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REPORT TO THE NATIONAL WILDFIRE COORDINATING GROUP

Fire Personnel Positions with Smoke Management Training within the Incident Qualifications and Certification System (IQCS)



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Authors

Joshua Hyde
Smoke Program Coordinator
Forest, Rangeland, and Fire Sciences
College of Natural Resources
University of Idaho
Hyde.017@gmail.com



Alistair Smith
Assistant Professor
Forest, Rangeland, and Fire Sciences
College of Natural Resources
University of Idaho
alistair@uidaho.edu

Lisa Bye
Fuels Program Lead
Bureau of Land Management
New Mexico State Office
lisa_bye@blm.gov

The National Wildfire Coordination Group Smoke Committee's Training Subcommittee:
Lisa Bye, Bureau of Land Management and Stu Hoyt, Forest Service (Co-Chairs); Mark Fitch, National Park Service; John Kennedy, Environmental Protection Agency; Pete Lahm, Forest Service; Rod Mendes, Hoopa Tribe OES; Kipp Morrill, Fish and Wildlife Service; Susan O'Neill, Forest Service; Trent Procter, Forest Service; David Utley, Florida Forest Service; Andrea Boyer, Nez Perce Tribe.

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DRAFT

List of Acronyms

BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CAA	Clean Air Act
FEMO	Fire Effects Monitor
FOBS	Field Observer
FBAN	Fire Behavior Analyst
FS	United States Forest Service
FWS	United States Fish and Wildlife Service
LTAN	Long Term Fire Analyst
IQCS	Incident Qualifications and Certification System
NIIMS	National Interagency Incident Command System
NPS	National Park Service
NWCG	National Wildfire Coordinating Group
RX-341	Course abbreviation for Prescribed Fire Plan Preparation
RX-410	Course abbreviation for Smoke Management Techniques
RXB1	Prescribed Fire Burn Boss Type 1
RXB2	Prescribed Fire Burn Boss Type 2
RXM1	Prescribed Fire Manager Type 1
RXM1	Prescribed Fire Manager Type2
SmoC	NWCG's Smoke Committee
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
AD	Administratively determined

Executive Summary

This report *Fire Personnel Positions with Smoke Management Training within the Incident Qualifications and Certification System (IQCS)* is an analysis of queries performed against the IQCS database to identify the extent to which smoke management training has penetrated various wildland fire positions, either in personnel current positions or via previously held positions. The analysis builds upon the previously submitted report *An Assessment of NWCG Wildland Fire Training and Position Requirements for Smoke and Air Quality* which reviewed the occurrence of smoke and air quality information within 91 NWCG courses and 125 position task books (PTBs) within the national interagency incident management system (NIIMS) as of April 2011. With these two reports, a picture forms of the current state of smoke management training in key suppression and prescribed fire positions in NIIMS. The goal is to use this information to identify current smoke training needs and inform discussions about the future direction of NWCG smoke training and knowledge base.

The first report *An Assessment of NWCG Wildland Fire Training and Position Requirements for Smoke and Air Quality* identified two courses as containing content conveying a working knowledge of smoke management and air quality principles; Prescribed Fire Burn Plan Preparation (RX-341) and Smoke Management Techniques (RX-410). RX-410 is 32 hours long and devoted to prescribed fire smoke management, while RX-341 only includes a 1 hour smoke module but also addresses smoke in burn plan exercises. Both courses are intended for support of prescribed fire activities and are not oriented towards wildfire activities. The positions identified as having some level of smoke management responsibilities were: Field Observer (FOBS), Fire Effects Monitor (FEMO), Fire Behavior Analyst (FBAN), Long Term Analyst (LTAN), Strategic Operational Planner (SOPL), Prescribed Fire Burn Boss Types 1,2 and 3 (RXB1,2 & 3), Prescribed Fire Managers Types 1 and 2 (RXM1 & 2).

Based upon the results of the first report, queries were performed against the IQCS database to evaluate the extent of smoke training within the key suppression and prescribed fire positions in NIIMS, and are summarized in this report.

Suppression Positions

- The positions of LTAN, FBAN, FOBS, and FEMO contained some level of smoke responsibility, though there is no required training to support it. Despite this, 40-84% of the personnel in these positions have completed either RX-341 or RX-410.
- The type of smoke training may not quite fit with what the position requires, for example, LTANs have smoke monitoring requirements, yet there is little smoke monitoring training in the courses.
- PIO positions have the least proportion of personnel who have completed RX-410 or RX-341 (4-6%).

Prescribed Fire Positions:

- Greater than 70% of all personnel in prescribed fire positions have completed RX-410 or RX-341.
- Agencies are not consistent in smoke training requirements. The USFS requires completion of RX-410 for RXB2, the BLM requires RX-410 for RXB1, while other agencies do not require this training for RXB2, nor for any of the other RX positions.

Overall, we find these smoke management and air quality trainings are being used to a greater extent than is indicated by minimum position requirements for prescribed fire and suppression positions. Other observations are:

- There are multiple levels of smoke responsibility, where different positions require less detail, or different knowledge, than is currently conveyed in RX-341 or RX-410. For example, LTANs have smoke monitoring requirements, yet there is little smoke monitoring training in the courses. PIOs often need smoke messaging information to relay to the public but do not receive training in this area.
- Many wildfire positions have smoke management training likely acquired by their previous or current involvement in prescribed fire and fuels programs indicating a dependence of the wildfire incident management teams on the prescribed fire and fuels programs.
- Smoke from wildfires is an example where direct coordination with partners, stakeholders, and the public is needed in wildfire decisions, something that is directed in two NWCG reports; *Report on Evolving Incident Management: A Recommendation for the Future* (NWCG 2011) and the *Guidance for Implementation of Federal Wildland Fire Management Policy* (Fire Executive Council 2009). Smoke impacts can be costly and recent studies have correlated wildfire smoke impacts with dramatic increases in medical costs and mortality. Furthermore, transportation fatalities have been attributed to wildfire smoke. Currently, no training addresses this.

While it appears that smoke management training is permeating many prescribed fire and suppression positions, some key positions (such as PIOs) have very little smoke training and other positions may not be getting the type of smoke training they need (such as LTANS). Finally, recent wildfire smoke impact situations clearly indicate the need for additional training. The goal of this project is to identify current smoke training needs and to inform discussions about the future direction of NWCG smoke training and knowledge base.

This work has been accomplished by the NWCG Smoke Committee (SmoC) Training Subcommittee in collaboration the University of Idaho under a Cooperative Ecosystems Studies Units (CESU) agreement. Funding is provided by the DOI Fuels Management Committee.

Introduction

Federal wildland fire personnel achieve and maintain qualifications for their duties according to guidance outlined in the National Interagency Incident Management System (NIIMS) framework (NWCG 2009a). This framework consists of both responsibilities for which competency must be demonstrated (outlined in position task books), and trainings which aid personnel in performing tasks. This system supports a variety of suppression and prescribed fire activities with a wide range of subjects. Smoke from wildland fires has become an increasingly pertinent topic, as an impediment to public and fire personnel health, a risk to transportation safety and subject of regulation. The need to address smoke is increasingly encountered by fire personnel, yet a formal assessment of smoke management content within this framework was lacking until recently.

An assessment by Hyde *et al.* (2011) evaluated the level of smoke responsibility and training within the NIIMS structure by evaluating the contents of NWCG position task books and training courses. The assessment described positions with smoke management responsibilities, the level of responsibility within each position, and the trainings which were required for these positions as stated in the Wildland Fire Qualification System Guide PMS 310-1 (NWCG 2009b). Individual land management agency guidelines were also evaluated. The assessment indicated trainings which conveyed a working knowledge of smoke issues included prescribed burn planning (RX-341, 36 hour duration) and Smoke Management Techniques (RX-410, 32 hour duration). Requirements to take these trainings varied depending upon position and home agency. Positions which contained various levels of smoke management tasks were evaluated and are repeated here in Table 1.

This report builds on the previous one by evaluating the prevalence of smoke training within key suppression and prescribed fire positions in NIIMS. Smoke management training is defined herein as the completion of either RX-341 or RX-410. Course objectives for these trainings are listed in Appendix A. Key positions were compiled from the 2011 assessment as those with varying levels of smoke management responsibilities. Expert input, as supplied by the NWCG Smoke Committee and Training Subcommittee, indicated positions which may encounter smoke issues not listed in position task books were added for evaluation Table 1. The scope of this assessment is limited to Federal Wildland Fire Agency Personnel and Tribal resources (under a Compact or Contract agreement with the BIA) that follow PMS 310-1 and are represented in the Incident Qualifications and Certification System (IQCS). Other Federal, State and Local agencies generally have systems for maintaining Interagency Incident Management Qualifications and have adopted NWCG standards as a basis for qualifying wildland fire personnel. Examples of those systems are Incident Qualifications system (IQS), California Incident Command Certification System (CICCS), and others.

Table 1. Positions queried in this report reflect those identified in the previous report as well as newly selected positions.

Positions within the original NWCG Assessment	Positions added by the SmoC Training Subcommittee
Field Observer (FOBS)	Incident Commanders Types 1-3 (ICT1,2,&3)
Fire Effects Monitor (FEMO)	Operations Section Chiefs Types 1&2 (PSC1,2)
Fire Behavior Analyst (FBAN)	Public Information Officer (PIOF)
Long Term Analyst (LTAN)	Public Information Officer Types 1-2 (PIO1,2)
Strategic Operational Planner (SOPL)	Planning Section Chiefs Types 1-2 (PSC 1,2)
Prescribed Fire Burn Boss Types 1,2 (RXB1& 2)	
Prescribed Fire Managers Types 1 and 2 (RXM1& 2)	

Note that the positions to the right of Table 1 were added to the list compiled as a result of our 2011 assessment. These are positions which were included in this report based upon input from the NWCG SmoC and Training Subcommittee. Position task books for these added positions do not specifically address smoke, but it is known that these positions may directly or indirectly be involved with smoke. For example, Operations Section Chiefs conduct on-the-ground actions, therefore these are the people who are having a direct effect on smoke emitted from ground activities such as burnout operations. Similarly, Incident Commanders and Planning Section Chiefs are involved in a decision making process which influences the levels of smoke emitted. Finally, Public Information Officers are tasked with communicating with the public, including conveying safety information, describing management actions, and answering questions; to address these public concerns with regard to smoke, an introductory level knowledge of smoke terms and issues can be of great benefit.

Methods

The interagency IQCS database stores the training background for NIIMS positions. The positions in Table 1 were queried in March of 2011 for completion of RX-341 and RX-410 via Cindy Schaefer with the BLM who worked with the SmoC Training Subcommittee. The goal of this query is to determine the degree of smoke management training support obtained by personnel via RX-410 and RX-341. This yielded anonymous data on the number of personnel in each agency who have completed one or both of the RX trainings listed above. From these numbers, percentages of personnel who had completed these trainings were calculated for each agency. These percentages were compared with the smoke management responsibilities outlined in the NWCG position task book for each position. Original data results may be viewed in Appendix B. Initially results of smoke training completion will be reviewed within the broad framework of prescribed fire versus suppression positions. Following this description the results of each individual position will be discussed. See the figure below for an explanation of the table which will be displayed with each position:

FEMO					
Agency	Total personnel	RX-410		RX-341	
BIA	31	10	32%	18	58%
BLM	112	54	48%	70	63%
FS	533	242	45%	249	47%
FWS	39	15	38%	30	77%
NPS	201	47	23%	61	30%
Total	916	368	40.1%	428	46.7%

Total personnel in the position of FEMO in BIA
 Total FEMO in BIA who have completed RX-410
 Percent of FEMO in BIA who have completed RX-410

Note that position task book responsibilities quoted in this assessment have been re-formatted from a list to sentences; italicized font indicates information that was originally in the form of a list. For example, an excerpt from the NWCG FEMO task book (*page 7, left*) appears as a sentence in this document (*page 7, right*).

Review the project objectives, monitoring plan or management objectives as appropriate. Communicate concerns to supervisor.

- *Components for monitoring standards, timeliness, and available resources.*
- *Expected sampling intensity, required documentation with respect to fire behavior, and expected fire effects.*
- *Relationship of the prescription factors, project objectives, and monitoring plan.*
- *Relationship of the management objectives, fire effects and data collection.*
- *Potential safety hazards as they relate to the collection of data.*
- *Smoke management requirements.*

Review the project objectives, monitoring plan or management objectives as appropriate. Communicate concerns to supervisor...

Smoke management requirements.

Caveats

The data for this report was queried in March 2011, as such it should be seen as a snapshot of the training qualifications during that time. The queries may not capture personnel who were grandfathered into the system; this group is not necessarily under qualified, to the contrary, many have a long history of service from which they have an expert knowledge of smoke management, however there is currently no way for us to

factor this into our assessment at this time. Personnel who have taken RX-450, the predecessor to RX-410 are also not captured herein. Additionally, some USFS data may be incomplete as the records for these were hand entered upon the adaption of the IQCS system and thus it is possible that only required information was entered for the purposes of expedience. Some records, such as administratively determined personnel (AD's), and militia (federal employees who are not regularly funded fire personnel), may be updated less frequently than fire funded personnel. Personnel that have not had any activity (training or experience) entered in IQCS for five years are moved to the inactive files are not captured in these results. Line officers tend to fall into the inactive category unless they maintain line qualifications or attend fire training and actually have it entered in the database.

Many people hold more than one red-carded position. It is unknown how many of the positions summarized in this report are actually counted in one or more positions; For example, we do not know how many FEMO are also RXB2 and vice versa. Also, as the taskbook system has evolved and recommended courses have become required, personnel that held that position prior to the change are not required to go back and take the now required training.

Groups who may not be captured in this assessment include contractors and state fire personnel. Federal contractors must demonstrate their competence in fire management, however they are not subject to the same training and command structure as federal employees and requirements may differ based upon the contracting agency. The extent of contract work may vary from region to region. When state fire personnel complete training, they record this in the Incident Qualifications System (IQS), which is a separate state equivalent to IQCS. Each state chooses to maintain an IQS system and as such some states have chosen not to have a training and qualification database.

Flowchart Key

NWCG position requirements, and specific agency requirements, are described by a flow chart for each position in the Results Section. This chart utilizes color coding and symbols to convey details. An explanation of these colors and symbols is provided in the key. For a fuller explanation of where each position fits within the position task book system, please refer to NWCG document numbers PMS 310-1 (NWCG 2009b) and PMS 308 (NWCG 2009a).

