

**Notes from Budget Ad Hoc Group Meeting
On August 25, 1999**

Develop the budget to reflect different types of information requested by the AMWG/TWG.

Track the budget so you can generate reports that show:

- Sources of revenue (i.e., AMP-Power Revenues, O&M, Sec. 8, etc.)
 - For each project or activity show the sources of revenue that support it
- Employee related expenses (ERE)
 - For each employee develop a table that shows how they are spending their time
- Aggregate costs by activity
 - Show, for each activity/project, the total costs for that activity, in terms of GCMRC personnel, contracts, logistics, survey expenses, travel, space & facilities, etc.
- Add a section on Frequently Asked Questions (FAQs) that address issues such as: the costs for logistics, costs for biological opinion related work, costs for PA work, In-house science vs. competitive RFPs, what is included in overhead, etc.
- Develop a table for contracts that shows how the contracted work relates to specific MOs and INs
- Add a 2-3 sentence narrative that describes what is being done for each project and why it is being done

Status:

- GCMRC is developing organizational codes so that they can produce the requested reports.
 - Will require an additional .25 -.5 FTE in year one to input data and generate reports.
 - See Attached Table 1 for example of an "Aggregate Costs by Activity" report.
 - See Attached Table 2 for example of an "Employee Related Expenses" report.
 - See Attached Table 3 for an example of a "Sources of Revenue" report.
 - See Attached "Table 2.1" for an example of the information that will be included in the FY 2001 Work Plan showing the relationship between activities and MOs and INs
 - See Attached "Table 2.2" for an example of the information that will be included in the FY 2001 Work Plan showing total activity/project expenses
- List of Frequently Asked Questions (FAQs) needs to be developed with input from TWG/AMWG

Completion Date: Will have budget formats, narratives and FAQs ready for review at January 21-22, 2000 AMWG meeting

TABLE 1. AGGREGATE COSTS BY ACTIVITY

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	Salary	Travel	Space & Facilities	Other Operating Expenses	Capital Expense	Contracts	Logistics	Survey Expense	TOTAL EXPENSE
	Incls Bens, Awards CPA 21% OGE 43%			Supplies, Train'g, Veh, Adm/Network Support, etc					
AMWG									
TWG									
GCMRC ADMINISTRATION									
PHYSICAL RESOURCES PROGRAM									
Program Support (incl supervision)									
Contracts - Monitoring									
Conceptual Modeling									
Extended Synthesis									
Mainstem/Tributary Streamflow/Sediment									
Tributary Model Verification									
Protocols Evaluation Review / Field Testing									
Debris Fans and Rapids Change Detection									
BIOLOGICAL RESOURCES PROGRAM									
Program Support (incl supervision)									
Contracts - Monitoring									
Conceptual Modeling									
Aquatic Food Base									
Native Fish									
Lees Ferry Trout									
Riparian Vegetation									
Terrestrial Endangered Species									
Avifauna (Breeding Birds)									
Side-scan Sonar Pilot									
Unsolicited Proposals									
TWG Requests									
Contracts - Research									
In-House									
CULTURAL RESOURCES SCIENCE									
Program Support (incl supervision)									
Photographic Terrace Modeling									
Investigation of Isolated Occurrences									
Protocol Assessments									
Unanticipated Information Requests									
Application of Flow/Deposition Model									
Tribal Resource Projects (3)									
Tribal Technologies									
Application of Geomorphic Testing									
Socioeconomic									
Contracts - Monitoring									
Assessing 30-year Campsite Changes									
Evaluating Trout Angles Satisfaction									
Campsite Monitoring Protocols									
Boater Adopt-a-Beach Program									
INFORMATION TECH. PROGRAM									
Program Support (incl supervision)									
Database Management									
Geographic Information Systems									
Library Information									
Survey									
Data Standards & Protocols									
System Admin. of Computers & Networks									
REMOTE MONITORING TECHNOLOGY									
Remote Sensing Evaluation									
GIS Image Processing									
Survey Control & Bathymetry Pilot Tests									
LOGISTICS OPERATIONS									
INDEPENDENT REVIEW PANELS									
RFP Review									
SAB Review									
Technical Report Review									
TOTAL									

