

Date of Report: 13-Sep-18

Lions Fire - Burned Area Report

(Reference FSH 2509.13)

Type of Request

Type of Report

- ☒ Funding request for estimated WFSU-SULT funds
- ☐ Accomplishment Report
- ☐ No Treatment Recommendation

Type of Action

- ☒ Initial Request (Best estimate of funds needed to complete eligible rehabilitation measures)
- ☐ Interim Report
 - ☐ Updating the initial funding request based on more accurate site data or design analysis
 - ☐ Status of accomplishments to date
- ☐ Final Report (Following completion of work)

Burned Area Description

Fire Name: Lions**Fire Number:** SNF-493**State:** CA**County:** Madera**Region:** 05**Forest:** Sierra & Inyo**District:** Bass Lake (SNF) & Mammoth (INF)**Fire Incident Job Code:** P5LVC518**Date Fire Started:** June 6, 2018**Date Fire Contained:** TBD**Suppression Cost (Estimated):**

Fire Suppression Damages Repaired with Suppression Funds: Fireline Waterbarred (Miles): ... miles, Fireline Seeded (Miles): 0 Miles, Other (Identity): 0 Miles

Watersheds (Acres & % Burned): Lower Middle Fork San Joaquin River: 7,666 Acres (56%), Middle Middle Fork San Joaquin River: 1,804 Acres (8%), & North Fork San Joaquin River: 3,988 Acres (11%)

Total Acres Burned: NFS: 13,458 Acres, NPS: 0, Private: 0, and BML: 0

Dominant Vegetation Types: Red Fir, Mixed Conifer - Fir, Upper Montane Mixed Chaparral, Subalpine Conifers, & Lodgepole Pine

Dominant Soils: Typic Cryumbrepts, Xeric Vitricyands, Typic Cryorthents, Typic Xerumbrepts, and Rock Outcrop

Geologic Types: Mount Givens Granodiorite, Volcanic Rocks of the Ritter Range, Talus & Slopewash, Glacial Deposits, and Granodiorite of King and Fish Creeks

Miles of Stream Channels by Order or Class: Perennial: 24 Miles and Seasonal: 82 Miles

Transportation System: Hiking Trails: 19.8 Miles (SNF) & 3.5 Miles (INF)

Watershed Condition

Soil Burn Severity (Acres): Unburned / Very Low: 3,797 Acres (28%), Low: 5,500 Acres (41%), Moderate: 3,982 Acres (30%), and High: 179 Acres (1%)

Water-Repellent Soil (Acres): 926 Acres

Soil Erosion Hazard Rating (Acres): None: 27 Acres (< 1%), Low: 1,821 Acres (14%), Moderate: 5,215 Acres (39%), High: 4,250 Acres (32%), and Very High: 2,145 Acres (16%)

Erosion Potential (Tons/Acre): 0.97 Tons/Acre

Sediment Potential (Cubic Yards/Square Mile): 544 Cubic Yards/Square Mile

Hydrologic Design Factors

Estimated Vegetative Recovery Period: 5 Years

Design Chance of Success: 80%

Equivalent Design Recurrence Interval: 5 Years

Design Storm Duration: 1 Hours

Design Storm Magnitude: .78 Inches

Design Flow: 26.2 Cubic Feet/Second/Square Mile)

Estimated Reduction in Infiltration (Percent): 25%

Adjusted Design Flow (CFS / Square Mile): 31 CFS per Square Mile

Summary of Analysis

Introduction



Watershed Emergency

The soil burn severity (SBS) map shows approximately 31% burned at high and moderate soil burn severity. The rest of the fire was either very low, low soil burn severity or unburned. It is very important to understand the difference between fire intensity and burn severity, and soil burn severity as defined for watershed condition evaluation in Burned Area Emergency Response BAER analyses. Fire intensity or burn severity as defined by fire, fuels, or vegetation specialists may consider such parameters as flame height, rate of spread, fuel loading, thermal potential, canopy consumption, tree mortality, etc. For BAER analyses, mapping is not simply vegetation mortality or above-ground effects of the fire – soil burn severity considers additional surface and below-ground factors that relate to soil hydrologic function, runoff and erosion potential, and vegetative recovery. Areas of high and moderate soil burn severity are present throughout the fire. Areas of high and moderate soil burn severity (especially high) are considered “flood source” areas and can produce accelerated runoff and sedimentation affecting roads, water quality, and downstream infrastructure.