KEY

(Black solid line) Routes to positions where smoke management and air quality are critical task book signoffs.

(Red dotted line) Route to position in which smoke management or air quality was a critical task book signoff to qualify, however no formal Smoke trainings are required

(Green Dashed) Route to position in which smoke management or air quality was a critical task book signoff to qualify and at least one agency requires RX-341 or RX-410 in or prior to this position .

(Dash Dot Border) Position which can be achieved via multiple routes within an agency, some with and some without a smoke management background

(BIA) Training or position specific to the BIA

(BLM) Training or position specific to the BLM

(NPS) Training or position specific to the NPS

(FS) Training or position specific to the USFS

(FWS) Training or position specific to the USFWS

(TNC) Training or position specific to The Nature Conservancy (TNC)



Indicates USFS specific requirement of RX-410 or RX-341 for, or previous to, this positions.



Indicates BLM specific requirement of RX-410 or RX-341 for, or previous to, this positions.



Indicates TNC specific requirement of RX-410 or RX-341 for, or previous to, this positions.



Indicates RX-410 or RX-341 is optional for, or previous to, this position

Results for positions identified within the 2011 Assessment: Suppression Positions

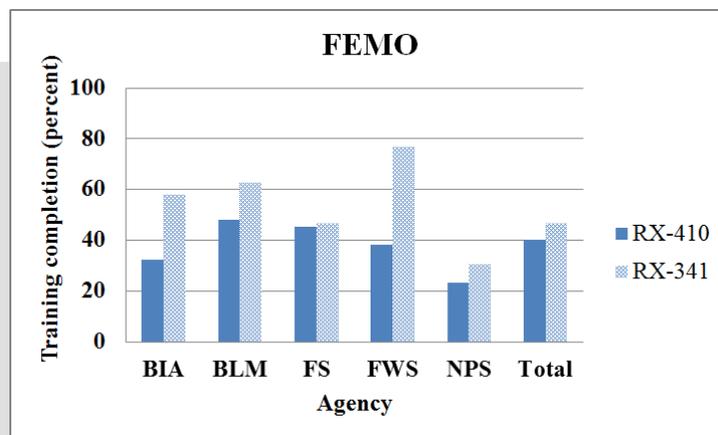
Fire Effects Monitor (FEMO)

<p>FEMO Fire Effects Monitor</p> <p>RT-130 S-290 IS-700 (FS) RX-310 (BLM)</p> <p>Qualified as: FFT2</p> <p>Optional: RX-310 S-244</p>
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<p>FFT2 or RXCM (FS, FW) Firefighter Type 2 or Prescribed Fire Crewmember (FS, FW)</p> <p>I-100 I-700 (FW) L-180 S-190 S-130</p> <p>Qualified as: NONE</p> <p>Optional: Any</p>
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FEMO					
Agency	Total personnel	RX-410		RX-341	
BIA	31	10	32%	18	58%
BLM	112	54	48%	70	63%
FS	533	242	45%	249	47%
FWS	39	15	38%	30	77%
NPS	201	47	23%	61	30%
Total	916	368	40.1%	428	46.7%



Background and Findings

The FEMO position is an entry level position. Among other tasks, those related to smoke management include:

- Review the project objectives, monitoring plan or management objectives as appropriate. Communicate concerns to supervisor... *Smoke management requirements.*
- Document first order fire effects related to fire treatment or management objectives and constraints....*Air quality*
- Monitor and record smoke management information.

Neither RX-410 nor RX-341 is required training for FEMO under NCWG or any of the land management agencies. The query of the ICQS indicates 40% of all FEMOs have taken RX-410, and 47% have taken RX-341. The NPS has a smaller proportion of FEMOs who have completed RX-341 (30%) and RX-410 (23%), while the BLM has the highest (48% for RX-410 and 63% for RX-341). Overall there is a larger range of completion for RX-341 among the agencies (30-77%) than RX-410 (23-48%). We find a great number of personnel qualified for this position have more than the required level of smoke training.

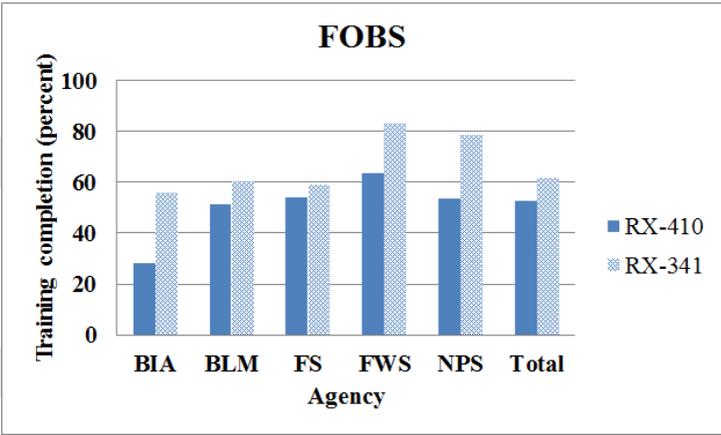
Field Observer (FOBS)

FOBS
 Field Observer
 RT-130
 IS-700 (FS)
 Qualified as: CRWB OR DOZB
 OR ENGB OR FELB OR FIRB
 OR HMGB OR TRPB
 Optional: S-244



**FIRB OR CRWB OR DOZB OR
 ENGB OR FELB OR HMGB
 OR TRPB**
 [Listed in the 'Operations'
 Section]

FOBS					
Agency	Total personnel	RX-410		RX-341	
BIA	25	7	28%	14	56%
BLM	121	62	51%	73	60%
FS	468	252	54%	278	59%
FWS	30	19	63%	25	83%
NPS	56	30	54%	44	79%
Total	700	370	53%	434	62%



Background and Findings

The FOBS position has similar smoke responsibilities as FEMO, these two positions share a position task book which outlines smoke responsibilities as follows:

- Review the project objectives, monitoring plan or management objectives as appropriate. Communicate concerns to supervisor... *Smoke management requirements.*
- Document first order fire effects related to fire treatment or management objectives and constraints... *Air quality*
- Monitor and record smoke management information.

As is the case with FEMO, neither RX-410 nor RX-341 are required for FOBS under NWCG or any of the land management agencies. The IQCS database shows 53% of FOBS have taken RX-410, while 62% have taken RX-341. The agencies with the highest number of RX-341 completion by FOBS are the FWS, NPS, BLM, FS, and BIA respectively. For RX-410 the agencies with the highest to lowest percentage of personnel completion are the FWS, FS/NPS, BLM, and BIA. We find a great number of personnel in this position have more than the required level of smoke training.

Fire Behavior Analyst (FBAN)

FBAN
Fire Behavior Analyst

RT-130 S-490 S-590
IS-700 (FS) IS-800 (FS)

Qualified as: DIVS

Optional: S-491



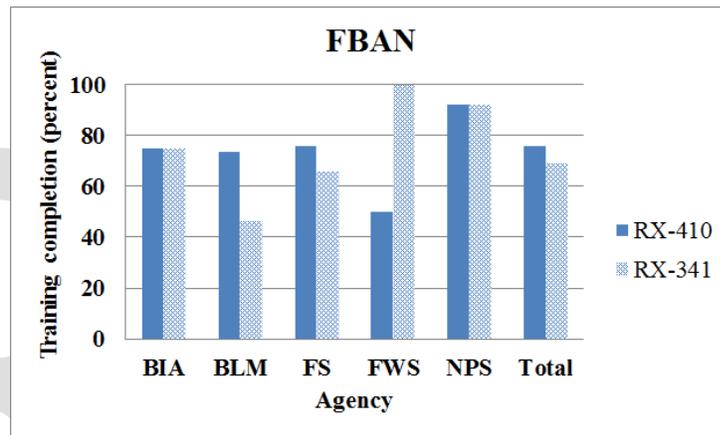
DIVS
Division/Group
Supervisor

RT-130 S-339 S-390

Qualified as: TFLD +
DIVS OR ICT3 + DIVS
OR ICT4 + STCR or
STEN + DIVS

Optional: I-300 L-380
S-336

FBAN					
Agency	Total personnel	RX-410		RX-341	
BIA	8	6	75%	6	75%
BLM	15	11	73%	7	47%
FS	74	56	76%	49	66%
FWS	6	3	50%	6	100%
NPS	13	12	92%	12	92%
Total	116	88	76%	80	69%



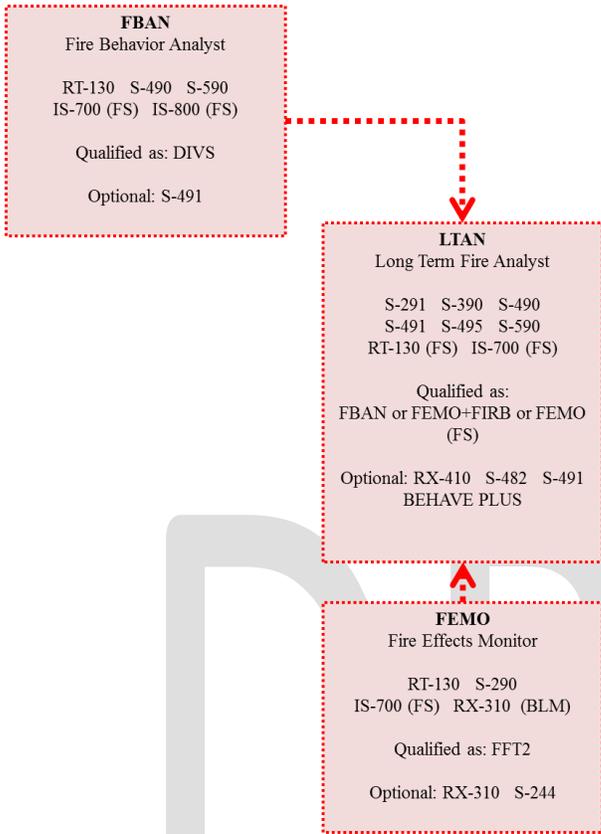
Background and Findings

The position of FBAN includes smoke responsibilities such as:

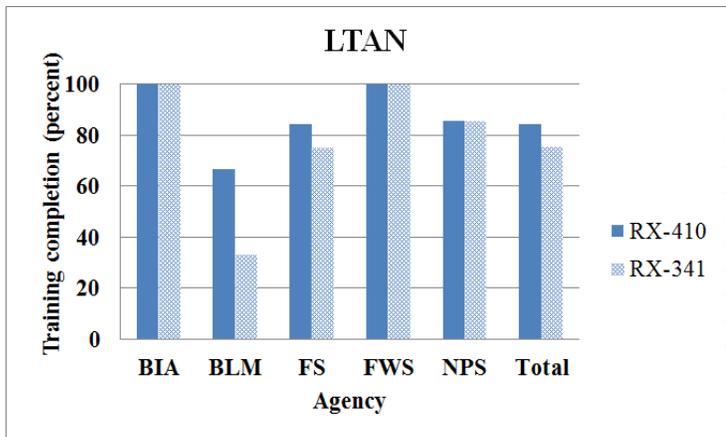
- Interpret weather forecasts, fire behavior predictions, and decision support products to: Evaluate smoke management impacts
- Prepare written fire behavior forecast for the time period specified...*Impact of smoke production*

NWCG does not require personnel to take RX-410 or RX-341 under NWCG standards, nor are there agency specific requirements for these. In querying IQCS, 70% of all FBANs have taken RX-410, and 69% of FBANs have taken RX-341. By agency, RX-410 is taken by at least 75% of all agency FBANs except for the FWS which has 50% RX-410 completion. In terms of RX-341 a similar pattern is present with over 60% of FBANs having completed the training in all agencies except the BLM which have completion level closer to 50%. These numbers indicate a substantial proportion of FBANs has completed either RX-410 or RX-341, and as such are familiar with smoke management. This may be due to personnel who also serve as RXB2s; however our query of IQCS could not capture situations such as this.

Long Term Fire Analyst (LTAN)



LTAN*					
Agency	Total personnel	RX-410		RX-341	
BIA	1	1	100%	1	100%
BLM	3	2	67%	1	33%
FS	32	27	84%	24	75%
FWS	2	2	100%	2	100%
NPS	7	6	86%	6	86%
Total	45	38	84%	34	76%



* The data from BIA, BLM, and FWS have insufficient sample sizes to provide a comprehensive evaluation.

Background and Findings

Smoke responsibilities for the position of LTAN include the same requirements for FBANS, in addition to other smoke responsibilities:

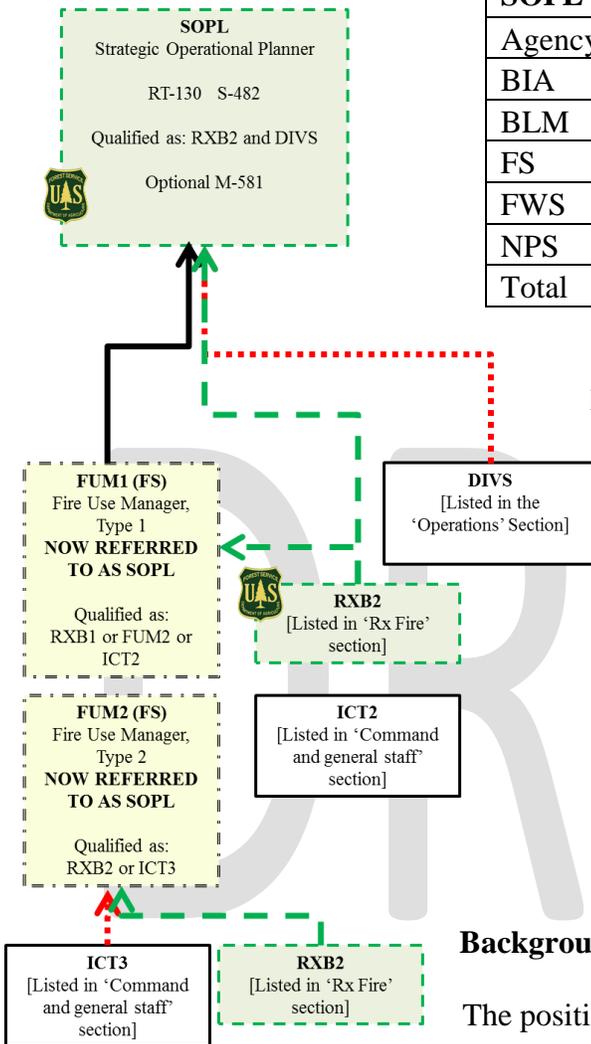
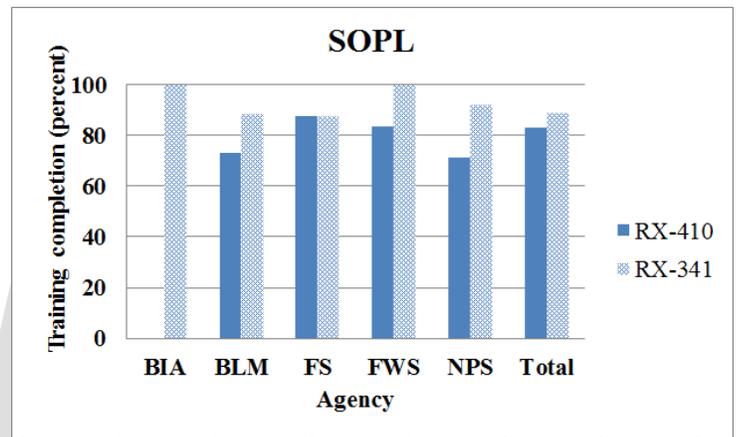
- Interpret weather forecasts, fire behavior predictions, and decision support products to: Evaluate smoke management impacts.
- Prepare written fire behavior forecast for the time period specified...*Impact of smoke production*
- Produce products and provide support for decision making and planning (e.g., wildland fire decision support documentation)... *Obtain and/or provide smoke management predictions.*
- Monitor smoke emissions for health, safety, and vista impairment as required by the incident.

