

Assessment of the Risks for Siting the Thirty Meter Telescope on Mauna Kea

October 26, 2007

I. Introduction and Background

This document reports on The Keystone Center's (Keystone) independent risk assessment regarding a possible siting of a Thirty Meter Telescope (TMT)¹ on Mauna Kea on the Island of Hawaii. All findings, conclusions, and options for consideration in this report are solely the opinions of Keystone and do not reflect the views of The Gordon and Betty Moore Foundation, the TMT Observatory Corporation, or anyone other than Keystone. The Keystone Center, founded in 1975, exists for two interrelated purposes: to help solve today's most pressing, science-intensive environment, energy, and public health problems and, simultaneously, to help prepare the next generation to take the reins and do better than their predecessors. Keystone takes no position on the issues it becomes involved in but seeks to help analyze, design, and facilitate discussions when requested and when appropriate. Detailed information about Keystone is available at www.keystone.org. This analysis was conducted by Peter S. Adler, PhD, President and Janesse Brewer, Senior Associate.

The Gordon and Betty Moore Foundation is dedicated to advancing environmental conservation and cutting-edge scientific research around the world. The Foundation is a funder of the development stage of the Thirty Meter Telescope project and a potential funder for the construction of the telescope. In late June 2007, the Foundation asked The Keystone Center to undertake an independent assessment of the feasibility of siting the Thirty Meter Telescope on Mauna Kea in Hawaii. More specifically, the Moore Foundation asked that the assessment consider the environmental, economic, scheduling, and political risk factors for a TMT project in Hawaii, and that Keystone suggest one or more approaches for how TMT might work with interested stakeholders for the potential siting of the TMT in Hawaii should it go forward (Attachment A).

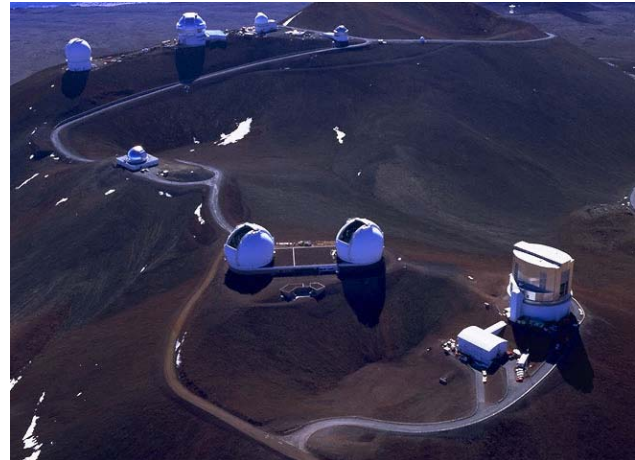


Photo courtesy of <http://www.ucolick.org>.

II. Method

After designing an interview protocol, Keystone conducted a set of interviews with Hawaii state regulators, political and community leaders, environmental NGOs, Native Hawaiian thought leaders, educators, members of the business community, and others who might help inform the assessment. Keystone identified the initial set of interviewees through its contacts in Hawaii and by using a rolling "snowball" method. In total, Keystone talked to over 60 stakeholders. While it was impossible to talk with every potential stakeholder, Keystone sought a diverse sample of perspectives including known

¹ This report uses TMT interchangeably to represent the telescope, the project, and the non-profit TMT Observatory Corporation.

project opponents, known proponents, political “gatekeepers” and decision makers, and individuals who did not seem aligned with any specific position but who are reasonably knowledgeable of the mountain and its issues. The list of interviewees is located in Attachment B.

We characterized our initial telephone conversations as a set of “shallow dives.” These were phone interviews from Colorado to Hawaii that usually lasted an hour or less for each person. The calls helped to orient Keystone, identify prospective interviewees, refine the method, and provide a preliminary sense of different stakeholder perspectives regarding Mauna Kea telescope issues. “Deep dive” interviews took place in person at meetings held on Oahu and Hawaii from August 24–September 9, 2007. These interviews delved into much greater detail on potential hurdles, flash points, delays, and showstoppers should TMT decide to pursue a site on Mauna Kea.

Additionally, The Keystone Center asked most interviewees with a working knowledge of Mauna Kea issues to do a simple “probabilistic analysis” of their views on the likelihood of different scenarios coming to pass. The question posed was, “What do you think will happen, as opposed to what you may hope, fear, or want to have happen?” While this analysis was presented in a somewhat whimsical format as a series of “bets,” the methodology is grounded in prediction theory and provides a rough quantitative sense of how different stakeholders view TMT’s risks and probabilities should they go forward with a Mauna Kea site (Attachment C).

III. Caveats

We do not offer this report as a definitive picture or analysis of all risks. It is a snapshot constrained by a short time frame, a limited cross-section of persons interviewed, and by events taking place in real-time even as the interviews were underway. With additional time, there are many other people we would have sought to meet with and interview. Our intent throughout the process was to courteously but intentionally go to the heart of the issues that TMT would encounter should it pursue a Mauna Kea site. We apologize to the many good people we would have liked to have spoken to but could not because of the press of schedules. We are especially appreciative to Mr. Sam Callejo and Ms. Stephanie Nagata for their assistance in coordinating and scheduling some of our meetings on Oahu and Hawaii.