Based on historic precipitation patterns, it can be expected that a thunderstorm of unknown intensity and distribution could occur in July/August with the first frontal storms occurring in mid-late September as the first wetting events following the Lion Fire. The risk of flooding and erosional events will increase as a result of the fire, creating potentially hazardous conditions within and downstream of the burned area. These hazardous conditions may be worsened in the case of a thunderstorm or a rain-on-snow event, where long-duration rainstorms falling on a shallow snowpack can produce very high peak flows.

Soils/Erosion Response

Quantitative erosion figures were estimated using the Erosion Risk Management Tool (ERMiT) batch model. ERMiT is a Water Erosion Prediction Project (WEPP-based application developed by USFS Rocky Mountain Research Station USFS, RMRS-GTR-188, 2007) specifically for use with post-fire erosion modeling. The model estimates only sheet and rill erosion, which occurs when rainfall exceeds infiltration rates, and surface runoff entrains surface soil particles. The model does not account for shallow landslides or gully erosion, stream-bank erosion, road effects, or fire-line erosion and gully erosion, which could present large additional sources of sediment entering the fluvial systems.

ERMiT models erosion potential based on single hillslopes, single-storm “runoff events,” and post-fire soil burn severity. Hillslopes include soil and topography inputs. Soil inputs include texture and matrix rock content, which was based upon soil map unit information and field verified in many areas of the fire as part of the assessment. Generalized hillslope gradients and profiles were developed in GIS by soil map unit (rock content & soil texture), vegetation, slope, slope length, and soil burn severity class to account for fairly site specific differences in topography.

Various storm runoff-event magnitudes may be chosen in ERMiT for erosion response estimates; 2-year, 5-year, and 10-year events were modeled for this analysis. ERMiT uses the PRISM module to generate climatic input parameters; a customized climate was generated to the latitude/longitude and elevation of the fire area. Burned and unburned soil erosion modeling was completed for both the fire wide perimeter and the individual HUC 12 watersheds within the fire area (. The reported values are in total tons and tons per acre. To help picture what a 1,000 tons of sediment might look like consider roughly 120 standard 10 cubic yard dump trucks filled up.

A 2-year storm event was modeled in ERMiT to determine if the estimated soil erosion for the fire area would affect soil productivity. The modeled 2-year event (50% probability) produced 15,440 tons of sediment equivalent to 0.97 tons per acre or 544 cubic yards per square mile (using a conversion factor of 1.35 tons per cubic yard). Increased hillslope erosion is expected to occur throughout the fire area regardless of the soil burn severity. The unburned, pre-fire

conditions 2-year storm modeled a total of 45.4 tons of sediment equivalent to 0.01 tons per acre or 1.6 cubic yards per square mile. The stated accuracy of the model is +/- 50%.

Watershed Response

Stairway Creek – Water Quality, Peak Flows, and Sedimentation

Stairway Creek is a 3418 acre watershed that was most impacted by the fire (1652 acres burned, 48 % of the watershed, see **Figure 1**) mostly within the middle and lower watershed at a moderate and high severity. Burned soils tend to decrease water infiltration and tends to increase storm runoff. Soils are deeper along the stream valley in the middle reaches of Stairway Creek and vegetation is robust. Vegetation along the stream was not burned severely and not significantly impacted. The fire burned more severe along the forested slopes above the main stream channel on the small tributaries. It is within these areas where local watershed response in terms of runoff are expected to be higher. Because only the mid to lower half of the watershed was burned, and the upper more water productive areas did not burn, overall increases in flows from a 5 year, 1 hour storm event is expected to be around a 20 to 25 % increase over normal (**Table 1, Modeling Results**). Increases in flow and sediment from the mid drainage areas and burned tributaries have the potential to cause water quality impacts and moderate sedimentation locally to Stairway Creek. Unless an unusual storm event occurs greater than the model storm, sediment impacts will likely be short lived as the stream has a steady slope and gradient to move bedload and turbidity downstream and will likely disperse sediment effectively. Further downstream the creek drops abruptly into the gorge of the MFSJ River and will move in- channel bedload's very efficiently. Pools could have increased sedimentation until larger peak flows occur or when typical seasonal snow melt runoff events occur.