LTANs have the option of taking RX-410, but neither it nor RX-341 are required by the NWCG or land management agencies. The IQCS database indicates that 84% of LTANS have taken RX-410, and 76% have taken RX-341. In both the FS and NPS, over 80% of LTANs have completed RX-410. The percentage of LTANS who have completed RX-410 is slightly greater than FBANS, which makes sense given the position of LTAN also has more smoke management responsibilities. A large part of these responsibilities include monitoring and producing products for decisions support, two topics which are not covered in depth in RX-410 at the time of this writing.

Strategic Operation Planner (SOPL)

SOPL*					
Agency	Total personnel	RX-410		RX-341	
BIA	1	0	0%	1	100%
BLM	26	19	73%	23	88%
FS	169	148	88%	148	88%
FWS	12	10	83%	12	100%
NPS	38	27	71%	35	92%
Total	246	204	83%	219	89%

* The data from BIA has an insufficient sample size to provide a comprehensive evaluation.



Background and Findings

The position of SOPL is responsible for the following:

- Develop the Course of Action for a long-term wildfire incident... *Consider impacts of smoke in course of action.*
- Coordinate with local Resource Advisor or other designated agency representative and identify issues regarding regulatory environmental compliance and mitigation to ensure concerns are adequately addressed in the Course of Action... *Smoke*
- Utilize risk assessment information in developing Course of Action... *Impacts resulting from projected smoke production.*

The position does not require completion of RX-410 or RX-341 under NWCG or agency standards. Total training background for SOPLs is high, with 83% having completed RX-410 and 89% having completed RX-341. The position of SOPL may be entered through a combination of Division Section Chief and Prescribed Burn Boss Type 2 Forest Service RXB2 will have been required to have taken RX-410, and RX-341 is an optional course, which in part, may explain some of these higher numbers; however RX-410 is not an RXB2 requirement for the other agencies.

Results for suppression positions identified by the NWCG Smoke Committee’s Training Sub-committee

Incident Commander Type 1

ICT1
(Incident Commander, Type 1)

S-520 or CIMC RT-130
IS-700 (FS) IS-800 (FS)

Qualified as:
ICT2

Optional: NONE

ICT2
Incident Commander, Type 2

S-420
IS-700 (FS) IS-800 (FS)
RT-130 (FS)

Qualified as:
ICT3+OSC2 OR ICT3+PSC2 OR
ICT3+LSC2 OR ICT3+FSC2

Optional: I-400 L-480 S-400

ICT3
Incident Commander, Type 3

RT-130 S-300 S-390
IS-700 (FS) IS-800 (FS)

Qualified as:
ICT4+TFLD OR ICT4 + Qualified as
a Strike Team Leader (STCR,
STDZ,STEN,STPL) + Qualified in
any two Single Resource Boss
positions (one must be CRWB or
ENGB)

Optional: L-381

ICT1*					
Agency	Total personnel	RX-410		RX-341	
BIA	1	0	0%	1	100%
BLM	4	1	25%	0	0%
FS	21	9	43%	9	43%
FWS	3	2	67%	2	67%
NPS	3	2	67%	2	67%
Total	34	14	41%	14	41%

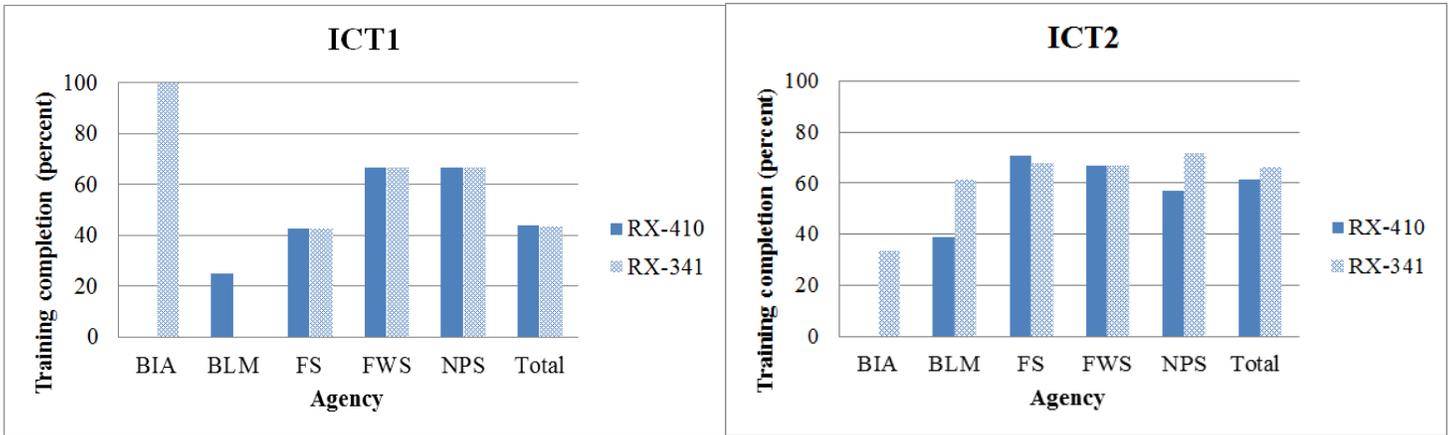
ICT2					
Agency	Total personnel	RX-410		RX-341	
BIA	3	0	0%	1	33%
BLM	18	7	39%	11	61%
FS	68	48	71%	46	68%
FWS	6	4	67%	4	67%
NPS	14	8	57%	10	71%
Total	109	67	61%	72	66%

* The data from BIA, BLM, FWS, and NPS has an insufficient sample size to provide a comprehensive evaluation.

Background and Findings

ICT1 and ICT2 do not have specifically stated responsibilities with regards to smoke, but may encounter the subject while considering air quality as a resource or public concern based on the following position task book responsibilities:

- Participate in public meetings.
- Anticipate and respond proactively to social, political and cultural issues and concerns.
- Provide for the safety and welfare of assigned resources.
- Review and approve information releases.



NWCG and land management agencies do not require ICTs to have completed RX 341 or RX-410. In looking at the queries we find ICT1s have a 41% completion rate for both RX-410 and RX-341. The ICT2 positions have a 61% and 66% percent completion of RX-341, respectively. Based on these numbers, nearly half of the personnel in this position have knowledge of the impacts of smoke and the air quality considerations that result from smoke emissions.

Incident Commander Type 3

ICT3
Incident Commander, Type 3

RT-130 S-300 S-390
IS-700 (FS) IS-800 (FS)

Qualified as:
ICT4+TFLD OR ICT4 + Qualified as a Strike Team Leader (STCR, STDZ, STEN, STPL) + Qualified in any two Single Resource Boss positions (one must be CRWB or ENGB)

Optional: L-381

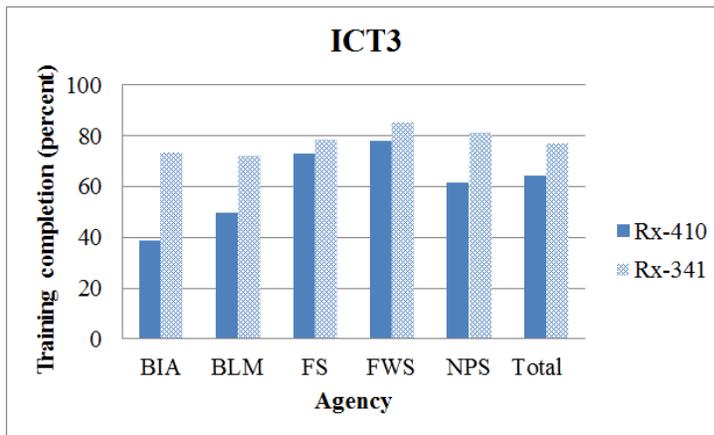
ICT4

RT-130 S-200
IS-700 (FS) L-280 (FS)
S-215 (FS)

Qualified as:
CRWB or HEQB or ENGB or FELB or FIRB or HMGB

Optional: S-215 S-234

Agency	Total personnel	RX-410		RX-341	
BIA	90	35	39%	66	73%
BLM	323	161	50%	233	72%
FS	773	563	73%	607	79%
FWS	54	42	78%	46	85%
NPS	86	53	62%	70	81%
Total	1326	854	64%	1022	77%



The position of ICT3 does not have the same level of responsibilities as ICT1 and 2's though percent completion of RX-410 and RX-341 is still relatively high, 64% and 77% respectively. The level of training support obtained by personnel appears to exceed the requirements for this position.

Public Information Officers (PIOF, PIO1, and PIO2)

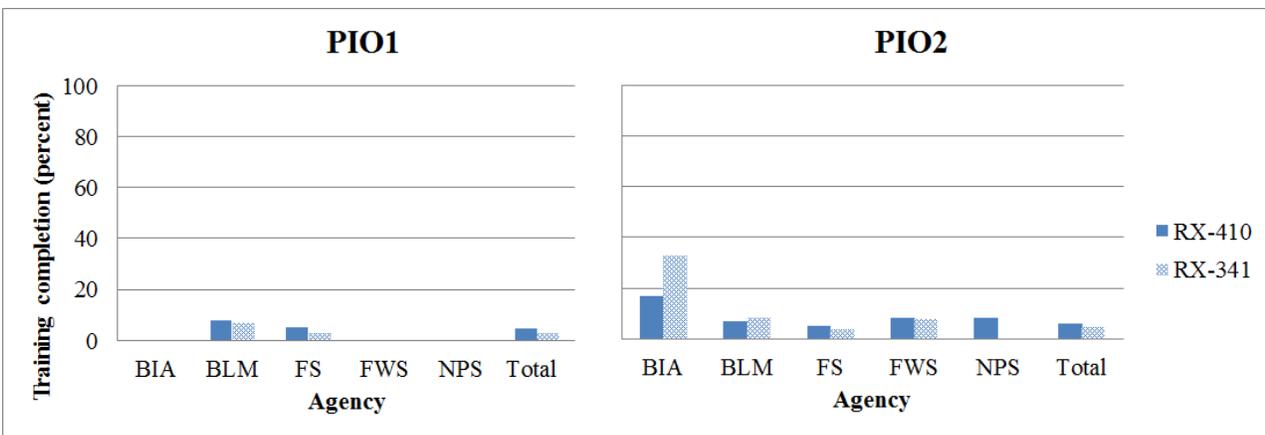
PIO1
 Public Information Officer, Type 1
 S-520 or CIMC RT-130
 IS-700 (FS) IS-800 (FS)
 RT-130
 Qualified as: PIO2
 Optional: NONE

PIO1*					
Agency	Total personnel	RX-410		RX-341	
BIA	0	0	0%	0	0%
BLM	13	1	8%	1	8%
FS	62	3	5%	2	3%
FWS	1	0	0%	0	0%
NPS	7	0	0%	0	0%
Total	83	4	5%	3	4%

PIO2
 Public Information Officer, Type 2
 S-190 S-420 RT-130
 I-100 (FS) I-200 (FS)
 I-300 (FS) I-400 (FS)
 IS-700 (FS)
 IS-800 (FS)
 Qualified as: NONE
 Optional: I-400 S-403

PIO2					
Agency	Total personnel	RX-410		RX-341	
BIA	6	1	0%	2	0%
BLM	57	4	8%	5	8%
FS	242	12	5%	11	3%
FWS	12	1	0%	1	0%
NPS	369	3	0%	0	0%
Total	353	21	5%	19	4%

* The data from BIA has an insufficient sample size to provide a comprehensive evaluation.



Background and Findings

Public information officers are required to issue appropriate communications based on emerging situations:

- Issue appropriate communications based on emerging situations.... *Evacuations, Road closures, Smoke conditions*
- Contact unit public information staff and/or established information center(s)...*Level of public/media interest in incident, Amount of media on scene, Incident information activities already underway, Primary point of contact for media and public, Community issues and concern*

PIO Types 1 and 2 are not required to have completed RX-410 or RX-341. Total numbers for completion of these trainings is fairly low, PIO1 and PIO have an RX-410 completion of 5% and 6%, respectively. This is not surprising given the level of detail in these trainings exceeds what is required in the position task books for these positions.

Public Information Officers (PIOF)

PIOF		
Public Information Officer		
I-100	IS-700 (FS)	L-180
RT-130	S-130	S-133 (FS)
	S-190	S-203
Qualified as:		
NONE		
Optional: I-300 L-180 S-110		
S-203		

PIOF*					
Agency	Total personnel	RX-410		RX-341	
BIA	11	1	9%	2	18%
BLM	81	5	6%	5	6%
FS	433	26	6%	25	6%
FWS	25	2	8%	2	8%
NPS	79	4	5%	1	1%
Total	629	38	6%	35	6%

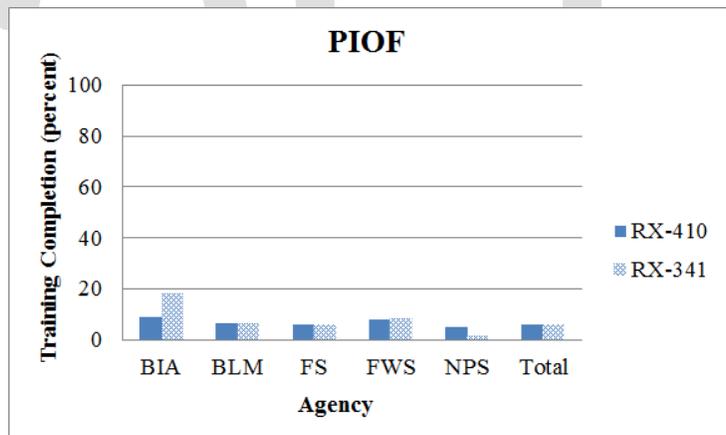
* The data from BIA has an insufficient sample size to provide a comprehensive evaluation of PIO1.

