**THE PAN-STARRS1 SEARCH FOR NEAR EARTH ASTEROIDS.** R. J. Wainscoat[1], R. Jedicke[1], L. Denneau[1], and P. Vereš[1] [1]University of Hawaii, Institute for Astronomy, 2680 Woodlawn Drive, Honolulu, HI 96822, USA, rjw@ifa.hawaii.edu, jedicke@ifa.hawaii.edu, denneau@ifa.hawaii.edu, veres@ifa.hawaii.edu

**Introduction:** The Pan-STARRS1 telescope (PS1) is conducting a survey of the sky that includes a search for NEOs. PS1 discovered its first NEO in September 2010, and has been improving in efficiency since then. The present status of the NEO search will be described, and future plans will be explained.

**The Pan-STARRS1 Telescope:** PS1 is a 1.8-meter diameter telescope located near the summit of Haleakala, Maui, Hawaii. It is equipped with the world's largest digital camera, with almost 1.4 billion pixels. The telescope's field of view is approximately 3 degrees in diameter and approximately 7 square degrees in area. The telescope has been operating since 2010.

**The Pan-STARRS1 survey:** PS1 is conducting several diverse surveys of the sky that serve multiple science goals, ranging from cosmology to a search for Near Earth Objects. The surveys include the "3pi" survey of the entire sky north of –30 degrees declination (56% of the observing time), a medium deep survey of a small number of selected areas (25% of the observing time), and a dedicated search for NEOs using a wide "w" filter (presently 6.5% of the observing time). The amount of observing time dedicated to the NEO search is expected to increase late in 2012.

All observations are obtained as multiple exposures, which makes them suitable for searches for NEOs. The 3pi survey consists of 2 pairs of observations in each of the g, r, and i filters over an area of 2,500 square degrees near opposition during the course of a lunation. The 3pi survey is expected to run for three years, and will therefore cover the sky three times. The available medium deep fields are observed using 8 consecutive longer exposures on most nights. The observations dedicated to searching for NEOs usually consist of four staggered exposures. The NEO search is being conducted in the opposition ecliptic region and in the morning and evening sweet spots.

PS1 produces excellent astrometry, typically better than 0.15 arcsec, and astrometry for all moving objects closer than Jupiter is reported to the Minor Planet Center on a daily basis. PS1 has now observed the entire northern sky via the 3pi survey, and established a network of star observations that will enable delivery of asteroid photometry of unprecedented precision.

**Pan-STARRS1 NEO discoveries:** PS1 discovered 18 NEOs in 2010, 173 NEOs in 2011, and is likely to discover a substantially higher number of NEOs in 2012. In addition, PS1 has rediscovered a substantial number of previously discovered, and subsequently lost NEOs, and continues to do so. PS1 discovered 11 large (H<18.3) NEOs in 2011 (27% of the total number of large NEOs discovered), and continues to discover some of the larger undiscovered NEOs.

About half of the 3pi observations are obtained as "quads" that consist of pairs of g and r, r and i, or g and i observations. These observations may therefore yield colors of NEOs, enabling future comparison of NEO colors with colors of main-belt asteroids.

**Discovery of comets by Pan-STARRS1:** The data from PS1 are also routinely searched for extended moving objects, using software that is designed to search for extended PSFs. In 2011, PS1 discovered 3 Jupiter Family comets, 1 main-belt comet, 1 active Centaur, and 3 long period comets. The long period comet discoveries include C/2011 L4 (PANSTARRS), which is expected to be visible to the naked eye in 2013, when it is near perihelion. Astrometry from all comets observed by PS1 is reported to the Minor Planet Center on a daily basis.

**Future plans for Pan-STARRS1:** To date, most NEO discoveries have been based upon observations involving three or more detections. Recent work has shown that detections from pair data are reliable provided that they are carefully screened, and the first discoveries of NEOs from pairs of observations have been made. We expect that the pair data, which is typically obtained by PS1 4 times per lunation, will result in a substantial number of new NEO discoveries. These are likely to include some larger distant NEOs that have motions that are more typical of main-belt asteroids, and are therefore remaining undiscovered because their digest scores are low. A substantial amount of historic pair data has not yet been submitted to the Minor Planet Center, and will also likely produce NEO discoveries.

An upgrade to the PS1 detectors is being considered, and would lead to a substantial increase in discovery efficiency.