IV. Findings

1. **The “Bets.”** Our small and very limited probabilistic analysis device of asking interviewees what they think will happen (as opposed to what they want to have happen) yielded interesting results, as follows:

	Bet Question	Betting \$100 <u>for</u>	Betting \$100 <u>against</u>
1	The revised Comprehensive Management Plan will be completed by May 1, 2008.	N = 12 (34.3%)	N = 23 (65.7%)
2	The revised Comprehensive Management Plan will be a solid document and not be further challenged through appeals or litigation.	N = 4 (12.5%)	N = 28 (87.5%)
3	A new lease for the summit will be successfully negotiated and put in place by June 2008.	N = 10 (29.4%)	N = 24 (70.6%)

	Bet Question	Betting \$100 for	Betting \$100 against
4	The University of Hawaii and the State of Hawaii will agree to distribute ceded land payments from the Mauna Kea observatories by April 2008.	N = 12 (35.3%)	N = 22 (64.7%)
5	A robust and culturally appropriate consultation process can be set up between members of the Native Hawaiian community and the TMT project.	N = 28 (82.4%)	N = 6 (17.6%)
6	The TMT can create new educational opportunities for Native Hawaiians and others on Hawaii Island.	N = 31 (93.9%)	N = 2 (6.1%)
7	The potential environmental impacts of the TMT can be satisfactorily mitigated.	N = 28 (84.8%)	N = 5 (15.2%)
8	The visual impacts of the TMT can be satisfactorily mitigated.	N = 21 (68.8%)	N = 13 (38.2%)
9	A satisfactory environmental impact statement that is not appealed or litigated will be completed by June 2010.	N = 17 (48.6%)	N = 18 (51.4%)
10	A Conservation District Use Permit will be approved by April 2011.	N = 25 (75.8%)	N = 8 (24.2%)

We offer the following specific cautions on these results. First, this was not meant to be a highly-rigorous, scientifically-calibrated survey, but rather it was intended to provide further insight as to where our interviewees would “put their money” regarding the various risks TMT might encounter were it to proceed. Second, it is a very small sample of people. Third, if we were revising the questionnaire, we would probably alter some of the questions. For example, the use of the word “can” in questions 5–8 may have given us slightly different data than if we had asked whether there was “confidence in” or even if we had said “will be” or “is/are likely to be.” In walking through the questions many participants remarked, “Well sure it *can* be done. It is possible. Whether I have confidence that it will be is a different question.” Finally, question 9 probably should have been broken into two questions to determine whether interviewees felt that any environmental impact statement (EIS) would be appealed or litigated and, second, whether an EIS conducted by TMT could be logically completed by June 2010. It is unclear if the results would have been different by de-coupling those concepts.

With those caveats in mind, we think the bets do offer more calibrated echoes of what we heard in the conversations and have summarized below.

2. **The Interviews.** Our interviews produced many thoughtful comments, perspectives, and ideas. Five major themes emerged:

- A. **A Sour History and Heavy Baggage.** Unfailingly, almost every interviewee we spoke with, even those who are great proponents of placing observatories on Mauna Kea, acknowledge a complex and, for many, a bad history on the mountain. Hawaiians, both Native and non-Native, speak of poor planning, bureaucratic bumbling, broken promises, technocratic arrogance, and a persistent failure to engage the Native Hawaiian community in meaningful and appropriate ways. Some of this has been reported in two legislative audits. While there are many fine individual efforts underway to rectify long-running problems, the situation remains contentious and confusing. Should TMT decide to pursue a Mauna Kea site, it will

inherit the anger, fear, and great mistrust generated through previous telescope planning and siting failures and an accumulated disbelief that any additional projects, especially a physically imposing one like the TMT, can be done properly. One interviewee said of future development, “It can be less objectionable, but it can’t be alright.”

- B. Land Use, Not Astronomy.** In our discussions with a number of Native Hawaiians, we were repeatedly told that the objections that have been brought up over many years are not to astronomy but to land use practices on a mountain that is revered and sacred. Hawaiians were, and are, great astronomers. What we think of and often dichotomize as traditional “Native Science” and “Western Science” sit very comfortably for most Native Hawaiians. The ‘Imiloa Astronomy Center is a fine example of this. Most objections are not to science but to the way science has been conducted on the mountain. There is a long litany of perceived problems that includes poor master and management planning, placing telescopes on inappropriate sites, poor disposal of rubbish and waste, the failure to consult Native Hawaiians in management decisions, and inadequate access for cultural and spiritual practices. We make no judgment as to the veracity of these concerns, but note that they will be an inevitable part of any future interactions should the TMT proceed.
- C. Legal Confusions and Bureaucratic Ambiguity.** Considerable jurisdictional, legal, and bureaucratic wrangling remains as to which agencies actually control what actions on the mountain. There are at least two large and ambient sets of tensions. One has to do with the role of the Board of Land and Natural Resources (BLNR, the land owner) and the other with the University of Hawaii (UH, the lessee). The first is, in part, a legal problem as to who actually has what authorities to write and enforce rules. The second tension is within the University of Hawaii itself and its many moving parts: the University of Hawaii’s Board of Regents, the system office (the president and his administration), the Institute for Astronomy (IFA), the University of Hawaii at Hilo, the Office of Mauna Kea Management (OMKM), and a number of key vice presidents and advisors to the president. Embedded in this second tension are questions as to which campus and community on which island, Oahu or Hawaii, really leads and controls. People want to know who, in effect, holds the cards. Many of these inter-island and inter-campus strains are old and continuing issues played out against the newer tapestry of Mauna Kea questions. They have now come to a head in the wake of Judge Hara’s order requiring that a Comprehensive Management Plan (CMP) be done for the mountain as a precursor to any further development. However, the continuing confusions and wrangling over the University’s different faces, voices, and roles creates potential delays for TMT should it decide to proceed.
- D. Leadership Vacuum.** One function of having so many people in charge of so many different related, overlapping, and connected functions is that no one actually appears to be in charge. One respondent characterized the situation as “multiple layers of advisers to advisers to advisers to nobody.” In the past, the IFA appeared to be the key leader for both the vision of astronomy on Mauna Kea as well as the critical point of contact for policy issues, management problems, and cultural frustrations. As well intentioned as they are, we were told by many different individuals that the IFA has failed in its interactions with non-university communities of interest. Individually, the astronomers associated with IFA are liked and respected. Collectively, they have lost their effectiveness and are the wrong group to lead Mauna Kea strategies or be the face and voice for UH interactions on the Science Reserve. Many of these long-running frustrations led to the 2000 Master Planning process and the development of the Office of Mauna Kea Management, which was expected to have greater authority and nimbleness in its responsiveness. While OMKM enjoys a solid relationship with many on Hawaii Island, many still perceive that UH-Manoa is in charge and

that OMKM does not have the weight and independence to negotiate solutions to local concerns. OMKM must continually “run things up the flagpole” when it comes to most issues.