Background and Findings

Public information officers are required to issue appropriate communications based on emerging situations:

- Issue appropriate communications based on emerging situations.... *Evacuations, Road closures, Smoke conditions*
- Assist with effective community relations in coordination with local unit. *Provide updates for community leaders*

and *other partners, Prepare for information meetings, Establish and maintain personal contacts as needed (trapline).*



PIOFS are not required to have completed RX-410 or RX-341. Total numbers for completion of these trainings is fairly low for RX-410 and RX-341 completion at 6%. This is not surprising given the level of detail in these trainings exceeds what is required in the position task books for these positions.

Operations Section Chief Type 2 (OSC2)

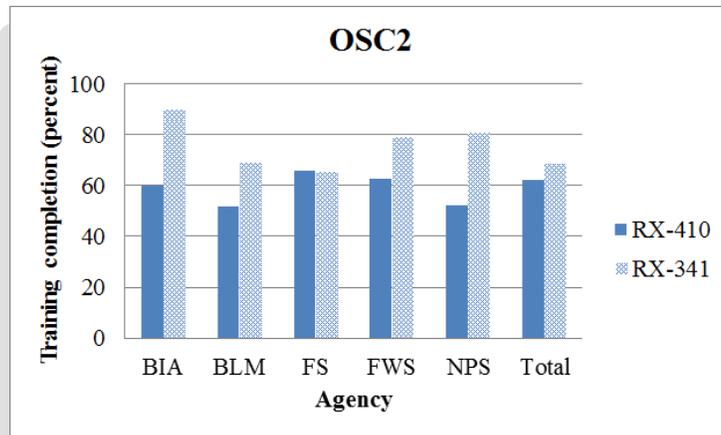
OSC1
 Operations Section Chief, Type 1
 S-520 OR CIMC RT-130
 IS-700 (FS) IS-800 (FS)
 Qualified as:
 OSC2
 Optional: NONE

OSC2
 Operations Section Chief, Type 2
 RT-130 S-420 S-430
 IS-700 (FS) IS-800 (FS)
 Qualified as:
 DIVS
 Optional: I-400 L-480 S-430

DIVS
 Division/Group Supervisor
 RT-130 S-339 S-390
 Qualified as: TFLD + DIVS OR
 ICT3 + DIVS OR ICT4 + STCR or
 STEN + DIVS
 Optional: I-300 L-380 S-336

OSC2					
Agency	Total personnel	RX-410		RX-341	
BIA	10	6	60%	9	90%
BLM	58	30	52%	40	69%
FS	256	168	66%	168	66%
FWS	24	15	63%	19	79%
NPS	21	11	52%	17	81%
Total	369	230	62%	253	69%

* The data from BIA and NPS has an insufficient sample size to provide a comprehensive evaluation.



Background and Findings

Operational Section Chiefs do not have requirements listed for smoke management or air quality within their position task books.

- Participate in the preparation of other necessary relevant plans.
Evacuation/structure protection plan
Prescribed fire plan
- Identify kind, type, and number of resources required to achieve control objectives. *Consider weather, fuels, terrain, fire behavior, kinds and types of resources, resource availability, and safety factors.*
Calculate control forces. Order necessary personnel and equipment. Discuss long-range and contingency plans and identify potential and future resources.
- Follow local direction to maintain environmental quality and avoid damage to social or cultural environment. *Notify Incident Commander of historical/cultural resources found.*

In looking at the queries 62% of OSC2's have completed RX-410 and 69% have completed RX-341. Percentage completion of RX-341 by agency includes in descending order BIA,NPS,FWS,BLM, and FS. Percentage completion of RX-410 by agency includes in descending order FS, FWS, BIA, NPS, and BLM.

Operations Section Chiefs Type 1 (OSC1)

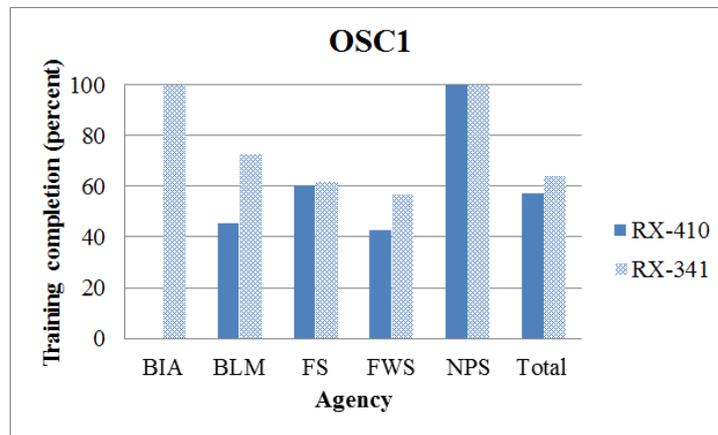
OSC1
Operations Section Chief, Type 1
S-520 OR CIMC RT-130
IS-700 (FS) IS-800 (FS)
Qualified as:
OSC2
Optional: NONE

OSC2
Operations Section Chief, Type 2
RT-130 S-420 S-430
IS-700 (FS) IS-800 (FS)
Qualified as:
DIVS
Optional: I-400 L-480 S-430

DIVS
Division/Group Supervisor
RT-130 S-339 S-390
Qualified as: TFLD+ DIVS OR
ICT3+DIVS OR ICT4+ STCR or
STEN+ DIVS
Optional: I-300 L-380 S-336

OSC1					
Agency	Total personnel	RX-410		RX-341	
BIA	1	0	0%	1	100%
BLM	11	5	45%	8	73%
FS	63	38	60%	39	62%
FWS	7	3	43%	4	57%
NPS	2	2	100%	2	100%
Total	84	48	57%	54	64%

* The data from BIA and NPS has an insufficient sample size to provide a comprehensive evaluation.



Background and Findings

Operational Section Chiefs do not have requirements listed for smoke management or air quality within their position task books, but may have indirect involvement with smoke:

- Participate in the preparation of other necessary relevant plans.
Evacuation/structure protection plan
Prescribed fire plan
- Identify kind, type, and number of resources required to achieve control objectives. *Consider weather, fuels, terrain, fire behavior, kinds and types of resources, resource availability, and safety factors. Calculate control forces. Order necessary personnel and equipment. Discuss long-range and contingency plans and identify potential and future resources.*
- Follow local direction to maintain environmental quality and avoid damage to social or cultural environment. *Notify Incident Commander of historical/cultural resources found.*

In looking at the queries 57% of OSC1s have completed RX-410 and 64% have completed RX-341. The Forest service had the highest percent of OSC1 with smoke training, followed by BLM and FWS. The BIA and NPS total personnel was not a sufficient sample size on which any conclusions could be based.

Planning Section Chief (Types 1 and 2)

PSC1
Planning Section Chief, Type 1

S-520 OR CIMC
IS-700 (FS) IS-800 (FS)

Qualified as: PSC2

Optional: NONE

PSC2
Planning Section Chief, Type 2

S-420
IS-200 (FS) IS-800 (FS)

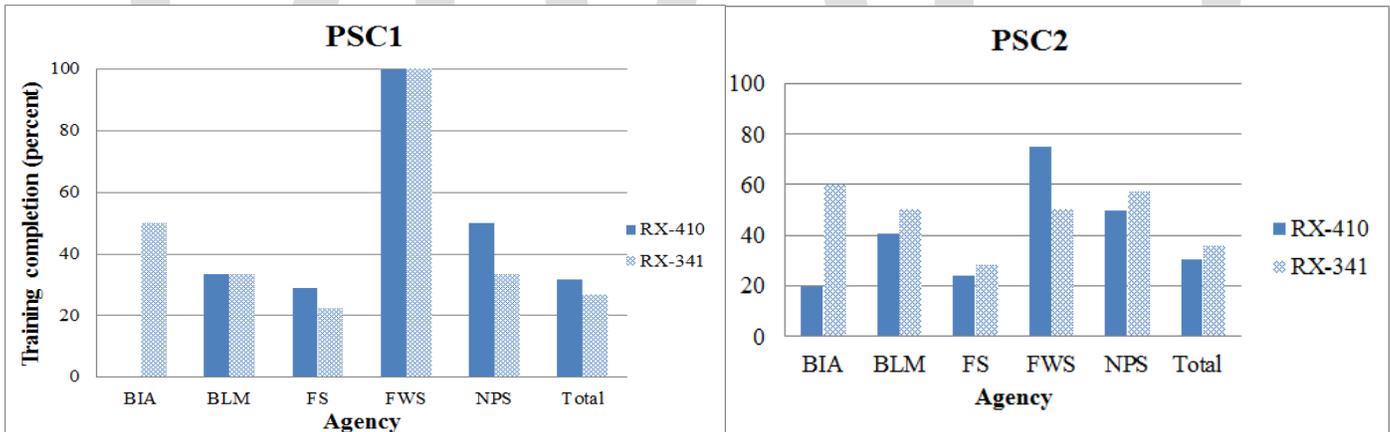
Qualified as: SITL + RESL

Optional: I-400 L-480 S-440

PSC1					
Agency	Total personnel	RX-410		RX-341	
BIA*	2	0	0%	1	50%
BLM	6	2	33%	2	33%
FS	45	13	29%	10	22%
FWS*	1	1	100%	1	100%
NPS	6	3	50%	2	33%
Total	60	19	32%	16	27%

PSC2					
Agency	Total personnel	RX-410		RX-341	
BIA	5	1	20	3	60
BLM	22	9	41	11	50
FS	103	25	24	29	28
FWS	4	3	75	2	50
NPS	14	7	50	8	57
Total	148	45	30	53	36

* The data from BIA and NPS has an insufficient sample size to provide a comprehensive evaluation.



Background and Findings

- Interact and coordinate with command staff, general staff and appropriate unit leaders.
- Facilitate Planning Section meetings and share pertinent information.
- Schedule and conduct operational period briefings
- Coordinate submission of ICS 209, Incident Status
- Ensure incident documentation is completed as required by the Incident Commander.

The NWCG position description does not explicitly describe smoke responsibilities, but does entail responsibilities which may entail smoke. There are no smoke training requirements for these positions, though there are personnel who have completed either RX-410 or RX-341.

DRAFT

Results for positions identified within the 2011 Assessment: Prescribed Fire Positions

Prescribed Fire Burn Boss Type 2 (RXB2)

RXB2
Prescribed Fire Burn Boss, Type 2

IS-700 RT-130 S-390
RX-310
RX-301 (BLM,FS, FW,TNC)
RX-341 (TNC) RX-410 (FS)

Qualified as:
FIRB+ICT4

Optional: L-380 RX-341 RX-310 RX-301

RXB2					
Agency	Total personnel	RX-410		RX-341	
BIA	129	45	35%	109	84%
BLM	282	194	69%	258	91%
FS	1013	869	86%	936	92%
FWS	168	94	56%	154	92%
NPS	152	103	68%	140	92%
Total	1744	1305	75%	1597	92%

ICT4

RT-130 S-200
IS-700 (FS) L-280 (FS)
S-215 (FS)

Qualified as:
CRWB or HEQB or ENGB
or FELB or FIRB or HMGB

Optional: S-215 S-234
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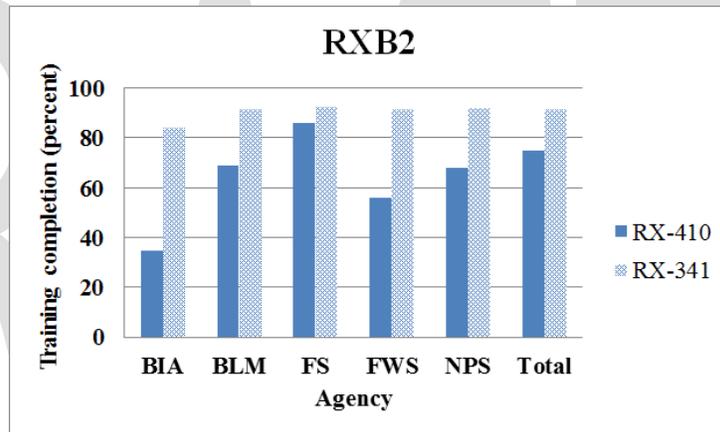
FIRB

Firing Boss, Single Resource

RT-130 S-230 S-290
I-200 (FS) IS-700 (FS)
L-280 (FS) S-234 (FS)
S-260 (FS) S-270 (FS)
S-234 (BLM)

Qualified as:
FFT1

Optional: I-200 L-280 S-230 S-260 S-270



Background and Findings

Personnel in RXB2 positions are responsible for the following:

- Obtain initial briefing from local fire management organization...*Smoke management issues*
- Ensure and maintain documentation as appropriate...*Smoke monitoring*
- Communicate operational activities among resources (ignition, holding, monitoring) to safely achieve prescribed fire plan objectives...*Smoke, ignition patterns, fire behavior, and tactics, Effectiveness of the holding operation relative to smoke, ignition patterns and fire behavior*
- Ensure regulatory environmental compliance and mitigation...*Smoke*
- Ensure the smoke management plan meets agency requirements
- Monitor prescription parameters. ..*Obtain smoke dispersal forecasts and analyze against the prescription.*
- Complete test fire according to the prescribed fire plan...*Evaluate expected fire behavior, smoke dispersal, weather conditions, and ability to meet objectives.*

For RXB2 NWCG specifies RX-341 as optional. Forest Service personnel must take RX-410 for this position. Completion is greater than required by the agencies with 75% of all RXB2 have completed RX-410 and 92% have completed RX-341. Agencies with the highest percentage of completion for RX-410 are the FS, BLM, NPS, FWS, and BIA, respectively. All agencies appear to have similar percentages of completion for RX-341. It should be noted that experienced personnel who were grandfathered into the position may not have been required to take the RX-410 training, thus the

percentage of FS completion is less than 100% even though this is a position requirement. Also, personnel who have taken RX-450, the predecessor to RX-410 may not be captured in these results.

