. Many of the Messier globular clusters are distinct naked-eye objects. The limiting naked-eye magnitude is as faint as **7.1 to 7.5**, while a **12½"** telescope reaches to magnitude **16** or **17**.

Class 3: Rural Sky. Some indication of light pollution is evident along the horizon. Clouds may appear faintly illuminated in the brightest parts of the sky near the horizon but are dark overhead. The Milky Way still appears complex, and globular clusters such as **M4, M5, M15** and **M22** are all distinct naked-eye objects. **M33** is easy to see with averted vision. The zodiacal light is striking in spring and autumn (when it extends **60°** above the horizon after dusk and before dawn) and its color is at least weakly indicated. Your telescope is vaguely apparent at a distance of 20 or 30 feet. The naked eye limiting magnitude is **6.6 to 7.0**, and a **12½"** reflector will reach to **16th** magnitude.

Class 4: Rural / suburban transition. Fairly obvious light pollution domes are obvious over population centers in several directions. The zodiacal light is clearly evident, but doesn't extend even halfway to the zenith at the beginning or end of twilight. The Milky Way well above the horizon is still impressive but lacks all but the most obvious structure. **M33** is a difficult averted-vision object and is detectable only at an altitude of higher than **50°**. Clouds in the direction of light pollution sources are illuminated but only slightly so, and are still dark overhead. You can make out your telescope rather clearly at a distance. The maximum naked-eye limiting magnitude is **6.1 to 6.5**, and a **12½"** reflector used with moderate magnification will reveal stars of magnitude **15.5**.

Class 5: Suburban sky. Only hints of the zodiacal light are seen on the best spring and autumn nights. The Milky Way is very weak or invisible near the horizon and looks rather washed out overhead. Light sources are evident in most, if not all, directions. Over most or all

of the sky, clouds are quite noticeably brighter than the sky itself. The naked eye limit is around **5.6** to **6.0**, and a **12½"** reflector will reach about magnitude **14.5** to **15**.

Class 6: Bright suburban sky. No trace of the zodiacal light can be seen, even on the best nights. Any indications of the Milky Way are apparent only toward the zenith. The sky within **35°** of the horizon glows grayish white. Clouds anywhere in the sky appear fairly bright. You have no trouble seeing eyepieces and telescope accessories on an observing table. **M33** is impossible to see without binoculars, and **M31** is only modestly apparent to the unaided eye. The naked eye limit is about **5.5**, and a **12½"** telescope used at moderate powers will show stars at magnitude **14.0** to **14.5**.

Class 7: Suburban / urban transition. The entire sky background has a vague, grayish white hue. Strong light sources are evident in all directions. The Milky Way is totally invisible or nearly so. **M44** or **M31** may be glimpsed with the unaided eye but are very indistinct. Clouds are brilliantly lit. Even in moderate-size telescopes the brightest Messier objects are pale ghosts of their true selves. The naked eye limiting magnitude is **5.0** if you really try, and a **12½"** reflector will barely reach **14th** magnitude.

Class 8: City sky. The sky glows whitish gray or orangish, and you can read newspaper headlines without difficulty. **M44** and **M31** may be barely glimpsed by an experienced observer on good nights, and only the bright Messier objects are detectable with a modest-size telescope. Some of the stars making up the familiar constellation patterns are difficult to see or are absent entirely. The naked eye can pick out stars down to magnitude **4.5** at best, if you know just where to look, and the stellar limit for a **12½"** reflector is little better than magnitude **13**.

Class 9: Inner-city sky. The entire sky is brightly lit, even at the zenith. Many stars making up familiar constellation figures are invisible, and dim constellations like Cancer and Pisces are not seen at all. Aside from perhaps the Pleiades, no Messier objects are visible to the unaided eye. The only celestial objects that really provide pleasing telescopic views are the Moon, the planets, and a few of the brightest star clusters (if you can find them). The naked eye limiting magnitude is **4.0** or less.