We were surprised at the lack of strong and assertive leadership from other parts of the political map as well, whether it be the Board of Regents, the Governor, BLNR and the Department of Land and Natural Resources (DLNR), the legislature, or the president of the university. There are indications that this could change in the very near future if President McClain’s involvement becomes more evident and prominent. As many interviewees suggested, and Judge Hara’s August 6, 2006 ruling indicated, there is a need for more active leadership by BLNR. The former chairman of BLNR, Peter Young, was highly engaged on Mauna Kea development issues and by several accounts was bridge-building with the most vociferous of opponents towards the end of his term. However, given the recent changes at DLNR and Laura Thielen’s short time on the job, it is too early to tell what level of BLNR leadership will be applied toward Mauna Kea issues.

E. **Continuum Politics: Hard on the Edges, *Kanalua* in the Middle.** As with many controversial issues in Hawaii, there is a hard core of proponents at one end of the political continuum who believe science should always trump culture and, at the other, an equally strident core that believes culture should always supersede science. More towards the middle are many people who, at least at this moment, are *kanalua* (“dubious” or “skeptical”) that the legacy of contention over Master Plans, management practices, and the Outriggers project can be overcome. We spoke with a number of individuals, including a number of Native Hawaiians, who would love to support a culturally sensible and environmentally sensitive science industry on Hawaii Island, but who cannot do so at the moment. Sentiments against further telescope development are strong. Should TMT choose to proceed, it will need to reach out extensively to the skeptics and critics as well as to those supporters who remain publicly quiet. Much of the burden for this does not lie within TMT’s control and maybe not even within its influence. The burden sits squarely with the University of Hawaii and the State of Hawaii. One respondent put it this way, “The university needs a catalyst that will ignite the silent majority of Native Hawaiians who really care deeply about both science and Mauna Kea, and who do not believe one automatically forecloses the other.”

3. **The Gauntlet.** After more than 60 interviews, we have an increased understanding of the “gates,” hurdles, and tripwires that a potential project will need to pass through. That being said, it is not an understatement to say that there are a multitude of interpretations and confusions that will need to be sorted out in the process. To succeed at a Mauna Kea site, TMT must run a gauntlet that entails a number of potential challenges, not all of which are of TMT’s making and some of which could be potential showstoppers if TMT’s schedule and timing do not have great flexibility. One opponent described this gauntlet as potential opponents having “fifty bites at the apple.” Our interviews tell us the following:

A. **Comprehensive Management Plan.** The path the CMP must travel is complicated, poorly-marked, and subject to potential showstoppers if TMT’s timeline remains tight. Prior to the legal challenge brought by *Anaina Hou et. al. v. Board of Land and Natural Resources*, OMKM had initiated work on a cultural and biological plan that would guide its own efforts on the mountain regarding the stewardship of natural and cultural resources. Sections of this plan are being drafted now. Judge Hara’s ruling on August 6, 2006 effectively put further telescope development in abeyance pending a completed CMP and instantly placed OMKM’s work in a legally and politically more volatile context. Unfortunately, Judge Hara gave no guidance as to what must be in the CMP and the conservation district rules do not offer much

help or direction.

As of this writing, a proposed plan is being developed by various authors within the UH system (OMKM and consultants to UH's VP for Legal Affairs). It is unclear whether this plan will need approval by the UH Board of Regents. There has been little or no consultation with CMP stakeholders, including those opponents who litigated the matter in Judge Hara's court. That also may change as UH has secured the services of a reputable Hawaiian consultant team to assist with the CMP and other Mauna Kea-related issues.

We understand any new CMP must ultimately be brought to BLNR for approval because the conservation district rules for obtaining a conservation district use permit (CDUP) require an approved management plan for all astronomy projects. Should that be the case, it is unclear whether BLNR could act on a draft CMP or choose to not act on it until they actually have a conservation district use application (CDUA) in front of them for a new telescope project. Finally, should the CMP embody any new development features (number, placement, and timing of telescope development), as opposed to pure management practices, it could trigger administrative litigation in the form of a contested case hearing and possibly an EIS.