Prescribed Burn Boss Type 1 (RXB1)

RXB1
Prescribed Fire Burn Boss, Type 1

Rx

RT-130 S-490
IS-700 (FS) RX-410 (BLM, FS)

Qualified as:
RXB2 (BLM)
Optional: M-581 RX-410
RX-510 RX-341 (BLM)

RXB2
Prescribed Fire Burn Boss, Type 2

IS-700 RT-130 S-390
RX-310
RX-301 (BLM,FS, FW,TNC)
RX-341 (TNC) RX-410 (FS)

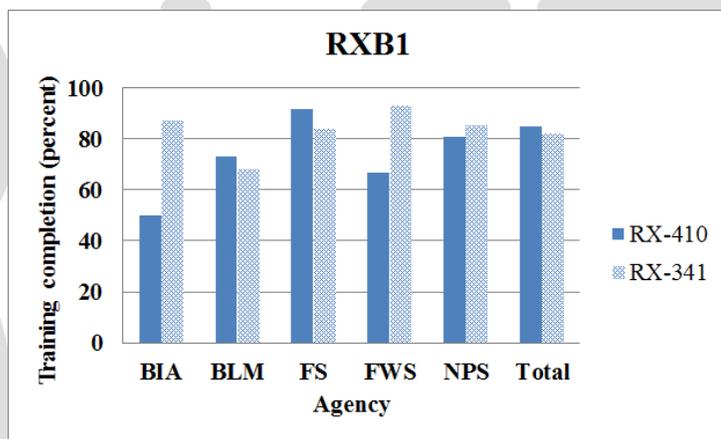
Qualified as:
FIRB+ICT4

Optional: L-380 RX-341 RX-310 RX-301

ICT4
[Listed in the "Command and General Staff" section]

FIRB
[Listed in the "Operations" section]

RXB1					
Agency	Total personnel	RX-410		RX-341	
BIA	8	4	50%	7	88%
BLM	41	30	73%	28	68%
FS	169	155	92%	142	84%
FWS	15	10	67%	14	93%
NPS	21	17	81%	18	86%
Total	254	216	85%	209	82%



Background and Findings

Personnel in RXB1 positions are responsible for the following:

- Obtain initial briefing from local fire management organization...*Smoke management issues*
- Ensure and maintain documentation as appropriate....*Smoke monitoring*
- Communicate operational activities among resources (ignition, holding, monitoring) to safely achieve prescribed fire plan objectives.....*Smoke, ignition patterns, fire behavior, and tactics, Effectiveness of the holding operation relative to smoke, ignition patterns and fire behavior*
- Ensure regulatory environmental compliance and mitigation...*Smoke*
- Ensure the smoke management plan meets agency requirements
- Monitor prescription parameters. ..*Obtain smoke dispersal forecasts and analyze against the prescription.*
- Complete test fire according to the prescribed fire plan...*Evaluate expected fire behavior, smoke dispersal, weather conditions, and ability to meet objectives.*

Under NWCG standards, RXB1 personnel may take RX-410, however it is not required. RXB2 is the gateway to this position; FS RXB2's are required to have taken RX-410, while BLM RXB2s have the option of taking RX-341. Personnel having taken RX-410 and RX-341 number 85% and 82%, respectively. Agency trends for RX-410 indicate that FS, NPS, BLM, FWS, and BIA have the highest percentages of personnel respectively. For RX-341 agencies with the highest personnel numbers are

FWS, BIA, NPS, FS, and BLM, respectively. These high percentages for training completion are to be expected for those seeking the training support to meet the responsibilities of this position.

Prescribed Fire Manager Prescribed Fire Manager Type 2 (RXM2)

RXM2
Prescribed Fire Manager, Type 2
IS-700 (FS) RT-130

Qualified as:
RXB2

Optional: I-300 M-581

RXB2
Prescribed Fire Burn Boss, Type 2

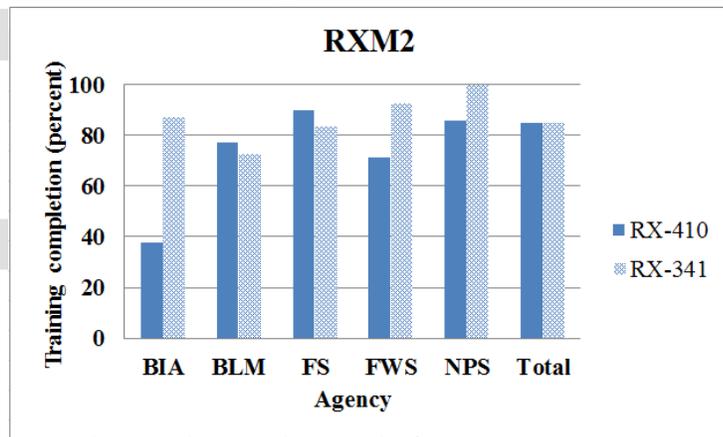
IS-700 RT-130 S-390
RX-310

RX-301 (BLM,FS, FW,TNC)
RX-341 (TNC) RX-410 (FS)

Qualified as:
FIRB+ICT4

Optional: L-380 RX-341 RX-310 RX-301

RXM2					
Agency	Total personnel	RX-410		RX-341	
BIA	8	3	38%	7	88%
BLM	22	17	77%	16	73%
FS	148	133	90%	124	84%
FWS	14	10	71%	13	93%
NPS	21	18	86%	21	100%
Total	213	181	85%	181	85%



Background and findings

The following are the responsibilities of RXM2:

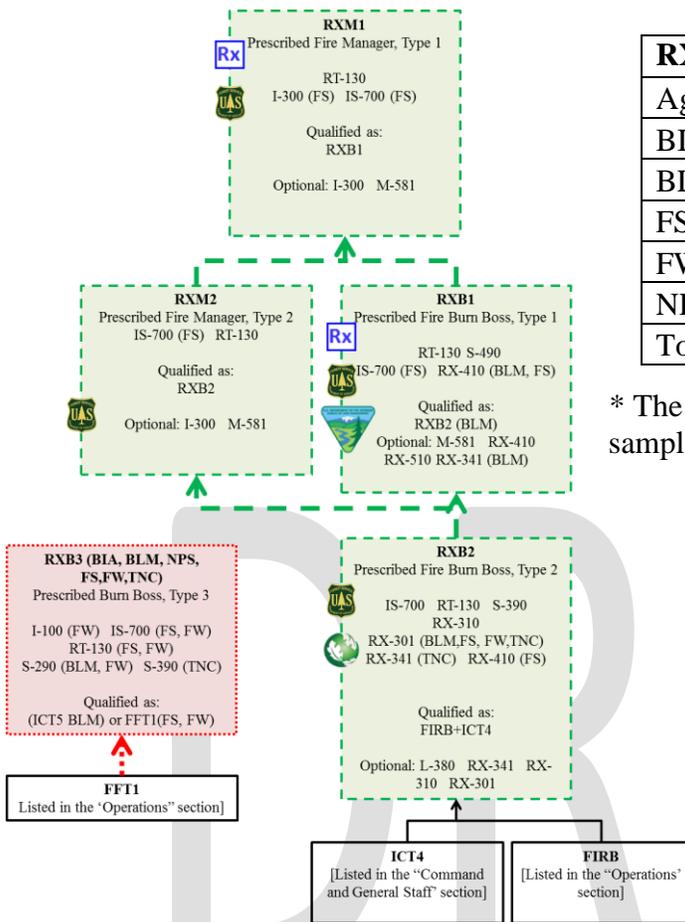
- Obtain initial briefing from local fire management organization.....*Smoke management issues*
- Manage multiple operations...*Ensure timely fire behavior and smoke management predictions.*
- Coordinate the termination of burn(s) if smoke, resource, and/or fire management objectives are not being met.
- Coordinate burn organization(s) with other relevant agencies/personnel.....*Air quality authorities*
- Anticipate and evaluate impacts of prescribed fire/smoke on the public, *Coordinate with air quality authorities, Follow correct air quality compliance guidelines, Direct use of appropriate smoke emissions prediction and smoke modeling software.*
- Maintain contact with National Weather Service, state air quality regulators, agency administrator(s). Identify air quality constraints relative to use of fire.

The NWCG standard pathway for RXM2 is via RXB2. With no additional smoke management courses required, the potential smoke backgrounds for RXM2 and RXB2 are identical. Percentage of personnel having completed smoke management training is 85% for both RX-410 and RX-341. Agency specific

completion of RX-410, in descending order, is FS, NPS, BLM, FWS, and BIA respectively. Agency trends for RX-341 completion in descending order is NPS, FWS, BIA, FS, and BLM.

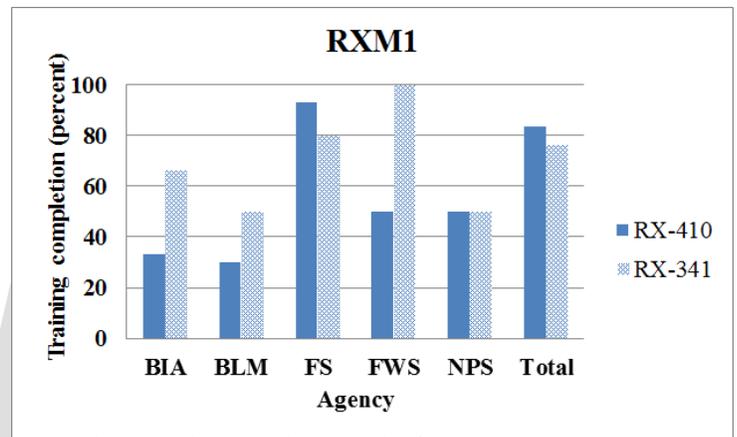
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Prescribed Fire Manager Type 1 (RXM1)



RXM1*					
Agency	Total personnel	RX-410		RX-341	
BIA	3	1	33%	2	67%
BLM	10	3	30%	5	50%
FS	85	79	93%	68	80%
FWS	2	1	50%	2	100%
NPS	2	1	50%	1	50%
Total	102	85	83%	78	76%

* The data from BIA, FWS, and FWS has an insufficient sample size to provide a comprehensive evaluation.



Background and findings

Among the responsibilities of RXM1 are:

- Obtain initial briefing from local fire management organization.....*Smoke management issues*
- Manage multiple operations...*Ensure timely fire behavior and smoke management predictions.*
- Coordinate the termination of burn(s) if smoke, resource, and/or fire management objectives are not being met.
- Coordinate burn organization(s) with other relevant agencies/personnel.....*Air quality authorities*
- Anticipate and evaluate impacts of prescribed fire/smoke on the public, *Coordinate with air quality authorities, Follow correct air quality compliance guidelines, Direct use of appropriate smoke emissions prediction and smoke modeling software.*
- Maintain contact with National Weather Service, state air quality regulators, agency administrator(s).
- Identify air quality constraints relative to use of fire.

RXB1 is the pathway to RXM1, there is not additional smoke training for the position of RXM1. Thus the smoke management background for RXM1 is likely to be similar to that of RXB1. The progression to Type 1, for both managers and burn bosses, equates to overseeing increasingly complex projects and burns. IQCS queries show that 83% of personnel of had RX-410, and 76% have had RX-341, slightly lower than RXB1. Agencies with the highest completion of RX-410 for the position of RXM1 are FS,

FSW/NPS, BIA, and BLM, respectively. Agencies with the highest completion numbers for RX-341 include FWS, FS, BIA, and BLM/NPS, respectively

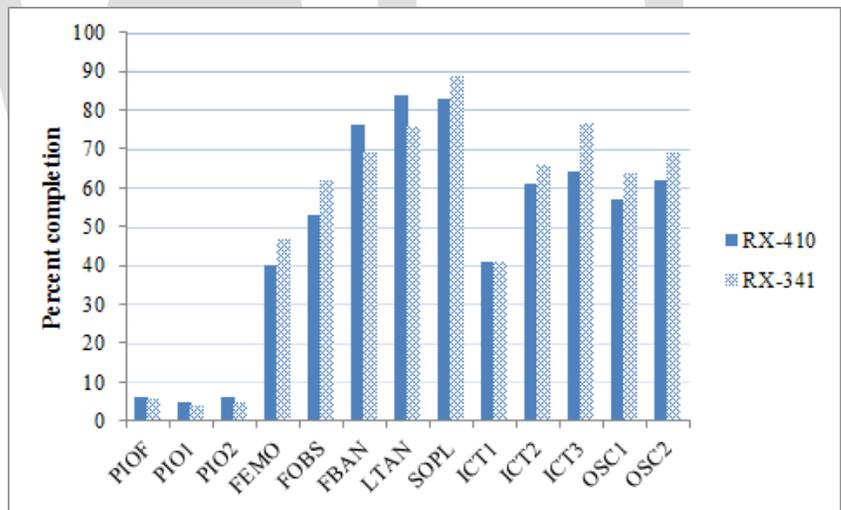
Conclusions

Suppression positions

There is a substantial number of personnel within suppression positions which have completed either RX-410 or RX-341, this is particularly true for FBANs, LTANs, and SOPLs, which have an interagency total of 70% or greater completion of RX-410. Of these positions ICTs and PIOs have the least proportion of personnel who have completed RX-410 or RX-341. Further, the positions of FEMO, FOBS, FBAN, and LTAN have varying levels of smoke responsibilities which require the monitoring of smoke or conditions which impact smoke; however there is no specific training material required for these positions that demonstrates the link between meteorology and smoke movement.

In the 2011 assessment we found the position of SOPL could be arrived at via multiple routes. Additionally, the positions of LTAN, FBAN, FOBS contained some level of smoke responsibility, with no required training to support it. Based on these findings the penetration of material across all agencies exceeded what would be expected given the minimum requirements as of 2011. The smoke responsibilities vary considerably across the various suppression positions, thus the two training courses evaluated herein may not be ideal for all positions. For example, LTANs are indicated as being responsible for monitoring smoke, however the two courses which address smoke RX-341 and RX-410, do not contain significant monitoring information.