TABLE 3. SOURCES OF REVENUE

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	AMP	O&M	Section 8	Other	Total
AMWG					
TWG					
GCMRC ADMINISTRATION					
PHYSICAL RESOURCES PROGRAM					
Program Support (incl supervision)					
Contracts - Monitoring					
Conceptual Modeling					
Extended Synthesis					
Mainstem/Tributary Streamflow/Sediment					
Tributary Model Verification					
Protocols Evaluation Review / Field Testing					
Debris Fans and Rapids Change Detection					
BIOLOGICAL RESOURCES PROGRAM					
Program Support (incl supervision)					
Contracts - Monitoring					
Conceptual Modeling					
Aquatic Food Base					
Native Fish					
Lees Ferry Trout					
Riparian Vegetation					
Terrestrial Endangered Species					
Avifauna (Breeding Birds)					
Side-scan Sonar Pilot					
Unsolicited Proposals					
TWG Requests					
Contracts - Research					
In-House					
CULTURAL RESOURCES SCIENCE					
Program Support (incl supervision)					
Photographic Terrace Modeling					
Investigation of Isolated Occurrences					
Protocol Assessments					
Unanticipated Information Requests					
Application of Flow/Deposition Model					
Tribal Resource Projects (3)					
Tribal Technologies					
Application of Geomorphic Testing					
Socioeconomic					
Contracts - Monitoring					
Assessing 30-year Campsite Changes					
Evaluating Trout Angles Satisfaction					
Campsite Monitoring Protocols					
Boater Adopt-a-Beach Program					
INFORMATION TECH. PROGRAM					
Program Support (incl supervision)					
Database Management					
Geographic Information Systems					
Library Information					
Survey					
Data Standards & Protocols					
System Admin. of Computers & Networks					
REMOTE MONITORING TECHNOLOGY					
Remote Sensing Evaluation					
GIS Image Processing					
Survey Control & Bathymetry Pilot Tests					
LOGISTICS OPERATIONS					
INDEPENDENT REVIEW PANELS					
RFP Review					
SAB Review					
Technical Report Review					
TOTAL					

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Table 2.1. Summary table of FY2001 Project titles and associated Management Objectives and Information Needs.

Project title	Management objective addressed	Information need	How accomplished
<p>Fine-grained sediment storage throughout the main channel</p>	<p>MO 1 (sediment resources): Maintain a long-term balance of river-stored sand to support maintenance flow, BHBF flow and unscheduled flood flows...</p> <p>MO 2: (recreation) Maintain flows (under approved operating criteria) and sediment processes that create an adequate quantity, distribution and variety of beaches for camping, as long as such flows are consistent with management of natural recreation and cultural resource values (other natural resource values).</p> <p>MO 2: (trout) In the Colorado River downstream of Glen Canyon Dam to the confluence of the Paria river, sufficient ecological conditions (such as habitat, foodbase and temperature) should be maintained, which in conjunction with management by Arizona Game and Fish will produce a healthy self-sustaining population of at least 100,000 Age II+ rainbow trout that achieve 18 inches in length by Age III with a mean annual relative weight (Wr) of at least 0.90.</p>	<p>IN 1.1 Define historical and current levels of river stored sediment.</p> <p>IN 1.2 define minimum levels of river stored sediments necessary to maintain sanbars, backwaters and instream sediment deposits.</p> <p>IN 1.3 Develop procedures to monitor and predict impacts of alternative operating criteria (flow regimes) on river stored sediment, and impacts in select reaches</p> <p>IN 1.4 Measure and model sediment contributions from all contributing sources, including tributary and high terrace sources</p> <p>IN 1.5 (sediment) Evaluate the geology/geomorphology within Glen Canyon to: (1) determine historical changes in size and extent of beaches, sandbars and backwaters, (2) quantify sediment (size class and quantity) input from side channels, (3) understand bed morphology dynamics, (4) evaluate high terrace erosion and contribution to river sediment.</p> <p>IN 2.4 Evaluation of flow regime (under the approved operating criteria) impacts on terrace and cultural</p>	<p>Multi-beam and sidescan sonar mapping of main channel.</p> <p>sandbar surveys of reattachment bars, and channel margin bars.</p> <p>Campsite monitoring and evaluation</p>