Smaller Tributary Effects

Other smaller unnamed watershed tributaries with the burn area are expected to have similar increases of peak flows (about 25%). However, these tributaries are numerous, smaller and steep, flow and sediment will be less in proportion and they enter the MFSJ River at various points, not concentrated and more dispersed. The effects on the MFSJ River will be minimal to moderate and very short term, because of the much larger amount of existing flow as compared to the burn area stream contributions, therefore, a dilution effect occurs. It is expected only a very slight impact to downstream beneficial uses are possible.

Table 1: Modeling Results

The table below shows modeling results for the Lion Fire BAER.



Fire Name Lion

Mean Elevation (ft):	8163
Annual Precip (in):	35

Design Flow for 5 year storm (Sierras)

Drainage	Drainage Acres	Soil Burn Severity (acres)				Drainage Area (mi2)	Elevation (ft)	Annual Precip (in)	In Cubic Feet per Second (cfs)				
		Unburned	Low	Moderate	High				Pre fire Q5	Pre fire Q10	Pre fire Q25	Post fire Q5	Change in Q5 Flow
Stairway Creek	3418	2216	697	460	45	5	8163	35	136.50	231.27	394.57	152.66	12%
Rest of Fire	2412	297	1327	698	90	4	8163	35	100	169	290	127	27%
Total Flow:									236	Total Post Fire Flow:		279	18%

2 year 1 hr storm = 0.572"

5 year 1 hr storm = 0.784"

Avg Post Q 5 19.5 % Increase

From: Methods for Determining Magnitude and Frequency of Floods in California, Based on Data through Water Year 2006
By Anthony J. Gotvald, Nancy A. Barth, Andrea G. Veilleux, and Charles Parrett; 2012

* Change in flow is the increase in flow resulting from the reduction in soil infiltration after a fire based on a paper by Terry Henry.

Acres of unburned and low soil burn severity are modeled at Q5, acres of moderate soil burn severity are modeled at Q10 and acres of high soil are modeled at Q25. A weighted average is then calculated to arrive at post fire Q5.

Geology/Geologic Response

Debris Flows: Specific debris flow modeling was not completed for this fire. Given the burn severity, topography, and rainfall pattern, localized debris flows are expected impacting water quality in the channels and San Joaquin River. It has an **Intermediate Risk**

Critical Values/Resources & Threats

Table 1: Risk assessment matrix

Probability of Damage or Loss	Magnitude of Consequences		
	Major	Moderate	Minor
	Risk		
Very Likely	Very High	Very High	Low
Likely	Very High	High	Low
Possible	High	Intermediate	Low
Unlikely	Intermediate	Low	Very Low

Threats to Life/Safety and Property

National Forest System Trails

Trail 25E20, Snake Meadow Trail, connects the Iron Creek trail and the Summit Meadow (Mammoth) Trail. Suppression operations complete tree clearing on this trail. Post-fire watershed response is expected on sections of this trail through moderate burn severity areas. Stabilization treatments are recommended.

Trail 26E01, Summit Meadow (Mammoth) trail is a Maintenance Level 3 trail that traverses approximately 1 mile through the fire area. This trail is a Trans-Sierran trail and is highly popular. This trail was used during suppression operations with some tree clearing completed during suppression repair. Post-fire watershed response is expected on sections of this trail through high and moderate burn severity areas. Stabilization treatments are recommended.

Trail 26E46, Lion Point Trail; this unmaintained Maintenance Level 1 trail was severely impacted by the large blowdown event that occurred in 2011. Many trees fell across the trail making it virtually impassable. Suppression operations did not use this trail. This trail is mostly on the ridge top therefore post-fire watershed response is expected to be non-existent to minimal. No additional treatments are recommend at this time.

Trail 26E56, Upper French Trail, Fire crews reported that this trail varied from non-existent in sections too difficult to find in other sections. This trail ends at Stairway Creek. Suppression operations did not use this trail. This trail is mid-slope through the fire area below areas of high and moderate burn severity. It is expected that post-fire runoff will impact the trail. However, due to the remote nature, lack of use and difficulty finding the trail, no stabilization treatments are recommended.