SUPPRESSION				
Position	RX-410		RX-341	
	number	percent	number	percent
FBAN	88	75.9	80	69
FEMO	368	40.2	428	46.7
FOBS	370	52.9	434	62
ICT3	854	64.4	1022	77.1
ICT2	67	61.5	72	66.1
ICT1	14	43.8	14	43.8
LTAN	38	84.4	34	75.6
OSC2	230	62.3	253	68.6
OSC1	48	57.1	54	64.3
PIOF	38	6	35	5.6
PIO2	21	5.9	19	5.4
PIO1	4	4.8	3	3.6
PSC2	45	30.4	53	35.8
PSC1	19	31.7	16	26.7
SOPL	204	82.9	219	89



Prescribed fire positions

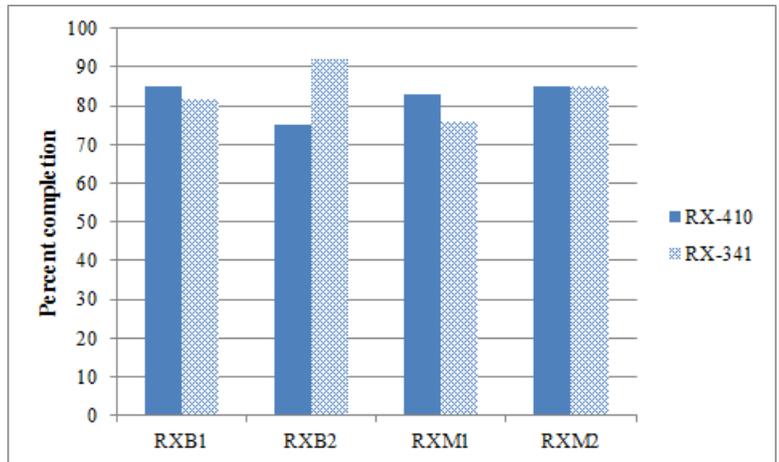
All prescribed fire positions have a high number of personnel who have completed RX-410 or RX-341, 70% or greater. These numbers will likely not reflect 100%, even for the FS, in which RXB2s are required to have taken RX-410, due to the fact that some personnel were occupying these positions prior to the development of these trainings.

In the previous report we found the position of RXM2 and RXB2 varied in the level of recommended training, with USFS requiring completion of RX-410. Other agencies did not require this for RXM2, or for any of the other prescribed fire positions. In evaluating the IQCS data the dissemination of smoke material across all agencies exceed what would be expected given the minimum requirements as of 2011.

Training Recommendations

Based upon the position task book responsibilities, and the number of personnel in these various positions who have completed RX-341 and RX-410, we find these trainings are being used to a greater extent than is indicated by minimum position requirements for prescribed fire and suppression positions. Upon evaluating the positions we find multiple levels of smoke responsibility. Future research is recommended to determine how to address the smoke training needs of various positions which may require less detail, or different knowledge, than is current conveyed in RX-341 or RX-410. This is especially true in the context of addressing smoke in wildfire operations.

PRESCRIBED FIRE				
Position	RX-410		RX-341	
	number	percent	number	percent
RXB2	1305	74.8	1597	91.6
RXB1	216	85	209	82.3
RXM2	181	85	181	85
RXM1	85	83.3	78	76.5



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Appendix A – Course Objectives for RX-341 and RX-410

Prescribed Fire Plan Preparation (RX-341) Lesson Objectives

Unit 0 – Introduction

OBJECTIVES:

During this unit the instructor will:

1. Introduce the cadre and students.
2. Discuss course logistics.
3. Explain the course objectives.
4. Identify course reference materials.
5. Explain student evaluation methods.
6. Discuss the final project.
7. Review the pre-course work.

Unit 1 – Policies and Guidelines

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Identify the policies that direct prescribed fire planning.
2. Identify the responsibilities of the prescribed fire plan preparer, technical reviewer, and agency administrator as they relate to plan preparation.
3. Define the purpose of a prescribed fire plan.
4. Describe the processes involved in preparing the prescribed fire plan.

Unit 2 – Goals and Objectives

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Define land management goals and project objectives.
2. Develop S.M.A.R.T. (Specific, Measurable, Achievable, Relevant, Time Bound) objectives to meet project goals.
3. Describe how the prescribed fire plan relates to fire management plans and land management plan goals.
4. Identify information sources used to develop project goals and objectives.

Unit 3 – Description of the Prescribed Fire Area

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Identify information required to accurately describe the prescribed fire area.
2. Define the concept of project boundary as it relates to landscape prescribed fire planning.
3. Identify the mapping requirements and standards for a prescribed fire plan.

Unit 4 – Risk Assessment and Preliminary Complexity Analysis

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Define the risk management process and describe how it relates to the complexity analysis.
2. From the NWCG Prescribed Fire Complexity Rating System Guide:
 - a. Identify the three factors of the complexity analysis.
 - b. Identify the 14 elements that apply to the three risk factors of the complexity analysis.
 - c. Describe how mitigation measures may change the rating of complexity element(s).

Unit 5 – Prescription Development and Scheduling

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Describe ranges of acceptable prescription parameters to produce fire behavior that meets fire effects objectives and control limitations.
2. Identify the components of fuels and weather that contribute to the development of the prescription.
3. Demonstrate how fire modeling outputs may be used to develop prescriptions.
4. Discuss how the assumptions and limitations in the fire spread model relate to prescribed fire.
5. List supporting documentation that may be required for the prescription.

Unit 6 – **Smoke management** and **Air quality**

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Describe the relationship between **smoke management** and prescribed fire objectives.
2. Identify principal **smoke management** mitigation strategies.
3. Describe the steps for identifying **smoke** concerns and mitigation techniques for managing **smoke** production and **dispersion**.
4. Identify available tools and technologies that help develop the **smoke management** element of the prescribed fire plan.

Unit 7A – Implementation: Pre-burn Considerations and Briefing

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Identify on- and offsite actions that must be completed and documented prior to implementation.
2. Identify considerations that must be addressed in the prescribed fire plan.
3. Identify actions, timelines, and responsibilities for interagency and intraagency coordination and public notifications.
4. Identify briefing criteria to be covered in the prescribed fire plan.

Unit 7B – Implementation: Organization and Equipment

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Identify appropriate resources, or resources capabilities, equipment, and organization necessary to implement the prescribed fire plan.
2. Identify required staffing qualifications based on prescribed fire complexity.

Unit 7C – Implementation: Test Fire and Ignition Plan

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Describe the test fire process and documentation requirements.
2. Describe ignition strategies used to meet fire behavior objectives and control limitations.

Unit 7D – Implementation: Holding Plan

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Describe general procedures to be used for operations to maintain the fire within prescription and project area, until the fire is declared out.
2. Describe critical holding points and potential mitigation actions.

Unit 7E – Implementation: Contingency Plan and Wildfire Conversion

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Identify the importance of the contingency plan as it relates to risk management and burn objectives.
2. Identify contingency plan elements.
3. Describe the concepts of trigger points for contingency planning.
4. Describe the process of converting a prescribed fire to a wildfire.

Unit 7F – Implementation: Communication

OBJECTIVE:

Upon completion of this unit, students will be able to:

- Identify the communications needs to implement a prescribed fire plan.

Unit 7G – Implementation: Public and Personnel Safety, Medical

OBJECTIVE:

Upon completion of this unit, students will be able to:

- Describe considerations for personnel and public safety, and emergency procedures.

Unit 8 – Monitoring

OBJECTIVE:

Upon completion of this unit, students will be able to:

- Identify and discuss the four levels of monitoring and what needs to be covered in the prescribed fire plan.

Unit 9 – Funding, Post-Burn Activities (Rehabilitation and Reports), and Appendices

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Identify the funding source(s) and estimated costs for all phases of the prescribed fire.
2. Identify post-burn rehabilitation to be detailed in the prescribed fire plan.
3. Identify required and optional reports to be completed for the prescribed fire plan.
4. Identify required and optional appendices to be attached to the prescribed fire plan.
5. Describe the prescribed fire plan project file requirements.

Unit 10 – Final Complexity Rating

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. From the NWCG Prescribed Fire Complexity Rating System Guide:
 - a. Describe how to develop the summary complexity rating and the rationale for that rating.
 - b. Describe the process of finalizing the complexity analysis.

Unit 11 – Reviews, Approvals, and Signature Page

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Describe the prescribed fire plan review and approval process.
2. Explain the amendment process.
3. Describe the importance and process of the Agency Administrator Pre-Ignition Approval Checklist and the Prescribed Fire Go/No-Go Checklist.

Smoke Management Techniques (RX-410) Lesson Objectives

Unit 0 - Introduction

OBJECTIVES:

1. Discuss administrative requirements of the course.
2. Introduce instructors, course coordinator and students.
3. Present course objectives.
4. Explain course process and identify student expectations.
5. Discuss completed pre-course work assignments.
6. Explain course evaluation system.

Unit 1 - The **Smoke management** Challenge

Why are we here?

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Discuss, in general, the legal, social, safety reasons and challenges for managing **smoke**.
2. Discuss, in general, our need to use fire as an ecological tool and reduce hazardous fuels.
3. Discuss, in general, our need to be available to predict, monitor, and minimize the amount and impact of **smoke** produced from prescribed fire.
4. Discuss how having trained staff to manage **smoke** will determine our ability to retain prescribed fire as a land management tool.

Unit 2 - Leadership in **Smoke management**

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Discuss the relationship between leadership principles and **smoke management**.
2. Use the Incident Response Pocket Guide to define leadership and specific leadership tasks.

Unit 3 - Ecological and Historical Role of Fire

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Identify major differences between the pre-European settlement and post-European settlement fire regime periods in the United States as they relate to fire **emissions**.
2. Describe the need to reintroduce and maintain fire in fire dependent ecosystems and the resulting **smoke management** implications.
3. Describe the magnitude of prescribed fire occurrence and **emission** levels in the United States.
4. Describe current policies that govern fuels treatment and fire management.

Unit 4 - Characteristics of **Smoke** from Wildland Fire

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Describe the key compounds of **smoke** as a pollutant.
2. Identify **emission** factors for various chemical compounds, particle size distribution and possible air toxins.
3. Relate major concerns about **smoke** to its physical and chemical characteristics.

Unit 5 - **Smoke** Impacts

Lesson A - **Public health** Impacts

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. List three human health impacts of wildland fire **smoke** to the public.
2. Describe common concerns voiced by the public during **smoke** episodes.
3. Discuss the land manager's role in mitigating and/or minimizing health impacts.

Unit 5 - **Smoke** Impacts

Lesson B - Fire Personnel Impacts

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Discuss the impact of **smoke** exposure on fire personnel.
2. Describe different techniques to reduce fire personnel exposure.
3. Describe methods for evaluating fire personnel exposure to **smoke**.

Unit 5 - **Smoke** Impacts

Lesson C - Effects of **Smoke** on **Visibility**

OBJECTIVES:

Upon completion of this lesson, the student will:

1. Describe how **smoke** contributes to impaired **visibility** and regional **haze**.
2. Discuss how **visibility** impairment relates to the **Clean air act**, National **Visibility** Goals, and **Class I** areas.

Unit 5 - **Smoke** Impacts

Lesson D - Safety and Nuisance Impacts

OBJECTIVES:

Upon completion of this unit, students will be able to:

1. Define nuisance **smoke** impacts and list five examples.
2. List three public safety issues related to **smoke**.
3. Describe the current guidance for determining highway safety relative to **visibility**.
4. List three ways to monitor nuisance **smoke** impacts
5. List two ways to document nuisance **smoke** impacts.

Unit 5 - **Smoke** Impacts

Lesson E - Public Relations

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Identify public relation opportunities for **smoke management**.
2. Develop public contact contingency plans and coordinate with the media.
3. Discuss the importance of being knowledgeable and proactive about **smoke management** issues to establish credibility with the public and air regulatory agencies.

Unit 6 - Regulations

Lesson A - Legal Requirements for Managing **Smoke** from Wildland Fire

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Discuss the present and potential **air quality** legal requirements for managing **smoke** from wildland fire.
2. Define regional planning organization (RPO) and how their activities may impact the use of wildland fire.
3. Describe how to become effectively involved in the development of air quality regulations at a local level.

Unit 6 - Regulations

Lesson B - State **Smoke management** Programs

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Define the purpose of a state **smoke management** program.
2. Explain EPA's role in state **smoke management** programs.
3. Identify local **air quality** regulations and programs that impact prescribed fire operations.

Unit 7 - **Smoke management** Meteorology

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Define weather terms and concepts important to **smoke management**.
2. List three key weather factors that affect **smoke** behavior.
3. Verify **smoke** behavior forecasts using visual indicators and on-site measurements.
4. Describe the types of weather forecasts available and their limitations

Lesson 8A - **Fuel Consumption** and **Smoke** Production

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Describe the four phases of combustion.

2. Describe how different fuel characteristics affect combustion.
3. Describe how fuel moisture affects **consumption**.
4. Describe methods of estimating **fuel consumption**.
5. List five reasons why we need to estimate **emissions**.
6. Define an **emission** factor.
7. Predict **emissions** from wildland fires.

Unit 9 - **Smoke Emissions** and **Dispersion** Modeling

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Identify common **smoke emissions** and **dispersion** modeling systems available to help the fire practitioner plan for and communicate the impacts of **smoke**.
2. Describe the difference between **emission** production and **dispersion** models.
3. Describe the data and expertise needed to run **emissions** and **dispersion** models.
4. Identify which models are most appropriate for your area and application.

Unit 10 - Operational **Smoke management** Strategies

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. Define two general approaches to managing the impacts of wildland fire **smoke** (reduce **emissions** and redistribute **emissions**).
2. Discuss specific techniques within each approach and when they could be applied.
3. Discuss the tradeoffs between meeting planned objectives and applying **smoke management** strategies.

Unit 11 - **Smoke** Monitoring and Evaluation of Impacts

OBJECTIVES:

Upon completion of this lesson the student will be able to:

1. List reasons wildland fire managers monitor **smoke**.
2. Clarify and list specific **smoke** monitoring objectives.
3. Describe particulate and **visibility** monitors and their availability.
4. Locate **particulate matter** and **visibility** data available through the Internet.

Unit 12 - **Smoke management** Planning

Lesson A - NEPA Documentation

OBJECTIVE:

Upon completion of this lesson the student will be able to:

1. Discuss NEPA requirements in relationship to fire and **air quality**
2. List three criteria for identifying **air quality** as an issue in scoping.
3. Discuss a process to identify, describe, and quantify air impacts from prescribed fire and wildland fire use.