	<p>resources</p> <p>IN 2.5 Evaluate historical sandbar/backwater change, and develop methods for predefining beach and sandbar change under operating criteria</p> <p>IN 2.6 Determine implications of dam operating criteria on beach and sandbar and backwater character and structure, including suitability of camping beaches</p> <p>IN 1.7 Quantify the extent and location of existing sandbars, beaches and backwaters along the Colorado River corridor</p> <p>IN 2.2 (recreation) Evaluate impacts of operating criteria on establishing and maintaining adequate beaches and distribution of other resources, quality, character and structure</p> <p>IN 2.3 Develop methodology to evaluate distribution, quantity and quality changes in all campable beaches through time</p> <p>IN 2.4 (trout) Determine the availability and quality of spawning substrates in the Glen Canyon reach, necessary to sustain the rainbow trout fishery.</p>	<p>Gauging station monitoring at dam, Lees Ferry, LCR,</p>
<p>Streamflow and fine sediment transport</p>	<p>MO 1 (water resources): ... Operate GCD in a manner fully consistent with the ROD and subject to the "Law of the River" ...</p>	

	phantom ranch and diamond creek. Collect temperature, turbidity and suspended sediment. Also collect NASQUAN water quality variables at Diamond Creek, Lees Ferry.	composition, temperature IN 2.1 Quantify nitrate/phosphate ratios resulting from dam operations	phantom ranch and diamond creek. Collect temperature, turbidity and suspended sediment. Also collect NASQUAN water quality variables at Diamond Creek, Lees Ferry.
MO 2: Maintain water quality at levels appropriate to support physical, biotic, and human resource needs...			
Coarse-sediment inputs, storage and impacts	<u>MO 3:</u> (Recreation) Maintain flows (under approved operating criteria) that minimize impacts to navigability by authorized water craft and for boaters, waders, and campers in the riverine corridor.	IN 3.1 Determine if operating criteria maintains safe and adequate powercraft navigability in Glen Canyon and upper Lake Mead.	Documenting changes associated with unrigged tributary inputs
Modeling reach-averaged sandbar evolution			
Development of one-dimensional fine sediment routing model			
Advance conceptual modelling of coarse-grained sediments related to physical habitats and aquatic processes			
Monitoring avifauna assemblages	<u>MO 11:</u> (Terrestrial) Protect, restore, and enhance survival of native and special status species (federal, tribal, and state designations). Ensure that the required habitat for these species	IN 11.2 (terrestrial) Determine species population characteristics to detect departures from natural range of variation.	Field based surveys of bird abundance and distribution using point-counts, or toher