Emergency Determination:

Magnitude of consequences: Moderate

Probability: Likely

Risk: **High**

Threats to Natural and Cultural Resources

Aquatics & Wildlife Resources

A 1.75 mile stretch of Stairway Creek is occupied with a transplant population of Paiute cutthroat trout. This population of trout is managed as an out of basin population contributing to overall recovery of the species. Based on the soil burn severity mapping and aerial photos of the fire, approximately 0.6 miles of the occupied reach burned at moderate to high severity. The remainder of the reach burned at low to very low severity.

The Lions fire burned areas surrounding three meadows that are known to be occupied by Yosemite toad. From east to west these meadows are Stairway, meadow 508M93, and Corral. The Yosemite toad has an upland habitat use area of approximately 1,250 meters surrounding occupied meadows. Based on the Soil Burn Severity data, a total of 4,043 acres of YT upland habitat burned in the Lions fire including 18 acres of high severity, 1,067 acres of moderate, 1,604 acres of low, and 1,354 acres of unburned/very low. Most of the area surrounding Stairway Meadow appears to have burned at low to very low severity. Meadow 508M93 has mixed severity, and Corral meadow has the most moderate and high severity surrounding the meadow in all directions.

On September 8, 2018, a fire crewmember located a deceased adult Yosemite toad in a moderate burn area within the fire perimeter, approximately 300 meters southwest of Meadow 508M93. There was a burrow in the immediate vicinity, and it appeared the toad may have been trying to reach the burrow for cover as the fire moved through the area.



It is unknown how this level of fire intensity will affect toad upland habitat use and dispersal in the near term. In the long term, upland toad habitat should benefit from low to moderate severity fire. Some cover components may be lost due to consumption by the fire, but additional logs will become available as fire-killed trees fall in the future. It is expected that overall habitat conditions will improve by opening up travel corridors and dense areas. The Lions fire was a lightning ignited fire that burned through Wilderness areas. The YT evolved with these types of disturbance factors in the environment. Liang *et al.* (2010, p. 16) observed that toads were less likely to occur in areas where the fire regime was significantly altered from historical conditions, and suggested that the toads are affected by some unknown or unmeasured factors related to fire management.

In some systems, fire is thought to be important in maintaining open aquatic and riparian habitats for amphibians (Russell *et al.* 1999, p. 378), although severe and intense wildfires may reduce amphibian survival, as the moist and permeable skin of amphibians increases their susceptibility to heat and desiccation (Russell *et al.* 1999, p. 374). Amphibians may avoid direct mortality from fire by retreating to wet habitats or sheltering in subterranean burrows. In the closely related boreal toad (*Bufo boreas*), Hossack and Corn (2007, p. 1409) documented a positive response (increase in occupied breeding sites and population size) following a wildfire, with returns to near pre-fire occupancy levels after 4 to 5 years (Hossack *et al.* 2012, p. 224), suggesting that habitat-related changes associated with wildfires may provide at least short-term benefits to Yosemite toad populations. However, data on the direct and indirect effects of fire on Yosemite toads are lacking.

Ecosystem Stability and Vegetation Recovery

Noxious/Invasive weeds: Threats related to suppression disturbances (suppression response and repair).

The risk of weed spread into the Lion Fire area is moderate but the value at risk is high (wilderness); Early Detection Rapid Response (EDRR) treatments are proposed to ensure that invasive weeds weren't accidentally introduced and subsequently become established in the wilderness. This is based on the following rationale:

- During wilderness surveys conducted for botany for pack station permit reissuances since 2001, few to no invasive weeds were found to occur within the wilderness area encompassed by the Lion Fire.
- There are noxious weeds near the Mann Ranch (Inyo NF Pack Stock facility), including the State-listed noxious weeds white top (= hoary cress and related species), and perennial pepperweed (all *Lepidium* spp.).
- The risk is moderate that invasive weeds were introduced by the fire suppression effort (no dozers or other heavy equipment were used), but weeds could have been brought in on crew footwear, clothing, and gear as well as by pack stock.
- The value at risk (wilderness heretofore uninfested with invasive weeds) is high.

Inventory/Disturbance

Pack stock were used to supply crews "spiked out" at several locations throughout the fire area. Approximately 40 helispots were utilized with various amounts of clearing and disturbance. In addition approximately 20 miles of handline were constructed with the Summit Trail and other trails improved through the fire area. Approximately 1 mile of road was used as fire line. Seeds of noxious weeds could have inadvertently been introduced at any of these sites.