- B. **Master Plan.** The 1983 Complex Development Plan, of which BLNR approved only the Management section (and not those portions dealing with future development or the number of telescopes), references a 1982 Research Development Plan which the Board of Regents approved. That Research Development Plan allows for up to 13 telescopes. Our interviews lead us to believe that the university intends to take at least two older telescopes down, but there is no clarity yet as to: (a) which telescopes would come down; (b) by when (since leases run until 2033); (c) who has the authority to remove them; and (d) who, if anyone, might need to consent to removal. Further, some respondents believe that the Master Plan might need to be amended should any new telescope require a new site to be disturbed and developed or should it include new statements about the number and longevity of telescopes. While the Master Plan did indicate the future development of the site commonly referred to as "13 North," there may be other developments or redevelopments that may call for amendments to the Master Plan. Additionally, while previous DLNR interpretations were that BLNR did not need to approve the Master Plan, some believe that Judge Hara's ruling indicates a desire for DLNR to increase its oversight of all plans affecting development and management of the Mauna Kea Science Reserve.
- C. **Lease Negotiations.** The University of Hawaii holds the Master Lease for the Science Reserve from the State of Hawaii. Similar to many other state leases, UH pays one dollar a year for their lease. The Master Lease expires in 2033. Dollar-a-year leases of land zoned for conservation are a sensitive issue in Hawaii, especially so for the Mauna Kea Science Reserve, which involves long-standing cultural conflicts. Should TMT require a new lease as a condition for pursuing a Mauna Kea site early next year, and should legislative approval be required, a lease may need to be renegotiated by January or February of 2008 in time for the next legislative session. One very politically seasoned respondent who is not aligned nor positioned on Mauna Kea issues believes that a new lease will be the single-most challenging issue on the gauntlet described in this report.
- D. **Ceded Lands.** The Science Reserve sits on ceded lands, another long-standing and highly contentious issue. The manner and amount of ceded land payments that should be made from the State to one or more Hawaiian entities for all such lands has never been negotiated at a global level, though discussions have been ongoing for many years. Nor is it likely to be in the near future. This problem adds additional complexity to the lease questions discussed

above. In our interviews, we heard estimates that the real currency among telescopes and astronomers is observation time, which one person estimated to have an annual \$10 million value. It is unclear if this is based on an audited number. Hawaiians routinely talk of a 20% ceded land payment. President McClain's recent Convocation speech indicates a substantial increase in educational aid for Native Hawaiians, but there is no specific nexus to Mauna Kea.

- E. **Visual Impact.** Should the TMT proceed with a Mauna Kea site, it will be the largest structure on the mountain. It will be physically imposing and visible from Waimea on the north side of the island if it is sited at or around test site 13 North. Sheer size will draw criticism and controversy, and questions about how to mitigate its visibility are inevitable.
- F. **Environmental Impact Statement.** TMT will need to undertake a thorough impacts analysis that arrays alternatives, addresses disturbances, and identifies mitigations as appropriate. While NEPA is not formally triggered unless a federal agency becomes involved in the TMT proposal, TMT is required to perform a State EIS, which must be approved by the Governor and has the potential for litigation. Traditionally, EIS documents are a battleground for development projects and it would seem likely that TMT will be a magnet for litigation, especially if the prior issues (CMP, lease, ceded land payments, visual issues) have not been meaningfully addressed and resolved. Both the PanSTARRS and ATST environmental impact statements are currently behind schedule.
- G. **Context and Timing.** It is important to note the context and the timing of TMT's interest in pursuing a Mauna Kea site. The halting of the Outriggers project is attributed by some to NASA budget cuts and by others to victory by the plaintiffs in *Anaina Hou et. al. v. Board of Land and Natural Resources*. The PanSTARRS EIS, telescope issues on Haleakala, unsettled clean-up issues on Kaho'olawe, EIS concerns for the Superferry on Kauai and Maui, disputes over depleted uranium shells, and the realignment of the Saddle Road on Hawaii Island may fuel environmental issues related to TMT.
- H. **Consultation.** The history of poor or no consultations with Hawaiians, both Native and non-Native, was chronicled repeatedly in our conversations as a serious problem. None of this is TMT's fault, but all of it will be inherited. We heard many criticisms in our interviews, among them the following. As before, we make no comment on the veracity of these statements and simply report them as major themes from the interviews.
 - i. **Benefits.** The Native Hawaiian community derives little to no benefit from the Science Reserve. In contrast, the State of Hawaii, the University of Hawaii, UH scientists, and the Hawaii Island business community derive much benefit, none of which seems to flow back in the form of cash, education, and community enhancement for Native Hawaiians. If there is some trickle-down effect for the greater Native Hawaiian community, it is invisible.
 - ii. **Discouragement.** The long-running history of disputes on Mauna Kea has been disappointing for many who are deeply supportive of both Native Hawaiian culture and a solid Hawaii Island science industry. Moreover, possibilities for a successful reconciliation of the two are, for many, diminishing. "It is the wrong mountain at the wrong time by the wrong people," one interviewee told us. "It might have been right 20 years ago, but not today. They've broken our hearts." Alternatively, we also heard the

following from another knowledgeable interviewee, “The community is winnable, but it is far from automatic and by no means guaranteed.”

- iii. Patterns of Practice. Some of our interviewees do not believe the history on Mauna Kea is an accident of miscommunications. They described the situation as “a pattern of practice,” of not doing things that the public wants and that, in some cases, the law requires. As we probed these comments, we came to understand them as a kind of cumulative comment on the making of long-term plans for the mountain and a surrogate for issues regarding past telescope construction and operation, poor cultural and environmental management, and, most especially, the failure to consult. Most prior attempts at consultation, we were told, have been led by well-intentioned scientists from IFA in the face of specific proposed new telescopes. OMKM was praised for being more knowledgeable and sensitive to local consultation, but criticized for having no meaningful authorities or resources to make real and implement real policy and management decisions. One interviewee put it this way, “Letting the scientists lead has created a cultural disconnect of epic proportions.”
 - iv. Mutual Disconnect. Native Hawaiians repeatedly told us they feel “run around” by state officials. Interestingly, some state officials and astronomy proponents have very similar feelings of being sent in circles to talk to different Hawaiian groups and organizations, only to see those conversations hijacked by the shrillest and most strident opponents while actual supporters stay silent. A few people quietly told us they do not know who among Native Hawaiians they should seek reliable guidance from nor how. “One Native Hawaiian says talk to *kupuna*. Another says speak with young people. Others say talk to well-known cultural practitioners from hula *halau*, while others say they are the wrong people. Some tell us to conduct consultations through public meetings. Others tell us it is a waste of time. Who do we believe?”
- I. **Conservation District Use Permit**. Should TMT decide to pursue a Mauna Kea site, a CDUP will be required. This final “license to operate” will require a satisfactory EIS and may also prove to be a final point of contest should many of the previous issues not be resolved.