<p>Monitoring terrestrial habitat and evaluating quality</p>	<p>is preserved. MO 13: Protect, restore, and enhance survival of native and special status avifauna.</p> <p>MO 11: Protect, restore, and enhance survival of native and special status species (federal, tribal, and state designations). Ensure that the required habitat for these species is preserved.</p> <p>MO 16: Maintain, enhance or restore vegetative communities made up of diverse groups of native riparian and upland species with special emphasis on preservation of unique plant communities and special status species at different stages of succession and at different elevations above the water line.</p> <p>MO 3: (Cultural) Protect, and maintain physical access to and use of traditional cultural properties and other cultural resources, where such access and use may be impacted by dam operations</p>	<p>IN 11.3 (terrestrial) Determine changes, declines in special status species and characterize ecosystem changes to benefit species.</p> <p>IN 11.1 Define and specify ecology of native faunal components, especially threatened and endangered species; including evolutionary and environmental changes, natural range of variation, linkages, interdependencies, and requirements.</p> <p>IN 16.1 Determine distribution and abundance of native and non-native riparian and upland vegetation, including federal-, state- and tribal-listed sensitive species, old high water zone, new high water zone, and nearshore marshes.</p> <p>IN 16.3 Determine change in extent or abundance of the OHWZ and NHWZ plant communities. Link monitoring to site specific studies to determine species diversity.</p> <p>IN 16.4 Determine the effects of current and proposed dam operations under approved operating criteria on these communities.</p> <p>IN 16.6 Evaluate impacts of dam operations under approved operating criteria on establishment of and impacts from exotic plant species.</p>	<p>survey methods.</p> <p>Collecting data related to structure and composition at specified monitoring sites. Relating these data to bird occurrences and providing these data to tribes as well as exchanging data with tribes to ensure monitoring is complete.</p>
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Monitoring Kanab ambersnail habitat at Vaseys Paradise		<p>IN 3.1 Characterize historic and current traditional cultural associations of all sites associated with impacts of dam operating criteria</p>	Field surveys of habitat area and snail densities at Vaseys Paradise.
<p>MO 14: Sustain populations of Kanab ambersnail wherever they currently exist within the Colorado River ecosystem.</p>	<p>IN 14.2 Determine special flow impacts on Kanab ambersnail to assure that the level of incidental take is not exceeded. (I. T. - p.40)</p> <p>IN 14.3 Complete a census of the population and characterize the habitat. Once habitat requirements are determined, other potential habitat sites within the Grand Canyon corridor will be surveyed to determine species presence and recovery potential. (Conservation Recommendation 5-- p.43)</p> <p>IN 14.4 Survey KAS habitat before and after any flow greater than 25,000 cfs to determine population and its species response to disturbance and ability to recover. (T&C 4, p.42; and RPM)</p>	<p>IN 14.1 Determine status and trends in aquatic food base species composition and population structure, density and distribution and the influence of ecologically significant processes.</p> <p>IN 1.2 Determine the effects of</p>	<p>Logistic support for downstream translocated sites.</p>
Ongoing monitoring phyto-benthic community and evaluating quality	<p>MO 1: Maintain and enhance the aquatic food base in the Colorado River ecosystem to support desired populations of native and non-native fish. At a minimum, maintain continuously inundated areas for <i>Cladophora</i> and aquatic invertebrates at or above 5,000 cfs discharge levels from Glen Canyon Dam.</p>		<p>Data collection that quantifies abundance and composition at selected monitoring sites.</p> <p>Collection and processing of tissue</p>

		<p>past, present, and future dam operations under the approved criteria on the aquatic food base species composition, population structure, density, and distribution in the Colorado River ecosystem.</p> <p>IN 1.3 Determine the aquatic food base species composition, population structure, density, and distribution required to maintain desired populations of native and non-native fish in the Colorado River ecosystem.</p> <p>IN 3/4.7 Determine origins of fish food resources, energy pathways, and nutrient sources important to their production, and the effects of Glen Canyon Dam operations on these resources. (RPM 1.C.vi) Evaluate linkages between the aquatic food base and the health and sustainability of HBC populations.</p>	<p>samples to determine food web linkages using stable isotope surveys.</p>
<p>Ongoing monitoring of status and trends of fish community</p>	<p>MO 4: Maintain or enhance levels of recruitment of HBC in the mainstem as indexed by size frequency distributions and presence and strength of year-classes. (Focused at young-of-year and juvenile fish, and should include a fish health assessment.)</p> <p>MO 8: Achieve healthy, self-sustaining populations of flannelmouth sucker, bluehead sucker, and speckled dace in the Colorado River ecosystem, with special emphasis on flannelmouth sucker in Glen Canyon based upon</p>	<p>IN 3/4.1 Determine adult HBC populations and evaluate life history schedules, population health, and reproductive success. (<i>Fall 97 RPM 1</i>)</p> <p>IN 3/4.2 Determine levels of recruitment of humpback chub in the mainstem and the LCR.</p> <p>IN 8.2 Determine population dynamics, distribution, and other life history traits of native fish species.</p>	<p>Seasonal mainstem and tributary data collection on abundance and distribution and recruitment of fish in the mainstem</p>