Noxious/Invasive species with known occurrences near or where pack stock are held include: *Lepidium* spp. (2-3 species formerly in the genus *Cardaria*), *Tribulus terrestris* (puncture vine), *Lepidium latifolium* (perennial pepperweed), and *Bromus*

tectorum (cheatgrass). The *Lepidium*s at issue are California state-listed Noxious Weeds with high environmental impacts, especially in moist and wet sites. These species has a limited extent on both Sierra and Inyo NFs with less than 10 known locations in total. These infestations are being actively treated with the goal of eradication.

Perennial pepperweed

Perennial pepperweed is known to occur near the Forest Service pack station located in Bishop. The crews camped adjacent to dry meadow areas with pack stock dropping off supplies in these areas. While every effort was made to limit potential vectors, pack stock used during suppression activities may have inadvertently been vectors for invasive species introduction to formerly weed-free sites.

It is possible that viable propagules (seeds or plant fragments) of any of these weed species or other species were introduced along the trail, the hand line, or where tools used at the site were subsequently used elsewhere on the fire. Crew clothing, boots, and gear are also a frequently vectors, and propagules may have been picked up when personnel moved through the site to the fire line.

Cheatgrass

Cheatgrass is located at and adjacent to the Heli-spot in Mammoth. It is possible that viable propagules from this species were on the helicopter landing rails and boots, clothes and transported to the fire during suppression activities. This may serve as a vector for invasive species introduction to formerly weed-free sites. The Forest generally doesn't treat cheatgrass, though if isolated occurrences are found spot treatment may be effective.

Lepidium (formerly Cardaria) spp. (hoary cress and related species); Tribulus terrestris (puncture vine)

These species are also found in and adjacent to the Forest Service pack Station located in Bishop. While every effort was made to limit potential vectors, pack stock used during suppression activities maybe a vector for invasive species introduction to formerly weed-free sites.

Emergency Determination:

Magnitude of consequences: Moderate

Probability: Likely

Risk: High

Cultural Resources

There are a variety of known and newly discovered prehistoric to historic archaeological sites and isolated finds in the Lions Fire vicinity. A majority of the fire footprint, however, has not been surveyed. It remains possible that as yet unidentified cultural resources in high severity burn areas that may be at risk to mass wasting events. This potential risk cannot be meaningfully assessed or quantified in the absence of cultural survey and site data. No treatments are recommended at this time.

Emergency Treatment Objectives

- **Trails:** Storm proof trails to ensure trail tread stability and minimize post-fire watershed effects.
- **Botany:** Determine if noxious/invasive species have been introduced along hand lines, trails, helispots, and spike camps due to fire disturbance and/or suppression activities.

Probability of Completing Treatment Prior to First Major Damage-Producing Storm



- Trails: 70
- Botany: N/A

Table 2: Probability of treatment success

Treatment	Years After Treatment		
	1	3	5
Land	90	100	100
Channel
Roads
Trails	75	90	100

Skills Represented on Burned-Area Survey Team

- | | | | |
|---|---|--|---|
| <input checked="" type="checkbox"/> Hydrology | <input checked="" type="checkbox"/> Soils | <input checked="" type="checkbox"/> Geology | <input type="checkbox"/> Range |
| <input type="checkbox"/> Forestry | <input type="checkbox"/> Wildlife | <input type="checkbox"/> Fire Management | <input type="checkbox"/> Engineering |
| <input type="checkbox"/> Contracting | <input type="checkbox"/> Ecology | <input checked="" type="checkbox"/> Botany | <input type="checkbox"/> Archaeology |
| <input type="checkbox"/> Fisheries | <input type="checkbox"/> Research | <input type="checkbox"/> Landscape Architect | <input checked="" type="checkbox"/> GIS |

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Treatment Narrative

Trail Treatments

Trail treatments would be proposed on four trail segments that were identified by the lead READ on the fire. These segments were heavily impacted by the fire and proposed treatments would help storm proof the trail to minimize trail tread loss. Storm Proofing measures would include: cleaning of existing rolling dips and the installation of new ones in anticipation of post-fire increased runoff, increasing of outboard drainage (berm removal) where possible, and armoring of drainages to prevent undercutting and loss of trail tread. This will require the placement of rock in a rip-rap fashion below drainages to dissipate the energy of off trail water flows and decrease the possibility of down bank erosion.

