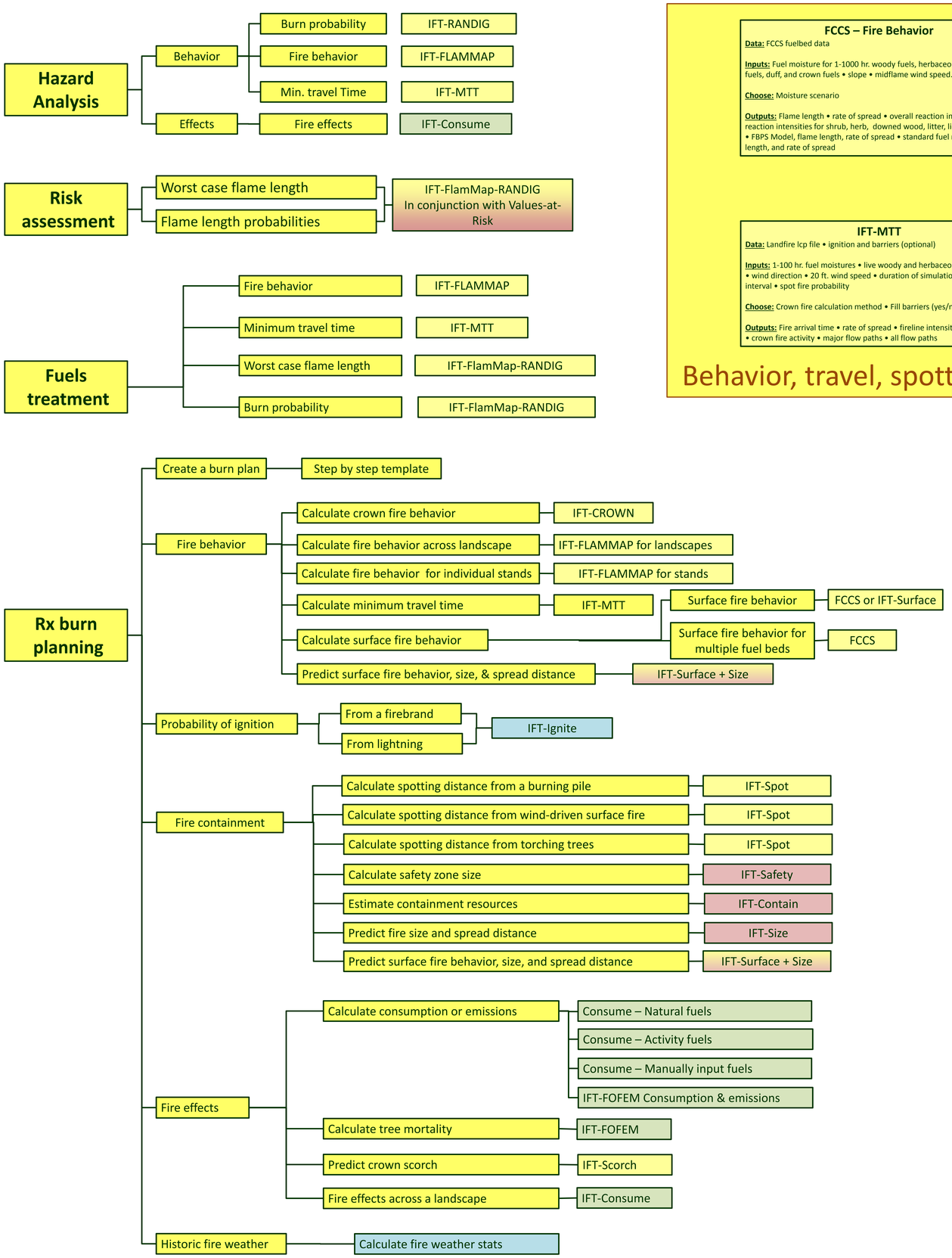
IFTDSS Workflows



FCCS – Fire Behavior

Data: FCCS fuelbed data

Inputs: Fuel moisture for 1-1000 hr. woody fuels, herbaceous fuels, shrub fuels, duff, and crown fuels • slope • midflame wind speed.

Choose: Moisture scenario

Outputs: Flame length • rate of spread • overall reaction intensity • reaction intensities for shrub, herb, downed wood, litter, lichen , and moss • FBPS Model, flame length, rate of spread • standard fuel model, flame length, and rate of spread

IFT-Crown

Data: User supplied inputs for a specified number of scenarios, no data set needed.