<p>Monitoring status and trends of the Lees Ferry Trout Fishery</p>	<p>the capability of the habitat to support those fishes.</p> <p>MO 2: In the Colorado River downstream of Glen Canyon Dam to the confluence of the Paria river, sufficient ecological conditions (such as habitat, foodbase and temperature) should be maintained, which in conjunction with management by Arizona Game and Fish will produce a healthy self-sustaining population of at least 100,000 Age II+ rainbow trout that achieve 18 inches in length by Age III with a mean annual relative weight (Wr) of at least 0.90.</p>	<p>IN 8.3 Determine historic and current character and structure of native fish populations.</p> <p>IN 2.2 Determine trends in rainbow trout population size, character and structure in Glen Canyon.</p> <p>IN 2.3 Evaluate harvested and field sampled rainbow trout to determine the contribution of naturally reproduced fish to the population in Glen Canyon.</p>	<p>Seasonal electroshocking, or scuba surveys that document size, condition and infers population size and spawning success.</p>
<p>Integrated Water Quality Monitoring</p>	<p>MO 1: (Lake Powell) Prevent impacts that adversely affect the water quality (physical, chemical, biological) of Lake Powell due to dam operations and ensure that fully informed AMWG decisions are possible both now and in the future.</p> <p>MO 2: (water resources) Maintain water quality at levels appropriate to support physical, biotic, and human resource needs...</p>	<p>IN 1.1 Determine the effect of current dam operations (under approved operating criteria) on reservoir water quality, including but not limited to the following:</p> <p>(a) Determine near dam hydrogen sulfide levels (and other hazardous chemical constituents) within the hypolimnion occurring under current dam operating criteria.</p> <p>(b) Determine the dynamics of lake stratification and advective flows and their effects on chemical constituents</p> <p>(c) Determine/quantify the dynamics of major cations, anions, and nitrate/phosphate ratios resulting from dam operations</p> <p>(d) Determine the effects of dam</p>	<p>Monthly, quarterly and continuous sampling at monitoring site in the reservoir and downstream.</p>

		<p>operations (under approved operating criteria) on the physical/chemical dynamics of Lake Powell side channels and embayments</p> <p>IN 1.1 Determine the impacts of dam operations and resulting water quality on primary and secondary productivity of Lake Powell, including:</p> <p>algae (phytoplankton, periphyton) Macrophytes Zooplankton</p> <p>IN 2.1 Monitor water quality, composition, temperature (a more comprehensive list of the INs that are addressed by the IWQP can be seen in Table 1 of the IWQP plan (Vernieu and Hueftle 1999)</p>	
Population genetics of HBC	MO 6: Establish a second spawning aggregation of HBC downstream of Glen Canyon Dam (RPM 4).	<p>IN 6.1 Develop criteria for defining self-sustaining populations of HBC.</p> <p>IN 6.2 Assess feasibility of establishing a second population of HBC downstream of Glen Canyon Dam including other current aggregations.</p> <p>IN 13.1 (avifauna) Define and evaluate food chain associations, interdependencies, requirements, etc. for native avifauna, including the Peregrine Falcon, Southwestern Willow Flycatcher, and other special status species (e.g., Yellow-billed</p>	Using molecular genetic techniques determine relationships and origin of aggregates in Grand Canyon.
Ongoing trophic interactions research	MO 13: Protect, restore, and enhance survival of native and special status avifauna.	<p>Collecting data on insect/plant/bird interactions in old and new high water zones.</p>	

<p>Native fish/non-native competitive interactions</p>	<p>MO 10: Minimize, to the extent possible, competitive and predatory interactions between native and non-native fishes.</p>	<p>IN 13.2 Determine impacts of dam operations under approved operating criteria on avifauna food chain associations.</p> <p>IN 10.1 Define areas and conditions of existing and potential interactions</p> <p>IN 10.4 Determine the species composition, relative abundance, and size class structure of non-native fishes in the Colorado River ecosystem and important tributaries</p>	<p>Examine collection data on native/non-native fish in the mainstem and tribs relative to life history components.</p>
<p>Section 8 funded research associated with experimental flows</p>	<p>MO 9: Attain riverine conditions, including appropriate habitat, that support all life stages of endangered and native fish species.</p> <p>MO 5: Remove jeopardy for the HBC in the Colorado River ecosystem (<i>B.O. 1994</i>).</p>	<p>IN 9.2 Quantify to the extent possible the effects of spring high steady flows and summer and fall low steady flows on endangered and native fish (RPM 1.a).</p> <p>IN 9.4 Assess biotic interactions between native and non-native fishes, particularly those that occur in nearshore rearing habitats affected by dam operations (RPM 1.C.iv).</p> <p>IN 5.1 Determine a set of possible temperature changes in the mainstem Colorado River resulting from implementing selective withdrawal (RPM 1.B.i).</p> <p>IN 5.2 Determine the anticipated effects on HBC and other native populations which may result from installing a selective withdrawal structure for thermal modification in the mainstem of the Colorado River</p>	<p>Controlled field and Laboratory experiments associated with growth and temperature and fish interactions.</p>