Unit 12 - **Smoke management** Planning

Lesson B - Incorporating **Smoke management** into a Burn Plan

OBJECTIVES:

Upon completion of this lesson the student will be able to:

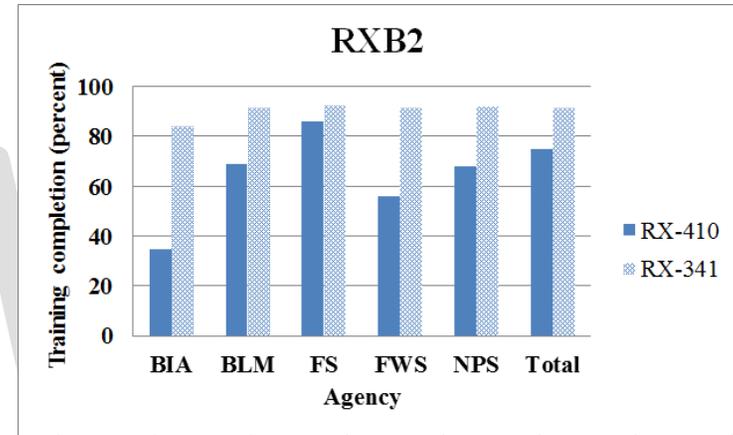
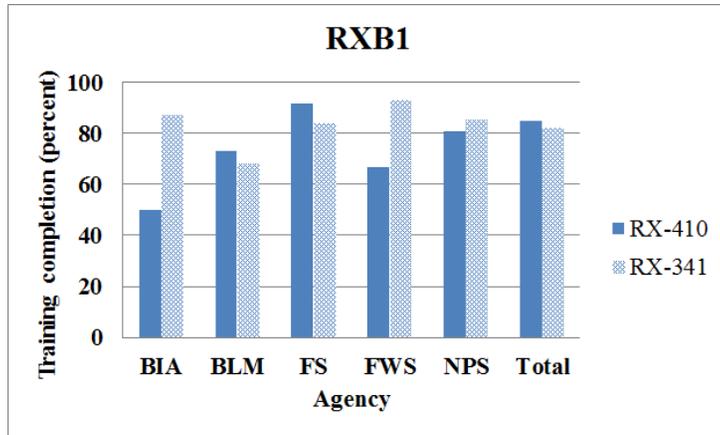
1. Describe how **smoke management** concerns are incorporated into a burn plan.
2. Describe how to integrate prescribed fire objectives and **smoke management** strategies to meet project objectives and minimize/mitigate **air quality** issues.
3. Identify the trigger points and contingency planning needed to mitigate impacts or terminate a burn due to **smoke**.

DRAFT

Appendix B – IQCS Queries by position

Prescribed Fire Positions [Queried 3 25 2011]

NOTE: Graphs show percent of personnel who have taken RX-410 and RX-341 by agency for each position. Percentages across all agencies, raw numbers, and trainee statistics for each position are displayed in the tables below each graph.



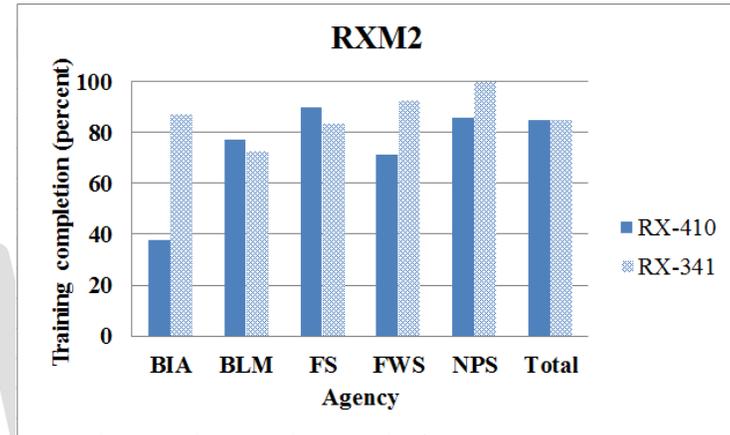
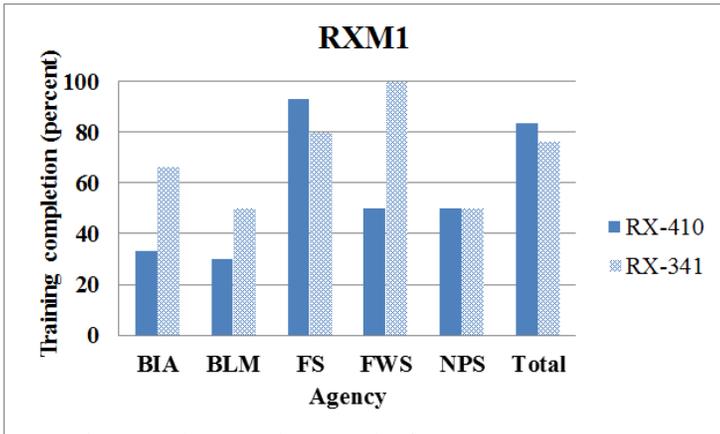
Position/training	RXB1	Rx410	Rx341	RXB1 Trainees	Rx410	Rx341
Percent	100%	85%	82%	100%	86%	92%
# of Personnel	254	216	209	202	173	185

RXB2	Rx410	Rx341	RXB2 Trainees	Rx410	Rx341
100%	75%	92%	100%	64%	81%
1,744	1,305	1,597	784	500	632

RXB1						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	8	4	7	4	1	4
BLM	41	30	28	38	24	32
FS	169	155	142	132	124	125
FWS	15	10	14	16	14	14
NPS	21	17	18	12	10	10
ALL	254	216	209	202	173	185

RXB2						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	129	45	109	40	10	25
BLM	282	194	258	190	86	140
FS	1013	869	936	474	376	404
FWS	168	94	154	37	15	32
NPS	152	103	140	43	13	31
ALL	1744	1305	1597	1597	500	784

Prescribed Fire Positions [Queried 3 25 2011]



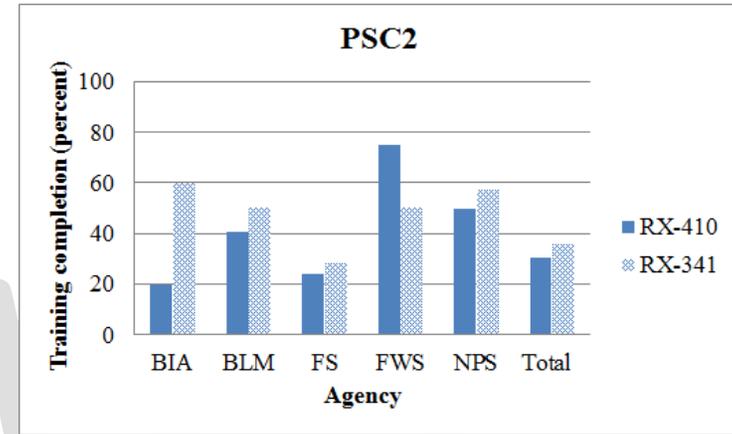
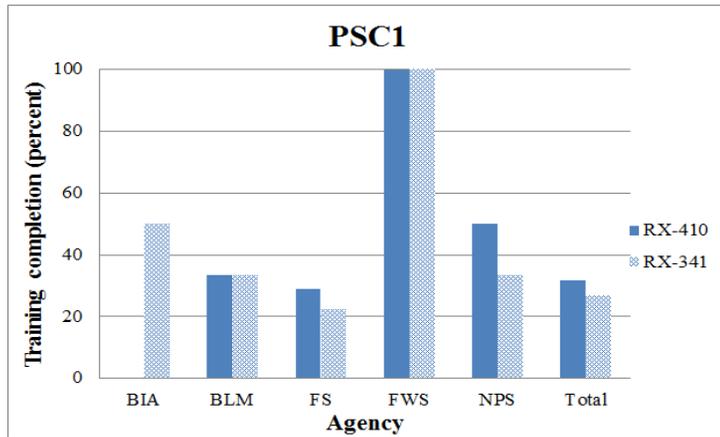
Position/training	RXM1	Rx410	Rx341	RXM1 Trainees	Rx410	Rx341
Percent	100%	83%	76%	100%	70%	59%
# of Personnel	102	85	78	96	67	57

RXM2	Rx410	Rx341	RXM2 Trainees	Rx410	Rx341
100%	85%	85%	100%	81%	86%
213	181	181	128	104	110

RXM1						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	3	1	2	3	2	3
BLM	10	3	5	13	4	6
FS	85	79	68	71	55	43
FWS	2	1	2	3	2	1
NPS	2	1	1	6	4	4
ALL	102	85	78	96	67	57

RXM2						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	8	3	7	6	4	5
BLM	22	17	16	22	17	17
FS	148	133	124	87	73	76
FWS	14	10	13	7	7	7
NPS	21	18	21	6	3	5
ALL	213	181	181	128	104	110

Planning Positions [Queried 3 25 2011]

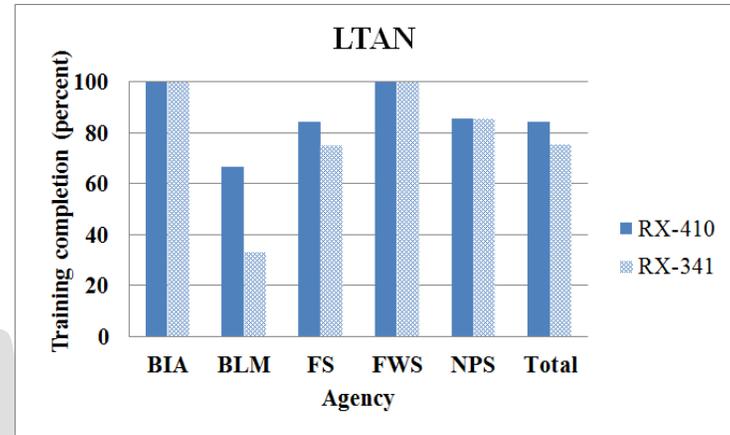
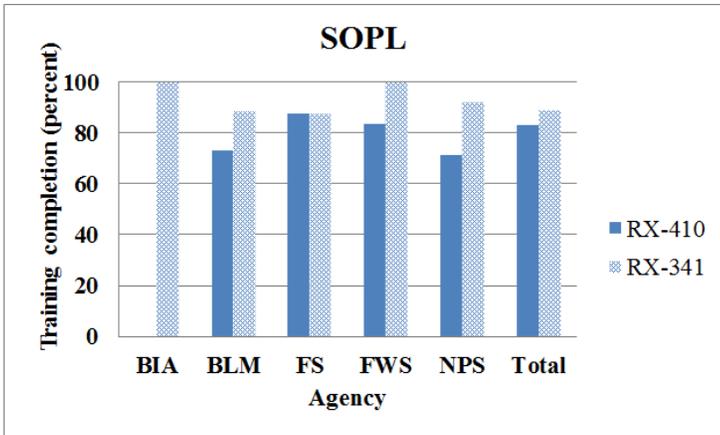


Position/training	PSC1	Rx410	Rx341	PSC1 Trainees	Rx410	Rx341
Percent	100%	32%	27%	100%	60%	70%
# of Personnel	60	19	16	10	6	7

PSC2	Rx410	Rx341	PSC2 Trainees	Rx410	Rx341
100%	30%	36%	100%	43%	47%
148	45	53	58	25	27

PSC1						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	2	0	1	0	0	0
BLM	6	2	2	7	3	4
FS	45	13	10	1	2	2
FWS	1	1	1	0	0	0
NPS	6	3	2	2	1	1
ALL	60	19	16	10	6	7

PSC2						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	5	1	3	4	0	0
BLM	22	9	11	18	7	7
FS	103	25	29	30	14	15
FWS	4	3	2	0	0	0
NPS	14	7	8	6	4	5
ALL	148	45	53	58	25	27

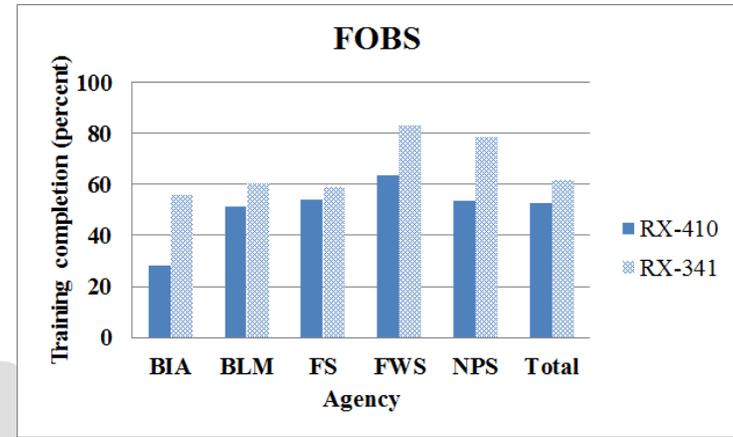
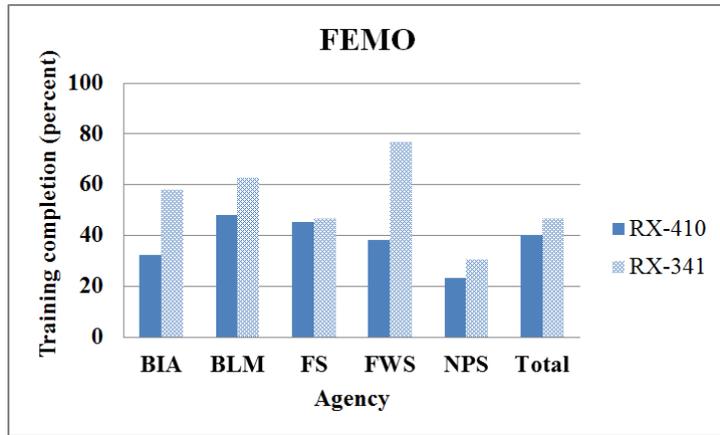


Position/training	SOPL	Rx410	Rx341	SOPL Trainees	Rx410	Rx341
Percent	100%	83%	89%	100%	87%	88%
# of Personnel	246	204	219	201	175	177

LTAN	Rx410	Rx341	LTAN Trainees	Rx410	Rx341
100%	84%	76%	100%	95%	82%
45	38	34	44	42	36

SOPL						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	1	0	1	2	1	2
BLM	26	19	23	34	25	27
FS	169	148	148	133	123	117
FWS	12	10	12	7	6	7
NPS	38	27	35	25	20	24
ALL	246	204	219	201	175	177