Table 3: Trail treatment costs

Item	Unit	Unit Cost	# of Units	Cost
Trail Crew (4 People - Includes per diem & mileage)	Daily	\$152	16	\$2,432
Stock Support	Each	\$1,500	1	\$1,500
Supplies	Each	\$500	1	\$500
Mileage	Use	\$0.5	200	\$100
Travel/Per Diem	Day	\$55	14	\$770
Subtotal:				\$5,302
10% Overhead:				\$530
Total Cost:				\$5,832

Total trail treatment costs: **\$5,832.**

Botany Treatments

Invasive weed early detection and rapid response: Treatments are proposed to ensure that invasive weeds weren't accidentally introduced and subsequently become established in the wilderness. At minimum, survey 5-6 miles of hand line, several helispots, two spike camps, and along the main trails including Summit trail.

Small, isolated infestations will be eradicated by hand pulling. Fruiting individuals will be disposed of in extra thick garbage bags that will be removed when departing the wilderness and disposed of appropriately. Perennial pepperweed and the other *Lepidium* spp., all deep-rooted rhizomatous species, are most effectively controlled using herbicide; however as initial detection hand methods can be effective, and NEPA has not been completed for herbicide on the Sierra or Inyo NF's, any perennial pepperweed or other *Lepidium* spp (whitetop) occurrences discovered will be treated by hand pulling only.

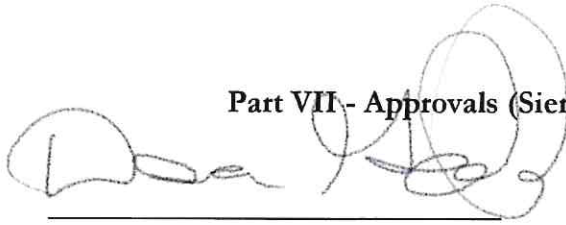
Table 4: Weed survey and rapid response treatment costs

Item	Unit	Unit cost	# of units	Cost
1 GS-11 Botanist	Day	\$375	4	\$1,500
1 GS-7 Weed Technician	Day	\$196	4	\$784
Animal packing/Packer	Each/Trip	\$1,500	1	\$1,500
Supplies	Each	250	1	\$250
Vehicle gas mileage	Miles	.5	200	\$100
Travel/Per Diem	Day	55	14	\$770
Total Cost:				\$4,904

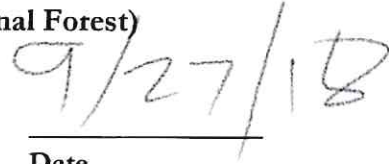
Total botany treatment costs: **\$4,904.**



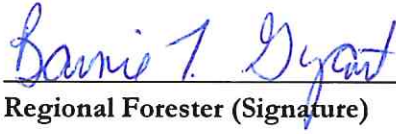
Part VII - Approvals (Sierra National Forest)



Forest Supervisor (Signature)



Date



Regional Forester (Signature)



Date



Part VI - Emergency Rehabilitation Treatments and Source of Funds by Land Owners

Table 5: Lions Fire BAER treatment costs

Line Items	NFS Lands			
	Units	Unit Cost	# of Units	WFSU SULT \$
Land Treatments				
Botany				
Weed Surveys and Rapid Response	Each	\$6,617	1	\$4,904
Total:				\$4,904
Subtotal Land Treatments				\$4,904
Channel Treatments				
None Proposed	-	\$0	0	\$0
Total:				\$0
Subtotal Channel Treat.				\$0
Road and Trails				
Roads				
None Proposed	-	\$0	0	\$0
Total:				\$0
Trails				
Trail Storm Proofing/Stabilization	Miles	\$2,651	2.2	\$5,832
Total:				\$5,832
Subtotal Roads & Trails Treatments:				\$5,832
Safety				
None Proposed	-	\$0	0	\$0
Subtotal Safety:				\$0
BAER Evaluation				
BAER team	Each			\$4,500
Subtotal Evaluation				\$4,500
Monitoring				
None Proposed	-	\$0	0	\$0
Total:				\$0
Subtotal Monitoring				\$0
Total (Excluding BAER Evaluation)				\$10,736