V. Keystone’s Conclusion

Should TMT decide to proceed, it will face serious “headwinds” as described in the findings above. There are also some potentially favorable “tailwinds” if some of the problems described above can be confronted and meaningfully resolved, first by the University of Hawaii, then by the Board of Land and Natural Resources, and then by the TMT itself.

However, we believe there will be no fast track to bringing the TMT to Mauna Kea. Potential funders and supporters of the project must be prepared to be extremely patient and pay a premium in social, political, and legal transaction costs. There are serious risks to TMT’s proposed schedule. Even those who support additional development on the mountain told us that it will be a lengthy process and one that cannot be rushed. The hard reality is that it will need to proceed on timelines and deadlines established in Hawaii by different groups and agencies, most of whom are not presently coordinated and some of whom are antagonistic to further telescope development. Furthermore, we believe that having a tight timeframe and a simultaneous development project like TMT in the works makes it even more difficult to have the broad community conversations that are necessary for drafting a satisfactory CMP and working through issues related to leases and ceded land payment questions.

Given the present political climate, we believe there is a high probability that litigation will occur that will negatively affect TMT's schedule of pending telescope permitting and construction, so far as we understand that schedule. Based on our interviews, we believe that the CMP, possible Master Plan revisions should those be needed, and lease negotiations will be particularly sensitive and open up junctures for legal and political contests. If we were asked to make bets (as we asked our interviewees to do), we would place our wagers on further litigation, first regarding the CMP, then regarding the lease, and finally over TMT's EIS. While rulings can and often do differ from judge to judge, there is precedent for an active and engaged Hawaiian Judiciary on controversial issues that involve EISs (see, for example, the Hawaii Supreme Court's 106-page Superferry decision). Furthermore, given the high-profile nature of issues related to Mauna Kea, there is always the possibility that the legislature could choose to become more involved. Such action could potentially bog matters down further unless the legislature is unified enough to take a positive leadership role.

VI. Options for Consideration

As stated previously, all findings, conclusions, and options for consideration in this report are solely the opinions of Keystone and do not reflect the views of The Gordon and Betty Moore Foundation, the TMT Observatory Corporation, or any of the individuals and groups we met with. In fact, should a decision be made to proceed, many aspects of a successful siting will be out of the control of TMT, the Moore Foundation, and any other potential funders. However, the Moore Foundation's significant interest in funding a Thirty Meter Telescope project ensures that it is an important stakeholder with significant influence. We suggest the following ideas for consideration:

1. **Insist on high-level leadership from the university.** The confusions and ambiguities within the UH system and between UH and DLNR create a decision-making vacuum. Fresh leadership is now essential. Given the long-standing history of distrust, increased and high-level political attention is needed on Mauna Kea matters. This will require direct meetings with some of the most respected senior Native Hawaiian voices on the Island of Hawaii, managing the many internal offices within the UH system, and interacting with the Office of Hawaiian Affairs (OHA), DLNR, and the Governor's office. One person with the fullest possible negotiating authorities should serve as a key point of contact on matters pertaining to the lease, the Master Plan, the trajectory of the CMP, and overall relations with the Hawaiian community. If that person is from Oahu, it may inevitably exacerbate the long-running push-pull between Oahu and Hawaii. If that person is from Hawaii, they may not have the fullest access to the many state level entities and individuals who must play a role in solving the problems discussed in this report. Regardless of where it comes from, without this more singular leadership, TMT will likely flounder in a continuing morass of different agencies, offices, organizations, and the continuing concerns of those who favor or oppose telescopes on Mauna Kea. Mistakes have been made in the past regarding UH's interactions with the Native Hawaiian community vis-à-vis policy formation, management, and telescope development planning. While we believe that none of these was intentional, they were mistakes nonetheless and the current result is great mistrust.
2. **Request an early role-clarification meeting between UH, DLNR, and TMT.** Should TMT decide to pursue a Mauna Kea location, we strongly urge that the key decision-making and "gate-keeping" entities involved in such a decision come together to develop a common pathway for the CMP, coordinate if and how the Master Plan may need to be revised, discuss any proposed new leasing arrangements, and further discuss any possible ceded land obligations. Legal counsel for each of the agencies should be engaged in these meetings or be available on-call for clarification of legal issues

and precedents. Once this group of stakeholders has a common set of understandings, it will be helpful to expand these discussions to include others from the Native Hawaiian community on Hawaii Island as well as OHA. Some of the questions that might be taken up by initial and/or expanded discussions include:

The CMP

- What are the working assumptions about what the CMP needs to entail?
- What is the flowchart of “gates” and the “approval chain” for the CMP?
- Can the CMP be approved internally by DLNR, or does the CMP need to be approved by BLNR?
- Is the CMP contestable? If so, how, when, and where?
- Will there be opportunity to provide public comment?
- Can the CMP be approved independent of a CDUP application?

Master Plan

- Does the present Master Plan need to be approved by BLNR?
- What is the flowchart of “gates” of the “approval chain” for any revised Master Plan?
- If the CMP consultations result in necessary amendments to the Master Plan, how will this occur?
- Can the sequencing of a revised Master Plan and CMP be concurrent?
- Is a revised Master Plan contestable?
- Will there be opportunity to provide public comment?