Inputs: Canopy height • fuel moisture for 1-100 hr. fuels, live woody fuels, and foliar fuels • heat per unit area • canopy base height • flame length • canopy bulk density • 20 ft. wind speed • time elapsed

Choose: N/A

Outputs: Critical surface intensity and flame length • transition ratio • fire type • active ratio • active crown fire • transition to crown fire • crown rate of spread • critical crown rate of spread • crown spread distance • crown fire area, perimeter, and length to width ratio • crown fireline intensity • crown flame length • power of the fire • power of the wind • power ratio • wind-driven fire • crown load • canopy heat per unit area • crown fire heat per unit area.

IFT-FlamMap (for landscapes & stands)

Data: NA (stand) , Landfire lcp (landscape)

Inputs: 1-1 00 hr. fuel moistures • live herbaceous and woody fuel moistures • wind direction • 20 ft. wind speed. For stand level predictions the following are also needed: • canopy coverage and height • canopy base height • canopy bulk density • slope • elevation • aspect

Choose: Crown fire calculation • Fire behavior model (for stand level predictions)

Outputs: Flame length • rate of spread • fireline intensity • heat per unit area • crown fire activity • mid-flame wind speed • horizontal movement rate • direction of maximum spread

IFT-FlamMap-RANDIG

Data: Landfire lcp

Inputs: 1-100 hr. fuel moistures • live herbaceous and woody fuel moisture • wind direction • 20 ft. wind speed.

Choose: Crown fire calculation method • number of ignitions to simulate • duration of simulation

Outputs: Burn probability at low, medium, high, and very high flame lengths • overall burn probability

IFT-MTT

Data: Landfire lcp file • ignition and barriers (optional)

Inputs: 1-100 hr. fuel moistures • live woody and herbaceous fuel moistures • wind direction • 20 ft. wind speed • duration of simulation • travel path interval • spot fire probability

Choose: Crown fire calculation method • Fill barriers (yes/no)

Outputs: Fire arrival time • rate of spread • fireline intensity • flame length • crown fire activity • major flow paths • all flow paths

IFT-Scorch

Data: N/A

Inputs: Wind speed • air temperature • flame length

Choose: N/A

Outputs: Scorch height

IFT-Spot (for burning piles and torching trees)

Data: N/A

Input: Downwind canopy height • 20 ft. wind speed • ridge to valley elevation difference and horizontal distance. For Piles Flame height from burning pile is also needed. For torching trees, torching tree height, DBH, and number of trees torching is also needed

Choose: Spotting source location. For torching trees also choose tree species.

Output: Spotting distance • cover height • firebrand height • flat terrain spotting distance. Outputs from torching trees also include: steady state flame height and duration, and tree height/flame height ratio

IFT-Surface

Data: N/A

Inputs: 1-100 hr. fuel moisture • aspect • elapsed time • slope • live woody and herbaceous fuel moistures, midflame wind speed, wind direction

Choose: Fire behavior model • Flanking direction

Outputs: Head, backing, and flank fire spread rates • heat per unit area • fireline intensity for head, backing, and flanking fires • flame length for head, backing and flanking fires • reaction intensity • head, backing, and flanking spread directions • head backing and flanking spread distance • residence time • effective wind speed.

Behavior, travel, spotting, scorching, & crowning

Consume –Manually populated (Activity and Natural fuels)

Data: N/A

Inputs: Duff: moisture, upper & lower percent cover, lower depth • litter: depth and cover • herb & shrub: primary and secondary layer percent live, total loading, percent shrub blackened by fire • woody fuels: total loading for all, moisture for 10 hr. (activity fuels only) and 1000 hr. and moisture source for 1000 hour • canopy percent modified by heat/flames • other fuels: lichen & moss depth and percent cover, loading for squirrel middens, stumps, trees, snags, ladder fuels • length of ignition midflame wind speed • slope • veg. features • days since rain • cover type

Choose: Ecoregion • emission factor group • consumption equation (natural fuels only)

Outputs: Preburn loading: canopy, shrubs, herbaceous, downed wood, litter lichen moss, ground fuel • Total consumption: fuelbed, canopy, shrubs, herbaceous, downed wood, litter lichen and moss, ground fuels • Total emissions: PM, PM_{10}, $PM_{2.5}$, CO, CO_2, CH_4, NMHC • Total Heat Released: fuelbed total, canopy, shrub , herbaceous, downed wood, litter lichen and moss, ground fuels

Consume – Activity & Natural Fuels

Data: FCCS fuelbed

Inputs: Days since rain • duff, & 1000 hr. woody fuel moistures • percent canopy modified by heat/flames • percent of shrub blackened by fire. For activity fuels also need length of ignition, and 10 hr. fuel moisture.