<p>Geomorphic investigations and application at cultural resource locations</p>	<p>MO 1: Conserve <i>in situ</i> all the downstream cultural resources and take into account Native American cultural resource concerns in the Colorado River ecosystem.</p>	<p>downstream of Glen Canyon Dam. Determine the range of temperatures for successful larval fish development and recruitment and the relationship between larval/juvenile growth and temperature (RPM 1.B.ii).</p>	
<p>Evaluating ground-based and airborne remote sensing technologies</p>		<p>IN 1.6 Evaluate flood terrace stability necessary to maintain cultural resources and terraces at pre-dam conditions</p>	

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Table 2.2. Summary table of projected FY2001 budget for projects and by GCMRC program allocations.

Project title	Physical	Biological	Cultural	Information technology	Remote sensing	Logistics	GCMRC Personnel	Total
Fine-grained sediment storage throughout the main channel	225,000	10,000	85,000	Unknown level of support	Use of over flight data sets	~80,000	Melis 15%, Ralston 5%, Lambert 5%, Gonzales ?%	~400,000
Streamflow and fine-sediment transport	400,000	70,000	N/A	N/A	N/A	~90,000	Melis 10%, Ralston 5%,	560,000
Coarse-sediment inputs, storage and impacts	75,000	10,000	N/A	Change detection bathymetry	Use of over flight data sets	~15,000	Melis 10%, Ralston 5%, Lambert 5%,	100,000
Modeling reach-averaged sandbar evolution	75,000	N/A	25,000	Channel mapping	N/A	~15,000	Melis 15%, Ralston 5%, Lambert 5%, Gonzales (?)	115,000
One-dimensional fine-sediment routing model	100,000	N/A	N/A	N/A	N/A	~15,000	Melis 10%	115,000
Advanced modeling of coarse-grained sediments ...	75,000	20,000	N/A	N/A	Use of over flight data sets		Melis 20% Ralston 10%	95,000
Monitoring avifauna assemblages	N/A	90,000	N/A	N/A	N/A	36,000-48,000	Ralston 5%	126,000-138,000
Monitoring terrestrial habitat and evaluating quality	N/A	90,000	75,000	N/A	N/A	~12,000-36,000	Ralston 10% Lambert 10% Melis 5%	155,000
Monitoring Kanab ambersnail habitat at Vaseys Paradise	N/A	20,000	N/A	Area surveying	N/A	32,000	Ralston 10% Kohl 10%	52,000-82,000
Ongoing	N/A	230,000	N/A	N/A	N/A	~10,000-	Ralston 5%	160,000-

monitoring phyto-benthic community and evaluating quality									32,000	Yard 5% Melis 5%	264,000
Ongoing monitoring of status and trends of fish community	N/A	470,000	N/A	N/A	N/A	N/A	N/A	90,000-120,000	Ralston 5% Yard 5% Melis 5%	560,000-590,000	
Monitoring status and trends of the Lees Ferry Trout Fishery	N/A	130,000	N/A	N/A	N/A	N/A	N/A	~10,000	Ralston 5% Yard 5% Melis 5%	140,000	
Monitoring reservoir and downstream water quality	N/A	250,000	N/A	N/A	N/A	N/A	N/A	20,000	Ralston 5% Hueftle 75% Vernieu 75%	270,000	
Population genetics of HBC	N/A	50,000	N/A	N/A	N/A	N/A	N/A	None	Ralston 5%	50,000	
Ongoing trophic interactions research	N/A	30,000	N/A	N/A	N/A	N/A	N/A	~20,000	Ralston 5%	50,000	
Native fish/non-native competitive interactions	N/A	????	N/A	N/A	N/A	N/A	N/A	????	Ralston 5% Yard 5%	????	
Section 8 funded research associated with experimental flows	N/A	300,000						????		300,000+ ???	
Geomorphic investigations and application at cultural resource locations	N/A	N/A	90,000	N/A	N/A	N/A	N/A	20,000	Lambert 5%	110,000	
Evaluating ground-based and	N/A	N/A	N/A	400,000-1,200,000				~24,000	Leszewski, Ralston,	424,000-1224,000	

airborne remote sensing technologies										Mietz, Gonzales	
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