LTAN						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	1	1	1	3	3	1
BLM	3	2	1	2	2	1
FS	32	27	24	31	30	27
FWS	2	2	2	3	3	3
NPS	7	6	6	5	4	4
ALL	45	38	34	44	42	36

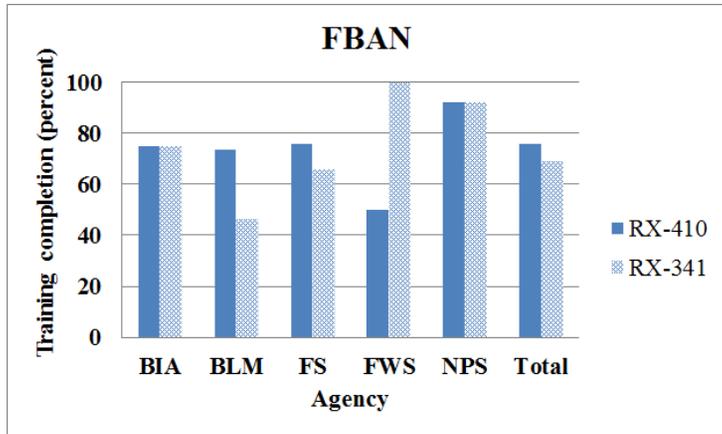


Position/training	FEMO	Rx410	Rx341	FEMO Trainees	Rx410	Rx341
Percent	100%	40%	47%	100%	23%	24%
# of Personnel	916	368	428	1,084	248	257

FOBS	Rx410	Rx341	FOBS Trainees	Rx410	Rx341
100%	53%	62%	100%	43%	48%
700	370	434	687	295	328

FEMO						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	31	10	18	40	5	11
BLM	112	54	70	146	29	43
FS	533	242	249	753	190	166
FWS	39	15	30	33	8	16
NPS	201	47	61	112	16	21

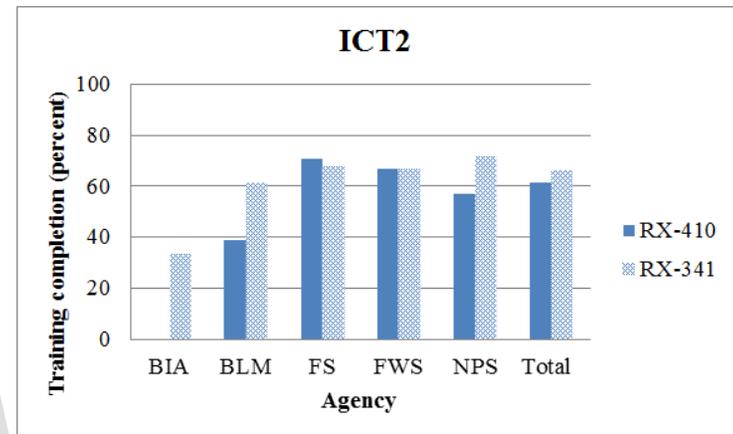
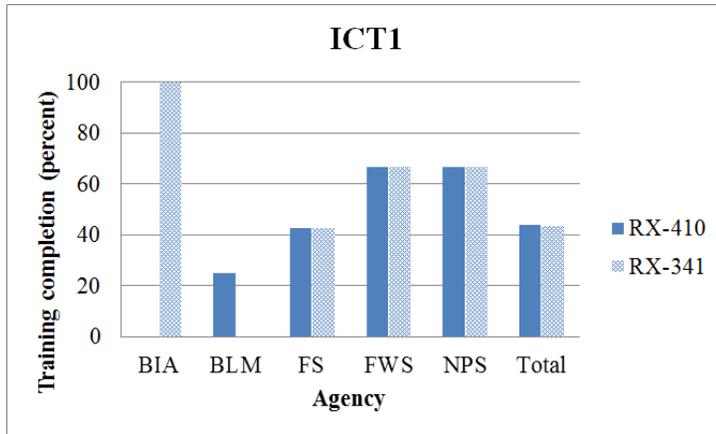
FOBS						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	25	7	14	33	3	12
BLM	121	62	73	102	32	52
FS	468	252	278	478	222	221
FWS	30	19	25	23	12	17
NPS	56	30	44	51	26	26



Position/training	FBAN	Rx410	Rx341	FBAN Trainee	Rx410	Rx341
Percent	100%	76%	69%	100%	88%	90%
# of Personnel	116	88	80	48	42	43

FBAN						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	8	6	6	1	0	1
BLM	15	11	7	7	6	7
FS	74	56	49	29	26	24
FWS	6	3	6	1	1	1
NPS	13	12	12	10	9	10
ALL	116	88	80	48	42	43

Command and General Staff Positions [Queried 3_25_2011]

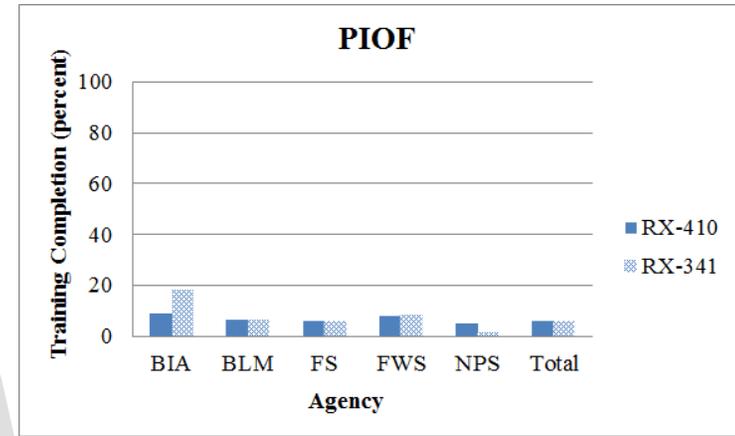
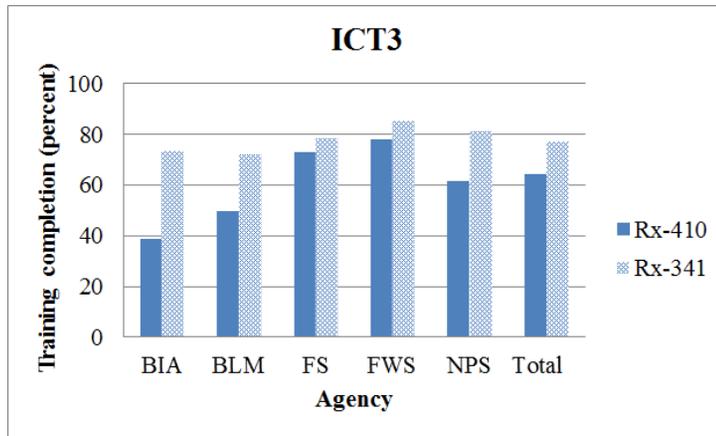


Position/training	ICT1	Rx410	Rx341	ICT1 Trainees	Rx410	Rx341
Percent	100%	44%	44%	100%	43%	57%
# of Personnel	32	14	14	14	6	8

ICT2	Rx410	Rx341	ICT2 Trainees	Rx410	Rx341
100%	61%	66%	100%	74%	78%
109	67	72	73	54	57

ICT1						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	1	0	1	1	0	0
BLM	4	1	0	3	0	2
FS	21	9	9	8	5	5
FWS	3	2	2	0	0	0
NPS	3	2	2	2	1	1
ALL	32	14	14	14	6	8

ICT2						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	3	0	1	2	1	2
BLM	18	7	11	15	8	10
FS	68	48	46	44	40	36
FWS	6	4	4	7	3	5
NPS	14	8	10	5	2	4
ALL	109	67	72	73	54	57

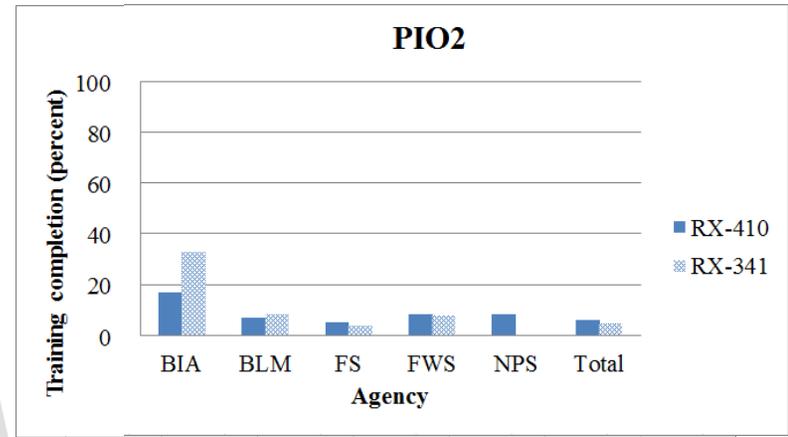
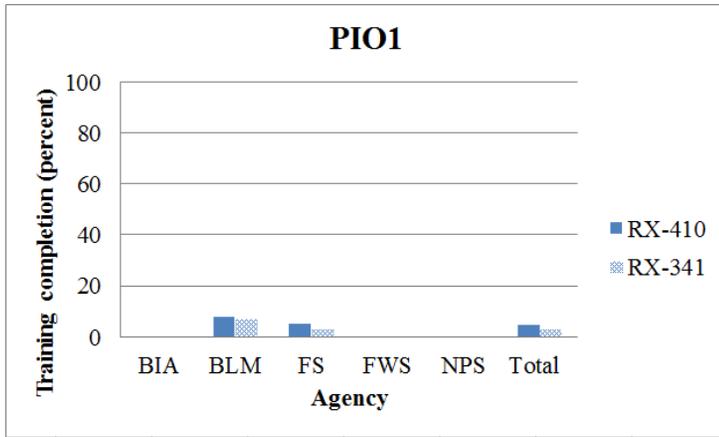


Position/training	ICT3	Rx410	Rx341	ICT3 Trainees	Rx410	Rx341
Percent	100%	64%	77%	100%	60%	74%
# of Personnel	1,326	854	1,022	774	463	569

PIOF	Rx410	Rx341	PIOF Trainees	Rx410	Rx341
100%	6%	6%	100%	4%	5%
629	38	35	718	27	33

ICT3						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	90	35	66	36	6	21
BLM	323	161	233	168	65	105
FS	773	563	607	501	354	383
FWS	54	42	46	30	18	28
NPS	86	53	70	39	20	32
ALL	1326	854	1022	774	463	569

PIOF						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	11	1	2	24	2	3
BLM	81	5	5	99	7	7
FS	433	26	25	479	15	18
FWS	25	2	2	26	2	2
NPS	79	4	1	90	1	3
ALL	629	38	35	718	27	33



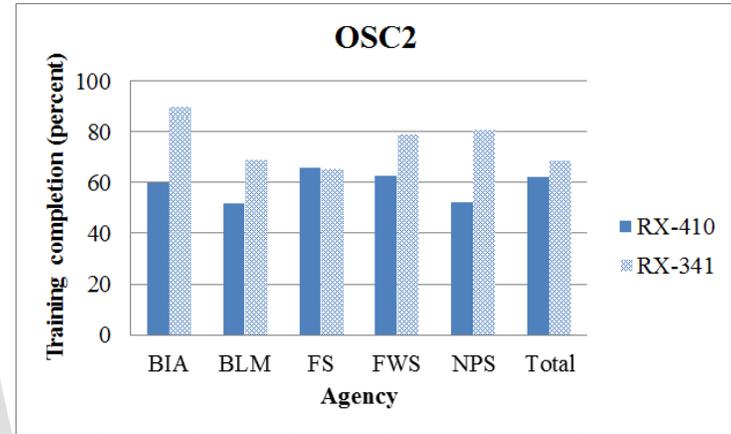
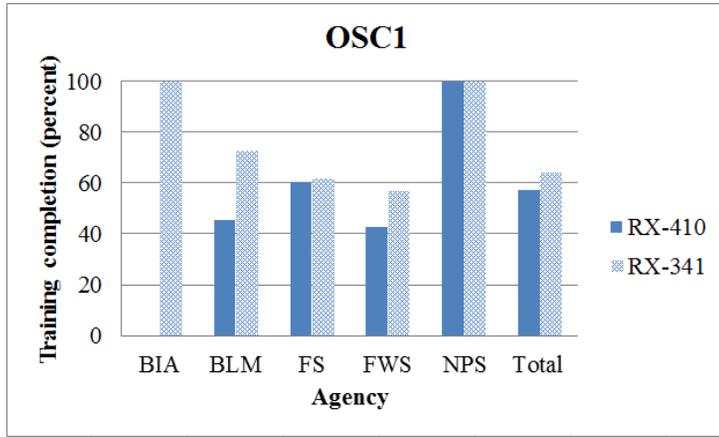
Position/training	PIO1	Rx410	Rx341	PIO1 Trainees	Rx410	Rx341
Percent	100%	5%	4%	100%	8%	10%
# of Personnel	83	4	3	60	5	6

PIO2	Rx410	Rx341	PIO2 Trainees	Rx410	Rx341
100%	6%	5%	100%	7%	10%
353	21	19	224	15	23

PIO1						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	0	0	0	0	0	0
BLM	13	1	1	10	1	2
FS	62	3	2	39	3	3
FWS	1	0	0	4	0	1
NPS	7	0	0	7	1	0
ALL	83	4	3	60	5	6

PIO2						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	6	1	2	3	0	0
BLM	57	4	5	40	5	4
FS	242	12	11	148	9	15
FWS	12	1	1	6	0	0
NPS	36	3	0	27	1	4
ALL	353	21	19	224	15	23

Operations and Other Positions [Queried 3 25 2011]



Position/training	OSC1	Rx410	Rx341	OSC1 Trainees	Rx410	Rx341
Percent	100%	57%	64%	100%	68%	76%
# of Personnel	84	48	54	34	23	26

OSC2	Rx410	Rx341	OSC2 Trainees	Rx410	Rx341
100%	62%	69%	100%	45%	83%
369	230	253	231	173	192

OSC1						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	1	0	1	0	0	0
BLM	11	5	8	4	2	3
FS	63	38	39	24	17	17
FWS	7	3	4	3	3	3
NPS	2	2	2	3	1	3
ALL	84	48	54	34	23	26

OSC2						
agency	Total	RX-410	RX-341	Trainee	RX-410	RX-341
BIA	10	6	9	12	7	9
BLM	58	30	40	47	25	40
FS	256	168	168	155	129	130
FWS	24	15	19	6	6	6
NPS	21	11	17	11	6	7
ALL	369	230	253	231	173	192