Lease and Ceded Lands

- What is the flowchart of “gates” or the “approval chain” for a new lease or revisions to the existing lease between DLNR and UH?
- Does the legislature ultimately need to approve a new lease or revise this lease? If so, what is the timing to ensure this is handled in the appropriate legislative session?
- Can a different entity (other than UH) apply for the Science Reserve lease?
- Can a different entity (other than UH) lease a potential TMT site independently of the rest of the Science Reserve?

EIS Requirements

- If a TMT proposal proceeds, who is the responsible party for developing an EIS?
- What level of analysis for the State EIS will be done and by whom?
- How do you go about choosing a good EIS preparer given the baggage of past EIS processes?
- What kind of public engagement can stakeholders anticipate?

CDUP

- If a proposal for TMT proceeds, what is the flowchart of “gates” or the “approval chain” for a new lease or revisions to the existing lease between DLNR and UH? We understand that the Office of Mauna Kea Management Board has developed this material, but it should be reviewed and understood by each of the entities involved.
- Is this contestable?

- Will there be opportunity to provide public comment?
3. **Organize a meeting with a high-level Native Hawaiian delegation.** If UH is serious about creating a new and enduring relationship with the Native Hawaiian community, which they appear to be, they must seek out a series of substantive conversations with representative Hawaiian organizations early in this process and conduct them at an appropriate site. The focus should be on disentangling past issues and creating new understandings of what it would mean for UH, DLNR, the Gordon and Betty Moore Foundation, the TMT Observatory Corporation, and others with long-term science interests to be “good neighbors” with Native Hawaiians and others who deeply treasure Mauna Kea for values other than advancing science. The conversations must go slow and not focus on the TMT. As one person told us, undertaking relationship building while simultaneously pursuing a specific project like TMT is akin to flying an airplane while you are trying to build it.
 4. **Find a Hawaii-based attorney that can advise on the legal implications for various issues.** Given the complexity of the issues and the decision paths for the CMP, Master Plan, lease, ceded lands, and a CDUP, we highly recommend that TMT find a Hawaii-based legal counsel who understands the legal issues and their precedents in Hawaii’s courts. Legal counsel should particularly advise on implications regarding the lease, which many have stated is one of the major potential tripwires.
 5. **Consider pulling together a “lessons learned” roundtable.** The Subaru and Gemini telescope teams were both cited by some of our interviewees as having reasonably positive ongoing relationships with local communities. The Japanese-owned Subaru telescope may have an important perspective as they know and understand old cultures, sacred mountains, and native peoples. Gemini has an extensive and well-staffed outreach program that enjoys community recognition and good, independent working relationships. The ‘Imiloa Astronomy Center’s consultation process sought to find a special balance between culture and astronomy, and most believe they have succeeded in a remarkable way. The Center will have important lessons learned to share with UH, TMT, and others seeking pathways for honoring the mountain while maintaining a thriving astronomy program.
 6. **Undertake both broad and deep consultations with Native Hawaiians.** Should TMT decide to proceed, discussions with the Native Hawaiian community will be imperative. In partnership with UH and DLNR, we recommend that the Moore Foundation and TMT perform the broadest possible range of consultations with the widest possible range of stakeholders in the Native Hawaiian community on Hawaii Island. Avoid fancy public relations splashes and glossy media campaigns and hire Hawaii talent, those with Hawaii Island roots, and those who are trusted by everyone to pave the way and provide guidance. Additional on-island meetings and outreach with non-Native Hawaiians will also be important. Again, it will be important to acknowledge the long and difficult history that has taken place before the proposed TMT project.

In our interviews on Hawaii Island, stakeholders also emphasized the importance of appropriately weighting the input of Native Hawaii Island stakeholders, most especially those with direct lineal connections to the mountain. While Mauna Kea is a sacred treasure for all Native Hawaiian people, people on Hawaii Island have, in the past, resented their input being weighed equally with the opinions of Hawaiians from other islands. Each island has its unique communities and these distinctions are important, understood, and respected by Native Hawaiians from other islands.

7. **Start by confronting the toughest issues raised by the most vociferous opponents.** Even though many people remain *kanalua* and undecided about the future of science on Mauna Kea, there is a small but vociferous opposition to any further telescope development. The tendency in many consultative processes, especially if litigation is in the air, is to not talk with opponents. We take an opposite view and would urge that they be at the proverbial negotiating table when solution-oriented

discussions begin. We understand there to be three big issues that must ultimately be discussed: (1) future telescope development on Mauna Kea; (2) fair payment for the use of the mountain and good accompanying benefits for the community; and (3) the creation of an independent and involved management authority with decision-making powers. These are discussions that must be undertaken, not just by UH, but with other telescope operators, any prospective TMT team, and others. In consultation with Native Hawaiians, TMT will want to look for ways to create a wider range of benefits for Native Hawaiians at all levels of the education system and seek new mechanisms for local cultural oversight on the mountain.

8. **Consider a three-pronged approach to public consultation and community engagement.** In our interviews, we found there was much confusion about who the legitimate “community” is that should be consulted on Hawaii Island. Everyone agrees that the Native Hawaiian community should be consulted. However, there is no broad agreement on exactly who can speak for the community or how best to understand overall community sentiment. A number of people we spoke with referenced a large “silent majority.” It is unclear as to why the silent majority stays quiet and, if they felt free to speak, precisely what they would say. Possible reasons we heard for the silence are: (1) they feel their issues are already properly represented by those more vocal in the debates; (2) they are intimidated to speak out against others in their identified cultural groups; (3) they do not care one way or another or have no knowledge of the issues that allows them to fully participate; or (4) they are simply fatigued by the poor dialogue and want to get on with something one way or another.

