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STATUS OF THE CATALINA SKY SURVEY

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ABSTRACT

In 2012 the Catalina Sky Survey (CSS) discovered a record 630 Near Earth Objects (NEOs), accounting for 63% of all NEO discoveries, including 41 Potentially Hazardous Asteroids (PHAs). CSS is currently in a period of expansion, recently commissioning a dedicated 1-m follow-up telescope, and initiating a collaboration with the Las Cumbres Global Observatory Telescope Network (LCOGT). The LCOGT collaboration provides a real-time, worldwide NEO follow-up capability using 1.0 and 2.0-meter telescopes in both hemispheres. In addition, significant upgrades are underway to the instrumentation of both the 0.7-m Schmidt and 1.5-m survey telescopes. New cameras featuring single monolithic 10k x 10k detectors are currently being built, which will increase the field of view (FOV) of the 1.5-m system by a factor of 4, to 5.0 deg^2. The FOV of the 0.7-m Schmidt will increase by a factor of 2.4, to a presently unmatched 19.2 deg^2. The spatial resolution of the detectors will also improve, to 0.77 arcseconds per pixel (“/pix) on the 1.5-m telescope (from 1.0”/pix), and to 1.5 “/pix on the Schmidt (from 2.5”/pix).

In tandem with the opto-mechanical upgrades, software development is underway to increase the efficiency and sensitivity of the acquisition and reduction pipelines, as well as to improve the graphical user interface tools. Central to the success of CSS is the fact that skilled observers visually validate each moving object candidate within minutes of detection, and can report NEO candidates and schedule follow-up observations immediately. The software improvements underway will allow CSS to

maintain the same level of real-time alertness, even with the significant increase in data rates from the larger cameras.

The increased FOV on both survey telescopes will enable modifications to our typical survey cadences. In addition to simply covering more area, we will be able to re-visit productive areas more frequently, or expose longer to increase our sensitivity to fainter NEOs. As part of the expected ~3,500 deg^2 per night of coverage with the 0.7-m Schmidt, a ~1,000 deg^2 opposition survey will be performed on a nightly or every-other night basis, to a limiting magnitude of V~20. This will better characterize the refresh rate of small NEOs through opposition, and increase the probability of discovering another small (~2-10-m), short warning-time impactor such as 2008 TC_3. The increased FOV of the 1.5-m will expand the coverage of this instrument to ~1,000 deg^2 per night, to a limiting magnitude of V~21.5. We will continue to focus effort on the near-sun “sweet spots”, which are still productive sources of undiscovered PHAs and large NEOs.