Choose: Emission factor group • consumption equation (for natural fuels only)

Outputs: Preburn loading: canopy, shrubs, herbaceous, downed wood, litter lichen and moss, ground fuel • Total consumption: fuelbed, canopy, shrubs, herbaceous, downed wood, litter lichen and moss, ground fuels • Total emissions: PM, PM_{10}, $PM_{2.5}$, CO, CO_2, CH_4, NMHC • Total Heat Released: fuelbed total, canopy, shrub , herbaceous, downed wood, litter lichen and moss, ground fuels

IFT-Consume

Data: FCCS fuelbed dataset (uploaded from LANDFIRE)

Inputs: Duff and 1000 hr. fuel moisture • percent canopy modified by heat/flames • percent shrub blackened by fire

Choose: Consumption equation • emission factor group

Outputs: Consumption of total fuel, canopy, shrub, herbaceous, total woody, litter, duff, total surface, sound woody, fine woody (0-3 in. diameter), coarse sound woody (over 3 in. diameter), coarse rotten woody • release of flaming heat, smoldering heat, and total heat • emission of PM_{10}, $PM_{2.5}$, CO, CO_2, CH_4, non-methane hydrocarbons.

IFT-FOFEM for consumption & emissions

Data: Digital photo series can be selected to provide the following data which the user may later edit:

Inputs: Duff depth • percent crown burn •10 and 100 hr. woody fuel moistures • duff fuel moisture • loading for: crown foliage, crown branches, herbaceous fuels, litter, duff, shrubs, 1-1000 fuels

Choose: Duff moisture method • region • season • fuel category • cover group

Outputs: Emissions of: PM_{10}, $PM_{2.5}$, CO, CO_2, CH_4, No_x, SO_4 • mineral soil exposed • postfire duff depth • duff depth consumed • postfire loading and consumption for: 1-1000 woody fuels, crown foliage, crown branches, herbaceous fuels, litter, duff, shrubs

IFT-FOFEM for tree mortality

Data: Digital photo series can be selected to provide the following inputs:

Inputs: Tree species and height • scorch height • stand density • crown ratio • diameter at breast height • flame length

Choose: Calculate mortality based on flame length or scorch height

Outputs: pre and post-fire tree density, canopy cover, and basal area • percent mortality • trees killed per acre

Consumption, Emissions, & Tree Mortality

IFT-FireFamilyPlus

Data: N/A

Inputs: Start and end date

Choose: State and monitoring site

Outputs: Displays month, day, number of years, mean, standard deviation, yearly maximum and minimum, and historic percentiles for: temperature • max and min. temperature • wind direction • relative humidity • max. and min. relative humidity • solar radiation • wind speed • precipitation amount and duration • herbaceous and shrub greenness factors • 1-1000 woody fuel moisture • herbaceous fuel moisture • live woody fuel moisture • KBDI • ignition component • energy release component • flame length • fire intensity • burning index • rate of spread

IFT-Ignite (for firebrands and lightning)

Data: N/A

Inputs: For firebrands: 1-hr. moisture, air temperature, fuel shading from the sun. • For lightning: duff and litter depth, 100 hr. fuel moisture.

Choose: For lightning: Lightning ignition fuel type, lightning strike type

Outputs: Probability of ignition

Ignition & Weather

IFT-Contain

Data: User supplied inputs for a specified number of scenarios, no dataset needed

Inputs: Surface rate of spread, fire size at report, resource duration, length to width ratio, resource line production rate, resource base cost, line construction offset, resource arrival time, resource hourly cost.

Choose: Suppression tactic

Outputs: Fire area at initial attack, time from report, number of resources used, perimeter at initial attack, contained area, cost of resources used, containment status, fireline constructed.

IFT-Safety

Data: N/A

Inputs: Flame length • number of personnel • area per person • number of heavy equipment • area per heavy equipment

Choose: N/A

Outputs: Safety zone separation distance, size, and radius

IFT-Size

Data: NA

Inputs: Effective wind speed • elapsed time • surface rate of spread

Choose: none

Outputs: Area • length to width ratio • fire length • perimeter • forward and backing spread distance • maximum fire width.

Values-at-Risk

Data: User-created polygons

Choose: Value of each polygon/resource

Outputs: Net value change given the probability and severity of a fire.

Management, containment, safety, size