For these reasons, Keystone recommends that TMT, should it decide to go forward, work in concert with UH and DLNR to undertake a simultaneous, three-pronged approach that can really triangulate issues and options.

- A. Hold public meetings. While not conducive to problem-solving, these meetings are necessary and important for disseminating information, answering factual questions, gathering public comments, and helping to identify the issues that are on people’s minds at the moment. These meetings must be preceded by a careful, quiet run-up (i.e., one-on-one meetings in each community to set the stage for public gatherings and understand how local meetings are best sponsored and conducted).
- B. Create a well-constructed, randomized community survey. On the theory that public meetings tend to draw people with strong and usually negative views, this mechanism attempts to gauge the views of the greater community-at-large, and particularly the “silent majority,” on the issues identified at public meetings. TMT should work carefully with experts (and potentially other stakeholders) to develop and conduct the survey. Given the high expense of surveys, TMT would need to be strategic about the right moment for conducting such a survey. This will vary depending on what questions are of highest concern.
- C. Convene an expert stakeholder advisory group. Over the past 30 years, we have had good, and sometimes extraordinary, results with a small but diverse group of stakeholders who are pulled together to try to fashion solutions to the issues raised in public meetings and further understood through surveys. Sometimes these are called “Working Groups.” Sometimes we call them “Dialogues,” “Roundtables,” or “Forums.” A TMT group of this sort would seek to understand, explore, and help formulate possible solutions to critical issues that might become solutions acceptable to all or at least a preponderance of stakeholders. This group might particularly help TMT scope EIS issues and perhaps develop new and innovative approaches to community EIS consultation. Representatives could include TMT, UH, DLNR, OHA, Native Hawaiian groups (associations, civic clubs, etc.), community-at-large

representatives (not Native Hawaiian), commercial vendors using Mauna Kea, the business community, rangers, 'Imiloa Astronomy Center, legislative staff, and others.

VII. A Final Thought

If TMT decides to proceed, coordination with UH, OHA, BLNR, and many different local communities on Hawaii will be essential. Struggles lie ahead, especially with the Comprehensive Management Plan and the lease. It is very important for UH and TMT to do advance thinking about what advice they each will want, from whom, and for what purposes. OHA, Native Hawaiians, and others on Hawaii Island must become part of the conversation. As a rule, The Keystone Center urges groups like TMT not to ask for advice if they are not prepared to first hear it and to then reciprocally enter into principled negotiations that respond to the requested advice when it involves criticisms and concerns. We would offer this same counsel to anyone else, including the agencies and communities involved in this most complex and challenging set of issues. If early hurdles can be overcome, TMT has a chance to model a new kind of dialogue with Native Hawaiians and others involved in, affected by, or interested in the future of Mauna Kea.



July 17, 2007

Peter S. Adler, PhD
President & CEO
The Keystone Center
1628 Sts. John Road
Keystone, Colorado 80435

Dear Dr. Adler,

The Gordon and Betty Moore Foundation is dedicated to advancing environmental conservation and cutting-edge scientific research around the world. In advancement our mission, we request that The Keystone Center undertake an independent assessment of the feasibility of siting the Thirty Meter Telescope (TMT) on Mauna Kea in Hawaii. This assessment will consider the environmental, economic, scheduling, and political risk factors in siting the Thirty Meter Telescope at Mauna Kea.

As part of this exercise, we ask that Keystone conduct a discrete set of interviews with Hawaii state regulators, political and community leaders, environmental NGOs, Native Hawaiian thought leaders, educators, members of the business community, or others who might help inform the assessment. These interviews will seek to: 1) further flesh out the risk factors in TMT pursuing Mauna Kea as a site; and, 2) test and refine one or more approaches for how TMT might work with interested stakeholders for the potential siting of the TMT in Hawaii.

After completion of the interviews, Keystone will provide an analysis of the risk factors and best advice to the Gordon and Betty Moore Foundation. After reviewing the final report, the Moore Foundation intends to make this report publicly available.

The Gordon and Betty Moore Foundation is a funder of the development stage of the TMT project, and a potential funder of the construction of the telescope. The Gordon and Betty Moore Foundation will use this analysis as one of the factors for determining whether Mauna Kea is a viable site.

Very truly yours,

A handwritten signature in black ink that reads "Jim K. Omura".

Jim K. Omura, PhD
Technology Strategist
The Gordon and Betty Moore Foundation

Mauna Kea Interviews

	Name	Affiliation
1.	Anelle Amaral	Former State Legislator
2.	Billy Bergen	Waimea Resident; Former Board of Regent, UH
3.	Mike Bolte	Thirty Meter Telescope Board Member
4.	Sam Callejo	VP for Administration, University of HI
5.	Dawn Naomi S. Chang	Principal, Ku iwalu
6.	James Chang	Legislative Assistant for Judiciary and Environment, Senator Inouye's Office
7.	Roberta Fujimoto Chu	Senior VP & Manager, Bank of Hawaii; President of HI Economic Development Board (HIEDB)
8.	Linda Colburn	Facilitator, Where Talk Works
9.	Paul Coleman	Astrophysicist, IFA
10.	Moses Crabbe	Hawaiian Language Teacher; Community Member; Mauna Kea Management Board Member, Hawaiian Culture Committee
11.	Sandy Dawson	Thirty Meter Telescope Team
12.	Rockne Freitas	Chancellor, Hawaii Community College
13.	James Gaines	Vice President for Research, UH
14.	Peter Giles	Executive Director, Imiloa
15.	Sam Gon	The Nature Conservancy
16.	Richard Ha	President, Hamakua Springs Country Farms; Member, HIEDB
17.	Mike Hamnett	Executive Director, Research Corporation of UH
18.	Masa Hayashi	Director, Subaru Telescope
19.	Hon. Clayton Hee	Senator, Hawaii State Legislature
20.	Walter Heen	Trustee, Office of Hawaiian Affairs
21.	Paula Z. Helfrich	CEO, Economic Development Alliance of HI
22.	Arnold Hiura	MBFT Media; Consultant to OMKM
23.	Lea Hong	HI Trust for Public Lands (formerly with Alston, Hunt, Floyd, and Ing)
24.	Julie Hugo	Realtor; Community Leader
25.	Herring Kalua	Mauna Kea Management Board Member
26.	Harry Kim	Mayor, Hawaii County
27.	Larry Kimura	Assistant Professor in the Hawaiian Language & Hawaiian Studies, UH Hilo; Kahu Ku Mauna Council Member
28.	Hon. Russell Kokubun	Senator, Hawaii State Legislature
29.	Rolf-Peter Kudritzki	Director, IFA
30.	John Lee	NASA
31.	Sam Lemmo	Administrator, Conservation and Coastal Lands, DLNR

	Name	Affiliation
32.	Darolyn Lendio	VP for Legal Affairs, UH
33.	Robert Lindsey	Trustee, Office of Hawaiian Affairs
34.	Ted Liu	Director, Department of Business, Economic Development and Tourism
35.	Kawika Lovell	Research Corporation of UH
36.	Kem Lowry	Department of Urban and Regional Planning
37.	Kepa Maly	Cultural Historian & Resource Specialist, Kumu Pono Associates LLC
38.	Robert Masuda	Special Assistant, UH
39.	Harold Matsumoto	Program Director, Pacific International Center for High Technology Research
40.	David McClain	President, UH
41.	Robert McLaren	Associate Director, IFA
42.	Mark McGuffie	HI Economic Development Board
43.	Jeff Melrose	Island Planning
44.	Clyde Namuo	Office of Hawaiian Affairs
45.	Stephanie Nagata	Associate Director, Office of Mauna Kea Management
46.	Tetsuo Nishimura	Associate Director, Subaru Telescope
47.	Sean Naleimaile	Kahu Ku Mauna Council
48.	Francis Oda	Group 70
49.	Gary Ostrander	VP for Research, UH
50.	Tom Peek	Community Member
51.	Kealoha Pisciotti	Mauna Kea Anaina Hou
52.	Cha Smith	Kahea
53.	Kapua Sproat	Richardson School of Law
54.	Ed Stevens	Kahu Ku Mauna Council
55.	Bill Stormont	Director, Office of Mauna Kea Management
56.	William Tam	Alston, Hunt, Floyd, and Ing (Law Firm Representing Plaintiffs in the Outrigger Case)
57.	Barry Taniguchi	Mauna Kea Management Board Member
58.	Ron Terry	Mauna Kea Management Board Member; Principal Scientist, Geometrician Associates
59.	Laura Thielen	Chairman, Board of Land and Natural Resources
60.	Rose Tseng	Chancellor, UH at Hilo
61.	W. Mapuana Waipa	Ke Ana La ahana PCS; Community Member; Mauna Kea Management Board Member
62.	Deborah Ward	Sierra Club
63.	Harry Yada	Property Manager, County of HI, Department of Finance; Mauna Kea Management Board Member, Hawaiian Culture Committee
64.	Peter Young	Former Chairman of DLNR



PREDICTION EXERCISE

As part of our assessment for The Gordon and Betty Moore Foundation, we are interested in the predictions knowledgeable people might make about various issues related to the Thirty Meter Telescope. Individual names are not important and will not be reported to anyone. All information will be aggregated by Keystone and the collective results made fully available to those who participate.

You have \$1,000 available to make ten different bets of up to \$100 each. If you win the most bets, it means your experience, knowledge, and political acumen is better than everyone else's.



One Thousand Keystone Bucks! Not Negotiable or Available for Deposit.

Example

“The new Hawaii Superferry will force one or more of Hawaii’s three carriers (Hawaiian, Aloha, Go) out of business within two years of startup.”

 I bet \$100 for.

 I bet \$100 against.

#1 - The revised Comprehensive Management Plan will be completed by May 1, 2008.

I bet \$100 for.

I bet \$100 against.

#2 - The revised Comprehensive Management Plan will be a solid document and not be further challenged through appeals or litigation.

I bet \$100 for.

I bet \$100 against.

#3 - A new lease for the summit will be successfully negotiated and put in place by June 2008.

I bet \$100 for.

I bet \$100 against.

#4 - University of Hawaii and State of Hawaii will agree to distribute ceded land payments from the Mauna Kea observatories by April 2008.

I bet \$100 for.

I bet \$100 against.

#5 - A robust and culturally appropriate consultation process can be set up between members of the Native Hawaiian community and the Thirty Meter Telescope project (TMT).

I bet \$100 for.

I bet \$100 against.

#6 - The TMT can create new educational opportunities for Native Hawaiians and others on Hawaii Island.

___ I bet \$100 for.
___ I bet \$100 against.

#7 - The potential environmental impacts of the TMT can be satisfactorily mitigated.

___ I bet \$100 for.
___ I bet \$100 against.

#8 - The visual impacts of the TMT can be satisfactorily mitigated.

___ I bet \$100 for.
___ I bet \$100 against.

#9 - A satisfactory Environmental Impact Statement (EIS) that is not appealed or litigated will be completed by June 2010.

___ I bet \$100 for.
___ I bet \$100 against.

#10 - A Conservation District Use Permit will be approved by April 2011.

___ I bet \$100 for.
___ I bet \$100 against.